

# Burnt Bridge Creek Partnership

## Stormwater and Capital Improvements Workgroup

### Meeting Summary – May 3, 2021



Please complete this [Doodle Poll](#) to find a time for the next Burnt Bridge Creek Partnership Meeting.

## Background

The Burnt Bridge Creek Partnership kicked off in February 2021 to develop a TMDL Alternative Restoration Plan for the Burnt Bridge Creek watershed, which is also known as a “Water Cleanup Plan.” After the kickoff meeting, the City of Vancouver established implementation workgroups for different priorities in the watershed. The workgroups include Sewer Connection and Septic Systems, Urban Forestry and Greenways, Stormwater and Capital Improvements, Operations and Maintenance, and Public Education and Outreach.

## Stormwater and Capital Improvements Workgroup

The Burnt Bridge Creek Stormwater and Capital Improvements Workgroup met on May 3, 2021 from 10:30 a.m. – 12:00 p.m. The purpose of this workgroup was to provide input on priorities for stormwater and capital improvements in Burnt Bridge Creek to support development of the *Burnt Bridge Creek Water Cleanup Plan*. The objective of the first workgroup meeting was to review priority locations for water quality improvement from the [Burnt Bridge Creek Source Assessment](#), and to begin outlining implementation priorities using the [Stormwater and Capital Improvements Worksheet](#).

Discussion topics included stormwater retrofit opportunities, property acquisition, illicit discharge detection and elimination, source control, construction stormwater and erosion control, and ERTS response and enforcement. As a next step, Ecology TMDL staff will have a meeting with the City of Vancouver’s stormwater permit manager and grants staff to learn more about the City’s implementation of Municipal Stormwater Permit requirements. The [agenda](#) and [presentation](#) from the workgroup meeting is available online.

## Next steps

The full Burnt Bridge Creek Partnership will meet in July 2021. The purpose of this meeting will be to review what was discussed at each of the Burnt Bridge Creek workgroups and to present some priorities for long-term implementation.

## Land use and land ownership

The Burnt Bridge Creek watershed is located in the City of Vancouver. The City of Vancouver is the primary jurisdiction in the watershed, and Clark County has some jurisdiction in northern portions of the watershed, mostly in Cold Creek. The Washington Department of Transportation (WSDOT) also has jurisdiction on state roads, which includes interstate 5 (I-5), Interstate 205 (I-205), and State Road 500 (SR 500). Only 11 percent of the land in Burnt Bridge Creek is publicly owned. Vancouver is the largest public landowner, owning 44 percent of the total public land. Clark County owns 10 percent of public land, and WSDOT owns 3 percent. The primary land use in the watershed is residential, with approximately 44 percent of the total watershed consisting of residential land uses. In total, approximately 89 percent of the watershed is privately owned.

The watershed can be divided into three parts, which includes the lower, middle, and upper watershed. The lower watershed is located between river miles 0 and 5. The lower watershed is 45 percent residential, 29 percent roads, and 7 percent commercial, manufacturing, and mining land uses. Vancouver, Clark County, and WSDOT have shared stormwater jurisdiction in the lower watershed. The middle watershed includes river miles 5 to 10. The middle watershed is 45 percent residential, 24 percent roads, and 15 percent commercial, manufacturing and mining. Most of the stormwater jurisdiction is the City of Vancouver, but there is some Clark County and WSDOT jurisdiction. The upper watershed is river miles 10 to 13. The upper watershed is 43 percent residential, 21 percent roads, and 11 percent commercial, manufacturing, and mining. City of Vancouver and Clark County share stormwater jurisdiction in the upper watershed.

## NPDES Permits

### Western Washington Municipal Stormwater Permit

The Western Washington Municipal Stormwater Permit requires local governments to manage and control stormwater runoff so that it does not pollute downstream waters. In the Burnt Bridge Creek watershed, there are three municipal stormwater permittees. Clark County has a Phase 1 stormwater permit, which regulates discharges in the most highly populated areas of the state. The City of Vancouver has a Phase 2 permit, which is implemented in jurisdictions with over 10,000 residents. The Washington Department of Transportation also implements the municipal stormwater permit on state roads.

Stormwater program elements include stormwater planning, mapping and documentation, illicit discharge detection and elimination, operations and maintenance, runoff and flow controls for development, source control for existing development, structural stormwater controls, and public education and outreach.

The City of Vancouver's Municipal Stormwater Permit (MS4 Permit) covers approximately 70 percent or 13,030 acres of the Burnt Bridge Creek watershed. In addition to the MS4 permit, there are two Industrial NPDES Individual Permits, and eleven Industrial Stormwater General Permits in the watershed. At the time of the Source Assessment, there were approximately 90 construction stormwater general permits in the watershed.

## Water quality priorities

The Burnt Bridge Creek Watershed is on the Washington State's Polluted Waters List (303d list) for bacteria, dissolved oxygen, temperature, and pH impairments. The following is a summary of

impairments from the *Burnt Bridge Creek Source Assessment*. A full [summary of water quality impairments](#) from the *Burnt Bridge Creek Source Assessment* is available online.

