Water Conservation and Stormwater Management for Water Quality Protection in the Shediac Bay Watershed

Final Report

By:

The Shediac Bay Watershed Association Inc.

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Acknowledgements

The SBWA would like to thank the Town of Shediac for their invaluable partnership, which has led to the realization of several on-the-ground projects for stormwater management and environmental protection in the Shediac Bay watershed.

Notably, a partnership with the Town of Shediac and the Homarus Centre was essential in the creation of 2 bioswales integrated into the parking area of the Shediac Rotary Park.

We also wish to thank the homeowners who participated in the residential rain garden program. These projects would not be possible without the stewardship of our citizens.

We would like to recognize the Polyvalent Louis-J.-Robichaud's administration and teachers, who worked collaboratively to create the school's first bioswale in 2021. Thank you to our teachers, Robert Bourque (Science de l'Environnement) and Véronique Thompson (Biology) for their dedication to integrate presentations and field trips into their programming.

We also wish to recognize our local elementary schools; Shediac Cape School and Monseigneur-François-Bourgeois, for their continued partnership for environmental presentations and activities. The dedication from these teachers makes our education programs possible.

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1. Introduction

1.1. Description of the Shediac Bay Watershed Association

The Shediac Bay Watershed Association (SBWA) was founded in 1999 as a result of growing concerns from local community residents over the ecological health of Shediac Bay. In order to establish a long-term water quality-monitoring program, a community-based association was formed.

The Shediac Bay Watershed Association gratefully receives guidance, donations and in-kind support from various organizations and interest groups consisting of business owners, industry, foresters, farmers, residents, cottage owners, recreation boaters and swimmers, conservation groups and community organizations within the Shediac Bay Watershed.

Public education has always been an integrated part of all the Shediac Bay Watershed Association's initiatives. Every year, the Association organizes activities meant to engage the public in environmentally friendly practices such as litter cleanup and tree planting, hoping to raise awareness and to build good habits (Figure 1). Our strong presence in the public eye is a major factor to the success of many of our initiatives, and to keep the public informed of the great work being accomplished by the Association.

Figure 1. Rain garden built and planted by the SBWA

1.2. **Overview of the Shediac Bay Watershed**

The Shediac Bay Watershed covers 420 km² of land area and stretches along 36 km of coastline, from Cap Bimet to Cap de Cocagne (Figure 2). The Shediac Bay Watershed is composed of two major river systems emptying into Shediac Bay: the Shediac River and the Scoudouc River. The Shediac and the Scoudouc Rivers are characterized by small tributaries covering a watershed of 201.8 and 143.3 km2, respectively. The Shediac River is composed of two major water arms. The northern water arm is created by the convergence of the McQuade Brook, the Weisner and the Calhoun Brook. The southern water arm of the Shediac River is the continuation of the Batemans Brook. Water velocity in both rivers is generally weak due to the gentle regional elevation. The watershed boundaries stretch into both Kent and Westmorland County and cross into both Shediac and Moncton.

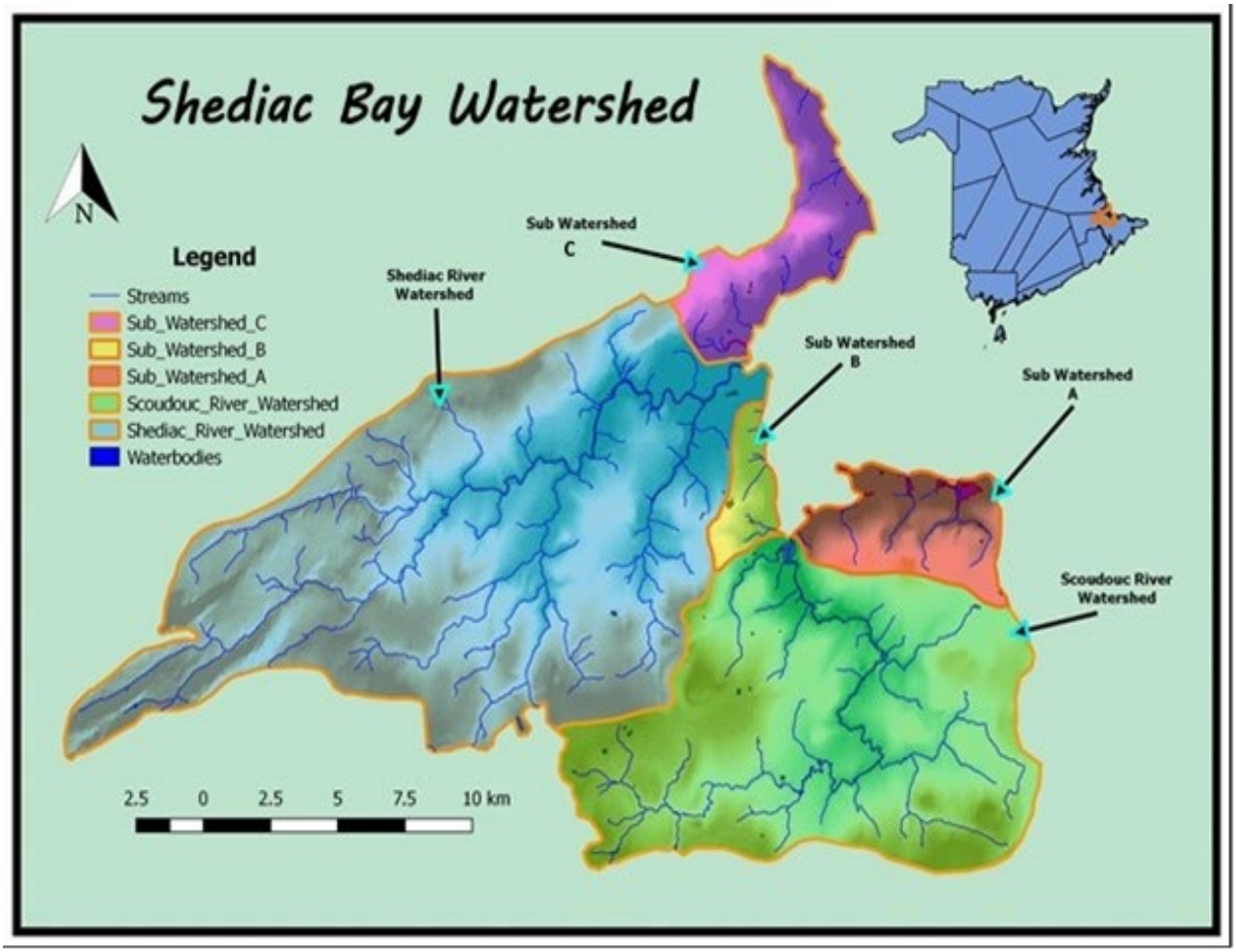


Figure 2: Map of Shediac Bay watershed boundaries

2. Stormwater Management

The Shediac Bay Watershed Association (SBWA) has a mandate to protect and enhance water quality throughout the watershed. The water quality in the saltwater ecosystems of the bay is influenced by the quality of the freshwater rivers and streams that flow into it.

