

Clear Water Projects in Sheridan Creek Watershed

Bernardi Building Supply Ltd.

What is a Watershed?

No matter where you are, you are in a watershed. A watershed is the area of land that catches rain and snow which travels over land or through soil into a marsh, stream, or lake. Another way to understand a watershed is to think of an area of land that drains to a low point such as a stream, marsh, creek or lake.

Sheridan Creek Watershed

Sheridan Creek starts at Highway 403 and flows approximately five kilometers through Mississauga into Lake Ontario. Sheridan Creek Watershed has many unique natural features and important water resources. Did you know Sheridan Creek flows into Rattray Marsh, a provincially significant wetland, which represents one of the few remaining examples of a coastal wetland along the western side of Lake Ontario? Nestled within the city, Sheridan Creek Watershed faces many challenges as a result of urbanization.



Rattray Marsh

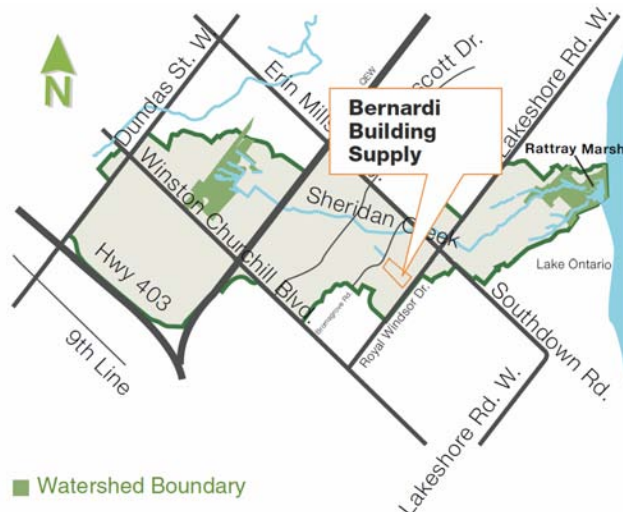


Sheridan Creek

To protect Rattray Marsh and Sheridan Creek, it is important to have clean water. One threat to clean water is rain water that washes across lawns, parking lots and roads carrying with it sediment, lawn fertilizers, pesticides, metals and pollution such as road salt. Pollutants are then washed into Sheridan Creek impacting environmental health and Lake Ontario, the source of Mississauga's drinking water.

Leading the Charge

The good news for restoration is that leaders like **Bernardi Building Supply** (in partnership with the City of Mississauga and Ministry of the Environment) are implementing projects on their property that will help to protect the health of Sheridan Creek and Lake Ontario.



Bernardi Building Supply Ltd is located at 2235 Royal Windsor Dr., Mississauga in Sheridan Creek Watershed

Implementation Planning

Funding

Bernardi Building Supply, in partnership with CVC and the City of Mississauga, received funding from the Ministry of the Environment to implement in-the-ground projects to protect surface water supply for small and medium sized businesses.¹

Through development of demonstration sites, the goals were to:

- remove and reduce threats to surface water and municipal drinking water supplies;
- empower stakeholders to take action and protect municipal drinking water supplies by implementing projects;
- increase public and community awareness of the importance of pollution prevention and making a connection between stormwater drainage and municipal drinking water supplies;
- gain knowledge and experience to apply to future watershed studies pertaining to innovative pollution prevention and protecting surface water municipal drinking sources.

Demonstration Site Selection

Demonstration sites were selected based on building a community where a number of properties could showcase pollution prevention practices. Each landowner could be an expert on pollution prevention measures implemented on their own property and could be a resource to other property owners within their community.

Strategy

The following sections describe potential sources of pollutants that may wash into the storm sewer system and strategies for keeping water clean.

Prevention is stopping or avoiding pollutants and waste from coming into contact with water in the first place. CVC's initiatives take a multi-faceted approach to prevent negative water quality impacts.

Treatment is implementing measures that filter and treat rainwater runoff before entering Sheridan Creek.

¹ This project has received funding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario or the contents of this material.

Prevention

A first line of defence is education to discourage detrimental actions that have a direct impact on Sheridan Creek, Rattray Marsh and Lake Ontario.

