

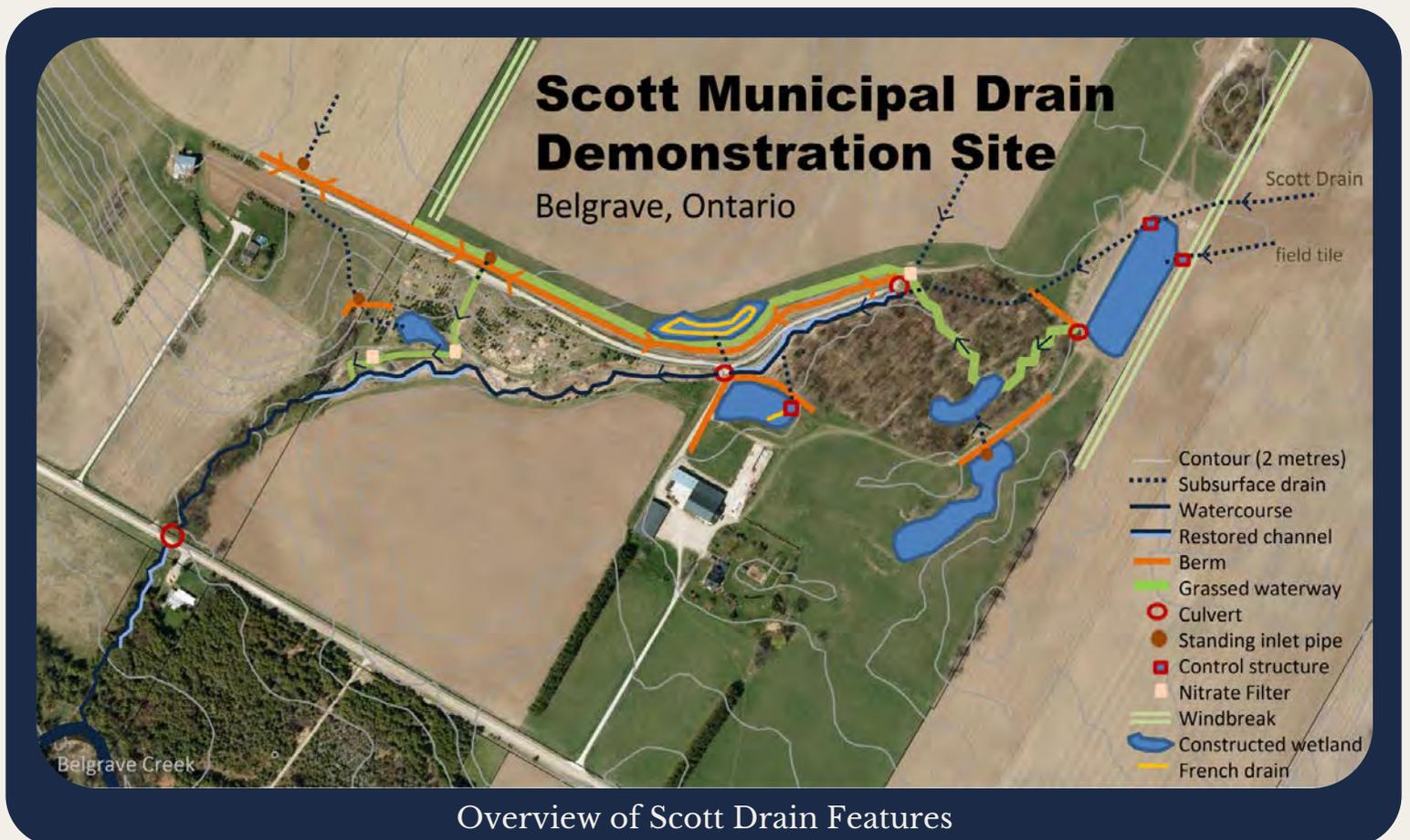
SCOTT MUNICIPAL DRAIN

Belgrave, Ontario (Nature Centre Road), Township of North Huron, Huron County

DRAIN HISTORY

The original Scott Municipal Drain was constructed in the 1940s and consisted of 800 m of closed drain and 1 km of open drain that outlets into the Belgrave Creek, a springfed cold-water stream. The drain services approximately 398 acres of agricultural land (566 total including roadways, forest and residential land). The predominant soil type is Donnybrook Sandy Loam, with a rolling topography.

