

CASE STUDY

INTRODUCTION

The following case study is an actual conservation farm plan initiated, and in the midst of being carried out, by a landowner in Zorra Township, Oxford County.

Initial contact was made by the landowner to local conservation staff in early 1990.

BACKGROUND

Type of operation:

- Swine (farrow to finish).

Land Base

- 200 acre parcel.
- 183 acres tillable (11 ac. woodland, 6 ac. buildings, lanes and horse paddock).

Soils

- Clay loam texture.

Drainage

- Good natural drainage.

Cropping and Tillage System

- Rotation of corn/corn/small grain underseeded to red clover.
- Fall moldboard plowing of less erosive areas, spring plowing of steeper land.
- Manure applied to red clover ground and corn stubble in the fall, and corn stubble in the spring.

Topography

- Rolling topography with relatively simple slopes.
- Variable 3 to 8% slope steepness and 600 to 1050 ft. slope lengths.
- The farm lies within 350 feet of a lake.

Field Equipment

- Tractor (100 Hp with front assist).
- Corn planter, 6 row (@ 30 inch).
- Sprayer(s), custom done with 60 ft. boom width.



EXISTING MANAGEMENT PRACTICES

Conservation practices in-place:

- ▶ All field operations carried out across the slope.
- ▶ Rotation.
- ▶ Red clover plowdown.
- ▶ Windbreaks around buildings.
- ▶ Spring primary tillage.
- ▶ Grass waterway to protect drainage way in southwest section of farm.

LANDOWNER CONCERNS

Landowner is aware of on-farm and off-farm impacts resulting from excessive soil erosion.

On-farm

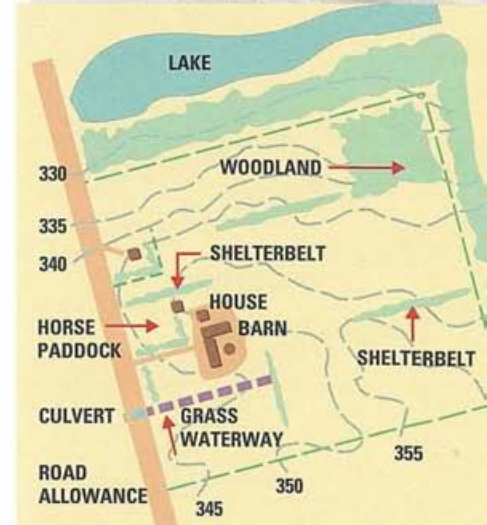
- ▶ Rills visible on hillsides of three fields and minor sedimentation at bottom of slopes.
- ▶ Two irregularly shaped fields of less than one acre lying on extreme slopes are difficult to manage.

Off-farm

- ▶ Directly impacts lake north of property.

CONSERVATION FARM PLANNING INITIATIVES

Generally, a field-by-field analysis is suggested to assess erosion related concerns. In this instance, the farm is divided into three fields which are relatively consistent in steepness and length. Therefore, the approach chosen for conservation management will be the same for each field.



Sketch of farm with five-metre contour intervals shown.



EVALUATION OF EXISTING SITUATION

Rill erosion is a visible concern on most of the sloping land following 'large' rainfalls.

A general investigation shows that although erosion has taken place (it may have been occurring beyond tolerable limits), the productive capacity of the land is still good. Under a good conservation management system, long term productivity will be sustained and possibly increased.

The existing crop rotation will continue as corn/corn/small grain (underseeded to red clover). Assume tillage practices will remain as they are now, but the landowner is open to alternatives. Other management practices such as fertility, pest, manure, etc. will remain as they are now.

PERFORMANCE GOALS

An erosion limit of less than 3 tons/acre/year on all cropland is desired by the landowner.

IMPROVEMENTS

A conservation plan for all of the cropland is preferred at this time.

Conservation tillage, cropping and structures, and land retirement may be alternatives that would fit into management plans.

