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HOSTS

Presented by:

Toronto and Region Conservation Authority

In association with:

Lake Simcoe Region conservation authority

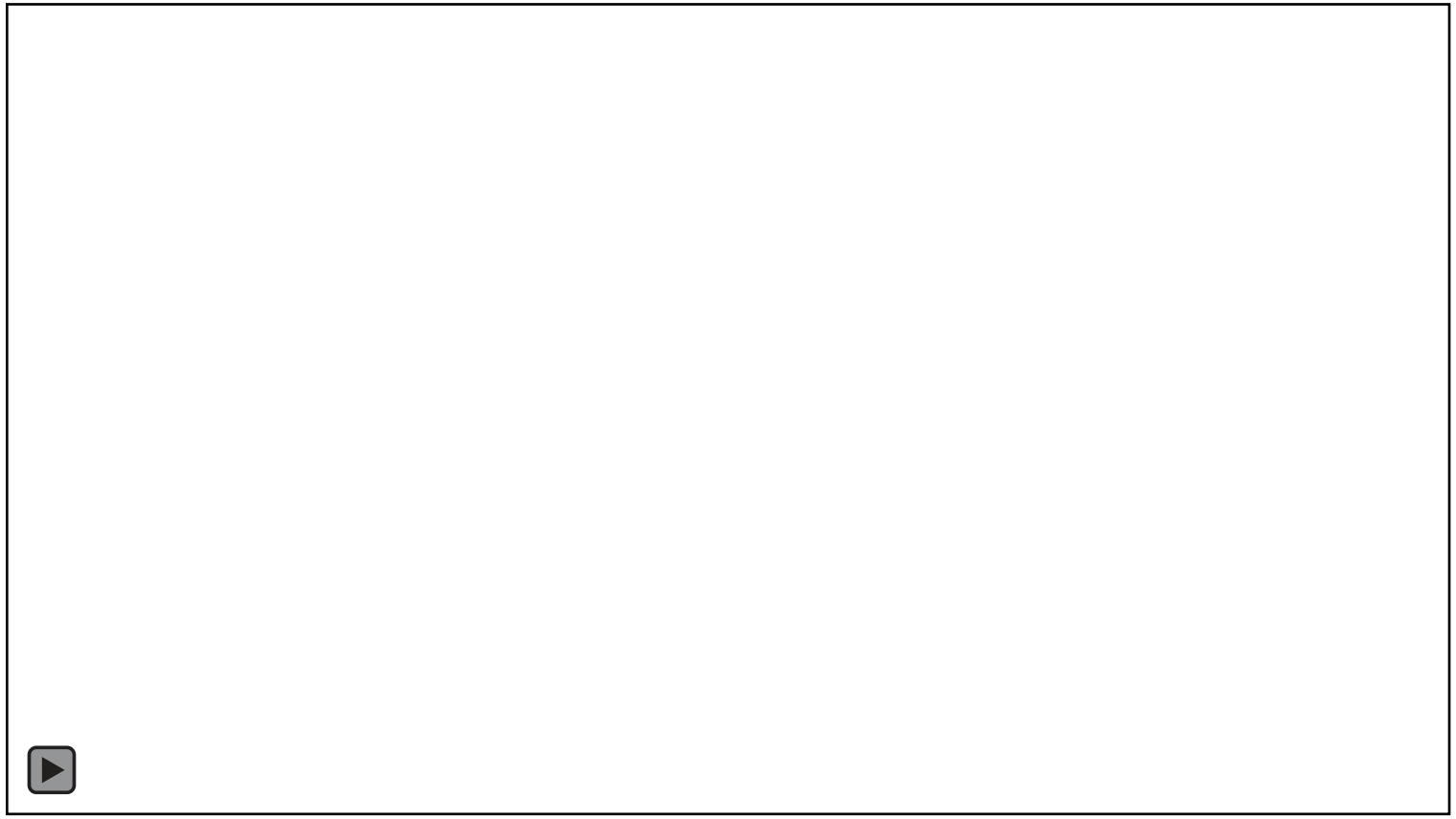
Credit Valley Conservation – inspired by nature