During the last 15 years, the landowner, with support from Maitland Conservation and many different supporters, constructed a system of Rural Green Infrastructure (RGI) features to improve the functioning and aquatic habitat of the drain. RGI is a series of structures and environmental features that help to reduce stormwater impacts and build resiliency across rural landscapes. These features greatly improved the resiliency of the drain during flood conditions, letting the stormwater “slow down, spread out, and soak in”. These features, as well as additional features constructed as part of a recent Section 78 Drain Improvement process, have dramatically improved the aquatic habitat of the open portion of the Scott Drain.



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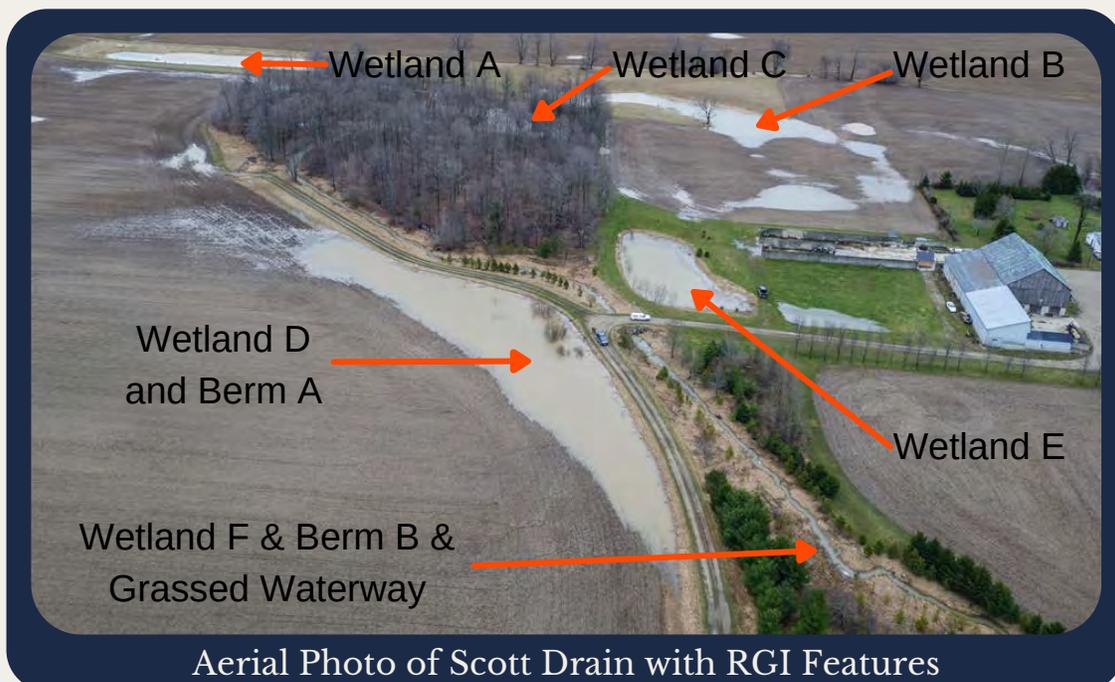
PROJECT GOALS

One of the main objectives of the Section 78 project was to incorporate the existing RGI features that were constructed privately into the Scott Municipal Drain Report, allowing for long-term protection and maintenance. Additionally, further opportunities for downstream drain rehabilitation were identified, which allowed for additional RGI features to be constructed and incorporated into the drain report.

SECTION 78 PROCESS

The Section 78 Drain Improvement process began with a request for improvement received by the municipality. This request includes a petition signed by several landowners and a description of the improvements that are requested. RJ Burnside was appointed as the engineer under Section 78 of the Drainage Act. RJ Burnside staff then met with the landowners, MVCA and municipal staff to establish a thorough understanding of current drain conditions, project goals and the various RGI features that were installed previously (privately) along the drain. This liaison involved extensive surveying and collecting various documentation on the previously constructed RGI. It was also decided that new improvements should be made to the downstream portion of the drain, where no private work had occurred previously. An Engineer's Report was developed, which details all aspects of the drain including previous RGI features, new drain improvements, future maintenance schedule of these features and itemized project costs. This report was presented to the Township of North Huron and various stakeholders during a council meeting to consider the report. North Huron council and stakeholders approved the Engineer's Report and the project was tendered for construction shortly thereafter.

Funding support from Bruce Power helped to offset the majority of the costs for this Section 78 Drain Improvement project.



Aerial Photo of Scott Drain with RGI Features

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SCOTT DRAIN RGI FEATURES

TWO (2) DIVERSION BERMS

These berms intercept and hold back surface stormwater in order to direct it underground via french drain inlets and/or raised catch basins. Maintenance of these berms (including excess sediment and vegetation removal) is detailed within the drain report and is the responsibility of the drain superintendent. Special consideration was made to vegetate overflow spillways, to ensure that even if the berms were overtopped, some form of protection would be in place to reduce erosion and filter stormwater. Berm A is approximately 1.5 m in height and Berm B is 1.2 m in height.



