CASS COUNTY FLOOD RISK REDUCTION

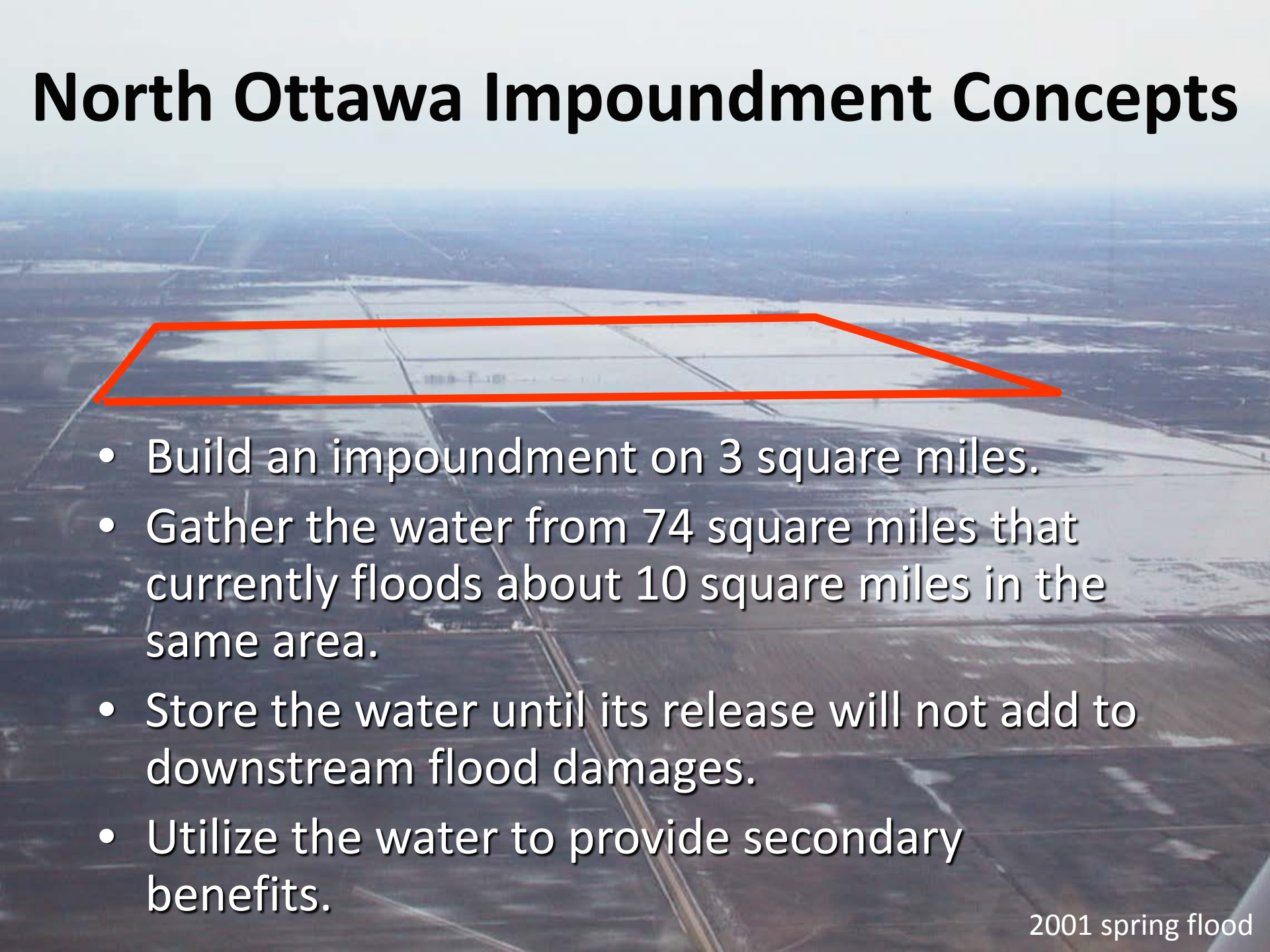
April 8, 2014

Jon Roeschlein, Administrator,
Bois de Sioux Watershed District

NORTH OTTAWA IMPOUNDMENT PROJECT

Bois de Sioux Watershed District

North Ottawa Impoundment Concepts



- Build an impoundment on 3 square miles.
- Gather the water from 74 square miles that currently floods about 10 square miles in the same area.
- Store the water until its release will not add to downstream flood damages.
- Utilize the water to provide secondary benefits.