50 Years in the Making

Rehabilitation of the Royal Oak Municipal Drain

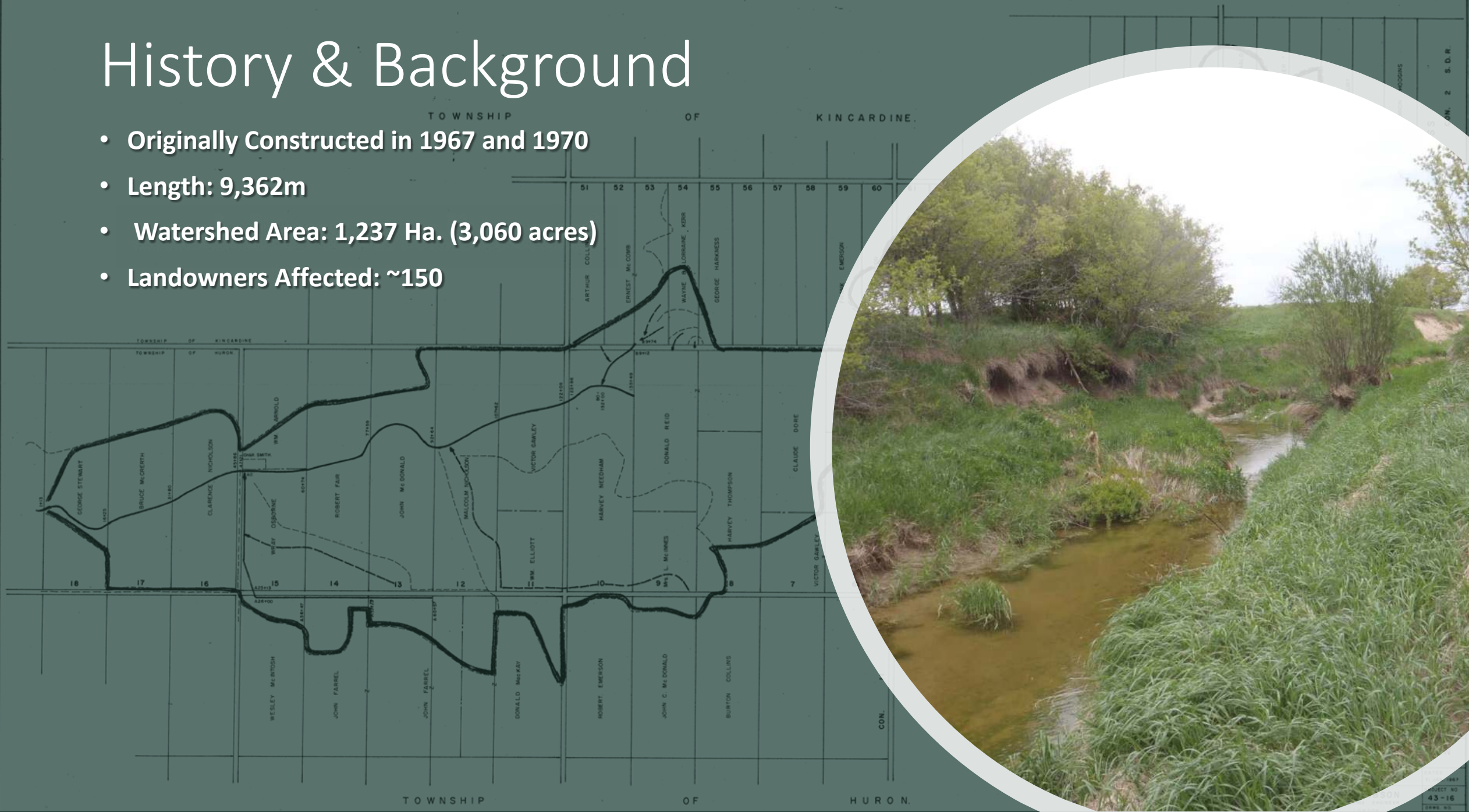
Contents

Location

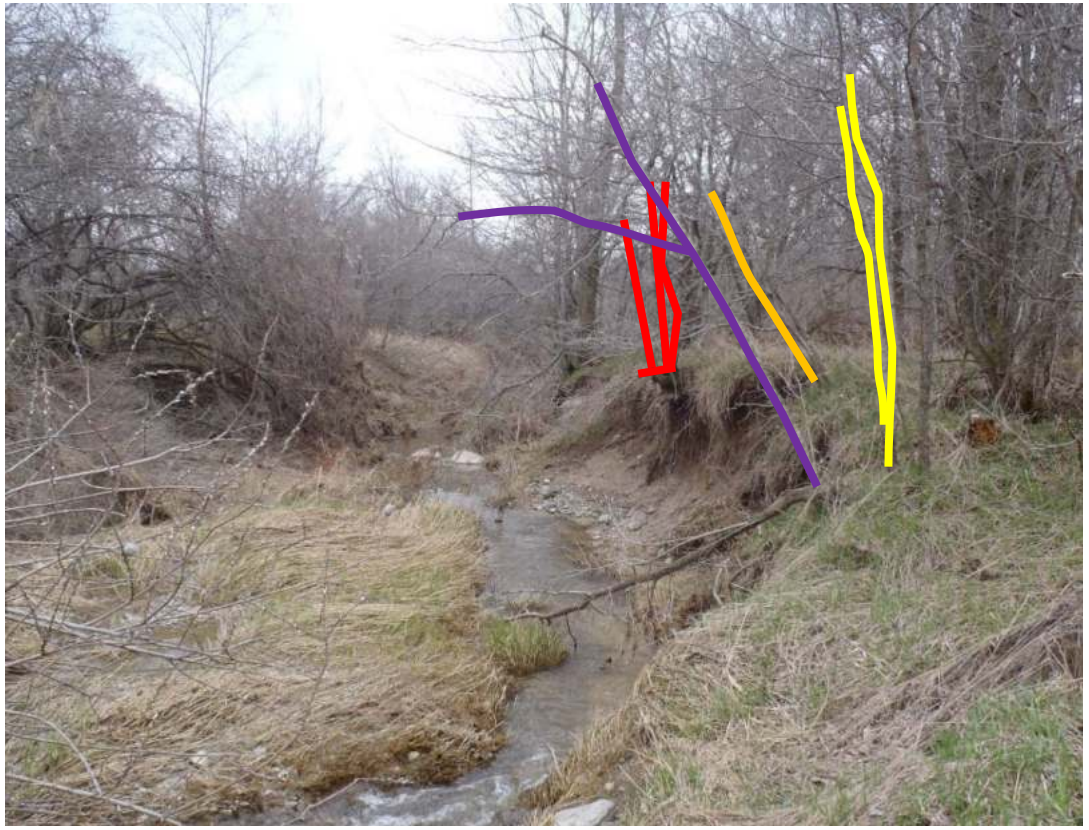


History & Background

