

# Improving Water Quality and Advancing Climate Change Adaptation in Tantramar with Rain Gardens and Other Low Impact Developments – Year 2 Report



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## Introduction

EOS Eco-Energy received support from Eco Action to plant and monitor a series of rain gardens, and organize and monitor depaving events. This report summarizes activities during year 2 of the project.

Ten rain gardens were planted in downtown, flood prone areas of Sackville, NB during year 2. Rain gardens are depressions a few inches deep planted with native water-loving and drought tolerant plants that slow and absorb stormwater.<sup>1</sup> It is beneficial to have many smaller rain gardens throughout a flood-prone area to help slow and absorb water in numerous locations.

One depaving project took place in year 2. Pavement was taken up and permeable asphalt was laid in a section of a parking lot in downtown Sackville.

Monitoring of the rain gardens and depaving site is underway and will continue into year 3. We will also check on the number of native plants that survive from year to year starting in spring 2020.

We kept track of behaviour changes among participants, volunteers and the general public by way of a community-based social marketing campaign. Throughout the summer we surveyed members of the public and asked how they use #RainAsAResource. We collected not just answers but photo commitments from the general public. Photo commitments have been shown to be more effective as ensuring people follow through on their plans because they have made a publicly visible commitment. These photos have been collected online with the use of the hashtag and also on our website. We have also followed up with homeowners and remain in tune with our community to hear about who else is putting in rain gardens.

Year two also involved planning the ten final rain gardens and final depaving project for summer 2020 (or year 3). This report includes site plans and before photos for the rain gardens and depaving project.

## Priorities and Objectives

The project priorities are:

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<sup>1</sup> Bilingual EOS how-to guides on rain gardens are available on the EOS website at: <https://eosecoenergy.com/fr/wp-content/uploads/2018/10/sm-FR-Rain-Gardens-How-to-Handout-for-Tantramar.pdf> and <https://eosecoenergy.com/en/wp-content/uploads/2018/03/sm-Rain-Gardens-How-to-Handout-for-Tantramar.pdf>

1. Canadians will build climate resilience through living natural infrastructure, such as rain (main priority)
2. Contribute to the diversion and reduction of substances that negatively affect water quality
3. Contribute to reducing climate-related hazards and disaster risks, specifically fresh water flooding
4. Canadians will contribute to the conservation and sustainable use of Canada's fresh water since rain gardens help recharge groundwater sources

The project objectives are:

1. Improve water quality of the Sackville Waterfowl park, storm water runoff and ground water in general where rain gardens are planted.
2. Increase local resiliency to climate change induced flooding and droughts using natural infrastructure (rain gardens, low impact developments).
3. Reduce climate change induced fresh water flood risks.
4. Improve and restore land to more natural features (rain gardens are planted with native plants, act like a wild meadow, and double as pollinator and butterfly gardens)
5. Increase capacity of local Canadians (including indigenous, youth, small businesses and the general public) to adapt to climate change using simple techniques.

## Methodology: Our Process for Success

During year 2 of the project (2019-2020) we undertook the following steps:

1. Planted 10 gardens
  - a. Ordered plants (purple aster, echinacea, joe pye weed, swamp milkweed, pink turtle head, black eyed susan, blue flag iris, monarda (bee balm), blood root, cinnamon fern, ostrich fern (fiddle heads), sedge, sweet grass, and rush)
  - b. Obtained free compost and mulch from the Town of Sackville
  - c. Rounded up volunteers to help deliver the free compost and mulch and also to help dig the gardens.
  - d. Contacted <http://www.info-ex.com/> to locate any utility lines before digging.
  - e. Dug and planted the gardens with the homeowners and volunteers. See time lapse vide of planting a rain garden on the EOS Facebook Page at: <https://www.facebook.com/eosecoenergyinc/>
  - f. Homeowners watered and weeded their gardens.



*EOS Staff and volunteers help deliver compost and mulch to garden sites. Photo A. Marlin*



*Digging and preparing the garden with compost. Photo A. Marlin*

## 2. Monitoring

- a. Visited the gardens throughout the summer and fall
- b. Took photos at 3 months
- c. Spoke to homeowners to see how their gardens did through large rain events and Hurricane Dorian.
- d. Monitored the depaving site during rain events, took photos.

## 3. Signage and promotion

- a. Designed and ordered bilingual stone signs for each garden.
- b. Designed and ordered a bilingual metal sign for the depaving site with educational information about how permeable asphalt works and its benefits.

- c. We didn't have to formally promote the need for more homeowners who wanted gardens because we had more than 10 names on our waiting list for gardens in year 3 at the start of year 2!
  - d. We did educate the public in general though at local community events, summer camps and a professional learning day for municipal staff, planners and engineers in New Brunswick.
4. Monitoring behavior changes
- a. Throughout the summer we surveyed members of the public and asked how they use #RainAsAResource. We collected not just answers but photo commitments from the general public.
5. Planning for year 3 – rain garden depaving site plans
- a. Visited 11 properties in downtown Sackville, met with homeowners, decided on garden locations and designs, shapes, plants, etc.
  - b. Took before photos, took photos of flood events.
  - c. Plants were ordered and Anderson's Greenhouse again agreed to look after them for us.
  - d. 2 depaving projects were designed for year 3.