2001 spring flood

PURPOSES

Primary

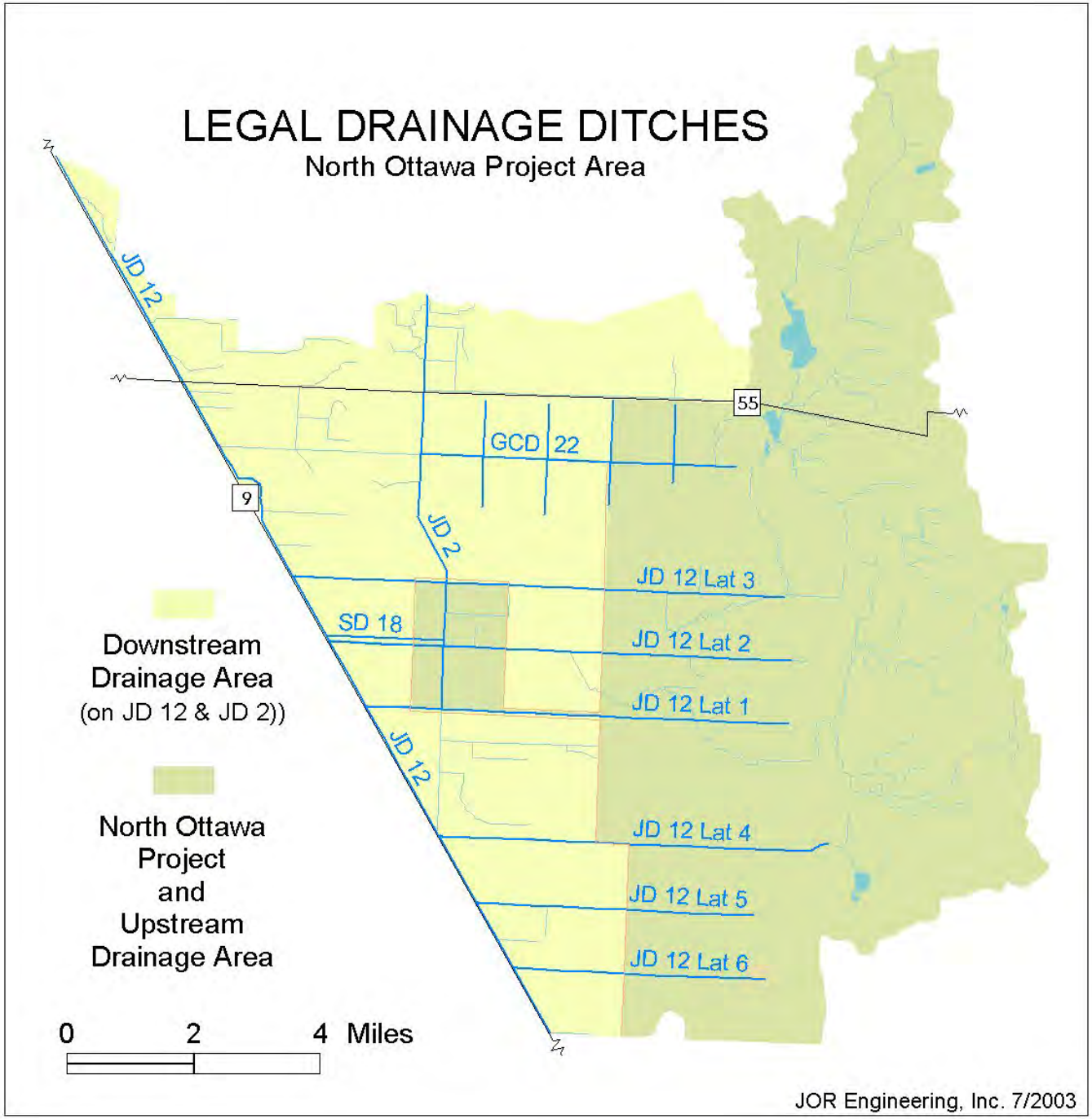
- Flood control

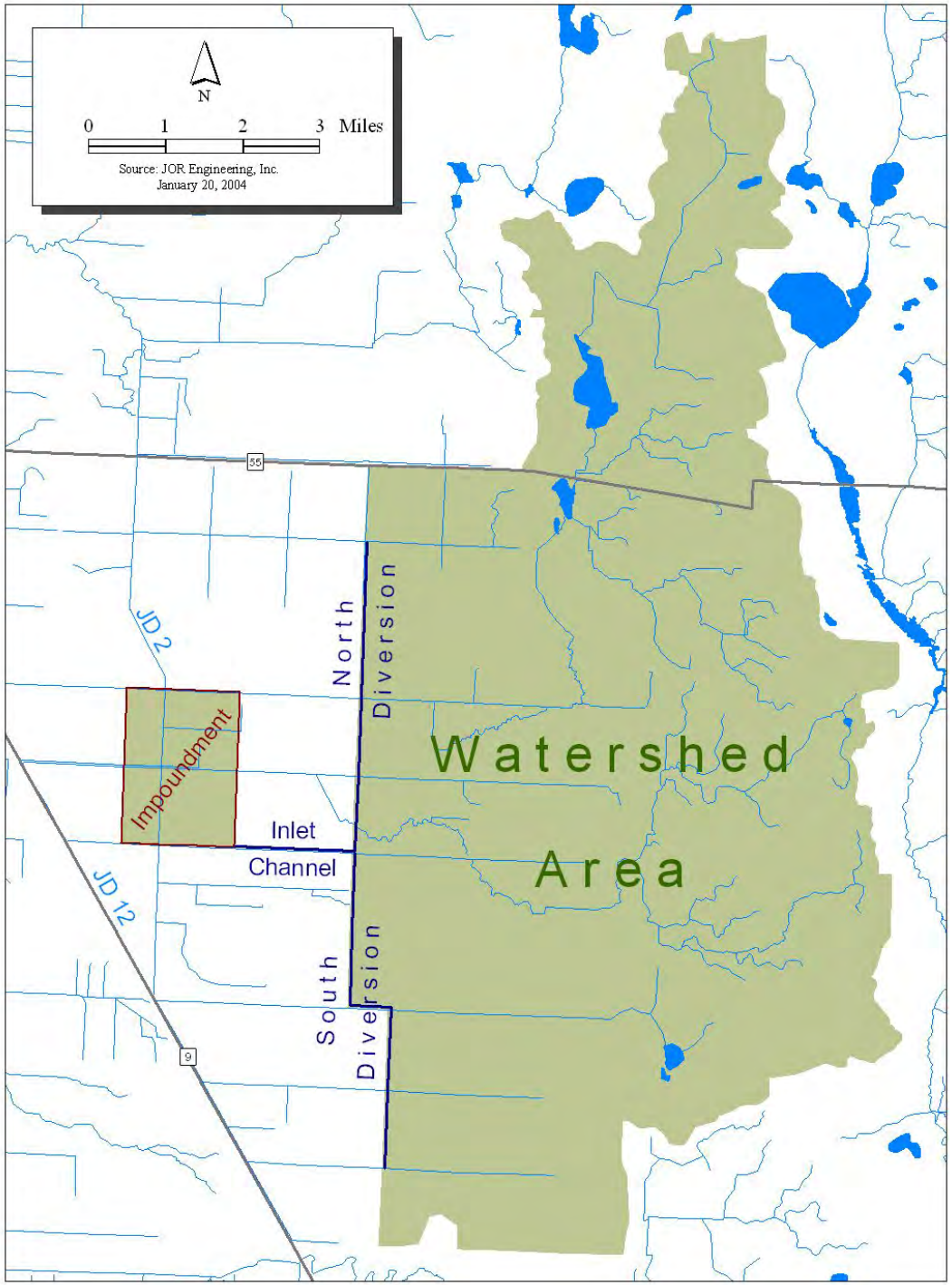
Secondary

- Stream flow maintenance
- Resting and feeding habitat for migratory waterfowl and shorebirds
- Water quality improvement
- Public recreation (bird watching)

