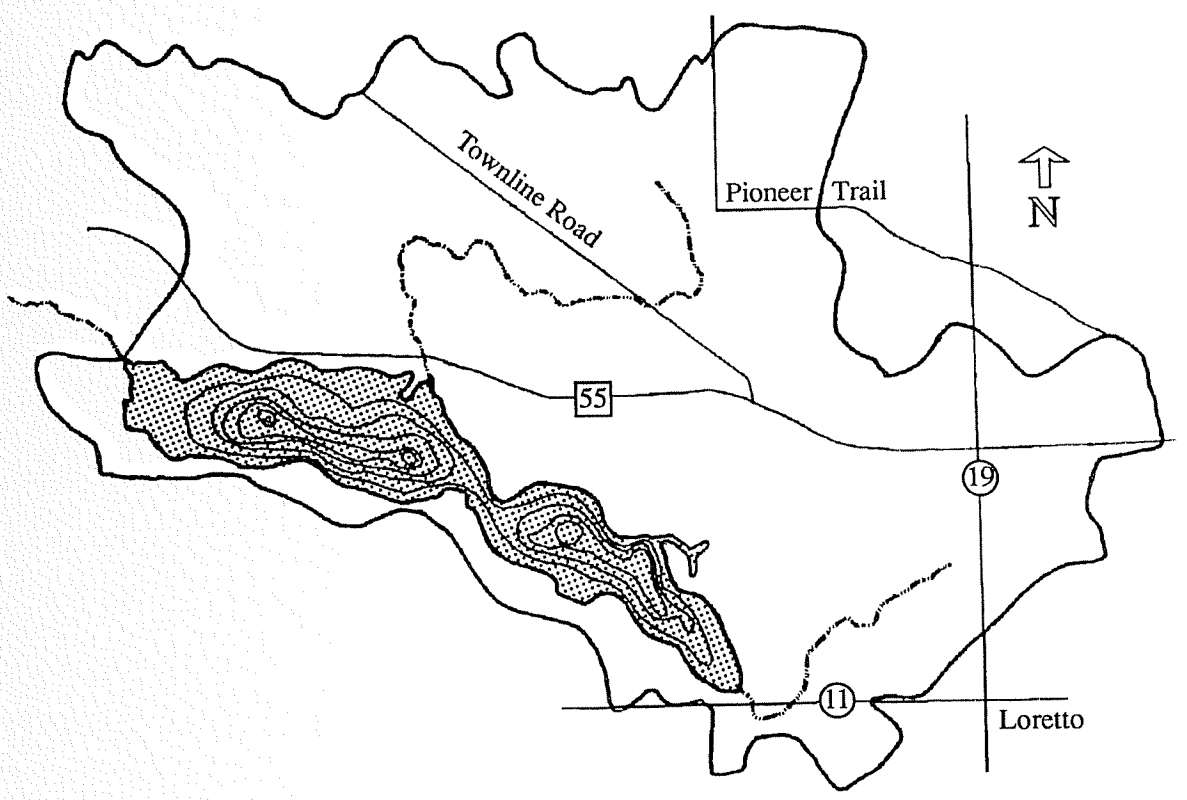
Lake Sarah Project

Implementation Plan



Clean Water Partnership Project

December 1996

Lake Sarah Project
Implementation Plan

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LAKE SARAH PROJECT IMPLEMENTATION PLAN

1.0 OBJECTIVES

The Lake Sarah Project was undertaken because of the concern over degrading water quality and its affect on the recreational use of the lake. Up until 1993, Lake Sarah was the only lake in Hennepin County that had a resort on it. The resort closed in 1993. Lake Sarah recreational use is primarily boating, fishing and esthetics. A few use the lake for swimming and water-skiing. The Lake Sarah Project goals were based on maintaining and improving the recreational use of the lake.

2.0 PRIORITY MANAGEMENT AREAS

The priority management areas are identified in Figure 1. They are listed below in random order.

2.1 Priority Management Area A

This site is adjacent to Lake Sarah. It is considered a priority management area because of its direct impacts to the lake. Three areas of concern are evident: 1) direct access of cattle to the lake, 2) feedlot runoff, and 3) milk house waste runoff. The site is described in the Diagnostic Study Report under part 2.4.

2.2 Priority Management Area B

This site is a 30 acre partially drained wetland just north of Lake Sarah. The area currently is used as pasture for cattle, but is proposed for development in the near future.