Education

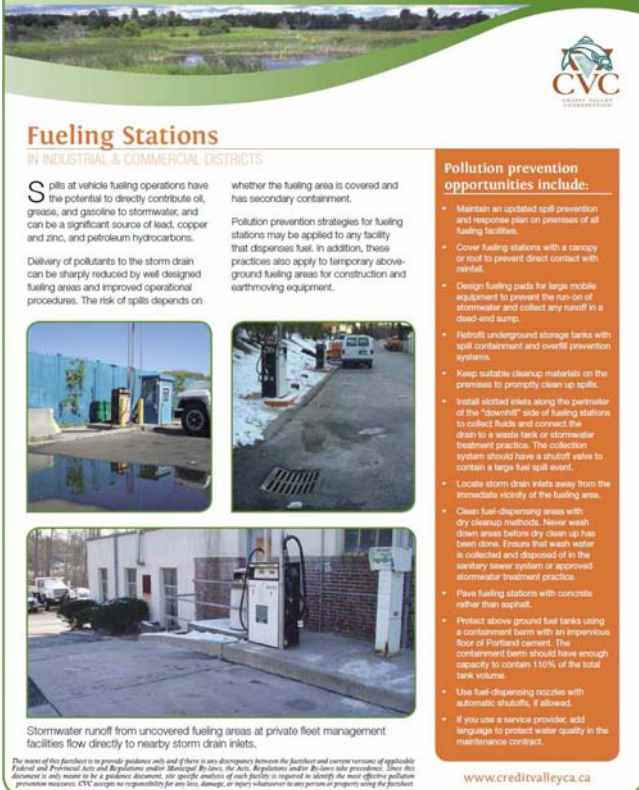
Education is a preventative measure that raises awareness and understanding of how certain activities affect the environment. Education helps increase environmental awareness, changes attitudes and behaviours and provides knowledge for making change.

Fact Sheets

Fact sheets are an educational tool to provide technical information about how to change a particular behaviour or practice. Fact sheets have been developed to show businesses actions they can take to improve operations and protect watershed health. This includes:

- Outdoor fueling stations
- Outdoor material storage
- Parking lot maintenance

Fact sheets are accessible online at www.creditvalleyca.ca/sustainability/.



Fueling Stations
IN INDUSTRIAL & COMMERCIAL DISTRICTS

Spills at vehicle fueling operations have the potential to directly contribute oil, grease, and gasoline to stormwater, and can be a significant source of lead, copper and zinc, and petroleum hydrocarbons. Delivery of pollutants to the storm drain can be sharply reduced by well designed fueling areas and improved operational procedures. The risk of spills depends on whether the fueling area is covered and has secondary containment. Pollution prevention strategies for fueling stations may be applied to any facility that dispenses fuel. In addition, these practices also apply to temporary above-ground fueling areas for construction and earthmoving equipment.

Pollution prevention opportunities include:

- Maintain an updated spill prevention and response plan on premises of all fueling facilities.
- Cover fueling stations with a canopy or roof to prevent direct contact with rainfall.
- Design fueling pads for large mobile equipment to prevent the run-on of stormwater and collect any runoff in a dead-end sump.
- Retrofit underground storage tanks with spill containment and overflow prevention systems.
- Keep volatile cleaner materials on the premises to promptly clean up spills.
- Install slotted inlets along the perimeter of the "downwind" side of fueling stations to collect leaks and connect the drain to a waste tank or stormwater treatment practice. The collection system should have a shut-off valve to contain a large fuel spill event.
- Locate storm drain inlets away from the immediate vicinity of the fueling area.
- Clean fuel-dispensing areas with dry cleanup methods. Never wash down areas before dry clean up has been done. Ensure that wash water is collected and disposed of in the secondary sewer system or approved stormwater treatment practice.
- Pave fueling stations with concrete rather than asphalt.
- Protect above ground fuel tanks using a containment berm with an impervious floor of Portland cement. The containment berm should have enough capacity to contain 110% of the total tank volume.
- Use fuel-dispensing nozzles with automatic shut-offs, if allowed.
- If you use a service provider, add language to protect water quality in the maintenance contract.

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The name of this fact sheet is to provide guidance only and if there is any discrepancy between the fact sheet and current versions of applicable Federal and Provincial Acts and Regulations and/or Municipal By-laws, the Acts, Regulations and/or By-laws take precedence. Since this document is only meant to be a guidance document, no specific mention of such parties is required to identify the most effective pollution prevention measures. CVC accepts no responsibility for any loss, damage, or injury whatsoever to any person or property using the fact sheet.