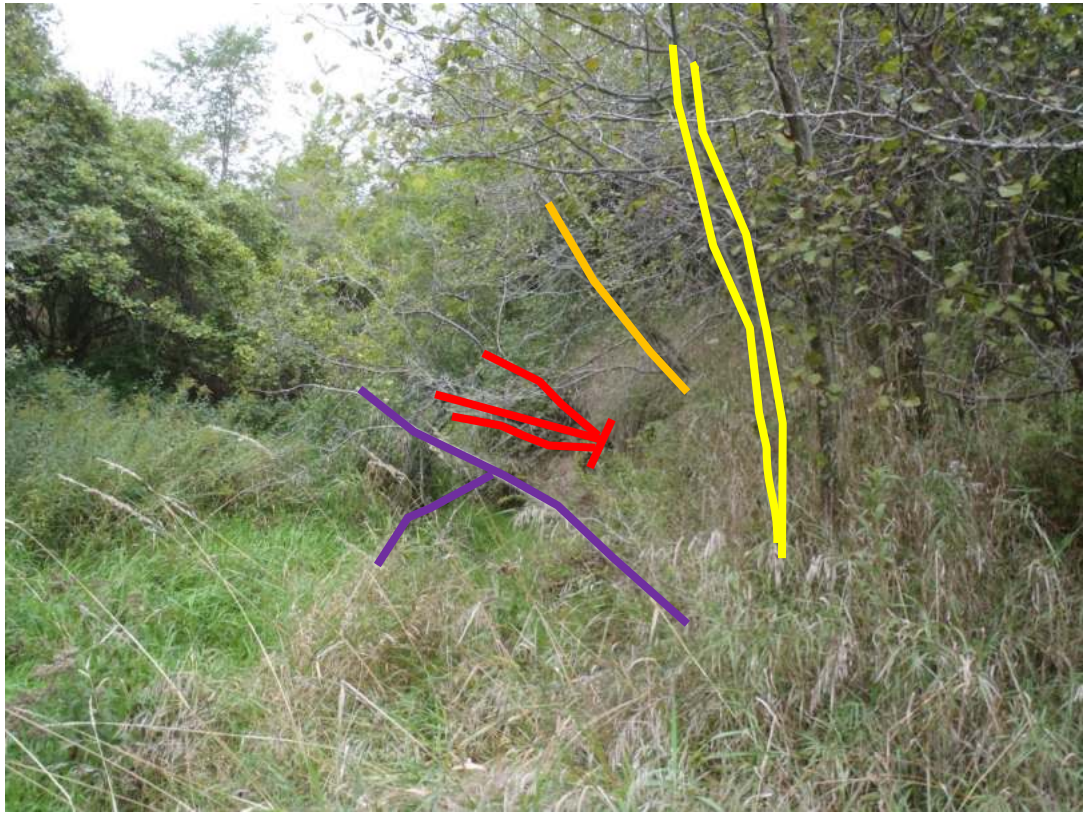
- **Originally Constructed in 1967 and 1970**
- **Length: 9,362m**
- **Watershed Area: 1,237 Ha. (3,060 acres)**
- **Landowners Affected: ~150**



