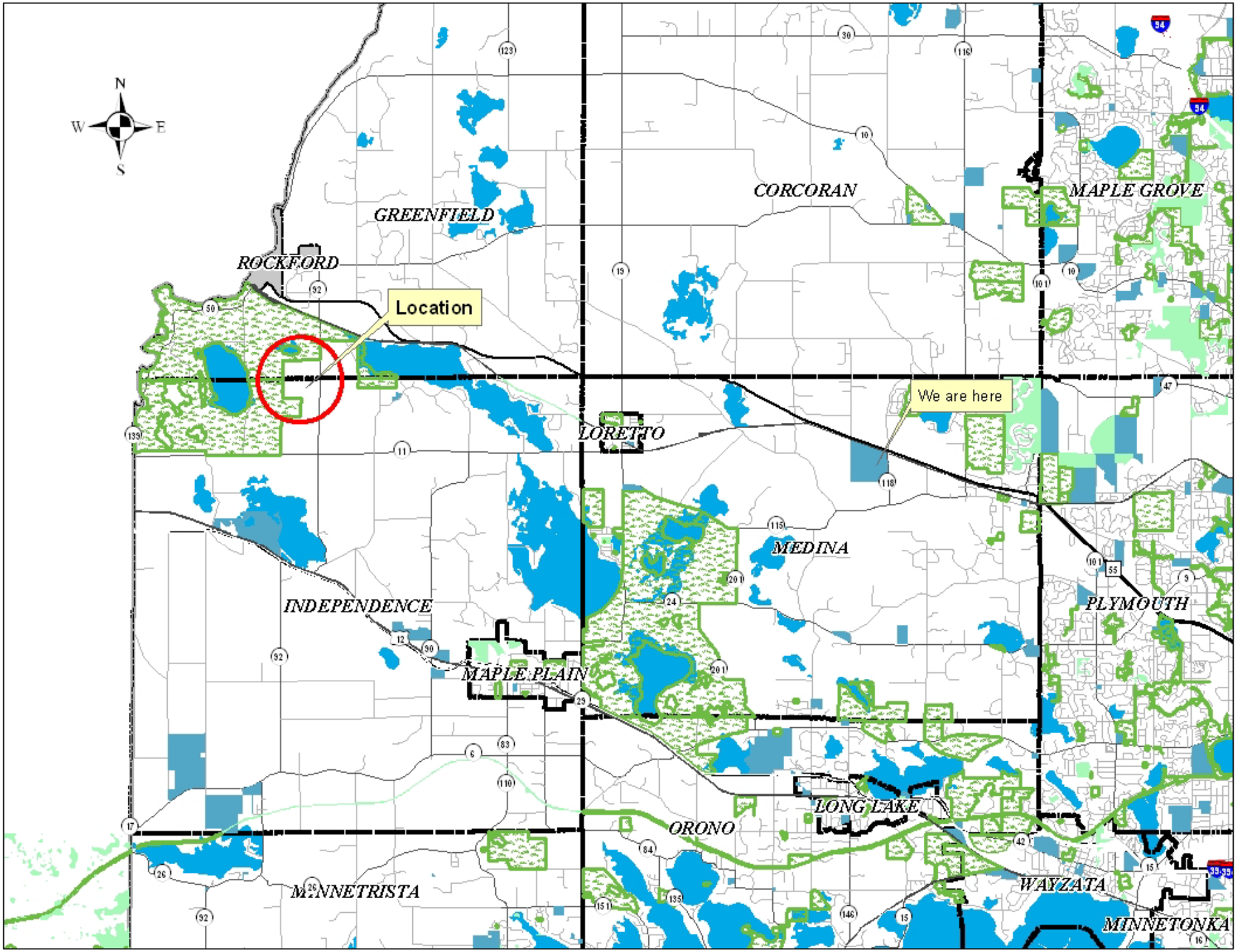
