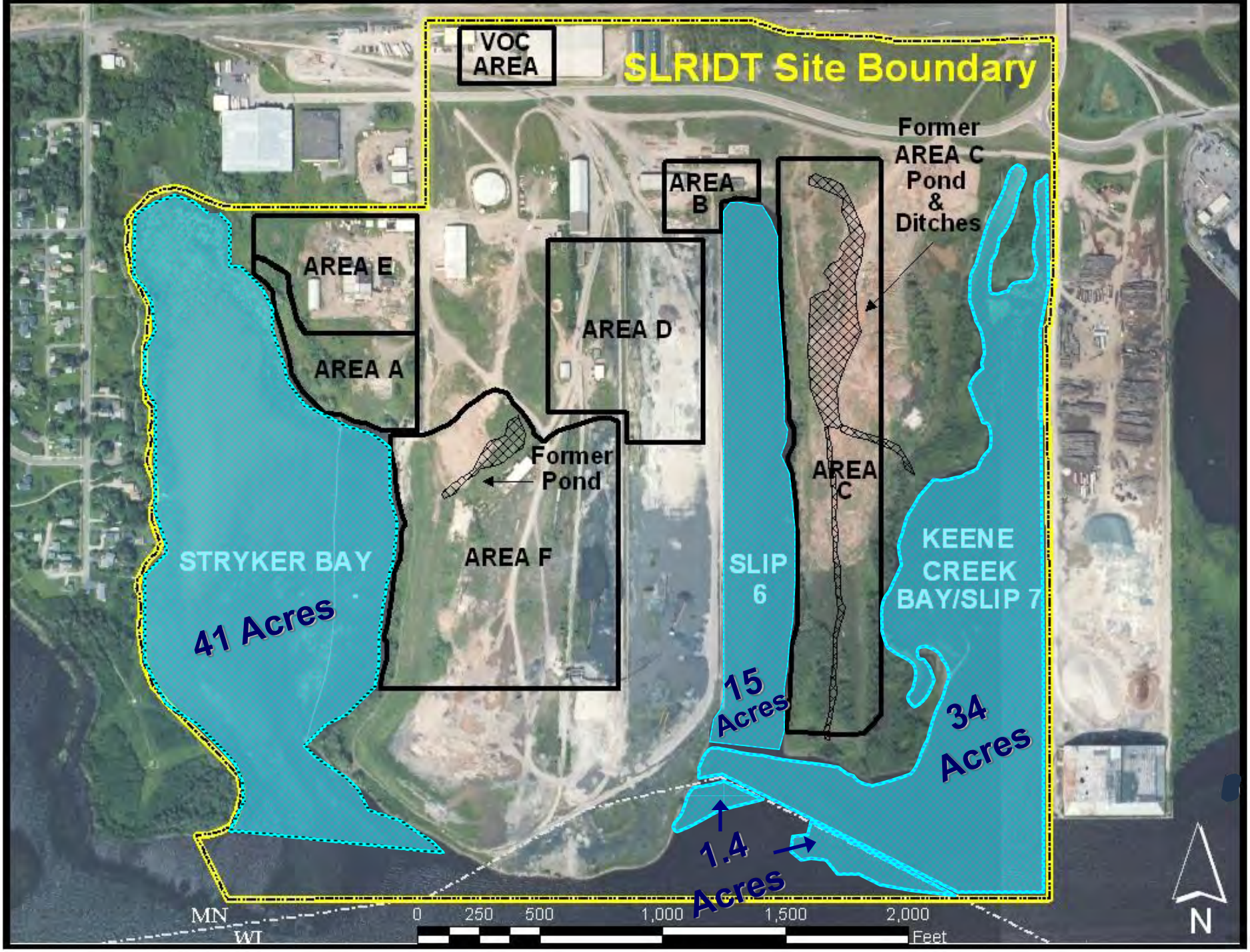
St. Louis River/Interlake/Duluth Tar Site (SLRIDT)

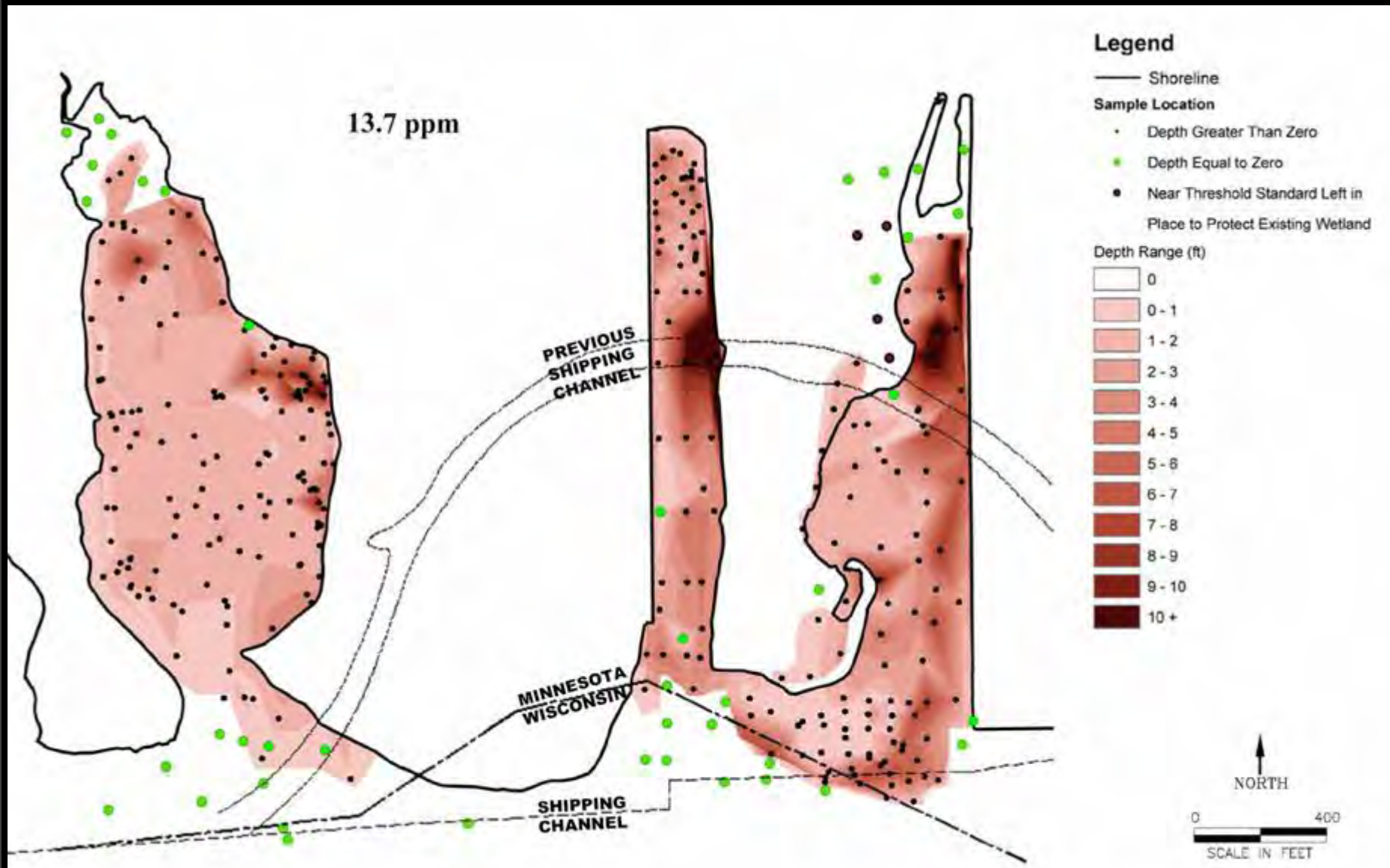
Remedy Construction Activities

Minnesota Pollution Control Agency

c-s3-16v

VOC AREA
SLRIDT Site Boundary
BNSF Right of Way
Former AREA C Pond & Ditches
AREA
AREA E
AREA D
AREA A
Former Pond
54th Avenue Peninsula
AREA C
STRYKER BAY
AREA F
SLIP 6
KEENE CREEK BAY/SLIP 7
59th Avenue Peninsula
MN
WI
0 250 500 1,000 1,500 2,000 Feet
N


VOC AREA
SLRIDT Site Boundary
Former AREA C Pond & Ditches
AREA B
AREA E
AREA D
AREA A
Former Pond
AREA C
AREA F
STRYKER BAY
41 Acres
SLIP 6
15 Acres
KEENE CREEK BAY/SLIP 7
34 Acres
1.4 Acres
MN
WI
0 250 500 1,000 1,500 2,000
Feet
N



Extent of Contaminated Sediment

Stryker Bay Oil Blooms

Stakeholder Process

- MPCA & RPs sought input from a broad group of stakeholders
- Meetings to discuss new information and the remedy implications
  - A wide range of issues were discussed


Flow through Cap Summary


3-2
3-3

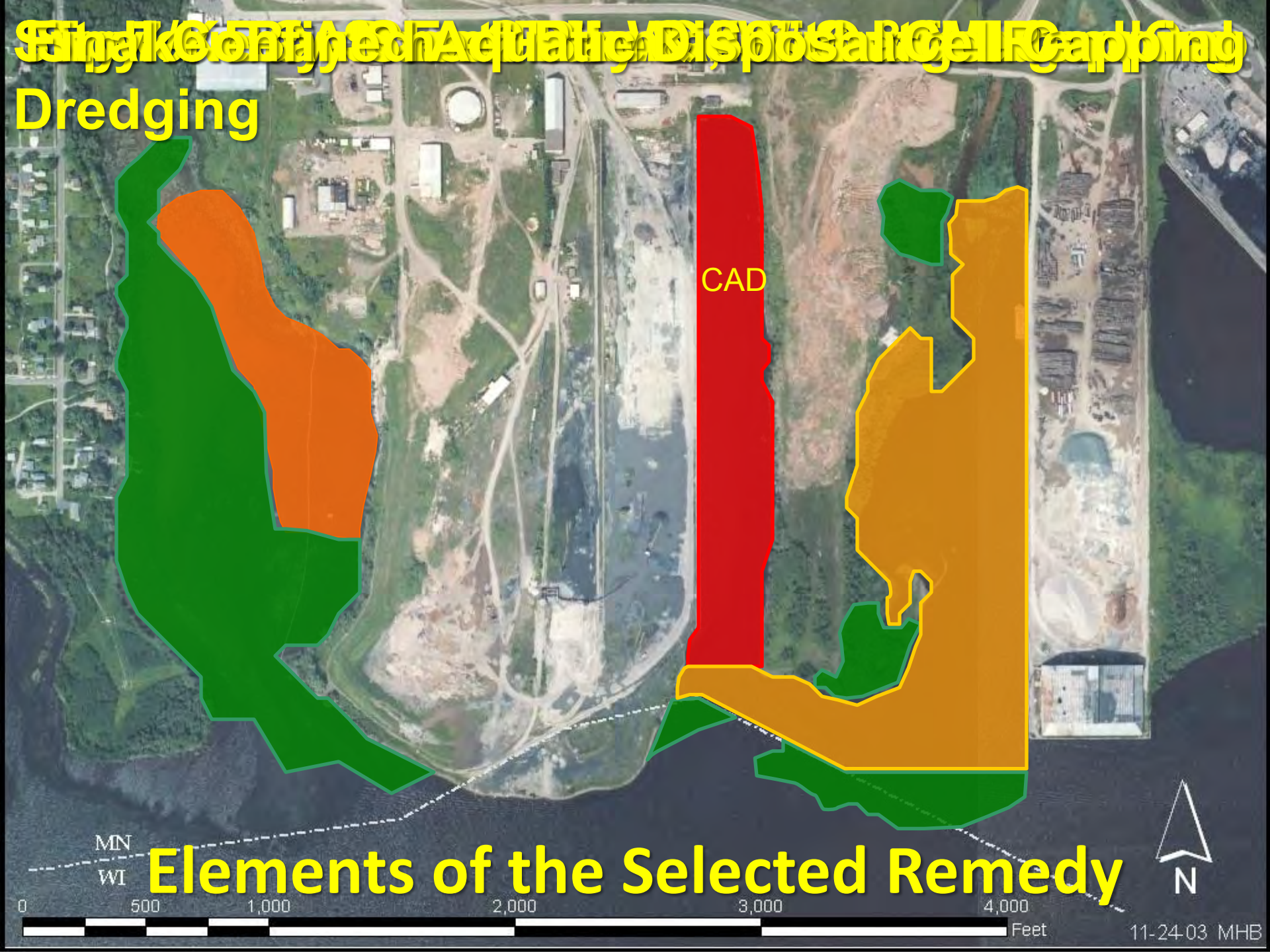
Participants that Helped Shape the Remedy