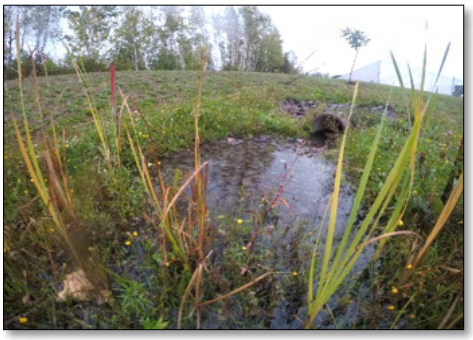


Figure 3: Bioretention system in the Shediac Bay watershed (2019)

Impervious surfaces, such as pavements, buildings, and parking lots, can have a significant impact on water quality. When rainwater or snow melts runs off these surfaces, it picks up pollutants, including oils and chemicals from cars, fertilizers and pesticides from lawns, and pet waste. This runoff, called stormwater, can contain high levels of bacteria, heavy metals, and other harmful substances.

One of the main ways impervious surfaces affect water quality is by increasing the volume and speed of stormwater runoff. Normally, water is absorbed into the ground and filtered through soil, rocks, and vegetation, removing pollutants and replenishing groundwater supplies. However, impervious surfaces prevent this natural filtration process, allowing contaminated water to flow directly into nearby bodies of water, increasing their pollutant levels.

In order to ensure good water quality in the Shediac Bay, there must be proper stormwater management in the watershed as a whole. The management strategies implemented by the SBWA include the use of green infrastructure systems and educating the public on stormwater management techniques.

Figure 4. SBWA summer students planting a rain garden

2.1. **Green Infrastructure Projects in 2022**

Since 2017, the SBWA has worked with local landowners, business owners, and the Town of Shediac on the implementation of green infrastructure projects in the watershed. Green infrastructure systems use vegetation, soil, and other natural materials to absorb, filter, and store stormwater runoff. They reduce the volume and rate of runoff that reaches our natural waterbodies, thereby improving and protecting water quality.

Normally, water is absorbed into the ground and filtered through soil, rocks, and vegetation, removing pollutants. However, impervious surfaces, such as rooftops and paved surfaces, prevents this natural filtration and infiltration process, allowing contaminated water to flow into nearby bodies of water.

The green infrastructure systems that have been implemented by the SBWA include rain gardens, bioswales and bioretention systems. A rain garden is a shallow landscape depression that is specifically designed to collect, soak up and filter rain and snowmelt runoff. Planted with deep-rooted grasses, flowers and shrubs that tolerate wet and dry conditions, it requires very little maintenance. A bioswale is very similar to the rain garden; normally differentiated by a clear entry and exit point, after the water has had a chance to percolate through a vegetated path.

Bioretention systems are the commercial equivalent to the rain garden. They serve the same purpose but have larger capacities to collect and filter runoff. These large-scale green infrastructure projects require the use of heavy machinery for their construction. Components such as inlets, ponding areas, filter bed, cover bed, plants, check dams, overflow outlets, and underdrains allows these large green infrastructure systems to handle large volumes of stormwater.

In 2023, two commercial bioswales and two residential gardens were constructed. These green infrastructure projects were planted according to the "*Rain Gardens – Design and Construction Guide for Homeowners*" plant list (Appendix B). The plants include flood resistant, drought tolerant, and pollinating plants including:

- Black-eyed Susan (*Rudbeckia fulgida*)
- Blue Flag Iris (*Iris versicolor*)
- Native Rush (*Juncus effusus*)
- Joe Pye Weed (*Eupatorium maculatum*)
- Karl Foerster grass (*Calamagrostis acutiflora*)
- Milkweed (*Asclepias sp.*)
- Pink Turtlehead (*Chelone obliqua)*
- Purple Aster (*Aster sp.)*
- Purple Coneflower (*Echinacea purpurea*)

2.1.1. Commercial Bioswales – Homarus Centre

In partnership with the Town of Shediac and the Homarus Centre, two bioswales were incorporated in the parking lot of the new centre and the resurfacing of the Shediac Rotary Park. The bioswales were designed in the building plans by Englobe in 2019 (Appendix A). The two bioswales will collect most of the stormwater runoff from the parking lot, which is about 2,600 m^2 of impervious surface area.

Both bioswales have similar components like an outflow drain and bioretention soil mix. The outflow drain will prevent water from overwhelming the bioswales or causing flooding during heavy rainfall events. The bioretention soil mix is designed to absorb, infiltrate, and filter stormwater runoff. This special type of soil is composed of a mixture of sand, top soil and compost. A filter fabric separates the bioretention soil from the gravel layer below (Figure 5). The gravel allows for storage of stormwater underground and allows time for infiltration into the ground. Both bioswales were planted according to the rain garden plants list from the "*Rain Gardens – Design and Construction Guide for Homeowners*". A layer of compost mulch was applied to both bioswales once the planting was completed.

The bioswale #1 has an additional component, an underdrain system composed of a perforated drainage pipe imbedded into the drainage stone layer. The underdrain system allows for treated stormwater to flow into the storm drain system.

These bioswales were planted late fall 2022. We will be monitoring closely the survival rate of the plants in the spring 2023. Due to unforeseen challenges, the decorative river rocks were not installed. This final step will be completed in 2023.

Figure 5: Homarus Centre Bioswale #2 Construction (Part 1)

Figure 6. Homarus Centre Bioswale #2 Construction (Part 2)

Figure 7. Homarus Centre Bioswale #1 Construction

2.1.2. Residential Rain Garden – Rue Louisiane

A partnership was formed for a residential rain garden with a homeowner on rue Louisiane, in Shediac. This citizen is an ambassador for eco-friendly yards, free of pesticides and pollinator-friendly plants.

This kidney bean-shaped rain garden was created in the front yard of a property. The homeowner's sump pump outflow was connected to the rain garden, by digging a trench to install an underground PVC pipe. This will allow the sump pump water to be directed into the rain garden. A berm was constructed to retain as much water as possible (Figure 8). A variety of flowering plants and grasses were selected from the list above (2.1), including milkweed to support the monarch butterfly.

Figure 8: Residential rain garden on rue Louisiane, Shediac

2.1.3. Residential Rain Garden – rue Grand Pré

This homeowner contacted the SBWA office after learning about the rain garden program. Following a discussion, a site visit to the home was made in the spring. There was a discussion around the issues of rainwater runoff causing water to pool in the backyard, and these areas remaining wet for long periods of time. The homeowner had already modified a section of the yard with a flower bed, in an effort to capture and absorb the water. We discussed another location where a rain garden could be created to intercept water originating from the rooftop, in line with the downspouts.

This rain garden was designed with the help of the homeowner; square in shape and dominant in purple coneflower and black-eyed Susans. A few plants of milkweeds were also added to attract monarch butterflies. Similar to the other residential rain gardens, a berm was constructed at the back to retain water (Figure 9). This rain garden should make a difference in absorbing and infiltrating larger amounts of runoff, which may also benefit the surrounding properties.

Figure 9: Residential rain garden on rue Grand Pré, Shediac

2.2. Ongoing Green Infrastructure Projects – Monitoring and Maintenance

From year to year, as we increase the number of on-the-ground green infrastructure projects, it is important to understand how they evolve and what type of maintenance they may require.

Our association makes a commitment to follow and assist in the maintenance of these projects for three years after the original construction. The monitoring includes the assessment of the survival rate of the plants, the establishment of other species (i.e. weeds, other native species or invasive species), the observation of their performance during rain events, the erosion of the soil or the accumulation of sediments. The maintenance may include weeding and adding mulch if necessary.

2.2.1. Maximum Signs & Time2Shine Bioretention System

In partnership with the Anglican Parish of Shediac and Maximum Signs & Time2Shine, our first commercial bioretention system, was constructed in fall 2021. This green infrastructure project is located between the two parking lots of the buildings at 612 and 620 Main Street Shediac (Figure 10). The bioswale collects most of the stormwater runoff from the east parking lot and part of the rooftop runoff from both buildings, which is about 920 m² of impervious surface area. A piping system was attached directly to the roof's downspout using a custom-built box and PVC piping, to ensure that the maximum amount of the rainwater from the Time2Shine building is collected by the bioswale. A local construction company, Pierre Cormier Construction, was hired for this project.

