



North Kettle Creek Watershed Evaluation Project

Conservation Cropland Planning Options at Farm No. 1

Field Analysis

- Sweet corn-Soybean rotation
- Clay loam and loam soils

Area 2



Legend

Topography

- High
- Low

Flow Path

Area 3



Area 1



Area 4



Lidar is a remote sensing method that uses light to measure distances to the Earth. It was used as a tool to locate erosion 'hot spots' on this farm. Damage from concentrated flow paths can clearly be seen. The areas above these 'scars' on the landscape are good locations to consider structural erosion control measures such as terraces.

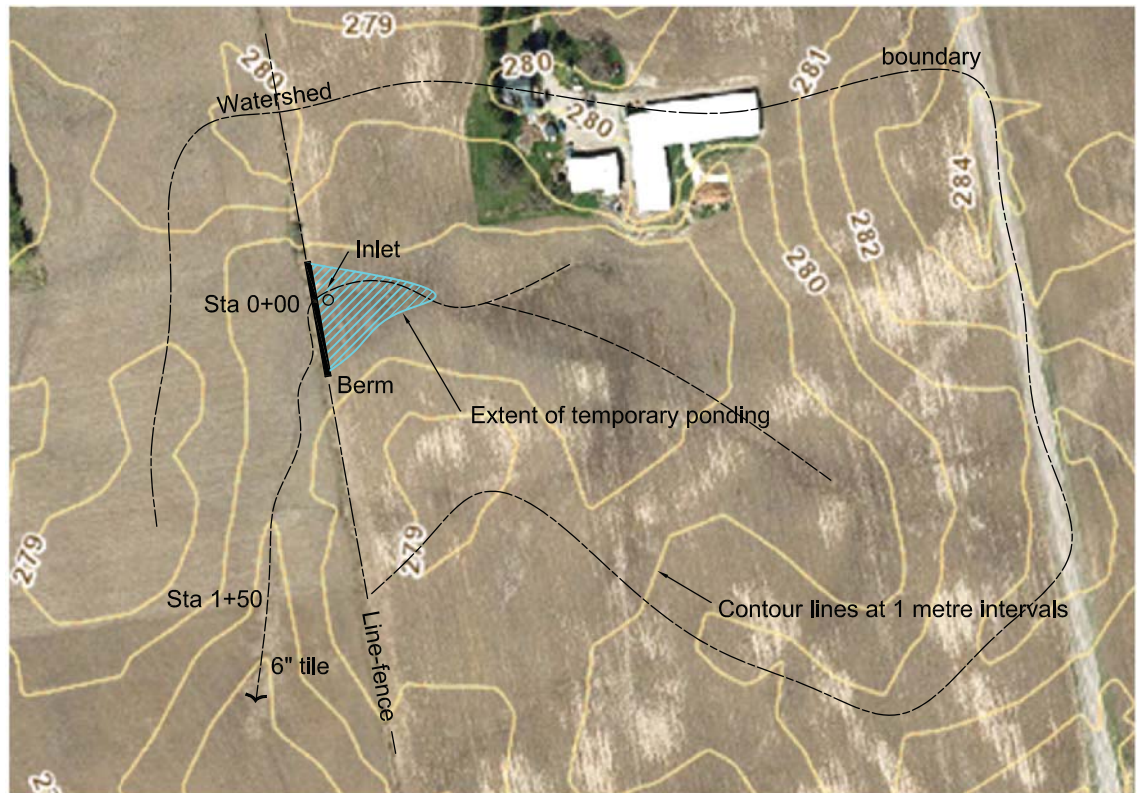
Area 1

Erosion Concerns:

Rill erosion is occurring in a single drainageway with a 9 ha watershed that originates on the neighbouring farm to the east.

Solution:

- Construct water and sediment control basin (WASCoB) on the fence line.
- Secure neighbour's permission.
- Install standpipe inlet and outlet into existing tile drainage system.



