

Sustainability Scholar Program
The Friends of Bowker Creek Society's 1000 Rain Gardens Project

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This report documents the work from May-August 2025
supporting the *1000 Rain Gardens Project*.

Disclaimer: This report is a product of the UVic Sustainability Scholars Program, a partnership between UVic and various on- and off-campus organizations offering internship opportunities to graduate students working on sustainability-focused research projects that advance sustainability in the region. This project was conducted under the mentorship of Dr. Rachael Scarth, Co-director of the Friends of Bowker Creek Society. The results and findings of this report may be used and published by the author.

Territorial Acknowledgement

This meaningful work was conducted in the traditional lands of the lək'wəḡən people, where the Songhees, Esquimalt and WSÁNEĆ peoples historical relationships with the land continue today. The Lək'wəḡən (Songhees) name for Bowker Creek is “Thaywun,” which translates to “coho salmon stream,” signifying the creek’s importance as a coho spawning ground. Coho salmon were known to be seen in the creek in the 1930s or 50s, and major diversions of the creek flow began in 1914, coinciding with the last documented chum salmon run.¹

General Acknowledgements

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<https://www.timescolonist.com/local-news/after-more-than-a-century-a-hope-that-salmon-will-return-to-bowker-creek-4691352>

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1. Introduction

The Bowker Creek Watershed is 1028 hectares (10.28 km²) and is home to approximately 30,000 people. The creek's headwater flows from the University of Victoria's wetland area near the University Club, through Saanich and Victoria and drains into the ocean at Oak Bay².

The Bowker Creek Initiative (BCI)³ was established in 2004 as a partnership between community, local government, and institutions with the aim to “protect and enhance the ecological, social and economic health of the Bowker Creek Watershed.” The Bowker Creek Blueprint published in 2012 outlined a detailed 100-year plan to revitalize the Bowker Creek Watershed. The plan is currently being updated (2025), and will be re-published following public feedback.

The Friends of Bowker Creek Society (FoBCS) supports the restoration and enhancement of Bowker Creek and its watershed to a healthy state, guided by the vision and goals of the [Bowker Creek Blueprint](#). Among the range of initiatives, from the chum salmon recovery project⁴, to the restoration and daylighting of the creek, FoBCS is leading the 1000 Rain Gardens Project to increase awareness of rain gardens as a tool to reduce excess stormwater flows and pollutants into the Bowker Creek Watershed.

Rain gardens are a landscape feature that can retain or store stormwater runoff, allowing it to soak into the ground rather than flow into storm drains (Figure 1). Rain gardens can be as simple as a lawn or cluster of rocks receiving runoff from a roof downspout that has been disconnected from a house perimeter drain, or it can be an ecosystem full of varied plants, insects and other animals. Rain gardens enable rainwater to slowly infiltrate or enter the ground, reducing the amount of rainwater entering storm drains and reducing peak flows in local waterways.

The 1000 Rain Gardens Project aims to help our communities improve rainwater management by building rain gardens in the Bowker Creek Watershed. FoBCS has partnered with Peninsula Streams and Shorelines (PSS) and their Rain Gardens for Headwaters Program to build rain gardens through the capital region. Alongside PSS, there have been rain garden demonstration sites constructed at three local schools, engaging students, faculty, and the community at large to participate and learn about green infrastructure such as rain gardens. The demonstration sites at Campus View Elementary, Monterey Middle School, and Oak Bay High School will be examined in this Sustainability Scholar report to develop recommendations for FoBCS' 1000 Rain Gardens Project.

² [Bowker Creek Watershed – District of Saanich](#)

³ [Bowker Creek Initiative and Blueprint Update – Capital Regional District](#)

⁴ [Chum Salmon Recovery – Friends of Bowker Creek Society](#)

Table 1. Rain garden definitions by the municipalities and regional government responsible for the Bowker Creek Watershed.

Definitions of a rain garden	Source
<p>A rain garden is a shallow depression. It uses soil and plants to manage runoff from hard areas such as roofs, roads and driveways. The plants and a layer of absorbent compost can hold several inches of rainwater and allow the stormwater to slowly seep into the ground. You can improve the look of your home and help the environment by incorporating rain gardens into your yard.</p> <p>Rain gardens mimic nature by collecting, absorbing and filtering stormwater runoff. The first inch of rainfall, also known as the first flush, is responsible for most of the pollutants in stormwater runoff. A rain garden temporarily holds this first flush to filter out many of the common pollutants in the stormwater, such as oil or chemicals.</p>	<p>City of Victoria</p>
<p>Rain Gardens are a type of bioretention facility. They receive runoff from impervious surfaces via a pipe or swale. They are suitable for relatively flat sites (< 5% slope) and are often the best choice for single family residential sites. They are heavily planted with vegetation that is adapted to wet winter conditions and dry summer conditions. Rain Gardens can be integrated into most site designs due to their flexibility in form and relative ease of construction. The planting scheme can be formal or informal</p>	<p>District of Saanich – Stormwater Best Management Practices</p>
<p>Rain gardens are landscape features that are designed to collect rainwater runoff from impervious surfaces such as roofs and driveways. They are simply depressed garden spaces that are designed to hold runoff and allow it to infiltrate into the soils. By allowing rainwater to infiltrate through a rain garden rather than enter the stormwater system, we can reduce flooding in our neighbourhoods and reduce erosion and pollution in our creeks and streams.</p>	<p>Capital Regional District (CRD)</p>

In 2022, an interactive Bowker Creek Watershed model⁵ was created to offer an engaging way of looking at urban watershed renewal. Participants are encouraged to use spray bottles to simulate rainfall in the watershed. The model demonstrates how rain washes pollution into the creek and ocean, and how green stormwater management can reduce flooding, erosion, and keep pollution out of Bowker Creek.” This model has been used to educate students in classrooms as well as for demonstrations at public events. Throughout this Sustainability Scholars project, this model was demonstrated in numerous community events to increase awareness of Bowker Creek and the 1000 Rain Gardens Project.

⁵ [Bowker Creek Watershed Model - CRD](#)

The project is presented in four sections as follows:

Chapter 2: Resources on the 1000 Rain Gardens Project

Chapter 3: Examining demonstration rain gardens in the CRD to identify current challenges and successes. This section includes a novel use of a microdrone to conduct rain garden measurements and assessments using aerial photography for a community organization like FoBCS.

Chapter 4: Survey to understand public perceptions on the adoption of rain gardens in private and public property in the Bowker Watershed.

Chapter 5: Drafting guidelines for rain gardens to meet municipal and regional requirements.

Throughout these chapters, recommendations for FoBCS are provided and are compiled in Appendix F.

2. Resources on the 1000 Rain Gardens Project

2.1 Online resources

This section provides key resources that are relevant to the development of rain gardens in the Bowker Creek Watershed. To spread awareness for the development of rain gardens in the region, there are many existing resources that can be provided to interested residents on the design and management of rain gardens. The information collected here has been curated for the context of Greater Victoria but may also include resources from other regions (e.g., plant lists from guides for the Pacific Northwest).

There is a publicly available ArcGIS StoryMap on the topic of rain gardens as an urban stormwater solution and has been developed for the context of Greater Victoria:

<https://storymaps.arcgis.com/stories/bade971de06f4502af700ecb844f3fb5>.

- This resource includes a section on “Creating Your Own Rain Garden” which provides a basic 5 step process on creating a rain garden, highlighting the [Rainwater Rewards Program](#) led by the City of Victoria, which provides a rebate of \$35 to \$1500 to assist with the upfront cost of installing a rainwater management method for owner-occupied properties. All low density residential properties are also eligible to receive a 10 per cent credit off the annual stormwater utility bill.
- [As part of the Resilient Urban Systems and Habitat \(RUSH\) initiative, a range of students have participated in mapping rain gardens across Greater Victoria](#). This map in collaboration with the Friends of Bowker Creek Society and Peninsula Streams and Shorelines can be accessed here: <https://new.opengreenmap.org/browse/maps/63e6939eabcc260100514352/map-view>
- To support the mapping of rain gardens in Greater Victoria, rainwater management projects can be submitted here:

<https://docs.google.com/forms/d/e/1FAIpQLSd9K5AlznpTMABfd73MjSC5X4NM7Sl5CqS5lgPU-yXW15ZO/viewform?vc=0&c=0&w=1&flr=0>

- To propose a rain water management site, projects can be submitted here:

<https://docs.google.com/forms/d/e/1FAIpQLSeQvS2HBe8SER3E4psI7jBR1VDJ9EUYM Pki5NvA4v2WgT9b0Q/formResponse?pli=1>

What are rain gardens? What are the key components of a rain garden and what are the phases or steps involved in the design, implementation and maintenance?

In the context of the Bowker Creek Watershed, what are the best practices available in scientific and grey literature? Provide alternative links to key documents that might provide insights for various regions around the world (e.g., plant species/invasives/natives, maybe major design considerations that are different regionally – soil types, etc.)

This project or initiative is not unique and mirrors many other initiatives around the world. The Puget Sound aims to have 12,000 rain gardens and is currently (as of 27-May-2025) at 6, 207.⁶ Universities, including the University of Victoria are early adopters of rain gardens and provide a range of resources and insights on the garden management⁷.

Incentives for rain gardens paper:

<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2015WR018063>: “We conclude that a cost-share rebate approach is likely to significantly affect household adoption decisions, and the partial contributions paid by households can assist with lowering the substantial compliance costs for local governments to meet water quality requirements.”

2.2 Educational resources

There are a number of educational resources that can support engagement initiatives for various audiences. The resources available on the FoBCS website⁸ include how to create a rain garden, collecting rain water, Do-It-Yourself activities, and other rain garden projects that provide additional resources.

The Pacific Education Institute has published a grade 5 rain gardens activity. The lesson is described as follows:

Students will read two articles and watch one video describing what rain gardens are and how they benefit the environment. They will also visit your school’s rain garden, taking photos to document its benefits. Students will compose and deliver a speech explaining how rain gardens improve the environment, incorporating photos from your school’s rain garden in their speech. Includes Teacher directions and scoring notes.

[Subject: Grade 5 Rain Gardens](#)

Level: Upper Primary

⁶ <https://www.12000raingardens.org/>

⁷ University of Minnesota Extension: <https://extension.umn.edu/landscape-design/rain-gardens#location-1778660>

⁸ <https://bowkercreek.org/1000-rain-gardens/resources/>

Material Type: Activity/Lab

Author: [Pacific Education Institute](#)

The 12,000 Rain Gardens project⁹ provides a range of K-12 curriculum and educational resources which community groups like FoBCS can use to promote the rain garden program and continue to engage with a range of audiences, like students and community members.

Recommendation 1

The FoBCS website has an extensive number of resources available on the topic of rain gardens ([source](#)). Adding a section on teacher and educational resources may broaden the reach of engagement, further promoting the program and the initiative to build rain gardens in the region. The Pacific Education Institute resource above is one example, and an extensive list of relevant K-12 Curriculum & Educational Resources are also available through the [12,000 Rain Gardens website resources page](#).

2.3 “Building a Rain Garden Workshop” in Charlottetown, Prince Edward Island

On June 11, 2025, a workshop was hosted by the City of Charlottetown, funded by the Government of Canada and the Government of Prince Edward Island (PEI) through the PEI Climate Challenge Fund. This workshop was available to the public and was led by Norman Dewar (Ellens Creek Watershed Group) and landscape architect, Tara Callaghan¹⁰. This workshop was conducted outdoors, using the Spring Park Elementary School’s rain garden which was built in 2018 through a microgrant of the PEI Climate Challenge Fund¹¹. Information from this workshop was collected and is summarized as a reference to be able to adapt a workshop for the context of the Bowker Creek Watershed

The format of this workshop is described from the perspective of a workshop participant and may provide insights into the design and feasibility of a rain garden workshop hosted by FoBCS.

1. Describe the history of the rain garden demonstration site and define what a rain garden is.
2. What was considered in the design of the rain garden.
3. What you can expect to consider when designing a rain garden for your home. Advice from a landscape architect.
 - a. Working with what you already have in your property (e.g., soil types, existing landscape features that can be modified, etc.).
4. Questions and engagement with community participants.

⁹ <https://www.12000raingardens.org/resources/>

¹⁰

<https://www.facebook.com/CityofCharlottetown/posts/building-a-rain-garden-workshopdate-wednesday-june-11-2025time-7-8-pmlocation-sp/1129635849202250/>

¹¹ <https://bewaterfriendly.com/2018-spring-park-home-and-school-rain-garden-microgrant-project/>

Notable insights during this workshop:

- Consider the benefits of enjoying your rain garden from inside your home as well, looking at the rain garden as a feature from your kitchen or your living room windows.
- Even though you do not have the most suitable soil for a rain garden, this should not discourage you from building a rain garden. Soil amendments and mixes are possible.
- Observation of the behaviour of water in a potential area for a rain garden is important. Spend some time understanding where water will be coming from (e.g., downspouts, other drainage areas).
- There might be other planted features that do not necessarily “fit” in a conventional rain garden but might provide other benefits for the rest of the garden. For instance, having a tree or larger shrub to reduce wind from a certain direction impacting the rest of the plants in the garden.