Diversion Berm A and Wetland D



Diversion Berm B and Wetland F

GRASSED WATERWAY

This feature provides a vegetated pathway for surface stormwater to travel to a stable outlet, in this case, Wetland F. The permanent vegetation in this area is protected within the drain report and cannot be converted to row crop production. The grassed waterway is 5 m in width and has been well-buffered with native shrubs and trees.



Grassed Waterway

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SIX (6) WETLANDS

These features provide flood attenuation and sediment/nutrient filtering for surface runoff and subsurface drainage. Water retention of the wetlands is managed by flow control boxes, raised catch basins or overflow spillways. Maintenance of the wetlands are detailed and mandated in the drain report, with an emphasis on inlet maintenance and sediment removal to ensure proper functioning. The flow control box pictured below on Wetland A can be closed or restricted to allow retention of water and maintain levels in the wetland. Flow control can be adjusted throughout the year. The report recommends that outflow is left open during the winter and spring months and reduced during late spring and summer to maximize water retention in the wetlands during the summer months.



Wetland A with flow control box



Wetland C filtering sediment

Alternatively, water height in Wetland B, pictured below, is controlled via a strategic overflow spillway. Although simpler in design, this static feature does not allow alterations to water height within the adjacent wetland. The total footprint for all six wetlands/retention ponds is 2.9 acres (1.2 ha). Each of the wetlands are well-buffered with permanent vegetation, including a variety of native grasses, shrubs and trees. These features provide semi-aquatic habitat and many ancillary benefits to wildlife in the area. The immediate 5 acres surrounding Wetlands A and B were established for hay production and cannot be converted to row crop production.



Wetland B with Raised Hickenbottom Outlet

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SIX (6) SEDIMENT BASINS

These features, sometimes called refuge pools, are basins within the open drain channel that accumulate/trap sediment that would otherwise flow downstream into the Blyth Creek. The basins are lined with rip rap stone to reduce the potential for erosion and provide a stable bed for sediment to settle onto. These basins also provide an offline pool for aquatic habitat.

The sediment basins are placed at strategic locations within the drain to ensure maximum functionality and allow for easier spot cleanouts in the future. Maintenance of these basins, including sediment removal and erosion protection, is detailed within the drain report. There are three sediment basins located within the drain, with each generally being 0.5 m long and 0.5 deep, with 1:1 side slopes.



Sediment Trap during low-flow

RIPARIAN BUFFER TREE AND SHRUB PLANTINGS

These features were planted along the open portions of the drain to provide structural stability to the drain. In certain locations, trees and shrubs will also provide help to filter excess sediments and nutrients from stormwater before it enters the open drain. Several different native species of grasses, shrubs and trees have been planted throughout the years by the landowner. In total, approximately 5.2 acres of riparian buffer was restored alongside the Scott drain. Many of these newly planted areas are detailed in the drain report and will be protected into the future. Alongside protection of these features, there is also special consideration within the drain report for the need to monitor vegetation in specific locations to ensure it does not negatively impact the functioning of the drain. For example, vegetation surrounding wetland D will be closely observed to ensure the french drain remains operable and does not become obstructed.



Riparian Buffer in 2007



Riparian Buffer in 2018

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RIFFLE AND POOL STRUCTURES

These features were constructed to initiate the development of a more natural open channel with improvements to aquatic habitat. Riffles are short segments of coarse gravel and rock substrate with turbulent, agitated flow. They are followed by pools, which are deeper basins that moderate water velocity and allow for sediment deposition. In the Scott drain, riffles and pools were constructed or improved upon at key locations within the drain to enhance existing habitat conditions. The profile of these structures is detailed within the engineered plans and will be maintained as such. Any repair materials (course stone, gravel, etc.) are detailed so that future maintenance will enable the continued functioning of these features.



Riffles and Pools post-construction



Riffles and Pools downstream

VEGETATED STONE REVETMENTS AND NATURAL MEANDERS

These features provide bank erosion protection and enhance aquatic habitat. The vegetated stone revetments were built by 'keying in' stone rip rap to strategic locations within downstream portions of the open drain. The stone was then layered with appropriate native material to provide a growing medium for numerous red osier dogwood shrubs. Under guidance from an aquatic ecologist, large woody debris was gathered on-site and strategically placed within the drain to further provide aquatic habitat and flow abatement.