### **Bacteria**

Peterson Channel, Cold Creek, and Burton Channel are the top priorities for bacteria reduction, as well as river miles (RM) 8.4, 2.6, and 1.6. All of these areas have bacteria geometric means over 200 cfu/100ml during the dry season. This is almost double the state water quality standard for fecal coliform at the time of this study, which was a geometric mean of 100 cfu/100ml. All of these locations need bacteria reductions of over 75 percent to meet water quality standards.

The second priority is all areas that need bacteria reductions of over 75 percent in the wet or dry seasons to meet water quality standards. These include Peterson Channel in the wet and dry seasons, Burton Channel in the wet season, Cold Creek and river mile 8.4 in the dry season, and river miles 7, 4.3, 3.4, 2.6, and 1.6 in the wet season.

The third priority are all areas that have geometric means over 100 cfu/100ml. These include river miles 10.4, 8, 5.9, 5.2, and 3.4.

Overall, the middle and lower watershed are the highest priorities for bacteria reduction. The presence of dry season bacteria can indicate a direct source of bacteria from an illicit discharge or illicit connection, a sewer pipe that needs maintenance or repair, a failing septic system, or direct access of livestock or pets to the river. The presence of wet season bacteria may indicate that stormwater runoff is facilitating the movement of bacteria into surface water. Wet season bacteria may also indicate challenges with infiltration and inflow in the sewer system.

### **Temperature and Dissolved Oxygen**

In the Burnt Bridge Creek Watershed, river mile (RM) 0 had the highest maximum water temperatures recorded in the *Source Assessment*, with 92 percent of days exceeding water quality criteria for temperature. The temperature water quality standard for the Burnt Bridge Creek watershed is 17.5 degrees Celsius to support salmonid spawning, rearing, and migration. In addition to RM 0, river miles (RM) 5.9 and 7.0 in the middle watershed had the most number of days above criteria, with RM 7 not meeting temperature standards 230 days out of the year, and RM 5.9 not meeting standards for 222 days. Sites with the most noncompliant days for dissolved oxygen are located in the upper watershed from RM 9.5 to 11.4, and in the middle watershed at river miles 7.0 and 5.9.

Increasing tree canopy in riparian areas provides important shade, which helps cool down Burnt Bridge Creek and its tributaries, by reducing the amount of sunlight that can warm up the river. Reducing warm water temperatures may also help improve dissolved oxygen levels in the watershed, as warm water can cause decreased dissolved oxygen. Increasing urban tree canopy in upland areas throughout the watershed also has the potential to help manage stormwater runoff and promote groundwater infiltration, to restore streamflow to the creek.

### **Shade deficit analysis**

A shade deficit of the mainstem of Burnt Bridge Creek was completed in the *Burnt Bridge Creek Source Assessment* to identify priority locations for tree planting projects. Overall, the upper watershed located between RM 10 to 13 had the highest average shade deficits in the watershed, followed by the middle watershed located between RM 5 to 10. The following table summarizes results from the shade deficit analysis. More information is included in the *Burnt*

Bridge Creek Source Assessment and in the meeting summary for the Urban Forestry and Greenways workgroup.

Table 1. Average shade deficits in Burnt Bridge Creek watershed.

Portion of Watershed	Average shade deficit
Upper watershed: RM 10-13	62 percent
Middle watershed: RM 5-10	39 percent
Lower watershed: RM0-5	27 percent

A shade deficit analysis was not completed for the Burnt Bridge Creek tributaries, which include Cold Creek, Peterson Channel, and Burton Channel. Completing a survey and analysis of these tributaries will be important to support future restoration.

### pH

Overall, most sites in the Burnt Bridge Creek watershed met standards for pH. River mile 0 had the most noncompliant days. Rivers miles 8.8, 8, 5.2, and Peterson Channel met criteria for pH. The minimum and maximum pH values measured were located in Burton Channel. In areas where the watershed is not meeting pH standards, Vancouver should prioritize implementation of construction stormwater inspections and erosion control BMPs to areas with pH exceedances. Additionally, efforts to reduce pollutant loading from stormwater and to increase riparian vegetation can also positively impact pH.

### Vancouver Watershed Health Assessment

In addition to Ecology's water quality assessment, the City of Vancouver contracted with Herrera Environmental Consultants to complete the [Vancouver Watershed Health Assessment in February 2019](#). This report confirmed that the most significant water quality decline from 2004-2007 and from 2011-2017 is located at river miles 8.4, 7.0, and 5.9, and at the confluence of Peterson Channel with Burnt Bridge Creek. This data is consistent with Ecology's *Source Assessment*, and confirms that the middle watershed is a top priority for implementation. Generally, pH has increased at all sites measured.

### Ecology Funding for Stormwater Implementation

The Department of Ecology has funded multiple stormwater in the Burnt Bridge Creek Watershed through the Water Quality Combined Funding Program's Stormwater Financial Assistance Program. With Ecology's support, the following projects have been implemented in the Burnt Bridge Creek watershed since 2014.