- Minnesota Department of Natural Resources
- Minnesota Department of Health
- US Fish and Wildlife Service
- US Environmental Protection Agency
- US Environmental Protection Agency Great Lakes Natl. Program Office
- US Army Corp of Engineers
- Fond du Lac Band of Lake Superior Chippewa
- 1854 Authority
- National Oceanic and Atmospheric Administration
- City of Duluth
- Responsible Parties and their consultants
- SLRIDT Community Work Group
- Metropolitan Interstate Committee
- Harbor Technical Advisory Committee
- St. Louis River Citizens Action Committee
- Spirit Valley Economic Development Association
- Community Associations
- Hallett Dock Company
- Stryker Bay Residents
- Landowners and Neighbors
- Neighboring Communities
- Nationally-recognized dredging, capping and sediment remediation experts

Best approach is a combination of cleanup methods

Construction of the Dredge/Cap Hybrid Remedy

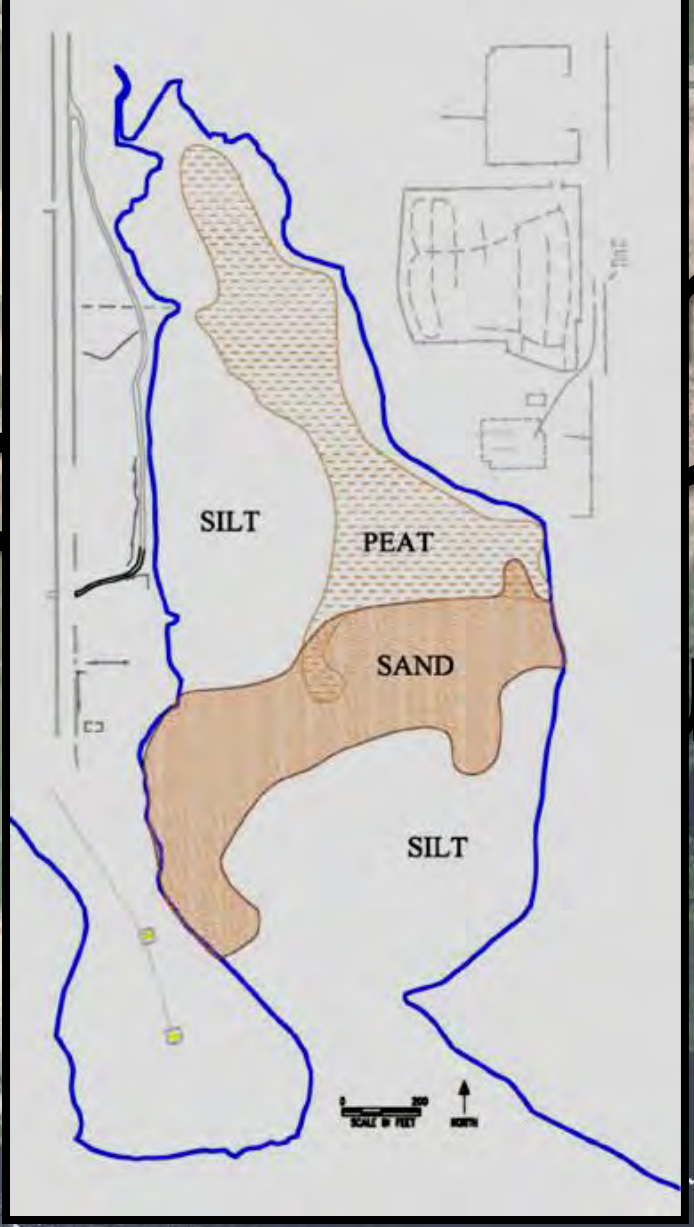
Minnesota Pollution Control Agency



Elements of the Selected Remedy

2006

r Bay
C rcharge
uction



MN
WI

0 500 1,000 2,000 3,000 4,000 Feet

N

11-24-03 MHB

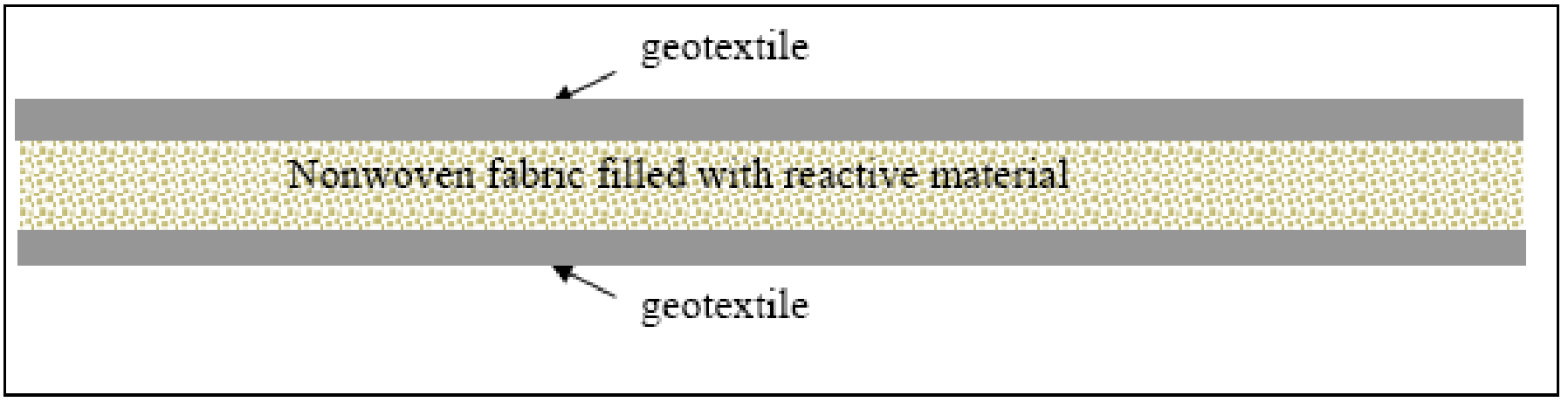
Sheet Pile Wall Installation

Capping with Spreader Barge

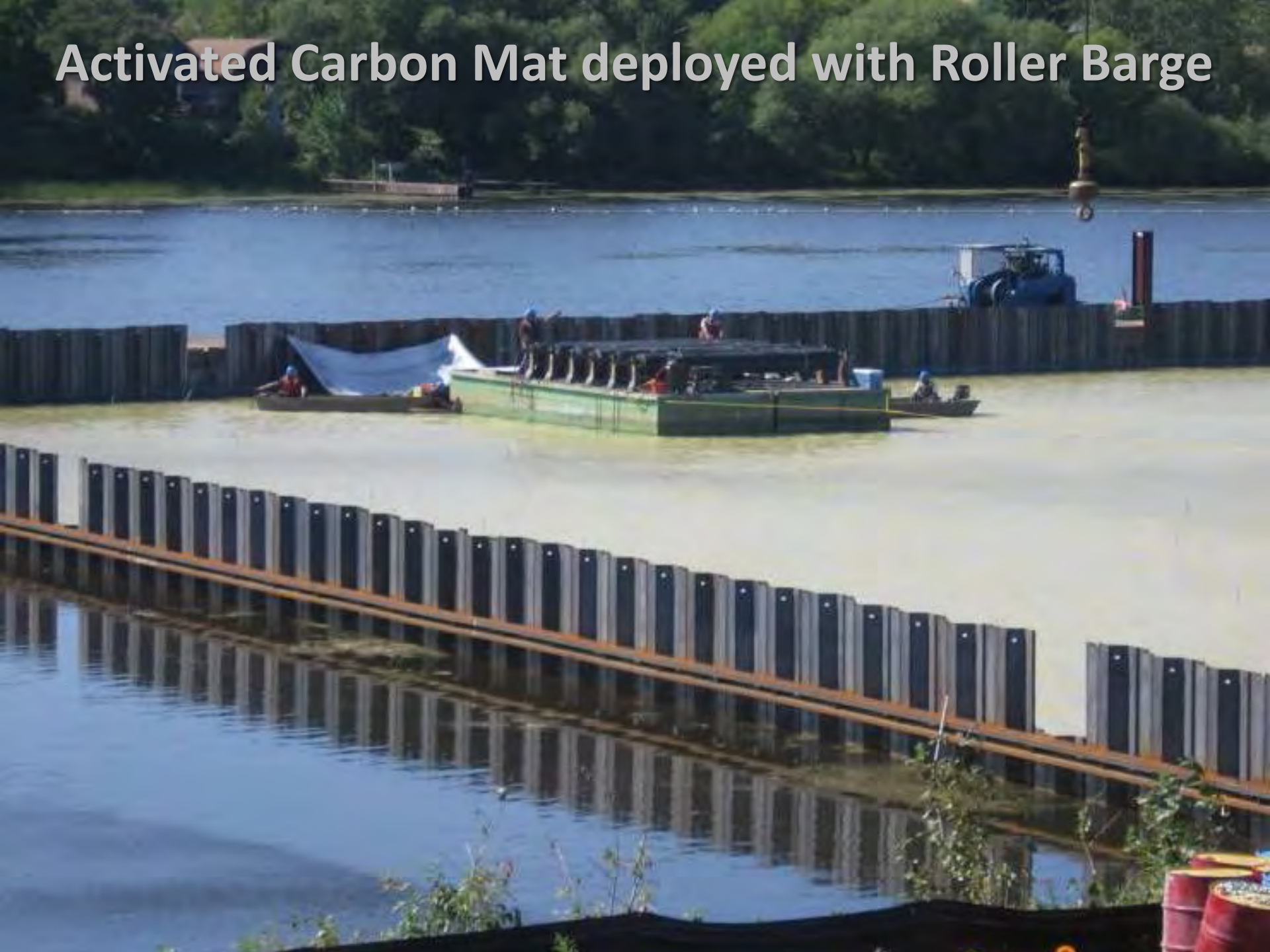
Spreader Barge Movement Trace

Lift 1 Summary – 8/21/2006
Sub-Aqueous Cap Core Samples
Stryker Bay - Duluth, MN

First Lift of Cap Sand


geotextile
Nonwoven fabric filled with reactive material
geotextile

Activated Carbon Mat deployed with Roller Barge



Activated Carbon Mat Deployment Pattern

Land Based Cap Placement

Placing Cap & Surcharge Material

Installing Sheet Pile Wall Tie-backs


Adding Surcharge Material
10/27/2006

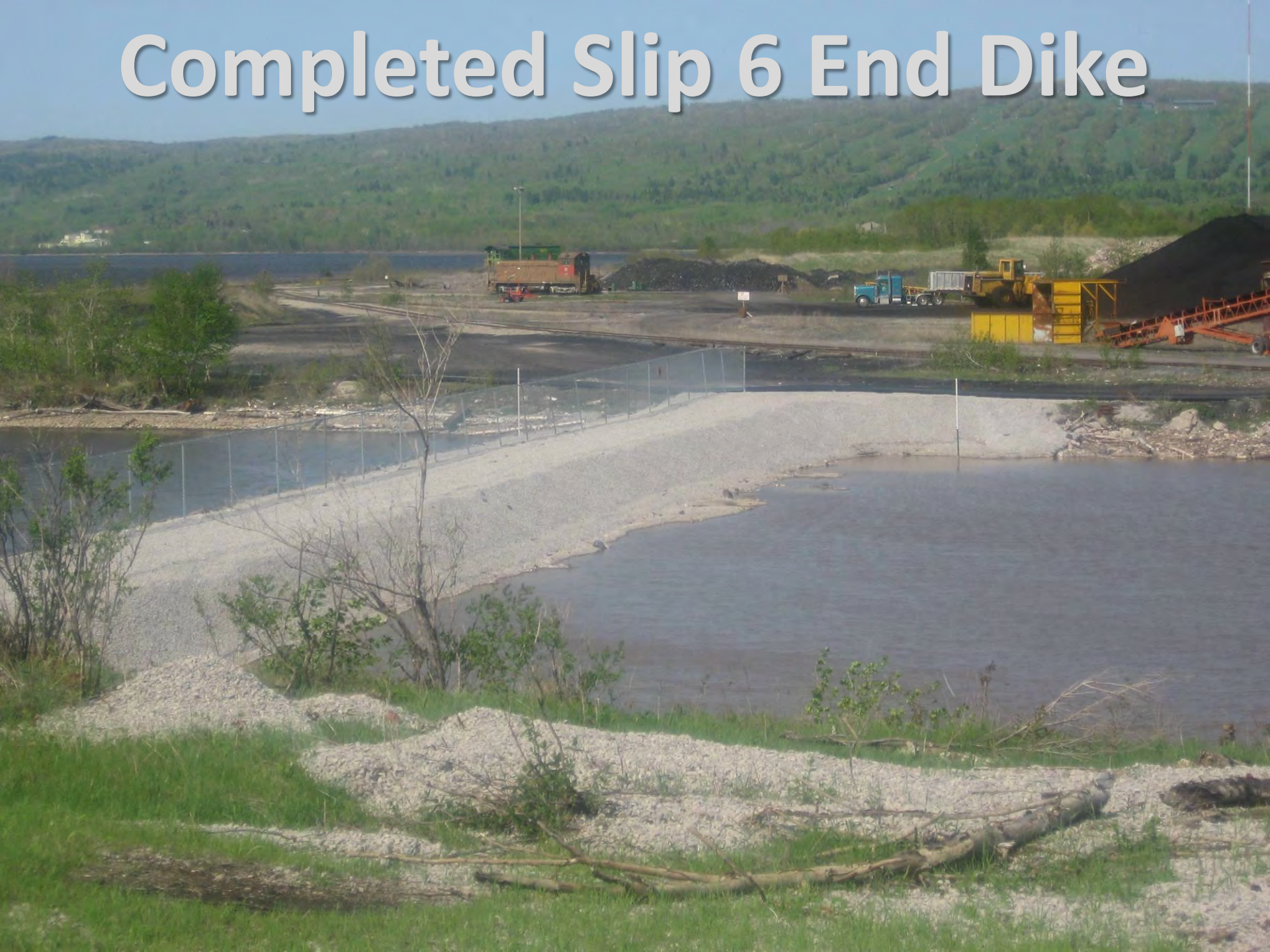
Full Cap & Surcharge

Cap and Surcharge Area