Certain midstream sections of the open drain were enhanced by creating a low-flow, meandering channel. This meandering channel has a variable channel width but is generally 0.6 m or less. High-flow events can still drain adequately via a gently-sloped bank to a channel with large bank widths. Where possible, the existing banks of the channel were left undisturbed and enhanced with native vegetation.



Natural Meander

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**ENGINEER COMMENTS: TREVOR KUEPFER, P. ENG
R. J. BURNSIDE & ASSOCIATES LTD.**

IMPORTANT BENEFITS AND FEATURES

- Previously constructed RGI features were incorporated into the Municipal Drain to ensure their future existence.
- Aquatic habitat was enhanced downstream of Nature Centre Road with woody debris, the construction of refuge pools, the improvement of highly erodible areas with rounded riverstone, and the installation red osier dogwood shrubs to provide biodiversity and shade within the channel.



Overview of Scott Drain Features

Check out the rest of our cast study series! You can find them on the Healthy Lake Huron website in the Technical Reports section at <https://healthylakehuron.ca/reports/>



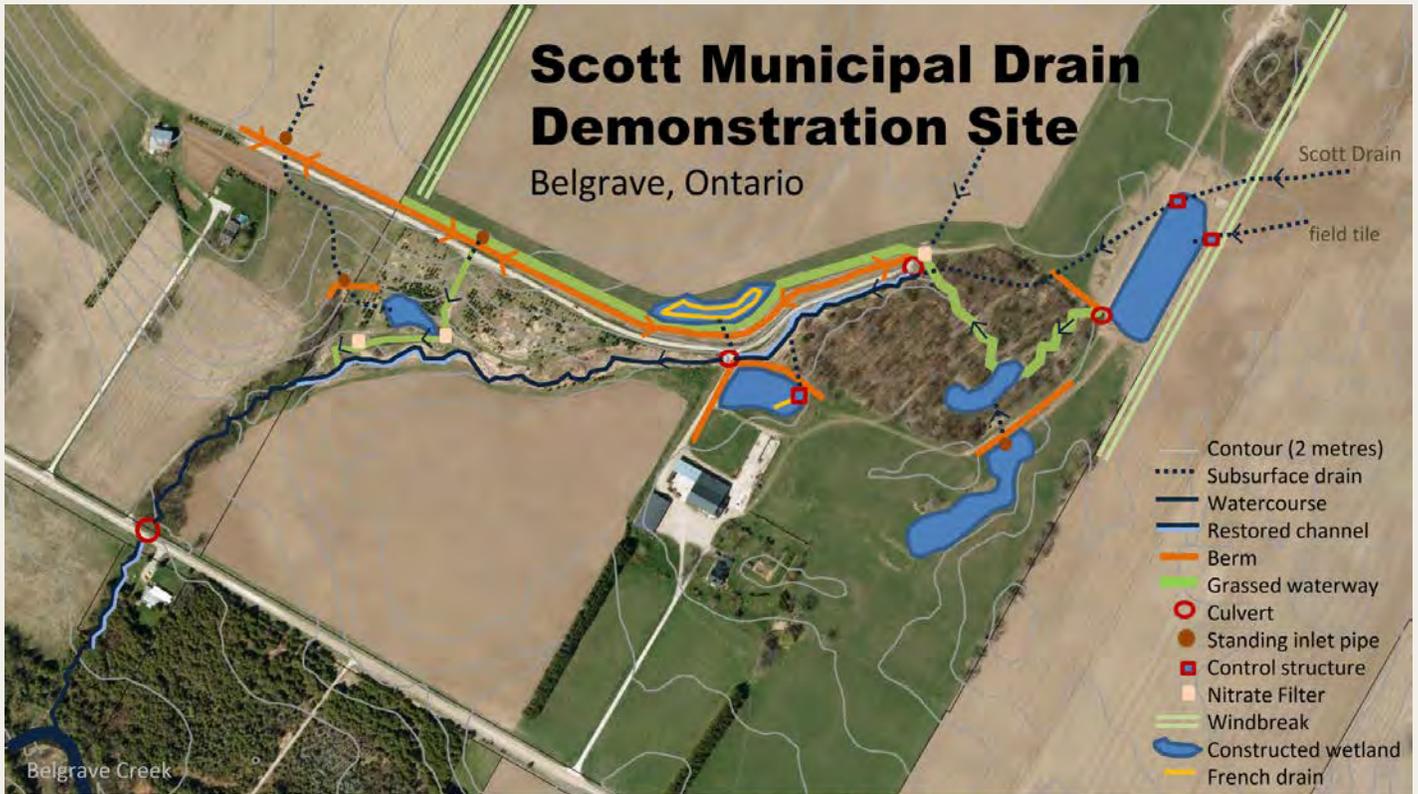
This project was supported by Ontario Ministry of Agriculture, Food and Rural Affairs