Figure 10: Commercial bioswale 2021 at Maximum Signs & Time2Shine

Figure 11: Before and After photos of the Time2Shine Bioretention System (2021)

The bioretention system was maintained by weeding regularly throughout the 2022 growing season. Weeding helps the young plants mature without the aggressive competition of certain weeds. The survival rate of the plants originally planted was 90 percent. In the fall, native blue asters established themselves naturally in this green space.

The added value of planting milkweed plants successfully attracted several monarch butterflies. Adults were witnessed visiting the plants on two occasions, and a monarch survey revealed eggs and monarch caterpillars on most milkweed plants.

Figure 12: Photo of the Time2Shine Bioretention System in 2022 and a Photo of a Monarch Butterfly Visiting the Milkweed plants

2.2.2. Bioswale - Polyvalent Louis-J. Robichaud

In September 2021, the SBWA partnered with the L.-J.-R. Environmental Science teacher and his students to build a bioswale on school grounds. The students received an in-class presentation on water quality issues in the Shediac Bay watershed as well as the concept of stormwater management using rain gardens and bioswales. Following the presentation, the class spent the next 4 periods outdoors, working to naturalize a drainage path; removing the surface lawn, turning and raking the soil, spreading mulch, installing the edging and planting the vegetation.

The bioswale covers an area of 60 m² and contains 109 plants (Figure 14). A mixture of flood tolerant grasses and flowers for pollinators were used in this project. These plants will filter runoff from the soccer field and the track that surrounds the drainage path. As stormwater percolates through the bioswale, the quality of the water runoff will improve before reaching the storm drain below.

This bioswale was maintained by weeding regularly throughout the 2022 growing season. As mentioned above, weeding helps the young plants mature without the aggressive competition of certain weeds. The survival rate of the plants originally planted was 85 percent. One species that didn't do well in this site were the ostrich ferns; in full sun, the ferns became dry and browned. The interpretive sign that was produced the previous winter was also installed.

The milkweed plants at this site also successfully attracted monarch butterflies; a monarch survey revealed eggs and monarch caterpillars on most milkweed plants.

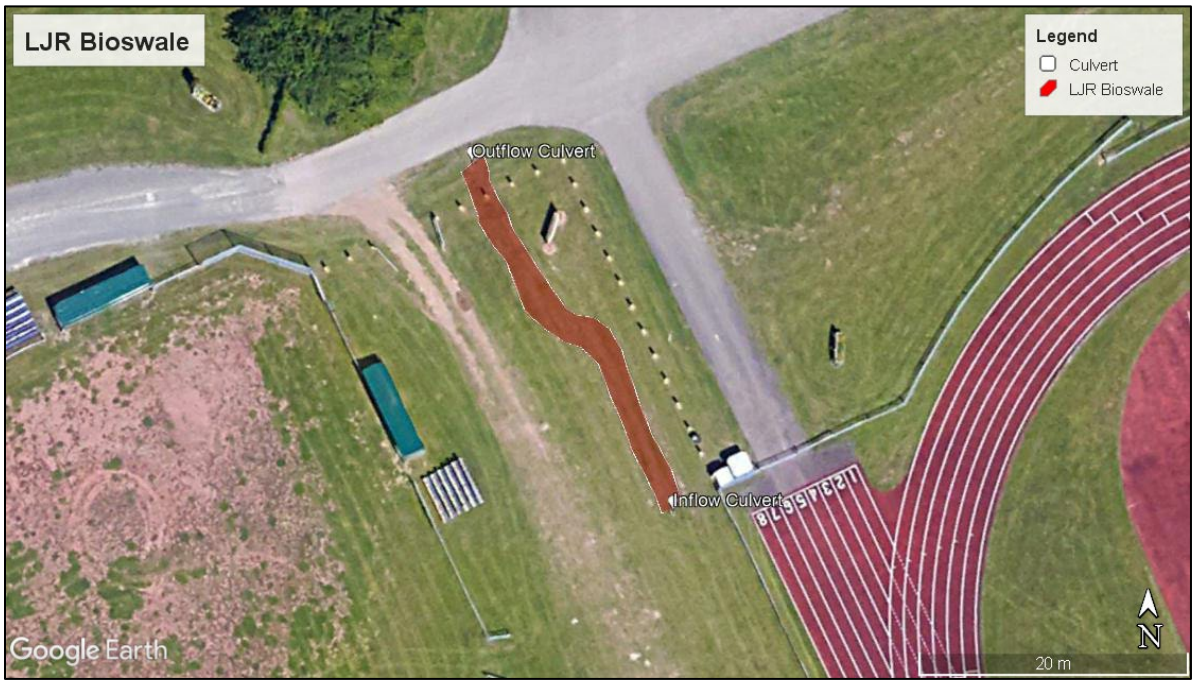


Figure 13: Map of L.-J.-R bioswale

Figure 14: Before photos and construction of the L.-J.-R bioswale (2021)

Figure 15: Photo (1) of the L.-J.-R Bioswale in the Summer 2022

Figure 16: Photo (2) of the L.-J.-R Bioswale in the Summer 2022

2.2.3. Residential Rain Garden Rue Rachel

The residential rain garden on rue Rachel in Shediac was the first one completed in 2021. The rain garden was strategically placed in their front yard and intercepts stormwater runoff from going into the storm drain. The gutter system flows underground through piping directly into the garden as well. A berm was constructed to retain as much water as possible.

Thanks to this partnership with the homeowners, this rain garden has become a destination for the site visit portion of the two workshops delivered in 2022. No maintenance was required on our part. Monitoring for survival rate of the plants showed that the sensitive ferns that were transplanted from a wild donor site did not survive. All other plants that were purchased are thriving, making the survival rate 95 percent. This site also allowed us to take photos of the flowers in bloom.