CAD End Dike Construction

Clay Mat & Ballast Installation

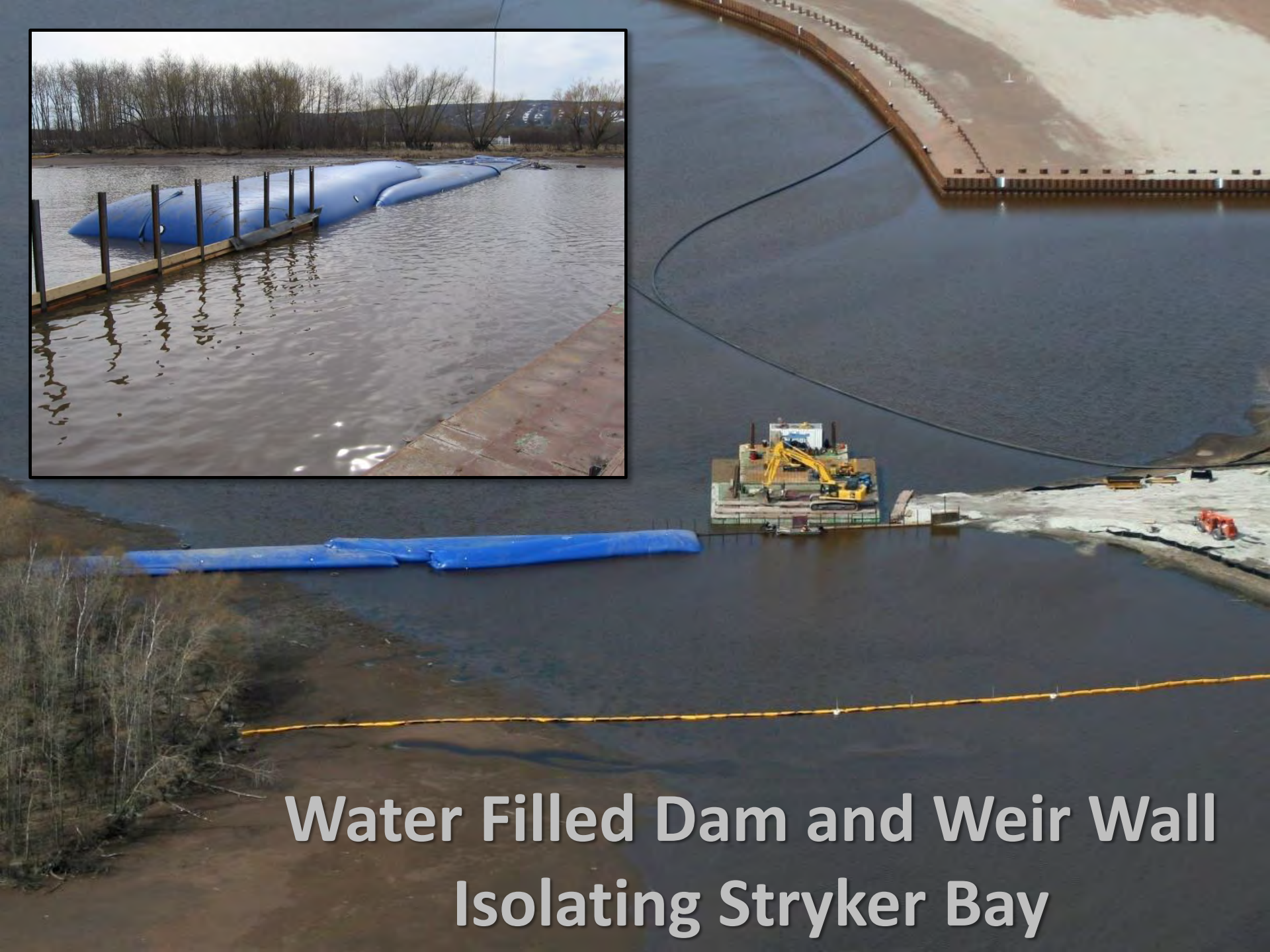
Completed Slip 6 End Dike




10/16/2006


2007
CAD
Stryker Bay Dredging
MN
WI
N
0
500
1,000
2,000
3,000
4,000
Feet
11-24-03 MHB

Best Technology Water Treatment Plant

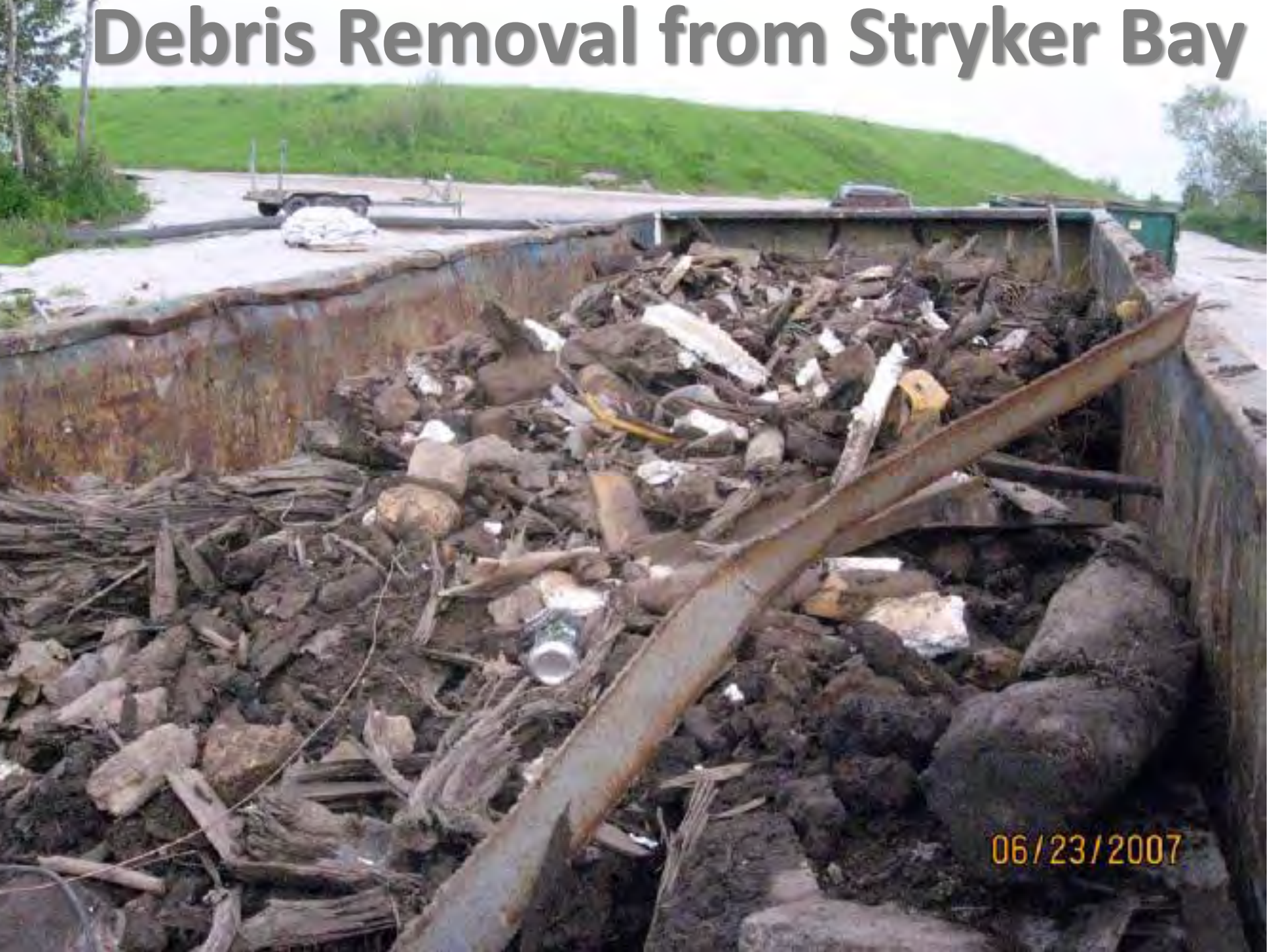


Water Filled Dam and Weir Wall Isolating Stryker Bay

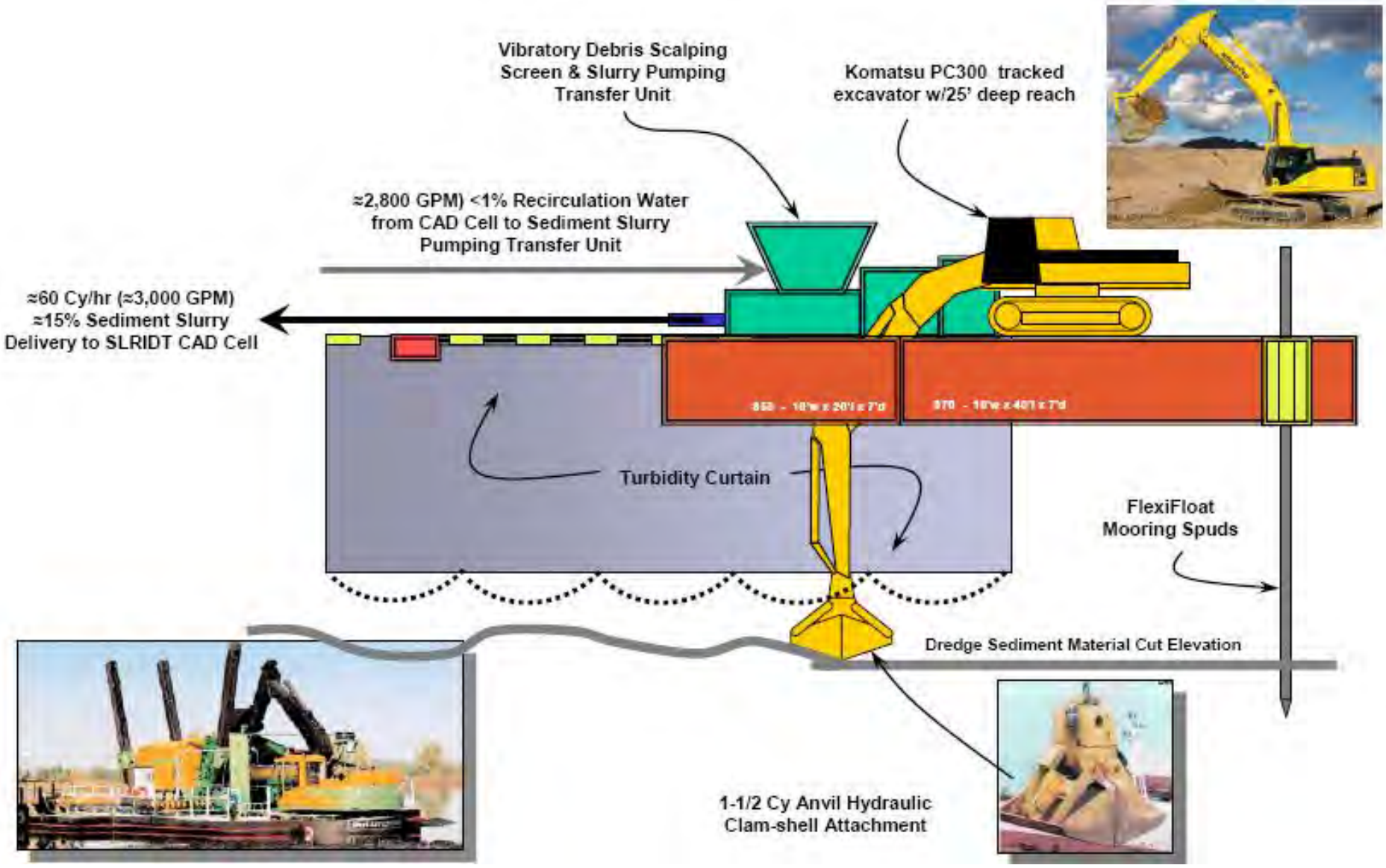
Aquatic Vegetation Harvesting

Herding Fish out of Work Areas

Debris Removal from Stryker Bay



Mechanical/Hydraulic Hybrid Dredge

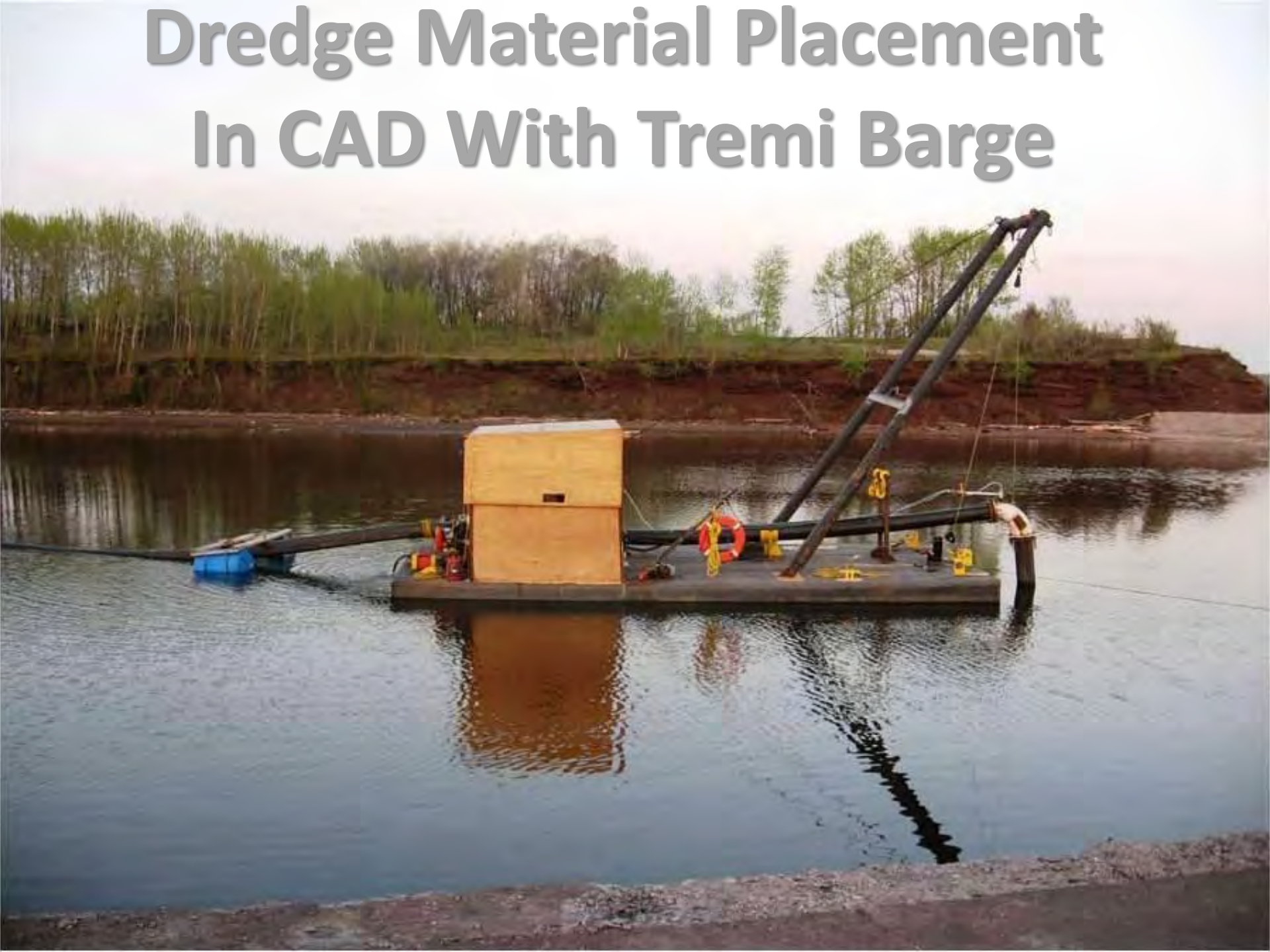



KOMATSU
KOMATSU
PC 400 LC


KOMATSU

Mechanical Dredging with Hydraulic Transport

Dredge Material Placement In CAD With Tremi Barge




08/07/2007

24 Hour Dredge Operations

Post Dredge Cover Application

11/19/2007


CAD
North & South
Wetland Excavations
MN
WI
0
500
1,000
2,000
3,000
4,000
Feet
N
11-24-03 MHB