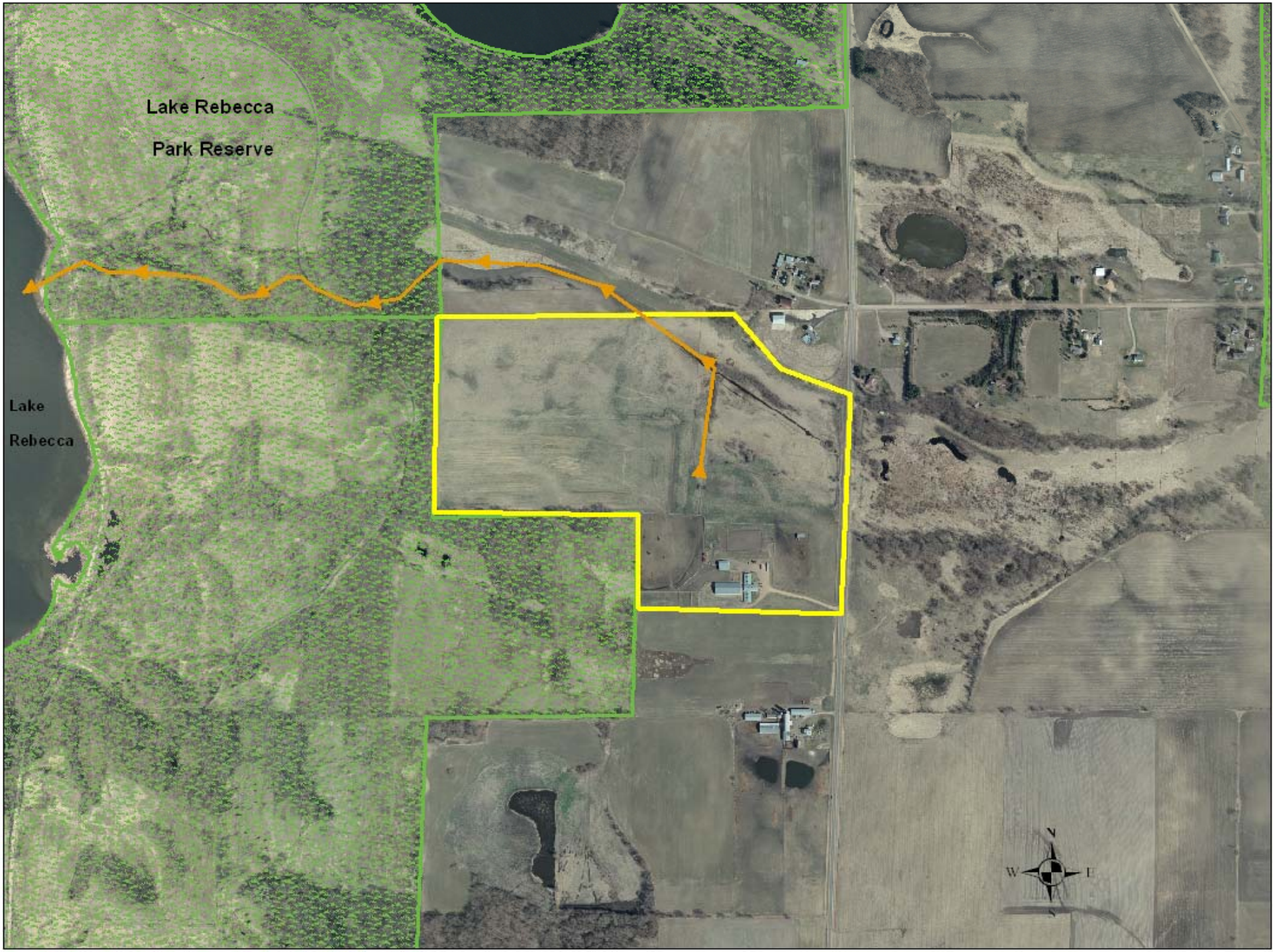
Shriners Horsemen