Recommendation 2

FoBCS can consider developing informal rain garden educational workshops for community members using existing demonstration sites to engage with participants. Section 2.3 provides a simple rain garden workshop format which has been successfully observed in Charlottetown, PEI.

3. Examining demonstration rain gardens in the CRD

During this project, a novel approach was developed to visually examine rain garden characteristics using an unmanned aerial vehicle (UAV). To date, UAVs have been used for a range of applications to monitor crops and detect and monitor plant species. Here, we used a DJI Mini 4 Pro to capture photos of rain gardens through various perspectives (e.g., birds-eye-view, various heights, angles, and rotations) to facilitate examination of plant persistence, plant coverage/areas, and potential desire paths¹². An inventory of 3D representations (using point clouds) of a range of areas valuable for FoBCS was created.

A guide on rain garden measurement and evaluation by [Hartman and Robinso, 2017](#) provided a method to objectively assess a rain garden’s performance based on the following characteristics:

- Stormwater performance
- Soil characteristics & water infiltration
- Plant diversity & coverage
- Ecological considerations
- Aesthetic considerations

¹² Desire paths are an informal or unplanned routes (shortcuts) created by repeated traffic of people or animals walking on a surface, forming paths or worn tracks which represents the shortest and typically the most efficient route between points of interest.

The third characteristic, plant diversity and coverage, is assessed based on a physical survey, done through observation. Plant diversity is calculated based on the recorded species count (number of species in each classification) and species richness (total number of species noted on-site). Plant cover is determined by observation, where a percentage determination of each plant classification is made based on the overall plant cover. For this Sustainability Scholar project, plant cover is estimated using aerial drone acquired birds-eye-view photographs.

3.1 Monterey Middle School rain garden

The rain garden site at Monterey Middle School is located in the District of Oak Bay and was built (planted) on November 5, 2022 in collaboration with Victoria School District (SD61), PSS (part of the Rain Gardens for Headwaters program) and FoBCS¹³. While this site is outside of the Bowker Creek watershed, it successfully demonstrates the implementation of a rain garden in the region in collaboration with community organizations, where students and community members participate in designing, building and maintaining the rain garden.

The following sections describe processes to monitor rain garden plant persistence and conduct measurements that are used to maintain the garden.

3.1.1 Use of aerial drone photography for rain garden monitoring and maintenance

Over 20 aerial photographs were taken of the rain garden from the perimeter of the site at an angle of approximately 30-40 degrees. The photographs were uploaded into a browser-based application called AerialModel.com. Prior to conducting data collection by flying the drone, permission was requested from and approved by the school administrator. While there is no requirement to request permission, this process enables the range of stakeholders to be informed and can also reassure onlookers that this process has been discussed with relevant parties. While drones are widely available for purchase, it is still a technology that is not widely used in the area.

¹³ [Saanich News. November 13, 2022](#)

Table 2. Persisting plant species at the Monterey Middle School rain garden compared to the initial plant purchasing list.

Plant (common name)	Estimated area (m ²)	Plant coverage based on total area (~370m ² total area) (%)	Proportion of plants based on total recorded 378 plant purchases (%)
Canada goldenrod <i>Solidago canadensis</i> Golden rod	33.8	9.1	9.5
Yarrow <i>Achillea millefolium</i>	14.2	3.8	2.4
Monkey-flower <i>Erythranthe guttata</i>	3.8	1	9.5
Jointleaf rush <i>Juncus articulatus</i> ed rush juncus	3.9	1.1	2.4
Tufted hairgrass <i>Deschampsia cespitosa</i> s	11.3	3.1	9.5

Recommendation 3

Using a UAV to collect images to evaluate the state of a rain garden can be integrated into an activity involving students and the local community. Similar to the engagement of the public in building the rain garden, there are various ways to integrate participation in the evaluation of the rain gardens as they mature, such as assessing stormwater performance, soil characteristics & water infiltration, plant diversity & coverage, ecological considerations, and aesthetic considerations. An evaluation of these opportunities is provided in a guide by Hartman and Robinson (2017), published through the Landscape Architecture Foundation at Rutgers School of Environmental and Biological Sciences¹⁴. Relating this to section 2.2 (Educational resources) and section 4.2.2 (Survey results), this evaluation tool is an activity that can be used by FoBCS' 1000 Rain Gardens Project to examine the landscape performance of the demonstration rain gardens, while educating and engaging students and the wider public (Figure 2).

¹⁴

<https://www.landscapeperformance.org/sites/default/files/Hartman-2017-Rain-Garden-Measurement-Evaluation-Guide.pdf>

Score each category from +3 to -3. Consider questions below each category to inform your score.

Ecological Considerations		Aesthetic Considerations	
Biodiversity		Context	
Are there a significant number of plant species present?		Is the garden suited to its surroundings?	
Are the species of different habits? (ferns, grasses, forbs, woody)		Does design work with nearby buildings?	
Are there multiple flowering species?		Do the plants fit in the greater plant community?	
Are there multiple woody species?			
Are there multiple grasses or other monocot species?		Color Interest	
		Is color a tasteful part of the design?	
Habitat		Do the colors work well together?	
Are there obvious signs of insects? (visible or leaf damage)		If only green, is there pleasing variation?	
Are there signs of butterflies or moths? (visible or chrysalis)			
Are there signs of bees, wasps or other pollinators?		Coverage, Bare earth or mulch	
Are there signs of birds?		Does the garden appear appropriately "full"?	
Are there signs of small mammals or other animals? (amphibians)		Is there little or no bare earth visible?	
		Are unplanted areas well-tended?	
Capacity			
Is there an obvious, significant depth to the retention area?		Geometry use / shape	
Is the area of capture depth significantly broad?		Does the shape of the garden suit the larger site?	
Is there a berm around the retention area?		Is the overall garden shape pleasing?	
Is garden of significant size to handle catchment areas?		Are any other geometric factors (e.g. hardscaping) used well?	
Is there an overflow catchment system in place (drain, basin)?			
		Texture	
Sustainability		Is there a good use of texture in the overall design?	
Is there no standing water?		Do the textures of the hardscaping work with plantings?	
Does water quickly drain from basin point during infiltration test?		Is their pleasing variation in foliage texture?	
Does the area receive full or part sun conditions?			
Does the garden receive runoff that is free of sediments?		Variation and Height	
Are plants healthy, dense and free of invasive weeds?		Are there a variety of plant species?	
		Are there woody structural elements for winter interest?	
Soil Quality		Is their a pleasing variation in plant height?	
Is soil texture suited to drain well?			
Is soil loose and pourous with no obvious compaction?		Patterns	
Visible presence of orgnaic material?		Are there pleasing massings of plantings?	
Presence of black soils?		Is there a good use of repetition and rhythm?	
Lack of grey, green or mottled soils?			
		Senses (smells, sounds, etc)	
Other notes:		Are there pleasant smells present?	
		Do you notice pleasing sounds (water, foliage rustle)?	
		Are your senses peaked in any other ways?	

Figure 2. Rain garden evaluation survey that may be used by Friends of Bowker Creek and community. Source: [Hartman and Robinson, 2017](#).

3.1.3 Use of aerial drone point cloud for plant fencing measurements

On July 7, 2025, aerial photographs were taken of the Monterey Middle School rain garden to determine approximate perimeter lengths to complete fencing for certain plant species that were observed to be prone to deer herbivory. Desktop measurements informed fencing material purchasing, requiring no manual on-site tape measurements (Figure 3).

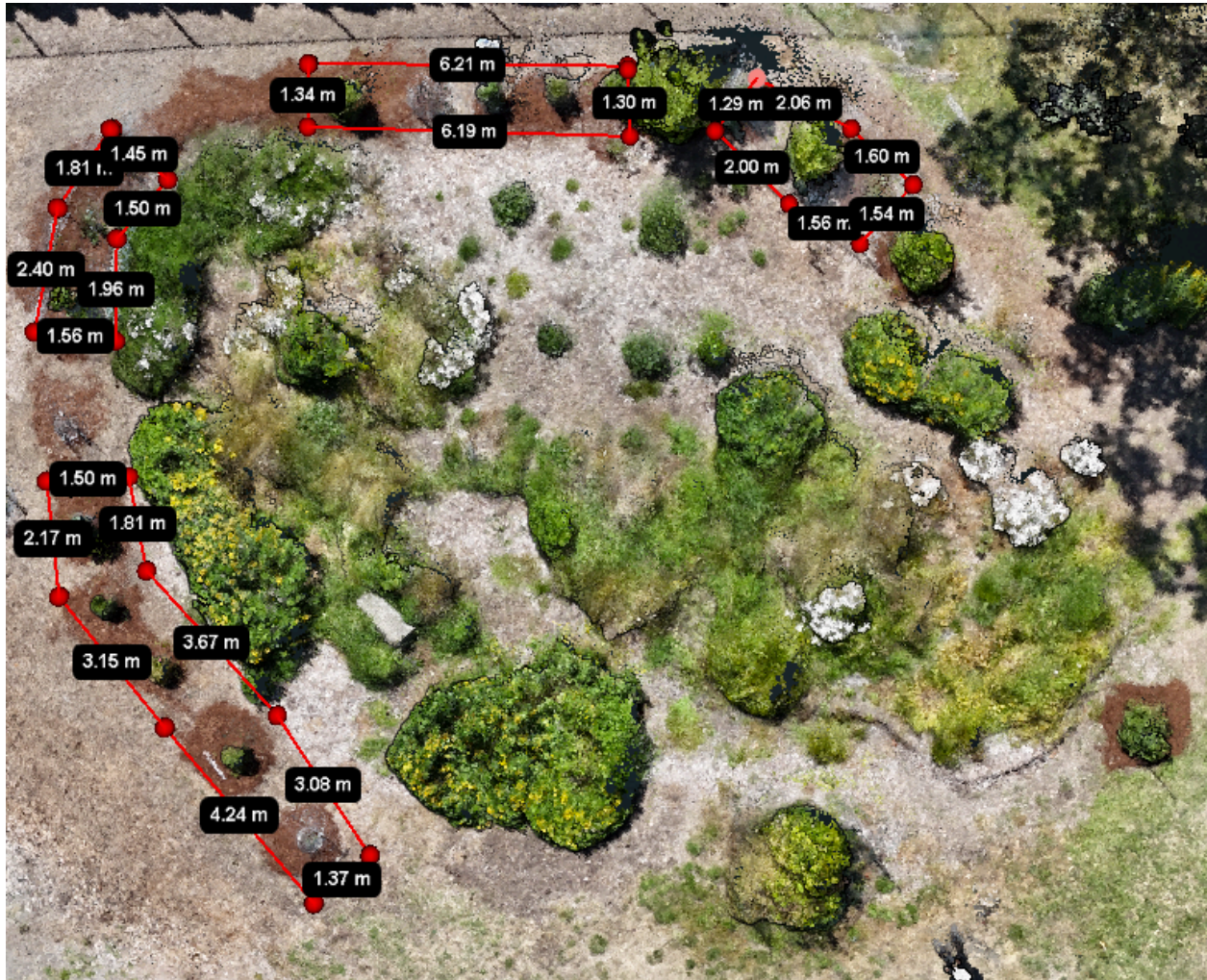


Figure 3. Aerial photograph approximate measurements using AerialModel.com.

3.1.4 Observed challenges

On May 1, 2025, during the examination of the rain garden the neighbouring homeowner adjacent to the rain garden site provided information on a heavy rainfall event in March 2025. The resident indicated that during the period of heavy rainfall, water was overflowing from the south side of the rain garden and onto his property, impacting his vegetable garden. Representing the FoBCS, we thanked the resident for informing us and providing photographs of the inundated rain garden to help inform ways to rectify this challenge.

A high volume of rainwater from the parking area (Figure 4) may have had a linear rather than sinuous conveyance of flow directed to the rain garden. Rainwater flows may not have distributed evenly during a period of high precipitation, resulting in ponding of rainwater in the garden (Figure 5) and overflow off the berm on the south end of the garden (Figure 6), as indicated by the property owner south of the property.

This information was brought to the attention of PSS and a deeper and redirected excavation (i.e., directing incoming flows in the north section of the rain garden) was completed. Another component is the planned installation of a drain cover to replace the solid man-hole cover at the edge of the parking lot so in the event of high levels of water collection, the outflow would be directed to the storm drain. Although overflow catchments are typically considered in rain garden designs, this case demonstrates their practicality and provides insight for the design of future rain gardens.



Figure 4. Photograph towards the northwest section (parking lot) of the Monterey Middle School rain garden during heavy rainfall.



Figure 5. Photograph towards the northeast section of the Monterey Middle School rain garden during heavy rainfall.



