BASE MAP SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, ASHLAND, WISCONSIN, DATED 1964, PHOTOREVISED 1975.

QUADRANGLE LOCATION

NORTH

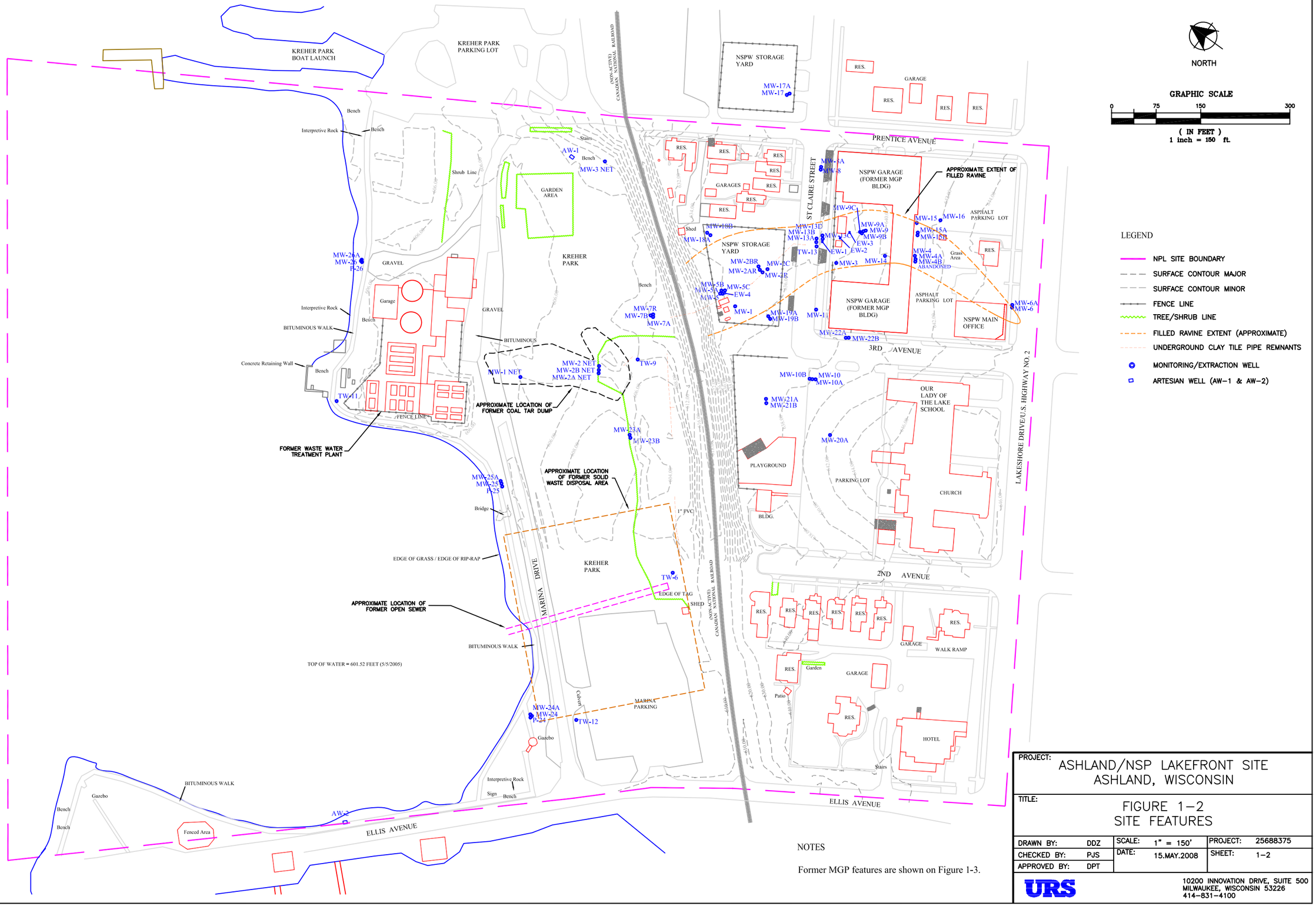
0 1320 2640 5280

SCALE IN FEET

PROJECT: ASHLAND/NSP LAKEFRONT SITE ASHLAND, WISCONSIN		
TITLE: FIGURE 1–1 SITE LOCATION		
DRAWN BY: DDZ	SCALE: 1" = 2640'	PROJ. NO. 25688375
CHECKED BY: PJS	DATE: 15.MAY.2008	SHEET: 1–1
APPROVED BY: DPT		

URS

10200 INNOVATION DRIVE, SUITE 500
MILWAUKEE, WISCONSIN 53226
414–831–4100



NOTES

Former MGP features are shown on Figure 1-3.

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: FIGURE 1–2
SITE FEATURES

DRAWN BY: DDZ	SCALE: 1" = 150'	PROJECT: 25688375	
CHECKED BY: PJS	DATE: 15.MAY.2008	SHEET: 1–2	
APPROVED BY: DPT			

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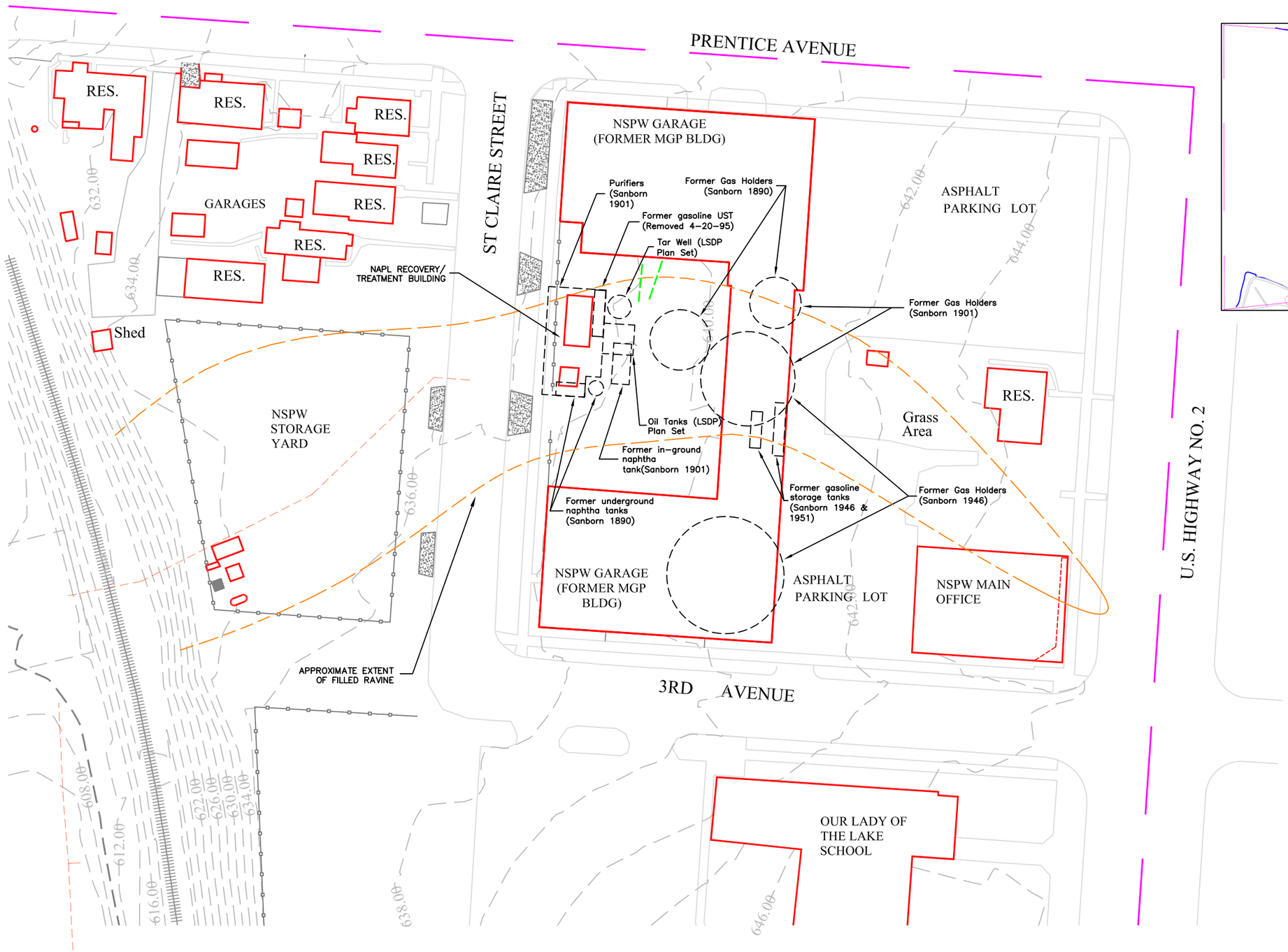
414–831–4100



OVERVIEW MAP

NORTH

GRAPHIC SCALE

0 30 60 120

(IN FEET)
1 inch = 60 ft.