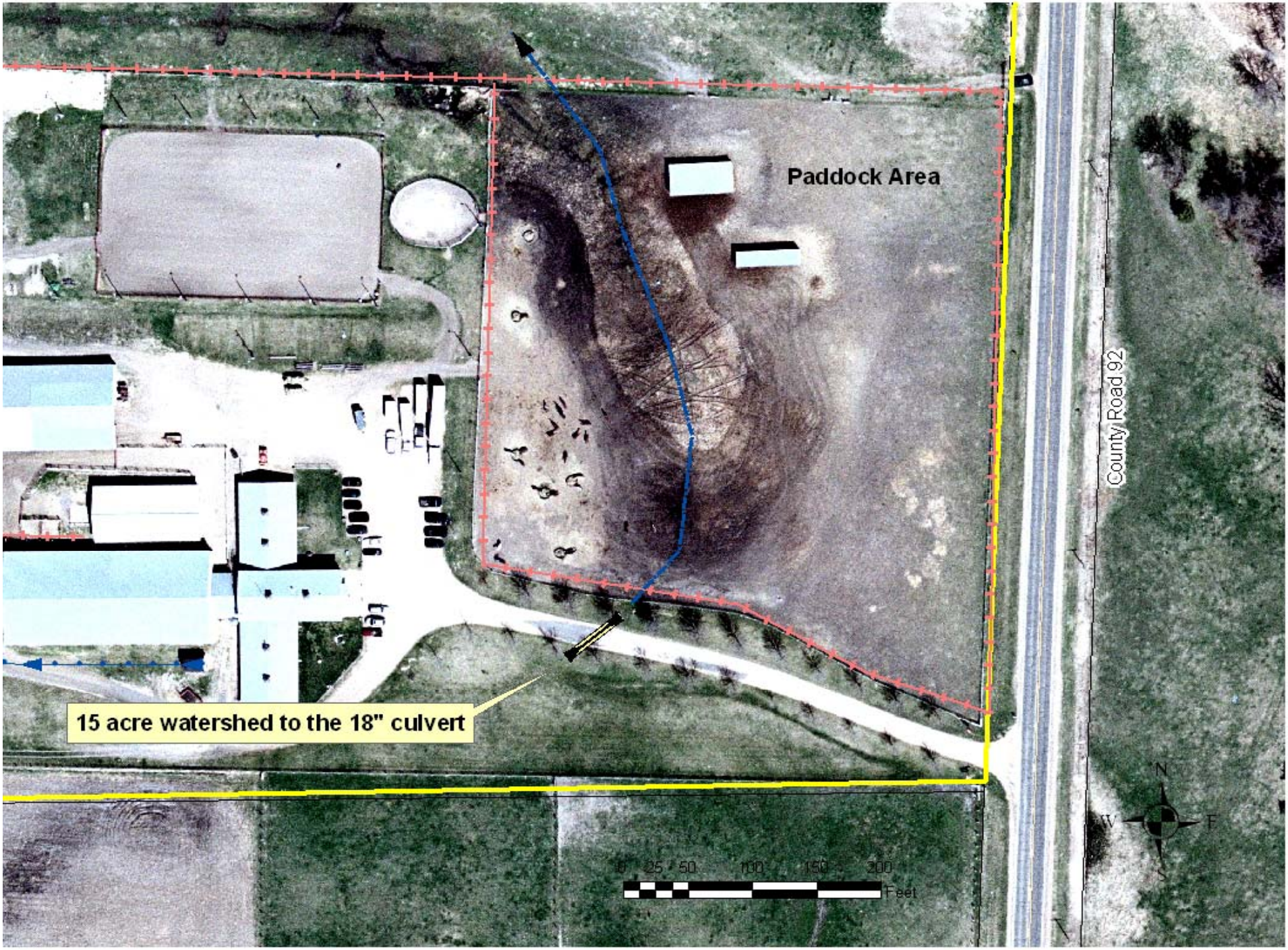
A Case Study in Nutrient Management


N
W
E
S
GREENFIELD
CORCORAN
MAPLE GROVE
ROCKFORD
Location
We are here
LORETTO
MEDINA
INDEPENDENCE
PLYMOUTH
MAPLE PLAIN
LONG LAKE
ORONO
WAYZATA
MINNETRISTA
MINNETONKA

Shriner Horesemen Property
93 acres
Purchased 1988
Barn Construction 1988
60 horses.
Personal horses,
Hennepin County Sheriff Patrol
Minneapolis Horse Patrol
LAKE SARAH DR S
COUNTY ROAD 92
92
N
W
E
S