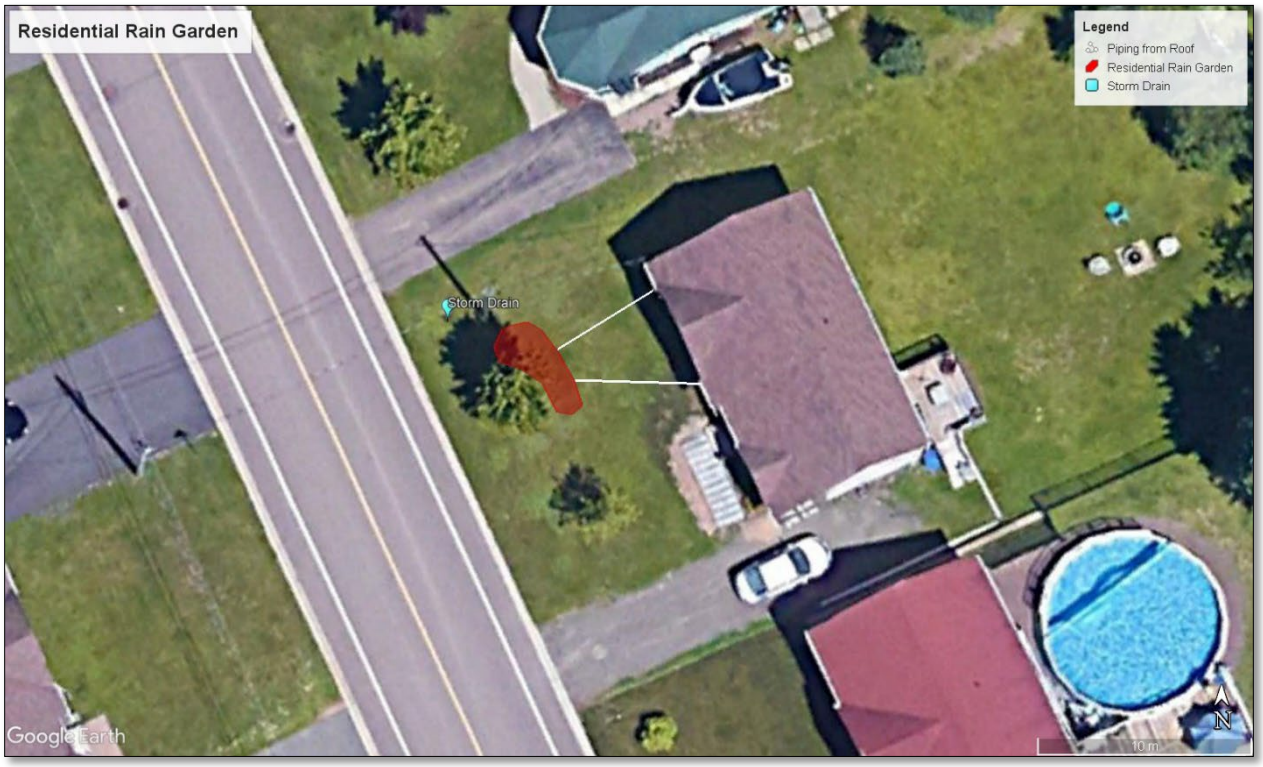


Figure 17: First residential rain garden of 2021

Figure 18: Residential Rain Garden on Rue Rachel construction (2021)

Figure 19: Residential Rain Garden on Rue Rachel completed (2021)

Figure 20: Residential Rain Garden on Rue Rachel – Summer 2022

2.3. **Impervious Cover Mapping**

In order to focus stormwater management efforts, the SBWA has been working towards developing an impervious cover map of the town of Shediac. The impervious cover map demonstrates the extent of development and impervious cover (IC) for specific areas within the town of Shediac and its possible effects on water quality.

The impervious cover map is derived from the stormwater watershed map by Hughes (2020) and the Shediac Bay spatial data compiled by Mount Allison University (2017). Hughes (2020) delineates stormwater drainage areas for the town of Shediac based on surface elevation and water flow calculations. A total of 59 stormwater watersheds were delineated, each having a defined discharge (outflow) location. Mount Allison University (2017) delineated IC for the town of Shediac. Recent development and increases in impervious cover were delineated by the SBWA using satellite imagery and digitizing tools in QGIS.

Figure 21. Impervious cover map showing the ICM rating for stormwater watersheds in the town of Shediac and the drainage area of the Homarus Centre bioswales

By combining elements of both Hughes (2020) and Mount Allison University (2017), the impervious cover map identifies the stormwater watersheds containing problematic amounts of impervious cover (Figure 21).

The strong relationship between imperviousness and stream quality has resulted in the development of the impervious cover model (ICM) (Schueler T. , 1994). This management tool simplifies complex stream science and allows watershed managers to diagnose the severity of present and future stream issues in urban watersheds (Schueler, Fraley-McNeal, & Cappiella, 2009). The ICM divides urban streams into three management categories based on IC and stream quality (Schueler T. , 1994):

1. Good stream quality (1-10% impervious cover)
2. Fair stream quality (11-25% impervious cover)
3. Poor stream quality (26-100% impervious cover)

Although the ICM was not originally developed for tidal coves and small estuaries. Schueler, Fraley-McNeal, & Cappiella (2009) have found that past studies mostly confirm or reinforce the use of the ICM in tidal coves and small estuaries.

The negative effects of IC on stream quality indicators are well documented for fresh water streams. IC is strongly correlated to hydrological, habitat, water quality, and biotic indicators of stream health (Schueler, Fraley-McNeal, & Cappiella, 2009). In tidal coves and small estuaries, adverse changes in physical, sediment, and water quality variables have been detected at 10 to 20% impervious cover. The biological response includes declines in benthic macroinvertebrates, shrimp, and finfish diversity (Holland, et al., 2004). Mallin et al. (2000) found that shellfish closures were common in watersheds above 10% IC and almost certain in watersheds above 20%. The town of Shediac is currently at around 26% IC (Appendix C).

When applied to the stormwater watersheds, the ICM suggest that a large section of the town of Shediac has problematic amounts of IC. The runoff discharging from the “Poor” stormwater watersheds are more likely to be detrimental to overall estuarine health. These problematic areas are mostly located within the town’s downtown area. This area has large parking lots, commercial buildings, and dense residential development.

Green infrastructure projects can help mitigate the negative effects of impervious cover by absorbing and filtering contaminated runoff. Certain areas of IC can be “discounted” if its runoff is absorbed by green infrastructure. For example, the Homarus Centre bioswales capture runoff from a drainage areas of approximately 2,600 m^2, reducing the IC of stormwater watershed #3 by 3%.

3. Water Conservation

The water conservation component of this project aims to help reduce the consumption of potable water, through education and through the implementation of water conservation techniques. For example, the promotion of rain barrels and rainwater harvesting systems helps to conserve drinking water by reusing rainwater for other purposes around the home, such as watering flowerbeds and vegetable gardens. It is important to note that it is not advised to use harvested rainwater for drinking or cooking, as it could contain harmful bacteria if consumed without proper treatment.

3.1. Rainwater Harvesting System

In the fall of 2021, the SBWA began a discussion with a representative of the Pointe-du-Chêne Recreational and Community Centre Committee. A plan was formed towards installing a rainwater harvesting system (RWHS) on the centre's rooftop. The water from the downspouts was going to be directed into two 1,000 L totes placed on wooden platforms next to the east wall of the building. The rainwater that would be harvested by the system was going to be used for the proposed PDC community garden, to be located in the back of the recreational centre.

This project was going to accomplish two goals; manage stormwater runoff by capturing rainwater from the rooftop, and conserve potable water by using the rainwater to irrigate 12 raised garden beds.

Figure 22: Example of a RWHS using a 1,000 L tote
Source: EcoContainer Co. Facebook Page

An on-site meeting was held in late April, to determine the exact placement of the system on the building. The equipment was then ordered from EcoContainer Co. (from Dorchester, NB) and delivered in May. At this same time, we were notified that the PDC Recreational Centre had to cancel their community garden project due to unforeseen circumstances. It was then determined that the RWHS was no longer a suitable project for the centre.

The SBWA has been working with the Parlee Beach Provincial Park to determine a suitable location to install the rainwater harvesting system on one of their buildings. This type of project is of interest to the Parlee Beach Provincial Park, thanks to their Blue Flag certification. Under the Blue Flag program, the certified beaches and marinas are required to take on environmental stewardship activities (Blue Flag, 2021). We hope to complete this project in the spring of 2023.

4. Education and Outreach

The development of educational materials, signage, presentations, and social media is an integral part of our education program. Significant work is being done on illustrative designs and informative videos. The illustrative designs have led to new handout materials and signage on various environmental topics.

4.1. Signage and Interpretation Panel

For the newly constructed bioswales at the Homarus Centre, a bilingual interpretation sign that explains the purpose and construction process of the bioswale was developed over the winter. The panel explains how bioswales collect and treat stormwater. It also has a segment on the importance of clean water and how it can affect the surrounding areas. The sign is currently in production and will be installed in the spring (Figure 23).