LEGEND

- NPL SITE BOUNDARY
- SURFACE CONTOUR MAJOR
- SURFACE CONTOUR MINOR
- FENCE LINE
- FILLED RAVINE EXTENT (APPROXIMATE)
- UNDERGROUND PIPE REMNANTS
- UNDERGROUND CLAY TILE PIPE REMNANTS

PROJECT: ASHLAND/NSP LAKEFRONT SITE ASHLAND, WISCONSIN			
TITLE: FIGURE 1-3 FORMER MGP FEATURES			
DRAWN BY: DDZ	SCALE: 1" = 60'	PROJECT: 25688375	
CHECKED BY: PJS	DATE: 15.MAY.2008	SHEET: 1-3	
APPROVED BY: DPT			

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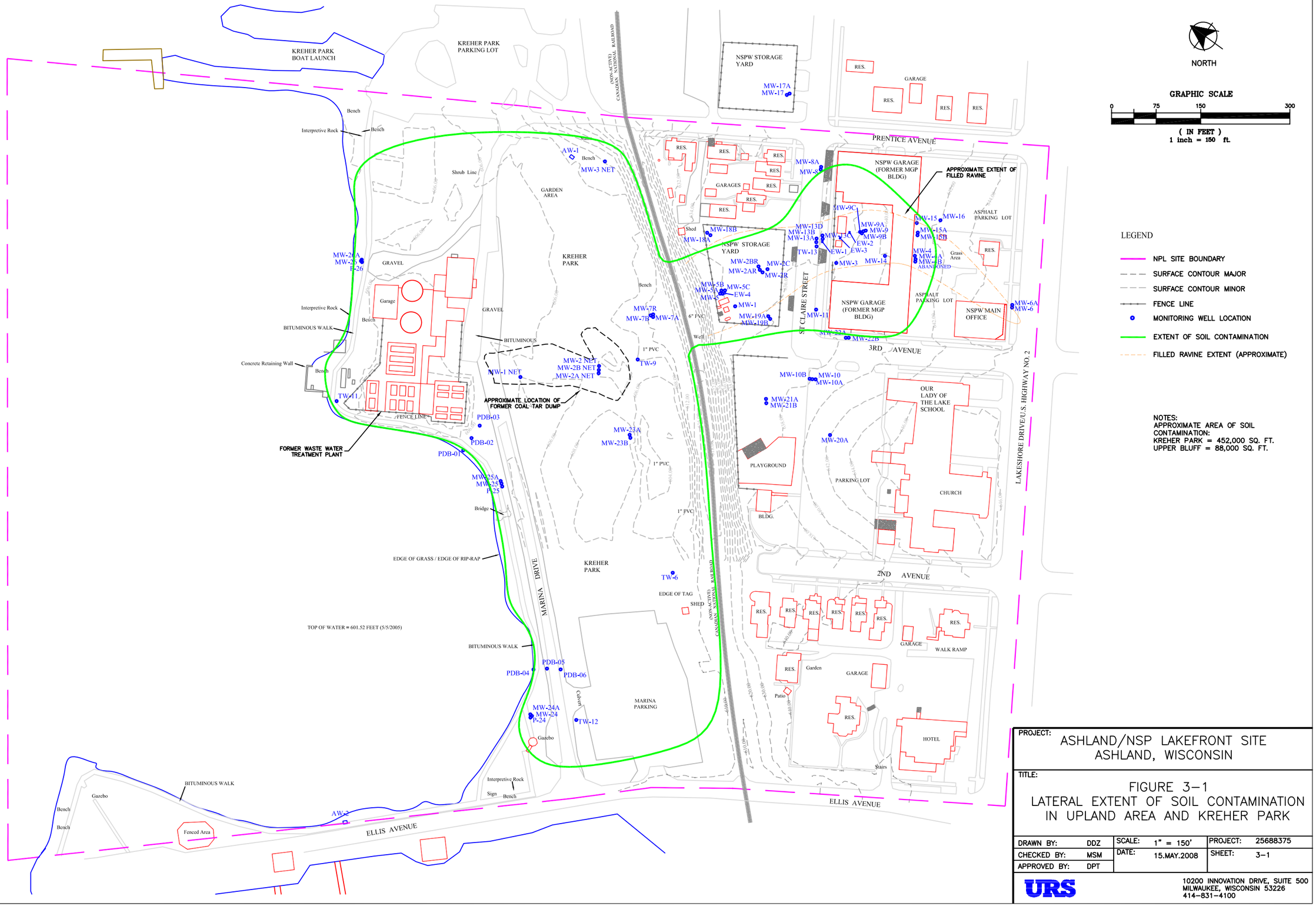

PROJECT:
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE:
FIGURE 3–1
LATERAL EXTENT OF SOIL CONTAMINATION IN UPLAND AREA AND KREHER PARK

DRAWN BY:	DDZ	SCALE:	1" = 150'	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	3–1
APPROVED BY:	DPT				

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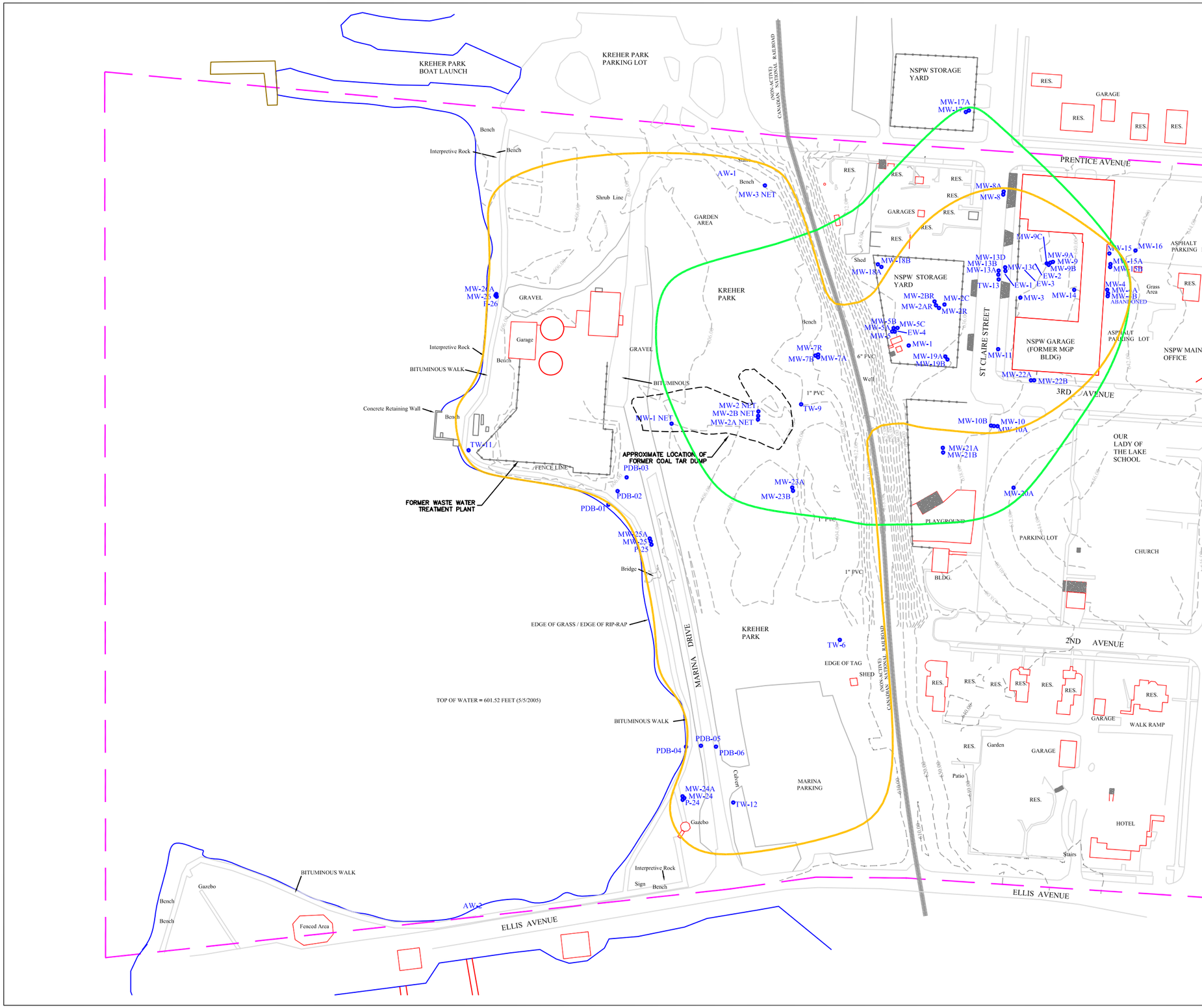
414–831–4100



NORTH

GRAPHIC SCALE

0 75 150 300

(IN FEET)
1 inch = 150 ft.

LEGEND

- NPL SITE BOUNDARY
- SURFACE CONTOUR MAJOR
- SURFACE CONTOUR MINOR
- FENCE LINE
- MONITORING WELL LOCATION
- EXTENT OF GROUNDWATER CONTAMINATION – SHALLOW
- EXTENT OF GROUNDWATER CONTAMINATION – COPPER FALLS

NOTES:
APPROXIMATE AREA OF GROUNDWATER CONTAMINATION FOR SHALLOW WELLS:
KREHER PARK = 452,000 SQ. FT.
UPPER BLUFF = 118,000 SQ. FT.

APPROXIMATE AREA OF GROUNDWATER CONTAMINATION FOR COPPER FALLS WELLS:
KREHER PARK = 103,000 SQ. FT.
UPPER BLUFF = 198,000 SQ. FT.