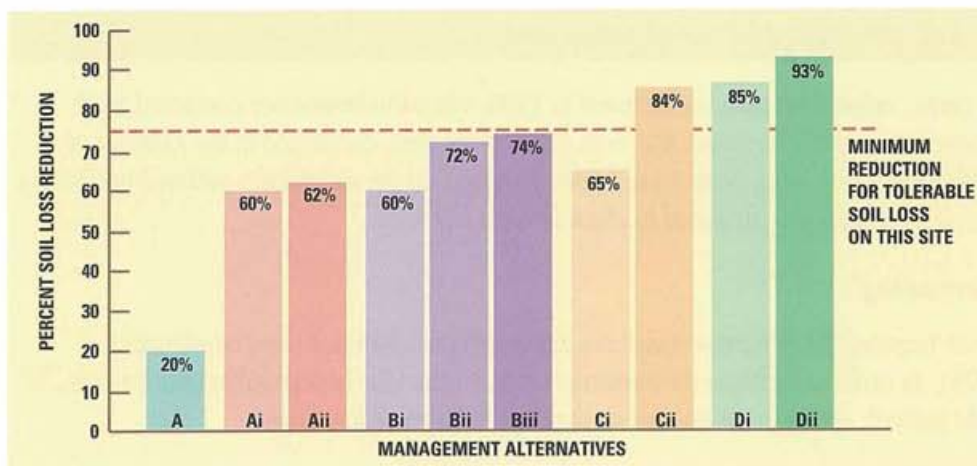
Assume in planning that farm equipment would remain as is, but the landowner would like to try mulch-till on ground in place of the moldboard plow and no-till with small grains. Manure would then only be applied on land to be mulch-tilled.

ALTERNATIVES AVAILABLE AND SELECTION

Using the Universal Soil Loss Equation, a number of conservation management systems were evaluated.

Based on existing management, a 75% reduction in soil loss would be necessary to maintain a tolerable level of 3 tons/acre/year soil loss. Existing management, for the purpose of the evaluation of alternatives, includes fall moldboard plowing all land across the slope and a corn/corn/small grain with red clover underseed rotation.

The following chart illustrates the best management practices considered in the planning process, and their relative effectiveness in reducing soil erosion by water.



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RELATIVE EFFECTIVENESS OF BEST MANAGEMENT PRACTICES CONSIDERED

CHART REFERENCE	MANAGEMENT ALTERNATIVES	RELATIVE PERCENT REDUCTION IN SOIL LOSS
<i>TILLAGE OPTIONS</i>		
A	Spring moldboard plow all ground	20
Ai	Mulch till all ground	60
Aii	Mulch till corn, no-till small grain	62
Strip Cropping Corn and Small Grain at 120 ft. Wide Strips.		
Bi	Fall moldboard plow all ground	60
Bii	Mulch till all ground	72
Biii	Mulch till corn, no-till small grain	74
Terracing at 300 ft. Spacing.		
Ci	Fall moldboard plow all ground	65
Cii	Mulch till all ground	84
Strip Cropping Corn and Small Grain at 120 ft. Wide Strips and Terracing at 360 ft. Spacing.		
Di	Fall moldboard plow all ground	85
Dii	Mulch till all ground	93

The recommendations for the two, irregularly-shaped fields experiencing erosion, were to establish forage which could be used for feed for horses (hobby), or, simply retire the land and plant to trees.

EVALUATION AND IMPLEMENTATION

A conservation farm plan was initiated in 1990, when the landowner contacted local conservation staff. Necessary site visits and surveys were conducted in the summer of 1990. Over the winter, plans were drawn up based on the alternatives outlined previously. Implementation was proposed to extend over a few years.

Terracing

Four terraces, three narrow based tile outlet and one diversion were constructed in 1991. In order to facilitate the construction in August (the best possible time for work of this nature), spring grain was grown at proposed terrace locations.