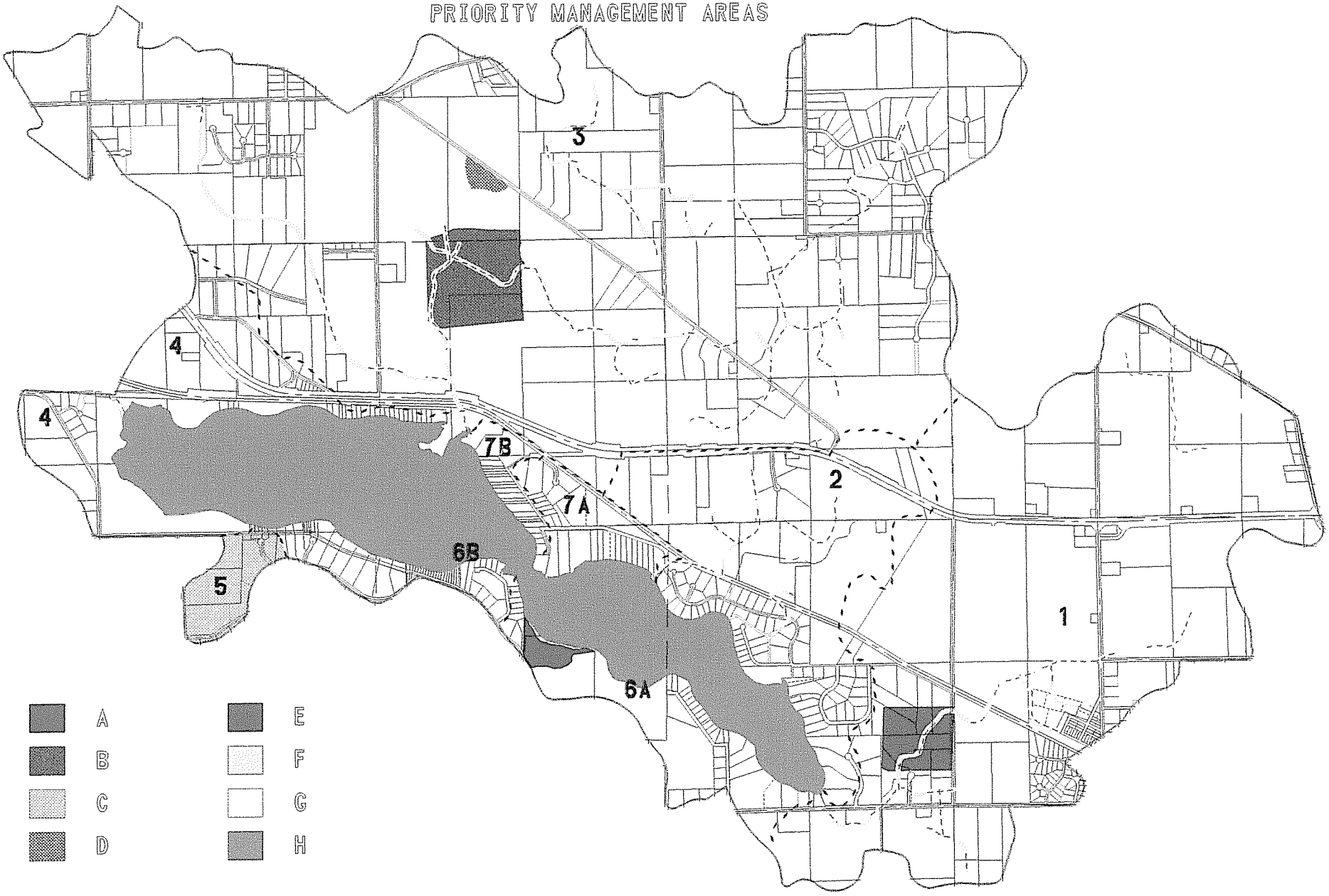
2.3 Priority Management Area C

This site is a 48 acre drainage area on the south side of Lake Sarah. It is tiled into the lake and drains primarily farmland and part of an area which is now under development.

FIGURE 1

LAKE SARAH WATERSHED

PRIORITY MANAGEMENT AREAS



2.4 Priority Management Area D

This site is on a tributary to Dance Hall Creek (Rush Creek). It is a feedlot area for cattle and pigs. The creek runs through the feedlot, which is then tiled and ditched to Dance Hall Creek just north of the wetland described in Priority management area B.

2.5 Priority Management Area E

This area is adjacent to Loretto Creek upstream of its entrance to Lake Sarah.

2.6 Priority Management Area F

This area consists of the corridors along the creeks and ditches draining to Lake Sarah.

2.7 Priority Management Area G

This area consists of the entire watershed and addresses land management practices.

2.8 Priority Management Area H

This area consists of Lake Sarah and its shoreline.

3.0 BEST MANAGEMENT PRACTICES (BMP) ALTERNATIVES AND ANALYSIS

The following best management practices were considered for implementation as part of the Lake Sarah Project Phase II.