North Wetland Excavation

South Wetland Area

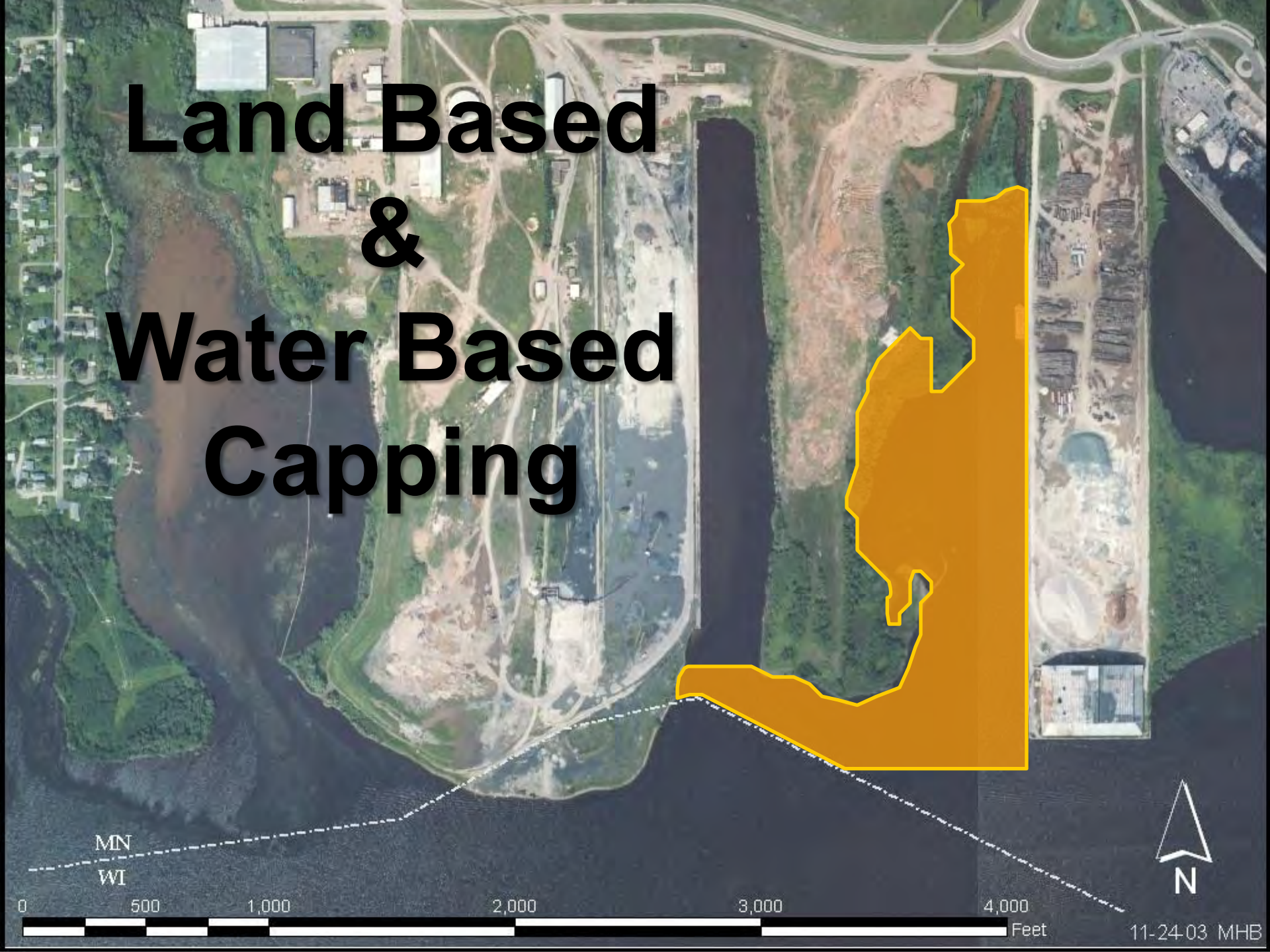

2008
Dredge Wisconsin & Nav. Channel
CAD
MN
WI
0
500
1,000
2,000
3,000
4,000
Feet
N
11-24-03 MHB


07/28/2008


08/10/2008


Deep Water
Dredging With
Hydraulic Transport
10/24/2008


MCM
10/24/2008


Land Based
&
Water Based
Capping
MN
WI
0
500
1,000
2,000
3,000
4,000
Feet
N
11-24-03 MHB