- **Vancouver Brookside Operations Stormwater Retrofit (2015-2018)** – The City of Vancouver protected water quality in Burnt Bridge Creek through the installation of cartridge media filters, infiltration trenches, and oil-water separators at the Central Operations Center in the City of Vancouver. This project provided treatment for total suspended solids and oil, and reduces stormwater flows to Burnt Bridge Creek by increasing stormwater infiltration. Additional benefits of this project include abandoning drywells in the operations yard that do not meet requirements. The total project cost was \$542,430.00.
- **Vancouver Country Club Phase A Retrofits (2015-2019)** – The City of Vancouver is improving water quality in the Burnt Bridge Creek watershed through installation of a

StormFilter® vault using PhosphoSorb® Media cartridges in the Country Club Village subdivision in the City of Vancouver. This project provides treatment for total suspended solids and (TSS) and total phosphorus. Additional benefits include construction of new stormwater conveyance lines that convey overflows to an existing regional detention facility. The total project cost was \$501,0149.69

- **Vancouver Phase III Peterson Channel Residential Low Impact Development (2015-2019)** – The City of Vancouver implemented a project to improve water quality in Peterson Channel through installation of bioretention facilities in the Oakbrook neighborhood in the Burnt Bridge Creek Watershed. This project provides treatment for total suspended solids (TSS), dissolved copper, dissolved zinc, and total phosphorus, and reduces flows to Peterson Channel by increasing stormwater infiltration. Additional benefits of this project include adding vegetation and improved aesthetic to a neighborhood right of way. The total project cost was \$212,649.92
- **Vancouver Private Stormwater Facility Inspection Program (2015-2018)** – The City of Vancouver will help prevent oils, chemicals, metals, and sediment from entering surface water and groundwater by initiating a private stormwater facility inspection program to remove pollutants from the stormwater system and implement pollutant source control activities. The total project cost was \$85,000.
- **NE 162nd Ave. WQ Treatments (2015-2019)** – The City of Vancouver is improving water quality in Burnt Bridge Creek through the installation of a cartridge media filter and bioretention facility on NE 162nd Avenue in the City of Vancouver. This project provides treatment for total suspended solids (TSS), dissolved copper, dissolved zinc, and total phosphorus, and reduces flows to Burnt Bridge Creek by increasing stormwater infiltration. The total project cost was \$147,600.00.

## Notes from workgroup meeting on May 3, 2021

Ecology hosted the first Stormwater and Capital Improvements workgroup meeting on May 3, 2021. Kris Olinger, Nikki Guillot, Dan Swenson, and Annette Griffy attended the workgroup on behalf of the City of Vancouver. Devan Rostorfer, Lawrence Sullivan, and Molly Gleason represented the Department of Ecology. The following are notes from the May meeting.

### **Implementation: assessments, activities, and retrofits**

The City of Vancouver has leveraged many Stormwater Financial Assistance Program (SFAP) grants to implement stormwater work in the Burnt Bridge Creek watershed. Grant funding has provided essential funding to the City, as Vancouver's City Council placed a 5 percent limit on the ability to raise utility rates, which is the primary source of funding for municipal stormwater. Currently, Vancouver has approximately 17 grants for stormwater implementation. These include assessment and studies, stormwater activities, and facility retrofit projects. Vancouver also has a grant through the Lower Columbia Fish Recovery Board, which is evaluating stormwater outfall conditions in Burnt Bridge Creek. The goal is to have a list of priority outfalls to implement improvements, as well as conceptual designs for priority outfall areas. The project will not only look at the conditions of outfalls, it will also make recommendations for instream habitat improvements in the creek, as well as recommendations for improvements to drainage areas contributing to the outfalls.

Overall, Vancouver has been completing stormwater assessments in Burnt Bridge Creek on a subbasin-by-subbasin basis. Peterson and Burton Channel are two assessment projects that are underway, which have looked at stormwater retrofit opportunities in the subbasins. Peterson Channel has benefited from significant stormwater implementation through a series of grants. Overall, Vancouver has implemented four SFAP grants in the Peterson Channel subbasin, which have included road retrofits, low impact development implementation, and monitoring. However, there are still areas in Peterson Channel that provide opportunities for stormwater retrofits, including an area that receives runoff from the Washington Department of Transportation's I-205 drainage.

As of now, the retrofit opportunities identified through the subbasin assessments have not been incorporated into Vancouver's Capital Improvement Plans (CIP) for stormwater projects. The goal is to incorporate projects identified during the subbasin studies into the long-term CIP for Vancouver.

### **Illicit Discharge Detection and Elimination (IDDE)**

Illicit Discharge Detection and Elimination (IDDE) activities are required through the City of Vancouver's stormwater permit. IDDE implementation has historically been focused on completing business inspections as the highest priority. Vancouver also has focused IDDE efforts on drinking water resource protection areas, and businesses generating liquid waste. Vancouver utilizes established IDDE guidance manuals to identify visual and odor indicators of illicit discharges. They are also incorporating some IDDE work into the outfall condition assessment funded by LCFRB.