Example of the fact sheets available on CVC's website

Signs

Different signs have been created to reach the greatest audience. This was done in three tiers, with a large sign notifying passersby that there is a clear water project on site. The next type of sign was posted either in front or inside the business to provide more information about the type of technology implemented. The third type, warning signs, alert people on site of the project and discourage illegal activities.

Informational Signs

This sign provides facts about the site and connections to the local watershed including:

- Who the project partners are
- Connection to Sheridan Creek Watershed
- Site map
- Projects implemented
- Where to get more information

Warning Signs

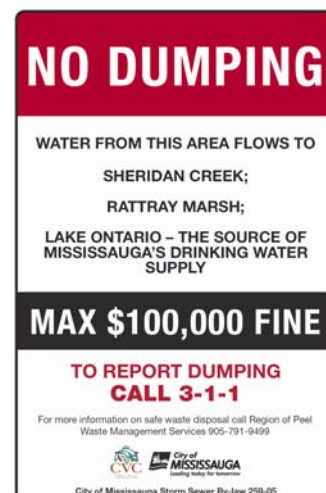
Many businesses are faced with the challenge of controlling waste being illegally dumped after regular business hours. This issue can be attributed to a lack of public understanding about the local environment and how pollution impacts the health of Sheridan Creek

Watershed. Drainage features, such as swales, may appear as a convenient location to dispose of waste far from the property owner's line of vision.



Illegal dumping on site

Educating with warning signs is a simple solution to discourage illegal dumping. Signs educate everyone about the direct connection between Bernardi Building Supply's property with Sheridan Creek, Rattray Marsh and Lake Ontario. Signs also inform potential offenders dumping is an illegal activity subject to fines under Mississauga's Storm Sewer By-Law 259-05 (with fines up to \$100,000).



Example of the signage to be installed

Spill Containment Sump

Bernardi Building Supply has an outdoor fuel station to fill its vehicles, a common feature for many businesses in Mississauga. The outdoor fuel station is constructed on a concrete pad as required by municipal bylaws, however, open fuel stations can be a threat to surface water quality if a spill takes place. Depending on the

size of the spill, fuel could wash into storm sewers and impact water quality in Sheridan Creek, Rattray Marsh and Lake Ontario. The impact of a spill may not be fully understood due to a lack of information, or where to seek out information.



Fuel station

Protecting surface water quality by preventing pollutants from coming into contact with rainwater and snow melt runoff initially is considered a first line of defence.

Constructing a spill containment sump will capture any spills that may take place when service vehicles are being fuelled. The pad is equipped with a shut-off valve that can be closed during fuelling and opened again once fuelling is complete to drain rainwater or snowmelt. When fuelling a vehicle, the drain valve is closed and the vehicle's fuel tank is positioned over the sump so any spills or leaks will fall into the sump. If a spill occurs during fuelling, it will be contained within the sump.



Spill containment sump installed

Instructions have been developed to provide direction on operating the spill containment sump. Instructions cover using the sump and what to do if a spill occurs.

Spill Containment Sump INSTRUCTIONS FOR USE

1. The purpose of the spill containment sump is to prevent any potential fuel spills from discharging to the municipal storm sewer network, which ultimately discharges to Lake Ontario (the source of our drinking water).
2. The drain valve is to remain normally open to allow egress of rainwater or snowmelt.
3. When fuelling a vehicle, close the drain valve and position the vehicle's fuel tank over the sump such that any spills or leaks will fall into the sump.
4. If a spill occurs during fuelling, it will be contained in the sump. For minor spills, use a compatible sorbent material to soak up the spilled fuel; for large spills, arrange for a waste hauler to pump out the spilled fuel.

Spill Containment Sump Configuration

Note: Drawing not to scale.

Spill containment sump instructions

Treatment

A second line of defense incorporates features into the site to filter and treat rainwater and snow melt before it reaches Sheridan Creek, Rattray Marsh and Lake Ontario.

Swale Enhancement

Existing drainage swales were enhanced to improve their ability to filter and treat rainwater runoff before entering Sheridan Creek.

Swale enhancements include the following components:

- Removing invasive species
- Re-grading existing swales
- Creating clear water buffer strips
- Creating sediment traps
- Planting native plant species
- Buffer protection - demarcation

Removing Invasive Species

Invasive plant species out-compete local native species by growing aggressively and reproducing rapidly without any natural predators to keep their numbers in check. After direct habitat loss, invasive plants are the next primary threat to native biodiversity. Invasives, such as Reed grass, European buckthorn and Manitoba maple, were well established throughout the site and were a seed source to downstream areas, especially Rattray Marsh, which is a provincially significant wetland.