Capping with Spreader Barge

Land Based Capping
Installing Root Barrier


08/19/2008


09/16/2008

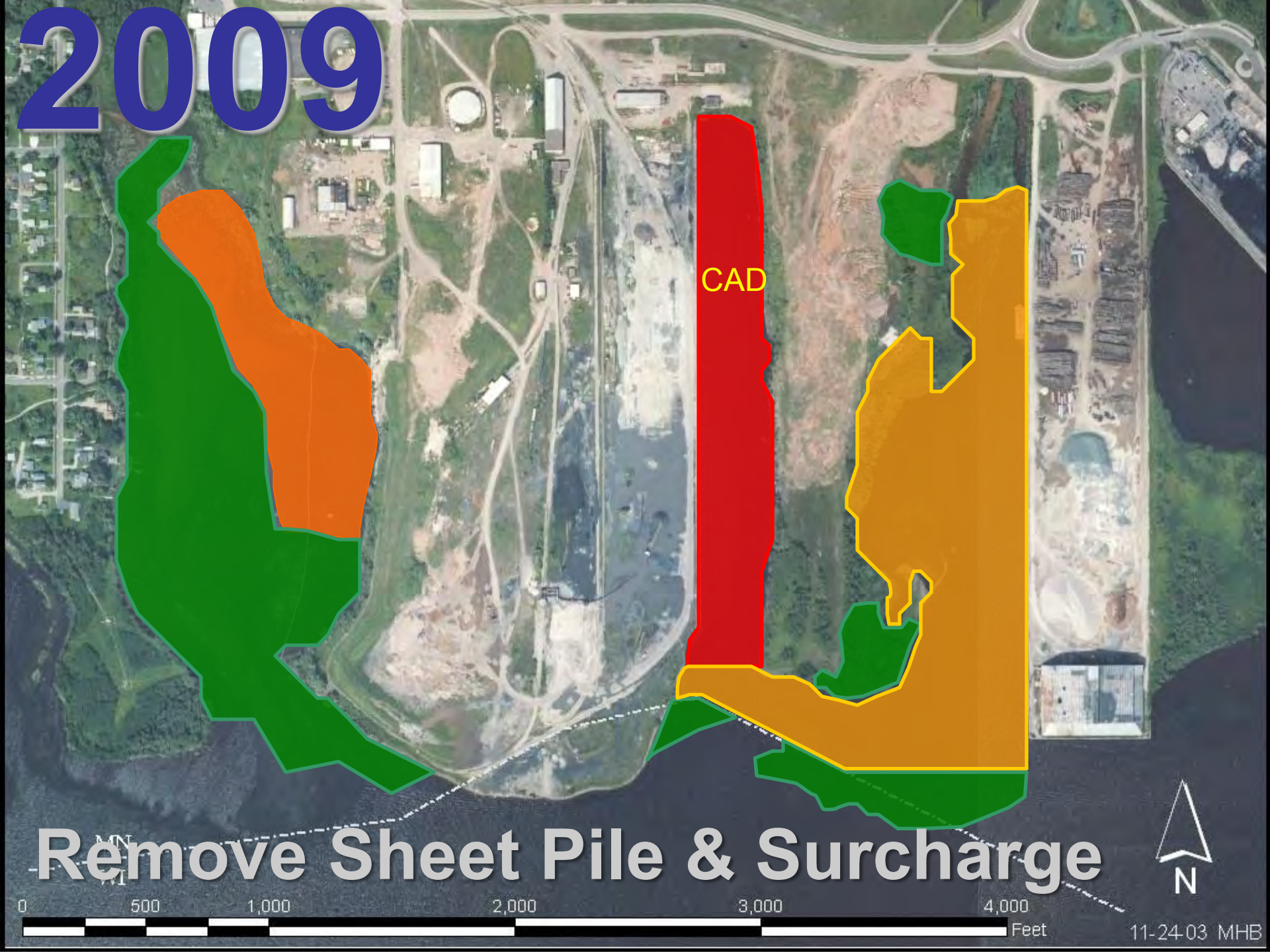
Installing Root Barrier in Cap

Capping Slip 7 Flats


Armor Material Placement
0
500
1,000
2,000
3,000
4,000
Feet
N
11-24-03 MHB

Staging Armor Materials

Placing Cap Armor Layer


2009
CAD
Remove Sheet Pile & Surcharge
N
0
500
1,000
2,000
3,000
4,000
Feet
11-24-03 MHB


Sheet Pile & Surcharge
to be Removed


CAT
08/03/2009


CAT
08/06/2009


08/04/2009

Cutting Sheet Pile Sections

Removing Sheet Pile sections

Capping Over Sheet Pile Cut

Removing Surcharge to leave Final Cap

Surveying final Cap Elevation

Capped Area After Surcharge Removal

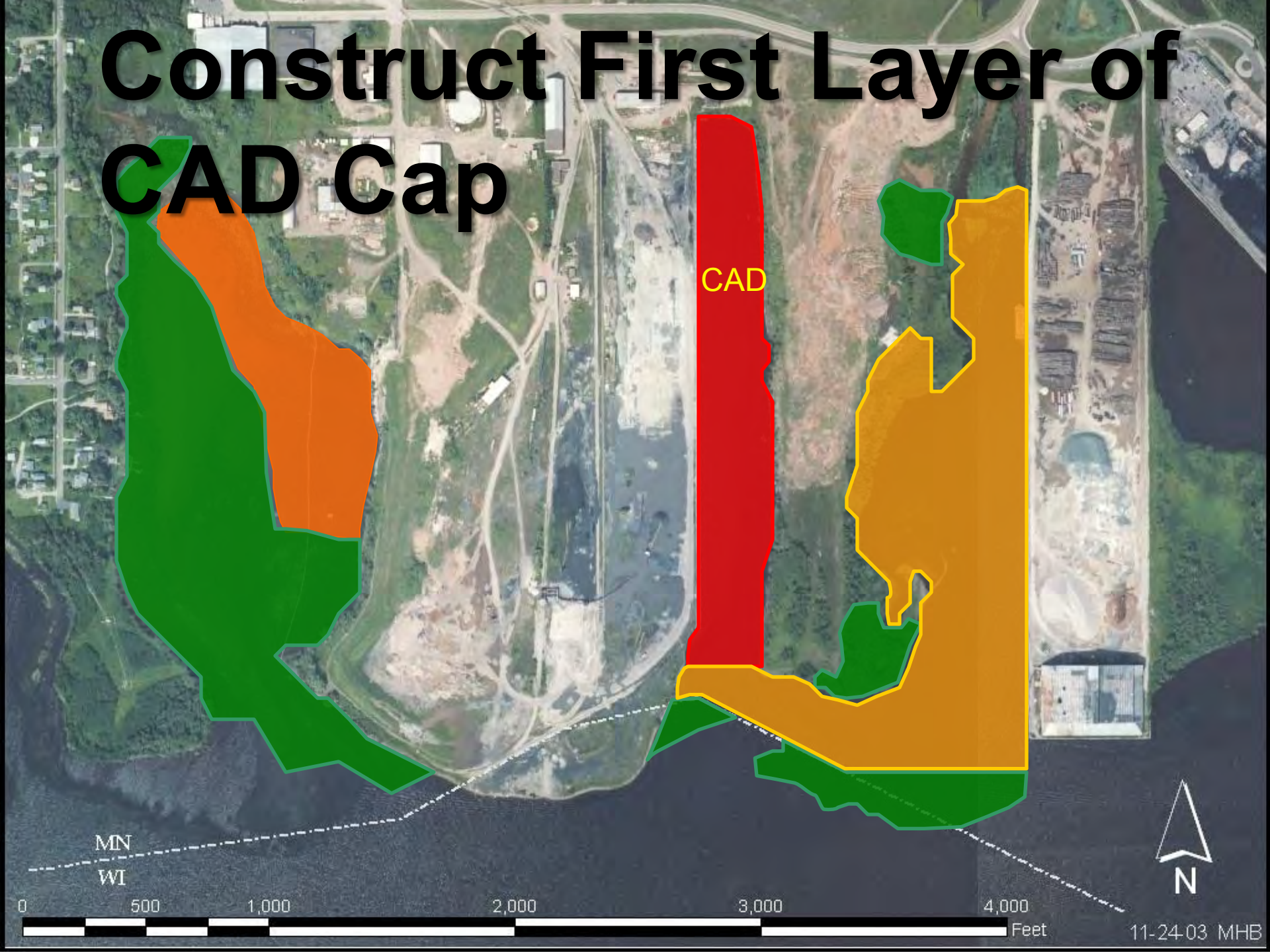
Complete Cap Construction and Armoring

Placing Cap Armor Material

Cap Armor Along Shoreline


Slip 7 flats with Final Cap

Construct First Layer of CAD Cap

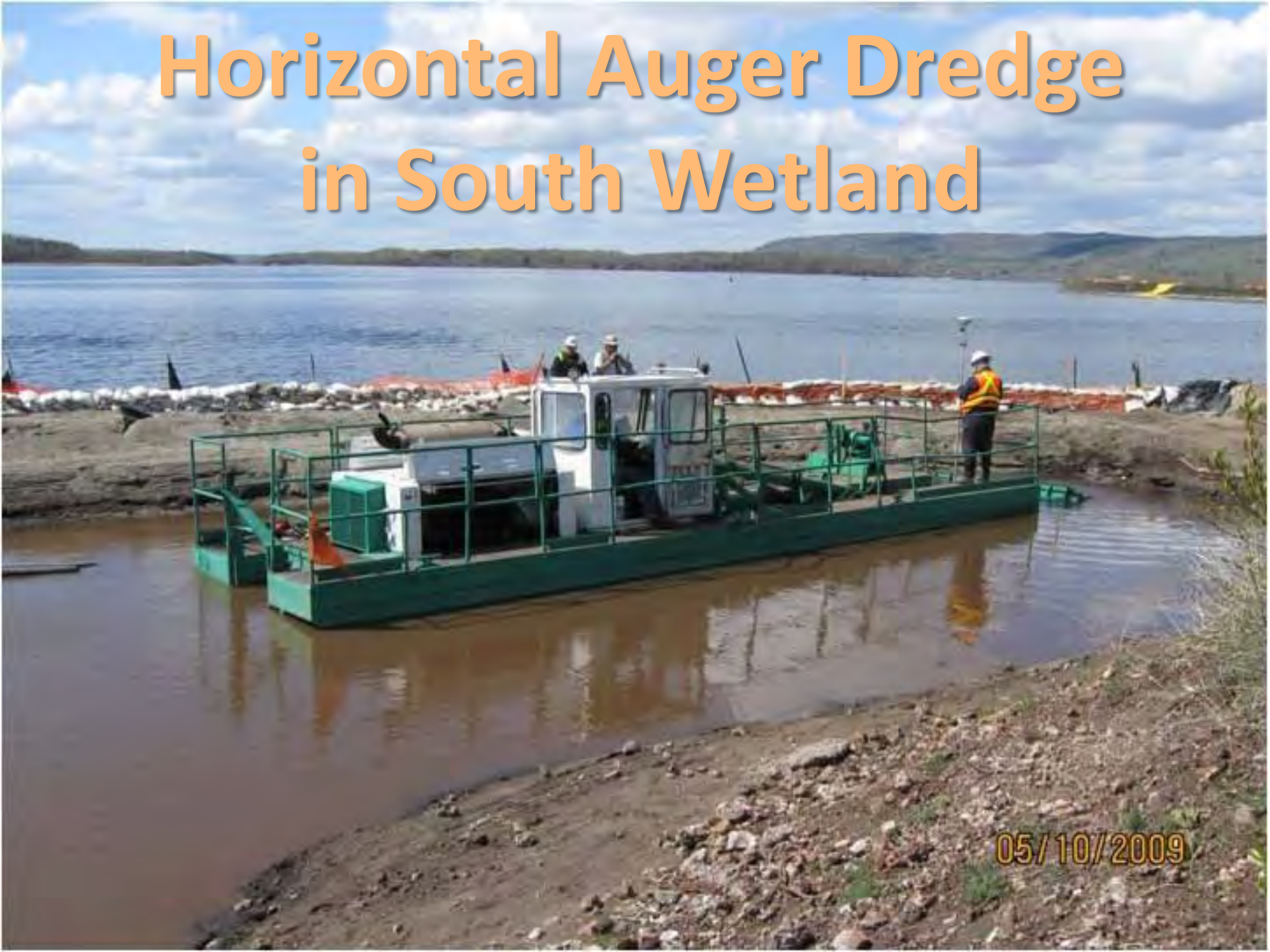