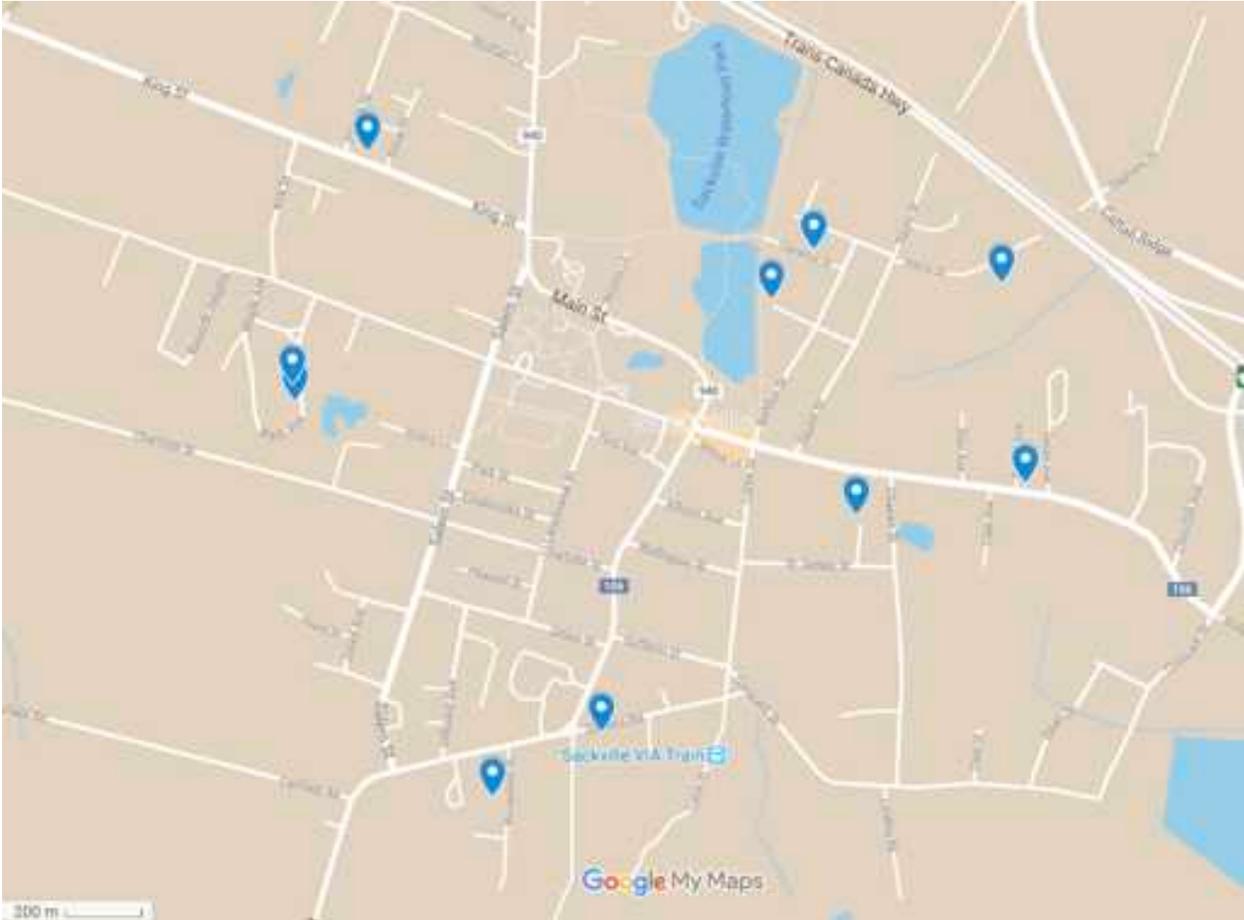


*EOS staff and volunteers plant a rain garden in Sackville. Photo A. Marlin*

## Residential Rain Garden Planting Year 2

During late spring and early summer 2019 we planted 10 rain gardens on residential properties in flood-prone areas of downtown Sackville, NB. They are represented on the following map. Rain garden locations represent a good distribution around town with gardens near the Sackville Waterfowl Park (King St, Morgan Lane, Clarence St, Harris St), uphill from the Lorne St. area which has suffered from chronic flooding issues (Bennet St, Queens Rd, Bridge St, Richardson St), and finally near the Quarry which is an area of higher elevation that drains down through town (West Ave).

Map of Rain Garden Project Locations Summer 2019



**9 Clarence St**

A 100 sq foot rain garden was planted by the garage where the homeowner removed a deck. It will catch water from the roof of garage, driveway, and land to try and let it absorb more into the ground before leading to flooding further down the property. This location is also very close to the Sackville Waterfowl Park. Nine volunteers with helped with this garden. The garden contains the following plants:

Plant	9 Clarence
Bay Berry	1
Blue aster	6
Echinacea (purple cone)	3
Joe Pye weed	10
Swamp Milkweed	10
Pink Turtlehead	10
Black eyed susans	14
Blue flag iris	12
Monarda - balmy lilac	3
Monarda - fistulosa - tall	7
Blood Root (poisonous to cats, dogs)	4
Cinnamon fern	4
Ostrich fern	5
Sedge (beak or lake)	
Sweet grass	
Rush	
Vesey's Swamp Milk Weed - new	1
Panorama mix monarda - red	1
<b>Totals</b>	<b>91</b>



*Rain garden completed at 9 Clarence St. with berm on lower end. Photo: A. Marlin*

### 13 Richardson St

This 100 sq foot garden was placed in a publicly visible location on the front lawn. This is a busy street which leads to an entrance to Salem Elementary School. Areas around this property are lower lying and impacted by floods and poor drainage including Salem Elementary School and towards Lorne St and the marshes. The homeowners reported getting some water in their basement during rain events, so the garden will help draw water away from the house and let it absorb into the ground. The garden is a free form shape to fill in around existing gardens with the ultimate goal for the homeowner of having a grass-free, natural lawn. Ten volunteers with helped with this garden. The garden contains the following plants:

Plant	13 Richardson
Bay Berry	
Blue aster	6
Echinacea (purple cone)	10
Joe Pye weed	10
Swamp Milkweed	10
Pink Turtlehead	10
Black eyed susans	
Blue flag iris	5
Monarda - balmy lilac	3
Monarda - fistulosa	7
Blood Root	0
Cinnamon fern	
Ostrich fern	
Sedge (beak or lake)	10
Sweet grass	8
Rush	10
Vesey's Swamp Milk Weed - new	
Panorama mix monarda - red	
<b>Totals</b>	<b>89</b>



A completed rain garden at 13 Richardson St. Photo A. Marlin

### 39 King St

The 100 sq foot garden is in the back corner of property to the left of an apple tree and somewhat visible from the street. It will catch runoff from the neighbour's property and the land to try to reduce sogginess of back yard. Further down King St, water will pool at the end of the street by an entrance to the Waterfowl Park during rain events. Ten volunteers with helped with this garden. The garden contains the following plants:

Plant	39 King
Bay Berry	
Blue aster	6
Echinacea (purple cone)	5
Joe Pye weed	10
Swamp Milkweed	10
Pink Turtlehead	10
Black eyed susans	11
Blue flag iris	10
Monarda - balmy lilac	3
Monarda - fistulosa	7
Blood Root	3
Cinnamon fern	4
Ostrich fern	5
Sedge (beak or lake)	5
Sweet grass	
Rush	
Vesey's Swamp Milk Weed - new	
Panorama mix monarda - red	
<b>Totals</b>	<b>89</b>



Completed rain garden at 39 King St. Photo Perry Eldridge

### 11 Morgan Lane

The garden is located to the right of the driveway and is 100 sq feet. It will catch rain from the neighbour's driveway and from Morgan Lane. This garden is an ideal location and will help limit runoff and sediments from reaching the Waterfowl Park. Upon a follow up visit in the fall, we learned that the homeowners had extended their garden a bit and planted additional milkweed. Nine volunteers with helped with this garden. The garden contains the following plants:

Plant	11 Morgan Lane
Bay Berry	
Blue aster	6
Echinacea (purple cone)	5
Joe Pye weed	10
Swamp Milkweed	12
Pink Turtlehead	12
Black eyed susans	11
Blue flag iris	10
Monarda - balmy lilac	3
Monarda - fistulosa	7
Blood Root	3
Cinnamon fern	4
Ostrich fern	5

Sedge (beak or lake)	
Sweet grass	5
Rush	
Vesey's Swamp Milk Weed - new	
Panorama mix monarda - red	
<b>Totals</b>	<b>93</b>



Homeowner waters her garden. Photo A. Marlin

### 34 Queens Rd

The garden is located to the side of house at the back corner, visible from road, and around shed. It is 100 sq feet. It catches water from the shed roof and house roof. The homeowners noted that rain water will run across their driveway and down toward Lorne St, a low-lying area with chronic flooding problems. Nine volunteers with helped with this garden. The garden contains the following plants:

Plant	34 Queens
Bay Berry	
Blue aster	6
Echinacea (purple cone)	10
Joe Pye weed	10

Swamp Milkweed	8
Pink Turtlehead	8
Black eyed susans	11
Blue flag iris	10
Monarda - balmy lilac	3
Monarda - fistulosa	7
Blood Root	4
Cinnamon fern	4
Ostrich fern	5
Sedge (beak or lake)	5
Sweet grass	
Rush	
Vesey's Swamp Milk Weed - new	
Panorama mix monarda - red	
<b>Totals</b>	<b>91</b>



*Completed garden at 34 Queens Rd. Photo A. Marlin*

### **21 West Ave**

The rain garden is 100 sq feet and is located to the side of the house and catch rain from the downspouts. Runoff goes toward the side lot beyond the garden location and some runoff in the general area will go towards the Quarry, some will go further downhill and back up in culverts on Maple Ave, another area known for localized flooding. The property has a lot of clay soil and water was seen laying on the lawn as we visited just after a fall rain storm in 2018. Twelve volunteers with helped with this garden. The garden contains the following plants:

Plant	21 West
Bay Berry	
Blue aster	6
Echinacea (purple cone)	5
Joe Pye weed	10
Swamp Milkweed	10
Pink Turtlehead	10
Black eyed susans	9
Blue flag iris	12
Monarda - balmy lilac	3
Monarda - fistulosa	7
Blood Root	0
Cinnamon fern	4
Ostrich fern	5
Sedge (beak or lake)	
Sweet grass	5
Rush	
Vesey's Swamp Milk Weed - new	
Panorama mix monarda - red	
<b>Totals</b>	<b>86</b>