Location of the Project within the Watershed

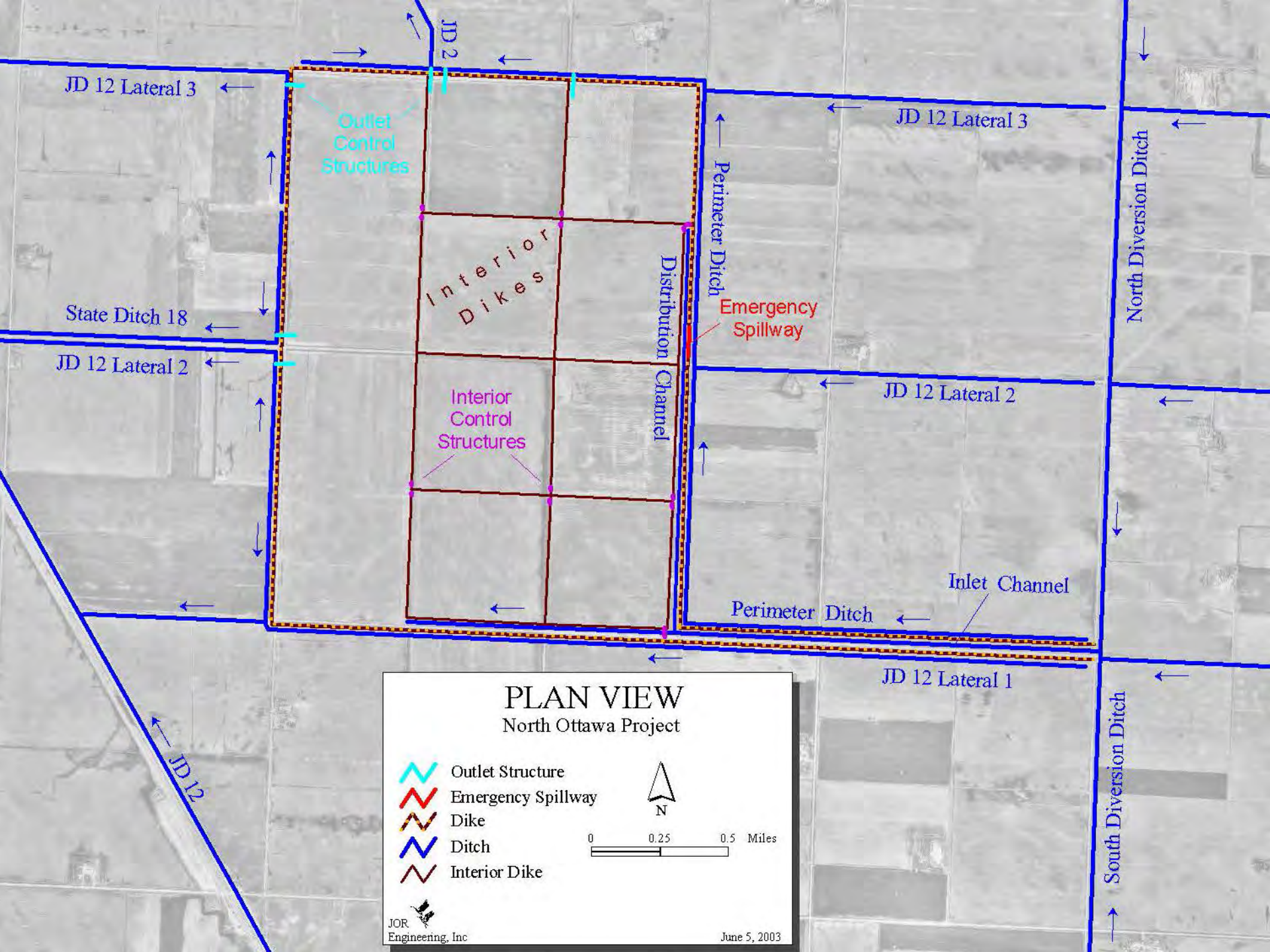
- Total drainage area controlled is about 74 square miles
  - 60% of JD2 and JD12 drainage areas upstream from TH55
  - 23% of Rabbit River drainage area
  - 5% of Bois de Sioux Watershed District


