

# Township of Nipigon

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## TREE BOX FILTERS AND RAIN GARDEN

### MUNICIPAL PROFILE:

POPULATION: ~1,642 (2016 Census)

LOCATION: Northern Ontario—northeast of Thunder Bay

SIZE: 109.11 km<sup>2</sup>

TOTAL PRIVATE DWELLINGS: 721

GREAT LAKES WATERSHED: Lake Superior

### BACKGROUND

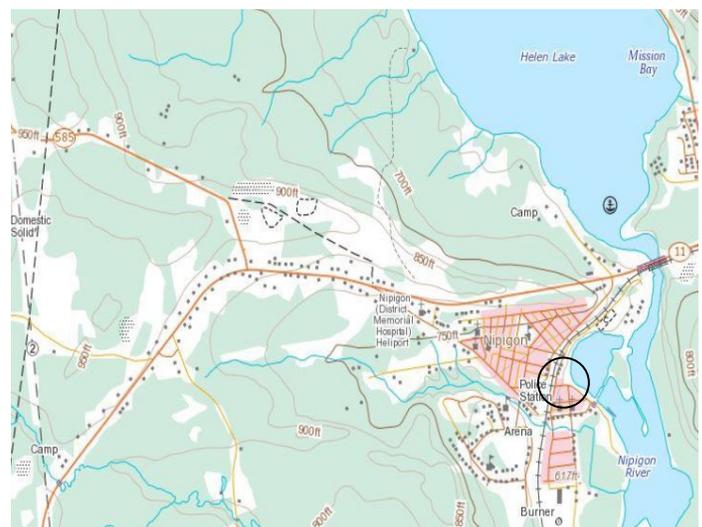
The Township of Nipigon is already experiencing the impacts of climate change. Recent events such as the heavy rain of 2012, the hail and wind storms of 2013, the extreme cold temperatures of 2013, 2014 and 2015, and the severe heat waves of 2015 have highlighted the need to be prepared for and adapt to climate change. Failure to plan for and mitigate these changes will have significant consequences on the Township's physical, social, economic, and ecological systems.

In 2015, the Township of Nipigon completed a stormwater master plan that identified opportunities for the improved management of stormwater. The township is particularly interested in exploring the use of low impact development (LID) strategies that rely on natural infrastructure (e.g., soils and plants) and natural processes (e.g., transpiration, filtration) to both reduce peak runoff during rain and melting events, and to improve stormwater discharge quality, particularly by reducing suspended solids. Doing so will reduce the negative impacts of stormwater discharge at its outfall.

### PROJECT DESCRIPTION

In order to explore and demonstrate the utility of low impact development in the management of stormwater, the Township proposed an upgrade to existing stormwater infrastructure with a new tree box filter and a rain garden, located adjacent to the Cenotaph at 6th Street and Railway Street. Similar to bioswales, rain gardens slow and filter rainwater, and are often designed to manage runoff from large impervious areas. Given the extent of the construction involved in the rain garden, the project scope also includes restoration of the existing storm sewer collection system, manholes, catch basins, and storm sewer pipe in the

immediate vicinity. Specifically, the storm sewer works of the project include improvements to 350 meters of storm sewer collection system and 13 manholes.



### OBJECTIVES

The objectives of the tree box filter and the rain garden are to:

- Capture stormwater that is currently eroding and deteriorating road shoulders and road base;
- Enhance the removal of suspended solids;
- Reduce the peak runoff/discharge; and
- Reduce the negative impacts of stormwater discharge at its outfall. The outfall is located in an area of a steep bank and discharges to a sensitive receptor.

### PROJECT PLANNING

The project had been informally discussed internally with all staff beginning in December 2016, as well as at a Public Works Committee meeting with Mayor & Council. The first few months of project planning were focused on identifying and applying to funding opportunities, beginning the design of the rain garden, and identifying challenges (e.g., procurement of ideal tree species).