*Rain garden at 21 West Avenue with house and downspouts in background. Photo. A. Marlin*

## 100 Bridge St

The 100 sq foot garden was placed at the edge of the driveway by the back field, visible from Starr Ave and will collect rain from overland and further uphill on Starr Ave. It will help to limit water and sediment making their way over the driveway to storm drains on Bridge St. Ten volunteers with helped with this garden. The garden contains the following plants:

Plant	100 Bridge
Bay Berry	
Blue aster	7
Echinacea (purple cone)	5
Joe Pye weed	7
Swamp Milkweed	6
Pink Turtlehead	10
Black eyed susans	16
Blue flag iris	3
Monarda - balmy lilac	3
Monarda - fistulosa	9
Blood Root	3
Cinnamon fern	
Ostrich fern	5
Sedge (beak or lake)	
Sweet grass	0
Rush	
Vesey's Swamp Milk Weed - new	2
Panorama mix monarda - red	0
<b>Totals</b>	<b>76</b>



*Planting the rain garden at 100 Bridge St. Photo. A. Marlin.*

## 10 Bennet St

The rain garden is located on the front lawn near where water is known to pool and then travel to storm drains on Bennet St. The area is also close to Lorne St. This garden will be highly visible as it is beside a walking trail and is 100 sq feet in size. Seven volunteers with helped with this garden. The garden contains the following plants:

Plant	10 Bennet
Bay Berry	
Blue aster	6
Echinacea (purple cone)	4
Joe Pye weed	10
Swamp Milkweed	10
Pink Turtlehead	10
Black eyed susans	14
Blue flag iris	9
Monarda - balmy lilac	3
Monarda - fistulosa	7
Blood Root	2
Cinnamon fern	
Ostrich fern	5
Sedge (beak or lake)	
Sweet grass	8
Rush	
Vesey's Swamp Milk Weed - new	
Panorama mix monarda - red	
<b>Totals</b>	<b>88</b>



*Planting the rain garden at 10 Bennet St. Photo A. Marlin*

**25 Harris St**

At this property water pools mostly in spring by front corner of lawn near driveway, and there can be water in the shed. It also pools by front eavestrough. The garden is 100 sq feet and is located in a highly visible area on the front lawn and will help catch rain from the front corner downspout. Flooding is known to occur further downhill on Squire St, near the Sackville Waterfowl Park. Eleven volunteers with helped with this garden. The garden contains the following plants:

Plant	25 Harris
Bay Berry	
Blue aster	6
Echinacea (purple cone)	4
Joe Pye weed	5
Swamp Milkweed	10
Pink Turtlehead	10
Black eyed susans	11
Blue flag iris	9
Monarda - balmy lilac	3
Monarda - fistulosa	3
Blood Root	3
Cinnamon fern	4
Ostrich fern	5
Sedge (beak or lake)	
Sweet grass	8
Rush	
Vesey's Swamp Milk Weed - new	1
Panorama mix monarda - red	2
<b>Totals</b>	<b>84</b>



*EOS staff, homeowners and volunteer pose with the rain garden at 25 Harris. Photo: A. Marlin*

## 17 West Avenue

EOS staff and volunteers planted a 100 sq foot rain garden replaced the one on Squire Street mentioned in our year 1 report. The homeowners on Squire were not able to go ahead with their garden so we went to the next on our waiting list. The garden at 17 West Avenue is located on their front lawn and catches rain coming down the land and from their downspouts. It reduces the amount of water that will run off and down through culverts. Further downhill some properties can experience flooding during intense rain events. This area is also near the top of the watershed in Sackville and will help slow, hold and absorb rainwater. After EOS planted the garden, the homeowner extended the garden so it is now more than 200 sq feet in size! Some plants that other homeowners didn't want (due to colour preference and some being potentially toxic to cats, etc) were relocated to this extended garden. Six volunteers with helped with this garden. The garden contains the following plants:

Plant	17 West
Bay Berry	
Blue aster	7
Echinacea (purple cone)	4
Joe Pye weed	18
Swamp Milkweed	14
Pink Turtlehead	10
Black eyed susans	12
Blue flag iris	19
Monarda - balmy lilac	2
Monarda - fistulosa	12
Blood Root	11
Cinnamon fern	4
Ostrich fern	5
Sedge (beak or lake)	
Sweet grass	
Rush	
Vesey's Swamp Milk Weed - new	1
Panorama mix monarda - red	2
<b>Totals</b>	<b>121</b>



*Rain garden at 17 West Avenue. Photo A. Marlin*

### **Rain Garden Signage**

Bilingual signs were designed and made by Set in Stone of Moncton, NB using stones from the Bay of Fundy (for which they have a licence to collect). These were placed at each garden to help inform passersby that they are rain gardens. Stone was selected because it is natural and durable and blends well into the garden while still being visible and easy to read.



*Bilingual rain garden sign made by Set in Stone of Moncton. Photo: A. Marlin*

## **Rain Garden Monitoring and Follow Up**

Follow up surveys were done with the homeowners to see how their gardens performed during rain events later in the summer and fall. And also to see if they had taken any additional steps to reduce flood risk, conserve water, or use rain as a resource. Some of the things we learned were that many gardens had an immediate impact on reducing flooding and sogginess of lawns, and homeowners reported they are easy to look after. More details from homeowners are presented on the next pages.

**9 Clarence Street**

At 9 Clarence Street the homeowners noticed less water pooling in a troubled spot at the bottom of their property. They said that most plants took well to the garden, aside from a few irises that didn't grow.



*The rain garden located at 9 Clarence St. Photo: E. Arbeau*

**13 Richardson Street**

The garden at 13 Richardson Street had all plants growing well during the summer. The homeowner noted that the garden seemed to prevent water from flowing down the driveway after rain.



*The rain garden located at 13 Richardson St. Photo: E. Arbeau*

**39 King Street**

The homeowners of 39 King Street really enjoyed having a rain garden as they noticed a significant decrease in water pooling on their lawn around the garden. They removed some of the larger weeds but reported having little trouble with weeds overall.



*The rain garden located at 39 King St. Photo: E. Arbeau*

**11 Morgan Lane**

At 11 Morgan Lane they extended their rain garden and planted additional milkweed plants. They also completed flood proofing of their foundation. They confessed to possibly over weeding their rain garden and possibly removing some of the good plants.



*The rain garden located at 11 Morgan Ln. Photo: E. Arbeau*

**34 Queens Road**

The homeowners mentioned they liked the stone sign that was dropped off in September by EOS staff. EOS staff observed the garden to be growing well in September.



*The rain garden located at 34 Queens Rd. Photo: E. Arbeau*

**21 West Avenue**

The garden at 21 West Avenue grew well throughout the summer, aside from a few Blue Flag Irises that did not take well. The homeowners had very little trouble with weeds and noticed the areas of lawn around the garden to be much drier after rain.



*The rain garden located at 21 West Ave. Photo: E. Arbeau*

### **100 Bridge Street**

The homeowners at 100 Bridge Street said that the garden thrived from August through late fall. There was a significant decrease in the amount of water running down the driveway after rain, and reduced erosion of the gravel on the driveway. Like a couple of other gardens, iris didn't grow well, and the homeowner believes their soil may have caused this problem.



*The rain garden located at 100 Bridge St. Photo: E. Arbeau*

### **10 Bennett Street**

Although the homeowner was not able to respond to our request for an update, EOS staff observed the garden to be growing well in the fall.



*The rain garden located at 9 Clarence St. Photo: E. Arbeau*

### **25 Harris Drive**

The homeowners at 25 Harris Drive reported seeing monarchs this summer at their rain garden, including a chrysalis.



*The rain garden located at 25 Harris Dr. Photo: E. Arbeau*

### **17 West Avenue**

At 17 West Avenue the homeowner extended her rain garden to reach almost the full width of her front lawn. It now measures at least 200 square feet.