LEGAL DRAINAGE DITCHES
North Ottawa Project Area
JD 12
55
9
GCD 22
JD 2
JD 12 Lat 3
SD 18
JD 12 Lat 2
JD 12 Lat 1
JD 12
JD 12 Lat 4
JD 12 Lat 5
JD 12 Lat 6
Downstream Drainage Area (on JD 12 & JD 2))
North Ottawa Project and Upstream Drainage Area
0 2 4 Miles
JOR Engineering, Inc. 7/2003



North Ottawa Project

- A 4 mile diversion channel from the north and a 4.5 mile diversion channel from the south intercepts the westward flow of water from the watershed area and diverts it to the inlet channel.
- A 1.5 mile long inlet channel, diked on both sides, conveys the water to the impoundment from the higher ground upstream.
- A 3 sq.mi. impoundment area, diked on all four sides, impounds the water and eventually releases it through controlled outlets into JD2 and JD12.


JD 2
JD 12 Lateral 3
Outlet Control Structures
JD 12 Lateral 3
Perimeter Ditch
North Diversion Ditch
Interior Dikes
Distribution Channel
Emergency Spillway
State Ditch 18
JD 12 Lateral 2
JD 12 Lateral 2
Interior Control Structures
Inlet Channel
Perimeter Ditch
JD 12 Lateral 1
South Diversion Ditch
JD 12
PLAN VIEW
North Ottawa Project
Outlet Structure
Emergency Spillway
Dike
Ditch
Interior Dike
N
0
0.25
0.5
Miles
JOR Engineering, Inc
June 5, 2003

FLOOD CONTROL DESIGN OBJECTIVES

Provide inlet capacity for 100-year design flood flows into the impoundment.

Store all 10-year design flood inflows with no automatic release from the impoundment.

Limit outflows from all 100-year design floods to JD2 capacity with no automatic release to JD12.

FLOOD CONTROL OPERATING PLAN

The outlet controls are normally part open to release excess water and to maintain base flows downstream.

The gates shall be closed when flood conditions exist, or are expected to occur at damage points downstream.

If the impoundment gated capacity is exceeded, there will be automatic overflows, first to JD2, then to JD12.

During extreme events when impoundment gated capacity is expected to be exceeded, the gates may be opened during flood periods to maximize control in an attempt to reduce overall damages.

FUNCTIONAL DESIGN PARAMETERS

Drainage area	74 sq-mi	
Outlet elevation in JD2	1001.0 ft-msl	
Low ground elevation in pool	1006 ft-msl	
Summer pool storage	4000 ac-ft	1.01 inches
▪ Equivalent elevation	1009.5 ft-msl	
Gate control elevation	1016.2 ft-msl	
▪ Storage	16,160 ac-ft	4.10 inches
Emergency spillway elevation	1017.3 ft-msl	
▪ Storage	18,210 ac-ft	4.61 inches
Top of dam elevation	1020.3 ft-msl	
Storage	23,800 ac-ft	6.03 inches

PERIMETER DIKE DESIGN

The dike is 9’ to 14’ high

The top width is 24’

The side slopes are 4 to 1

The inside slope includes a 40’ wave protection berm

Dikes on the North, West, and South sides are raised Township Roads

DEC 20 2004

04/08/2009

SECONDARY OBJECTIVES

Downstream flow augmentation.

- Provide about 5 cfs continuous discharge during the ice free months in a normal year.
- Improve in-stream fishery.
- Enhance water supply.

Provide feeding and resting habitat for migratory birds.