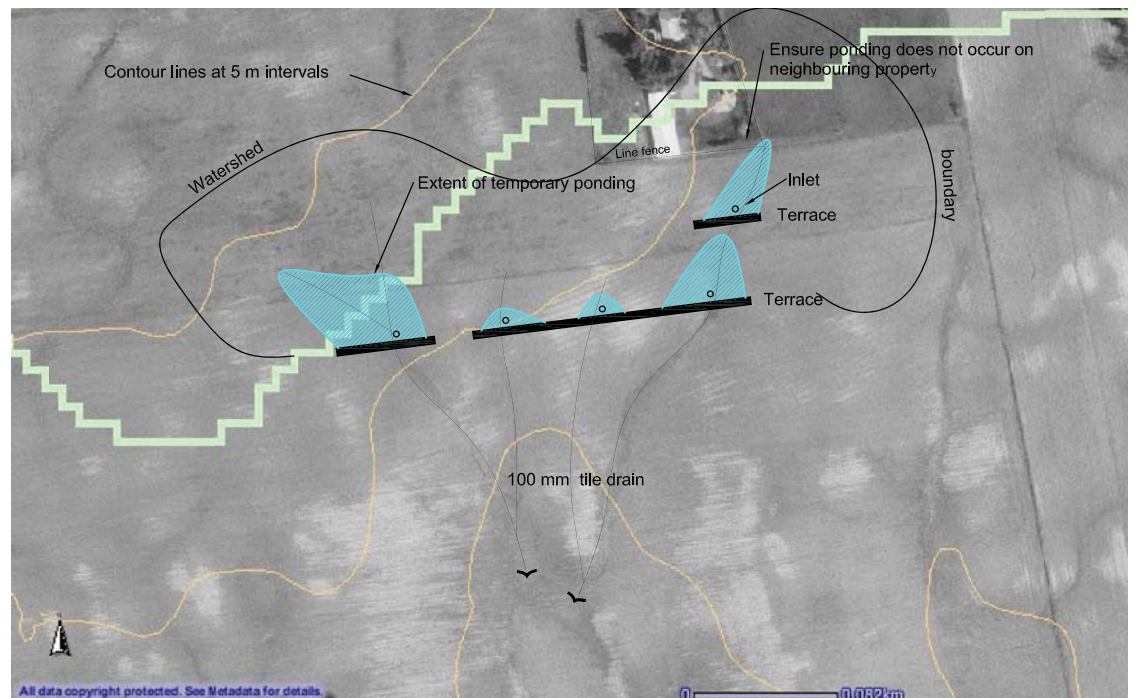
Area 2

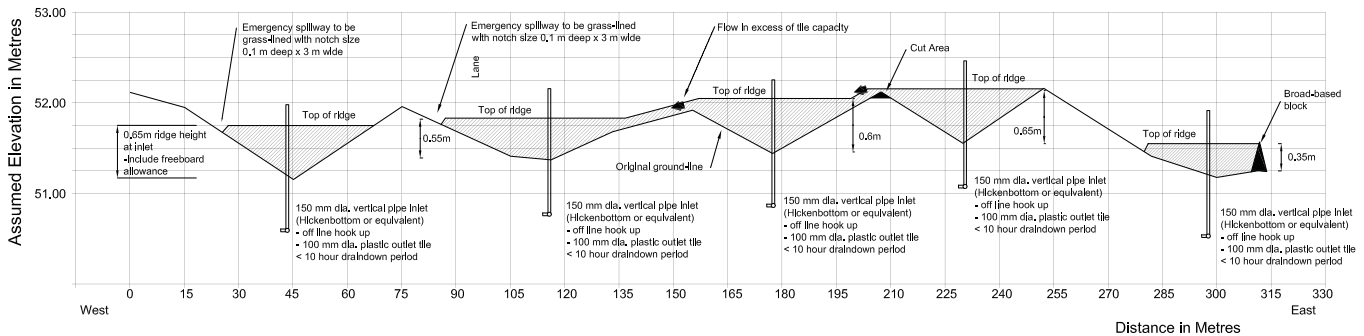
Erosion Concerns:

Significant sheet and rill erosion are occurring on the north slope of a large, bowl-like area. Based on the existing management, it is estimated using the Universal Soil Loss Equation that over 21 tons/acre average annual soil loss may be expected on this 5.5% slope.

Solution:

- Construct a single, 240 m long narrow-based tile outlet terrace across the entire slope.
- Install four standpipe inlets (one in each distinct drainageway) and the necessary drainage tile for adequate outlet.
- Along the eastern-most drainageway, construct a second terrace 45 m upslope. This system will break up the slope by diverting surface water underground from over 3 ha of cropland.





Terrace Cross-section

Area 3

Erosion Concerns:

Much of this field slopes north-to-south with an average slope of 2.3%. Sheet erosion is prevalent across the entire field. Within the field there are five distinct drainageways that experience ongoing rill erosion concerns. Four of these drainageways come together at the base of the slope to form a single flow path that heads southwest. About 25 years ago, a WASCoB with a watershed of over 12 ha was constructed at this junction with an 'L' shaped berm, likely to fit field management at the time. This WASCoB has worked well and trapped considerable sediment over the years. However, erosion continues to be a problem both above and below this structure. Below the 'L' shaped berm (part of the same field) about 3.5 ha of land drains from the south and east into the same southwest drainageway, causing very serious rill erosion.