*The extended rain garden located at 17 West Ave. Photo: E. Arbeau*

Further monitoring of the gardens will take place during spring 2020 (year 3) to see how many plants survived the winter.

## Depaving Project for Year 2

In June 2019, EOS created the first ever permeably paved parking space in Sackville. A parking space near the Bill Johnstone Memorial Park was chosen due to water pooling being noted in the area, as well as the high amount of traffic and pedestrians that would pass by the site. This alternative location was chosen as the original parking lot at the Visitor Information Centre had wires underneath which would not allow for the 1 m fill underneath the permeable pavement. On June 3rd, the Town of Sackville tore up 335 square feet of existing pavement, dug down one meter and placed the ¾ inch clearstone fill in the hole. On June 5th, Dexter Construction was onsite to install the permeable asphalt.

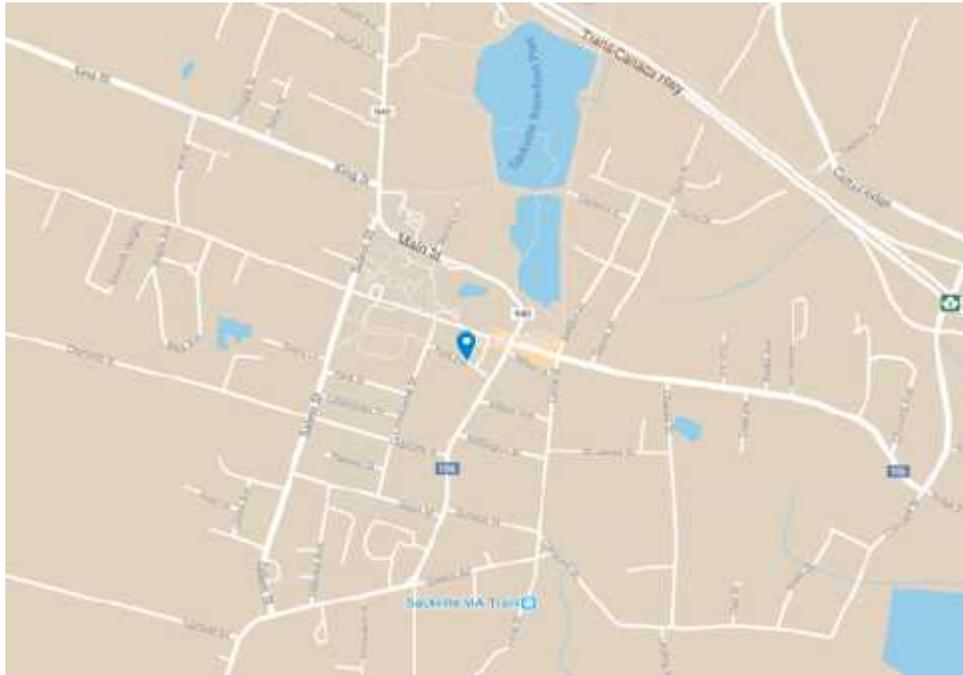
Unlike traditional asphalt, permeable varieties and their base-layers allow rainwater and runoff to seep through the surface and back into the ground rather than being directed to storm drains. By mixing in more large stone and less sand during the manufacturing process, natural pores are created. As water filters through the pavement and fill layers, suspended solids and pollutants are trapped and prevented from entering the soil. An additional benefit of the pavement's porous nature and the gaps in the fill underground is the ability to withstand freeze-thaw events. The air pockets found throughout the site prevent buckling as ice is formed. This leads to a more durable pavement and the need for less road salt and sand.

The long-term goal of this project is to encourage homeowners and local businesses to not pave or depave their driveways, parking lots and patios. By replacing paved areas with permeable pavers or gardens, more water will be able to recharge ground water supplies and reduce the damaging impact of water runoff during heavy rain events.



*Work being done on the parking space and the final product. Photos: KN Croucher*

## Location of Depaved Area – Ford Avenue, Sackville, NB



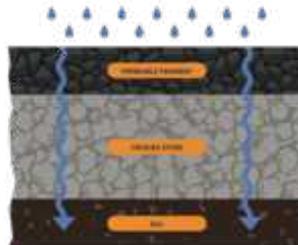
### Signage

An educational and bilingual sign was designed and placed at the parking space to help raise awareness about depaving and permeable asphalt.



#### Permeable Pavement

Unlike regular pavement, permeable pavement allows rainwater to flow through it to a reservoir of crushed stones below. The ground can then absorb water that enters the reservoir, reducing runoff that reaches storm sewers.



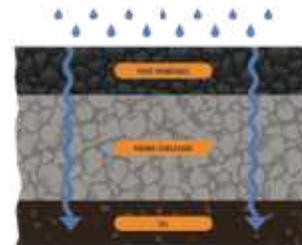
#### BENEFITS

- Reduces flooding
- Filters pollutants
- Recharges groundwater
- Requires less road salt
- Reduces potholes
- Maintains durability



#### Pavé perméable

Contrairement au pavé habituel, le pavé perméable permet à l'eau de pluie de le traverser et d'atteindre un réservoir de pierre cassée. Le sol peut ensuite absorber l'eau qui entre dans le réservoir, réduisant ainsi l'écoulement dans les égouts.



#### BIENFAITS

- Réduit les inondations
- Filtre les polluants
- Recharge les eaux souterraines
- Nécessite moins de sel
- Réduit les nids-de-poule
- Conserve sa durabilité



Educational sign explaining depaving. Photo: EOS Eco-Energy

## **Monitoring**

Finally, the depaved site is performing well, letting rainwater absorb into the ground. The Town of Sackville staff know that they need to keep the location well cleared of debris and to street clean more often. Further monitoring will take place after the winter in spring 2020 (during year 3). There has been interest from homeowners, businesses, Town of Sackville and Mount Allison University in using permeable asphalt if it performs well at the demo site.

## **Education, Promotion and Commitments**

The project in year 2 included a number of educational events to help promote rain gardens, depaving and natural infrastructure. We also surveyed members of the general public about their commitments to use #RainAsAResource.

### **NBEN/BRACE Learning Day June 4<sup>th</sup>, 2019**

About ninety professionals including engineers, planners, municipal staff and NGOs participated in a natural infrastructure learning day. EOS provided two educational stops on the tour, one at a rain garden and one at our depaving site. Local media covered the event. See media coverage in the Appendix.

### **Sackville Farmers Market – June 22<sup>nd</sup>, 2019**

EOS set up an information booth at the Sackville Farmer's Market to promote the depaved space. People were able to drop some water on both regular depaved areas to compare the absorption of water and runoff and see first-hand the benefits of depaving and the technologies that exist to replace it. We also continued to collect commitments using the hashtag #RainAsAResource.

### **Rain is a Resource Community of Practice Presentation - June 27<sup>th</sup>, 2019**

EOS presented on our depaving project and #RainAsAResource campaign to the green infrastructure community of practice, a national group of 17 individuals/community groups/organizations co-hosted by the Canadian Freshwater Alliance, Our Living Waters and Green Communities Canada looking to connect and support groups and organizations looking to advance nature based solutions in communities across Canada.

### **Sackville Rotary Club Presentation - July 11<sup>th</sup>, 2019**

EOS presented to a group of over 20 Rotary Club members on rain gardens, what they, how to plant, and why they are beneficial to reduce flood risk and increase resiliency to climate change; as well as our depaving project and the benefits of permeable pavement.

### **Rain Gardens and Resiliency at Home, The Deanery Project, September 28<sup>th</sup>, 2019**

EOS presented to a group of over 20 homeowners and students on rain gardens, what they, how to plant, and why they are beneficial to reduce flood risk and increase resiliency to climate change.