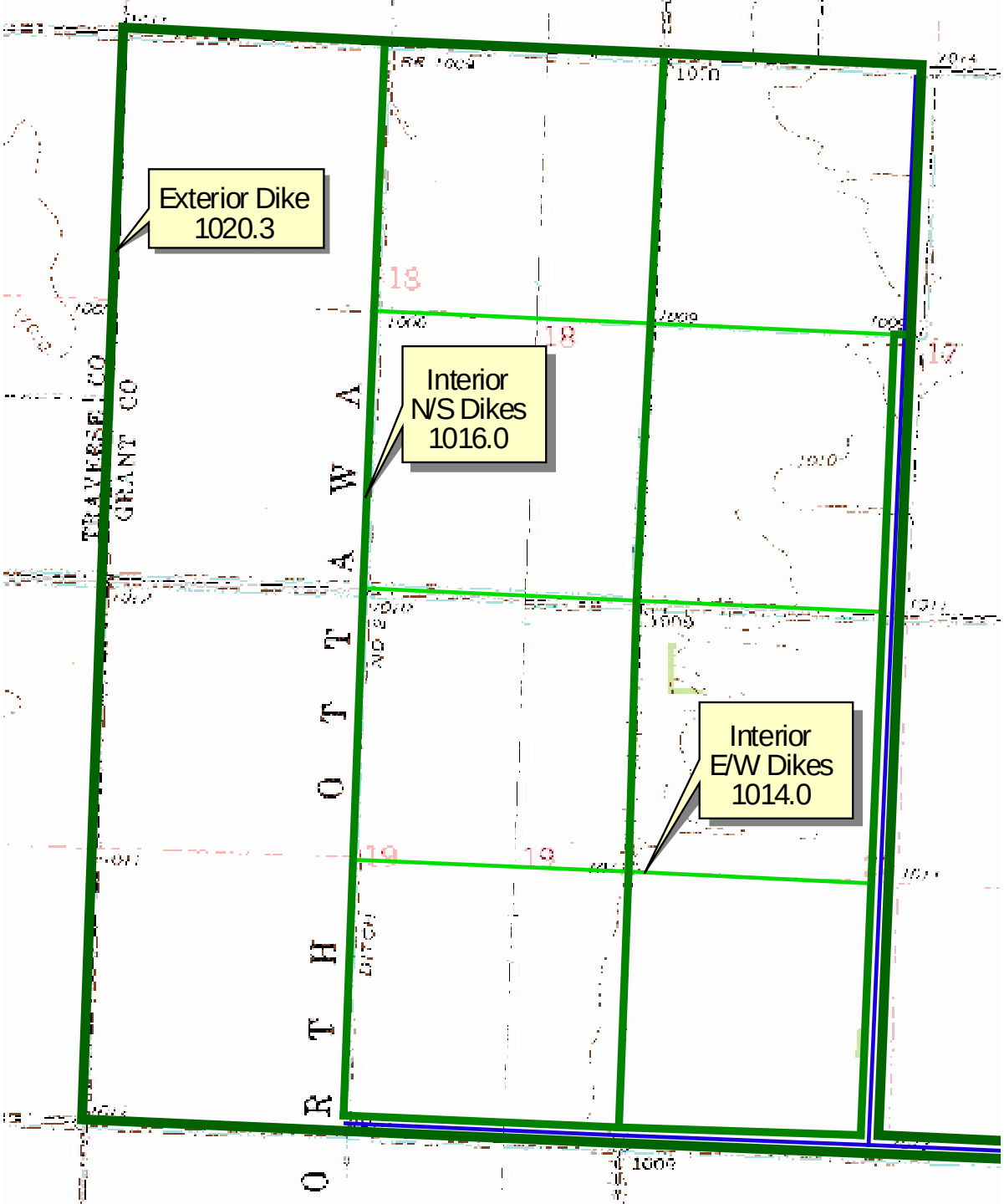
- Feeding areas for shorebirds are provided by drawing down water levels to expose mudflat areas.
- Feeding areas for waterfowl are provided by using a portion of the drawdown water to reflood vegetation in dry pool areas.
- Designation as a State Game Refuge provides an ideal resting area for waterfowl and other wild game.

Water quality enhancement.

- Remove sediment and nutrients carried by incoming water.

Public recreation.

- Provide opportunity for viewing shorebirds and waterfowl.
- Improve hunting opportunities in nearby areas.

