

## Purpose/Scope

As a companion study to the overall Secondary Plan, the Scoped Subwatershed Study is intended to:

- Document and define natural features and their functions
- Establish the role of water in supporting these features as well as natural hazards like floodplains
- Define environmental constraints and opportunities
- Provide a basis for assessing impacts due to proposed land use changes
- Establish fully integrated management strategies

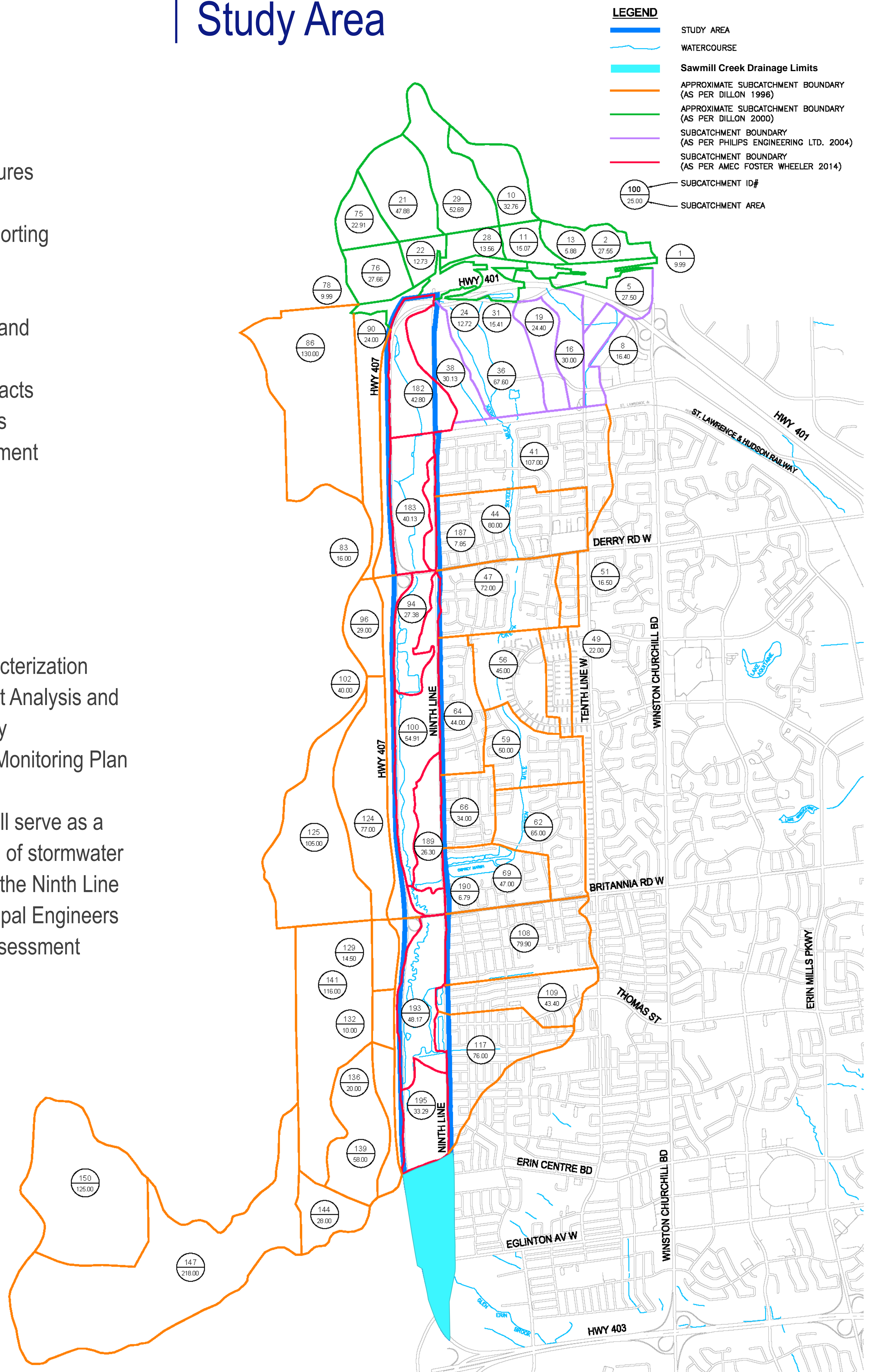
## Process

Three stage process:

- Stage 1** – Subwatershed Characterization
- Stage 2** – Subwatershed Impact Analysis and Management Strategy
- Stage 3** – Implementation and Monitoring Plan

The Scoped Subwatershed Study will serve as a Master Plan to facilitate the planning of stormwater and environmental infrastructure for the Ninth Line Lands in accordance with the Municipal Engineers Association Class Environmental Assessment provisions.