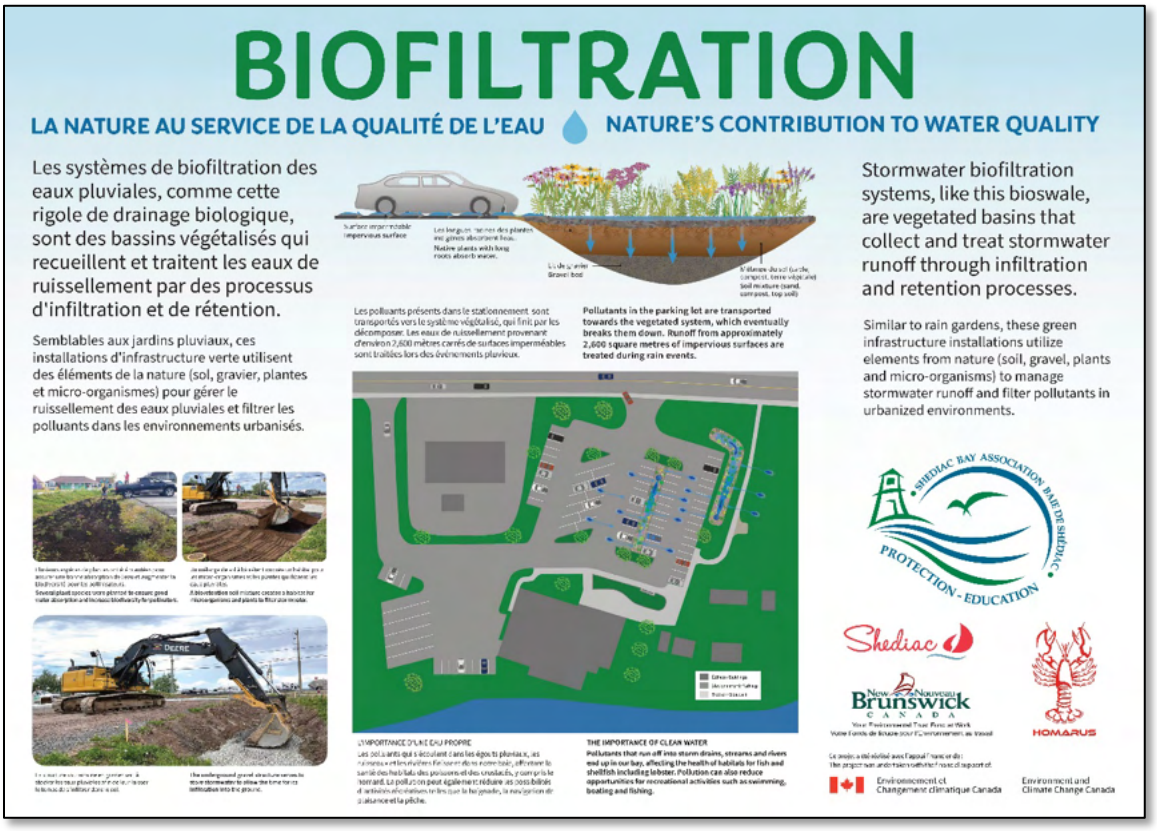


Figure 23. Homarus Centre Interpretation Panel

4.2. General Presentations

The SBWA organizes regular presentations to various audiences and stakeholders of our watershed. Since the COVID-19 pandemic, some activities such as public workshops and school programs have been affected. This past year, as the circumstances and restrictions have improved, we have been able to increase the number of in-person events.

In addition, due to staff turnover at the SBWA, there has been less capacity to deliver school programs. We have been working to recover and train new staff in educational activities. The following reports on the educational activities in the 2022-2023 fiscal year.

4.2.1. Residential Rain Garden Workshops

Two workshops on residential rain gardens were organized in 2022; one session in French on June 18th, held at the Shediac Multipurpose Centre, and the second session in English on August 16th, was held at the Pointe-du-Chêne Recreational Centre. The session in French was organized in partnership with "Les Ami.e.s de la nature du sud-est du NB", and the session in English was organized in partnership with the Red Dot Association of the Shediac Bay.

The workshop begins with a 1-hour presentation on the types of pollution in a watershed (with the focus on non-point source pollution), the concept of green infrastructure for stormwater management to improve the water quality in our community, and the steps on how to build a rain garden. Each participant received a copy of the SBWA Rain Garden Construction Guide for Homeowners. Following the question-and-answer period, participants were able to visit 3 local project sites; the rain garden at the Vestiaire St-Joseph (created in 2017), the residential rain garden on rue Rachel, and the bioretention system at Time2Shine.

These workshops were very well received, and there have been subsequent requests for additional sessions.

Figure 24:Rain Garden Workshop Promotional Poster

Figure 25: Photos of the Rain Garden Workshop on June 18, 2022 (photo credit : les *Ami.e.s de la nature du sud-est du NB*)

4.2.2. Virtual Workshop – Impacts of Climate Change on Surface and Groundwater

A virtual workshop on underground water quality is being organized for March 22, 2023, on World Water Day. This initiative is led by Vision H2O, co-hosted by; SBWA, Groupe de développement durable du pays de Cocagne (GDDPC), Petitcodiac Watershed Alliance (PWA), and facilitated the New Brunswick Environmental Network (NBEN).

This workshop will focus on the impacts of climate change on both surface and underground water quality. Private well testing following major storms, what to do when well water tests positive for contaminants, and how to protect our homes from flooding are topics that will be covered by the presenters.

Figure 26: Promotional graphic for virtual workshop "The Importance of Groundwater

4.3. School Programs, Field Trips and Presentations

The SBWA has been working with local schools and teachers on the development of yearly environmental education programs. This long-term relationship led to the development of a series of presentations that links science curriculum objectives and outcomes to local environmental issues. The main focus of these presentations revolves around water quality, aquatic habitats and biodiversity. In addition to the presentation series, annual programs such as Adopt-A-River, presentations on bioswales and importance of habitat include field trips to further immerse the students in nature.

4.3.1. LJR Tree Planting Activity

In partnership with the town of Shediac and students from the Polyvalent Louis-J.-Robichaud, 12 trees provided by the Town were planted at the Shediac Centennial Park. These trees will help bring shade to the park during the warm summer months. The L.J.R. students were also given a presentation on the Acadian Forest before planting the trees. This activity took place on April 21st.

Figure 27. L.J.R. students planting a tree (left) and receiving a presentation about the Acadian forest (right)

4.3.2. Monarch Butterfly Garden at MFB School

The SBWA partnered with a 3rd grade teacher at Monseigneur-François-Bourgeois elementary school to create a Monarch Butterfly garden.

The SBWA manager was requested by LSF – LST (Learning for a Sustainable Future/L'éducation au service de la Terre), to deliver a new webinar focused on climate change adaptation using green infrastructure. LSF-LST is a Canada-wide organization, who provides a platform for various educational school resources and webinar series.

The 45-minute presentations were scheduled for two dates and two age categories; on February 9th for the 5th to 8th grade, and on February 22 for the 9th to 12th grades. Some registered classes attended the live webinar, while others have used and will continue to use the recordings. To date, 54 students from the grades 5-8 were registered and 53 students for the grades 9-12. Registrations were mostly from New Brunswick and Ontario schools. Several rain garden projects were presented as examples and each slide contained the NB ETF logo.