Figure 6. Photograph facing west from the south fenced area of the Monterey Middle School rain garden.

3.2 Campus View Elementary rain garden

3.2.1 Use of aerial drone orthophotos for plant cover and plant persistence – iPad/tablet interface

Similar to the rough plant survey conducted in Monterey Middle School (section 3.1.2), an orthophoto of the rain garden was used to record observations of the various plant species and the area they covered to understand what plants have persisted after being established for 3 years. This method involved taking an aerial photo of the rain garden (July 17, 2025), sending the photo to the iPad, and with a note-taking application such as Notability, plant species and areas can be easily annotated on-site (Figure 7 and Figure 8). This enables the data collector to better make use of the high-resolution image as they have the ability to zoom in and out to differentiate areas from a birds-eye-view while being able to verify what is directly in view of the collector. The tool also enables the use of various pen colours and the ability to fill in areas and comfortably annotate with more space than annotating on a printed image. Based on observation, it was determined that not all the plants planted at the inception of the rain garden have persisted and as such, estimates of persistent plant species were estimated based on the plant area relative to the total rain garden area.



Figure 7. Birds eye view of Campus View Elementary rain garden taken on July 17, 2025.



Figure 8. On-site annotation of plant species. GR: Golden rod, MF: Monkeyflower, WM: Wild mint, Y: Yarrow, SS: Slough sedge, SCF: Sticky Cinquefoil, CS: Chamisso sedge

As shown on Figure 8, after noting estimated plant cover and species, images were uploaded to AerialModel.com to create a 3D point cloud model of the site. The areas were then identified to gather estimated areas of the current plants species. Using the annotated note for reference and the measurement tools of AerialModel.com, an area estimation can be determined without relying on human determined estimates.

Table 3. Identified persistent plants in Campus View Elementary rain garden.

Plant (common name and species)	Estimated area (m ²)	Plant coverage based on total area (%) (based on ~50m ² total area)	Proportion of plant s species based on total recorded number of plant purchases (%) of (based on ta the total number of 140 plants)
Wild mint <i>Mentha arvensis</i>	5.6	11.2%	Unknown – only found in area 2 plant list
Golden rod <i>Solidago canadensis</i>	21.8	43.6%	25.7%
Monkey flower <i>Erythranthe guttata</i>	0.4	0.8%	3.6%
Common Yarrow <i>Achillea millefolium</i>	1.8	3.6%	4.3%
Slough sedge <i>Carex obnupta</i>	2.2	4.4%	6.4%

Chamisso sedge	4.1	8.2%	6.4%
Sticky cinquefoil <i>Dryomocallis glandulosa</i>	0.1	0.2%	Unknown – found in area 2 plant list

These findings indicate golden rod, wild mint, and monkeyflower as the primary persisting plant species in the area. The high number of goldenrod that are currently observed may align with the high number of plants initially introduced in the rain garden, resulting in almost half of the plant cover observed. Alternating, this species may be the best adapted to the conditions in the rain garden. This information can be used to suggest plant persistence for future rain garden projects administered by FoBC and PSS, and can also be recommended to residents as plants that have had a higher likelihood of persisting in recent years.

We also determined that the following plant species were either not found or very few instances were recorded and were not significant based on the overall plant cover:

- St. John’s wart
- Tufted hairgrass
- Meadow barley (potentially 1 found)
- All sedges
- Sword-leaved rush

This process of determining plant persistence may contribute to the plant selection process for those interested in building rain gardens in this area. Given the variables of climatic conditions, site and design considerations (e.g., plant selection, spacing, soil type, etc.), accurately recorded plant persistence in established rain gardens may provide people with added confidence in their decision making.

3.2.2 Custom signage for rain garden demonstration sites

The Campus View Elementary rain garden demonstration site provides an excellent example of custom signage that educates onlookers on the function and benefits of rain gardens (Figure 9). The sign introduces new concepts such as “impervious surfaces”, simplified descriptors such as “hot, fast and toxic” stormwater, and recognizable sources such as parking lots, roofs and pavements. The benefits of pollination and creation of mini urban ecosystems are highlighted.

The sign helps contextualize the rain garden within the local ecosystem and community efforts

“Water from Campus View flows directly to the headwaters of Bowker Creek 150m behind you.”

This message, paired with a map and reference to students planting native species, reinforces the connection to community and sense of place. The sign also provides a question and activity for the reader to identify the native plants in the garden, an added attempt to gain and maintain the interest of the reader. Logos for collaborating partners are shown and a QR code to the PSS Rain Gardens for Headwaters Program’s website is provided for those wanting to learn more.



Figure 9. Campus View Elementary rain garden sign. July 17, 2025.

Recommendation 4

FoBCS should allocate resources to create rain garden signs for other demonstration sites and provide a template that homeowners can use for their own personal rain gardens. This method of public education and passive outreach is an ideal approach to initiate and increase awareness of the program with little-to-no upkeep. As seen in Campus View's sign, it would be ideal to provide a method such as a link to a website to find additional resources or to connect with a resource person.

3.3 3.3 Oak Bay High School rain garden

3.3.1 Use of an aerial drone to capture the current state of a newly planted rain garden

On June 4, 2025, aerial drone photographs were taken using the DJI Mini 4 Pro to capture the state of a newly planted rain garden site located along the north side of the Oak Bay soccer turf/field, west of Oak Bay High School. This rain garden has been designed to capture rainwater from the school's northwest parking lot and was newly planted on Earth Day, April 23, 2025 by Oak Bay High School students (Figure 10, Figure 11). 300 native plants in the rain garden were planted by the students, with an initial planting of 100 plants in the fall (Friends of Bowker Creek [Facebook post, May 9, 2025](#)).



Figure 10. Image taken from the Friends of Bowker Creek Facebook page, published on May 9, 2025. Image taken on April 23, 2025. Source: <https://www.facebook.com/photo?fbid=1090486649779700&set=pcb.2266258200436135>



Figure 11. Students planting native plant species at Oak Bay High School. Image from the Friends of Bowker Creek Facebook page, published May 9, 2025. Image taken on April 23, 2025. Source: <https://www.facebook.com/photo?fbid=1090486639779701&set=pcb.2266258200436135>

Aerial drone photographs were taken of the rain garden, which had a long length at just under 100m in total, with two sections, one approximately 74m in length, and the other approximately 22m in length. Because of the length of the rain garden being captured, the drone had to be flown at a height of 50-70m to be in the full frame of the drone's camera view. 24 photos were taken circling the rain garden at 360 degrees, and a 3D point cloud model was generated using AerialModel.com (Figure 12).



Figure 12. A point cloud of the Oak Bay High School rain garden using AerialModel.com indicated the total length of approximately 100m.

Because of the distance of the photos captured, there was difficulty in identifying plant features when zooming into the point cloud as shown in Figure 13. Alternatively, sections of the rain garden could have also been captured in sections to have multiple higher resolution point clouds that can then be examined separately. Flyby videos can be captured using the drone with the hope of examining plant changes to the rain garden year after year to demonstrate plant persistence and physical characteristics.



Figure 13. Zoomed-in version of the point cloud presenting difficulty identifying plant features in the Oak Bay High School rain garden.

3.3.2 Integrating artificial intelligence (AI) into the design of rain gardens

The property of Oak Bay High School has multiple grassy areas already designed with sunken features, stormwater overflow drains, and features to direct stormwater from impervious areas (e.g., parking lots) into them. These areas are potential locations for rain gardens. One example is shown in Figure 14. The following four figures will demonstrate the use of ChatGPT (GPT-40 model) to generate an imagined rain garden using aerial photos taken of an area.



Figure 14. First aerial image input into ChatGPT for the design of a rain garden.

Inputting Figure 14 into ChatGPT, the prompt “In the grassy space surrounded by trees, generate an attractive rain garden that uses native species from the Pacific North West, specifically Victoria, BC” was used to generate Figure 15. As shown, an oval rain garden was created in the previously empty space, complete with a range of visibly different plant species, rocks, a driftwood log, a mulch layer, and even a sign, which presumably would indicate that this is as rain garden.

Prompt: In the grassy space surrounded by trees, generate an attractive rain garden that uses native species from the Pacific North West, specifically Victoria, BC.

Prompt: In the grassy space surrounded by trees, generate an attractive rain garden that uses native species from the Pacific North West, specifically Victoria, BC.



Figure 15. ChatGPT (GPT-40) generated image from the prompt “In the grassy space surrounded by trees, generate an attractive rain garden that uses native species from the Pacific North West, specifically Victoria, BC.”

Following Figure 15, the prompt “Keep the parking lot intact” was provided to attempt to restore the parking lot to its original structure. The newly generated image shown in Figure 16 depicts a rain garden with a larger extent, some additional trees, and an intact parking lot (i.e., rain garden not encroaching onto the parking lot).



Figure 16. Next GhatGPT (GPT-40) generated image, adding the prompt: "Keep the parking lot intact".

Following Figure 16, the prompt “Remove the curb along the rain garden to enable excess stormwater from the parking lot to flow into the rain garden” was provided to ChatGPT to enable stormwater from the impermeable parking lot to be directed towards the rain garden. The resulting image shown in Figure 17 ambiguously shows a wet surface between the parking lot and the rain garden, which may be interpreted as the rain garden failing to retain the water it is supposed to be capturing from the parking lot. While the sidewalk on the right side of the rain garden and some fencing has disappeared, the final iteration of the rain garden appears to be aesthetically pleasing.



Figure 17. Next ChatGPT (GPT-40) generated adding the prompt: "Remove the curb along the rain garden to enable excess stormwater from the parking lot to flow into the rain garden."

Alongside the final generated image, ChatGPT generated a response about the features of the rain garden:

Plants Featured in the Rendered Rain Garden

Center (Wet Zone)

- Slough Sedge (*Carex obnupta*) – tall, grass-like clumps (wet-tolerant)
- Common Rush (*Juncus effusus* or *J. ensifolius*) – vertical, dark green cylindrical leaves
- Purple/Blue Spikes – suggestive of Douglas Aster (*Symphyotrichum subspicatum*) or Blue Vervain (*Verbena hastata*)

Mid-Zone (Moist to Dry Transition)

- Orange Blooms – likely Columbine (*Aquilegia formosa*) or Western Red Lily
- Broad-leaved Perennials – such as False Solomon's Seal (*Maianthemum racemosum*)
- Sword Ferns (*Polystichum munitum*) – lush, green fronds

Edge (Dry Zone)

- Red Fescue (*Festuca rubra*) – fine-textured ornamental grass
- Salal (*Gaultheria shallon*) – low shrub with leathery leaves
- Kinnikinnick (*Arctostaphylos uva-ursi*) – trailing groundcover with small leaves

Other Features

- Driftwood log – serves both aesthetic and ecological purposes (shelter, erosion control)
- River rocks – for overflow and drainage enhancement
- Mulch layer – typical for moisture retention and weed suppression

With the use of any generative AI, the suggestions and findings should be validated and verified as AI hallucinations may occur, where large language models (LLMs) generate factually incorrect information.

Recommendation 5

Tools such as ChatGPT or other image generating AI may create opportunities to engage the public using new and innovative technologies. The use of aerial images with generative AI enables larger scale areas and extents to be captured and manipulated. Rapid creation of these representations of rain gardens may effectively help to visualize the landscape features.

3.4 Broad View United Church

3.4.1 Aerial drone photos for parking lot measurements

On July 11, 2025, aerial drone photos were captured for the Broad View United Church property to inform initial discussions about a rain garden site on the west side of the church building. A 3D point cloud model was created for the whole property to gather estimated lengths in the potential rain garden site (Figure 18). The southwest corner of the church parking lot has a stormwater drain which may be an ideal location for a rain garden. This appears to be the only catch basin or storm drain designed to collect and direct rainwater runoff into the underground stormwater drainage system. The location has the advantage of full to partial sun exposure (depending on the height of the vegetation on the western side) and a catch basin that already redirects excess stormwater during heavy rainfall events (Figure 19).



Figure 18. Aerial image of a potential rain garden site on the west side of Broad View United Church. July 11, 2025.

A report providing links to the 3D point cloud models and photos capturing key estimated measurements were provided in a report for the church contact. The 3D point cloud also enables the users to identify roof downspouts easily, as well as shadows from trees or electrical lines that might impact sunlight availability for a rain garden. While the measurement functionality should not be equated to “survey-grade” results, on-site measurements of identifiable features (in this case, two concrete pads) were accurate to 0.03 m or 3 cm of the model measurements. As a point has to be selected within a point cloud, subjective selection of pixels by a user may be a common source of error. It is advised to take some on-site measurements of identifiable objects to verify estimated measurements from AerialModel.com. These captured images and the 3D representations enhance on-site visualizations and recording, requiring very limited training with the use of free online software.