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Appendix

APPENDIX A
Maps & Diagrams

Restoration Project Overview

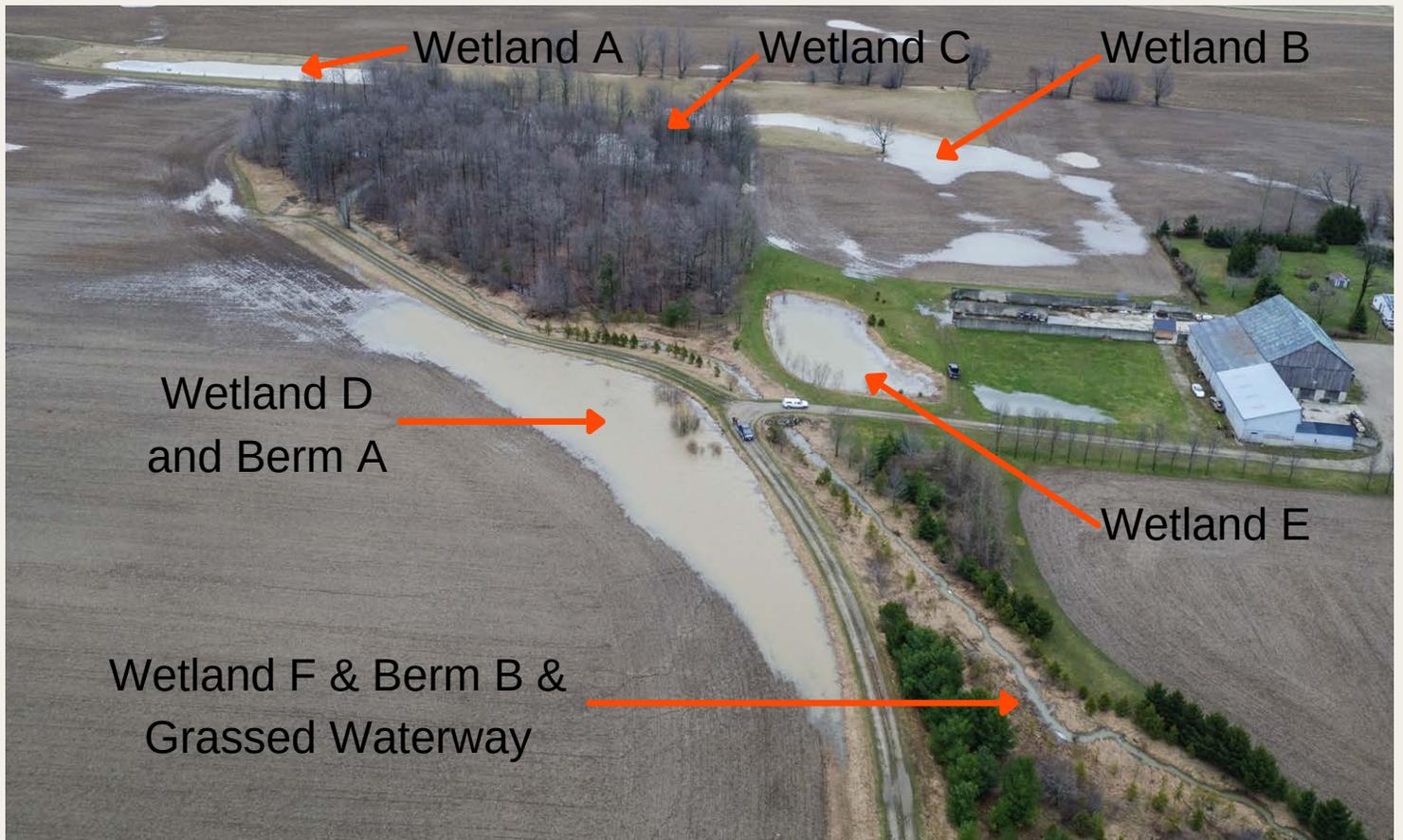


Detailed RGI Map



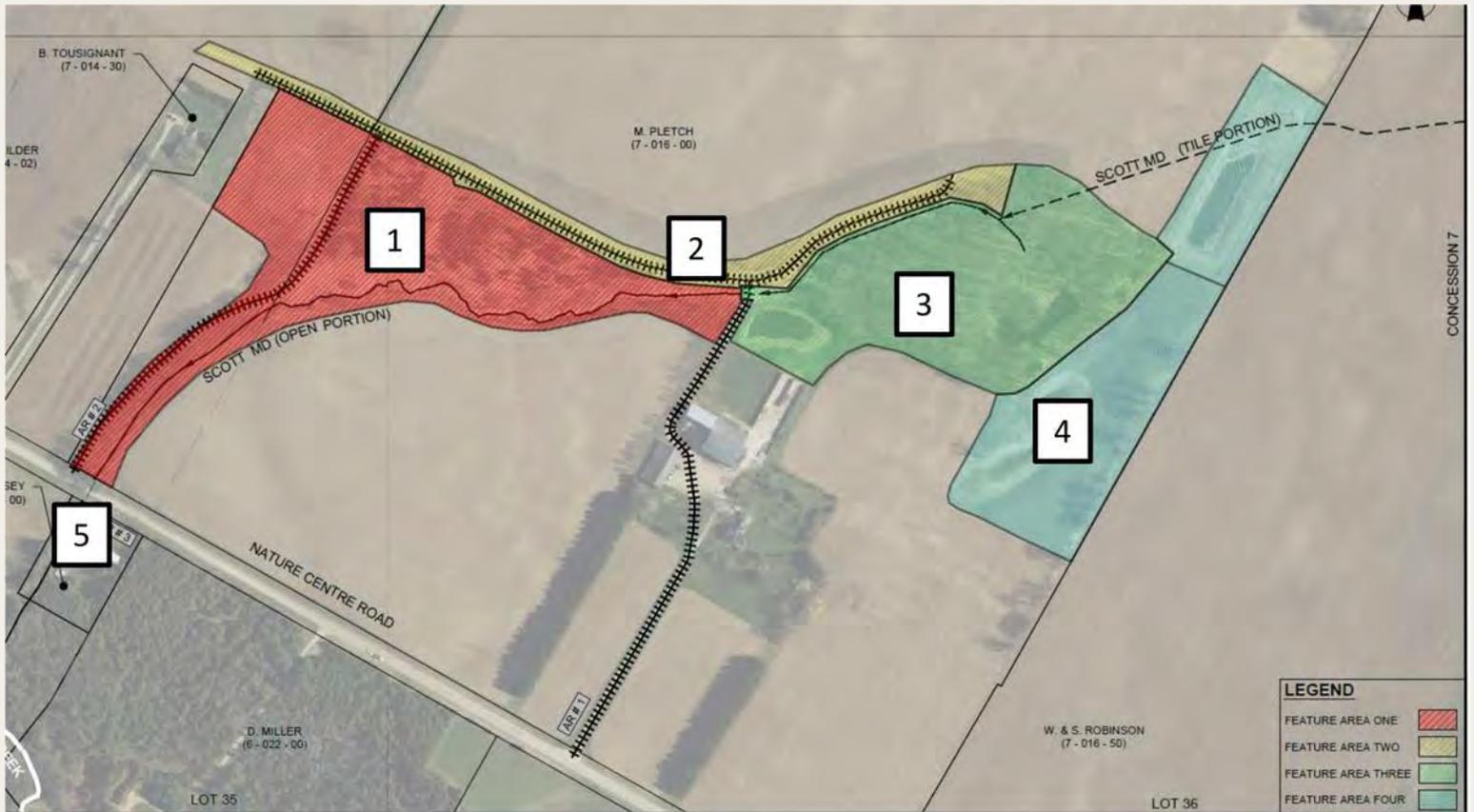
Aerial View of Property with RGI Features