The terraces will serve to limit maximum slope length on any field at 360 feet. This spacing falls within the suggested guidelines for terraces as shown on page 117 and also blends in with a proposed strip cropping layout.

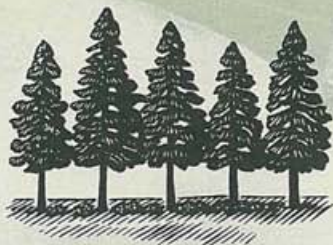
Investigations were made into the state of the existing tile drainage system. If possible, in order to save money, the existing tile drains would be incorporated into the terrace designs. The original tile installer was contacted, and fortunately site maps showing tile drain layout and sizes, were available. It was determined that the tile system was recently installed and that it would easily handle the terrace design requirements. Water will not pond longer than 24 hours on the cropland.

Two terracing patterns were considered; an east-west, across the slope system, and a true contour system. The soil loss reductions would be relatively the same with either system. Based on management preference, the pattern offering parallel field boundaries was selected.

In 1991, over 4,000 feet of terraces were constructed using bulldozers, by the original tile drain installer, at a cost of less than \$2.00/ft. complete. This was cost-shared through the Land Stewardship II Program.

Strip Cropping

With the terraces at a 360 ft. spacing, it is proposed that three 120 ft. strips of alternating small grain and corn should complement the system. A rough strip cropping pattern was started in 1990, when strips of corn and small grain were grown to allow for terrace construction. The entire farm will not be strip cropped each year, but rather, the system will be rotated through the cropland as management determines necessary.



Tillage

A mulch-tiller was purchased by the landowner in 1991 and will be used in place of the moldboard plow as management allows. Land Stewardship II assisted in cost-sharing this implement.

Trials will begin with a no-till drill in 1992. Either spring or fall cereals will be planted on a small acreage to determine the system's capability on the farm. Ideally, if the reduced tillage practices are successful, strip cropping would be used only in the most erosive fields.

Trees

The landowner has established shelterbelts around the farm buildings. Windbreaks and hardwood plantings are planned along terrace boundaries. These areas may be used as walking and horse trails.

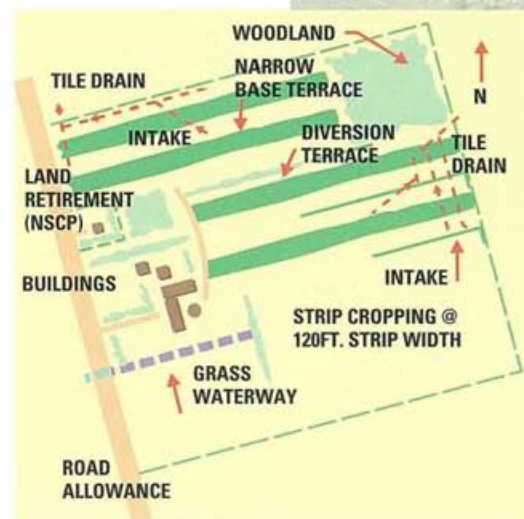
Fragile Land Retirement

Approximately one acre of highly erodible land was taken out of production and planted to trees, under a National Soil Conservation Program agreement. The flat top land adjacent to the fragile land will be used for forage production.

The farmstead shelter belt was enhanced by additional plantings and management was eased by squaring off the field in this area.

In fact, top soil may be generated on the farm with good nutrient, manure, and rotation / cover crop management. The terraces will serve to maintain slope length limits. Cropping and tillage management will continue to be fine-tuned. The conservation planning process is never ending, the landowner can continually strive to improve his system to fit his objectives.

Overall, it is anticipated that erosion levels will average less than 1 ton/acre/year.



Best management practices implementation (conservation farm plan).

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DISCLAIMER:

This publication reflects the opinions of the contributing writers and is based on information available as of the publication date. It may not reflect the programs and policies of the supporting agencies. References to particular products should not be regarded as an endorsement.

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CONTACTS AND SOURCES:

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