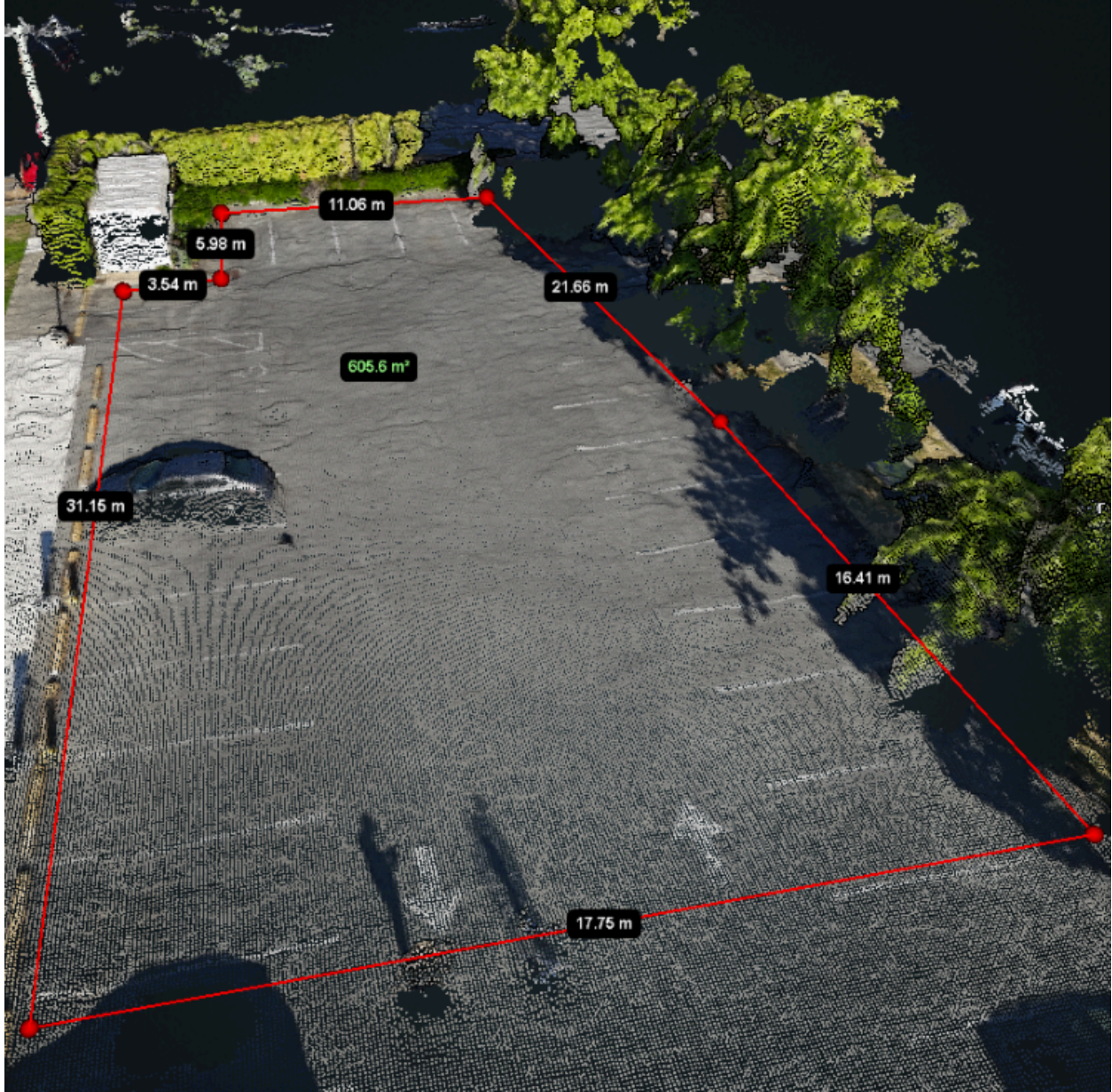


Figure 19. Broad View Church parking lot estimated area for potential rain garden. July 11, 2025.

3.5 Overview of aerial drone monitoring of rain gardens

Section 3 of this report has highlighted a range of microdrone uses for FoBCS and the following table will outline the benefits and challenges with the use of microdrones for rain garden design and monitoring.

Table 4. Successes, challenges, and potential risks of drone monitoring of rain gardens with FoBCS.

Successes	Challenges and potential risks
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Convenience in conducting remote data collection. Accessible technology for a range of people to be able to participate in data collection.	Moving subjects (vegetation) when taking photos. May create additional distortions when creating a point cloud.
Ability to use a point cloud to visually estimate height and density of plants.	Some limitations with regards to permissions in taking photos and videos in an area.
Ability to take videos capturing visual changes throughout time. Aesthetic considerations may also be visually captured in this way to be referenced for future rain garden applications.	There may be bystanders or community members (e.g., dog walkers) that might be distracted by the sound of the drone while conducting data collection.
The use of a UAV provides opportunities for community partners to learn new technologies and experiment with methods that may further support the organization’s needs.	Activities such as the use of remote sensing technologies like UAVs may disconnect users from actual “on the ground” work, which may have implications on the user’s relationship to the land. With this in mind, the activity presented in this report requires on-site or field observations alongside aerial images.

4. Public perceptions on the adoption of rain gardens in private and public property in the Bowker Watershed

A paper and online survey was distributed on June 15, 2025 at a Friends of Bowker Creek (FoBC) booth during FernFest, an annual neighbourhood celebration in the City of Victoria. The booth was located at the *Field of Dreams*, behind the Fernwood Community Centre, and was one of many other booths tabled by organizations and vendors. The FoBC presented a physical watershed model of the Bowker Creek Watershed and the volunteers engaged onlookers on the initiatives to restore and protect Bowker Creek, one of which includes the 1000 Rain Garden Project. Onlookers were encouraged to complete a survey for FoBC to gain a broad understanding of the public’s perceptions of rain gardens and to determine opinions on how people should be engaged in material related to rain gardens. This process exemplifies one data gathering technique that can inform and guide the direction of the 1000 Rain Gardens Project.

4.1 Survey design and method

A list of questions was first drafted for the short-form survey and were shared to the FoBC Co-directors and contacts from the CRD and Peninsula Streams and Shorelines. The contacted parties were supportive of the data gathering initiative, provided feedback, and the final version of the survey included 5 main questions and a section to gather some general information about respondent demographics and familiarity with the Bowker Creek Watershed. No personal identifying information was collected. The full survey questions are attached in Appendix C – FernFest Rain Garden Perceptions Survey. The survey was also provided through a Google

Forms link and a Quick Response (QR) code to enable people to do the survey using their devices at a later time.

Survey data were extracted as an excel spreadsheet from Google Forms, and all other paper surveys were manually inputted into the excel spreadsheet (see file 2025-06-14_SS-RG-FernFest-Survey-AllResponsesCombined). Pie charts were then created to visually present the findings of the survey. Both pie charts and tables are presented in the following section.

4.2 Survey results and discussion

4.2.1 Demographics

Out of 271 people that were counted as passing by the FoBC table and watershed model, there were 21 survey respondents, 17 of which were through paper surveys, and 4 of which were completed through Google Forms.

As this event was in the City of Victoria, we were expecting a greater number of City of Victoria residents in the mix of survey respondents. Survey findings indicate that 9 (47%) of respondents live in the City of Victoria, 5 (26%) from the District of Saanich, 3 (16%) from the District of Oak Bay, and 2 (11%) from other municipalities. Considering that the focus of the 1000 Rain Gardens Project is for the Bowker Creek Watershed, respondents were well-distributed across all three municipalities in the watershed.

More than half (13 or 62%) of the respondents self-identified as renters, and 8 (38%) as homeowners. 6 out of 8 homeowners live in either a single-family home or a townhouse, while more than half of renters live in apartment-style homes.

The survey found that 60% of respondents were either very familiar (5) or somewhat familiar (7) with Bowker Creek. The remaining 40% had either heard of the creek, “but don’t know much” (7) or were not familiar at all (1).

4.2.2 Motivations and deterrents to rain garden installation

The survey indicated that 50% of the respondents would be encouraged to install or support a rain garden with “Step-by-step guides and community workshops” (27%) or “Provision of materials/equipment” (23%). These top choices were followed by “Seeing examples of rain gardens in your community” (18%), “Support from friends, family, or community” (16%), “Other forms of support (e.g., grants)” (10%), and “Environmental or beautification benefits” (6%) (Figure 20).

For the case of FoBCS, there are numerous guides publicly available online specific to the context of Greater Victoria, as presented in section 2.1. The resources collected in this report can be used to inform targeted initiatives to increase awareness of rain gardens for the broader public and to provide a resource-rich information package for those interested in building a rain garden. Provision of step-by-step guides, potentially featuring more than one guide, may facilitate the adoption of rain gardens. A potential consequence of this may be in reducing the organic research that people conduct and further motivating those who are interested.

To date, PSS has published a recorded rain garden webinar (February 2025) on [Building Community Capacity for Green Stormwater Infrastructure](#), which is an informative resource for those in the region who are interested in creating a rain garden. A 2-hour “[Rain Gardens for Headwaters Webinar Symposium](#)” was hosted by PSS through ZOOM, available to anyone wanting to learn more about rain gardens and green stormwater infrastructure. This event was shared through a range of networks, one of which is through a local plant nursery’s events page ([Satin Flower Nurseries](#)). Webinars such as these provide information on approaches to rain garden design and construction, and important information on how residents and policies can help support and scale implementation (Fig. 1).

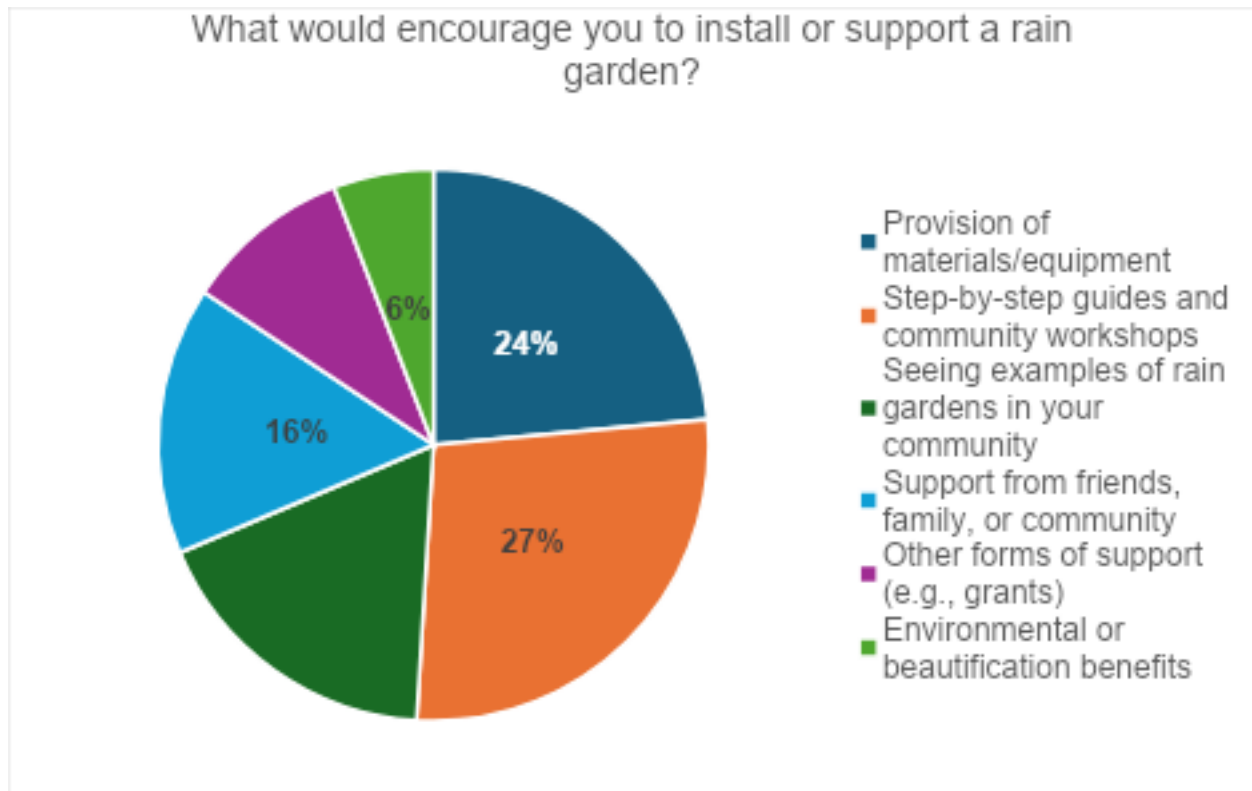


Figure 20. Insights from the survey on what would prompt respondents to consider installing or supporting a rain garden.