### **Chignecto Naturalist Club Presentation - October 21<sup>st</sup>, 2019**

EOS presented to a group of 20 Chignecto Naturalist Club members on rain gardens, what they, how to plant, and why they are beneficial to reduce flood risk and increase resiliency to climate change; as well as our depaving project and the benefits of permeable pavement.

### **Transforming Towns Webinar - October 31<sup>st</sup>, 2019**

This webinar was hosted by the Canadian Freshwater Alliance to 100 listeners/participants. EOS sat on a panel with 2 other organizations and gave a presentation on our rain garden & depaving projects, how these natural solutions can overcome challenges around flooding, drought, and water quality.

### **#RainAsAResource**

One of the ways we engaged the public was through our #RainAsAResource campaign. Using the hashtag, we gathered photo commitments of pledgers holding a white board with their commitment and the hashtag. Overall, we want to change behaviors, not promote a one-time action. After attending a community-based social marketing workshop lead by Dr. Doug McKenzie-Mohr, we learned that using photo commitments is a more effective method of promoting your message and turning actions into behaviors Dr. McKenzie-Mohr's research suggests that by making your commitment public and durable, you're more likely to follow-through with the behavior. Thus, we posted the photo commitments we gathered to our website and social media pages, while also encouraging people to post their own commitments using the hashtag.

To date, we collected a total of 21 commitments from local residents and attendees of events around the region. Commitments were gathered at various events that EOS attended throughout the summer such as the NBEN Learning Day on June 4th and during the planting of the rain gardens. Some of the commitments made include watering gardens with rainwater, educating others about rain gardens and using rain barrels to capture water during rain events.

Link to our webpage with photo commitments and more information - <https://eosecoenergy.com/en/depaving/>



*Selected photo commitments from the #RainAsAResource campaign. Photos: A. Marlin, E. Arbeau*

### **Media Coverage**

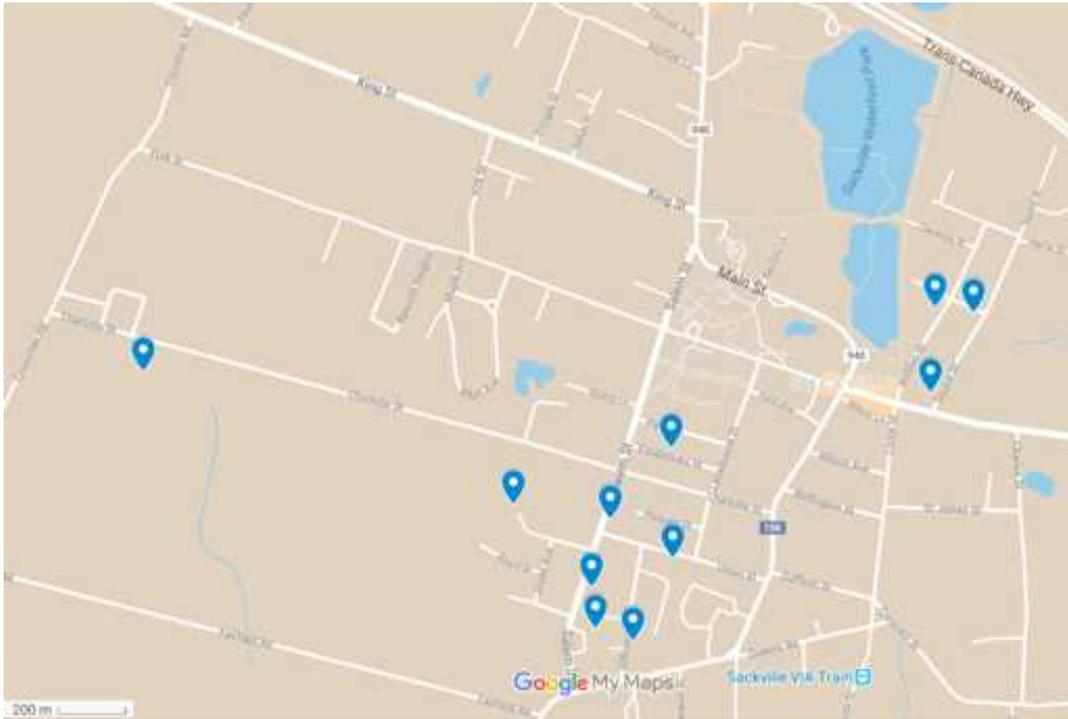
More than 1000 people read articles and watched news stories on the project. See media coverage in the appendix.

EOS will also be featured as one of the Freshwater Alliance Green Infrastructure Case Studies highlighting our residential rain garden and depaving projects.

## **Residential Rain Garden Plans for Year 3**

During fall 2019 we visited 11 residential properties in flood-prone areas of downtown Sackville. They are represented on the following map. The locations represent a good distribution around town with gardens near Sackville Waterfowl Park (Weldon St., Squire St.), uphill from the Lorne St. area which has suffered chronic flooding issues (Estabrooks St, Union St., Hillcrest Ave., Salem St., Brenmar Cres.), and finally up at the top of Charlotte St. at a higher elevation that then drains through town. We developed garden plans for each location and plan to plant them during spring and summer 2020 (year 3 of the project).

## Map of Rain Garden Project Locations 2020



### 9 Brenmar Cres.

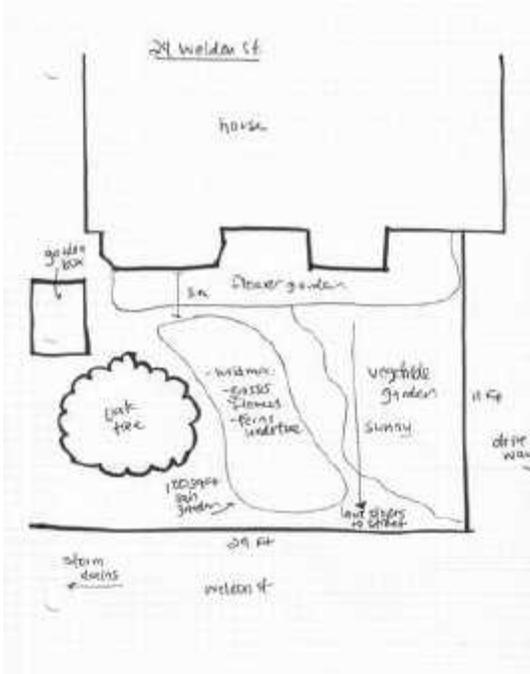
The rain garden will be planted in the back yard to catch rain from the end of a drainage pipe that collects rain from the driveway and adjacent property to direct it towards a culvert under the road that tends to clog. This rain garden will help catch the storm water before it makes its way to the culvert, preventing clogging. Prior to installation on the drainage pipe flooding would occur during rain events adjacent to the driveway and garage. There is also a good spot for a second, smaller rain garden below the downspout off the backside of the roof of the house.





24 Weldon St.

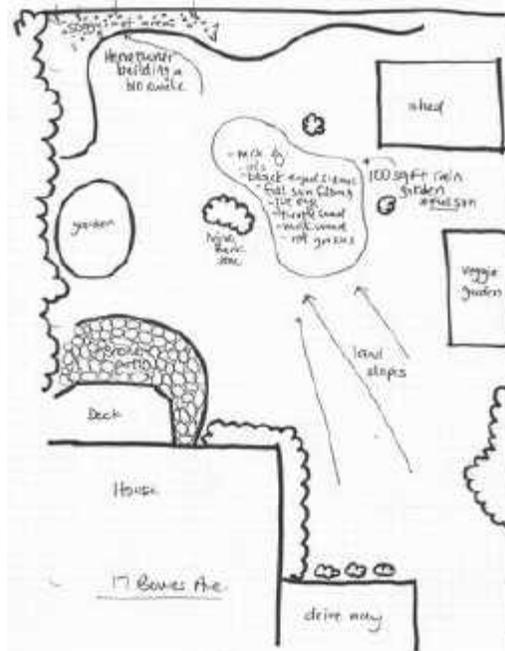
This rain garden will be placed in a publicly visible location on the front lawn. This is a popular residential street that people walk on to access Bridge St. or Waterfowl Park. Areas around this property are lower lying and impacted by floods and poor drainage. The homeowners reported flooding in their basement and neighbours' basements during heavy rain events. This rain garden will help catch rain off the house roof (no eaves) prior to reaching the storm drains on the Weldon St.



