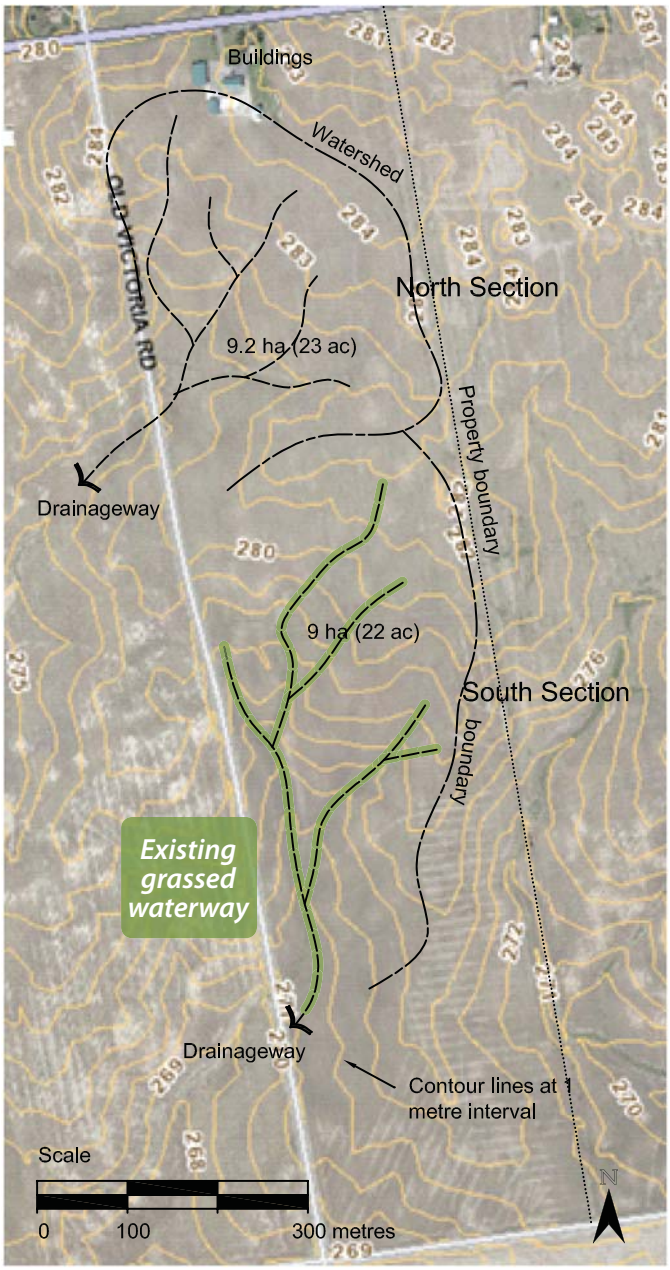
North Kettle Creek Watershed Evaluation Project
Conservation Cropland Planning Options at Farm No. 3

This case study examines how multiple erosion control strategies can be used to manage water runoff, protect soil health and accommodate farmer operations. Conservation Authority staff will work with you to ensure the best solution for your farm.



Field Analysis

43 hectare farm (42 ha tillable)
280 metre field slope length
2-3% slope, overall fall from east to west
Clay loam and loam soils
Corns-soybeans-winter wheat rotation

Background

- gully erosion was a problem until a grassed waterway was established by landowner
- top soil from base of slope/field was moved back uphill to fill gullies and shape waterway
- waterway performed well once grass was established

Concerns

- inconsistent cross-section shape of waterway continues to cause scour (to meet slope/soil and runoff needs, waterway should be wider and shallower)
- headlands have established from working the field parallel to the waterway
- runoff not able toenter waterway causing gully formation
- side slope rill erosion still exists