Invasive species on the east side of the property prior to removal

Overgrown reeds created a thick wall of vegetation and impaired how the existing swale drained. These features also made ideal locations for illegal dumping.



Invasive species on the west side of the property prior to removal

Removing reeds and other invasive species (Manitoba maple, European buckthorn and Purple loosestrife) established a clear view of the swales and buffers, creating a visible link to the swale's condition. A visible

buffer also deterred people from dumping in swales and let the property owner and staff quickly recognize when illegal dumping had occurred. The dense stand of reeds impaired the swale's ability to treat rainwater and snow melt and also created maintenance issues.



Invasive species removed

Invasive species were sprayed with an herbicide. The remaining plants were physically removed.



Invasive species removed

Clear Water Buffer Strips

Where space permitted clear water buffer strips were enhanced or created to help filter rainwater runoff and snow melt before reaching swales and catch basins that drain to Sheridan Creek. Buffer strips were prepared by excavating and disposing 300 mm of compacted soil and replacing it with 300 mm of clean topsoil. Lab tests were performed on approved topsoil to ensure it had the desired characteristics.



Buffer strip and soil amendments

Re-grading Existing Swales

Where space permitted, swales were re-graded to optimize water quality treatment performance for a 25 mm storm event. Swales were re-graded to meet the following criteria:

- Bottom width - 0.75 m
- Side slopes - 2.5:1 to 3:1
- Flow – less than 0.15 m³/s for 25 mm storm
- Velocity – less than 0.5 m/s for 25 mm storm
- Flow depth – less than 100 mm for 25 mm storm
- Longitudinal slope – 0.5 per cent to 2.0 per cent
- 300 mm topsoil depth in swale cross section



Swale enhancement on the west side of the property

Design calculations included provisions for a channel roughness typical of high vegetation growth (75 mm) to enhance filtration of suspended solids.

Creation of Sediment Traps

Sediment traps that manage to pass through vegetated buffer strips will hit a third barrier – sediment traps.

To reduce sediment, sediment traps were constructed within drainage swales. Sediment traps act as a settling area for suspended solids and can remove a large percentage of sediment entering and flowing within the drainage swale.



Sediment trap on the west side of the property

Creating sediment traps provides time needed for sediment to separate and sink to the bottom. By filtering sediment from rainwater runoff and melt water, the trap prevents sediment from being transported downstream, reducing clogging in drainage swales, flooding issues and future maintenance needs.

Sediment traps were also designed to treat spring snow melt runoff by placing the traps downstream of snow storage areas. Sediment traps were designed to promote discrete settling and require maintenance once 25 mm of accumulation has occurred.



Sediment traps in front of curb cuts

Plant Local Species

Once invasive species are cleared, local plant species will be planted and seeded on the site. The following are some species of plants introduced to swales and buffers:

- Eastern white cedar
- Red osier dogwood
- Nannyberry
- Serviceberry
- Grasses/sedges/wetland species



Local species planted (Nannyberry)

Once local vegetation is established it becomes difficult for invasive species to re-colonize the site.

Buffer Protection

Demarcating swales indicates where the buffer starts with established posts and stones. It provides a physical barrier to snow being dumped or pushed into the swale. Swales also prevent encroachments into the buffer and discourage illegal dumping.



Demarcation by cedar posts

Summary

Table 1 below provides a summary of all restoration opportunities for Bernardi Construction Company. Following the table is a diagram that shows how all of the design features work together (Figure 1).

Summary of Strategies Implemented at Bernardi Building Supply		
Opportunity	Prevention	Treatment
Fact Sheets	✓	
Prevention of Illegal Dumping	✓	
Fuel Station Spill Prevention	✓	
Signage	✓	
Buffer Protection	✓	
Removing Invasive Species		✓
Clear Water Buffer Strips		✓
Re-Grading Existing Swales		✓
Plant Local Species		✓
Creation of Sediment Traps		✓