Rain garden will be planted between oak tree and vegetable garden. Photo: KN Croucher

## 17 Bowes Ave.

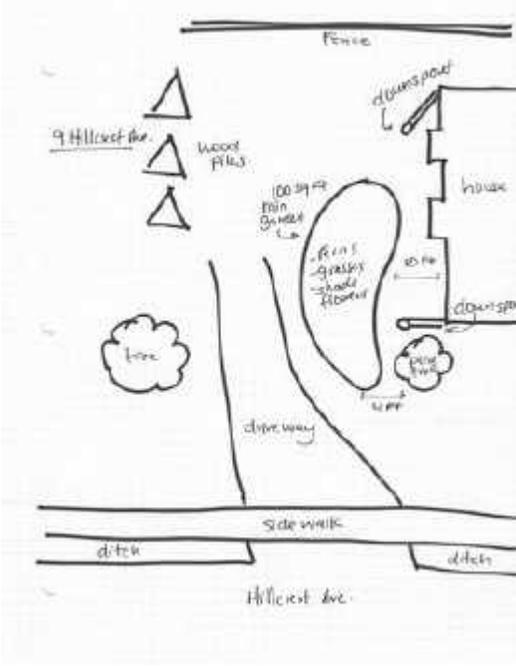
The rain garden will be planted in the backyard near the bottom of the property. The land slopes toward the back of the property, bringing storm water from the driveway and upper part of the property, resulting in the bottom of the property being very soggy and muddy after rainfall and snow melt. The homeowner has started building a bio-swale at the bottom of the property to try to alleviate the soggy. This rain garden will help catch water before it reaches the bottom, reducing the soggy of the backyard.



Looking at back of property toward bio-swale. Photo: KN Croucher

9 Hillcrest Ave.

This rain garden will be planted on the left-hand side of the house catching rain off of the roof as all of the rain gutters/eaves are directed towards this proposed garden site, as well as from the driveway since the property is sloped slightly down towards the back of the backyard. The road culverts around this property tend to fill in the springtime. The driveway used to pool water before the homeowners covered it in woodchips.



Rain garden site. Photo: KN Croucher



30 Squire St.

This rain garden will be placed in a publicly visible location between two driveways on Milner Ave. This street sees foot traffic from people walking to the Sackville Waterfowl Park entrance at the end of Morgan Ln. Water from 3 neighbouring backyards, and off of the garage roof, flow downwards towards the road. This rain garden will collect the water before it reaches the road, preventing it from entering the storm drain system.

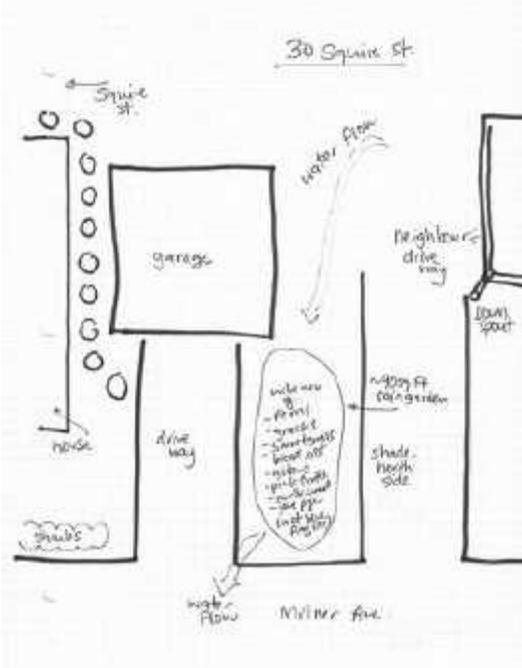
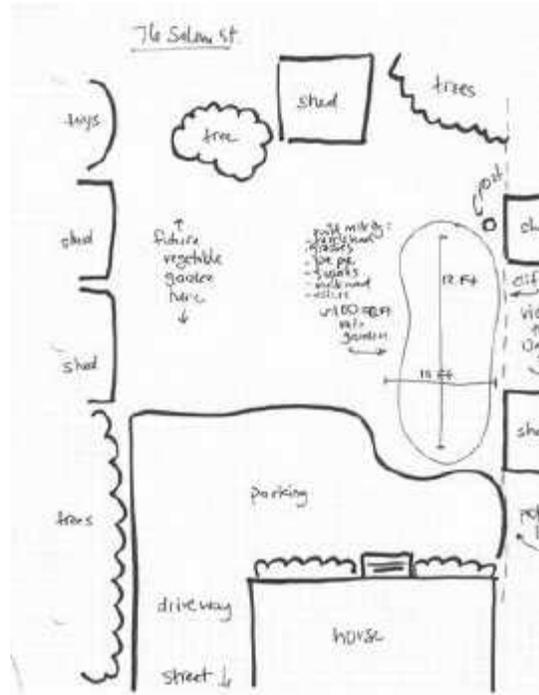


Photo: KN Croucher

## 76 Salem St.

Water collects and pools on the driveway located on the left-hand side of the house. There are no eaves on the house so all the rain falls off of the roof as well. There is a slight slope so the storm water tends to flow off of the driveway towards the backyard. This rain garden will collect the storm water from the driveway, as well as off of the neighbors shed roof.



Rain comes off of roof and flows down to end of driveway. Photo: KN Croucher

98 Salem St.

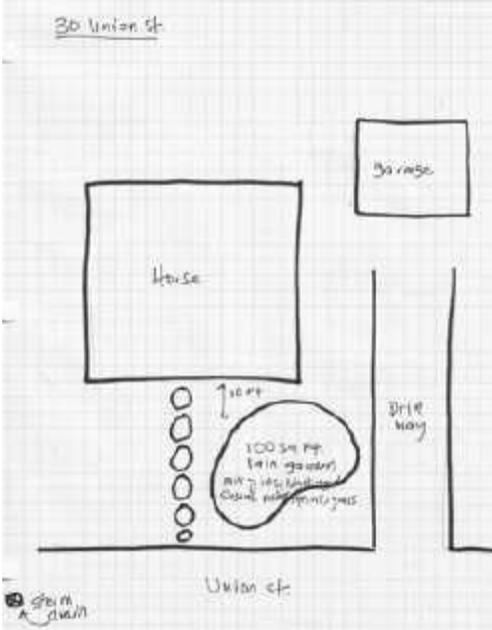
This rain garden will be located near the front of the property next to the house. It will be an extension of a pre-existing garden that has common water-loving, native plants we use in our rain gardens (e.g. blue flag iris, black eyed susan, golden rod, purple aster). Runoff flows downslope from the driveway to the back field of the property where there is evidence of flooding in the spring. This rain garden will help catch water from the driveway, as well as part of the roof, as one of the eaves is directed toward the proposed garden location.



Rain from roof and driveway will feed the rain garden location. Photo: KN Croucher

30 Union St.

This rain garden will be placed in a publicly visible location in the front yard. The rain garden will catch water from the neighbour's driveway and the roof of the house before it reaches the storm drain on Union St. The homeowner has experienced basement flooding and has seen swampy patches in the backyard.



Rain garden will be placed on front lawn. Photo: KN Croucher



# Depaving Project Plans for Year 3

For year 3 we chose two depaving sites: Salem Elementary School in Sackville & the C&J Restaurant parking lot in Port Elgin.