Solution:

- Cut existing 300M slope length in half
- Build 300M long broad-based tile outlet terrace
- Install 5 standpipe inlets
- Plant 1000 ft windbreak

Fact:

- 25 years of deposition (soil erosion) in ponding area of 'L' shaped berm yielded 800 tons of sediment, enough to construct entire 300M terrace!
- 800 tons = 50 truck loads of soil

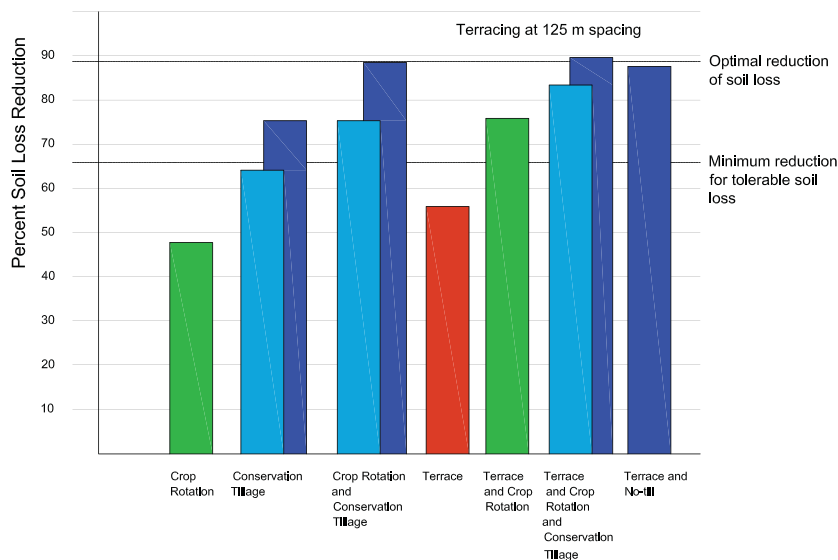
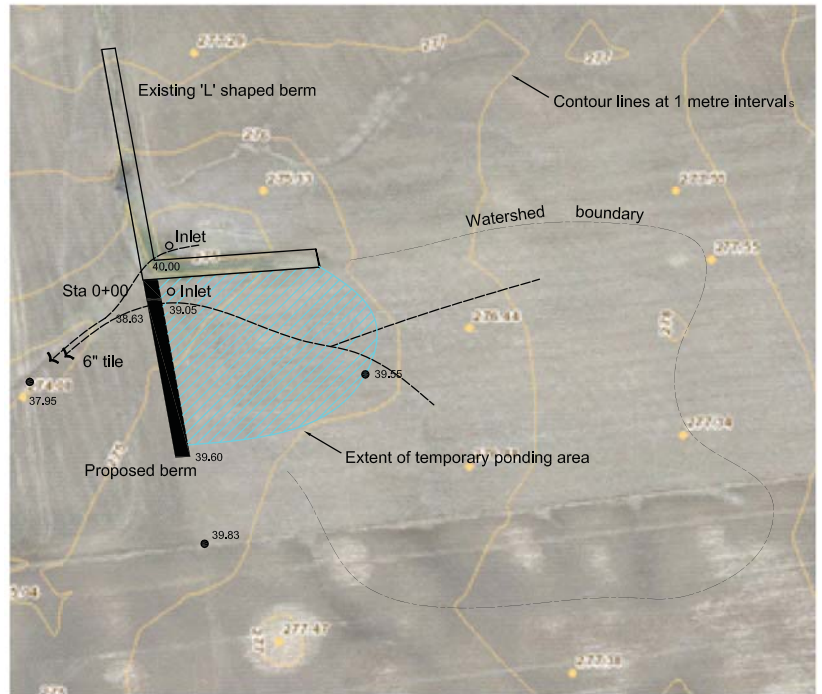
Area 4

To protect the drainageway below the 'L' shaped berm, this structure was extended to the south. Although the berm now has a 'T' shape with two standpipe inlets serving as outlet, this is for monitoring purposes only. At some point in the future it may be straightened to a north-south direction only.

In order to fully benefit from the erosion control structures in place on this farm and maintain their integrity over the long term, it is essential the landowner adopt a conservation cropping and tillage program. This program may include:

- No-till or minimum-till corn and soybeans
- Adding winter wheat or other close-grown grain crop to the rotation
- Utilizing cover crops as much as possible
- Strip cropping
- Cross-slope buffer strip cropping

Using the Universal Soil Loss Equation (USLE) various cropping, tillage and structural erosion control scenarios were modeled to estimate potential soil loss under different practices. The landowner can better visualize the preferred cropland conservation farm plan. The 800 tons of soil scraped out of the 'L' shaped berm sediment disposition area is estimated to be about 50-75% of the overall soil eroded from the upland field.



Tillage Options

- Mulch-till corn, no-till soybeans and cereal grain (minimum 30% residue on all ground after planting)
- No-till corn, soybeans and cereal grain (minimum 30% residue on all ground after soybeans and 60% after corn/cereal grain)

Crop Rotation assumes a change from corn (sweet)-soybeans to corn-soybeans-winter wheat with red clover underseed

Management Alternatives

Using the universal soil equation (USLE) a number of management alternatives are evaluated based on soil loss reduction. It is preferred to adopt management options that maintain soil loss annually to less than 3 tons/acre/year and optimal soil loss is less than 1 ton/acre/year. The base management practices include fall ploughing and continuous row crops.

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



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