PROJECT:
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE:
FIGURE 3–2
LATERAL EXTENT OF SHALLOW AND DEEP GROUNDWATER CONTAMINATION

DRAWN BY:	DDZ	SCALE:	1" = 150'	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	3–2
APPROVED BY:	DPT				

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MILWAUKEE, WISCONSIN 53226
414–831–4100

Legend

All Sed Results - Total PAH ppm

Total PAH ppm

- ND
- 1 - 5
- 6 - 10
- 11 - 100
- 101 - 200
- 201 - 1000
- >1000

0 50 100 200 300 400 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 3-3
Area of Impacted Sediment

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	3-3
APPROVED BY:	DPT				

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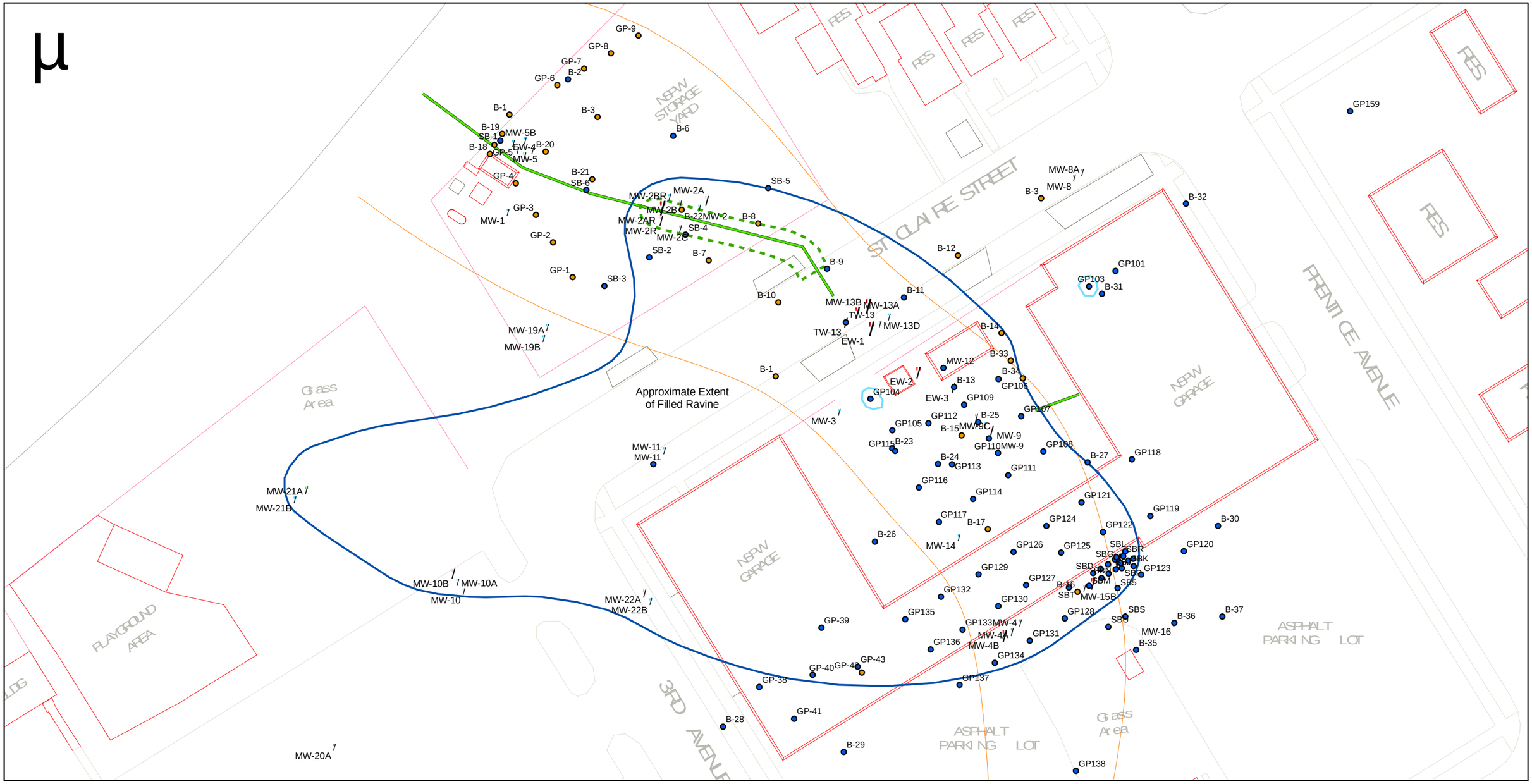

Legend

Free Product thickness (feet)
Maximum by well

- 0
- 0.1 - 1
- 1.1 - 5
- 5.1 - 10
- 10.1 - 26.3
- Historical Soil Borings
- Soil Sample Locations

Free Product Extent
Label

- April 2005 geoprobes
- Copper Falls wells
- Free Product Extent Inferred - Filled Ravine
- Free Product Extent - Filled Ravine
- 2001 Clay Tile Investigation

0 25 50 75 100 Feet

Note:
Free product extent between TW-13 and MW-2R is based on recent data, which indicates the free product plume in this area is significantly declining (dashed line where inferred).
Free product is assumed to approximate trace of clay tile which was removed in 2001.
Wells MW-2, MW-2A, and MW-2B were abandoned during the 2001 clay tile investigation.
Historical soil borings indicate locations with no associated laboratory data.

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 3-4
Extent of DNAPL in
Upper Bluff, Filled Ravine, and Copper Falls

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	3-4
APPROVED BY:	DPT				

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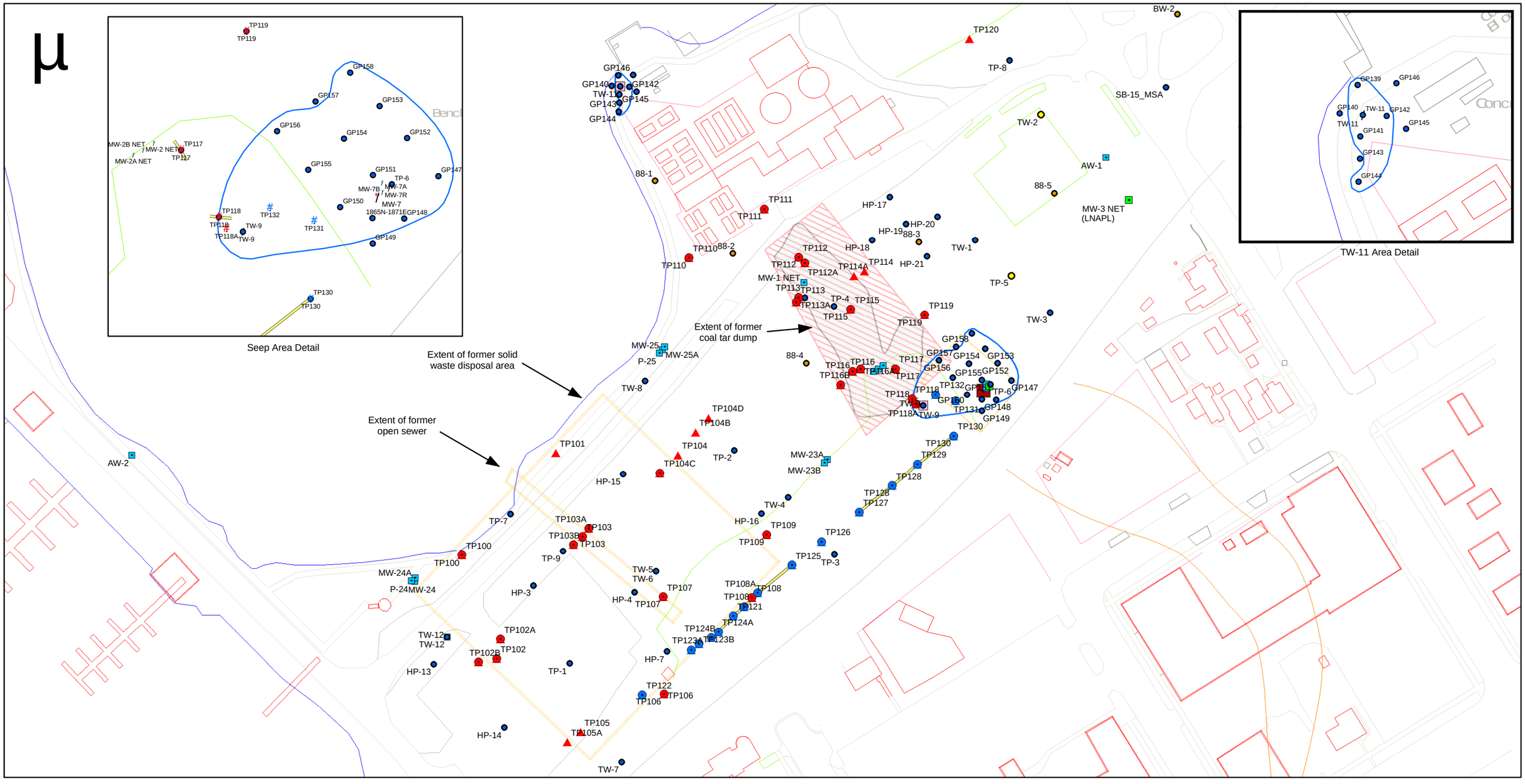

Legend

Free Product thickness (feet)

Maximum by well

- 0
- 0.1 - 1
- 1.1 - 5
- 5.1 - 10
- 10.1 - 26.3

- 2005 RI clay pipe investigation
- Free Product Extent - Kreher Park
- Removal - Soil Excavation

- Soil Sample Locations
- Historical Soil Borings
- 1994 Locations

Test Pit locations with LNAPL

Event Date

- Nov 2005
- June 2005

Test Pit locations without LNAPL

Event Date

- Nov 2005
- June 2005

0 37.5 75 150 225 300 Feet

Note:
Defined boundaries shown at seep area and TW-11 indicate probable extent of DNAPL.
Symbols denoting LNAPL where encountered in borings and test pits are shown seperately.
Well MW-7 was abandoned during the 2002 seep remediation.
Historical soil borings indicate locations with no associated laboratory data.
1994 locations shown indicated oily sheen in soil cuttings in TW-2 and oil present on wood pieces in TP-5.