## Study Area





Floodlines

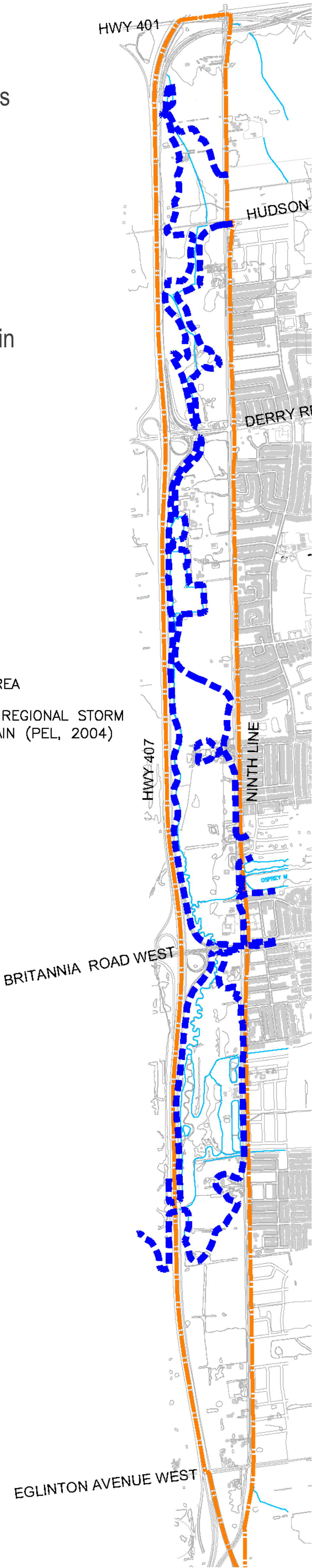
The Province of Ontario regulates flood hazards on the basis of the Regulatory Flood Event (in this jurisdiction this is based on Hurricane Hazel).

The adjacent plans depict the approximate Regulatory floodplain under the existing and proposed land use conditions.

LEGEND

STUDY AREA

EXISTING REGIONAL STORM FLOODPLAIN (PEL, 2004)



LEGEND

SHAPING NINTH LINE DRAFT  
EMERGING LAND USE CONCEPT

STUDY AREA

PROPOSED TRANSITWAY

TRANSITWAY RIGHT OF WAY

14 METER SETBACK

PROPOSED TRANSITWAY STATION

407 RIGHT OF WAY

PROPOSED TRAIL

CONNECTIONS

PROPOSED ROADS

RESIDENTIAL

MIXED USE

BUSINESS EMPLOYMENT

PUBLIC OPEN SPACE

GREENLANDS

RECREATION USES – RESTRICTED

UTILITY

NATURAL HAZARDS

OFFICIAL PLAN DESIGNATIONS  
EAST OF NINTH LINE

RESIDENTIAL LOW DENSITY I

RESIDENTIAL LOW DENSITY II

RESIDENTIAL MEDIUM DENSITY

RESIDENTIAL HIGH DENSITY

MIXED USE

CONVENIENCE COMMERCIAL

MOTOR VEHICLE COMMERCIAL

BUSINESS EMPLOYMENT

PUBLIC OPEN SPACE

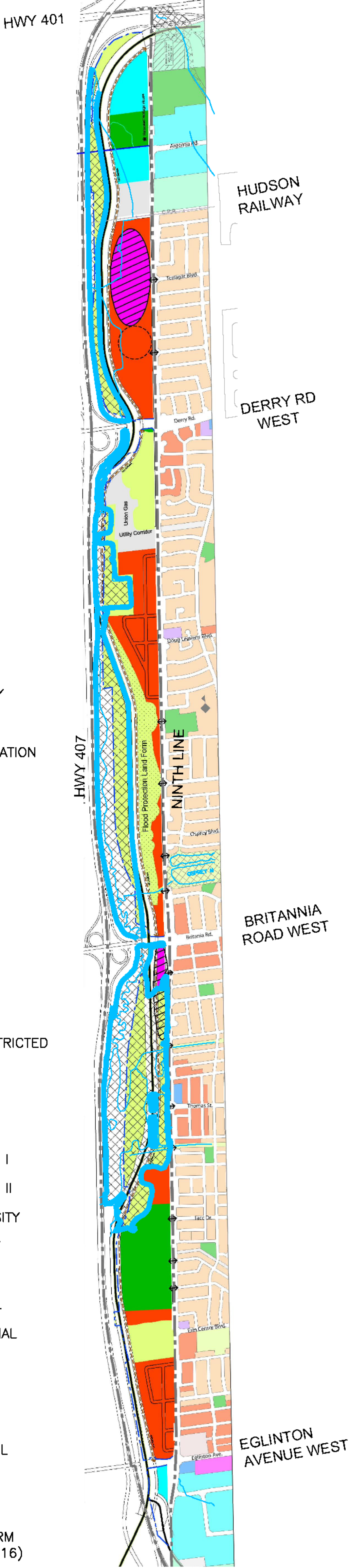
GREENLANDS

EXISTING CATHOLIC SCHOOL

UTILITY

NATURAL HAZARDS

PROPOSED REGIONAL STORM FLOODPLAIN (AMEC FW 2016)





Stormwater  
Management

Stormwater Management

All new development in Ontario must manage its impacts to stormwater for the following:

- Flooding
- Erosion
- Water Quality
- Water Budget

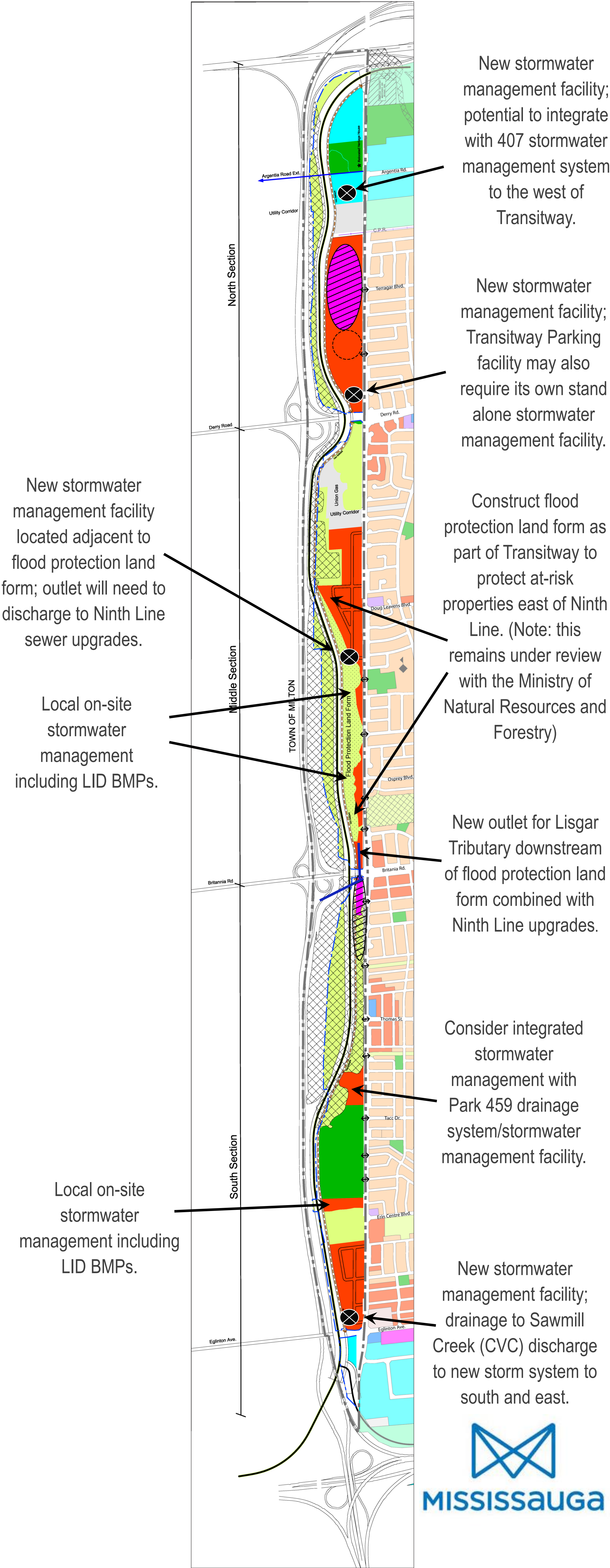
There are numerous techniques to address these impacts including:

- Stormwater management facilities (ponds/wetlands)
- Oil and Grit Separators
- Underground Tanks
- Low Impact Development Best Management Practices (LID BMPs)

The current plan for stormwater management for the Ninth Line Lands remains in development subject to land use refinement; the following graphic depicts emerging thoughts on various stormwater management infrastructure.



Disclaimer: Land uses shown in the Draft Emerging Land Use Concept are preliminary, for information purposes only and subject to change based on pending studies, agency, public and stakeholder input and other considerations.