Comparison



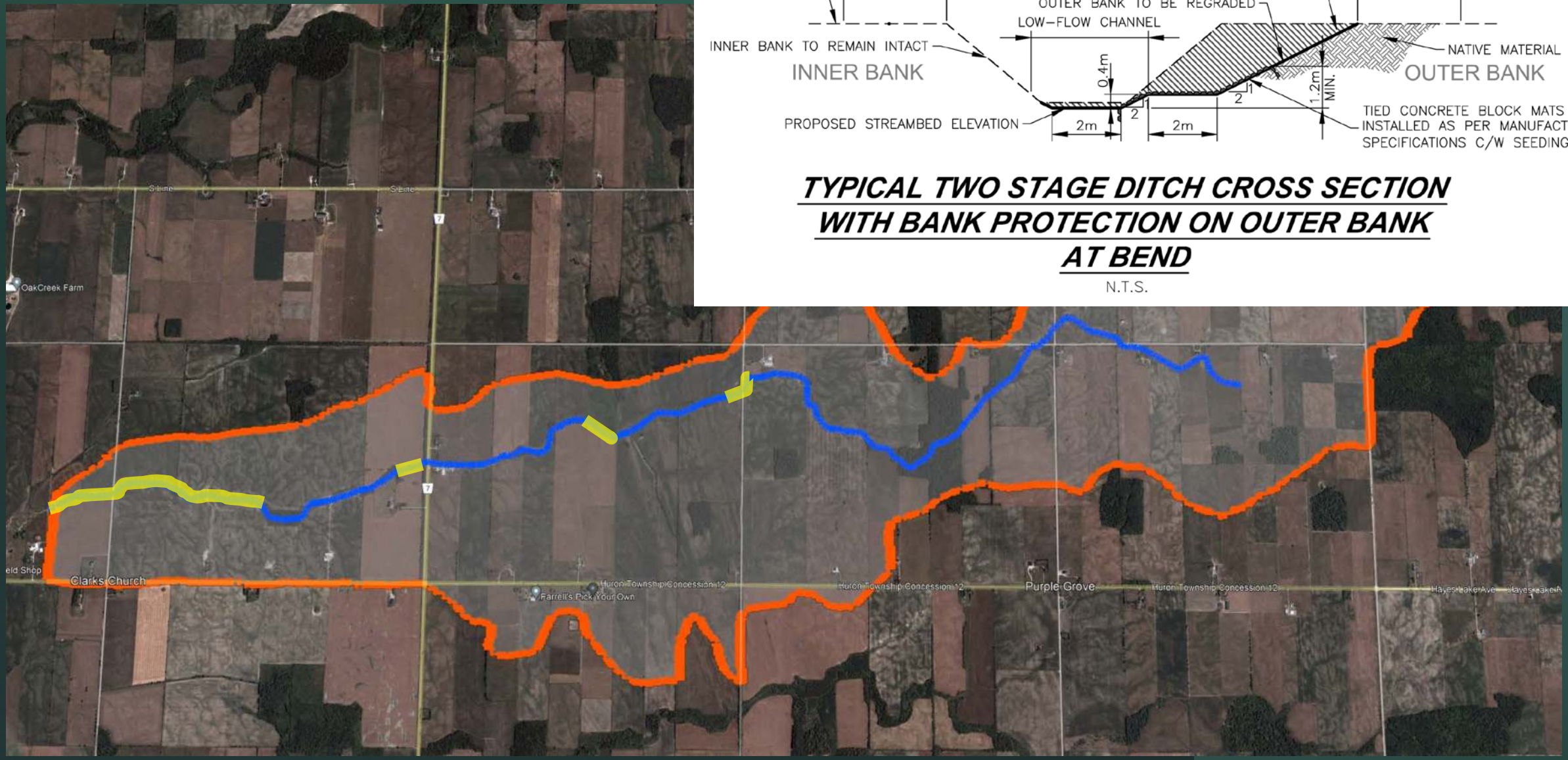
April 21, 2015



September 27, 2016
One Year – 5 Months Later

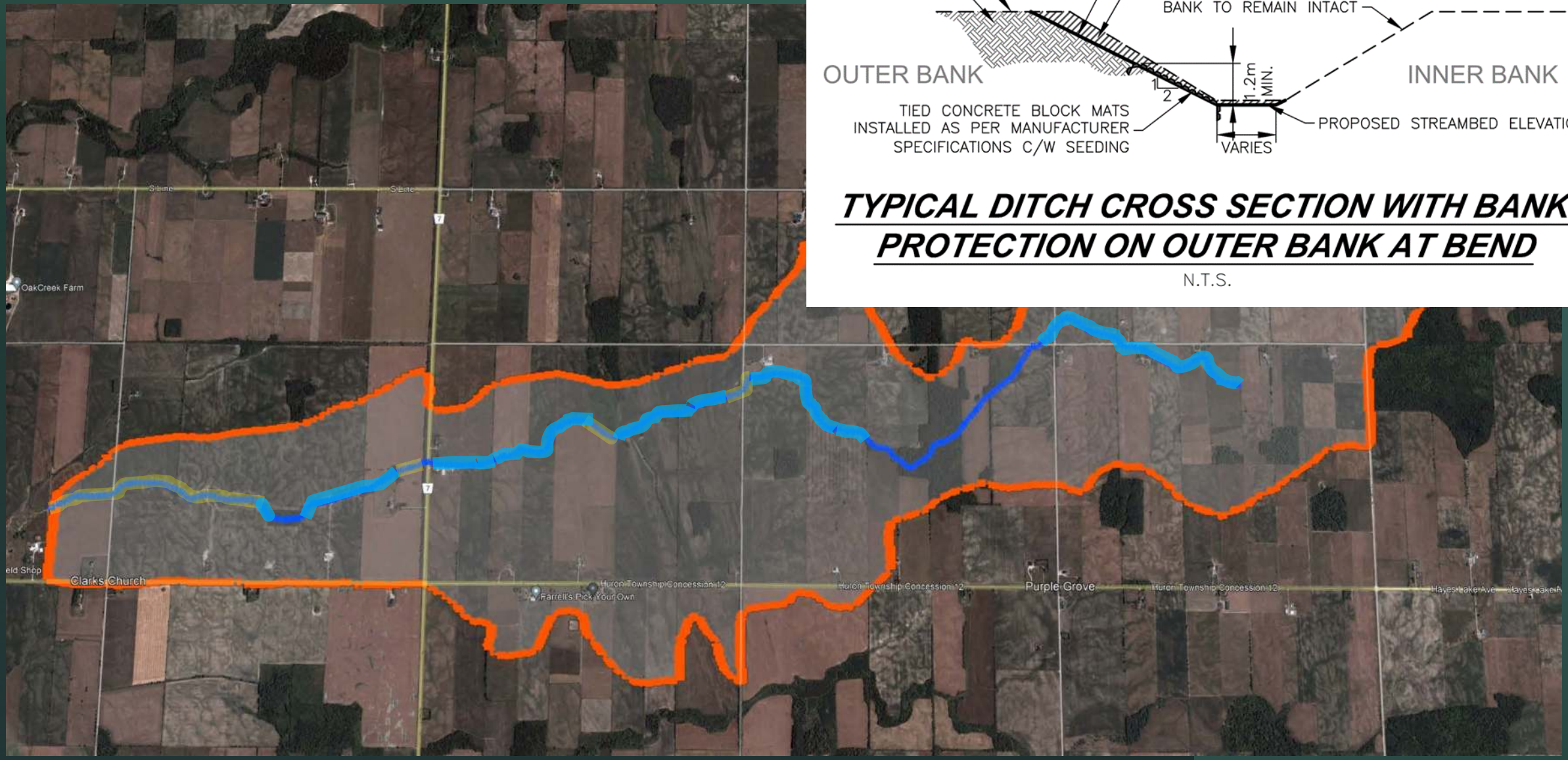
Objective:

To establish a stable agricultural drainage channel in the most affordable fashion possible, while also satisfying Fisheries Act.



TYPICAL TWO STAGE DITCH CROSS SECTION WITH BANK PROTECTION ON OUTER BANK AT BEND

N.T.S.



TYPICAL DITCH CROSS SECTION WITH BANK PROTECTION ON OUTER BANK AT BEND

N.T.S.


S Line
S Line
7
OakCreek Farm
7
eld Shop
Clarks Church
Huron Township Concession 12
Farrell's Pick Your Own
Huron Township Concession 12
Purple Grove
Huron Township Concession 12
HayesLakerAve
HayesLakerA

Erosion Control Design Methods

Reduce Shear from Flow

- Shear Threshold is very low
- Requires Significant Real Estate

Increase the Resistance to Shear

- Location Specific
- Simplistic
- Plenty of Product Options




Erosion Control Products

- Vegetation
- Tied Concrete Block Mat
- Rolled Erosion Control Products
- Turf Reinforcement
- Rock Rip-Rap


Tied Concrete Block Mat

Shear Reinforcement (Long Term Erosion Control)

Partnership between Armour & Vegetation (Ecological value)

Constructability

Cost

Flexamat
Composition of Materials

Blocks: 35 MPa Wet-Cast Portland Cement

Interlocking Grid: Biaxial Geogrid 30 KN/m (MD & CMD)