Slip 6 CAD Capping Spreader Barge

Slip 6 Land Based Capping

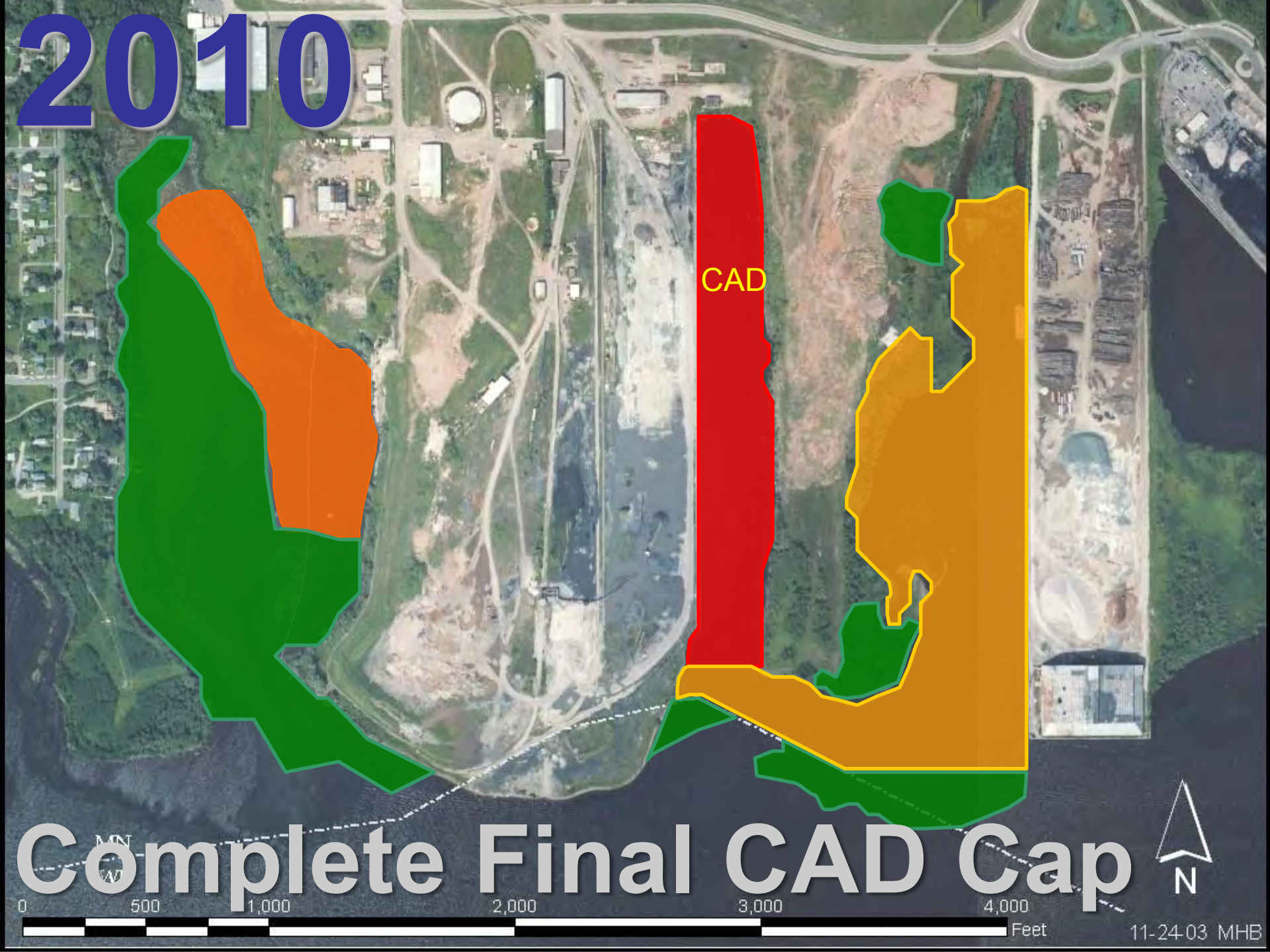

Wetland dredging & Capping
WI
0
500
1,000
2,000
3,000
4,000
Feet
N
11-24-03 MHB

Horizontal Auger Dredge in South Wetland



South Wetland Excavation

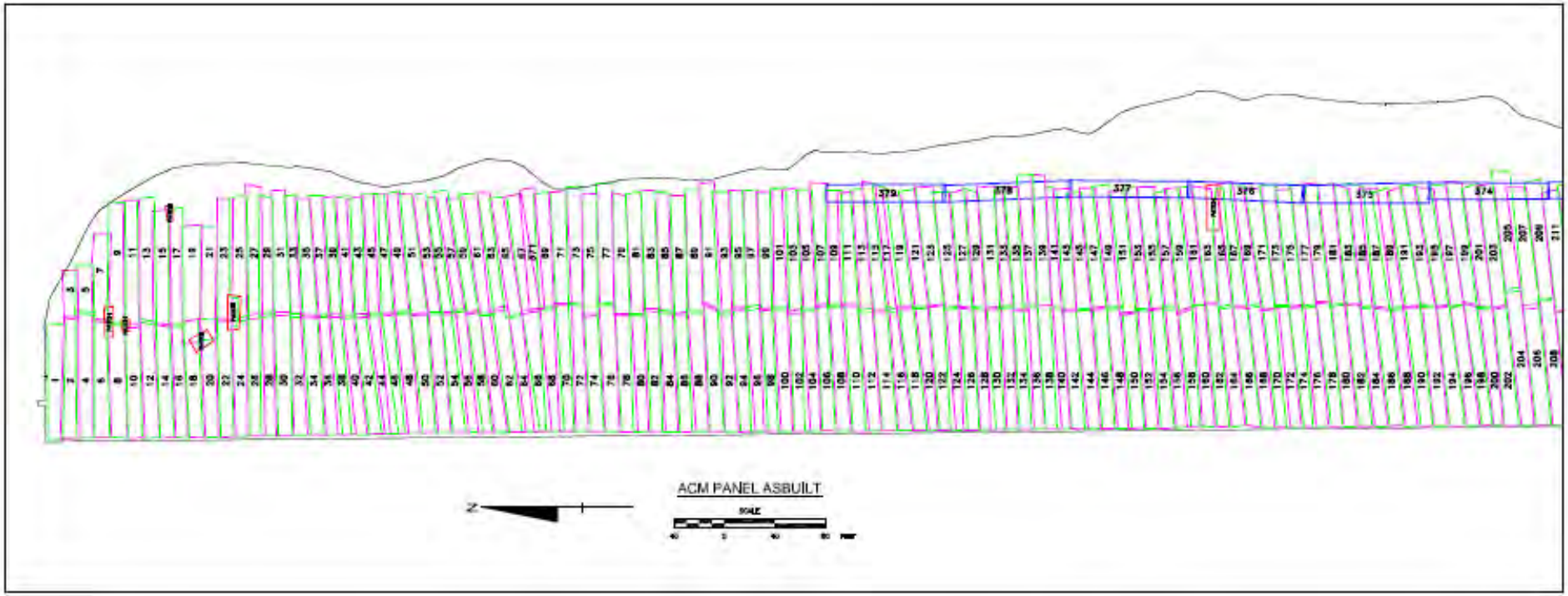
South Wetland

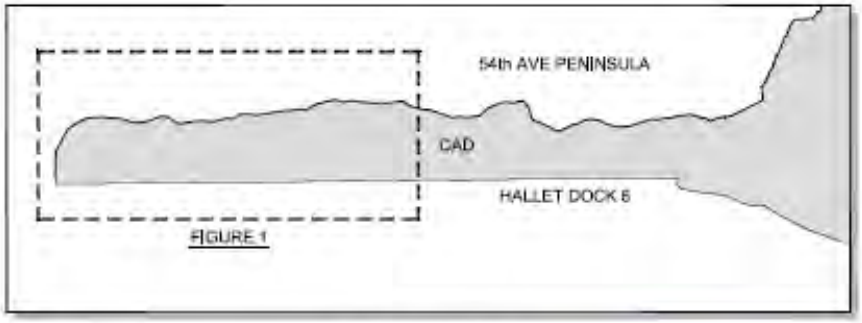

2010
CAD
Complete Final CAD Cap
MN
W
N
0
500
1,000
2,000
3,000
4,000
Feet
11-24-03 MHB

Placing Activated Carbon Mat in CAD Cap

Placing Activated Carbon Mat from Roller Barge

Carbon Mat Layout Pattern





KEY PLAN OF CAD

LEGEND:

PANEL ID

002 — PRIMARY ACM PANELS INSTALLED

005 — PRIMARY ACM PANELS INSTALLED

272 — SECONDARY ACM PANELS INSTALLED

ACM PATCHED AREAS

NO.	BY	CHK	APP	DATE	REVISION DESCRIPTION

BARR

XIK CORPORATION
DULUTH, MN

SLIPDT
DULUTH, MN

CAD – ACM PANEL ASBUILT
FIGURE 1

BARR PROJECT No. 23690877
CLIENT PROJECT No.
DWG. No.
REV. No.