3.1 Agriculture BMPs

Animal Waste Management
Conservation Tillage
Contour Farming
Feedlot Runoff Management
Field Strips
Grassed Waterways
Livestock Exclusion
Manure Management/utilization

Soil Testing

Tile inlet filters

Vegetative Buffer Strips

3.2 Other BMPs

Education

Homeowner Practices

NURP Ponds

Phosphorus Inactivation

Septic System Maintenance

Shoreline Erosion Control

Soil Testing

Streambank Stabilization

Vegetative Buffer Strips

Wetland Restoration

3.3 Administrative Options

Erosion Control Ordinance

Inspection Program

Shoreland Ordinance

Stormwater Ordinance

4.0 AGRICULTURAL PRACTICES

4.1 Vegetated Buffer/Filter Strips

Buffer strips are strips of naturally vegetated land adjacent to a lake, stream or wetland. These strips act to filter out some of the nutrients and sediment carried in runoff before they enter the water. Large buffer strips are appropriate for agricultural land. Smaller buffer strips can be constructed as part of individual lakeshore property, leaving a smaller area (e.g. 30 feet) for beach and boat docking.

Design Criteria (Dennis et. al., 1989)

a. slope of buffer should be <30%

b. runoff must enter the buffer as sheet flow
c. buffer effectiveness increases with width up to 300 feet
d. buffer strips should be planted in native vegetation

There are two types of buffers, wooded and non-wooded. Wooded buffers are more effective than non-wooded buffers in retaining water and removing nutrients. All areas lacking vegetation must be seeded and mulched, preferably in native plants which require less long term care. Creating a dense stand of vegetation is the goal. A combination of grasses, shrubs and trees is ideal. Some ornamental native plants may be used to improve the aesthetics of the buffer strip for an individual yard. Buffer strips should be designed to promote sheet flow across the width of the buffer. Shallow stone trenches should be used to distribute flow evenly in areas exhibiting concentrated flow. Activity within the buffer should be limited to prevent disturbance of the vegetation or leaf litter. In an areas where access to the water is desired (e.g. lakeshore property), removal of vegetation should be limited to a maximum 6 foot wide path. The path should be winding rather than straight down to the water. The buffer should not be mowed more than twice per year with a mowing height of a minimum of 6 inches.

Large buffers along streams and drainageways in agricultural fields should be seeded with native vegetation. Additional plantings of woody species would also be beneficial.

The buffer width can be calculated to limit phosphorus export to a specified amount (Dennis et. al., 1989). Phosphorus export is determined by slope, and soil hydrologic group.

Soil Conservation Service standards to achieve maximum pollutant removal for filter strips require buffer widths based upon slope (USDA, 1986):

Table 1. Recommended Filter Strip Flow Lengths

Slope	Minimum Flow Length, feet
<1%	10
1 - 10%	15
10 - 20%	20
20 - 30%	25
>30%	30

4.1.1 Advantages and disadvantages

Installation of a buffer strip (4% slope) was shown to reduce runoff and phosphorus loading from a feedlot by 67%, nitrogen by 84% and sediment by 79% (Olem and Flock , 1990). Another study showed 80 - 90% solids removal, 60% phosphorus removal and 70% nitrogen removal from feedlot runoff (Dallaha et. al. 1988).

A disadvantage of buffer/filter strips is the difficulty in preventing them from being impacted. When placed in residential areas, they are often disturbed. Some periodic maintenance and inspection is needed to make sure there is not erosion due to concentrated flow and to make sure they are being maintained as a buffer. In larger agricultural fields, impacts to the buffer may not be a problem.

4.1.2 Estimated cost

The costs of this program are dependent upon many factors, including width of buffer, type of vegetation, and existing erosion problems.

Aerial half-section map photos of the watershed were examined to determine potential buffer sites. Areas where cropland or livestock were located adjacent to creeks and drainageways were marked. Approximately 32,750 linear feet of buffers could be potentially installed. If a 50' wide buffer was installed the total is 38 acres of buffer. The estimated cost for seeding is $200/acre. If all 38 acres of buffer were installed, the total cost would be $7600 for seeding. Additional costs would apply for any seedbed preparation needed. NRCS cost specifications #393 provide estimates of filter strip installation at $1067 per acre plus annual costs of $213 per acre (USDA-NRCS, 1991). This includes shaping, seeding , mulch and fencing. A wooded buffer would be more costly than just a vegetated buffer. Costs would include installation of bare rot shrubs and trees. The estimated costs for these are $0.64 $\pm$ $0.17 each for installation. Additional planting may be need over a few year period to replace those that did not survive.

4.2 Field Strips

Field strips are similar to buffer strips except that that are not only adjacent to a stream but may be placed at intervals up a slope.