Underlaying Options: Curlex II, TRM, non-woven geotextile

Flexamat Manufacturing Values

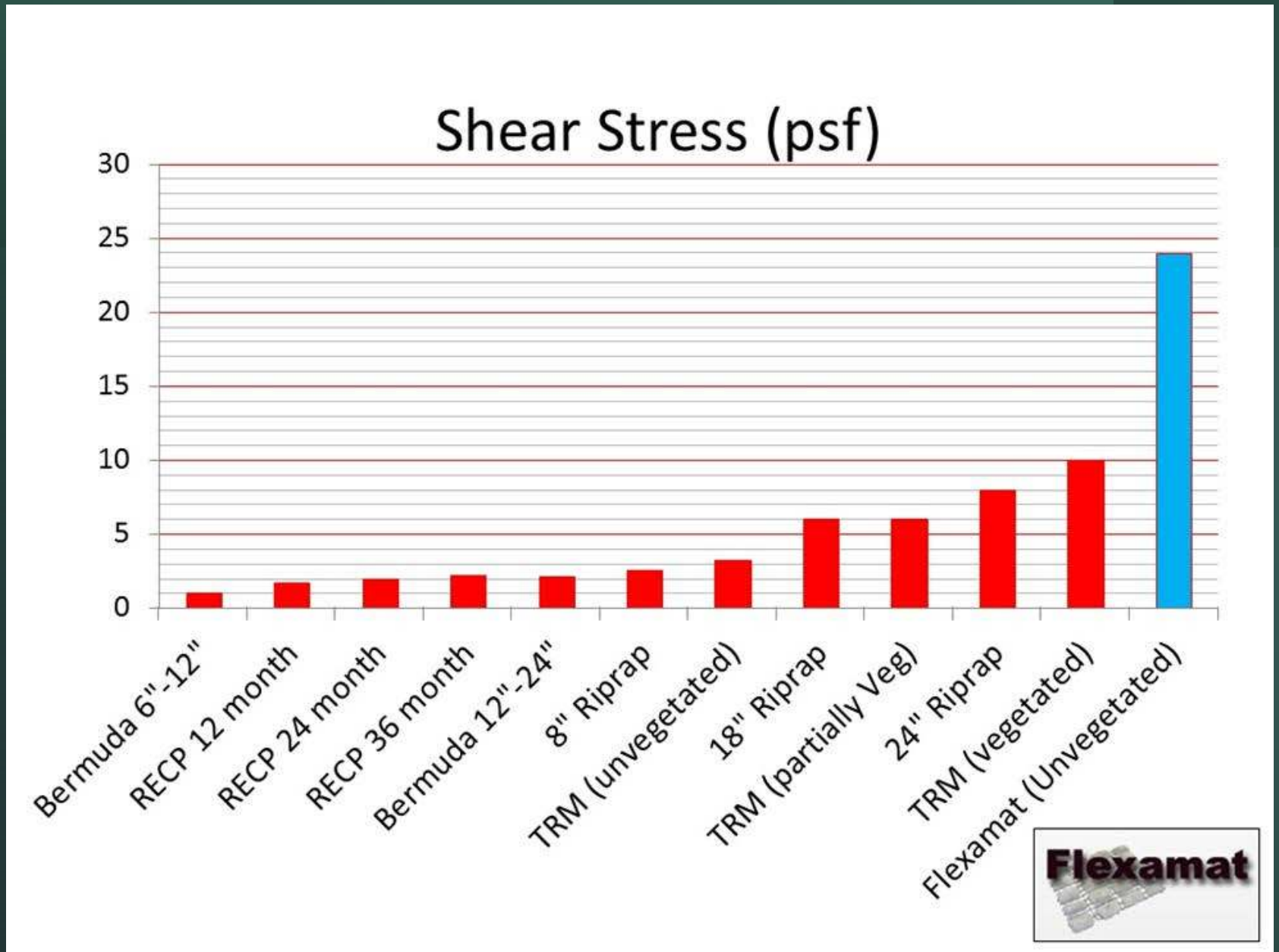
- Roll Width: 1.22m - 4.88m
- Roll Length: 0.3m increments
- Material weight: 48.8 kg/sqm
- Block size: 165mm x 165mm x 57mm

Flexamat
Performance Design Criteria

- Percentage Open Area: 30%
- Shear Tolerance: 1,150 Pa
- Velocity Tolerance: 9.1 m/s

Flexamat
Large Scale Testing

ASTM D 6460 (Standard Test Method For Determination of Rolled Erosion Control Product Performance in Protecting Earthen Channels From Stormwater-Induced Erosion)


Shear Stress (psf)
30
25
20
15
10
5
0
Bermuda 6"-12"
RECP 12 month
RECP 24 month
RECP 36 month
Bermuda 12"-24"
8" Riprap
TRM (unvegetated)
18" Riprap
TRM (partially Veg)
24" Riprap
TRM (vegetated)
Flexamat (Unvegetated)
Flexamat

Flexamat Benefits

- Interconnecting block system vs individual rocks
- Will not crack under freeze/thaw cycles
- Blends in with the surrounding landscape
- High installation rate
- Can be maintained by commercial mowers