Table 1: Summary of Strategies Implemented at Bernardi Building Supply

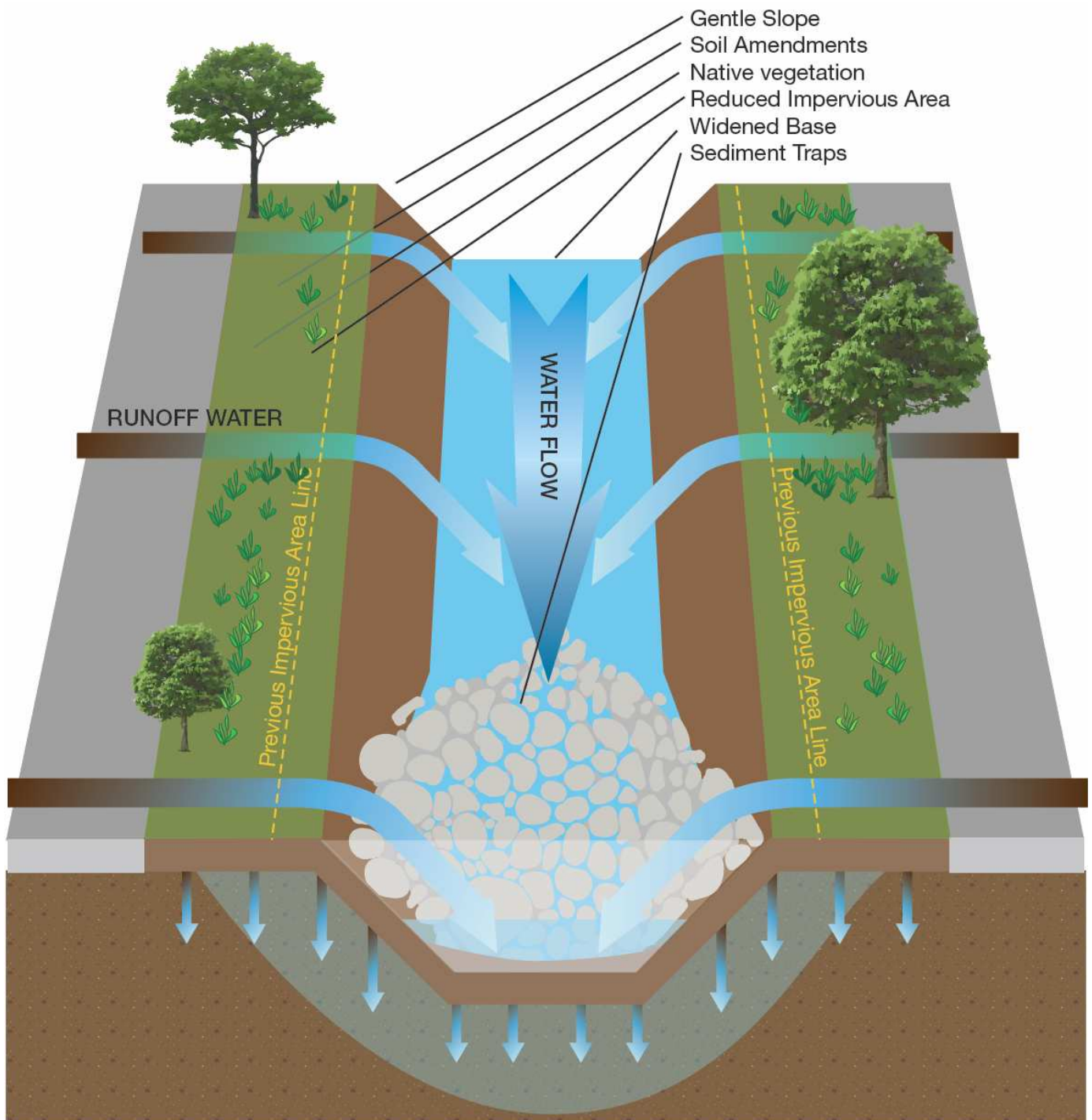


Figure 1: Runoff water from Bernardi Building Supply is filtered as it flows laterally through newly constructed clear water buffers, soil amendments, and native vegetation (local species). Runoff then flows to enhanced swales and sediment traps, allowing particulates to settle before draining to the catch basin.