Figure 28: Photos of the students building a Monarch Butterfly Garden at MFB School

4.3.3. Adopt-A-River

In the 2022, SBWA continued to partner with Shediac Cape School for the annual Adopt-A-River program. On June 6, two in-person presentations were held at the school gymnasium, touching on the importance of biomonitoring using macroinvertebrates. One session was held for English students and one for the French immersion students.

Later in June, the classes went to the Scoudouc River to do the macroinvertebrate sampling and to collect other habitat measurements and observations (Figure 29). On June 8th, 9th and 10th the field trips for the English classes were held. Field trips for the French immersion students took place on June 16th and 17th. Not accounting for absences, a maximum of 141 students from 6th to 8th grade participated in these activities.

Figure 29: Students collecting macroinvertebrate samples.

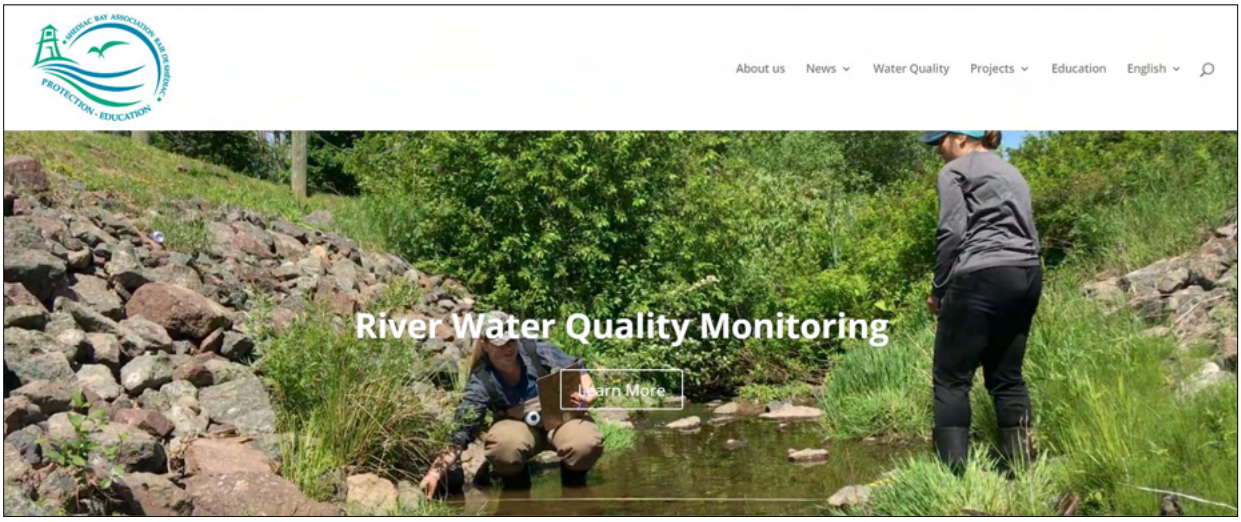
5. MEDIA OUTREACH

5.1. Newsletter

During the 2022-2023 fiscal year, 2 bilingual newsletters were produced. One was published in the fall and the second will be released in March. The newsletters display information and photos on the various projects that the SBWA has been doing in the year. The newsletter is now distributed electronically by email list and is available on our website and Facebook page.

5.2. Socials Medias and Website

The SBWA is working to keep its website and social media up to date, posting photos and short descriptions of activities and projects. The SBWA now has a dedicated employee who focuses on outreach and communications, and the design and production of educational materials.



www.shediacbayassociation.org

www.facebook.com/#!/shediacbaywatershedassociation

https://www.instagram.com/bvshediacwatershed/?hl=en

https://www.youtube.com/channel/UCT1bsN08OyOeIzqqwn9ZhlQ

5.2.1. Website map

A map indicating the locations of all SBWA green infrastructure project has been created using Google's "My Maps" application. The map contains both images and information related to the green infrastructure projects. This application will be used to embed this map into the SBWA website and will inform visitors of the prevalence of green infrastructures within the Shediac Bay watershed.

Figure 30: SBWA Green Infrastructure Project Map

5.2.2. Facebook Group for Residential Rain Gardens

In March 2022, the SBWA launched a new Facebook group "Jardins Pluviaux - Baie de Shediac Bay - Rain Gardens". The group is dedicated to helping homeowners within the Shediac Bay watershed further connect and get guidance on rain gardens and stormwater management. The rain garden construction guide and other resources are available in the "Files" section of the group. This group is a platform where we are able to share our rain garden project stories, and for community members to share their own experiences with their rain gardens.

6. Conclusion

To conclude, the SBWA plans to continue to build rain gardens, bioswales and other green infrastructure projects as we gain more experience. These activities will continue in an effort to control stormwater runoff from impervious surfaces in the watershed, to help improve overall water quality.

This year we built two residential rain gardens and two commercial bioswales. More projects are already in the works for 2023.

Our projects are focused on finding solutions to reduce the quantity and improve the quality of surface water runoff, and educating the general public on the importance of our various projects in the watershed.

Education has always been an important part of every project realized by the Shediac Bay Watershed Association. When dealing with local environmental issues, creating dialogue with various members of the community, of any age group, is essential to raise awareness that these issues exist. These issues need to be known and discussed in order to spark interest and change thinking patterns. As they say, knowledge is half the battle.

The Shediac Bay Watershed Association is becoming more and more known for its good work in enhancing the overall health of the Shediac Bay, and that would not be possible without our maintained presence in the public eye through our education programs. The support from the NB Environmental Trust Fund is essential for our group to be able to accomplish the quantity and variety of activities for the community. We hope to continue expanding our programs in future years.

7. References

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8. Appendix A – Bioswales Homarus Centre Design Plans