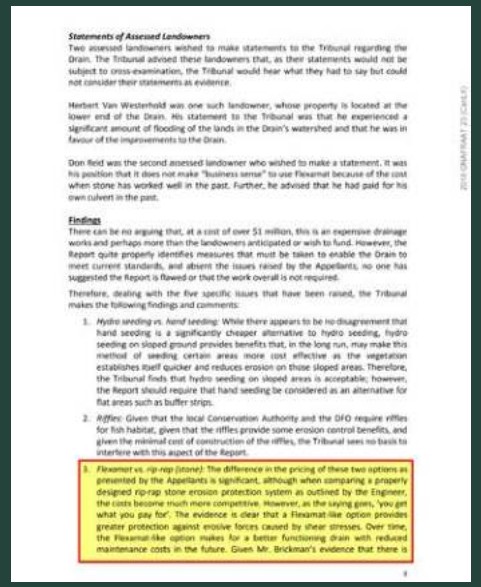
Tribunal

Issue:

- The Engineer proposes using a material commercially known as “Flexamat”, which is a mat of linked concrete blocks used on the slopes of a waterway to prevent or minimize erosion; the Appellants argue that there are less expensive methods (such as stone riprap) to control erosion. *Issue: Is Flexamat a proper erosion solution in the circumstances?*

Decision

- Flexamat vs. rip-rap (stone): The difference in the pricing of these two options as presented by the Appellants is significant, although when comparing a properly designed rip-rap stone erosion protection system as outlined by the Engineer, the costs become much more competitive. However, as the saying goes, ‘you get what you pay for’. The evidence is clear that a Flexamat-like option provides greater protection against erosive forces caused by shear stresses. Over time, the Flexamat-like option makes for a better functioning drain with reduced maintenance costs in the future.



Statements of Assessed Landowners

Two assessed landowners wished to make statements to the Tribunal regarding the Drain. The Tribunal advised these landowners that, as their statements would not be subject to cross-examination, the Tribunal would hear what they had to say but could not consider their statements as evidence.

Herbert Van Westerhold was one such landowner, whose property is located at the lower end of the Drain. His statement to the Tribunal was that he experienced a significant amount of flooding of the lands in the Drain's watershed and that he was in favour of the improvements to the Drain.

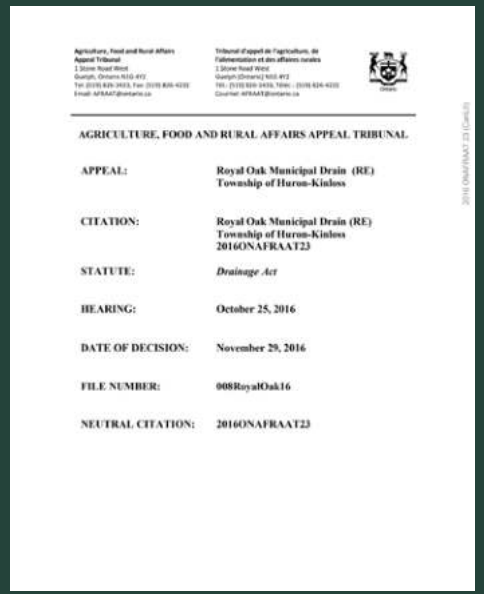
Don Reid was the second assessed landowner who wished to make a statement. It was his position that it does not make "business sense" to use Flexamat because of the cost when stone has worked well in the past. Further, he advised that he had paid for his own culvert in the past.

Findings

There can be no arguing that, at a cost of over $1 million, this is an expensive drainage works and perhaps more than the landowners anticipated or wish to fund. However, the Report quite properly identifies measures that must be taken to enable the Drain to meet current standards, and absent the issues raised by the Appellants, no one has suggested the Report is flawed or that the work overall is not required.

Therefore, dealing with the five specific issues that have been raised, the Tribunal makes the following findings and comments:

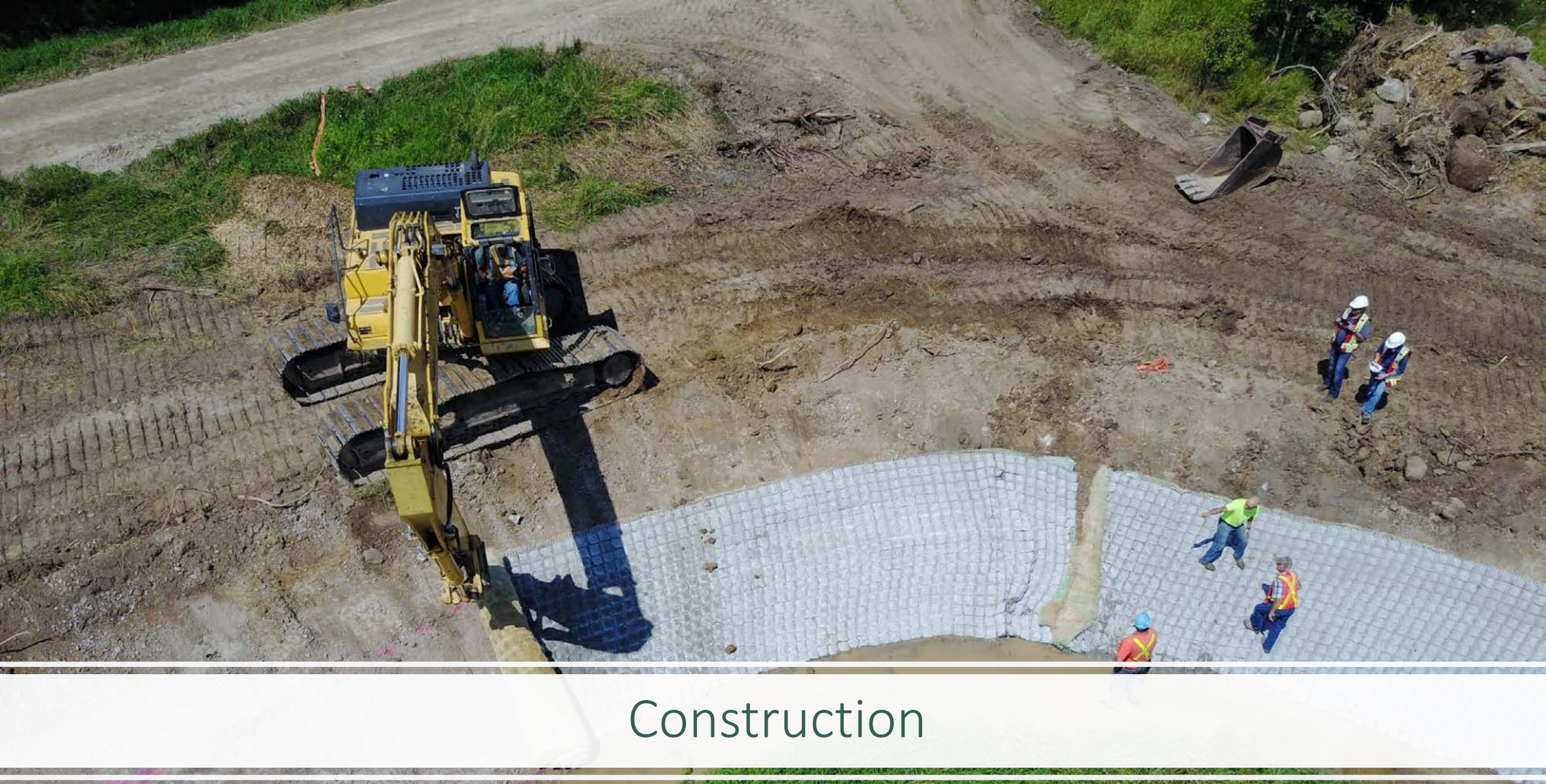
1. *Hydro seeding vs. hand seeding:* While there appears to be no disagreement that hand seeding is a significantly cheaper alternative to hydro seeding, hydro seeding on sloped ground provides benefits that, in the long run, may make this method of seeding certain areas more cost effective as the vegetation establishes itself quicker and reduces erosion on those sloped areas. Therefore, the Tribunal finds that hydro seeding on sloped areas is acceptable; however, the Report should require that hand seeding be considered as an alternative for flat areas such as buffer strips.
2. *Riffles:* Given that the local Conservation Authority and the DFO require riffles for fish habitat, given that the riffles provide some erosion control benefits, and given the minimal cost of construction of the riffles, the Tribunal sees no basis to interfere with this aspect of the Report.
3. *Flexamat vs. rip-rap (stone):* The difference in the pricing of these two options as presented by the Appellants is significant, although when comparing a properly designed rip-rap stone erosion protection system as outlined by the Engineer, the costs become much more competitive. However, as the saying goes, 'you get what you pay for'. The evidence is clear that a Flexamat-like option provides greater protection against erosive forces caused by shear stresses. Over time, the Flexamat-like option makes for a better functioning drain with reduced maintenance costs in the future. Given Mr. Brickman's evidence that there is



AGRICULTURE, FOOD AND RURAL AFFAIRS APPEAL TRIBUNAL

APPEAL:	**Royal Oak Municipal Drain (RE) Township of Huron-Kinloss**
CITATION:	**Royal Oak Municipal Drain (RE) Township of Huron-Kinloss 2016ONAFRAAT23**
STATUTE:	***Drainage Act***
HEARING:	**October 25, 2016**
DATE OF DECISION:	**November 29, 2016**
FILE NUMBER:	**008RoyalOak16**
NEUTRAL CITATION:	**2016ONAFRAAT23**

Construction



Construction

Construction

Construction

Construction

Approx. 3,000 sqm installed
Project completed in 5 1/2 weeks

Before Vegetation

2 Months after Construction

2 Months after Construction

2 Months after Construction

1 Year after Construction

Thank-You

J.J. Breede, P.Eng.
Product Manager
Terrafix Geosynthetics Inc.

Stephen Brickman, P.Eng.
Project Manager/Engineer
Headway Engineering

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