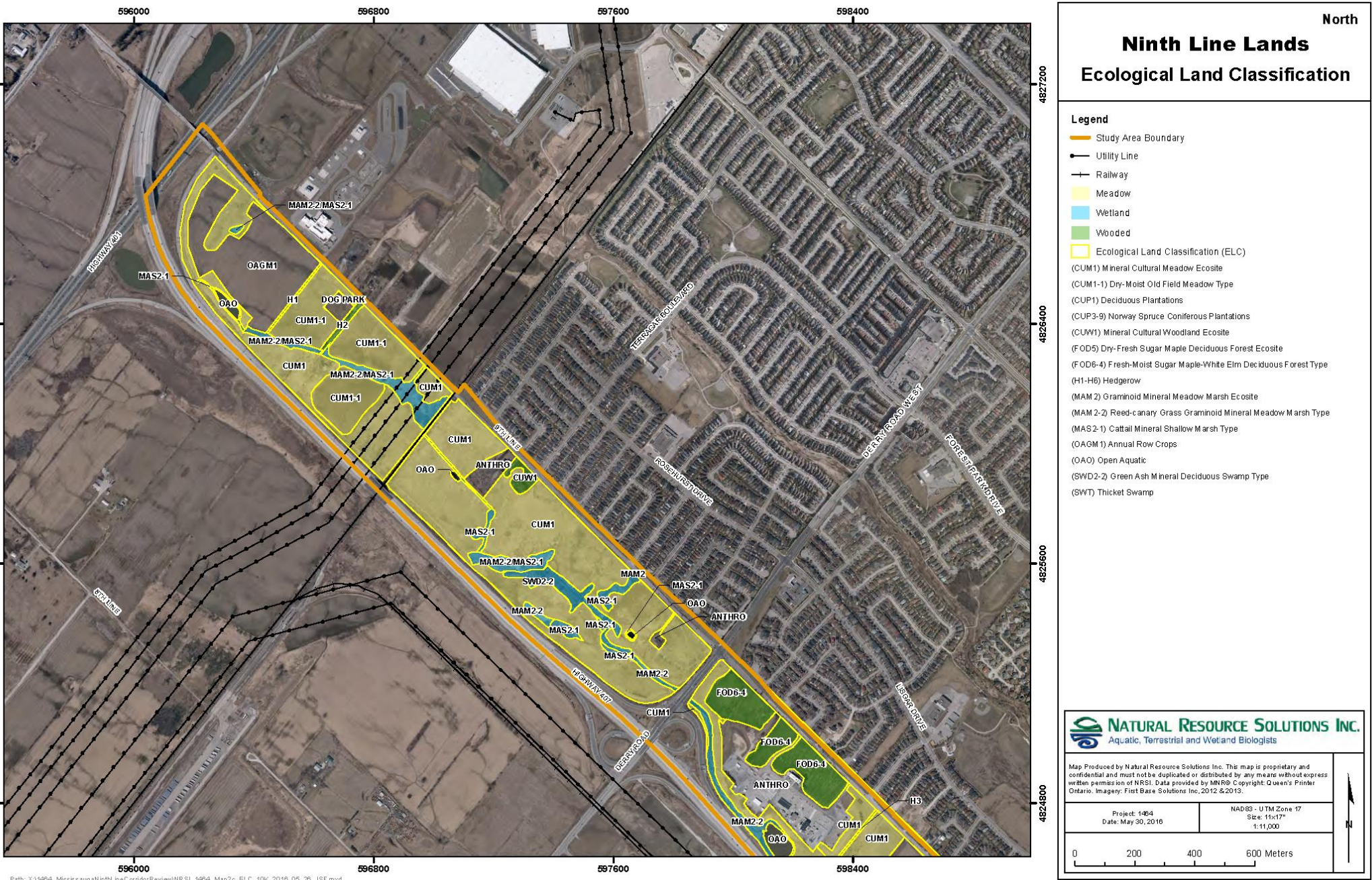




# SCOPED SUBWATERSHED STUDY

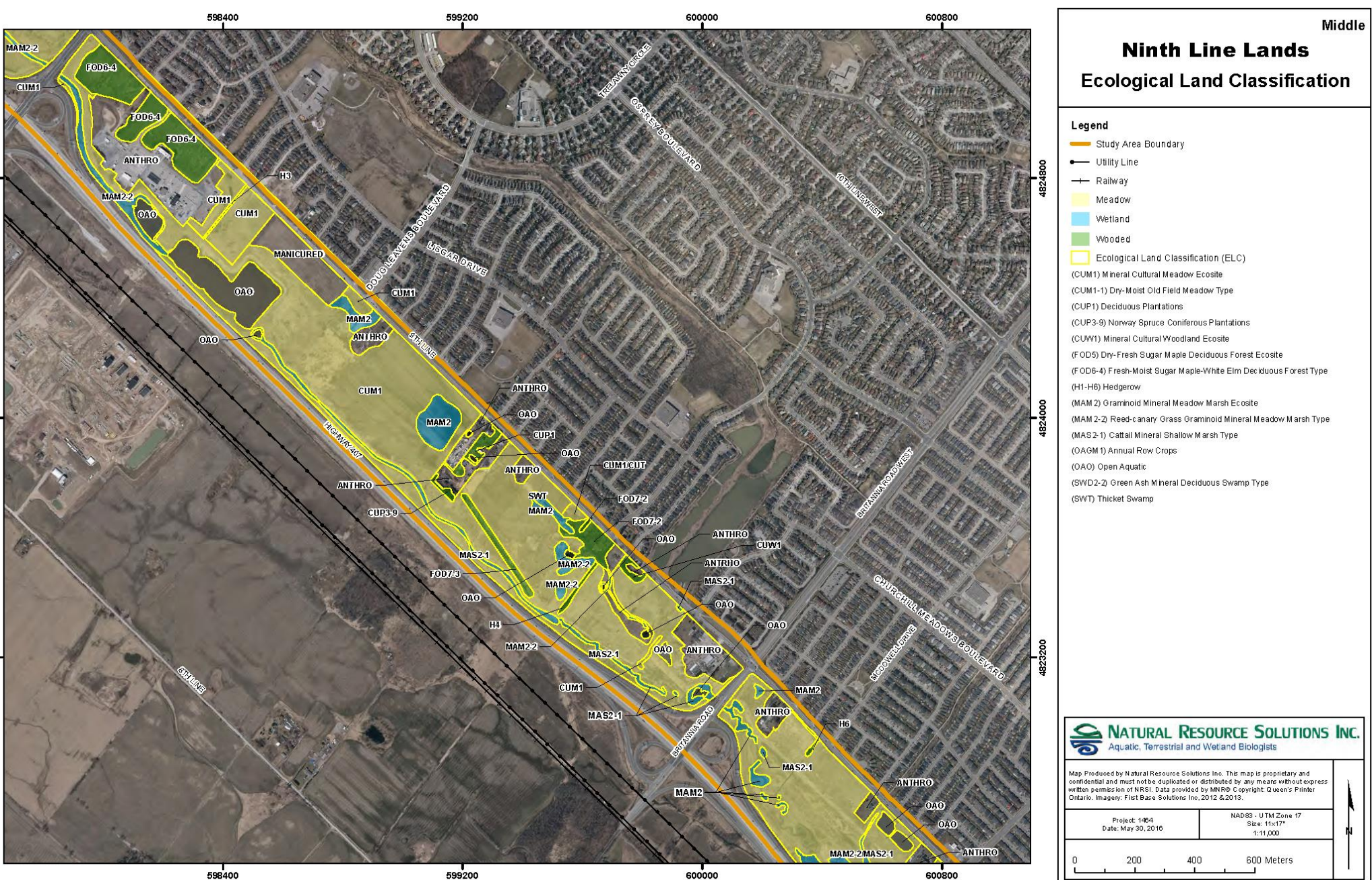
## Natural Heritage

### Natural Heritage



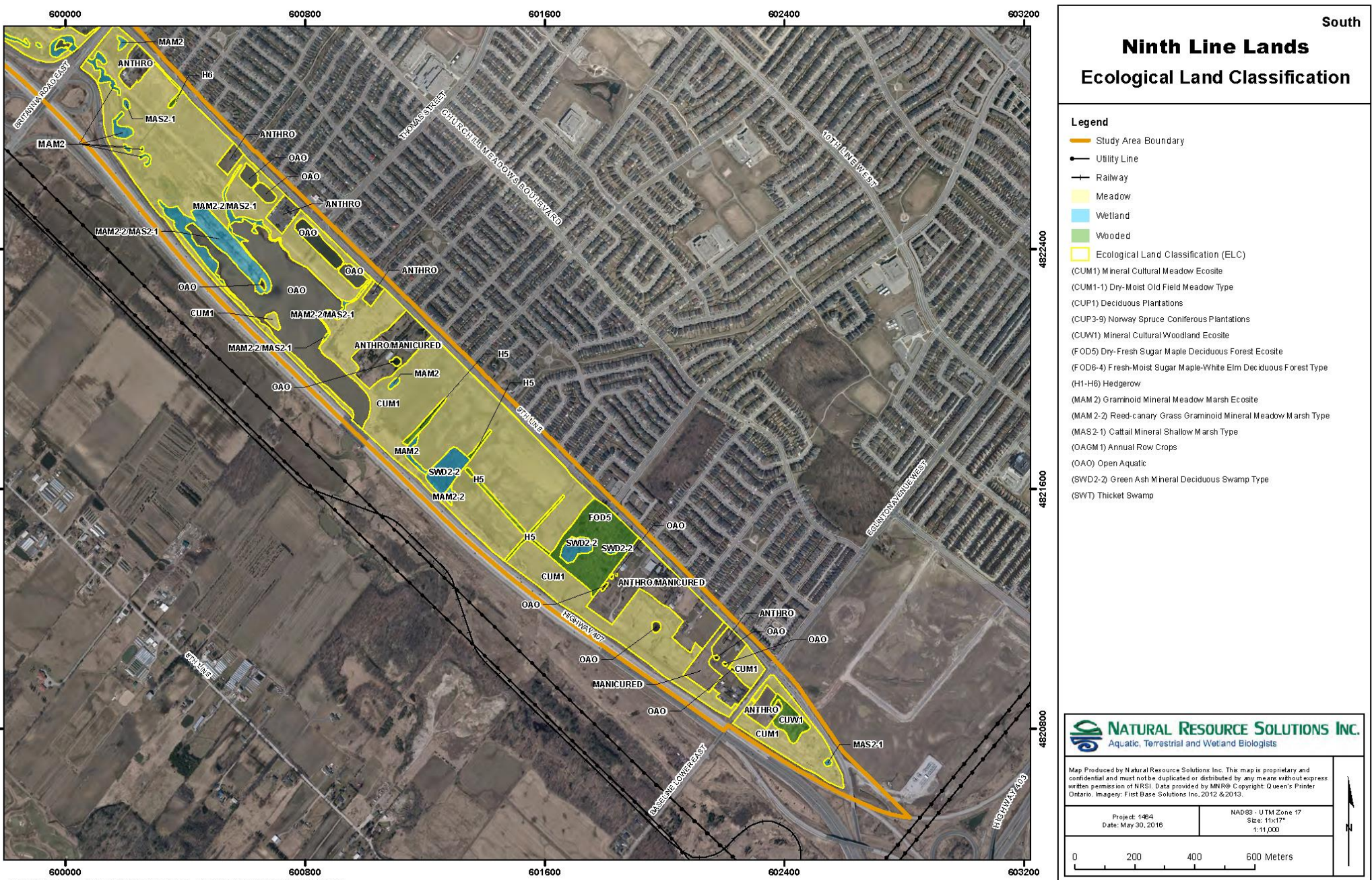
### Field Review:

- The existing lands are characterized by grassland or meadow areas, isolated woodlots (Ash species), 2 larger woodlots (Sugar Maple and White Elm), highly tolerant wetlands associated with the watercourse corridor, and other isolated wetland patches.
- Field surveys were conducted to verify these conditions and to assess the quality and functionality of these areas.



### Natural Heritage System (NHS):

- The NHS was developed to ephasize the connectivity of natural spaces, species diversity, and sustainability, while balancing other land use needs in the area, including the Transitway and Flood Protection Landform.
- The NHS is a connected system of woodlands, wetlands, and meadows that provide diverse habitat for the wildlife that inhabit the area.
- Within the NHS, lands will be restored to include double the area of woodland and wetland that currently exists, as well as over 40ha of meadow.





Restoration Plan

Ninth Line Lands

Restoration Plan

Legend

Study Area Boundary

Landform Limit

Highway

Primary Road

Secondary Road

Watercourse

Natural Heritage System

Transitway

Existing Wetland

Restoration Plan

Meadow

Wetland

Wooded Area

Stormwater Management Pond

Conceptual Channel

NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists


Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by MNRFO Copyright: Queen's Printer Ontario.

Project: 1464  
Date: May 30, 2016

NAD83 - UTM Zone 17  
Size: 24x36"  
1:10,500

0200400600800 Meters

A detailed map of the Ninth Line Lands restoration plan. The map shows a vertical corridor along Ninth Line, bordered by a yellow study area boundary. Various colored zones represent different restoration targets: yellow for meadows, green for wetlands, dark green for wooded areas, and light blue for stormwater management ponds. A conceptual channel is shown as a blue line. Infrastructure includes Highway 10, several primary roads (Derry Road, Hurontario Street, Hurontario Street West, Hurontario Street East, Hurontario Street West, Hurontario Street East, Hurontario Street West, Hurontario Street East), secondary roads (Derry Road, Hurontario Street, Hurontario Street West, Hurontario Street East, Hurontario Street West, Hurontario Street East, Hurontario Street West, Hurontario Street East), and transitways. A north arrow is located in the upper right corner of the map area.