Lake Rebecca
Park Reserve
Lake
Rebecca
N
W
E
S

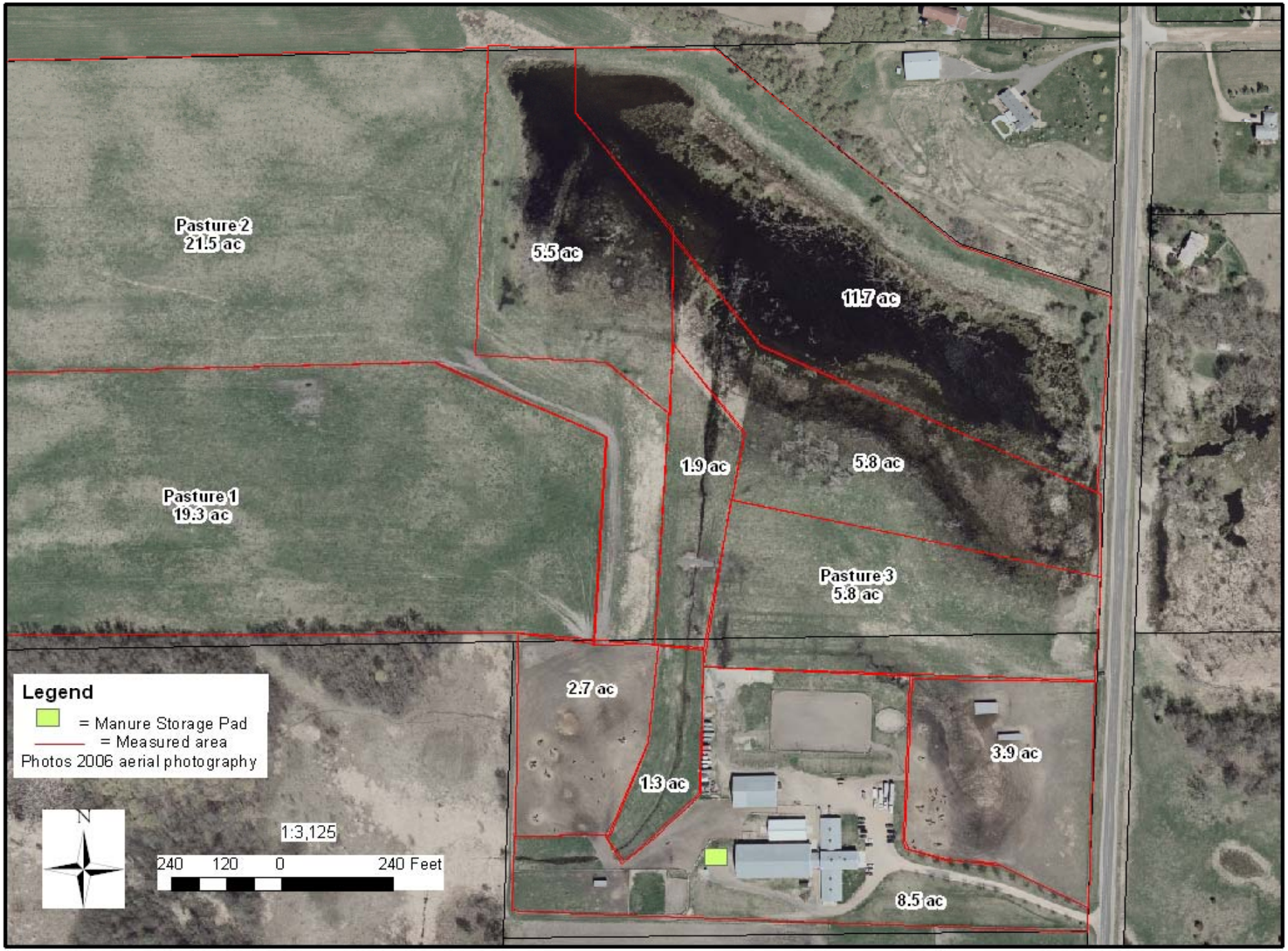
Paddock/Bare Ground
Paddock/Bare Ground
50 Acre Watershed Inflow
15 Acre Watershed Inflow
N
W
E
S


Paddock Area
County Road 92
15 acre watershed to the 18" culvert
N
W
E
S
0 25 50 100 150 200
Feet

Objectives/Goals

- Shriners
  - Mud Control
  - Efficiency
  - Manure Management
    - Daily Cleaning
    - Daily Spreading
    - Time
  - Drainage
- Agencies
  - Resource Protection
    - Lake Rebecca
    - Wetlands
    - Nutrient Controls
    - Soil Loss

Waterway and Buffer Establishment
Tile Lines
Exclusion Fencing
Clean Water Diversion/Pipe
Roof Gutters diverted into tile lines
COUNTY ROAD 92
92
N
W
E
S


Pasture 2
21.5 ac
5.5 ac
11.7 ac
1.9 ac
5.8 ac
Pasture 1
19.3 ac
Pasture 3
5.8 ac
2.7 ac
1.3 ac
3.9 ac
8.5 ac
Legend
= Manure Storage Pad
= Measured area
Photos 2006 aerial photography
N
1:3,125
240 120 0 240 Feet

Manure Management Plan
Zuhrah Shefner Horseman's Ranch

Manure Management Plan Summary
1. Do not spread manure on the property until Bray soil tests for Phosphorus are below 20ppm.
2. If manure is spread after tests recommend it, spread 13-14 tons of manure per acre.
3. Spread in Pastures 1 and 2 as indicated on enclosed map.
4. Calibrate the manure spreader before spreading.
5. Keep records of where and when manure is spread.
6. Keep records of manure produced or hauled away. Strongly advised, but not required.
7. Spread manure in spring or early fall.
8. Do not spread manure on frozen or actively thawing ground.