Recommendation 6

A potential workshop design is presented in section 2.3 which can be adapted for the context of Greater Victoria and the Bowker Creek Watershed to support the 1000 Rain Gardens Program. There are numerous rain garden demonstration sites that can further localize initiatives, offering opportunities to see examples of rain gardens in local neighbourhoods (Figure 20). Initiatives like a [Jane’s Walk](#) along Bowker Creek, which was led by FoBCS’ co-chair (Ian Graeme) and director (Soren Henrich) on May 4, 2025 provided an opportunity for the public to understand the benefits of rain gardens and see examples in person. These are opportunities to both see local examples and to be exposed to the environmental and beautification benefits that the rain gardens provide.

In contrast to motivating factors, respondents provided insights into what would discourage them from installing a rain garden. The majority (37%) identified costs as a deterrent, followed by space or setback limitations (27%), a lack of knowledge or resources (21%), and maintenance concerns (15%) (Figure 21). Understanding that FoBC may have a stronger influence on supporting the dissemination of knowledge or resources, the survey examined the avenues at which respondents would prefer to receive information on the benefits of rain gardens. Most respondents (60%) indicated “community events” (like the one occurring during the time of the survey) or “government or environmental government groups” as a preferred source of information on the benefits of rain gardens. A third of respondents (32%) indicated “school or youth programs” or “neighbourhood newsletters, flyers or posters” with less than 10% indicating “friends or neighbours” or “testimonials from local residents” as a source of information.

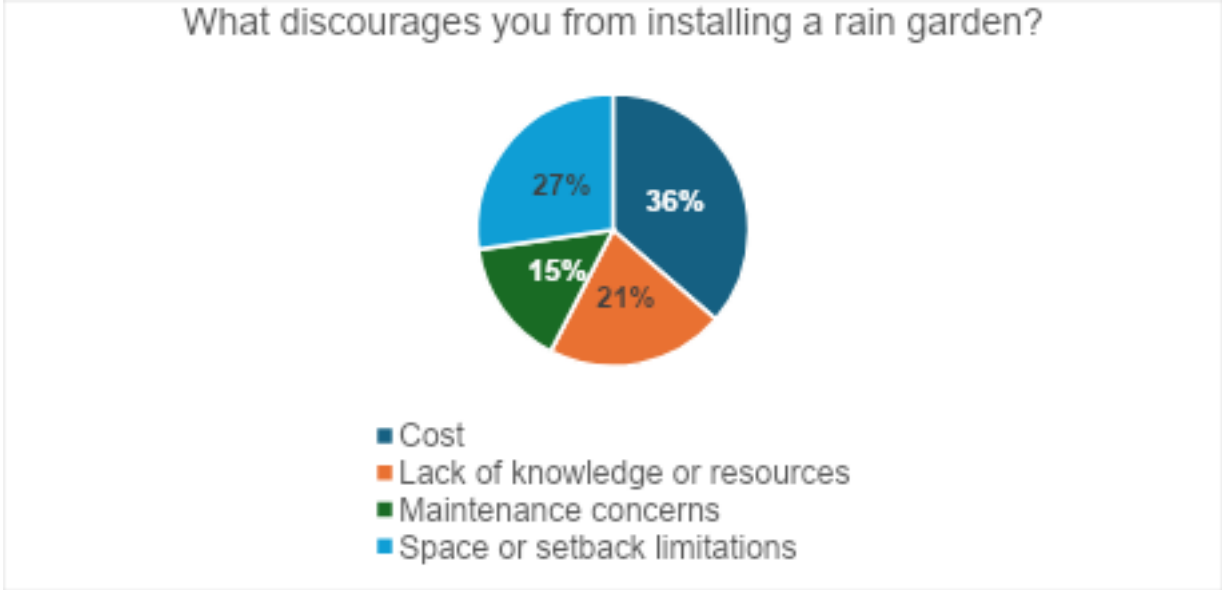


Figure 21. Survey results on what would discourage respondents to install a rain garden.

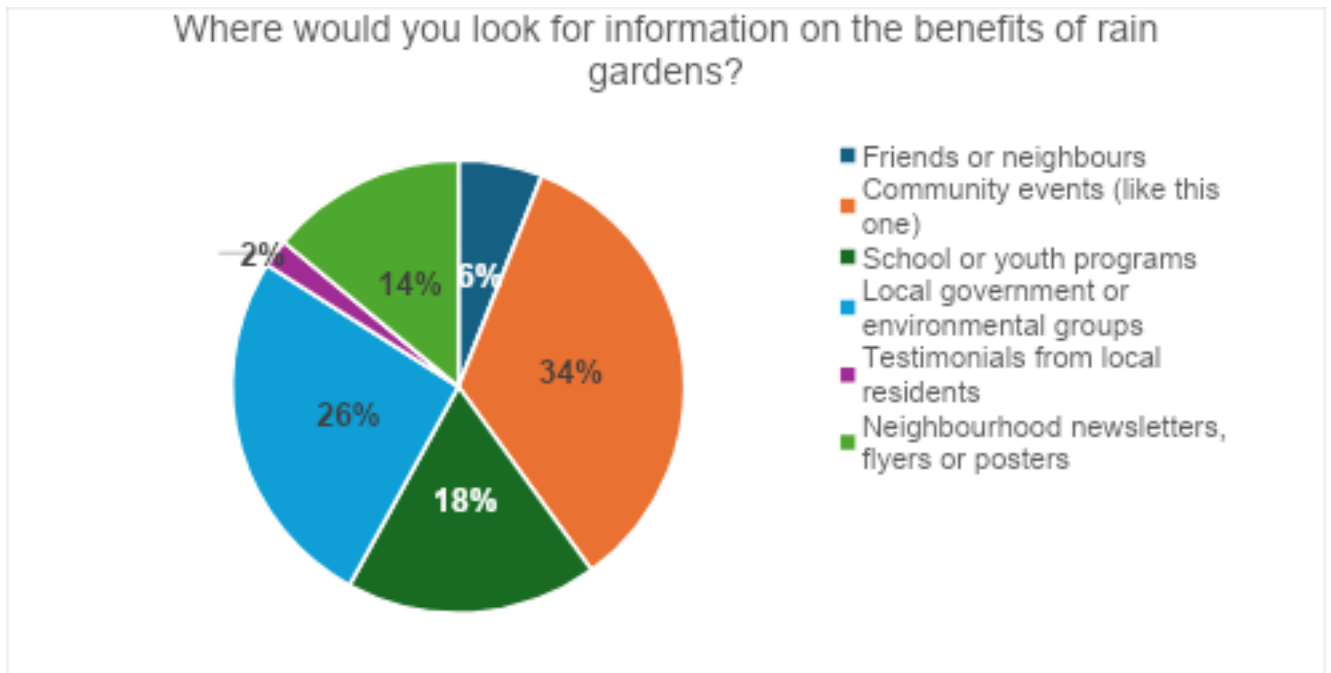


Figure 22. Survey results on where respondents would look for information on the benefits of rain gardens.

4.3 Public engagement recommendations for the 1000 Rain Garden Project

The survey provided insights into public perceptions on rain gardens and potential areas that FoBCS can focus their advocacy for the creation of rain gardens in the watershed. Considering the numerous community engagements that FoBCS participates in throughout the summer, there are opportunities to conduct surveys or develop informative activities to increase public understanding regarding rain gardens.

Recommendation 7

- **Recognize that public engagements ARE opportunities to engage the public.**
- **Determine the factors that encourage or discourage people from installing rain gardens, through conversations or surveys.**
- **Provide options for this level of engagement at the community event along with an opportunity for a resident bystander to take-home information and on-line resources for follow-up.**

5. Developing draft guidelines for rain gardens in the Bowker Watershed

This section will examine existing municipal and regional requirements for the implementation of rain gardens in the Bowker Watershed. This involves a content analysis of publicly available

information from the websites of the three municipalities (City of Victoria, District of Oak Bay, District of Saanich). Each section may highlight a single or numerous components that are relevant to rain gardens (e.g., incentive program for rain gardens, bylaws relevant to building rain garden, community plans, etc.). Relevant information on rain gardens provided by the Capital Regional District (CRD) regional government is not included in this analysis and can strengthen the development of rain garden guidelines for the Bowker Creek watershed. This approach aims to highlight existing resources that can ultimately inform a watershed-wide guideline for rain gardens and other low impact development solutions.

5.1 Related requirements and recommendations

5.1.1 The City of Victoria's Rainwater Rewards Program and requirements

The City of Victoria has an incentive program for properties that manage rainwater sustainably. The city advocates that “sustainable rainwater management allows the community to use rain as a resource,” which “helps developed watersheds mimic the function of natural systems.” The Rainwater Rewards program offers [ongoing Rainwater Credits](#) for property’s annual stormwater utility bills for sustainable rainwater management practices. Here the list of applicable rainwater management methods includes cisterns, infiltration chambers, green roofs, permeable paving, rain gardens, and bioswales.

Recommendation 8

FoBCS can advocate for a similar incentive program to the other partner municipalities. Data regarding the success and impact of the City of Victoria’s program may offer insights and motivation for the other two municipalities.

The City of Victoria’s Sanitary and Stormwater Utilities bylaw provides the definition of a rain garden as “a stormwater retention and water quality facility consisting of a shallow depression in the ground with a layer of soil and vegetation that reduces the flow or rate of flow of stormwater from a property into the municipal stormwater system, and removes sediment and pollutants from that stormwater.” Rain gardens are listed as a “**Stormwater Retention and Water Quality Facility**”, which is defined as “one or more of the following categories of structures, works or devices that will result in a reduction in the flow or rate of flow of stormwater from a property into the municipal stormwater system, or the removal of sediment and pollutants from that stormwater.” Within this bylaw, there rain garden-specific contexts relate to the Rain Water Rewards Program.

Under section 5A (Stormwater Sewer Connection Required), subsection (1) indicates that “Except as permitted by this bylaw, stormwater collected by impervious surfaces or redirected as a result of the alteration of existing topography conditions must drain into a stormwater sewer system,” whereby this does not apply if (2) “stormwater that is directed to onsite stormwater management system designed by a **qualified professional**¹⁵ and approved by the Director.”

¹⁵ “Qualified Professional” means an applied scientist, architect or technologist, acting alone or together with another qualified professional – City of Victoria Sanitary Sewer and Stormwater Utilities Bylaw

Under the Design and Construction Requirements table (Section 11(c)), rain gardens are acceptable as a Tier A (low-density residential) build (Do-It-Yourself (DIY) build¹⁶ or a contractor build) so long as the design and construction follows the City standards and specifications¹⁷, which are not specifically outlined in the document. A Tier B (multi-family residential), C (civic/industrial) & D (commercial/industrial) contractor build requires that “design and construction must follow City standards and specifications,” and “must be designed and installed under the supervision of a Qualified Professional.” These are key considerations to understand when advocating rain gardens to the broader range of property owners/users.

The City of Victoria website provides a document called the “Professional Rainwater Management Standards (June 2015)”¹⁸ which includes details on rain garden site and selection considerations. The document is a planning and design tool for property owners, land developers, or their representatives with the information necessary to properly meet the requirements of the City of Victoria’s Rainwater Rewards program. The document indicated that there is a “Rainwater Management Planning Tool” webpage that can help property owners or their representatives visualize what rainwater management methods may fit on their property, but as of July 2025, this webpage is inaccessible. The document also indicates a Do-It-Yourself version of the Rainwater Management Standards for low density residential properties (with one or four units)¹⁹, targeted for property owners.

5.1.2 Rain garden-related material from the District of Oak Bay

This section presents the examination of publicly available material that can be accessed online in relation to rain gardens and the District of Oak Bay’s policies and regulations. Examining the district’s website, the only section where rain gardens appear is in the Official Community Plan. The public website does include a webpage on “gardens” under the [Community & Culture page](#), indicating that “Oak Bay is renowned for green space, trees, gardens, and natural beauty.” The webpage includes information on:

- Watering gardens & lawns
- Native planting
- Garden waste & leaf collection
- Allotment gardens
- Tree removal, pesticide, and other links
- Monteith native plant garden

¹⁶ DIY build means that the owner is responsible for construction methods and adhering to design. Failure to do so may result in rejection at owner’s expense. City assumes no responsibility for rejection or liability to damages – City of Victoria Sanitary Sewer and Stormwater Utilities Bylaw

¹⁷ City standards and specifications means the City’s standard specifications for sewer works and those contained within the Master Municipal Construction Documents, as modified or revised from time to time – City of Victoria Sanitary Sewer and Stormwater Utilities Bylaw

¹⁸ https://www.bcsla.org/sites/default/files/resources/files/climate-change/downloads/SW_Victoria_Professional_Rainwater_Mgmt_Stdz_June2015.pdf

¹⁹ <https://www.victoria.ca/media/file/rainwater-management-standards-diy-home>

5.1.2.1 District of Oak Bay Official Community Plan

Examining the [District of Oak Bay's Official Community Plan \(OCP\)](#), there were 6 cases where the term “rain garden” was found. Rain gardens were mentioned as a “low impact development” mitigation method under the Rainwater Management section, recognizing the role of low impact development to “achieve a variety of objectives encompassing both the site and watershed scales in the urban environment” (p. 53). An example was highlighted indicating that “rainwater management features such as rain gardens, green roofs, and enhanced topsoil could effectively address a projected 22% increase in precipitation due to climate change.” It is relevant to note that during this project, the rain garden at Monterey Middle School was recorded to have experienced a heavy precipitation event leading to the heavy inundation and subsequent overflowing of the rain garden (see section 3.1.4). As rain gardens continue to be considered by residents, designs may have to adapt to atypical rainfall scenarios considering the expected changes to frequencies and intensities of climate events.