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 3-5
Extent of DNAPL in Kreher Park

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	3-5
APPROVED BY:	DPT				

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MILWAUKEE, WISCONSIN 53226
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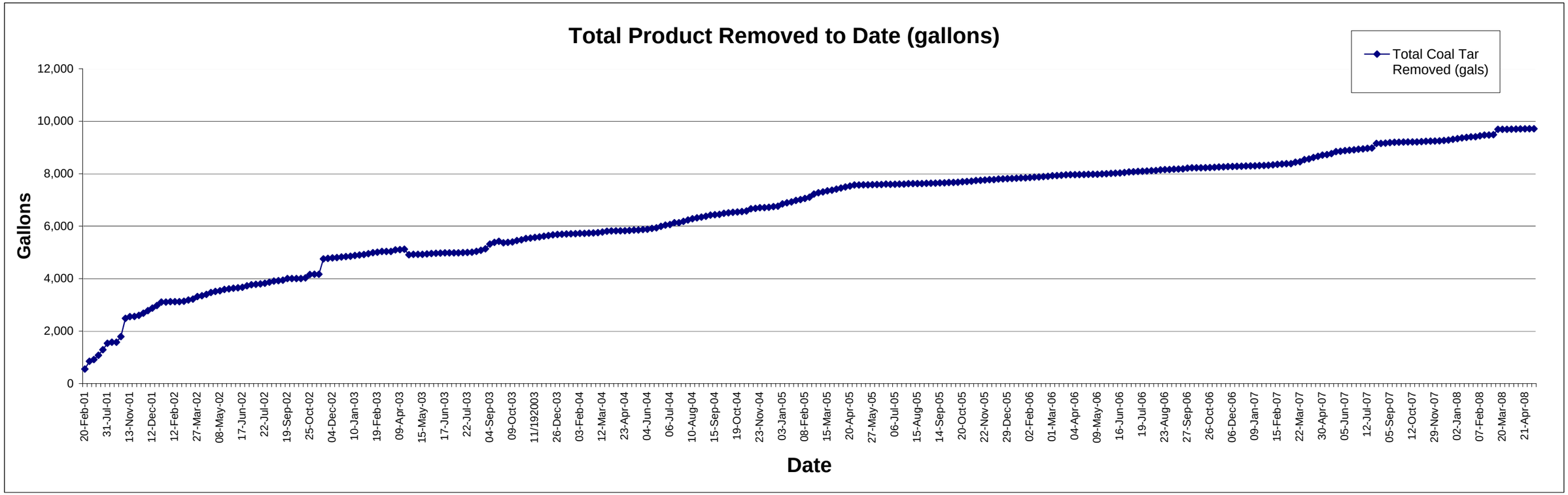
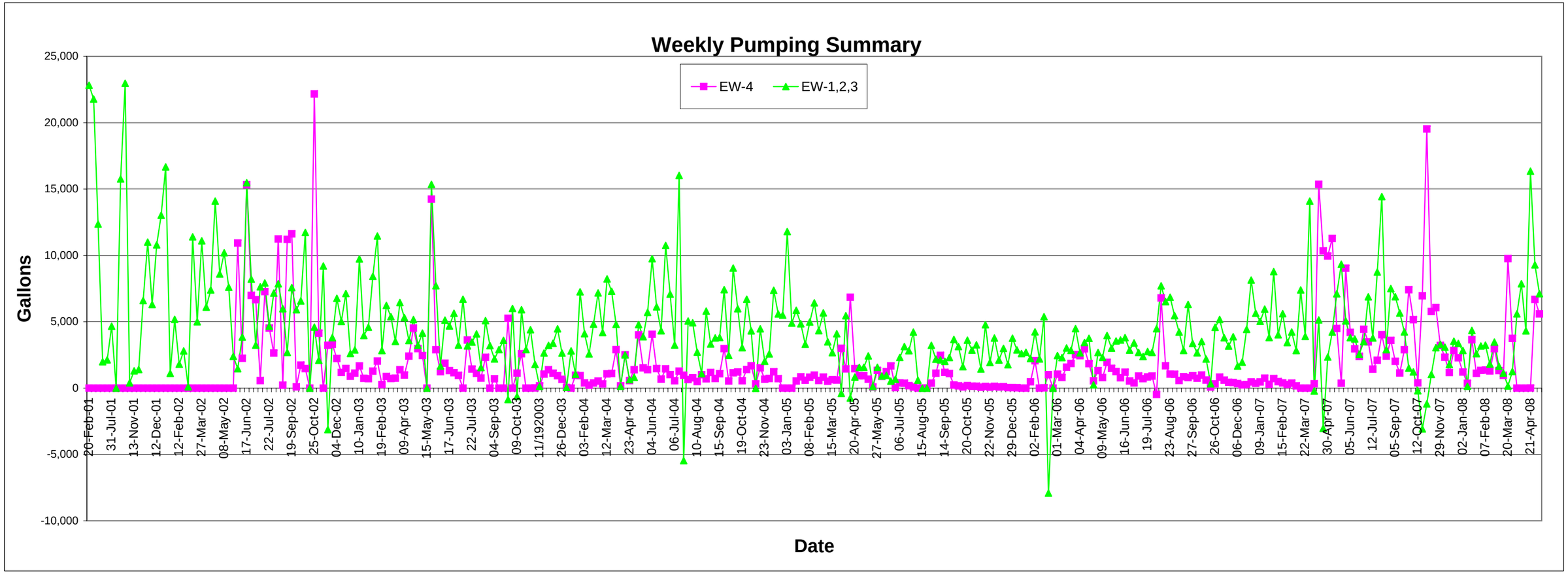
Figure 4-1
Total Product Removed to Date
Northern States Power, Ashland, Wisconsin

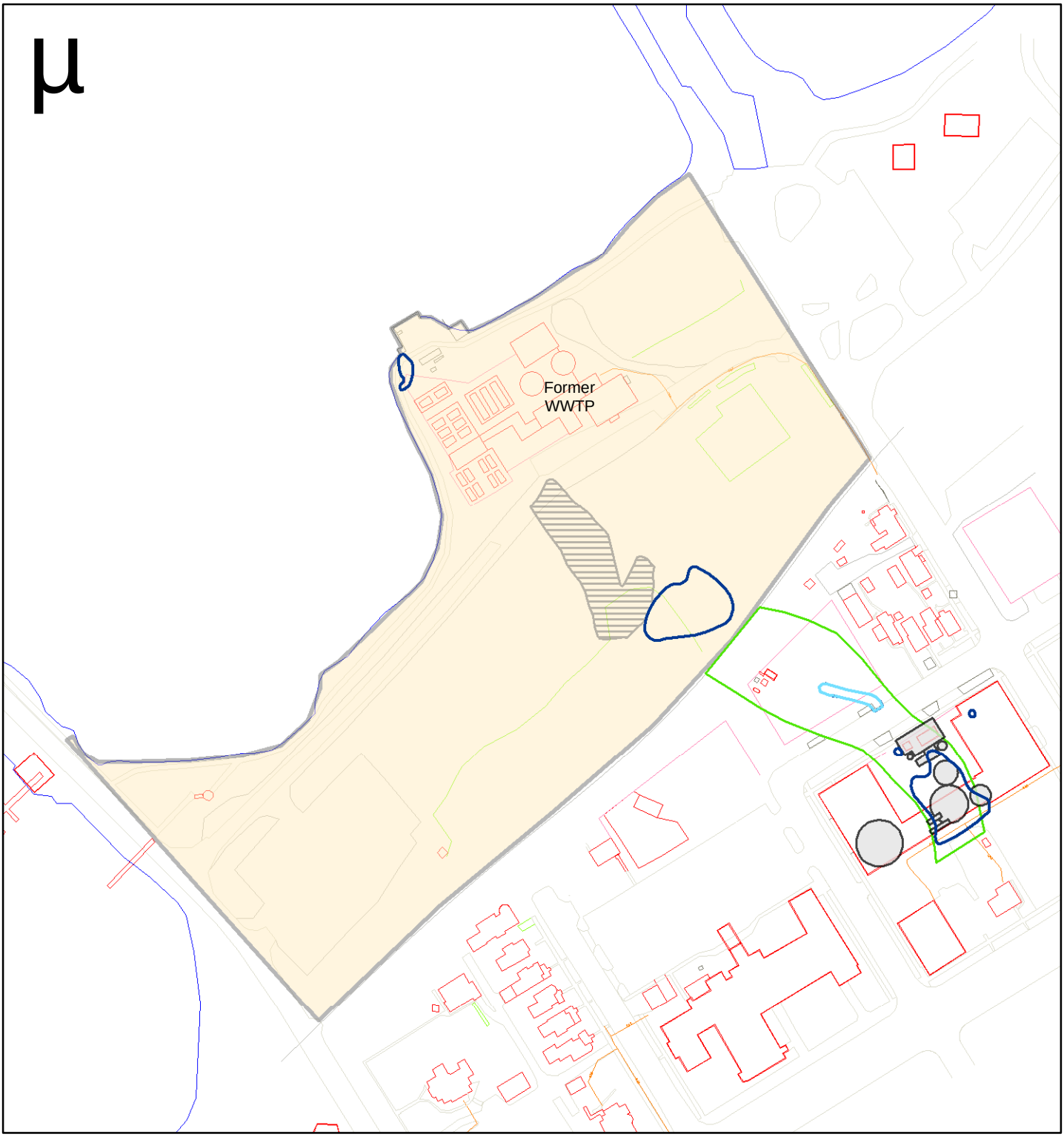


See Table 4-1 for a summary of treatment system volumes.

Figure 4-2
Weekly Pumping Summary
Northern States Power, Ashland, Wisconsin



See Table 4-1 for a summary of treatment system volumes.
Negative numbers indicate corrections made to flow readings due to system maintenance.