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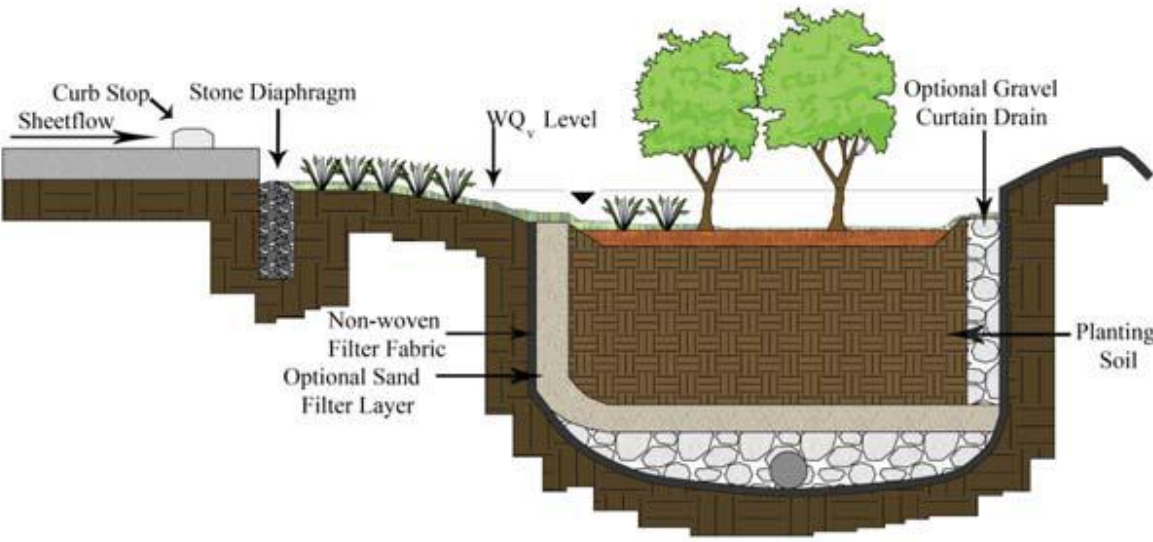


## Low Impact Development (LID)

Low Impact Development (LID) is a stormwater management strategy that seeks to mitigate the impacts of increased runoff and stormwater pollution by managing runoff as close to its source as possible. There are a number of potential techniques which can be considered depending on land use and physical conditions including:

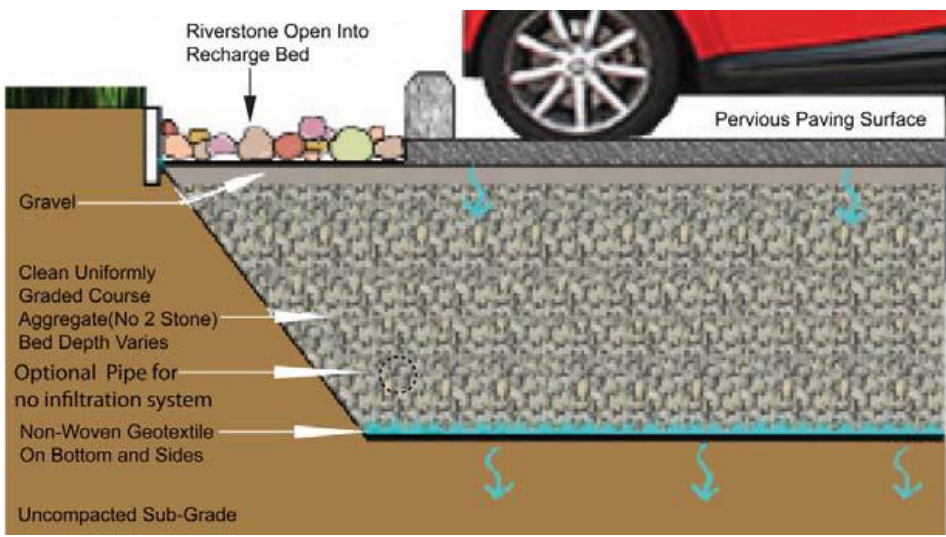
### Bioretention:

- Bioretention areas are planted depressions that store and filter rainwater to enhance water quality.
- They may be used to pre-treat runoff prior to discharge into infiltration systems or can be used to store excess stormwater when the downstream infiltration system has been surcharged.