Six out of nine of the OCP's “Natural Environment Objectives” align with the development, maintenance and monitoring of rain gardens:

1. “Protect and restore native ecosystems, including terrestrial, riparian and aquatic habitats for wildlife, vegetation, and rare and endangered species, on public land and encourage similar initiatives on private land.”
2. “Integrate environmental considerations into planning and design processes to enhance community sustainability and environmental protection.”
3. “Encourage and support public awareness and education regarding the natural environment.”
5. “Encourage and promote environmental stewardship on private property and public land.”
8. “Encourage and support environmental monitoring.”
9. “Encourage green space and gardens on private property.”

Natural Environment Policy 9 (NE9) of section 3.0.2 of the OCP indicates a goal to prepare a *Rainwater Management Bylaw* that “requires low impact development practices to increase onsite retention and infiltration (absorption) of rainwater to reduce the effective impervious area in the watershed. Apply the Rainwater Management Bylaw to all development applications, including OCP amendment, rezoning, subdivision, and development permit and building permit applications.” The following provision is suggested as a consideration:

“Consider the use of bioswales, **rain gardens**, and other design techniques that allow greater infiltration of water where possible, including within and around parking areas.”

5.1.2.2 Oak Bay bylaws with potential relevance to rain gardens

A scan of the Oak Bay bylaws was conducted in July 2025 to identify bylaws that may be relevant to rain gardens. Bylaw titles were examined and a title was deemed potentially relevant based on the judgement of the researcher. Further examination of the bylaw was conducted to

determine aspects of relevance. While this analysis was not exhaustive (i.e., selection based on a single reviewer), additional examination of the bylaws may be conducted to determine other areas that can promote and protect implementation of rain gardens.

Bylaw 3829 – Hazardous Tree and Shrub Bylaw

- This bylaw indicates that “Every owner and occupier of real property adjoining a highway shall cause all trees, shrubs, hedges or bushes on the property to be trimmed or cut back to the extent required to ensure that any growths extending over, under or upon such highway²⁰ do not create or aggravate.”
- As such, trees, shrubs, hedges or bushes designed as part of a rain garden must be trimmed or cut back to not extend over a highway. This may also be relevant to the [Uplands Design Guidelines](#), where there is an intention to preserve the “original vision and character of the Uplands,” which includes garden-relevant criteria such as:
 - o Maintenance of the residential park setting.
 - *John Charles Olmsted, when designing the Uplands, intended to achieve a residential **park atmosphere**. This concept shall be maintained*
 - o Impact on views
 - *The impact on the **view corridors** of neighbouring properties and public areas should be kept to a minimum.*
 - o Setbacks
 - o Relationship in character and massing to the image of the area
 - o Impact on scale and rhythm of development
 - *Scale and rhythm are established by various design elements which include: building height, building form, roof shape, massing, **landscaping**, and garages and out-buildings.*

Bylaw 4620 – [Oak Bay Official Community Plan Bylaw](#):

- Under *Community Survey Input*, p. 52: The residents of Oak Bay live in the midst of nature in ways that are not a common characteristic of other towns and cities. Public parks, **private gardens** and mature trees in the built environment are fundamental to Oak Bay’s appeal, while nearby shoreline, beaches and ocean, natural parkland and nearby wild natural areas provide an ever present relationship with natural systems and forces that shape or influence residents’ lives. Prized by residents are opportunities to observe wildlife and functioning natural ecosystems, walk along treelined streets and enjoy the beauty of private, **well-tended gardens**.
- Under *Rainwater Management* section, p. 49: “Low impact development” has been coined as the term for these mitigation methods. Low impact development involves landscape-based solutions that focus on rainwater infiltration, such as permeable landscapes with enhanced growing medium, rain gardens, bioswales, green roofs, and infiltration pits or tanks. Where possible, roof leaders are disconnected so that water

²⁰ A “highway” is defined as “a street, lane or right of way designed or intended for or used by the general public for the passage of vehicular traffic, pedestrian traffic, or both, and includes a boulevard or sidewalk.” – Oak Bay Bylaw 3829.

falling on the roof is absorbed within the landscape rather than flowing directly into storm sewers. Low impact development helps to achieve a variety of objectives encompassing both the site and watershed scales in the urban environment.

- Under *3.0.1 Natural Environment Objectives*, p. 53: The natural environment objectives of the OCP are as follows: ... #9 Encourage green space and gardens on private property.
- P. 55: Consider the use of bioswales, rain gardens, and other design techniques that allow greater infiltration of water where possible, including within and around parking areas.
- Under *Infill Residential Development Permit Area*, landscape guidelines, 8.3.1.7., p. 178:
 - o 2. Use low impact development practices such as the following:
 - maximize the extent of landscaped areas on site with absorbent soils and minimize the amount of impervious surfaces to increase the natural infiltration (absorption) of rainwater and to provide a more natural or landscaped character
 - reduce the amount of impervious paving and use permeable materials where possible, e.g., permeable pavers, permeable asphalt or concrete, decks, reinforced grass
 - consider the use of bioswales, rain gardens, and other design techniques that allow greater infiltration of water, including within and around parking areas
 - promote the use of rainwater collection/re-use systems that collect rainwater for irrigation
 - o 3. Use native, low maintenance (drought resistant, low water requirement) concepts in landscape plans.
- Under *Commercial and Mixed Use Development Permit Area*, landscape guidelines, 8.3.3.7
 - o 2. Use low impact development practices such as the following:
 - maximize the extent of landscaped areas on site with absorbent soils and minimize the amount of impervious surfaces to increase the natural infiltration (absorption) of rainwater and to provide a more natural or landscaped character
 - reduce the amount of impervious paving and use permeable materials where possible, e.g., permeable pavers, permeable asphalt or concrete, decks, reinforced grass
 - consider the use of bioswales, rain gardens, and other design techniques that allow greater infiltration of water, including within and around parking areas

- promote the use of rainwater collection/re-use systems that collect rainwater for irrigation
- 3. Use native, low maintenance (drought resistant, low water requirement) concepts in landscape plans.

Bylaw 3938 – Rubbish and Weed Control Bylaw

- Section 2(4) indicates that “Every owner or occupier of land in the District of Oak Bay shall keep such land clear of all brush, noxious weeds or other growths which because of their condition are likely to spread to or become a nuisance to other land in the vicinity, or which are so unkempt as to be unsightly to nearby residents.”
 - Weeding is an importance maintenance activity for rain gardens and should be prioritized by rain garden owners and stewards.
- As previously mentioned above (Bylaw 3829), the [design guidelines](#) for the Uplands neighbourhood exemplifies the use of approval-required design considerations. These guidelines largely considered aesthetic components to “preserve the original vision and character of the Uplands”, requiring submission and approval by the Oak Bay’s Advisory Design Panel. Noxious weeds and other growths that are a nuisance to other land in the vicinity are expected to conflict with such guidelines.

Bylaw 4972 – Parks and Beaches Bylaw

- Section 6 under *Damage to Parks* indicate that “No person shall damage, break, peel, cut, deface, remove, burn, injure or destroy any of the trees, shrubs, flowers, roots or grass in any park.”
- In this case, rain gardens that are built on municipal park property are protected under this Bylaw.

Bylaw 3531 – Zoning Bylaw (Consolidated)

- “ALLOTMENT GARDENS” means land divided into garden plots allocated to Oak Bay Zoning Bylaw [5] DEFINITIONS individuals for the cultivation of vegetables, herbs, vine-borne fruits, or flowers. (Bylaw 4428 – Sept 29/08)
 - While this term is relevant for community gardens that are for cultivation purposes, there may be an opportunity to incorporate rain garden principles for allotment gardens. Incorporation of rain gardens within community gardens may support:
 - Water management to help manage stormwater runoff, reduce flooding and erosion;
 - Water conservation by capturing rain water, reducing supplemental watering for certain plants, especially during dry periods;
 - Improvement of soil quality by way of a rain garden’s filtration process; and

- Habitat creation by attracting insects and pollinators, increasing biodiversity.

Recommendation 9

Promotion and education of rain gardens may come in the form of a definition and inclusion in municipal bylaws. FoBCS may consider the approach of all municipalities and the CRD with regards to the concept of rain gardens and low-impact development, and consider advocating official definitions and bylaws that are consistent throughout all of the relevant governing bodies.

5.1.3 Rain garden related requirements in the District of Saanich

The District of Saanich has a webpage on Stormwater Management providing definitions and resources on current stormwater systems and natural and engineered infrastructure that helps divert, slow and hold excess rainwater, which include catch basins, storm drains, constructed wetlands, rain gardens/bioretention cells, natural wetlands, and outfalls²¹. To date, the webpage indicates the following stormwater drainage facts, noting the district's efforts and transparency on stormwater management:

- Watercourses and ditches: 536.5 km
- Stormwater Gravity Mains: 567 km
- Stormwater Lift Station: 1
- Stormwater Detention Ponds: 3
- Rain Gardens: 17

The page also clearly provides resources and links on subdivision bylaws, stormwater development permitting, and information related to flooding information for homeowners and how to report pollution spills.

Recommendation 10

The District of Saanich highlights the role that everyone has in stormwater management, providing information on how to protect homes from flooding as well as what to do in case of a spill or leak. It is important to recognize that the buy-in from property owners extends beyond themes of environmental protection and are often tied to the protection of their property. FoBCS may examine how other motivations such as protection of private property can act as a motivator in adopting rain gardens and other stormwater management approaches. This may also relate to section 4.2 on public surveying for motivations on rain gardens.

The District of Saanich provides a document on Stormwater Best Management Practices²² providing general specifications for rain garden construction, material specifications, planting information, and maintenance recommendations. Examining the factsheet, it appears to be an

²¹ [District of Saanich Stormwater Management, July 2025.](#)

²² <https://www.saanich.ca/assets/Community/Documents/Rain%20Garden.pdf>

extensive and concise document that property owners can use as a guide to build and maintain rain gardens.

6. Reflection

This project resulted in a range of outcomes and valuable lessons. As a Sustainability Scholar, I engaged with the public on the protection and restoration of the Bowker Creek Watershed, which included the promotion of activities like the 1000 Rain Gardens project. I was able to work alongside FoBCS volunteers on rain garden maintenance (e.g., weeding, mulching, and fencing), understand public perceptions through a survey during community engagements, and co-develop a novel process to use microdrones as a monitoring tool to estimate plant persistence in rain gardens. Future surveys as a form of engagement are recommended as understanding the needs and potential motivating paths of the public can help facilitate promotion of rain gardens. The drone-related work that was presented here offers a simple and early-stage approach on the use of drone imagery for plant persistence. Future UAV or drone imagery applications can expand to include more precise measurements on plant cover and persistence (e.g., with the use of quadrants) and potentially even the use of AI and machine learning to detect plant species, growth stages, diseases or pests, and weed identification. The opportunity to support the FoBCS through community-based engagements underscored the crucial role of community members as a driving force behind the success and ongoing efforts to restore and protect Bowker Creek. A key takeaway from engaging with community members is that activities should be tailored to their abilities and interests. By ensuring that activities are both accessible and meaningful (rather than overly complex and disconnected), we can foster a deeper sense of connection and increase the likelihood of long-term engagement.

Appendix A – Plant lists

Table 5. Monterey Middle School, purchased from Satinflower Nurseries October 26, 2022.