Legend

- Clay Tile DNAPL Area
- DNAPL Extent
- Former Coal Tar Dump Area
- Former MGP Tanks/holders
- Filled Ravine - Unlimited Removal Excavation Area
- Kreher Park - Unlimited Removal Excavation Area

0 75 150 225 300 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 6-1
Existing Conditions at
Upper Bluff Area & Kreher Park

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	6-1
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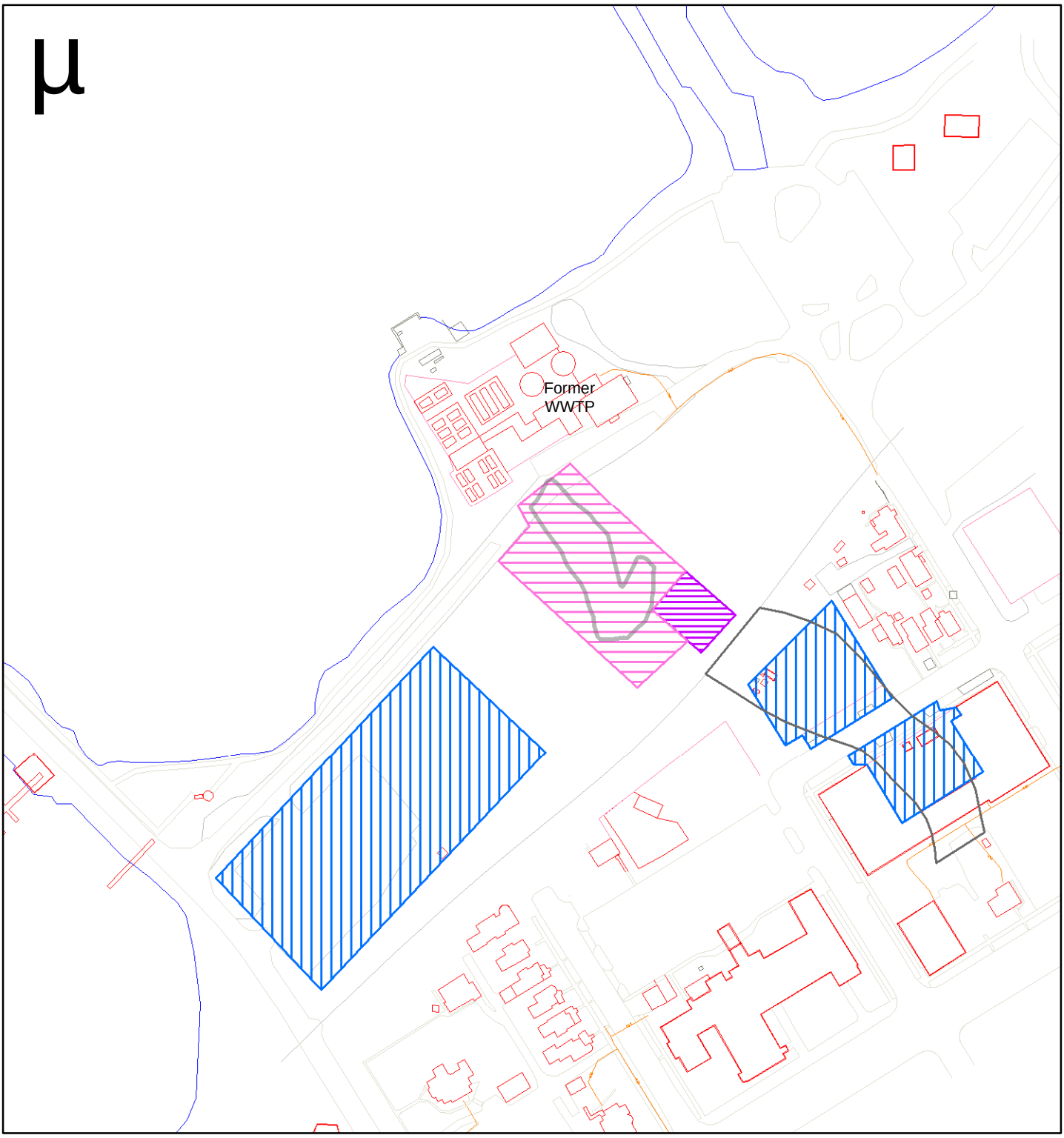

Legend

- Former Coal Tar Dump Area
- Filled Ravine
- Asphalt pavement (new)
- Low Permeability Clay Cap
- Existing Surface Barrier - Former Seep Area

0 75 150 225 300 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 6-2
Engineered Surface Barriers
Upper Bluff Area & Kreher Park

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	6-2
APPROVED BY:	DPT				

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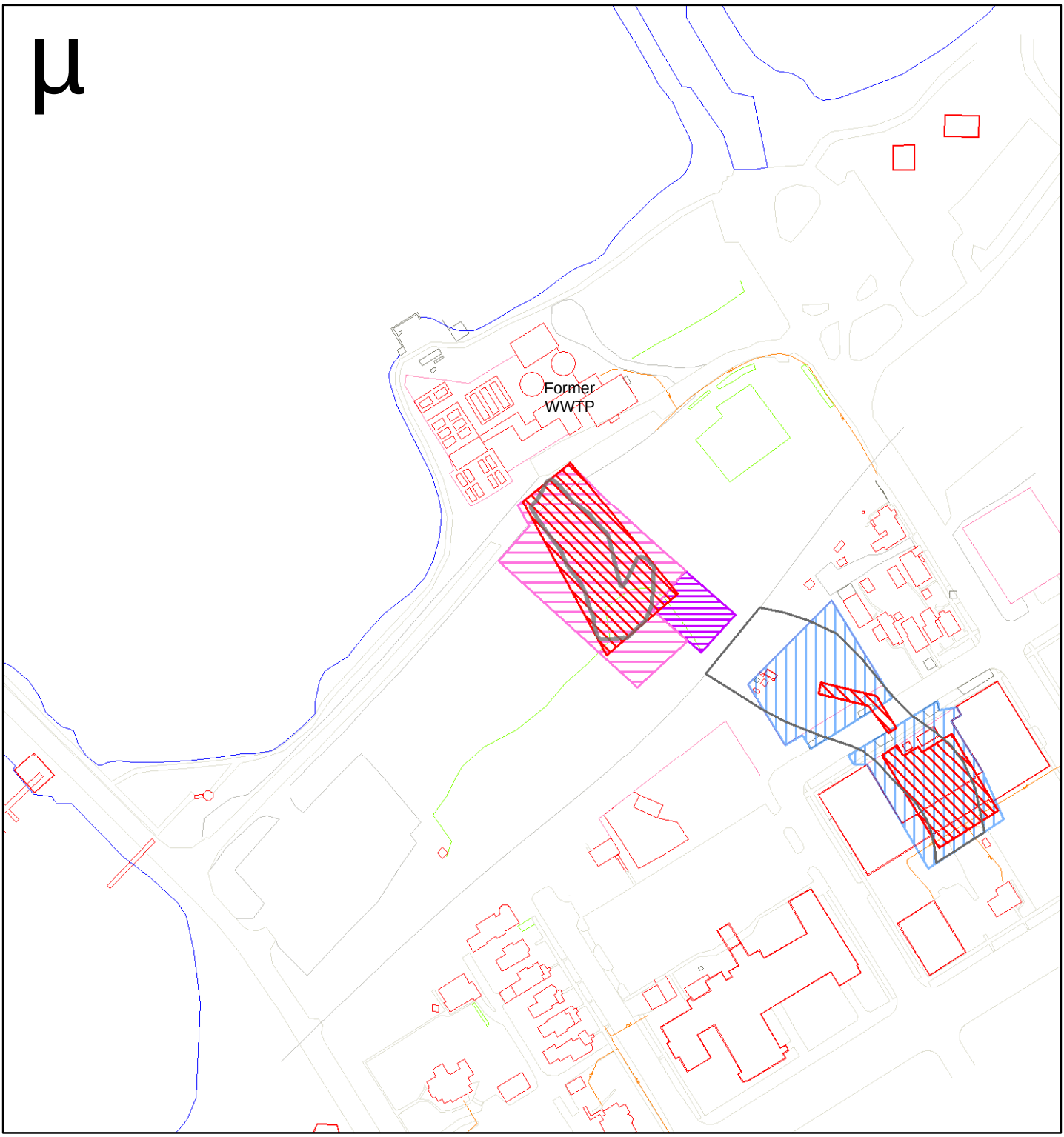

Legend

- Former Coal Tar Dump Area
- Filled Ravine
- Soil Excavation Area - Limited Removal Area
- Asphalt pavement (new)
- Low Permeability Clay Cap
- Existing Surface Barrier - Former Seep Area

0 75 150 225 300 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 6-3A
Limited Removal & Off-site Disposal
Upper Bluff Area & Kreher Park