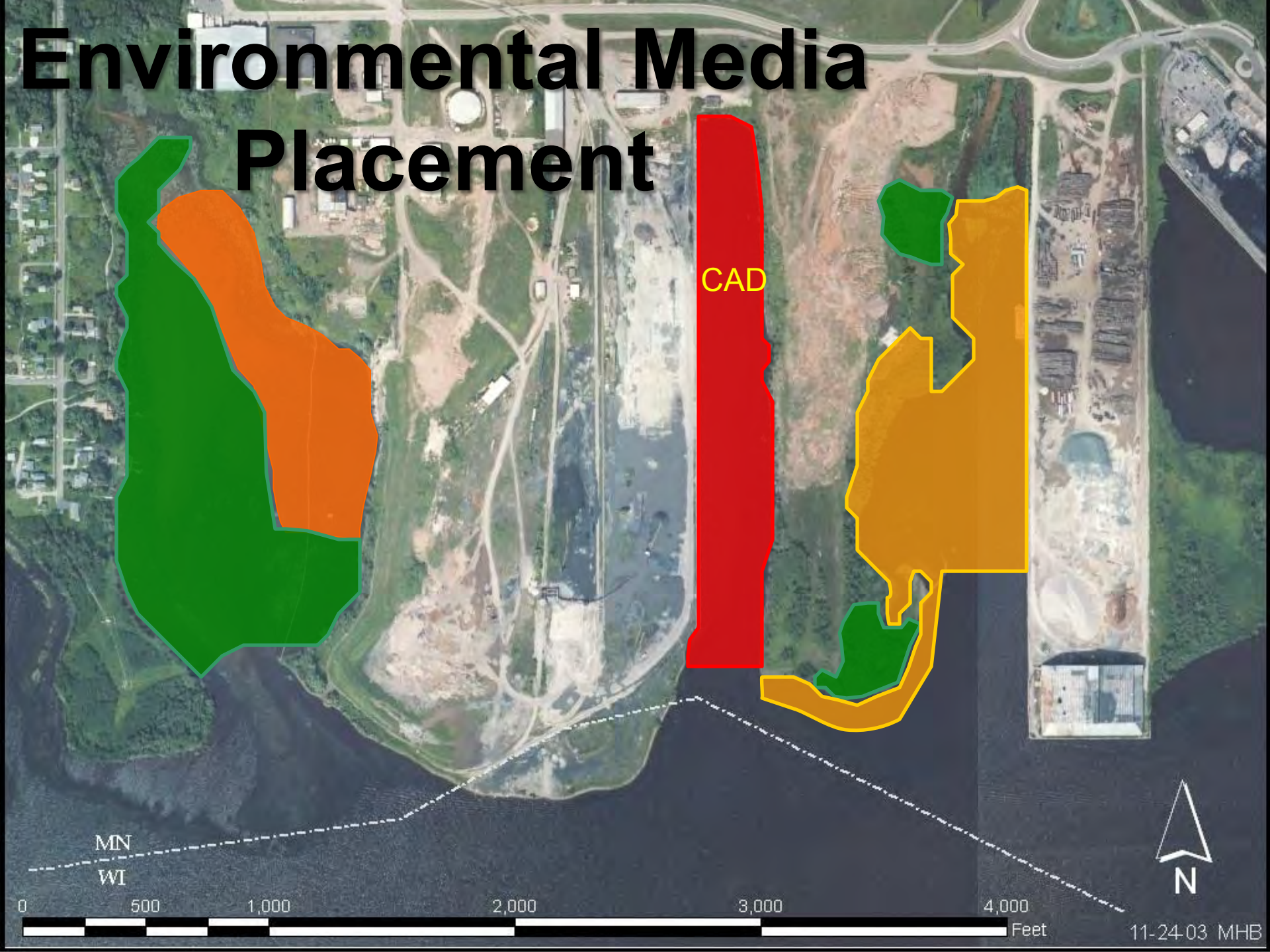
Final CAD Capping


Cad End Dike Removal


10/22/2010

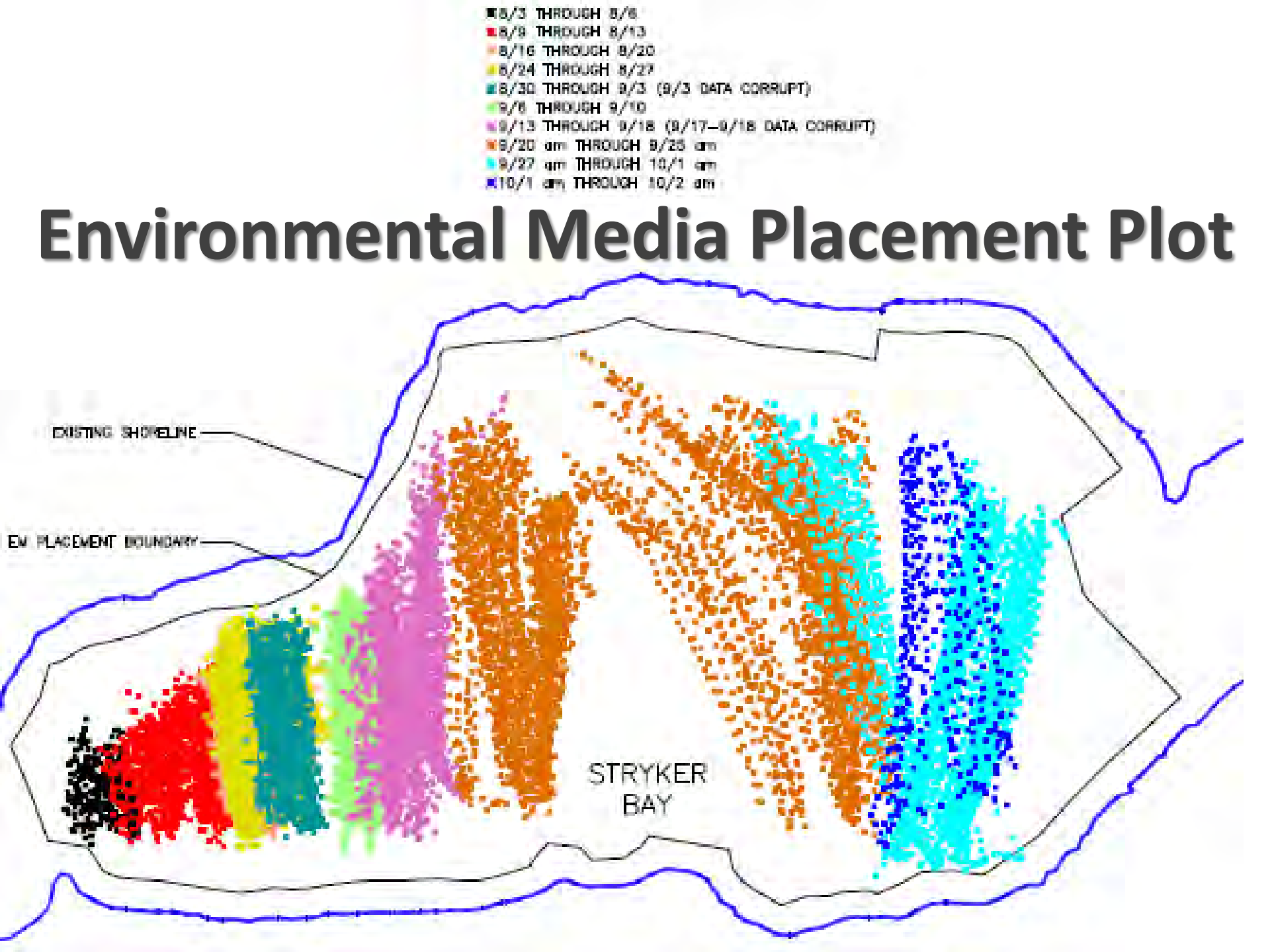
CAD End Dike Removal

Environmental Media Placement

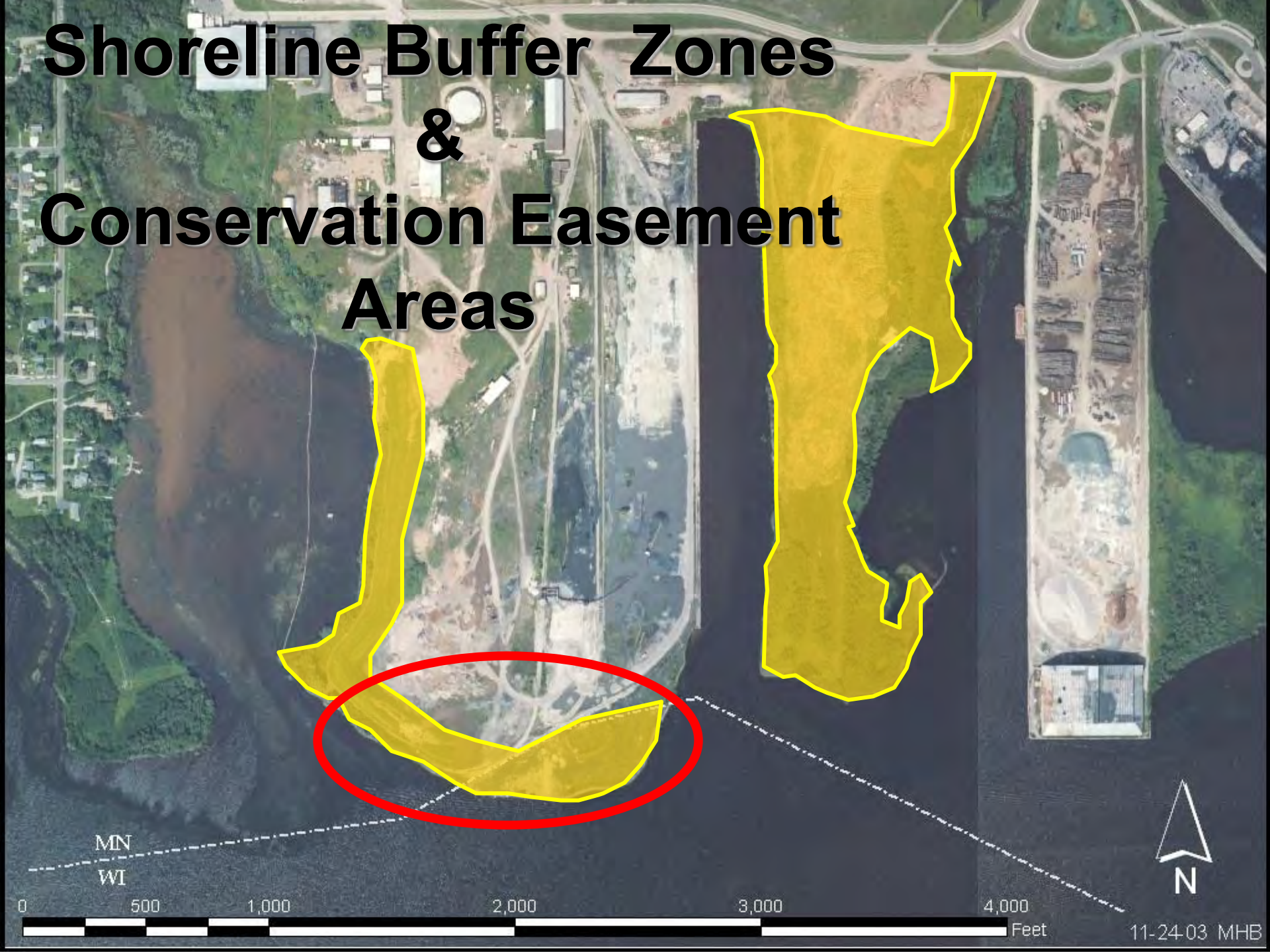



Environmental Media Pumped from
08/09/2010
Tallas Island Project to Stryker Bay


09/16/2010



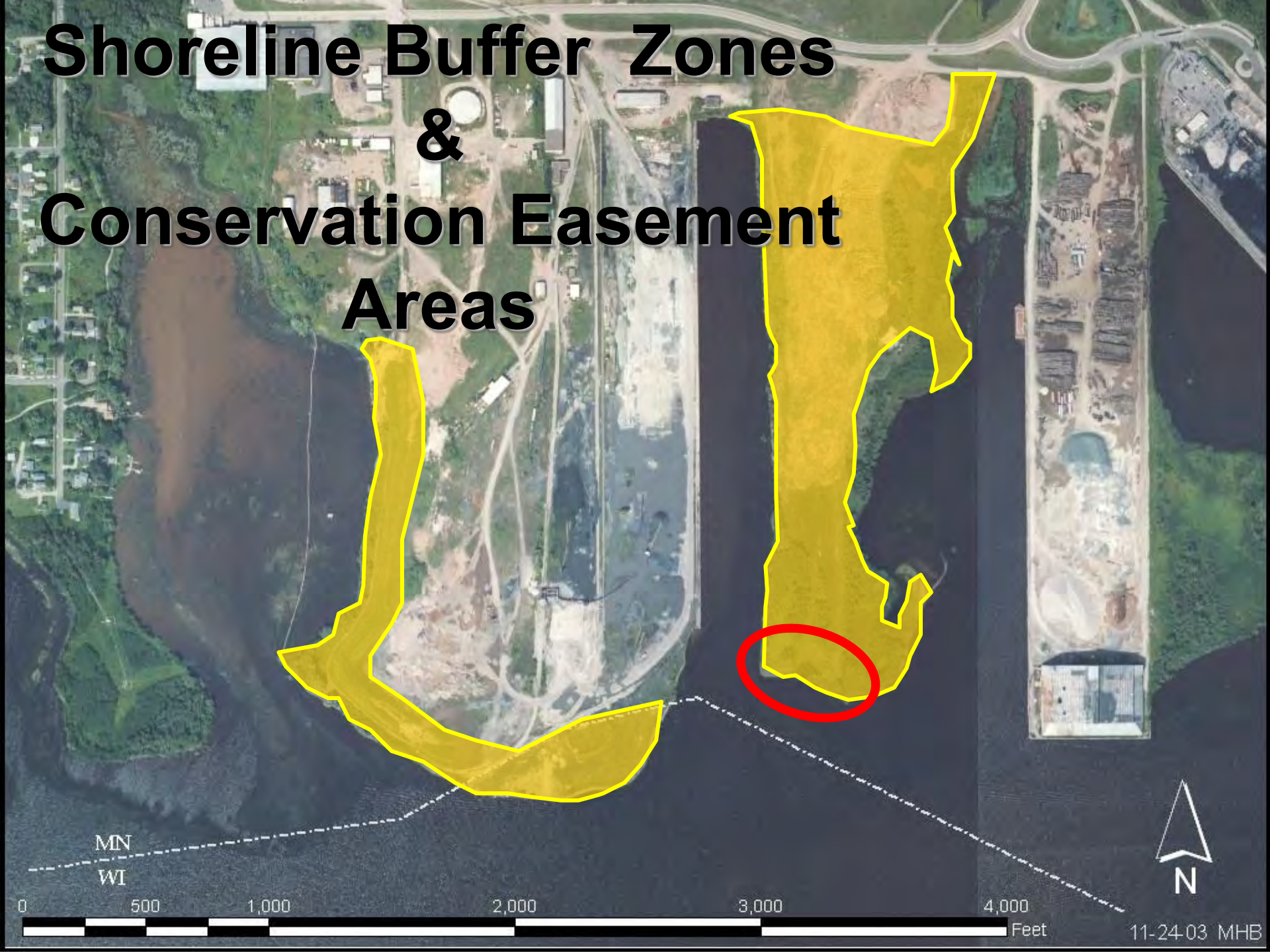
Environmental Media Placement Plot


Shoreline Buffer Zones
&
Conservation Easement
Areas
MN
WI
0
500
1,000
2,000
3,000
4,000
Feet
N
11-24-03 MHB

Shoreline Debris & Industrial Fill Prior to Removal

Shoreline Improvements


Shoreline Re-grading & Planting
11/04/2010


Shoreline Buffer Zones
&
Conservation Easement
Areas
MN
WI
0
500
1,000
2,000
3,000
4,000
Feet
N
11-24-03 MHB

Exposed Flue Dust & Slag Cliff

Bluff Face Erosion

Grading & Softening Slopes

Final Grading & Topsoil Placement

Seeding, Planting & Mulching

Slope Contouring & Topsoil Placement

Topsoil Enhancements

Tree & Shrub Planting

3375 Trees and Shrubs Planted

SLRIDT SITE RESTORATION LANDSCAPING Tree-Shrub Planting report			54-1	54-2	54-3	54-4	59-1	59-2	59-3	59-4	59-5	Install Total
Fencing	7.5" tall	3850	1150	780	220	245	340	110	120	115	720	3800
Species	Size	Qty										
Gray dogwood (Cornus racemo	24" bare rt	700	80	294			200	38	18	20	50	700
Bush honeysuckle (Diervilla lo	15" bare rt	700	250	110			90				250	700
Meadow rose (Rosa blanda)	15" #1 cont.	200	175	15							10	200
Red osier dogwood (Cornus ser	24" #1 cont.	100	6	15	24		23	4	4	4	20	100
American hazel (Corylus Amer	15" #2 cont.	75	65	10								75
Black cherry (Prunus serotina)	36" #2 cont.	50	45	5								50
Red maple (Acer rubrum)	24" #2 cont.	50	38	7							5	50
Tamarack (Larix laricina)	30" #2 cont.	50		0	5		13	4	4	4	20	50
Ninebark (Physocarpus opulifo	15" #2 cont.	50	24	5	6		4	2	2	2	5	50
White spruce (Picea glauca)	15" #2 cont.	30	22	8								30
Trembling aspen (Populus trem	36" #2 cont.	50	33	10							7	50
Big-tooth aspen (Populus grand	36" #2 cont.	50	40	10								50
Balsam poplar (Populus balsam	36" #2 cont.	20	20	0								20
Winterberry (Ilex verticillata)*	15" #2 cont.	50		0			18		6	6	20	50
White pine (Pinus strobus)	24" #5 cont.	100	38	50			4	2	2	2	2	100
Pin cherry (Prunus pensylvanic	24" #2 cont.	75	25	30			10	6	2	2		75
White cedar (Thuja occidentali	15" #1 cont.	100		10	10		22	6	6	6	40	100
Balsam fir (Abies balsamea)	20" #2 cont.	75	45	10	10		2	1	1	1	5	75
Nanny berry (Viburnum lentago	20" #2 cont.	100	14	0	27		14	2	2	4	37	100
High bush cranberry (Viburnum	15" #2 cont.	200	41	45			38	14	14	9	39	200
Mountain maple (Acer spicatum	10" #2 cont.	100		40	38		11	5	3	3		100
Round leaf serviceberry (Amel	15" #1 cont.	50	38	7							5	50
Regent serviceberry (Amelanch	30" #2 cont.	100	39	20	36						5	100
Staghorn sumac (Rhus hirta)	12" 4" pots	100	77	12			7	2		2		100
Smooth sumac (Rhus glabra)	12" 4" pots	100	100	0								100
Black chokeberry (Aronia melo	15" 4" pots	100	44	37	10		9					100
Totals		3375	1259	750	166		465	86	64	65	520	3375

Shoreline Improvements


11/12/2010

St. Louis River/Interlake/Duluth Tar Site (SLRIDT)

Thank You
It's a Wrap!

Minnesota Pollution Control Agency