Wetlands & Berms named in Engineer's Report

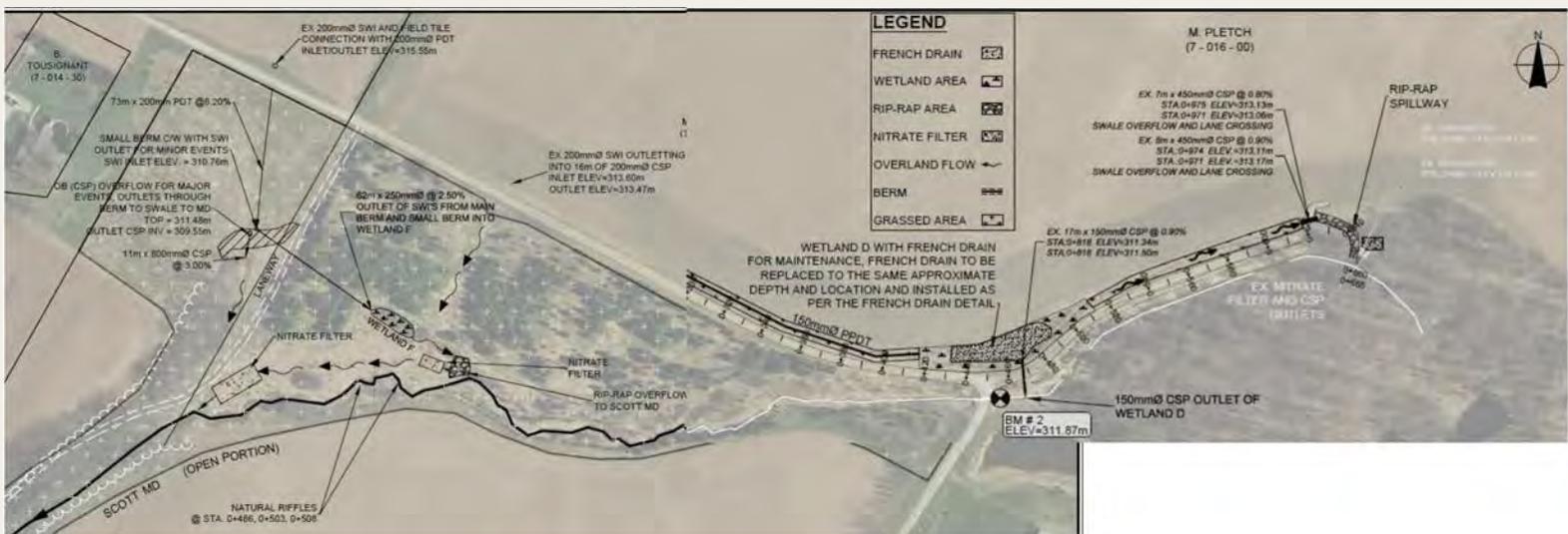


APPENDIX B
Engineer Report Maps

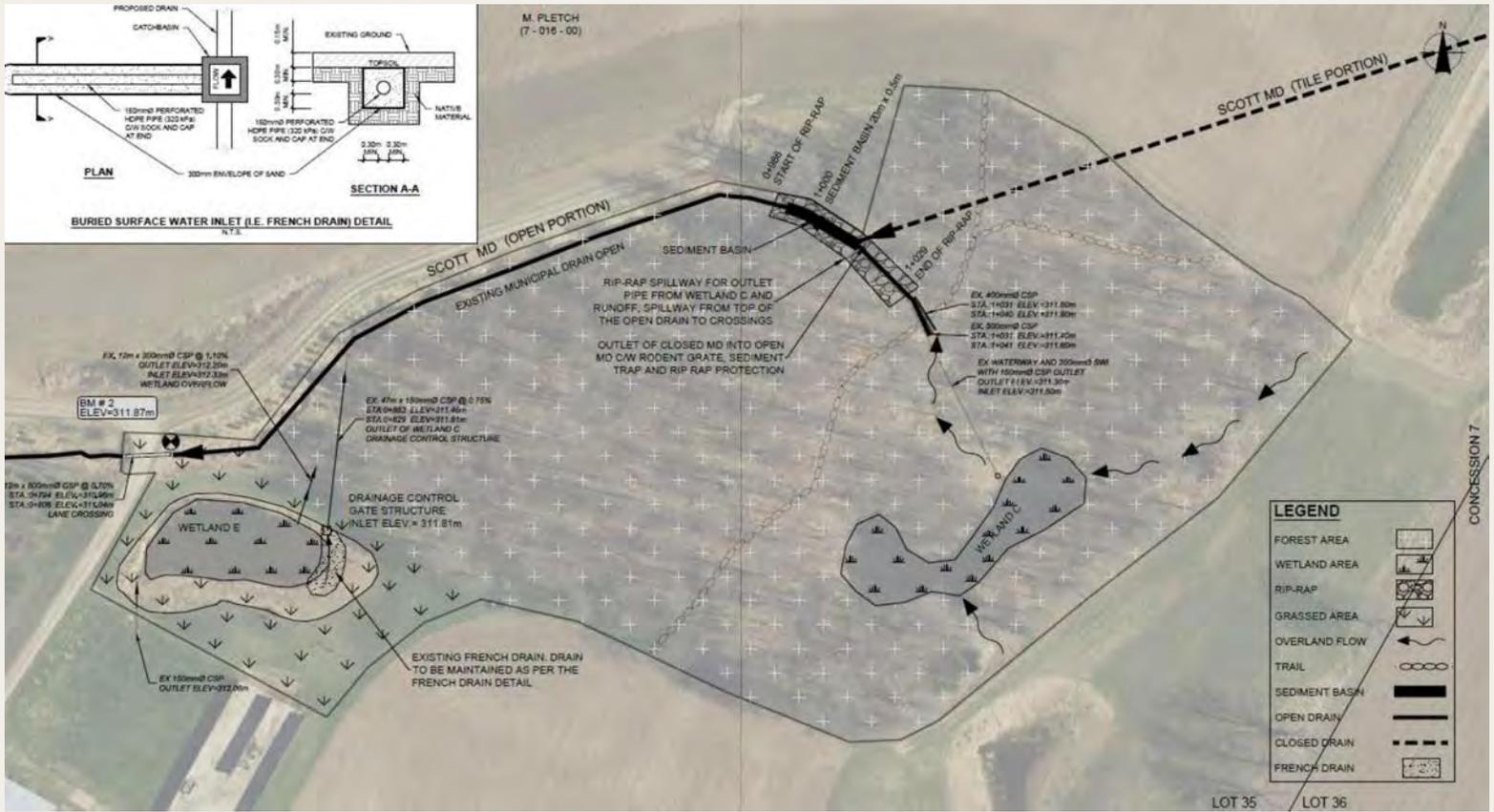