Each year, Vancouver focuses on one subbasin for IDDE work, and builds data from IDDE efforts into an asset management system. To implement IDDE programming, the City completes dry weather screening of outfalls, but water quality monitoring and source tracing is rarely utilized as an IDDE tool to track potential sources upstream in the stormwater system from outfalls to manholes. Cross connections are usually found by visible or odor indicators, or through the City's infrastructure televising program completed by the sewer department.

On average, Vancouver estimates it response to and investigates 100 to 150 complaints each year. Some complaints may be related to illicit discharges and cross connections. However, in the past, Vancouver has mostly identified cross connection challenges where downspouts were incorrectly connected to sewer. Remodels and home additions are also common situations where downspouts are connected to sewer, resulting in an illicit cross connection. Vancouver eliminates any cross connection it identifies through enforcement. The stormwater team works with the sewer department throughout the correction process.

If an illicit connection is found, there is no financial assistance available from the stormwater department to correct the issue, but sometimes the sewer department has provided financial support to landowners. Developing financial assistance resources to support the removal of cross connections may be helpful to support IDDE implementation.

One suspected challenge with cross connections is that plumbers that work in Vancouver may also work in Portland, which is a city that has a combined sewer system where there is one pipe for sewer and stormwater. Because Vancouver has a separate stormwater and sewer system, this can result in misunderstanding and improper installation of plumbing. Developing training for contractors and plumbers on proper installation of infrastructure may help prevent future challenges.



As of now, the City does not have a formal pre-occupancy screening process to confirm that sewer and stormwater connections are properly installed before a new home is occupied. However, construction inspectors do oversee infrastructure installation during construction, and business inspectors' check after construction is complete. Developing a pre-occupancy process to confirm sewer is connected appropriately, such as dye testing, may help prevent future cross connections. Overall, the City of Vancouver did express that there is an opportunity to align and prioritize IDDE implementation in areas with greater bacteria issues; however, the city does not currently prioritize areas with bacteria pollution issues for IDDE work.

## **Source Control**

With new source control requirements in the Phase II Municipal Stormwater Permit, Vancouver is expanding its IDDE and source control program focus from prioritizing businesses, to prioritizing every property with a parking lot. Within the source control program development process, Vancouver is currently focused on source control inventory development, and recently purchased an ESRI package to support Vancouver in developing the inventory.

To support inventory development, the City plans to conduct a windshield survey of properties with the "potential to pollute" to document any pollution issues observed in the field. The city estimates that there are approximately 8,200 businesses that will be included in the windshield survey. During the survey, they are looking for sources of pollution and are focused on properties that have the greatest "potential to pollute," which are identified in the Stormwater Management Manual for Western Washington. Businesses with higher pollution potential, such as businesses with grease or storage drums on site, are a high priority. Vancouver plans to complete ordinance revisions and develop an outreach plan to support its source control program as the next step. This will include developing focus groups to engage broad demographics, as well as completing interviews. Businesses and land uses that have the potential to contribute bacteria and nutrients should be prioritized for source control inspections.

## **Private Stormwater Facilities**

Vancouver has a private stormwater facilities inspection program, which has developed an inventory of private facilities. It is estimated that there are approximately 1,400 private stormwater facility structures throughout the city and that 50 percent of these structures are deficient and do not meet engineering or performance standards. Vancouver is providing technical assistance to private facility owners through site visits, and by completing annual inspections. The city has a protocol, which prioritizes facilities for inspections and technical assistance based on deficiencies, and maintenance needs.

The City is currently working with homeowners associations (HOAs) and multifamily properties to implement phased maintenance on private facilities. Overall, HOAs are more challenging to work with compared to multifamily properties due to challenges reaching leadership within the HOA. If there is no official property manager associated with the facility, then outreach is normally completed to HOA boards, but this is often challenged due to board turnover. Vancouver has tried implementing mailers and webinars to engage HOAs, but past webinars have not been well attended. New partnerships with Clark Conservation District are being developed to implement more HOA education.

Vancouver plans to host a residential source control webinar soon, with the goal that more HOA's will attend. The long-term vision for Vancouver is to connect private stormwater facility

education with source control education, and to engage with HOAs earlier in their establishment. When private facilities are not maintained or repaired, Vancouver has enforcement mechanisms in place to require correction. However, there are not financial resources available to assist HOAs, and HOAs are responsible for maintenance and repairs. Most of Vancouver's enforcement actions on private facilities are implemented at private businesses rather than residential areas. Increasing enforcement efforts on private facilities in residential areas may result in more compliance with requirements, improved maintenance, and decreased deficiencies.