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	6-3A
APPROVED BY:	DPT				

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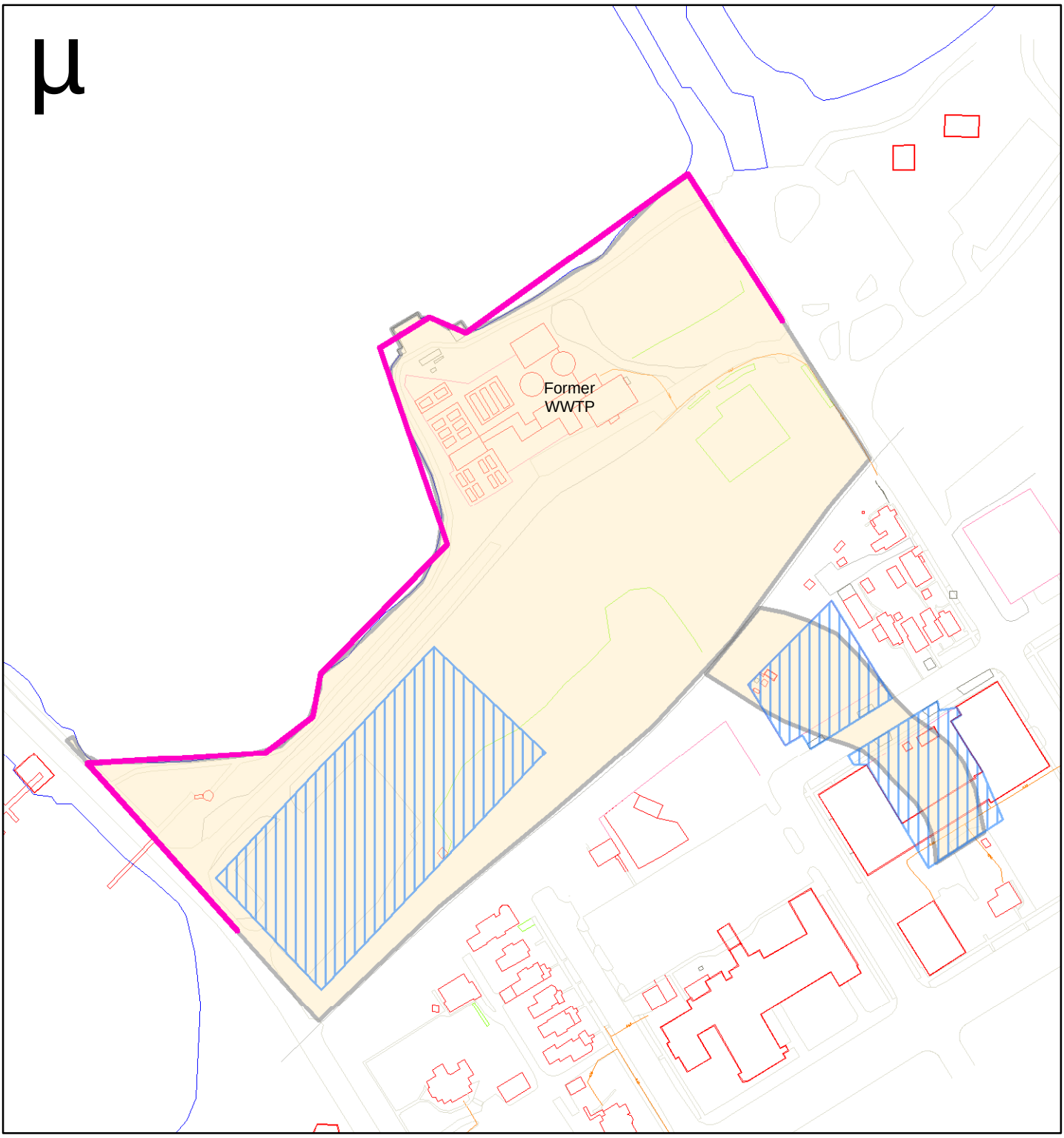
414-831-4100



Legend

- Vertical Barrier Wall
- Asphalt pavement (new)
- Filled Ravine - Unlimited Removal Area
- Kreher Park Extent of Fill - Unlimited Removal Area

0 75 150 225 300 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 6-3B
Unlimited Removal & Off-site Disposal
Upper Bluff Area & Kreher Park

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	6-3B
APPROVED BY:	DPT				

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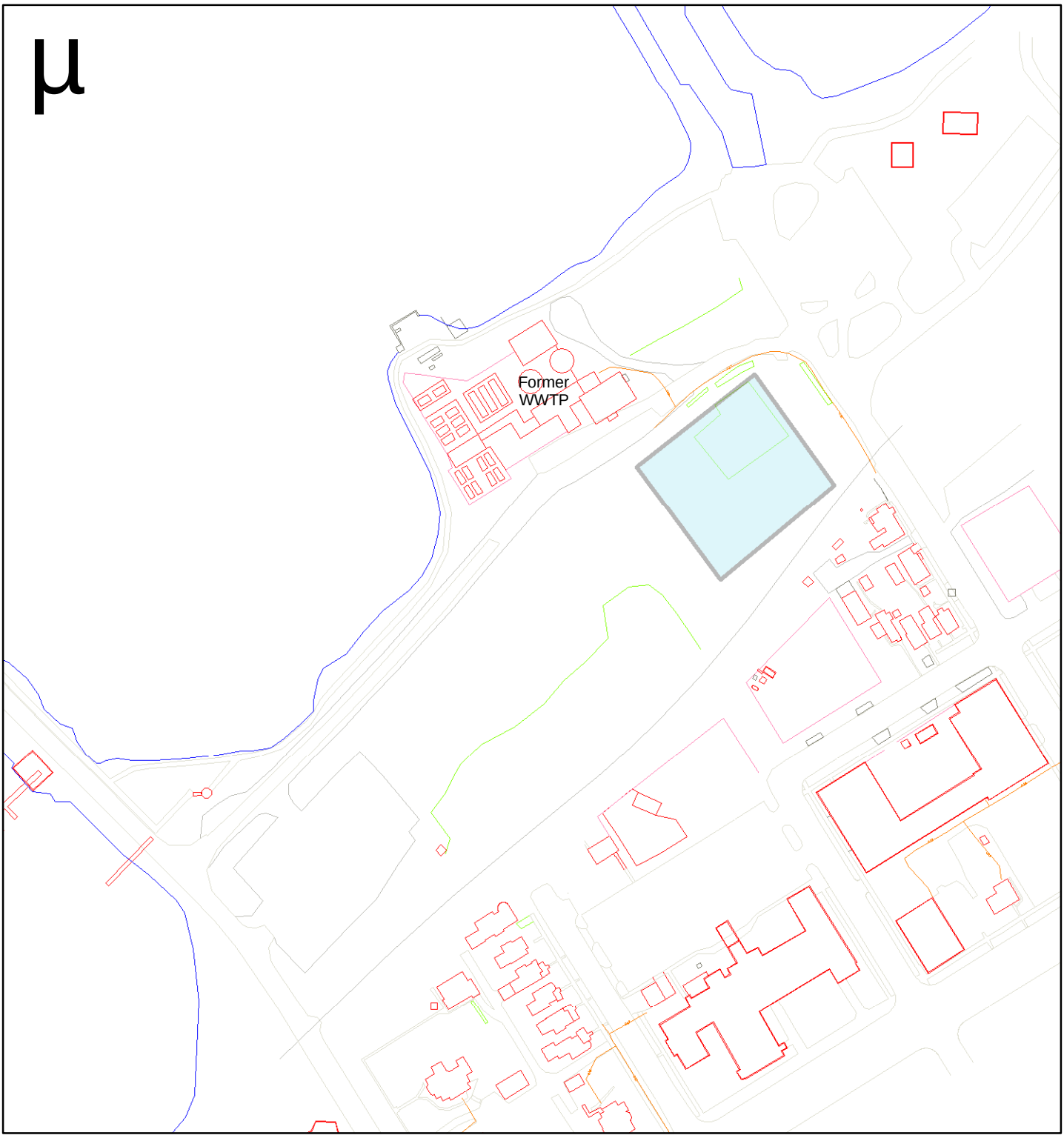

Legend

Disposal Cell - Approximately One Acre

0 75 150 225 300 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE ASHLAND, WISCONSIN			
TITLE: Figure 6-4A On Site Disposal - Kreher Park One Acre Disposal Cell			
DRAWN BY: DDZ	SCALE: AS SHOWN	PROJECT: 25688375	
CHECKED BY: MSM	DATE: 15.MAY.2008	SHEET: 6-4A	
APPROVED BY: DPT			

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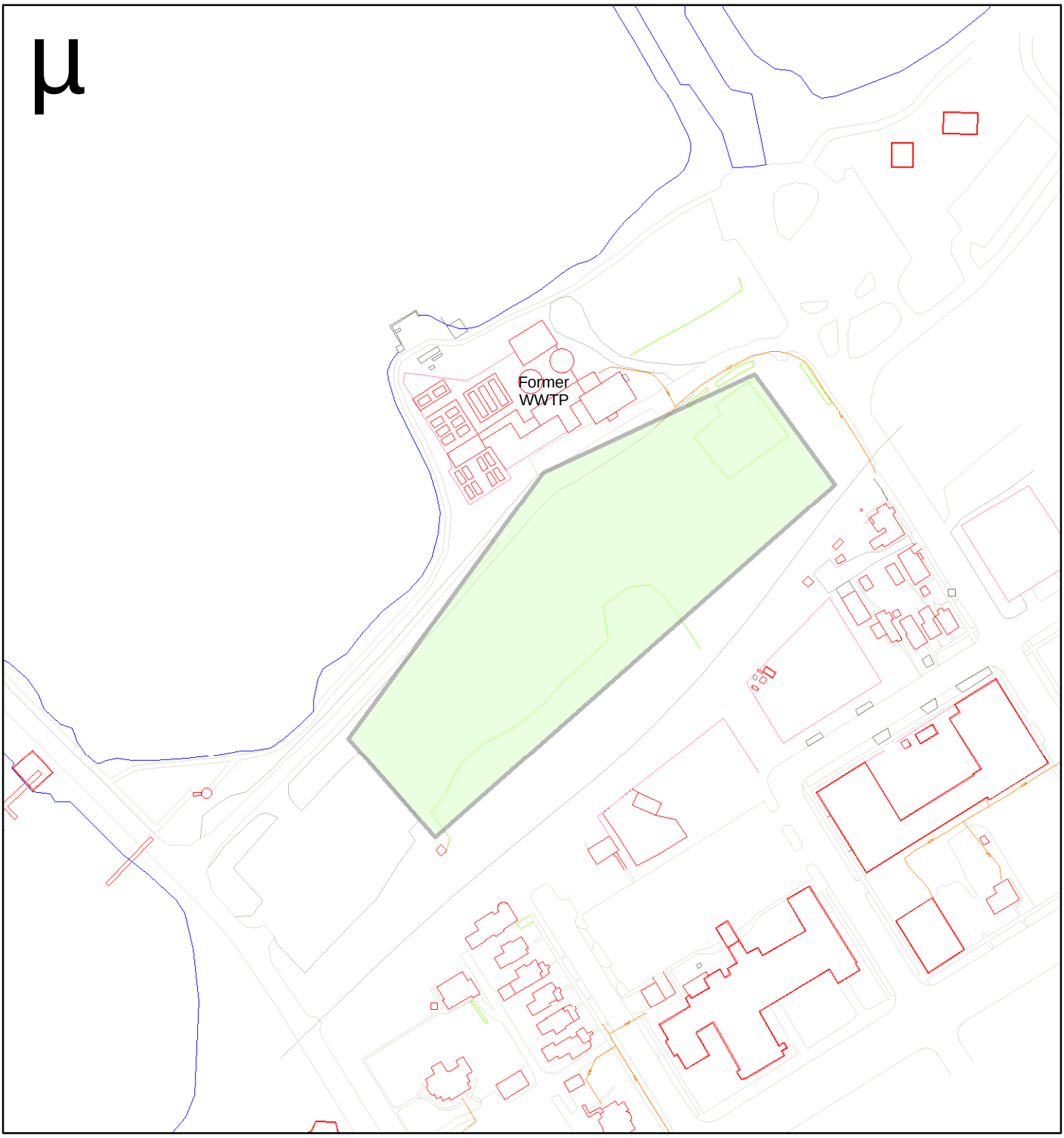