Annual Manure Production

Average animal weight.	1000 lbs (W)
Number of animals*:	50 (N)
Animal units (AU) = (W x N)/1000	50
Manure per animal per day:	55 lbs
Annual manure per animal= (365 days x 55lbs)	20075 lbs (10 tons) (84% water)
Total annual manure production (50 x 20 ton)	500 tons

*Calculations are based on 50 horses, as this is the number of horses the facility is permitted to house. Bedding is not included.

Annual Nutrient Production
Phosphorus (P) is the nutrient of most concern for manure application. Recommendations are based on preventing its over-application. A test of the manure/bedding mix in the storage bin indicates that the nutrient levels are 2 lbs of P and 14 lbs of K (Potassium or potash) per ton of the mix.

Annual Crop Nutrient Utilization
Pasture plants will take up roughly 27 lbs of P in a growing season, a yield of 3 tons of forage per acre is produced on these fields and 9 lbs of P are taken up for every ton of forage grown.[1]

27 lbs/acre
2 lbs/ton = 13.5 tons of manure/acre can be used by the plants annually.

Land Available for Manure Application Annually
The property contains roughly 40 acres of pasture appropriate for spreading in Pastures 1 and 2 (see enclosed map). The other pastures and grassed areas will not receive manure applications because of their proximity to wetland/ditch on the north side of the property or proximity to drainage ways leading to the wetland/ditch.

Soil tests indicate that current soil P and K levels are at the following levels as of May 21, 2009:

Pasture 1: 36 ppm of P and 265 ppm of K
Pasture 2: 42 ppm of P and 237 ppm of K

The University's Soil Testing Lab is not recommending a fertilizer application for this growing season, because the Bray test level is above 20 ppm for both pastures. When Bray test levels drop below 20 ppm, a P application is recommended. See the enclosed sheet from "Fertilizer recommendations for Agronomic Crops in Minnesota" by George Rehm *et al* and printout from the Soils Testing Lab website for more information.

Plan for Manure Utilization
Current plans are to haul the manure off site until further notice rather than utilize it on the pastures. Given the soil test results, this decision is recommended.

When Bray soil test results are below 20, up to 540 tons of manure could be spread annually over the 40 acres at a rate of roughly 13-14 tons per acre. The remaining manure must be disposed of responsibly. Soil tests should be performed annually to track changes in fertility levels and ensure manure nutrients are utilized when needed.

Before spreading the manure, an estimate of the spreading rate must be known. Information may be available from the manufacturer or contact University of Minnesota Extension or USDA Natural Resources Conservation Service for assistance in calibrating the manure spreader to determine spreading rates. Bulk density testing should also be performed to estimate manure applications rates.

Keep records of when and how much manure is spread. Also, it is strongly advised to keep records of how much manure is removed off site, to gain a more accurate understanding of amount of manure produced.

Spread manure in the spring when the ground is dry enough to support equipment without soil compaction or in late August to early September when plants are storing nutrients for winter. Do not spread manure on frozen or actively thawing soils.

Manure Storage Facilities.
The manure storage pad was designed to hold manure for 6 months[2]. It is 30ft x 80ft x 4ft, or 9600ft^3. This facility is ideal for the area as it was designed to minimize nutrient leaching and runoff as well as meet the ease of access requirements of the barn staff. It has a concrete skirting on the front to aid in access and is slanted back into the pad to prevent runoff.

Emergency Plan
Potential risk factors for large horse manure storage facilities include:

1. Spontaneous combustion from microbial activity in the pile. Check pile occasionally for temperatures exceeding 160°F to prevent this.

2. Lack of storage capacity during inclement weather such as spring conditions when trucks may not be able to access the pile for removal. This should not be a large concern in this situation as the storage space design accounted for this.

3. Nutrient runoff from storage site. Design of the facility and maintenance of existing grassed waterways should minimize this risk.

[1] Plants Database, USDA (http://plants.usda.gov).
[2] Wheeler, E. Horse Facilities Handbook. 2005. Midwest Plan Service. Ames, IA.