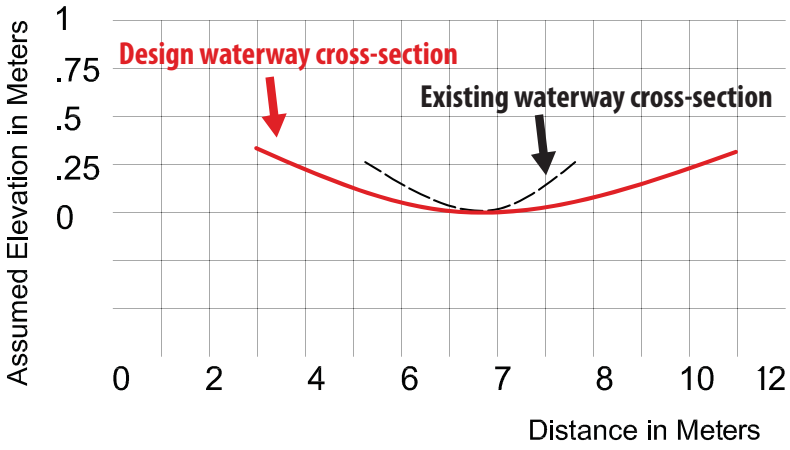
"Designing soil erosion control solutions is both an art and a science."

Headland deflects surface runoff away from waterway causing rill erosion

Cropland Planning Considerations

All structural erosion control works consider existing cropping and tillage practices and attempt to work with or improve field operations and management.

Existing Versus Design Waterway Cross-section



Using the Universal Soil Loss Equation (USLE) to estimate soil loss on this farm.

Current Situation:

- 5 to 6 tons/ac/yr soil loss
- this is 2 to 3 times tolorable rate

Impact: 5 to 6 tons/ac/yr soil loss carries a potential annual nutrient loss of;

- 2400 lbs available N
- 900 lbs phosphorous
- 3000 lbs potash

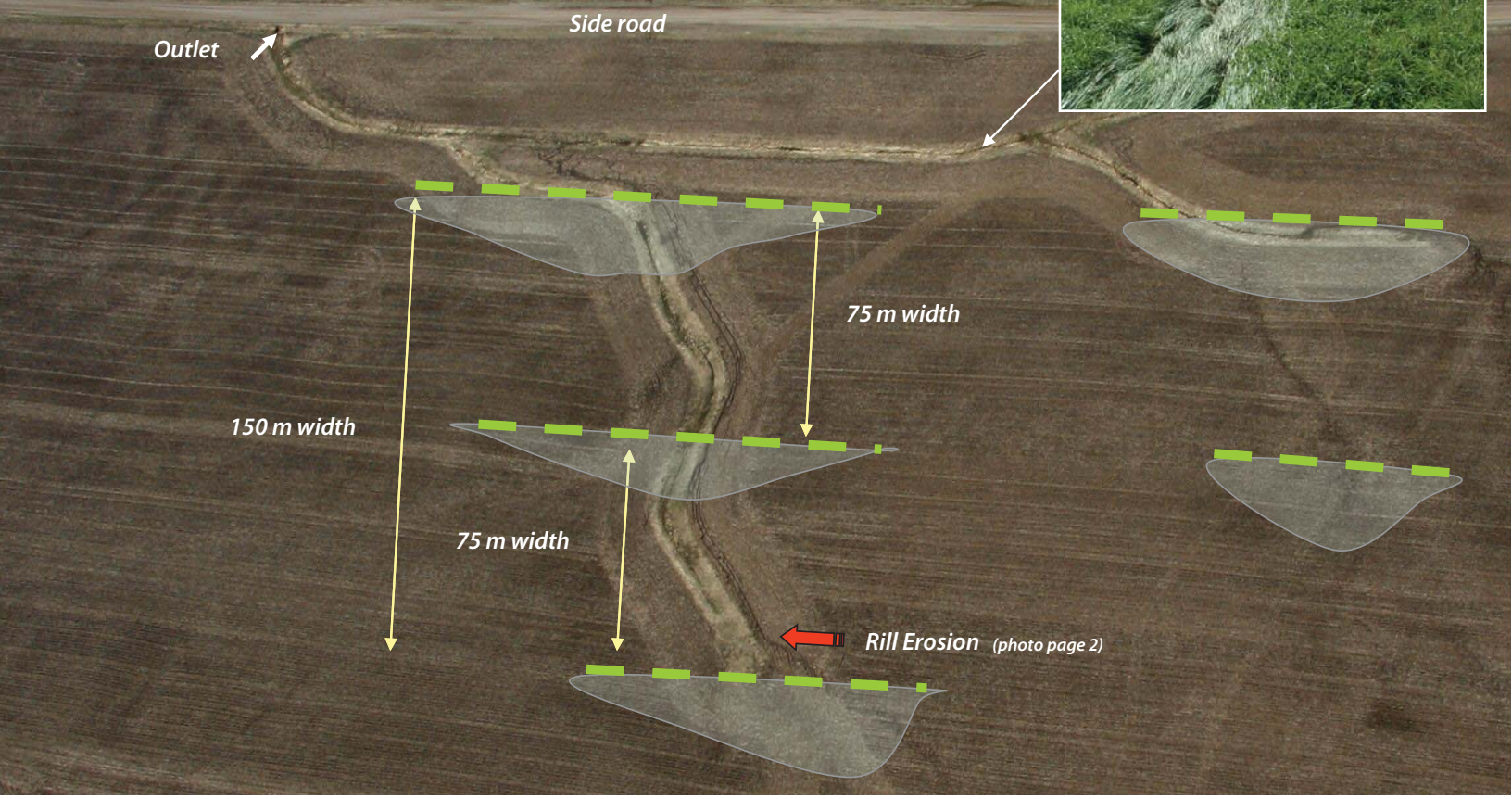
Conservation Management Option:

- reduced tillage
- no-till
- cross-slope farming
- cover crops
- terraces and grassed waterway

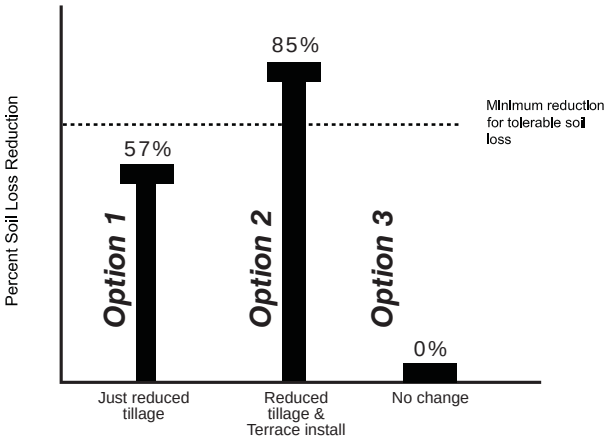
Result: 2 to 3 tons/ac/yr soil loss

Proposed Terrace Locations

(alternative to existing waterway)



Current Soil Loss from this field: 12 tons/ acre / year or 120 tons per year (8 truck loads)



Definitions:

- mulch-till: 30% of soil surface covered with residue after planting
- no-till: 60% of soil surface covered with residue after planting

GOAL: to achieve a minimum of 70% soil loss reduction

To achieve this goal. . .

Option 1:

- reduce tillage
  (mulch - till, corn; no-till soybean and wheat)

Result ....57% soil loss reduction = 5 to 6 tons/ac/yr

Option 2:

- reduce tillage
- install terrace system (above)