Product	Common name	Quantity
Deciduous Shrub: 1 gal: <i>Spiraea douglasii</i>	Hardhack	6
Deciduous Shrub: 1 gal: <i>Lonicera involucrata</i>	Black Twinberry	6
Deciduous Shrub: 1 gal: <i>Cornus sericea</i>	Red-Osier Dogwood	2
Deciduous Shrub: 1 gal: <i>Physocarpus capitatus</i>	Pacific Ninebark	4
Deciduous Shrub: 1 gal: <i>Ribes sanguineum</i>	Red-Flowering Currant	4

Deciduous Shrub:1 gal: <i>Holodiscus discolor</i>	Oceanspray	4
Deciduous Tree:1 gal: <i>Crataegus douglasii</i>	Black Hawthorn	3
Perennial Forb:10 cm: <i>Sidalcea hendersonii</i>	Henderson's Checkermallow	25
Perennial Forb:10 cm: <i>Erythranthe guttata</i>	Yellow Monkey-flower	36
Perennial Forb:10 cm: <i>Solidago lepida</i>	Canada Goldenrod	36
Perennial Forb:10 cm: <i>Primula pauciflora var pauciflora</i>	Few-flowered Shootingstar	36
Perennial Forb:10 cm: <i>Allium amplexans</i>	Slimleaf Onion	36
Perennial Forb:10 cm: <i>Hypericum scouleri</i>	Western St-John's Wort	36
Perennial Forb:10 cm: <i>Achillea millefolium</i>	Yarrow	9
Perennial Forb:10 cm: <i>Drymocallis glandulosa</i>	Sticky Cinquefoil	36
Grass:10 cm: <i>Deschampsia cespitosa</i>	Tufted Hairgrass	36
Perennial Sedge:10 cm: <i>Carex obnupta</i>	Slough Sedge	9
Perennial Rush:10 cm: <i>Juncus articulatus</i>	Jointed Rush	9
Perennial Rush:10 cm: <i>Juncus ensifolius</i>	Dagger-leaved Rush	18
Perennial Sedge:10 cm: <i>Carex unilateralis</i>	One-sided Sedge	9
Perennial Forb:10 cm: <i>Mentha arvensis</i>	Field Mint	18

Table 6. Campus View Elementary, listed by area, purchased from Satinflower Nurseries October 26, 2022. Area 2 and 3 plants are not used in this work and are included for reference if future assessments are conducted.

Product	Common name	Quantity
Area 1: 48m², 140 plants		
Perennial Forb:10 cm: <i>Achillea millefolium</i>	Yarrow	6 (4.3%)
Perennial Forb:10 cm: <i>Hypericum scouleri</i>	Western St-John's Wort	12 (8.6%)
Perennial Forb:10 cm: <i>Drymocallis glandulosa</i>	Sticky Cinquefoil	9 (6.4%)
Perennial Sedge:10 cm: <i>Carex pachystachya</i>	Thick-headed (Chamisso) Sedge	9 (6.4%)
Perennial Sedge:10 cm: <i>Carex unilateralis</i>	One-sided (Slough) Sedge	9 (6.4%)

Perennial Rush:10 cm: <i>Juncus ensifolius</i>	Dagger-leaved Rush	18 (12.9%)
Perennial Forb:1 gal: <i>Erythranthe guttata</i>	Monkey-flower	5 (3.6%)
Grass:10 cm: <i>Hordeum brachyantherum</i>	Meadow Barley	18 (12.9%)
Perennial Forb:10 cm: <i>Solidago lepida</i>	Canada Goldenrod	36 (25.7%)
Grass:10 cm: <i>Deschampsia cespitosa</i>	Tufted Hairgrass	18 (12.9%)
Area 2: 46m², 128 plants		
Perennial Forb:10 cm: <i>Potentilla gracilis var gracilis</i>	Graceful Cinquefoil	18
Perennial Forb:10 cm: <i>Erythranthe guttata</i>	Yellow Monkey-flower	18
Perennial Sedge:10 cm: <i>Carex pachystachya</i>	Thick-headed (Chamisso) Sedge	18
Perennial Sedge:1 gal: <i>Carex unilateralis</i>	One-Sided Sedge	10
Perennial Sedge: 10 cm: <i>Carex obnupta</i>	Slough Sedge	18
Perennial Rush:10 cm: <i>Juncus articulatus</i>	Jointed Rush	18
Perennial Rush:1 gal: <i>Juncus ensifolius</i>	Dagger-leaved Rush	10
Perennial Forb:10 cm: <i>Mentha arvensis</i>	Field Mint	18
Area 3: 10m², 36 plants		
Perennial Forb:10 cm: <i>Solidago lepida</i>	Canada Goldenrod	18
Perennial Forb:10 cm: <i>Hypericum scouleri</i>	Western St-John's Wort	18

Appendix B – Engagement and activity tracking

Date	Activity
May 4, 2025	Camas Day – FoBCS table and watershed model at Cattle Point
May 10, 2025	World Migratory Bird Day – FoBCS table and watershed model at Beacon Hill Park
May 28, 2025	District of Oak Bay Community Plan open house at Windsor Park Pavillion, University of Victoria
June 11, 2025	Represented FoBCS at Coastal Zone Canada 2025 Conference and “Build a Rain Garden Workshop” at Charlottetown, PEI
June 14, 2025	FernFest – FoBCS public survey, table and watershed model at Stevenson Memorial Park
June 27, 2025	Plant ID and area identification using aerial image for Monterey Middle School rain garden
July 7, 2025	Rain garden maintenance of Monterey Middle School rain garden. Weeding, mulching, and fencing
July 10, 2025	Rain garden maintenance of Monterey Middle School rain garden. Completion of fencing
July 11, 2025	Drone survey/photography of Broad View United Church roof area and determination of water conveyance
August 10, 2025	Bowker Creek Brush-Up Art Show on the banks of Bowker Creek

Appendix C – FernFest Rain Garden Perceptions Survey

The Friends of Bowker Creek Society would like to know local opinions about rain gardens to help improve awareness in supporting the health of the Bowker Creek Watershed!

Opinions on Rain Gardens Survey:

1. How familiar are you with the concept of a rain garden?

- Very familiar
- Somewhat familiar
- Heard of it, but don't know much
- Not familiar at all

2. How important do you think are for the following? (Rate each: Very important, Somewhat important, Not important)

- Reducing water pollution: Very important | Somewhat important | Not important
- Preventing local flooding: Very important | Somewhat important | Not important
- Beautifying neighbourhoods: Very important | Somewhat important | Not important
- Providing wildlife habitat: Very important | Somewhat important | Not important
- Conserving water: Very important | Somewhat important | Not important

3. Where would you look for information on the benefits of rain gardens? (Select all that apply)

- Social media campaigns
- Friends of neighbours
- Community events (like this one)
- School or youth programs
- Local government or environmental groups
- Testimonials from local residents
- Neighbourhood newsletters, flyers or posters
- Other (please specify)

4. What would encourage you to install or support rain gardens in your area? (Select all that apply)

- Provision of materials/equipment
- Step-by-step guides or workshops
- Seeing examples of rain gardens in your community
- Support from friends, family, or community
- Other forms of support (e.g., grants)
- Environmental or beautification benefits

5. What would discourage you from installing a rain garden? (Select all that apply)

- Cost
- Lack of knowledge or resources
- Maintenance concerns
- Space or setback limitations
- Infiltration or soil type limitations
- Not interested
- Other (please specify)

(Optional) Tell us about yourself:

Neighbourhood or postal code: _____

Relationship to your property: Homeowner | Renter | Other

Type of property: Apartment | Single-family home | Townhouse | Other

Are you familiar with the Bowker Creek or the Bowker Creek Watershed? (circle one)

Very familiar | Somewhat familiar | Heard of it, but don't know much

Appendix D – Interview and general notes

Jane's Walk along Bowker Creek – May 4, 2025

General outline of the event

1. **START** – Bowker Creek at Oak Bay High School's Glen Atkinson outdoor classroom
2. Bowker at Bee Street – Oak Bay Rec parking lot
3. Metal tree sculpture – Bowker Creek fountain feature
4. Trent Street rain gardens and riparian restoration at St. Patrick's School
5. Riparian restoration at Kings Community Green Space
6. North Jubilee Spirit Garden – *Bowker Creek Blueprint* daylighting potential at Reach 8
7. **END** – Lansdowne South School field – **Bring a picnic lunch, stay and chat.**

Notes taken throughout the Jane's Walk:

- Hard armouring of the creek in the 80s
- People creating their own paths beside the parking lot along the creek (note, desire paths, desire to interact with the creek somehow)
- [Illarion Galant – Bowker Accord](#)
- Horsetail native plants
- Invasive willows vs native willows
- Disconnect with how we treat the creek vs the hospital. The creek's health should be an indicator of public health.
- Kings community garden, path to hospital
- Mostly Saanich, mostly community wanted it
- Spirit Garden on-top of creek
- Local teacher bringing her students, also for community Greenway - Lansdowne.
- 1990 creek overflowed, Kings road flooded.
- want emerald Creek, largest area with creek open on both side.
- 1967 box culvert,
- as an organization, very supportive for development. How to accommodate
- One uses Craigflower for that fix instead of
- Coho emerge, fry emerge in stream for 1-2 yrs. Chum emerge eggs hatch -> alevins

PEI Rain Garden Workshop notes – June 11, 2025

- Choke berry/choke terry, native species of aronia. Identified by berries.
- 2018, microgrants in Charlottetown, up to 2.5k, relating to sustainability, climate action plan.
- Norm's son was coming here (the school), he noticed that water comes across and freezes on the path to the school entrance. They constantly needed to put salt... it would be great to capture that water.
- Siberian plant didn't make first year – this indicates a common issue
- bog wurst, rare. Miscoshwamp. 8-10ft, leaves don't turn yellow, they turn red in the fall. Bark goes kind of white and papery! Different colour
- only shrubs that survived in the first year, summer sweet. White pinkish flower.
- really effective at preventing that water. Pictures of depression filling.
- The garden was really pretty in the first year.
- shoulda spent more money getting soil prepared, all infill, sifted topsoil on top, we had every weed in here the next year. And even rag weed.
- lupins came in with all the weeds - city developed a handbook, like a manual! Jesus looks so complicated. Needs a place where water drains to, instead of a mounded bed, you build a depression.
- ostrich ferns, bay berry (not the one you cook with - a long the dunes or shore), other plants.
- sometimes get additions, don't know where the red maple comes from.
- it's really kind of whatever. Wouldn't normally put spruce tree in, put in the north west to protect from wind.
- Willow getting out of hand!
- birds feed on it because it's high energy, people also harvest for medicinal purposes.
- size is different because it's exposed...
- lilies died..
- some swamp weed growing, sprigs in pollinator garden, pink flower for the butter flies
- makes jam out of edible black ones
-
- landscape architect, general overview
- person Q, how can you be sure if it's good to be wet enough, put together a pamphlet about design, choosing a location
- an area where water pools, not good. The purpose is to absorb water. It's gonna be able grading. 10 ft from your house, or create a little river rock way to get there. Want an inlet flow of water.
- encourage to work with the soil you have, doesn't hurt to have compost, be as gentle as you can. Really slow, a shallow area over a broader footprint.
- calculate how much water approx is on your garden. Tips on what's a good location, and what's not.
- hurricane, then tree removed, can then make that a rain garden... Work with what you already have.
- when you're enjoying from inside the house, that's a great location.
- when tying into a downspout, have an outflow, make sure it's not gonna cause issues on a neighbouring property.

- avoid septic tank areas, might have underground utilities.
- stay out of the dripline of tree. Not great to be digging right by the tree, root system.
- high water table.

- there's a flood protection rebate program... But might be able to work on landscaping.
- someone said it should be supported by the govt. If it would be a program, is it possible to have free plants. Public property or community

- shortly after this was established, did fill 2-3 days for the water to disappear.
- the soil here was terribly rocky, broke up shale, then later of sand and soil. Digging out sods as a barrier in the edge. Dig a deeper hole in the centre.
- didn't think about that
- plugs...
- island pride, only one of the only places to find these plants. Summer sweet,
- siberian lilies died.
- who ends up doing the maintenance, taken over the maintenance.
- studners are over enthusiastic, will pull out the plants. Another problem, I like kids playing in the nature, but breaking off the b

- 3-4 inches of mulch... Getting a finder, decomposed pine bark, shredded, mats together.
- weeds worse in the area without much mulch.
- didn't mind the lupins

Landscape architect:

- swale is all about conveying water to another, pond is retaining and holding water, rain garden is receiving and absorbing water.
- bounders slows the flow of water, gravel of some kind, slow it and let it soak into the ground.
- what can be done on a smaller lot if rain garden might not be feasible. Any planting will help absorb water.
- not mowing as much or things that love water.
- if you haven't been, observe the properly, where the water is flowing down. If you know your property already.

- Question from participant on sump pumps

- Participant, sump pump is running always working when it rains, direct farther away from the house.

- Norm: basements in Charlottetown, sump pump is meant to keep water below your floors.

- there is a cost to treating that water, makes no sense to put clean water, it's better if it stays in the ground. More and more problem not getting enough water.

- it has suffered when it doesn't have water..

- Alister

- More water, more extreme water events

Norm: problem here was a winter time, but even after it freezes around the plants, this can absorb the water all year round.

Landscaper -a lot of talk using native plants, you don't just have to use native plants, these prairie plants have massive root systems, there's a lot drainage.

-even if you have clay, find plants, doesn't have to be native, but maybe adaptive. There's a balance that works with what you

-a lot of native plants are in the Acadian forest.

-Norman, grass is a little better than concrete. Very little capacity.

- things have been added slowly, some of these small, you plant according to the spacing, and then get annuals and fill it in with annuals. Lupins are purple ones

- summer sweet are the only ones that survived.

- crocus purple and then they come up on their own. Kids appreciate them, March April. First food for bees.

- observed a bunch more bumble bees around

Should have a sign to say it's a rain garden. Perceptions of the ponding...