Lessons Learned

Reflecting on original objectives of the project, the following are some lessons learned:

- Empower stakeholders to take action and protect municipal drinking water supplies through implementing projects.
 - Successful implementation of in-the-ground projects requires full-time construction inspection to ensure project success. Often times the contractor has questions regarding project design and intent of the project. Having an inspector on site to help answer questions helps the construction process move smoothly and the contractor can verify questions or concerns directly on site. This also provides a much smaller potential for errors since the contractor will not be using assumptions.
 - Maintaining constant dialogue between the landowner and contractor also ensured questions and/or concerns could be addressed promptly. Unexpected issues can arise that require adjustments to the design to ensure project success. There were a number of instances when the landowner was able to shed light on activities that took place on site that could impact the project. Minor modifications were made to the design to ensure project success.
 - Through the construction process, modifications were made to facilitate future maintenance issues. For example, higher densities of invasive species were present on some of the sites. Seed mixtures were replaced with mulch to suppress re-colonization of invasive species. Additional native vegetation was planted to form dense thickets to help invasive species from re-invading the site.
 - Landowner cooperation was an integral part of the success of this project. Bernardi Building Supply assisted by preparing the site for construction by removing all equipment and obstacles to ensure the contractor could complete work without interruption.
 - Provide operation and maintenance instructions for landowners and tenants.
 - Increase public and community awareness of the importance of pollution prevention and make a connection between storm water drainage and municipal drinking water supplies.
- Based on feedback from participating landowners, interpretive signs were modified to incorporate more images and less text.
 - Once you have captured public attention, offer additional education materials such as fact sheets and case studies to provide more detailed information.
 - Landowners were consulted on how to name and market future workshops to encourage a broad variety of stakeholders. Choosing appropriate words is important to ensure education events are appealing to a broad audience.
 - For additional tips to landowners and property managers interested in pursuing a clear water project, please see CVC's "Recommendations for Future Clear Water Projects". Details can be found on: Management Agreements, Tenders, Maintenance, Constructing to Specification, and Permits

Benefits of Partnership

This partnership will help to:

- support MOE with source water protection initiatives and guidelines since this site drains to Lake Ontario – Mississauga's drinking water supply;
- support the City of Mississauga with pollution prevention efforts, storm sewer bylaws, Mississauga Storm Water Quality Strategy Update, and Green Development Strategy, among others;
- support Region of Peel's sanitary sewer bylaw;
- support and complement low impact development initiatives;
- support the municipality, region and MOE when dealing with spill response and preparedness.

This partnership also supports the vision, goals and objectives of Mississauga's Strategic Plan "Our Future Mississauga" by ensuring healthy and attractive communities, natural environments and drinking water supply. These features would benefit even more by using pollution prevention strategies. This is also consistent with the vision of "Our Future Mississauga". As an environmentally responsible community, the City of Mississauga is committed to environmental protection, conducting its corporate operations in an environmentally responsible manner and promoting awareness of environmental policies, issues and initiatives.

More Information

For more information on this demonstration site or general information on clear water projects and source water protection please visit the following websites:

Ministry of the Environment (MOE)

- Sewer Use Best Management Practices (BMP) Documents
<http://www.ene.gov.on.ca/en/publications/forms/index.php#bmp>
- Snow Disposal and De-icing Operations in Ontario (1994)
<http://www.ene.gov.on.ca/envision/gp/0412e.pdf>
- Guidelines for Snow Disposal and De-icing Operations in Ontario (1975)
<http://www.ene.gov.on.ca/envision/gp/B4-1.pdf>
- Ontario Stewardship Drinking Water Program
<http://www.ene.gov.on.ca/en/water/cleanwater/index.php>

Region of Peel

- Sanitary Sewer Use Bylaw
<http://www.peelregion.ca/pw/water/sewage-trtmt/seweruse-bylaw.htm>

Credit Valley Conservation

- Strategies for Sustainability
<http://www.creditvalleyca.ca/sustainability/>

City of Mississauga

- Storm Sewer Use Bylaw
http://www.mississauga.ca/file/COM/Storm_Sewers.pdf
- Protect Our Water
http://www.mississauga.ca/file/COM/Protect_Our_Water_brochure.pdf

The Bloom Centre for Sustainability (Formerly OCETA)

- <http://www.bloomcentre.com>

Canadian Centre for Pollution Prevention (C2P2)

- <http://www.c2p2online.com/>
- <http://www.c2p2online.com/main.php3?session=§ion=39&heading=84>

Landowners and property managers interested in pursuing a clear water project, please see helpful tips in CVC's Recommendations for Future Pollution Prevention Projects:

- <http://www.creditvalleyca.ca/sustainability/pollutionprevention/index.html>