### **Public Education and Outreach**

Vancouver is planning a new pollution prevention at home webinar series in collaboration with Clark Conservation District. This webinar series is focused on pollution prevention at multifamily residences, and Vancouver is collaborating with Clark County's Green Neighbors program to provide education for property managers. Additionally Vancouver is working with Washington State University Extension to develop a safe pest control webinar for multi-family properties. Vancouver plans to reach more people by collaborating with Waste Connections, who is a local solid waste hauler, to receive addresses and names of individuals living in multi-family properties to start a new "green apartment living" program.

Other outreach and education efforts include EPA funding for a "Wash Right" campaign focused on the proper use of disinfectants and power washing practices. Vancouver is also completing farmer's market education and is collaborating with the Parks Department's special events team to incorporate educational information into farmer's market vendor handbooks. Vancouver is working with the city's Parks special events team on spill response education at the farmer's market and is putting educational material in the farmer's market handbook. The goal is to develop a centralized spill kits for Esther Short Park and Columbia Tech to help manage spills associated with events and food trucks. More detailed information on Vancouver's education and outreach is included in the Public Education and Outreach meeting summary. This includes education and outreach efforts related to urban forestry and greenways, and opportunities for Vancouver to improve education and outreach related to bacteria pollution.

### **Agriculture and pet waste**

For agriculture, the City of Vancouver does not have an official agricultural or manure ordinance, and the City defers to Clark Conservation District and other agricultural assistance organizations to help landowners with agricultural challenges. Some HOAs may have their own covenants, conditions, and restrictions regarding animals, however, the City does not enforce the rules of individual HOAs. When completing windshield surveys for source control, Vancouver's criteria is "potential to pollute," therefore any major challenges associated with agriculture should be documented through the source control inventory and survey process. Properties with agricultural issues should be referred to agricultural assistance organizations and Vancouver is responsible for enforcement if property owners do not correct agricultural issues.

For pet waste management, Vancouver relies on the Canines for Clean Water program to educate pet owners on proper practices for pet waste disposal. The Canines for Clean Water Program is implemented by Clark County. In the future, Vancouver may benefit from collaborating with Poop Smart Clark for education efforts related to pet waste, agriculture, and manure management.



## Impervious surfaces

The City of Vancouver collects a stormwater drainage fee that is based on impervious and hard surfaces. The definition of hard surfaces recently changed to include gravel, therefore some properties may have had their drainage fees increase with the new definition. The City of Vancouver has information on impervious surfaces in GIS, which is available upon request. This information can be used to prioritize the most densely impervious subbasins for implementation of stormwater activities and facility retrofits. Completing an analysis of the impervious area densities in drainage areas that contribute to priority areas for water quality water quality may help prioritize neighborhoods, roads, and commercial areas for implementation of stormwater best management practices.

## Schools and artificial turf

One of the biggest challenges Vancouver is currently facing is that more schools are starting to convert sports fields from open space grassy fields, to installing artificial turf. It is not clear if the turf areas are having adequate water quality treatment installed, and guidance on requirements for water quality treatment on artificial turf areas is unclear. Vancouver would like to see school districts implementing adequate structural and operational BMPs to manage stormwater runoff from artificial turf, especially since the materials used to make artificial turf are often associated with emerging contaminants of concern, which have the potential to pollute.

## DRAFT Implementation Actions

Based on the discussion from the May workgroup meeting, the following implementation actions are recommended for Stormwater and Capital Improvements in Burnt Bridge Creek. These implementation actions are draft, and may be edited and refined as Ecology and Vancouver continue to discuss water quality priorities.

*Table 2. Draft stormwater implementation actions for Burnt Bridge Creek.*

<b>SWM1</b>	<b>Priority areas for stormwater implementation</b>
SWM1.1	Prioritize stormwater implementation efforts to improve bacteria conditions in the middle and lower watershed, prioritizing Burton Channel, Cold Creek, and Peterson Channel, as well as river miles (RM) 8.4, 2.6, and 1.6 for having dry season bacteria exceedances over 200 cfu/100ml. As a secondary priority implement stormwater activities, and retrofits in areas that need bacteria reductions over 75 percent to meet water quality standards. These include Peterson Channel in the wet and dry seasons, Burton Channel in the wet season, Cold Creek and river mile 8.4 in the dry season, and river miles 7, 4.3, 3.4, 2.6, and 1.6 in the wet season.
SWM1.2	Focus nutrient source control efforts to river miles 5.9, 7, 9.5, and 11.4. Prioritize stormwater implementation to improve dissolved oxygen conditions at these locations.
SWM1.3	Focus illicit discharge detection and elimination in areas that are a priority for dry season bacteria reduction. These include the lower and middle watershed, and Burnt Bridge Creek tributaries.
SWM1.5	Prioritize and enforce construction stormwater permit implementation in Burton Channel and at areas contributing to river mile 0 to improve pH.
SWM1.6	Prioritize implementation of stormwater infiltration BMPs at river miles 0, 5.9, and 7 to help reduce the highest temperatures in the Burnt Bridge Creek watershed, by promoting groundwater recharge and increasing streamflow. Efforts to reduce