Legend

Disposal Cell - Approximately Four Acres

0 75 150 225 300 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE ASHLAND, WISCONSIN			
TITLE: Figure 6-4B On Site Disposal - Kreher Park Four Acre Disposal Cell			
DRAWN BY: DDZ	SCALE: AS SHOWN	PROJECT: 25688375	
CHECKED BY: MSM	DATE: 15.MAY.2008	SHEET: 6-4B	
APPROVED BY: DPT			

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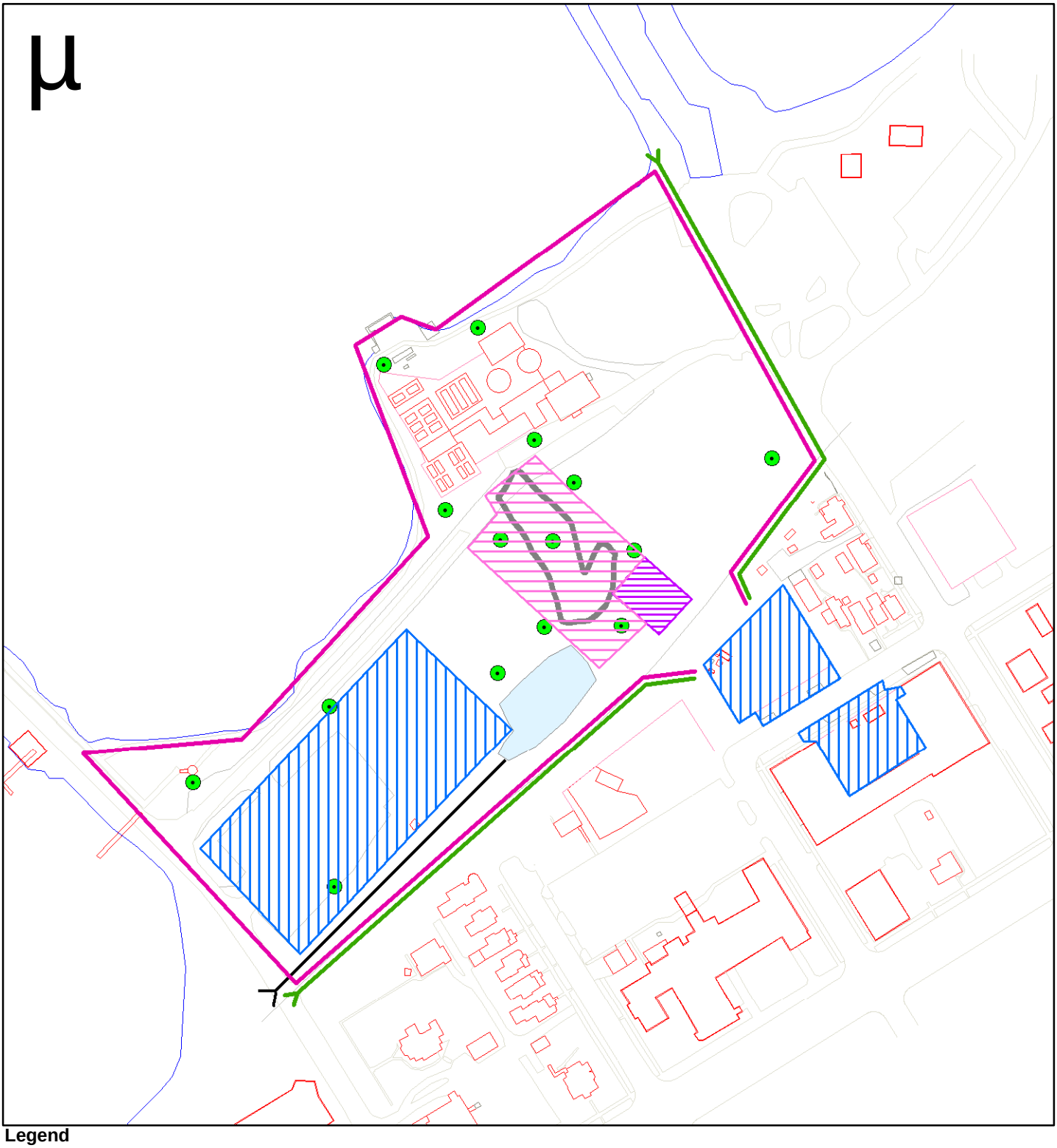

Legend

- Asphalt pavement (new)
- Low Permeability Clay Cap
- Existing Surface Barrier - Former Seep Area
- Vertical Barrier Wall
- Pressure Relief Wells
- Stormwater Outfall
- Stormwater Basin
- Stormwater Diversion Tile
- Former Coal Tar Dump Area

0 75 150 225 300 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-1
Containment Using Engineered Surface and Vertical Barriers

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-1
APPROVED BY:	DPT				

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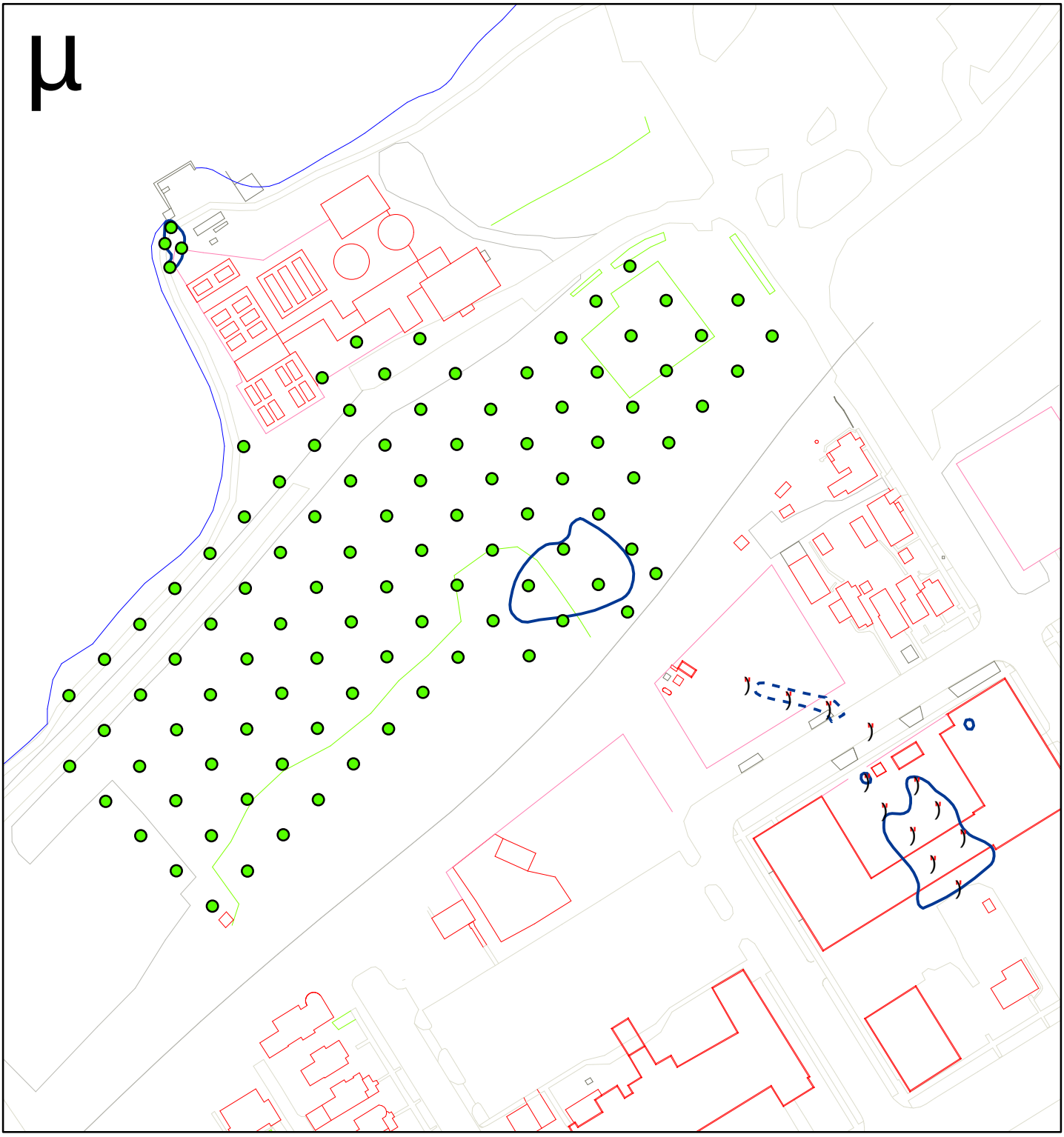