Site 11 Rain Garden - Deciduous Shrub Planting Schedule						
Symbol	Est. Qty.	Scientific Name	Common Name	Size	Type	Spacing
CG	15	<i>Cornus stolonifera</i> 'Farrow'	Arctic Fire Dogwood	600mm	#5 Cont.	150cm O.C.
DL	14	<i>Diervilla lonicera</i>	Dwarf Bush Honeysuckle	600mm	#5 Cont.	150cm O.C.
	29	Shrub Total				

Site 11 Rain Garden - Perennial Planting Schedule						
Symbol	Quantity	Scientific Name	Common Name	Size	Type	Spacing
bc	114	25% - <i>Bouteloua curtipendula</i>	Side oats Grama	10cm	Pot	60 cm O.C.
		25% - <i>Achillea millefolium</i>	Common Yarrow			
		25% - <i>Schizachyrium scoparium</i>	Little Bluestem			
		25% - <i>Monarda didyma</i>	Bee balm			
cv	46	60% - <i>Carex vulpinoidea</i>	Fox Sedge	10cm	Pot	60 cm O.C.
		40% - <i>Iris versicolor</i>	Blue Flag Iris			
cc	33	70% - <i>Carex crinita</i>	Caterpillar Sedge	10cm	Pot	60 cm O.C.
		30% - <i>Asclepias speciosa</i>	Showy Milkweed			
je	55	70% - <i>Juncus effusus</i>	Soft Rush	10cm	Pot	60 cm O.C.
		30% - <i>Physostegia virginiana</i>	Obedient Plant			
TOTAL	248					

Proposed Plantings

Once funding was secured through the Clean Water and Wastewater Fund (CWWF), the project team continued to improve the design (e.g., by decreasing its scope to ensure it was within budget) and released a request for quotation, which by September 2017 had been awarded to a local contractor.

As described below, early winter conditions have forced a delay in the construction of the rain garden until April 2018. Despite this delay, some procurement of project materials has been achieved. As of January 2018, the implementation of this project is partially completed.

### FUNDING

Funding for the project was supported by the \$7,000 grant from the MOECC for participating in the Collaborative Implementation Group project. These funds were matched by cash or in-kind contributions on behalf of the Township. Funding from the CWWF was approved by July 2017 (\$180,000). Additional funding was applied for through the Guardian Fund but was not awarded. Despite an initial rejection, the project team is re-applying to the Guardian Fund in order to increase the project's budget.

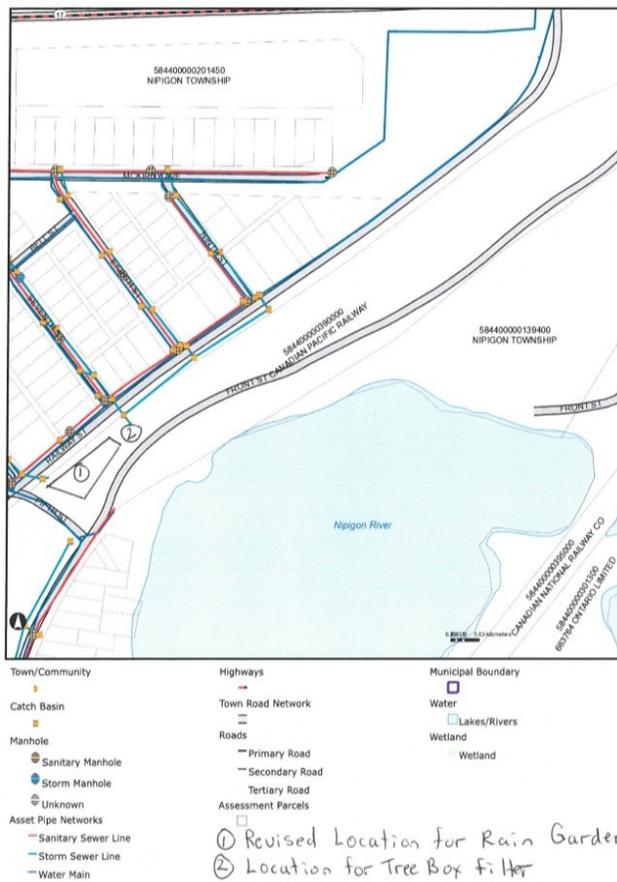
### PARTNERSHIPS

At this point in time, no formal partnerships have been established with other organizations.