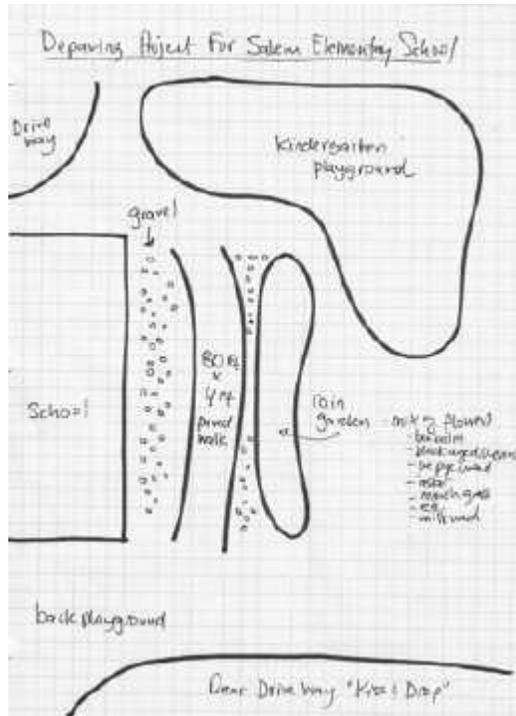
Location of Salem Elementary School Depaving Site



At Salem Elementary School we will be depaving a degraded paved pathway (80 x 4 ft, or 320 sq ft ~2 parking spaces worth of asphalt) that runs from the kindergarten playground at the front of the school to the kiss & drop parking lot & playground behind the school. The already broken up asphalt walkway will be further chunked up and disposed of with the help of student volunteers. We then plan to plant a rain garden beside the former pathway with the help of student volunteers. This will be a great educational project for the students at the school and will provide a great teaching tool for their annual Outdoor Education Days. This area receives runoff from the school roof and the raingarden will help absorb some of the storm water before reaching the storm drain near the rear parking lot.



Aerial view of depaving site.

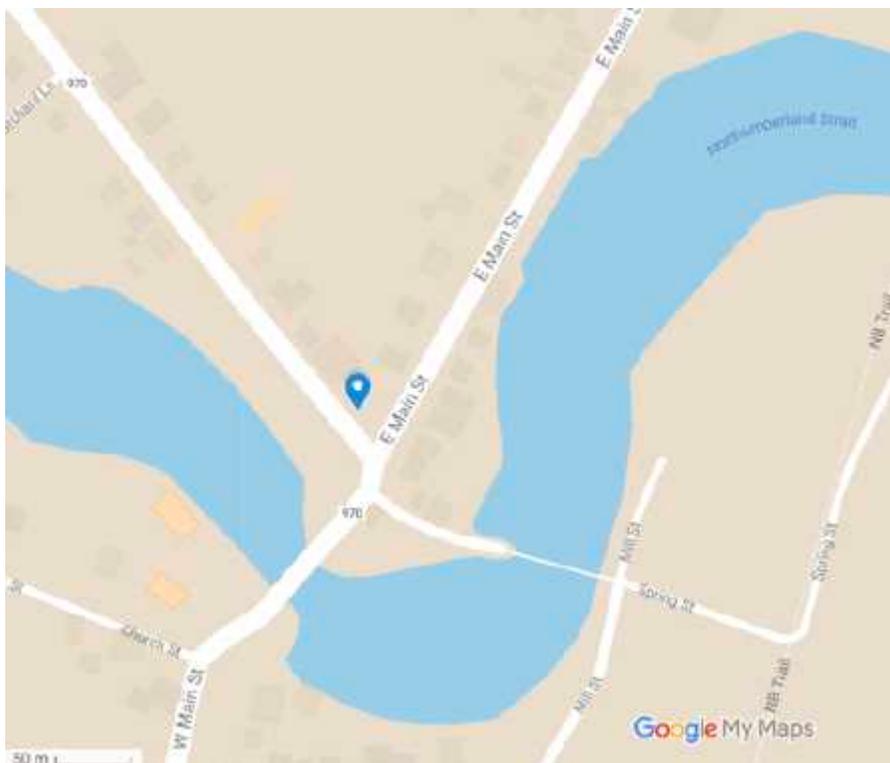


Looking towards kindergarten playground while measuring length of paved trail. Photo: KN Croucher



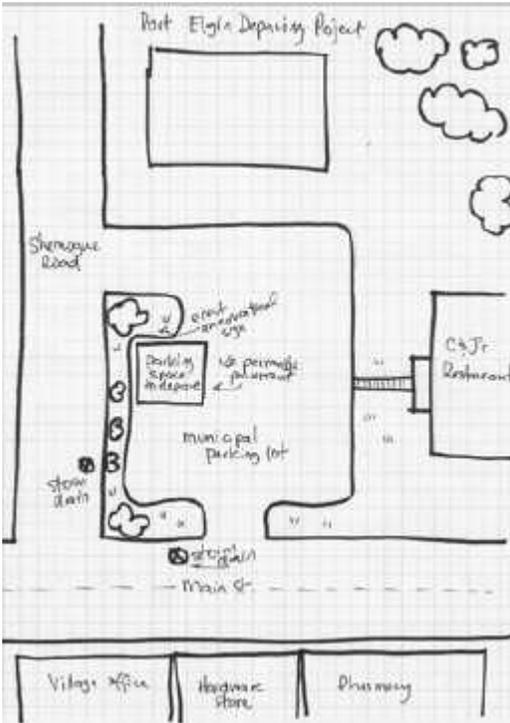
Looking towards kindergarten playground. Photo: KN Croucher

### Location of C&J Restaurant Parking Lot Depaving Site (Port Elgin)



We plan to do another permeable paving project for at least 1 parking space (9 x 18 ft, 162 sq ft) in the C&J Restaurant parking lot in Port Elgin. This will involve removing the impervious asphalt and replacing it with permeable asphalt. This is a great location with lots of public exposure from the riverside park across the street, and the village office, hardware store, and pharmacy across the street. This is also the only restaurant in the village so it receives a lot of customers, especially during the summer months when people are stopping in driving to or from

the PEI Confederation Bridge. An educational sign will be put in place to help the public understand why permeable pavement is used and what its benefits are.



Looking at water pooling at the back of C&J Restaurant Parking Lot. Photo: KN Croucher

### Challenges

In terms of challenges for year 2, plants ended up being a bit more expensive than planned so we had to plant a few less. However, all of the plants are perennials and will reseed themselves and continue to multiply and fill in the gardens. All homeowners are taking care of their gardens and at the three-month mark, the gardens were flourishing. One homeowner may have weeded

her garden a bit too much and removed some of the good plants. We won't know until we go back to count plants that survived the winter. All other aspects of the project worked well.

### Summary of Year 2 and Next Steps

In summary, 10 rain garden projects were planted. This included 908 plants and more than 1000 sq feet of gardens. The depaving project covered an area of 335 sq feet. A total of 93 volunteers helped with the rain gardens in year 2 and about 1000 people were reached with educational and promotional information. 21 members of the public committed to reducing flooding, using rain as a resource and conserving water. Additional site visits and follow up surveys/questions with homeowners revealed that some of them had taken additional steps to reduce flood risk at their homes such as extending their rain gardens, flood proofing their basements, etc.

#### Summary of Results – Year 2

Indicator	Result of Year 2
Area of habitat restored	0.0092903 Hectares
Native plants planted	908
Percentage of plants that survived the first winter	We will report in year 3
People reached via project activities (education and promotion)	1000+
Jobs created	4 EOS staff people worked on this project including the executive director, watershed coordinator and two summer students.
Volunteers (helped with rain gardens)	93 (close to the 120 for the project total)
People who said they would modify their behaviour	21 commitments were gathered during #RainAsAResource campaign in year 2

We look forward to year 3 of the project which involves planting the final 10 gardens and one-two more depaving projects. We will also monitor the gardens planted in year 2 and count the number of plants that survived the winter.