Result ....85% soil loss reduction = 2 to 3 tons/ac/yr

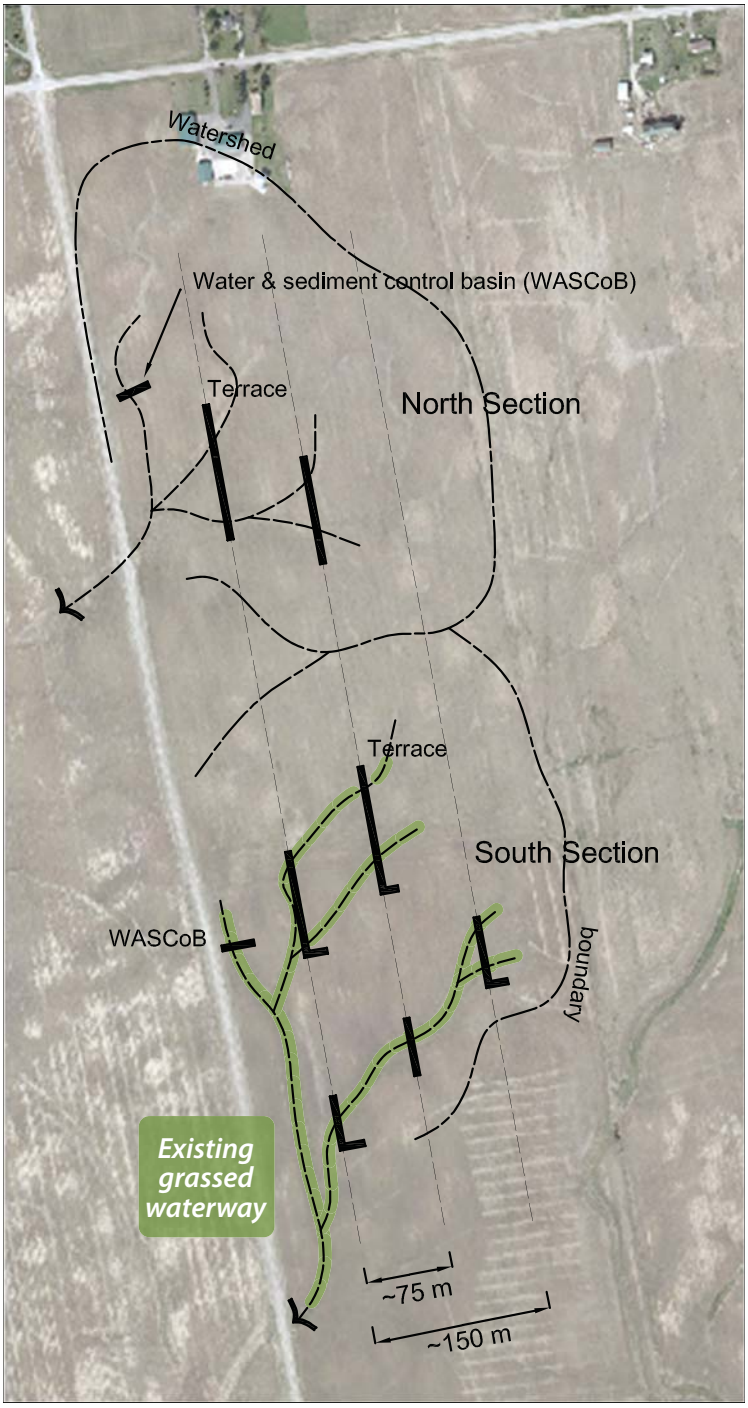
Option 3:

- no management change
  (mouldboard plow, cross slope)

Result ....continued 12 tons/ac/yr soil loss. In 25 years, 3000 tons of top soil will have been eroded away.

3000 tons = 188 truck loads.

Figure – Proposed Mulch-till/No-till and Terrace Plan



Cropland Conservation Planning Option 1

Maintain a tillage system that includes no-till corn, soybeans and winter wheat with red clover underseed. This must retain a minimum of 30% residue on the soil surface after wheat planting and 60% following soybean planting; and mulch tillage after wheat that retains a minimum 60% residue on the soil surface after corn planting. This will maintain average annual soil loss at 3.5 tons/acre/year.

Cropland Conservation Planning Option 2

Permissible slope lengths for cross-slope farming on 2-3% slopes are about 120 metres. With the slope lengths of 280 metres on this field, a method to break up the slope is necessary. Although contour buffer strips or strip cropping may be effective in controlling soil loss, this is not a management preference and therefore terraces and water and sediment control basins (WASCoB) are suggested. Following a detailed survey of the field to better determine the topography, a plan consisting of conservation tillage and cropping in combination with terraces was proposed.

The north portion of the field will consist of two narrow-based tile outlet terraces at 75 metre spacing. About 220 metres of terracing would protect the subwatershed in the northern portion of the field. The steeper south portion of the field will have three narrow-based tile outlet terraces at 75 metre spacing. The 540 metres of terracing would protect the southern area and eliminate the need for the 0.5 hectares of grassed waterways. Two other broad-based berms will be located along drainageways running perpendicular to the major slope. All inlets and tile sizing will ensure all collected runoff will not inundate fields longer than 24 hours.

There is very little if any tile drainage in these areas. As part of the proposed plan tile would be required for outlet.

Consideration was given to keeping and improving the existing grassed waterway, however, maintaining this network has proven difficult. Eliminating the waterway would allow for improved field operations.

Cropping and tillage options would be the same as in Option 1.

The North Kettle Creek Watershed Evaluation Project is aimed at evaluating the impact of agricultural BMP's on water quality, soil health and practical application. The project comes 25 years after the Soil and Water Environmental Enhancement Project (SWEEP)* was completed in the same 1200 acre watershed. This case study is one in a series that attempts to relay the lessons learned from 25 years ago and applying them to today's farming landscape.

UPPER THAMES RIVER CONSERVATION AUTHORITY

Ontario

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