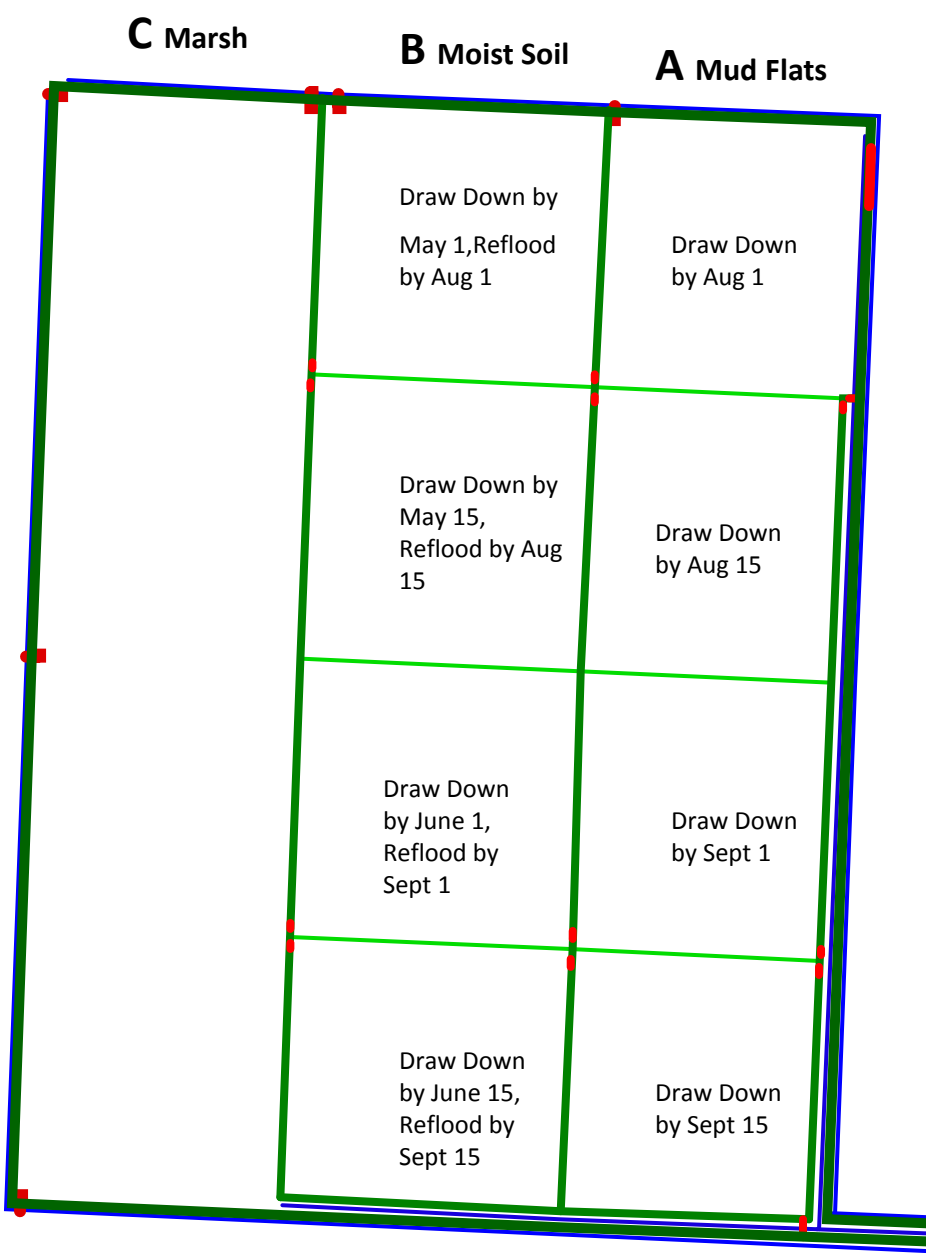


Interior Pool Areas

Low elevation interior dikes will divide the impoundment into 9 pools

This will allow independent water level management in order to create mud flats and shallow water feeding areas for migrating shorebirds and waterfowl

Internal Operation



Following Spring Runoff

A Pools = 2000 acre-feet

B Pools = 0 acre-feet

C Pool = 2000 acre-feet

Stream flow augmentation

Continuous discharge of about 5 cfs, depending on availability, throughout open water season