## Appendix – Media Coverage

CBC New Brunswick - <https://www.cbc.ca/news/canada/new-brunswick/aspahlt-pavement-depave-sackville-eos-water-quality-1.5163654>

Bruce Wark - <https://warktimes.com/2019/06/06/cool-clear-water-eos-testing-new-rain-friendly-asphalt-in-sackville/>

TIMES & TRANSCRIPT June 5, 2019



**Town looks to asphalt to address flooding**

Naki Nicole Crowcher, watershed coordinator for EOS Eco-Energy, a non-profit environmental group, holds heavy gravel that will act as a natural filter for an experiment with permeable asphalt in downtown Sackville. The trench next to her was excavated and filled with gravel, and will be covered with permeable asphalt, which will allow water to soak through it and dissipate slowly into the ground below. PHOTO: ALAN COCHRANE, TIMES & TRANSCRIPT

**ALAN COCHRANE**  
TIMES & TRANSCRIPT

**SACKVILLE** • An environmental group has teamed up with the Town of Sackville to pave a stretch of Ford Avenue next to a downtown park with permeable asphalt that should allow storm water to gently seep into the ground during heavy rainfall.

"Permeable asphalt is porous, but it has the same stability as regular asphalt," said Naki Nicole Crowcher, watershed coordinator for EOS Eco-Energy, a non-profit environmental group. "It is mixed in a way that it looks and appears the same as regular asphalt but it allows the water to go directly into it."

She said permeable asphalt has been used in the United States and some other parts of Canada, but is not currently used in Atlantic Canada. The City of Moncton used the product in a project on the Riverview Park in 2016.

The porous asphalt allows water to seep through it like a sponge and gradually dissipate through gravel below the surface that acts as a natural filter. She said the specialized asphalt is more expensive than the regular kind, so it is generally used in small areas where water tends to build up.

"It slows down the water, so if you have a heavy rainfall event or have all that storm water collecting in that one area, which happens in this parking lot, it's going to just allow the water to slowly sink into the ground, filter out pollutants as it goes through the fill and then dissipate into the soil," Crowcher said. "If there is an excess amount of water, the overflow will go through the storm drain system."

The test zone is at the bottom of a gentle slope on Ford Avenue, just off Main Street, where water tends to gather during heavy rains and snow melt. It's next to Bill Johnson Park, site of the town's Saturday market, playground and water park. During a tour Tuesday attended by representatives of municipalities and environmental groups, Crowcher showed how a piece of the street approximately 15 metres long and one metre wide has been excavated and refilled with a metre-deep layer of soil and gravel that will act as a natural water filter. It will be covered with the porous asphalt this week, just in time for predicted heavy rains. The group will monitor the site during storms over the next year to see how it works.

"The water has collected there in the past, and we wanted to try a new technology that would allow the water to filter through," said James Burke, senior manager of corporate projects for the Town of Sackville. "We hope there will be opportunities to do other projects with this type of material that are good for the environment."

Burke said interpretive signs will be put up to educate the public about the project, which is expected to cost about \$5,000. Crowcher said the group received funding from the federal government through Environment and Climate Change Canada for the paving project and a residential rain garden project. The group is building 10 rain gardens to show how various plants with deep roots can soak up excess water runoff from roofs, driveways, parking lots and lawns to prevent flooding.

**Rain gardens**

Attanda Martin, executive director of the EOS Eco-Energy, led a group tour to a demonstration rain garden in front of an historic house on Main Street that is used for office space. Martin said rain gardens can absorb 30 to 40 per cent more rain than a standard lawn, hold it and release the water slowly into the lower. She said deep-rooted plants that are usually found along the edge of wetlands absorb water during heavy rains and return water vapour to the atmosphere. The deep roots also increase the permeability of the soil and sustain microorganisms important to biofiltration.

"Building a rain garden in your own yard is one of the easiest and most cost-efficient things you can do to reduce your contribution to storm water runoff and adapt to climate changes," she said. Some of her suggested plants for the garden were bushy hedge, black-eyed Susans, blue flag iris, crimson fern, common rush, orchid fern (Kiddebeads) and swamp thistleweed.

Moncton Times and Transcript, June 5<sup>th</sup>, 2019

## RAINWATER AS A RESOURCE

# Permeable asphalt project passes first test

Depaving project aims to mitigate flooding, help keep waterways healthy

**KATIE TOWER**  
SACKVILLE TRIBUNE-POST

SACKVILLE, N.B. — It didn't take long to start seeing the positive results of a pilot project that aims to mitigate flooding in Sackville.

With the rain falling last Thursday, only one day after EHS Eco-Energy launched the town's first 'depaving' project, it was evident the permeable asphalt was doing its job, and allowing the rainwater to infiltrate into the soil and into the reservoir below.

"It was seeping right down into the ground right away," said Kelli Nicole Crocher, watershed coordinator with EHS Eco-Energy.

Crocher said the new project is part of EHS' overall programming that focuses on rainwater. And even though the project is small, the Sackville-based sustainability group is hoping it will show how beneficial these types of activities can be when it comes to mitigating floods and improving water quality.

The location selected for the depaving project was a parking space alongside the Bill Adairstone Memorial Park, behind the post office.

"That parking spot was in disrepair so we needed to do something there anyway," said town engineer Dwayne Arsenault.



A crew from Dexter Construction lays permeable pavement down last Wednesday at the downtown parking lot.

Sackville Tribune-Post, June 2019

# Depaving project

**FROM A1  
ASPHALT**

Acton said the town jumped at the opportunity to partner with EOS on this pilot project; the organization was looking for a test site and the municipality knew this location was a good fit for what they wanted to do.

Croucher agreed with Acton, saying the parking space didn't do well with surface runoff and had issues that needed addressed.

"That spot in particular had noticeable pooling issues," she said. "So this will allow the water instead to infiltrate through the pavement."

The town also provided in-kind work on the project, removing the existing asphalt, installing a perforated drain pipe and weeping tiles, as well as laying down a one-metre thick layer of drainage stone fill that will help filter the rainwater going into the ground below.

Dexter Construction then came in Wednesday to install the permeable asphalt. Croucher said it's not a product that's widely available at this time in Atlantic Canada so the cost is higher than typical asphalt - for the 315-square foot parking spot, the price tag came in at about \$5,000.

She said Dexter doesn't currently have the equipment to mix the permeable asphalt here so it was made in Saint John. But she noted if interest continues



The permeable asphalt was doing a good job absorbing the rain last Thursday morning.



A before photo of the site, showing the pooling that occurred there regularly.

to rise for larger-scale projects in the area, the company would consider moving some equipment to its Moncton or Amherst sites.

Croucher explained when water hits impervious surfaces, such as asphalt pavement and concrete, it is unable to enter the ground water system. And this causes rain

and meltwater to run into storm sewers and local waterways. She said this runoff water can carry pollutants such as oil, pesticides and plastics.

So depaving allows water instead to naturally enter the soil, she said.

"The permeable pavement absorbs the rainwater so it's re-

ducing the risk of flooding and it's collecting the pollutants so it's improving the water quality."

Croucher said EOS and the town will monitor the site over the year and will not only determine if the pavement is effective in reducing runoff but also to see how it holds up to frost and heavy trucks.

"We look forward to working with EOS over the next year to monitor the performance of the material," said Jenie Burke, the town's senior manager of corporate projects.

Burke said the town is always looking for ways to continue its efforts at being environmentally responsible "so to be able to test and evaluate this pilot project seemed like a win-win."

He said the town has worked with EOS on a number of projects over the years, such as its climate change adaptation plan, rain gardens, the Partners for Climate Protection Program, the Chignecto Climate Change Collaborative, public awareness events and more, and "they are a really valuable asset to our community."

EOS, an organization which works within the Miramichi-Grand-Fundy region on ways to reduce and adapt to climate change, received grants from Green Communities Canada, the Freshwater Alliance, and Our Living Waters for the project. The group also has funding for another depaving project next year although a site has yet to be determined.

Sackville Tribune-Post, June 2019