	imperviousness and increase urban green space may also help reduce thermal loading from impervious surfaces.
<b>SWM2</b>	<b>Stormwater retrofits and capital improvements</b>
SWM2.1	Incorporate proximity to impaired surface water into Vancouver's criticality matrix when prioritizing stormwater retrofits in asset management and capital improvement programs.
SWM2.2	Implement structural and non-structural stormwater BMPs to manage runoff from impervious surfaces. Prioritize implementation of BMPs on pollutant generating impervious surfaces, directly discharging to Burnt Bridge Creek from pollutant generating land use types, businesses, and activities.
SWM2.3	Complete mapping to delineate drainage areas contributing to priority areas for water quality in Burnt Bridge Creek. Conduct land use, landcover and jurisdiction analysis of drainages to identify and prioritize stormwater retrofit opportunities.
SWM2.4	Incorporate results from the subbasin studies completed in Burton Chanel and Peterson Channel into Vancouver's Capital Improvement Program. Prioritize implementation of projects that will help improve water quality in priority areas of Burnt Bridge Creek.
SWM2.5	Collaborate with Clark County to complete a basin study of Cold creek to identify retrofit opportunities to improve water quality.
SWM2.6	Prioritize drainage areas contributing to locations with water quality impairments for implementation of stormwater retrofits.
SWM2.7	Complete impervious surface assessment of drainage areas contributing to priority areas for water quality. Prioritize neighborhoods, and roads with the greatest percentage of impervious area for implementation of stormwater retrofits. Identify roads, commercial and industrial areas, schools, sidewalks, public buildings, and parking lots that present opportunities for stormwater retrofits.
SWM2.8	Preserve and restore natural areas to promote infiltration, restore streamflow, and increase groundwater recharge, to help provide sources of cool groundwater inputs to the Burnt Bridge Creek watershed.
SWM2.9	Collaborate with Clark County and Washington Department of Transportation to implement stormwater retrofits in the Burnt Bridge Creek watershed. When possible, identify publicly own priorities and road right-of-ways to implement stormwater best management practices.
SWM2.10	Implement stormwater BMPs that promote infiltration. Avoid detention and ponding BMPs that can contribute to warm water temperatures.
SWM2.11	Complete an audit of local codes, ordinances, and standards to identify opportunities to improve local codes to encourage adoption of low impact development in new development and redevelopment projects. When possible, reduce building setbacks, and parking lots sizes, and increase vegetation area and root zone requirements.
SWM2.12	Implement stormwater retrofits to treat runoff from roads. This includes implementing flow control and water quality treatment BMPs to manage runoff from I-205, I-5, and SR-500. When possible, collaborate across jurisdictions and establish new partnerships to share resources that help implement stormwater solutions in Burnt Bridge Creek. Prioritize roads with the highest vehicular traffic and the greatest potential to pollute.
SWM2.13	Conduct outreach to require HOAs to implement retrofits of private facilities that are deficient and do not meet engineering or performance standards. Approximately 50 percent of the 1,400 facilities are deficient and not meeting

	standards. Provide technical assistance to private facility owners through site visits, and by completing annual inspections. Prioritize facilities in drainage areas contributing to known water quality impairments. If feasible, develop financial assistance resources to support HOAs in implementing facility retrofits. Increase enforcement of private facility maintenance and retrofit requirements in residential areas, and not just at businesses.
SWM2.14	Develop and enforce operational and structural stormwater requirements for schools, sports complexes, municipalities, businesses, and private landowners that have installed artificial turf to replace natural areas.
<b>SWM3</b>	<b>Illicit discharge detection and elimination</b>
SWM3.1	Implement Illicit Discharge Detection and Elimination (IDDE) in subwatersheds that have known bacteria impairments, focusing first on areas with dry season impairments, which include Burton Channel, Peterson Channel, and Cold Creek, river miles 8.4, 2.6 and 1.6.
SWM3.2	Conduct dry weather screening for illicit connections using the most recent Illicit Connection and Illicit Discharge Field Screening and Source Tracing Guidance Manual.
SWM3.3	Implementing monitoring and source tracing in areas with known bacteria issues to identify and trace pollution issues in Burnt Bridge Creek. This may include pollution identification and correction efforts and microbial source tracking upstream from outfalls, into Vancouver’s infrastructure and manholes.
SWM3.4	Prioritize implementation of infrastructure televising, smoke testing, and dye testing in Burton Channel, Peterson Channel, and Cold Creek, and at river miles 8.4, 2.6 and 1.6.
SWM3.5	Develop financial assistance programs in partnership with the sewer department to help address illicit cross connections on private property.
SWM3.6	Develop interlocal agreement between Vancouver and Clark County to complete IDDE work in Cold Creek subbasin. Develop an interlocal agreement with WSDOT to complete IDDE work on infrastructure owned by WSDOT.
SWM3.7	Develop a pre-occupancy home inspection process to confirm stormwater and wastewater infrastructure is connected appropriately. If necessary, use visual inspection, smoke or dye testing to confirm.
<b>SWM4</b>	<b>Source control</b>
SWM4.1	Continue implementation of new source control requirements in the Burnt Bridge Creek watershed. Develop a source control inventory that prioritizes businesses and land uses that have the greatest potential to contribute bacteria and nutrients to Burnt Bridge Creek.
SWM4.2	Complete a windshield survey prioritizing businesses and land use types that have the greatest potential to contribute bacteria and nutrients to Burnt Bridge Creek. This includes agricultural businesses and properties, properties with septic systems, golf courses, parks, schools, and residential areas with lawns.
SWM4.3	Prioritize businesses and land use types that have the greatest potential to contribute bacteria or nutrients to Burnt Bridge Creek for source control inspections.
SWM4.4	Focus implementation of pet and goose waste BMPs at parks, along trails and greenways, and other public areas in subwatersheds with wet and dry season bacteria issues. Increase the number of pet waste facilities in public parks and along trails and greenways. Where possible, implement native shorelines and vegetation to deter geese from surface water.