### CHALLENGES

The project timeline was affected by a delay in the announcement of the CWWF funding. Specifically, the project team found out the funding had been approved when construction would have ideally been commencing. Another challenge arose when a second funding application (i.e., Guardian Fund) was declined. However, given the delay in the project, this funding source has now been re-applied for. Given that the team could not release the RFQ until the funding had been secured, this started a cascade that eventually ended with project construction being delayed until April 2018.

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During the design phase, a second storm sewer pipe was discovered downstream of the proposed rain garden, which connects to the same outfall as the storm sewer that will be collecting the effluent from the Rain Garden. In response to this, a tree box filter that will accept the storm water from the second pipe was added in order to reduce the amount of flow from the second pipe into the once associated with the rain garden.

These challenges were compounded by an early onset of winter conditions, thus postponing planting and construction work.

### POSITIVE OUTCOMES

Once the project is complete, it will provide several benefits to the Township and the community.

In addition to environmental benefits and the reduced stress on stormwater infrastructure, the tree box filter and the rain garden will help demonstrate the effectiveness of low impact development in stormwater management.

In March 2016, the Township of Nipigon received funding through the Federal Economic Development Initiative for

Northern Ontario for the implementation of the first phase of its waterfront development plan aimed at capturing a greater percentage of visitors travelling through the region in the summer months. Specifically, the funding is being used to design and build an observation tower and lookout area on the Nipigon River Bridge, as well as a boardwalk and an outdoor events park. The proposed trail will end at the tree box filter and rain garden. The increased pedestrian traffic in the area represents an opportunity for the Township, through the use of educational signages, to increase awareness of residents and other visitors on the importance of low impact development practices.

### MEASURING OUTCOMES

In order to measure the success of the rain garden, two primary indicators have been suggested. The first involves the measurement of total suspended solids from stormwater discharge after snow melt and significant rainfall events using loading values from the Township's stormwater management plan. The second indicator involves using the same sampling methods as above to measure total phosphorous. Nipigon is also looking into installing a data logger. The data logger would assist with monitoring the drawdown and working towards the "48 hour" Standard Operating Procedure.

In addition to the above-mentioned indicators, a set of recommendations has been established by the Township for long term inspection and maintenance. These are:

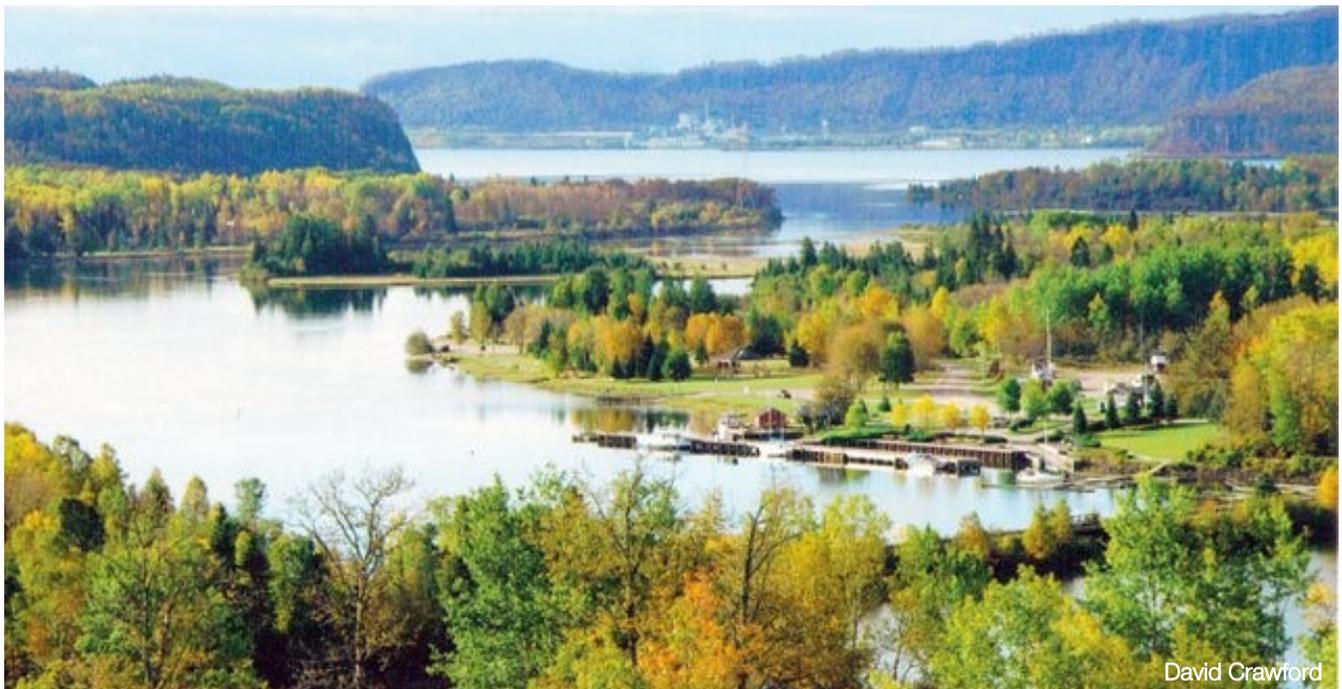
- Sweep streets at least once after spring melt and again in the fall.

- Inspect the pre-treatment sump and catch basins downstream of the rain garden outlet for sediment accumulation. Remove any sediment or debris from the pre-treatment sump with a shovel. Remove sediment from downstream CBS when it is found half full.
- Monitor for sediment accumulation in the rain garden and remove if found in order to maintain the filtration capability of the rain garden.
- Monitor the rain garden after rainfall events to ensure standing water is gone within 48 hours after events.
- On a monthly basis, pull or cut weeds and invasive plants in the rain garden - Add mulch to rain garden where it has been depleted.
- On a monthly basis, add additional plants where necessary (per warranty).
- Annually cut and remove herbaceous vegetation from the rain garden in early spring and rake downed vegetation.

### LOOKING AHEAD

The implementation of the project is set to commence in April 2018, with construction set to be completed by June 2018. Once completed, the project will serve as a demonstration project that can be used to attract funding for other low impact development projects.

The project team also hopes that the rain garden will strengthen active transportation in the community by serving as a destination for community members and visitors.



David Crawford

## Acknowledgements

This project was made possible by the Ontario Ministry of Environment and Climate Change, under the Canada-Ontario (COA) Respecting the Great Lakes.

## The Great Lakes Adaptation Project Collaborative Implementation Groups

The Collaborative Implementation Groups (CIG) project targeted 12 municipalities throughout the Great Lakes watershed to identify and implement an adaptation initiative in their community over the period of one year (January 2017 – December 2017). The CIGs came together at various stages to share experiences, challenges, and opportunities on such items as measuring progress through indicators, project financing, budgeting, scheduling, evaluation, monitoring, and reporting. Ultimately, the CIGs were an opportunity to bring together practitioners struggling with implementation challenges to create a peer support network that brings these individuals together (both online and in person) to collectively work through the implementation of an identified action and share the resulting experiences.

**Author: ICLEI—Local Governments for Sustainability Canada Office**

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