Mud flat exposure

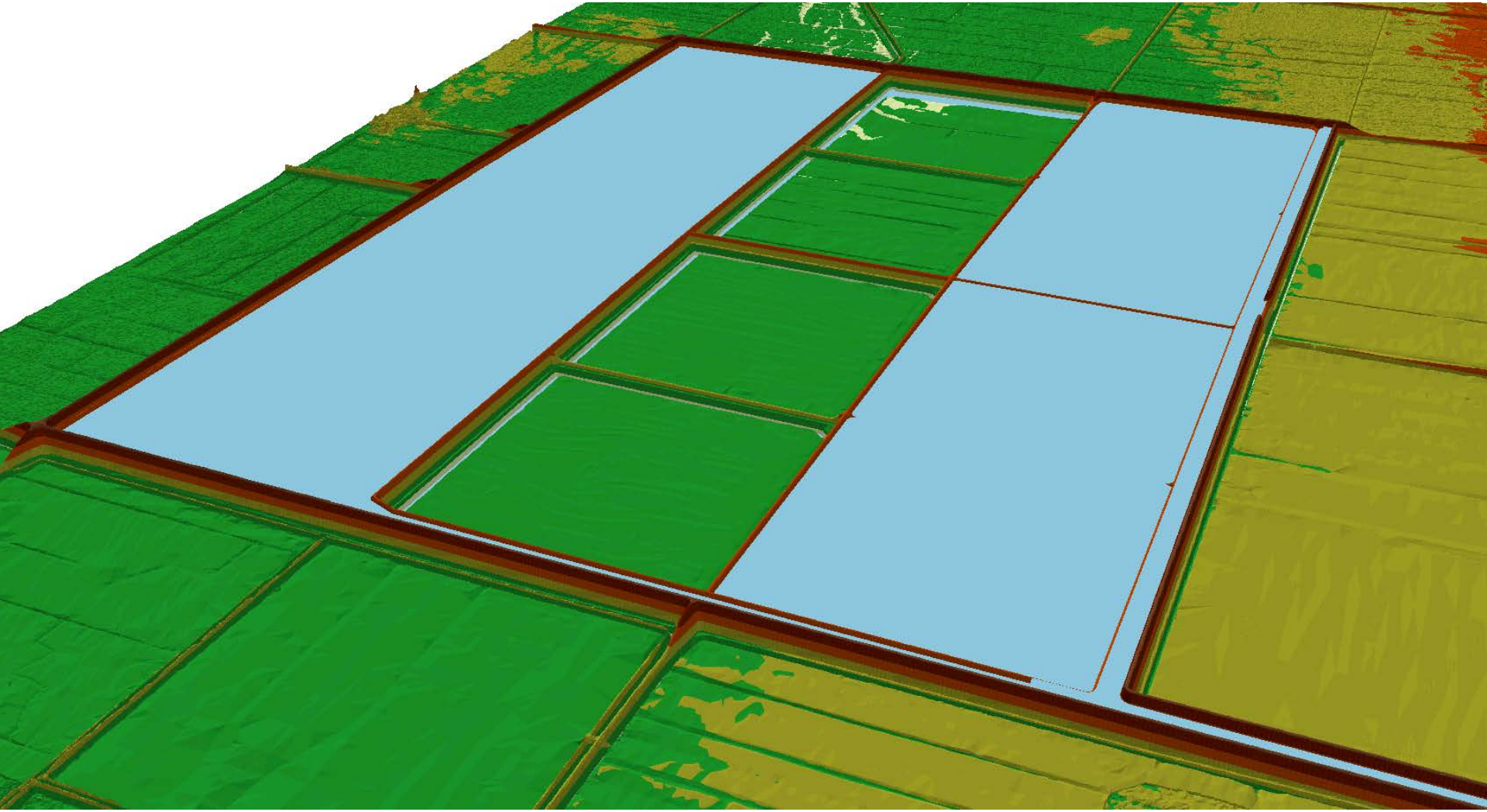
A Pools drawn down sequentially during shorebird migration period

Moist soil management

B Pools shallow flooded with water from A Pools

Draw Down Schedules Circulate each Year in A and B Pools

Typical Summer Operation



NORTH OTTAWA PROJECT FUNDING

~$19,000,000 - Total cost of project.

Funding sources:

- 75% - State of Minnesota, Flood Damage Reduction Program
- 16% - Red River Watershed Management Board
- 9% - Bois de Sioux Watershed District

WHAT'S NEXT?

Complete the construction of interior dikes and controls by 2015

Adaptive management strategy

- Flood operations by BdSWD
- Non-flood operations guided by a committee of natural resource experts

Water quality experimental project

- Cooperative project with Red River Basin Commission
- Cattail uptake of nutrients
- Cattail harvest for nutrient removal to minimize Nutrient recycling

Thank You!