SWM4.5	Utilize Clark County's Canines for Clean water program to amplify education on how pet waste impacts water quality. Consider opportunities to collaborate with animal service providers including groomers, boarders, and veterinarians to increase public awareness. Increase pet waste facilities in the watershed and access to dog waste bags. When possible, partner with local solid waste authority, such as Clark County Green Neighbors, to develop an ordinance that requires pet owners pick up waste at least once weekly, or more often as necessary using a bag, and disposing in a sealed trash container
SWM4.6	Implement best practices for local yard waste disposal programs to prevent bacteria and nutrient loading to surface waters
SWM4.7	Develop, adopt, and enforce a citywide agricultural and manure management ordinance. Collaborate with Poop Smart Clark to provide technical and financial assistance to landowners to address bacteria issues on private property. Focus on developing resources for urban agriculture, including resources for homeowners with chicken coops and micro-farms.
SWM4.8	Require implementation of manure management BMPs at animal facilities and agricultural operations in the watershed. Require development and implementation of nutrient and bacteria management plan for facilities.
SWM4.9	Develop financial assistance resources for local agricultural assistance, or provide funding support to Clark Conservation District or other agricultural service organizations to support implementation of agricultural technical assistance, planning, and BMP implementation in Burnt Bridge Creek.
SWM4.10	Increase street sweeping efforts in Burton Channel and areas contributing to river mile 0 reduce sediment-loading contributing to pH issues in Burton Channel.
SWM4.11	Work with Royal Oaks Golf Club to implement operational and structural source control efforts to reduce nutrient loading.
<b>SWM5</b>	<b>Public education and outreach – from <i>Public education and outreach summary</i></b>
SWM5.1	Collaborate with Clark County and the Washington Department of Transportation, and the Stormwater Partners for Southwest Washington, to develop and implement stormwater education activities in the Burnt Bridge Creek watershed.
SWM5.2	Increase the number of dog waste facilities in the Burnt Bridge Creek watershed. Utilize Canines for Clean Water education for public education and outreach. Establish relationships with business that provide pet waste removal services to foster new programs to remove dog waste from watersheds. Partnerships with local veterinarians, groomers, pet boarding, shelters, pet stores, and dog licensing should also be explored to educate on water quality.
SWM5.3	Prioritize stormwater source control outreach for bacteria and nutrient pollution to areas with known water quality problems. This includes the middle and lower watershed for bacteria pollution, and the middle and upper watershed for dissolved oxygen impairments. Provide source control education and outreach focused on BMPs to reduce bacteria pollution from pets and livestock, and from septic systems, and increase education on best practices for fertilizer application and lawn care to improve dissolved oxygen levels.
SWM5.4	Prioritize pollution prevention education that focuses on bacteria and nutrient reduction practices for pet waste, livestock, lawn care, and humans.
SWM5.5	Identify potential sources of agricultural pollution in the Burnt Bridge Creek watershed. Complete windshield survey to confirm agricultural sources. Collaborate with local agricultural assistance organizations such as Clark Conservation District, WSU Extension, or USDA NRCS to develop a local

	livestock or manure management ordinance. Provide outreach and technical assistance to agricultural landowners related to best management practices for manure management and livestock. Collaborate with the new Poop Smart Clark program to provide technical and financial assistance to agricultural landowners.
SWM5.6	Continue to implement the new Wash Right Campaign, Pollution Prevention at Home, and construction site pollution prevention programs in the Burnt Bridge Creek watershed. Continue to develop spill response education, outreach, and resources for Vancouver's Special Events team, including resources for Vancouver's Farmers market.
SWM5.7	Continue to develop education and outreach programs for Homeowners Associations (HOAs) focused on private stormwater facility maintenance, and best practices for pesticide and fertilizer application, and other pollution prevention activities. When possible, coordinate with HOA's earlier in the process once homes are constructed and occupied, to increase effectiveness and responsiveness to education and outreach.
SWM5.8	Increase stormwater stenciling on catch basins and increase labeling and signage in neighborhoods to help Vancouver residents learn what they can do to protect clean water, and how individual actions on private property and at the neighborhood level are connected to the creek.
SWM5.9	Educate the public on IDDE, source control, and how to submit an ERTS complaint if they observe a pollution issue.
SWM5.10	Provide required education to contractors and plumbers on proper installation of stormwater and wastewater infrastructure, to prevent challenges with cross connections. Many contractors working in Vancouver area are used to working in Portland's sewer system, which is a combined system. Vancouver has a separate stormwater and sewer system, therefore downspouts and drains need to be connected to stormwater pipes, and sanitary pipes must be connected to sewer. Collaborate with the Southwest Washington Contractor's association to develop and implement education.