Map Sections from Report



Sections 1 & 2

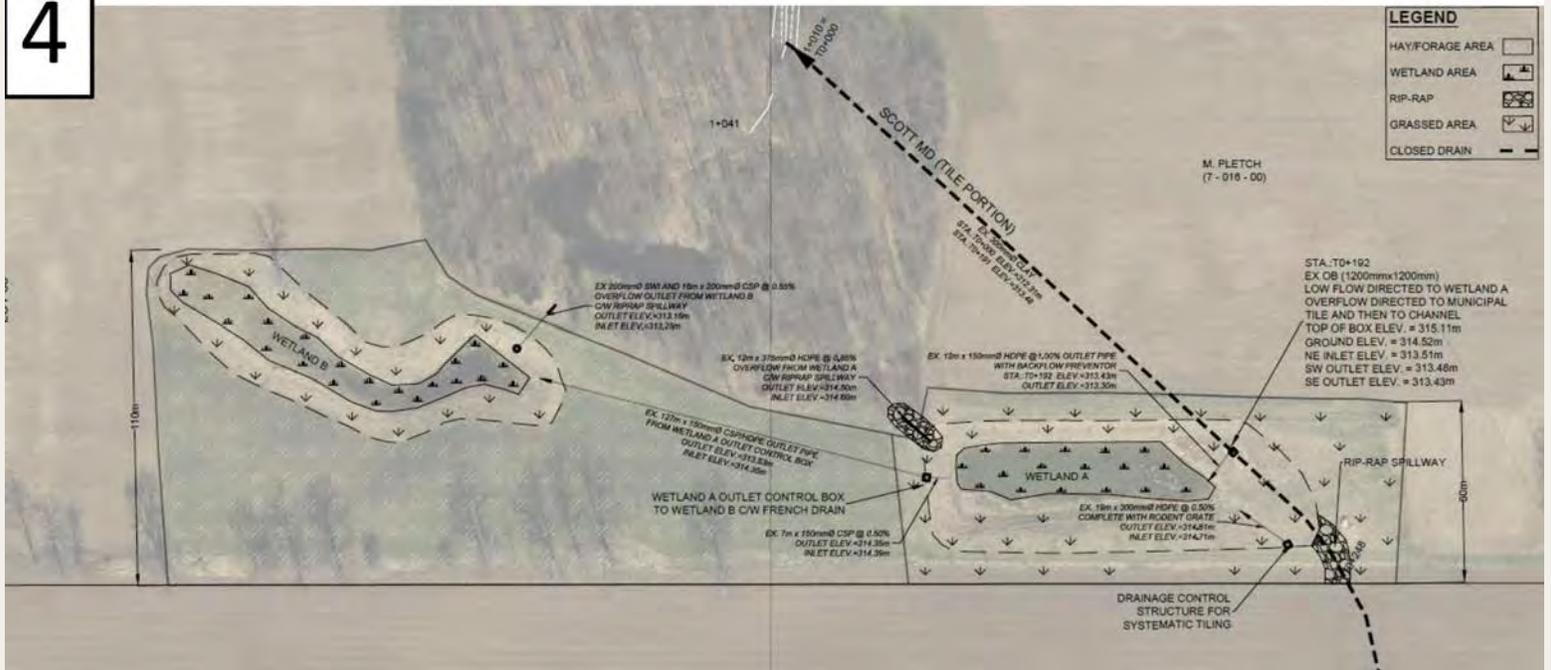


Section 3



Sections 4 & 5

4



5