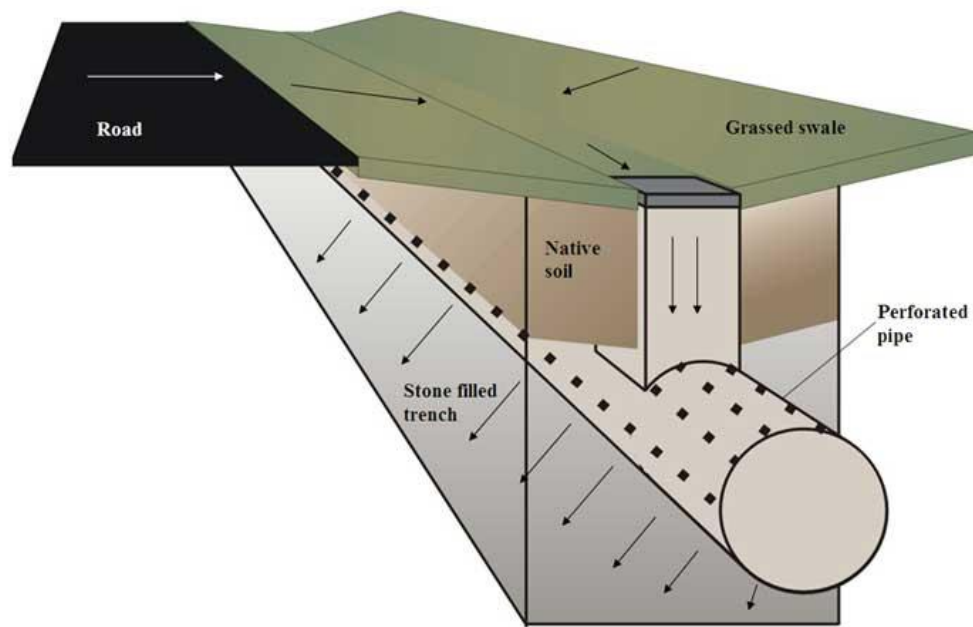
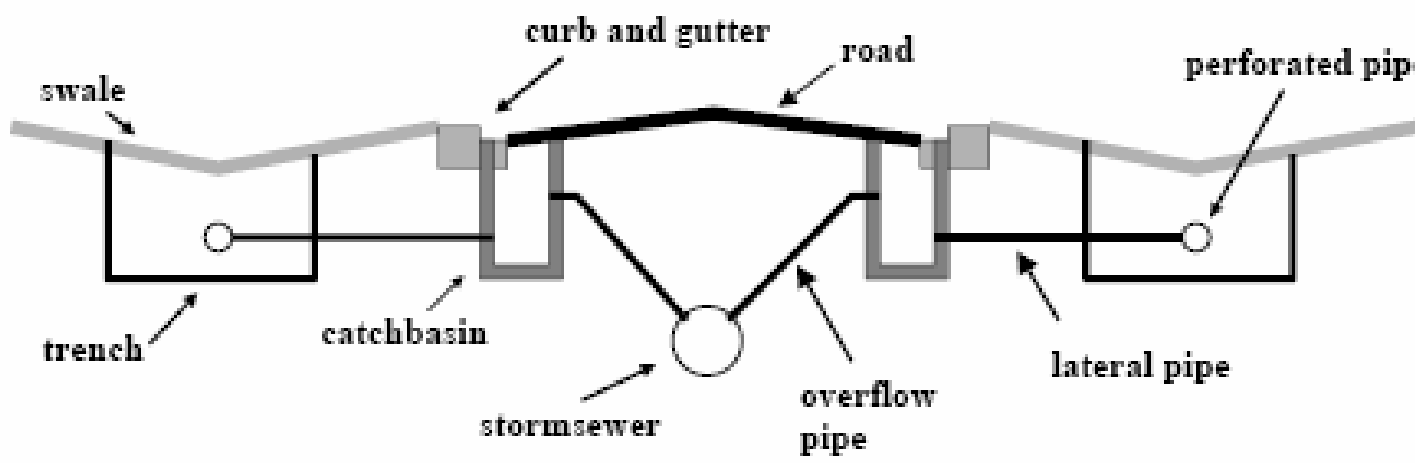
### Porous Pavement:

- Porous pavements can be used as alternatives to traditional hard surface paving systems that create expanses of impervious surface such as parking lots, driveways, access roads, plazas, and walkways
- Porous paving allows for filtration, storage, or infiltration of runoff, which can reduce stormwater flows compared to traditional impervious paving surfaces like concrete and asphalt.



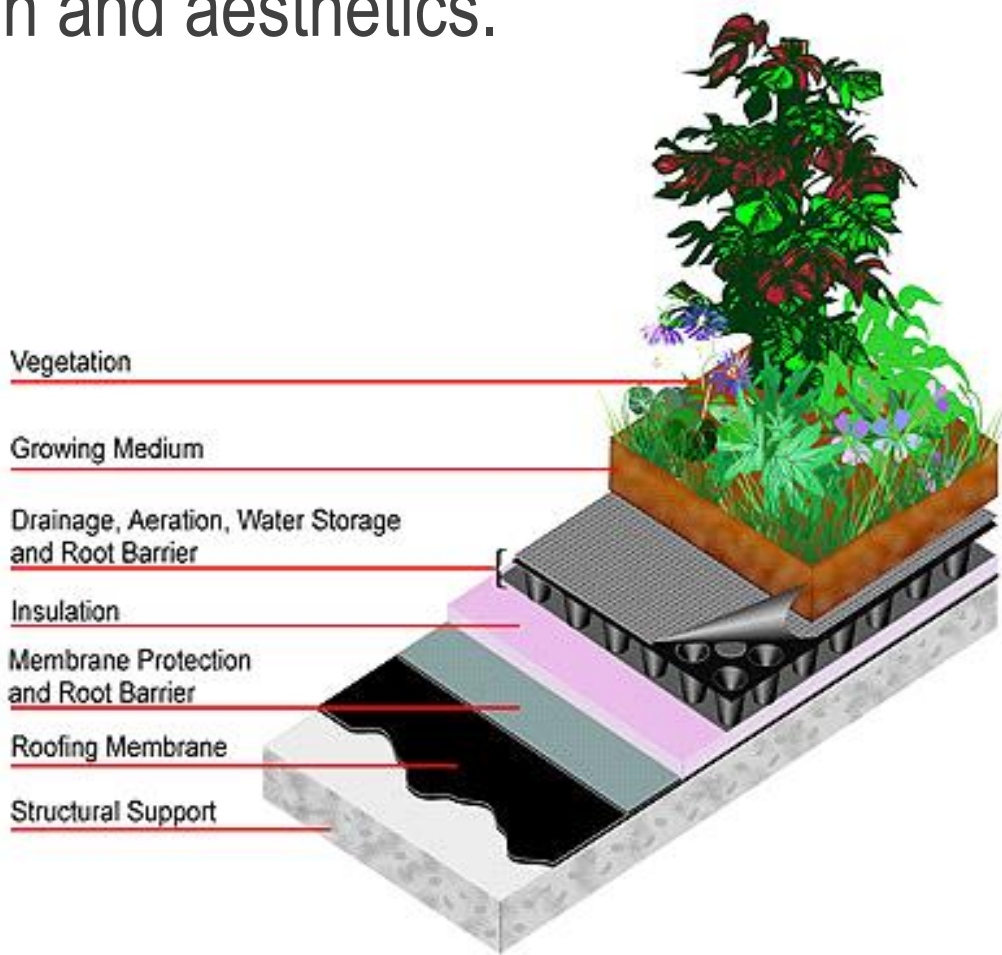
### Exfiltration Systems:

- Exfiltration systems are long infiltration trenches or linear soakways that are designed for both conveyance and infiltration of stormwater runoff.
- They are underground stormwater conveyance systems designed to attenuate runoff volumes and reduce contamination loads to receiving waters.



### Greenroofs:

- Also known as “living roofs” or eco-roofs” consist of a thin layer of vegetative growing medium installed on conventional or sloped roofs.
- Benefit to cities by improving energy efficiency, reduced urban heat island effects, greenspace for passive recreation and aesthetics.



### Rainwater Harvesting:

- It is the process of intercepting, conveying and storing rainfall for future use.
- Rainfall on catchment surface (i.e. roofs) is collected and conveyed to a storage tank or large cistern;
- Captured rainwater can significantly reduce stormwater runoff volume and pollutant load and reduce demand on water resources (i.e. groundwater aquifers and reservoirs);



### Enhanced Grass Swales:

- Vegetated open channels designed to convey, treat, and attenuate stormwater runoff. Enhanced grass swales are a preferred alternative to curb and gutter storm drains as water conveyance.
- When incorporated into the site design, they can reduce impervious cover, accent the natural landscape, and provide aesthetic benefits.

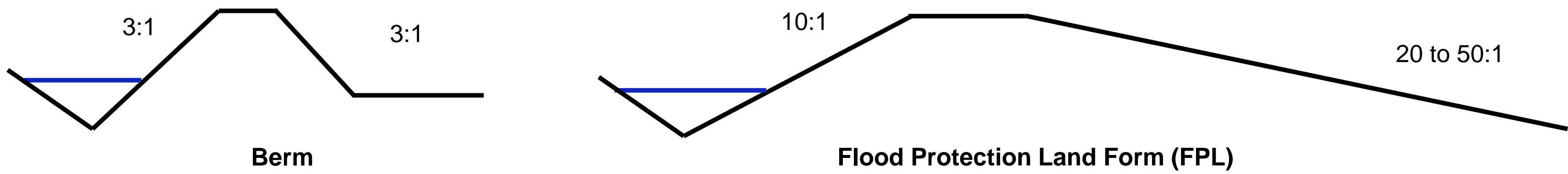




## | What is it?

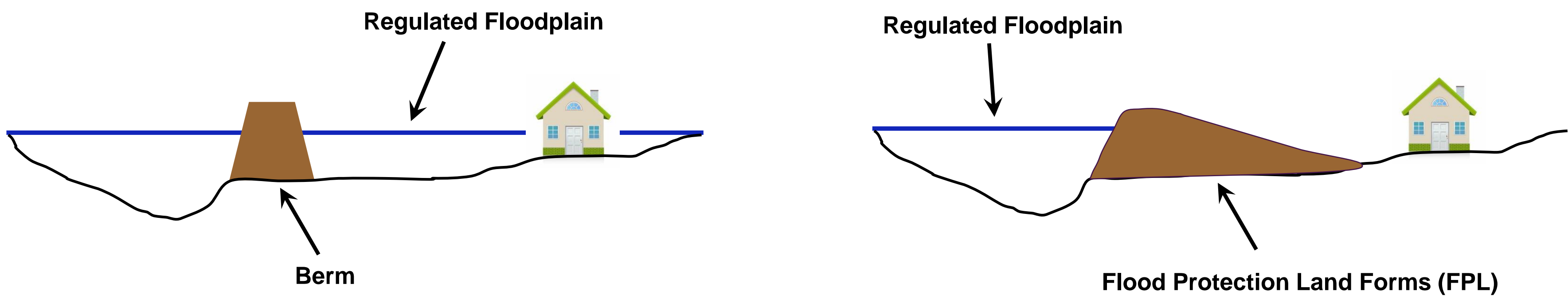
Conventional earthen berms for flood protection are generally quite narrow with side slopes in the range of between 2 to 1 and 4 to 1.

An FPL is much larger with side slopes on the ‘wet’ side at 10 to 1 and ‘dry’ side between 20 to 1 and 50 to 1.



## | Why is it needed?

The Province of Ontario, through the Ministry of Natural Resources and Forestry (MNRF) considers berms as ‘temporary’ structures which may fail, in which case uses on the dry side must, by Regulation, manage the lands as if the berm is not there. The FPL though has been deemed by MNRF as a ‘permanent’ measure hence the flood regulation can be modified.



## | What uses are allowed on a FPL?

Passive open space uses are preferred. No urban development (residential or employment) would be allowed. Some linear infrastructure (roads) would be allowed subject to being constructed ‘above’ the core of the FPL.