**DRAFT Milestones, targets, and timelines for stormwater and capital improvements**

*Note: Milestones and targets will be developed in collaboration with Vancouver staff.*

Table 3. Draft milestones, targets, and timelines for stormwater and capital improvements.

<b>Milestones and targets</b>	<b>Target Date</b>
<b>Stormwater Retrofits</b>	<b>TBD</b>
<b>IDDE</b>	<b>TBD</b>
<b>Source Control</b>	<b>TBD</b>
Complete a formal effectiveness monitoring study at priority areas for water quality after implementation occurs to measure how implementation has impacted water quality	<b>2031</b>



## DRAFT Criteria to measure progress

Table 4. Draft criteria to measure progress on stormwater and capital improvements.

Criteria to measure progress	Reporting timeline
Number of subbasin studies completed	Annual
Source control inspections and technical assistance completed	Annual
Acres of pollutant generating imperviousness with flow control BMPs	Annual
Acres of pollutant generating impervious surfaces with water quality treatment BMPs	Annual
Lineal feet or miles of stormwater drainages surveyed for illicit discharge detection and elimination	Annual
Number of source control inspections and technical assistance visits completed	Annual
Volume of stormwater managed	Annual
Number of stormwater BMPs implemented	Annual
Number of stormwater inspections completed on public facilities	Annual
Number of private stormwater facility inspections completed	Annual
Acres of land that have been assessed for stormwater retrofit opportunities	Annual
Number of catch basins cleaned	Annual
Pounds of sediment removed	Annual
Number of cross connections identified and corrected	Annual
Dollars spent on structural BMPs	Annual
Number of outreach events on stormwater source control and pollution prevention	Annual
Number of outreach events focused on private stormwater facilities and homeowners associations	Annual
Number of dog waste facilities and enrollment of Vancouver residents in Canines for Clean Water program or Poop Smart Clark	Annual
Calculate expected load reductions from implementation of stormwater management activities and report to Ecology and EPA	Annual

## DRAFT Funding and partnerships for implementation

Table 5. Funding and partnerships for stormwater implementation.

<b>Funding Sources</b>	Water Quality Combined Funding Program, City of Vancouver's Stormwater Utility
<b>Implementation Partners</b>	Clark County Clean Water Division, Washington Department of Transportation, Washington State Department of Ecology



## Timeline for Burnt Bridge Creek Water Cleanup Plan

Table 6. Timeline for Burnt Bridge Creek Water Cleanup Plan.

COMPLETE
<ul style="list-style-type: none"> <li>• <b>October 2020:</b> <i>Burnt Bridge Creek Source Assessment</i> published.</li> <li>• <b>February 2021:</b> Burnt Bridge Creek Partnership kicked off.</li> <li>• <b>March 2021:</b> Implementation workgroups assigned               <ul style="list-style-type: none"> <li>• Stormwater and capital improvements</li> <li>• Operations and maintenance</li> <li>• Urban forestry and greenways</li> <li>• Sewer connection and septic systems</li> <li>• Public education and outreach</li> <li>• Other TBD: SEH America, local water use, and monitoring</li> </ul> </li> <li>• <b>April-May 2021:</b> Implementation workgroups.</li> <li>• <b>June 2021:</b> Submit completed worksheets to Ecology.</li> </ul>
NEXT STEPS
<ul style="list-style-type: none"> <li>• <b>July 2021:</b> Full Burnt Bridge Creek Partnership meeting.</li> <li>• <b>Summer 2021:</b> External partnership meeting – Lower Columbia Estuary Partnership, Watershed Alliance of Southwest Washington, Washington Department of Transportation, DOT, Clark County Clean Water Division, Clark County Public Health, Clark Conservation District, Lower Columbia Fish Recovery Board, Clark Regional Wastewater District, Washington Department of Fish and Wildlife, Environmental Protection Agency.</li> <li>• <b>Fall 2021:</b> Public Webinar.</li> <li>• <b>January 2022:</b> Internal Draft (City of Vancouver, Ecology, and Environmental Protection Agency).</li> <li>• <b>Spring 2022:</b> External Draft <i>Burnt Bridge Creek Water Cleanup Plan</i>.</li> <li>• <b>Summer 2022:</b> Publish <i>Burnt Bridge Creek Water Cleanup Plan</i>.</li> </ul>