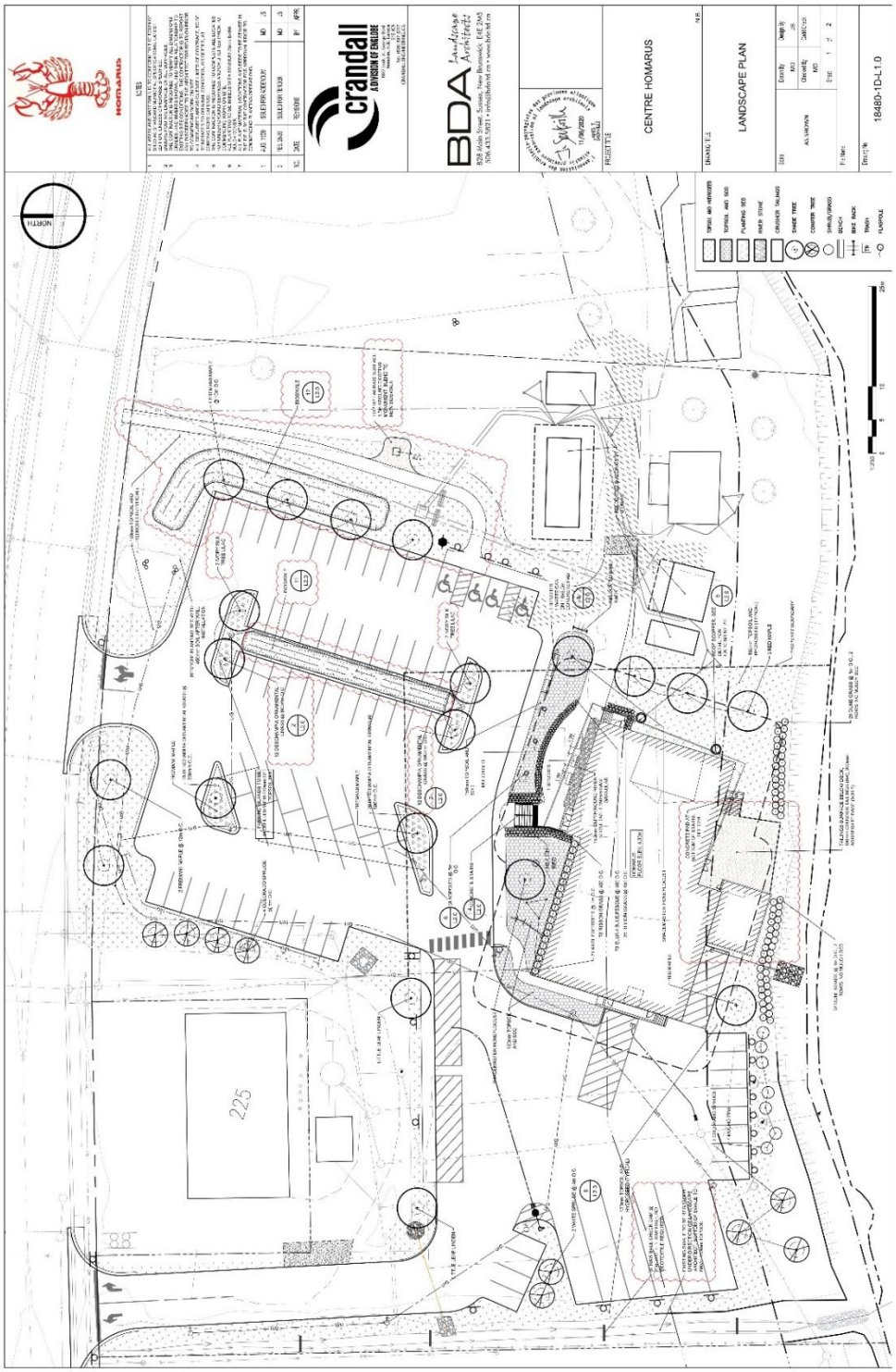

Figure 31. Bioswales Homarus Centre Design Plans 1

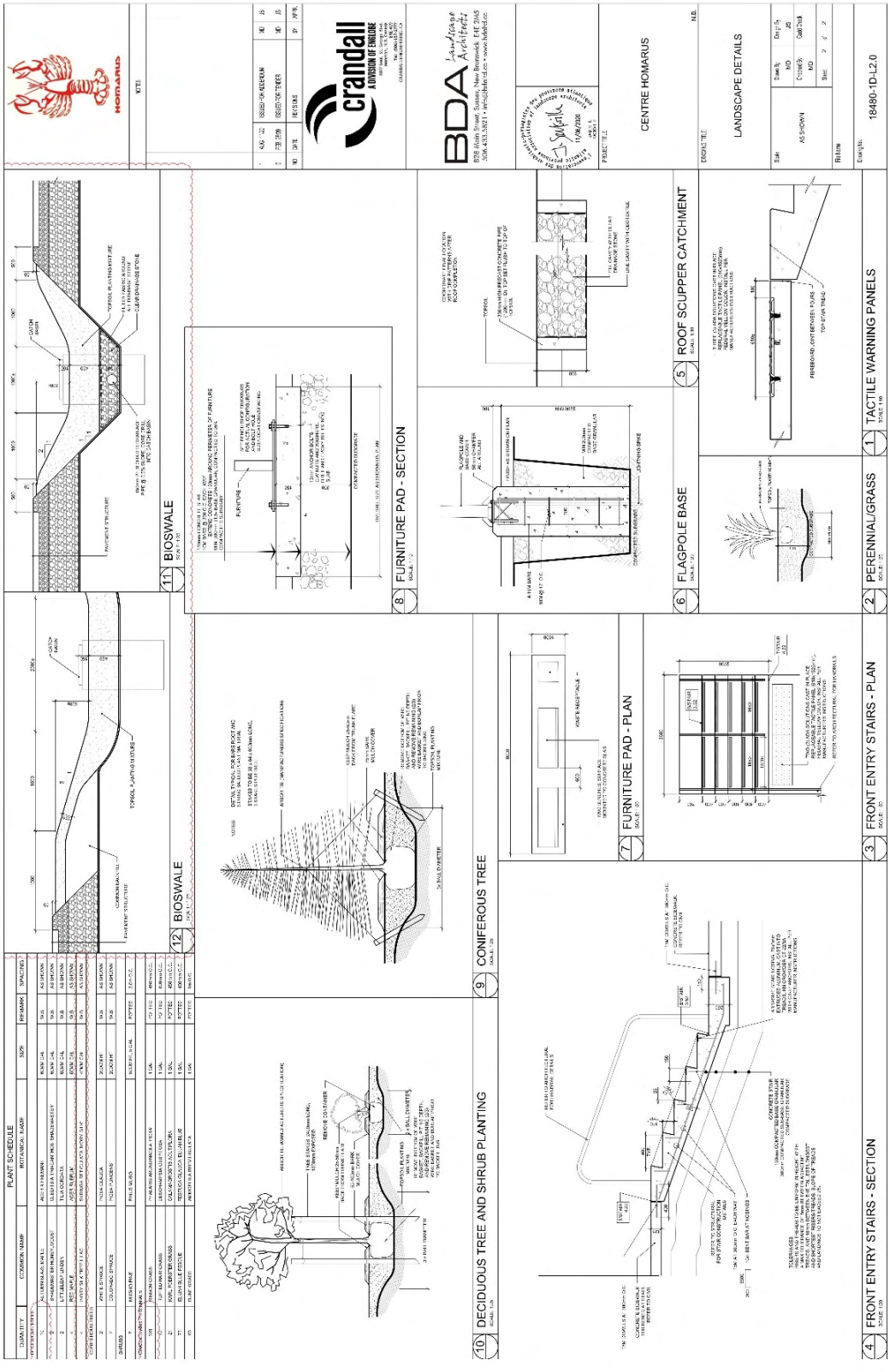

Figure 32. Bioswales Homarus Centre Design Plans 2

9. Appendix B: Rain garden design and construction guide for homeowners

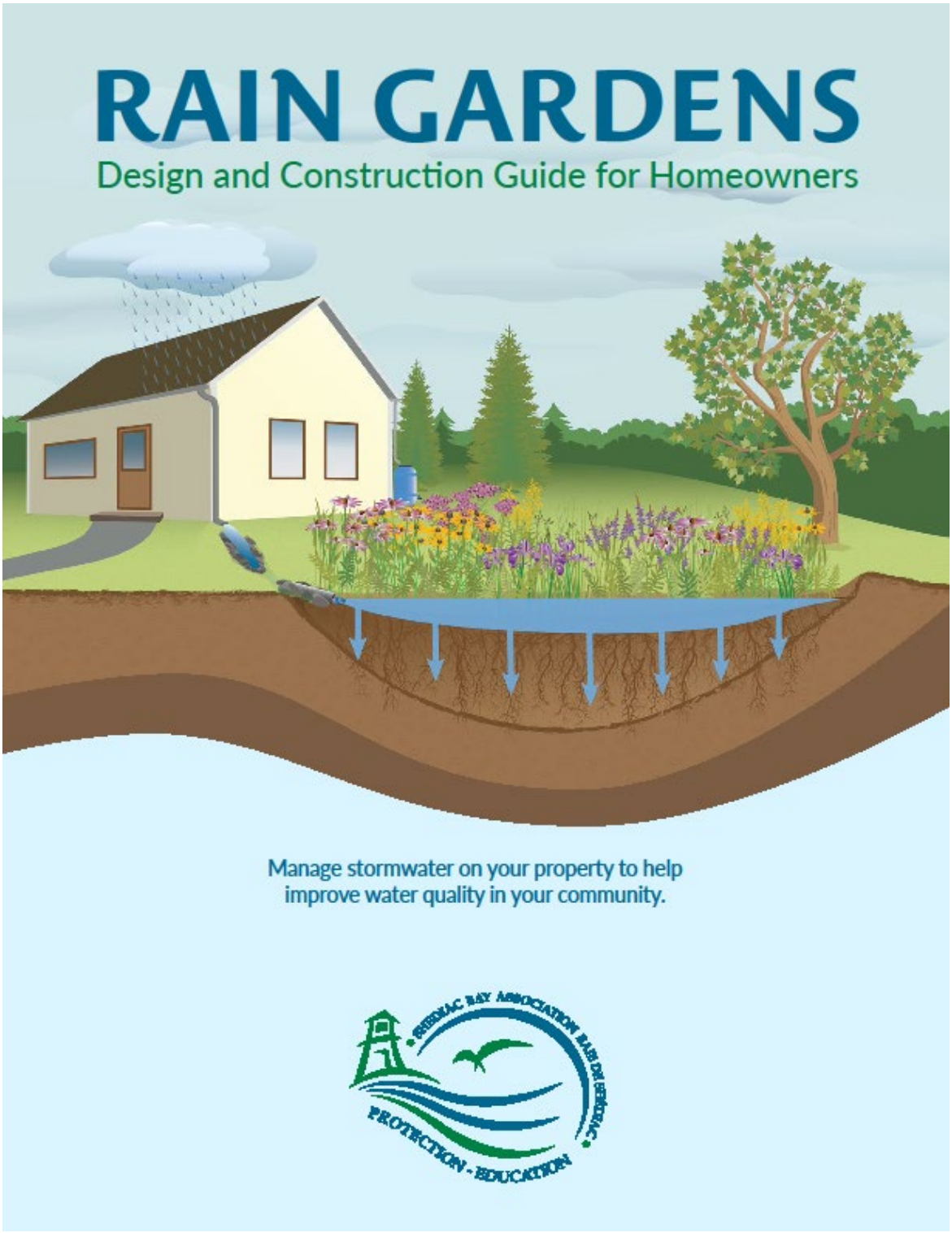

Figure 33. Rain garden design and construction guide for homeowners (English)

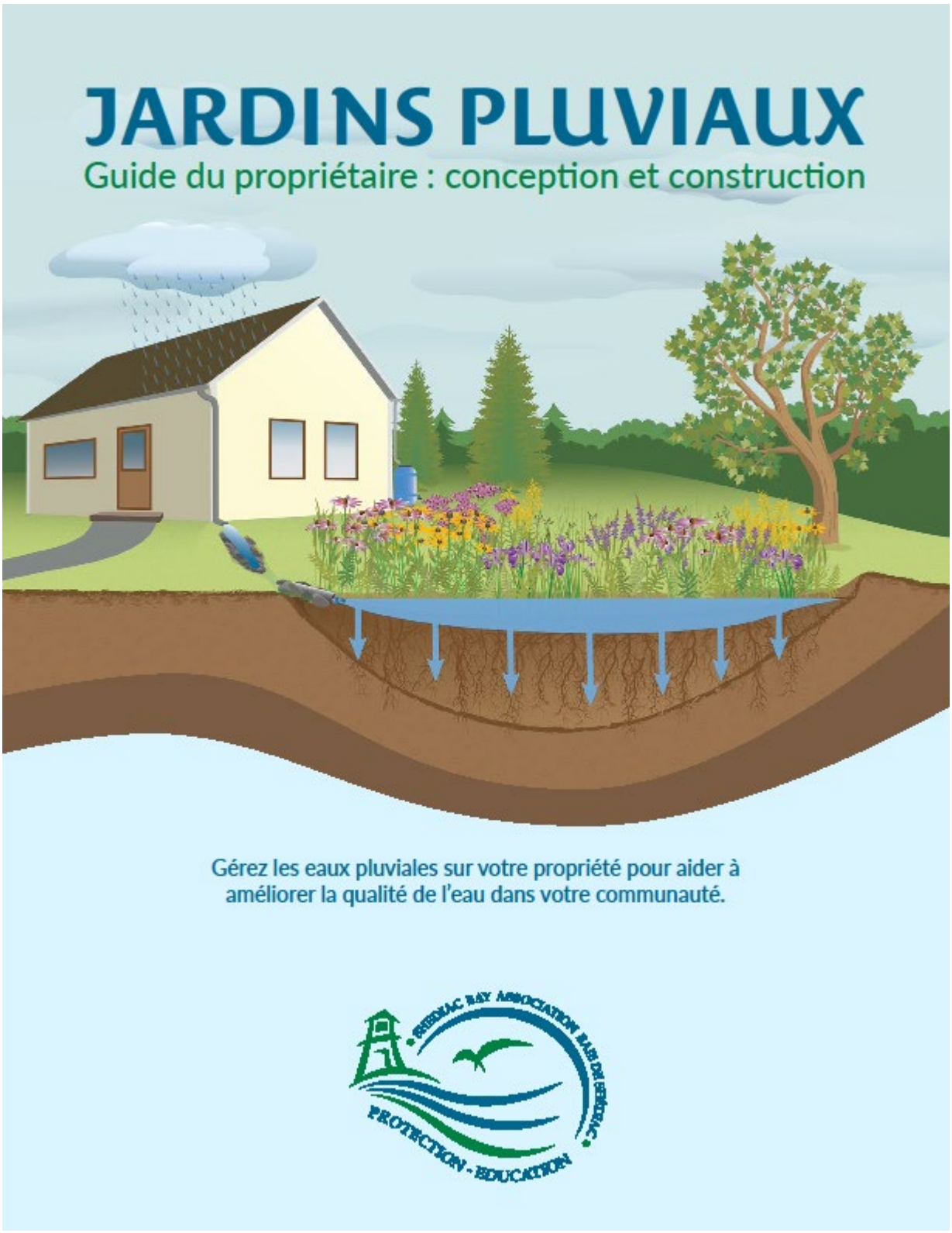

Figure 34. Rain garden design and construction guide for homeowners (French)

10. Appendix C – Impervious Cover Map

Table 1. Impervious cover percentage of the stormwater watershed

Stormwater Watershed	Impervious Cover %	Stormwater Watershed	Impervious Cover %
1	**18**	31	**14**
2	**25**	32	**15**
3	**28**	33	**26**
4	**52**	34	**23**
5	**23**	35	**20**
6	**15**	36	**15**
7	**13**	37	**3**
8	**13**	38	**4**
9	**9**	39	**13**
10	**42**	40	**15**
11	**31**	41	**10**
12	**22**	42	**25**
13	**20**	43	**14**
14	**26**	44	**19**
15	**31**	45	**18**
16	**52**	46	**31**
17	**45**	47	**45**
18	**49**	48	**43**
19	**43**	49	**38**
20	**34**	50	**39**
21	**36**	51	**33**
22	**14**	52	**12**
23	**31**	53	**30**
24	**31**	54	**21**
25	**41**	55	**14**
26	**28**	56	**6**
27	**20**	57	**29**
28	**22**	58	**24**
29	**18**	59	**48**
30	**39**		
Town of Shediac Average	**25.7**		