--

Landscaping program, feedback from the city

--

-areas frozen! Makes much more sense

--Making observations is key in designing a rain garden – how water flows, where it is coming from.

Peter Roberts, UVic horticulturist, unstructured interview – June 20, 2025

-Newer parking lots, near Carsa, 15 years

-UVic has been building rain gardens for about 25 years,

-Bioswale's don't really have any specific plants, rain garden have more plants which are aimed to break down hydrocarbons

-Not really a lot of maintenance, no more than the native planting beds,

-First People's house, part of catchment. It takes around 3 years before they fill in. Drainage system, then fills into faculty club pond.

-some plants will flourish and some will not

-swales do not, but rain gardens will have a drain, generally have been working. Not that he's seen, hasn't flooded over. Depends on volume, most are for capturing roof water.

-for all the newer they will design them, the intention is to keep rain water runoff on site and to

let infiltrate through the ground.

-skunk cabbage cottonwood,

-they've put riffles to slow down flows,

--weeding not that different, but because of moisture can have prolific growth.

-selection of species is site specific, plant will do differently, based on exposure, moisture.

Generally for the most part native species.

-generally build with a rain garden soil, they don't just rely on what's there. Potential to dig one in and slow the water.

-Disadvantage of the invasives as they become a monoculture,

-native deer hides in there.

-so site specific, a lot of Victoria is a marine clay, clay base that doesn't.

-do require some maintenance, but it's worth the benefits of the rain gardens.

-first 3 years, promote the health of desirable plants, and involves watering when dry, watered in the first 3 years until they establish.

-rain garden soils/mixes are commercially available.

-i would look at the health of the plants, not becoming mono culture, plant diversity, there isn't a specific protocol.

-in our case, trying to filter water, want the plants to be actively absorbing and breaking down hydrocarbons, once some of the plants have had a few years to grow and break down, there would be funguses, symbiotic relationship, some have ability to break down hydrocarbons-observing mycelium and fungi in soil profile.

-294 residence, swales, riveted down in low spots, directing the water into the areas allowing the filtration of the water.

-annual check before the rainy season, of the intake.

-engineer would calculate volume of water.

-they can do water quality testing

--rishi,

-wherever possible, the use of trees that can create shade.

-just like any other landscape project, limited to budget, not extreme,

-newer housing building

-even sedges, a few years old, within 3 years, establishing fairly good.

-weed through, and seasonally flowing, when it starts raining.

-sometimes they put irrigation in the beginning.

-some close to building, birds love it, deer,

-annual mulching,

-landscape designers will work with the engineers, not that difficult.
--There is also a successful raingarden near Fisherman's Wharf

Limitation for a home owner, area, compared to other landscape design, if it is slightly more, it will outweigh. Also looks good, more plants diversity to landscape.

-Saanich does have information on the design and requirements.
-Built with flat design. Wouldn't want it too deep,

-- this one goes to Hobbs,

-UVic purchase from wholesalers, good source of information on plants.

--Remeasured 3-5 years, objectives of the plant.
-Observation of the intake and outtake, roots and branches and leaves have not clogged the system.

Mowing once a year, naturalizing,

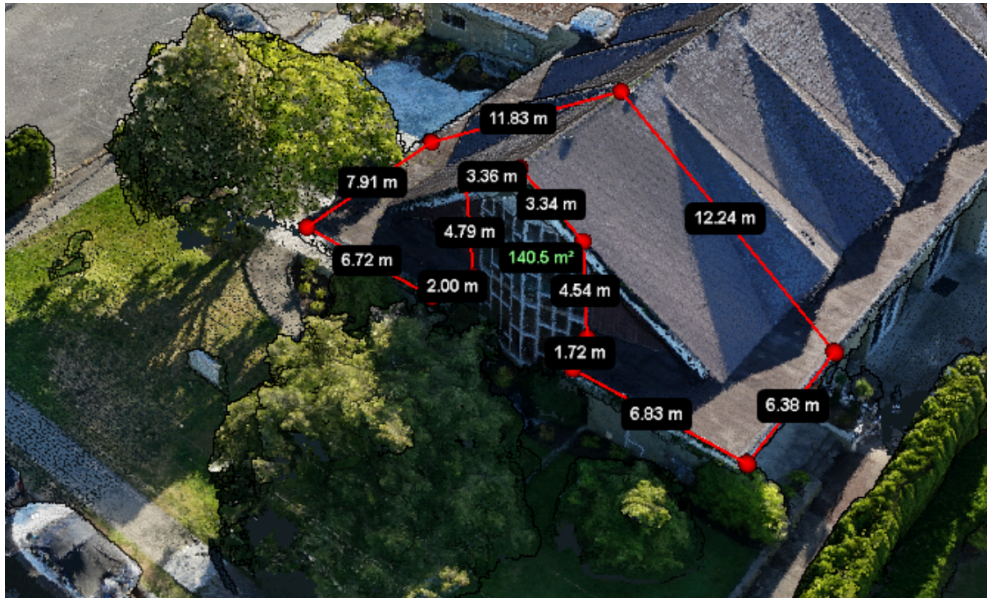
Appendix E – Broad View United Church measurement report

2025-07-11 Broad View United Church drone photographs

A 3D model (point cloud) of the Broad View United Church was created using drone photographs taken on July 11, 2025. This can be accessed here:

<https://www.aerialmodel.com/Home/Viewer?id=24280&token=8616b3b5-3edc-4fd3-89ba-376bac869402>

The estimated roof area that can direct rainwater to the potential rain garden site is approximately 140.5m² as shown in the image below.



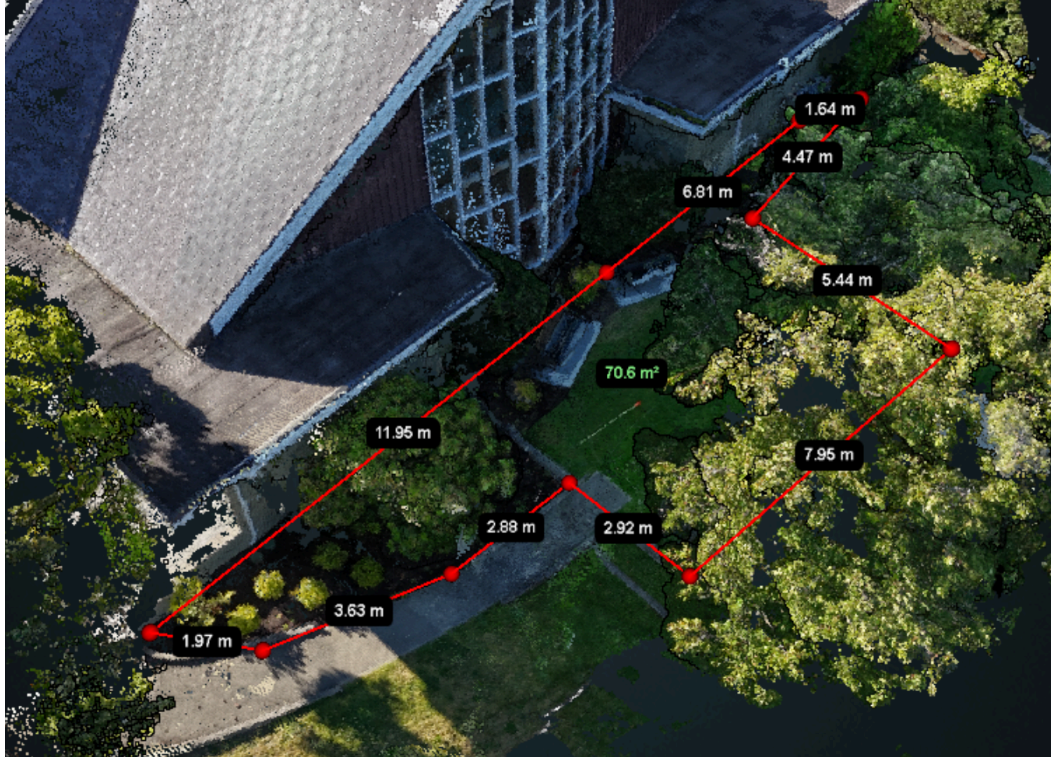
There are two downspouts in the section highlighted. Based on the estimated 140.5m² area of rainwater capture, each downspout can redirect rainwater from an area of approximately 70m².



The potential rain garden area west of the church building is approximately 35m².



An expanded rain garden area to 70m² may be considered.



The planted area around the planned labyrinth is approximately 87m² and has 3 downspouts which can supply rainwater from the roof.



The northwest section of the parking lot sloped towards the storm drain is approximately 661m². A raingarden site close to the sea can may be designed to capture rainwater from this 661m² area. The existing storm drain can be used to drain excess rainwater that may overflow from the rain garden.

North parking lot 3D model can be accessed here:

<https://www.aerialmodel.com/Home/Viewer?id=24281&token=203c0c4a-bc2f-4190-8a07-61afebf3f2a0>



Appendix F – Compiled list of recommendations

Rec #	Description
1	The FoBCS website has an extensive number of resources available on the topic of rain gardens (source). Adding a section on teacher and educational resources may broaden the reach of engagement, further promoting the program and the initiative to build rain gardens in the region. The Pacific Education Institute resource above is one example, and an extensive list of relevant K-12 Curriculum & Educational Resources are also available through the 12,000 Rain Gardens website resources page.
2	FoBCS can consider developing informal rain garden educational workshops for community members using existing demonstration sites to engage with participants. Section 2.3 provides a simple rain garden workshop format which has been successfully observed in Charlottetown, PEI.
3	Using a UAV to collect images to evaluate the state of a rain garden can be integrated into an activity involving students and the local community. Similar to the engagement of the public in building the rain garden, there are various ways to integrate participation in the evaluation of the rain gardens as they mature, such as assessing stormwater performance, soil characteristics & water infiltration, plant diversity & coverage, ecological considerations, and aesthetic considerations. An evaluation of these opportunities is provided in a guide by Hartman and Robinson (2017), published through the Landscape Architecture Foundation at Rutgers School of Environmental and Biological Sciences ²³ . Relating this to section 2.2 (Educational resources) and section 4.2.2 (Survey results), this evaluation tool is an activity that can be used by FoBCS' 1000 Rain Gardens Project to examine the landscape performance of the demonstration rain gardens, while educating and engaging students and the wider public (Figure 2).
4	FoBCS should allocate resources to create rain garden signs for other demonstration sites and provide a template that homeowners can use for their own personal rain gardens. This method of public education and passive outreach is an ideal approach to initiate and increase awareness of the program with little-to-no upkeep. As seen in Campus View's sign, it would be ideal to provide a method such as a link to a website to find additional resources or to connect with a resource person.
5	Tools such as ChatGPT or other image generating AI may create opportunities to engage the public using new and innovative technologies. The use of aerial images with generative AI enables larger scale areas and extents to be captured and manipulated. Rapid creation of these representations of rain gardens may effectively help to visualize the landscape features.

²³

<https://www.landscapeperformance.org/sites/default/files/Hartman-2017-Rain-Garden-Measurement-Evaluation-Guide.pdf>

6	<p>A potential workshop design is presented in section 2.2 which can be adapted for the context of Greater Victoria and the Bowker Creek Watershed to support the 1000 Rain Gardens Program. There are numerous rain garden demonstration sites that can further localize initiatives, offering opportunities to see examples of rain gardens in local neighbourhoods (Figure 20). Initiatives like a <u>Jane's Walk</u> along Bowker Creek, which was led by FoBCS' co-chair (Ian Graeme) and director (Soren Henrich) on May 4, 2025 provided an opportunity for the public to understand the benefits of rain gardens and see examples in person. These are opportunities to both see local examples and to be exposed to the environmental and beautification benefits that the rain gardens provide.</p>
7	<ul style="list-style-type: none"> ● Recognize that public engagements ARE opportunities to engage the public. ● Determine the factors that encourage or discourage people from installing rain gardens, through conversations or surveys. ● Provide options for this level of engagement at the community event along with an opportunity for a resident bystander to take-home information and on-line resources for follow-up.
8	<p>FoBCS can advocate for a similar incentive program to the other partner municipalities. Data regarding the success and impact of the City of Victoria's program may offer insights and motivation for the other two municipalities.</p>
9	<p>Promotion and education of rain gardens may come in the form of a definition and inclusion in municipal bylaws. FoBCS may consider the approach of all municipalities and the CRD with regards to the concept of rain gardens and low-impact development, and consider advocating official definitions and bylaws that are consistent throughout all of the relevant governing bodies.</p>
10	<p>The District of Saanich highlights the role that everyone has in stormwater management, providing information on how to protect homes from flooding as well as what to do in case of a spill or leak. It is important to recognize that the buy-in from property owners extends beyond themes of environmental protection and are often tied to the protection of their property. FoBCS may examine how other motivations such as protection of private property can act as a motivator in adopting rain gardens and other stormwater management approaches. This may also relate to section 4.2 on public surveying for motivations on rain gardens.</p>