Legend

- Clay Tile DNAPL Area
- DNAPL Extent

Groundwater ozone sparging location

- Kreher Park
- Ravine

0 75 150 225 300 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-2A
In-Situ Ozone Sparging
Shallow Groundwater at Upper Bluff & Kreher Park

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-2A
APPROVED BY:	DPT				

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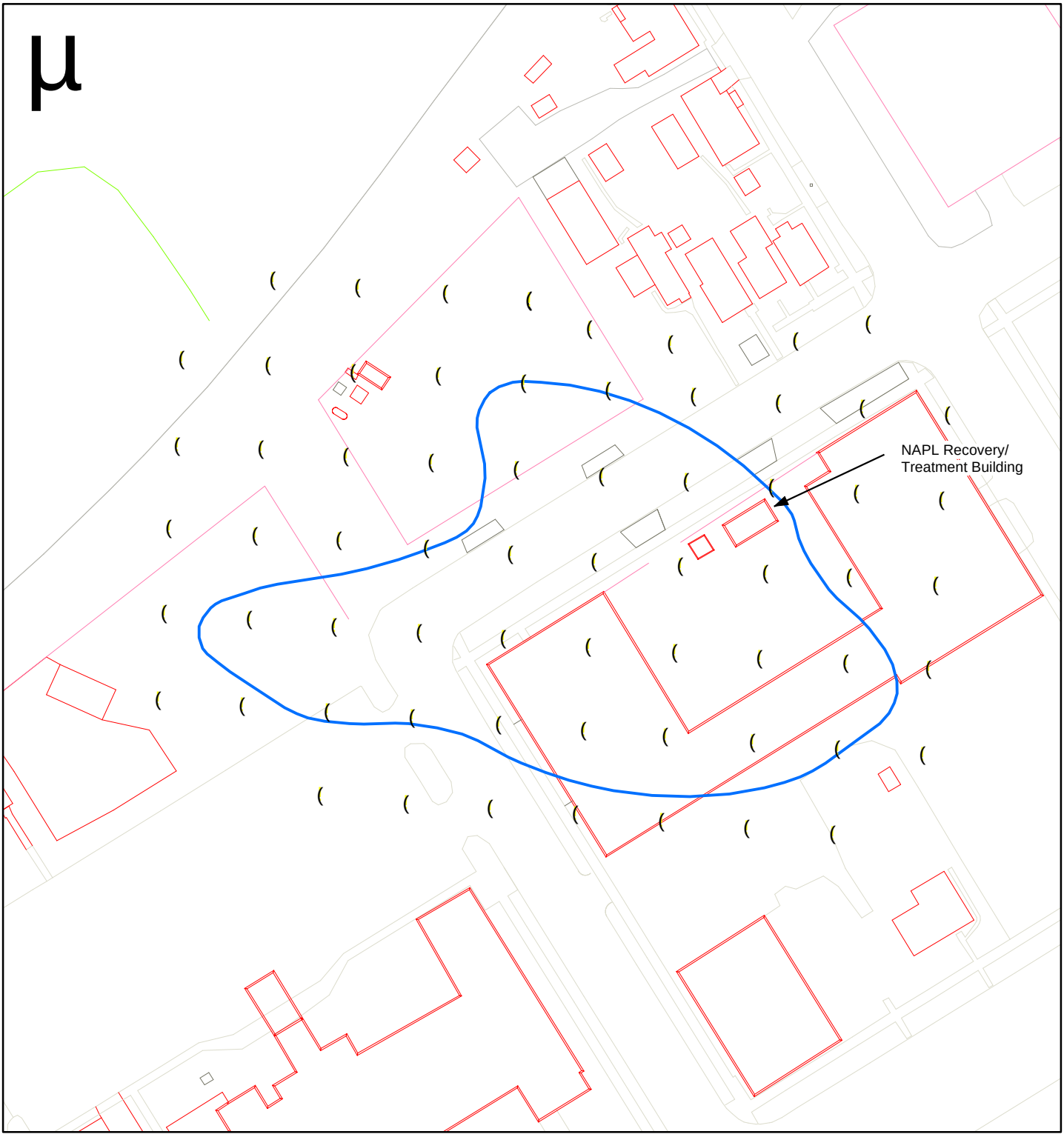

Legend

NAPL extent - Copper Falls

(Groundwater ozone sparge - Copper Falls Aquifer

0 30 60 90 120 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE ASHLAND, WISCONSIN			
TITLE: Figure 7-2B In-Situ Ozone Sparging Copper Falls Aquifer			
DRAWN BY: DDZ	SCALE: AS SHOWN	PROJECT: 25688375	
CHECKED BY: MSM	DATE: 15.MAY.2008	SHEET: 7-2B	
APPROVED BY: DPT			

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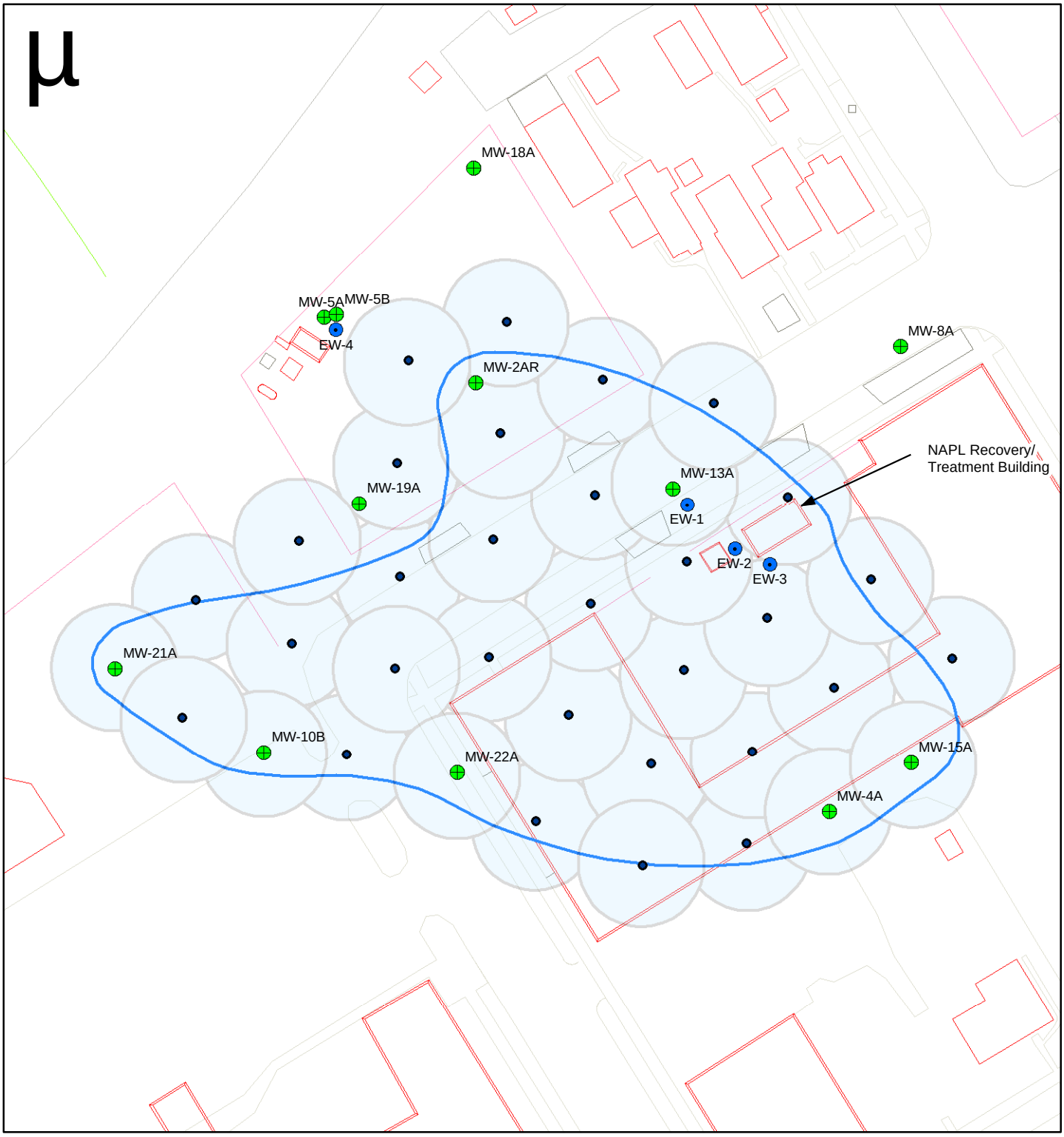

Legend

- Existing Piezometer
- Existing Extraction Wells
- Proposed Injection/extraction Well
- Proposed Injection/extraction Well (Area of Influence)
- NAPL extent - Copper Falls aquifer

0 25 50 75 100 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-3
Surfactant Injection & Dual Phase
Recovery - Copper Falls aquifer

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-3
APPROVED BY:	DPT				

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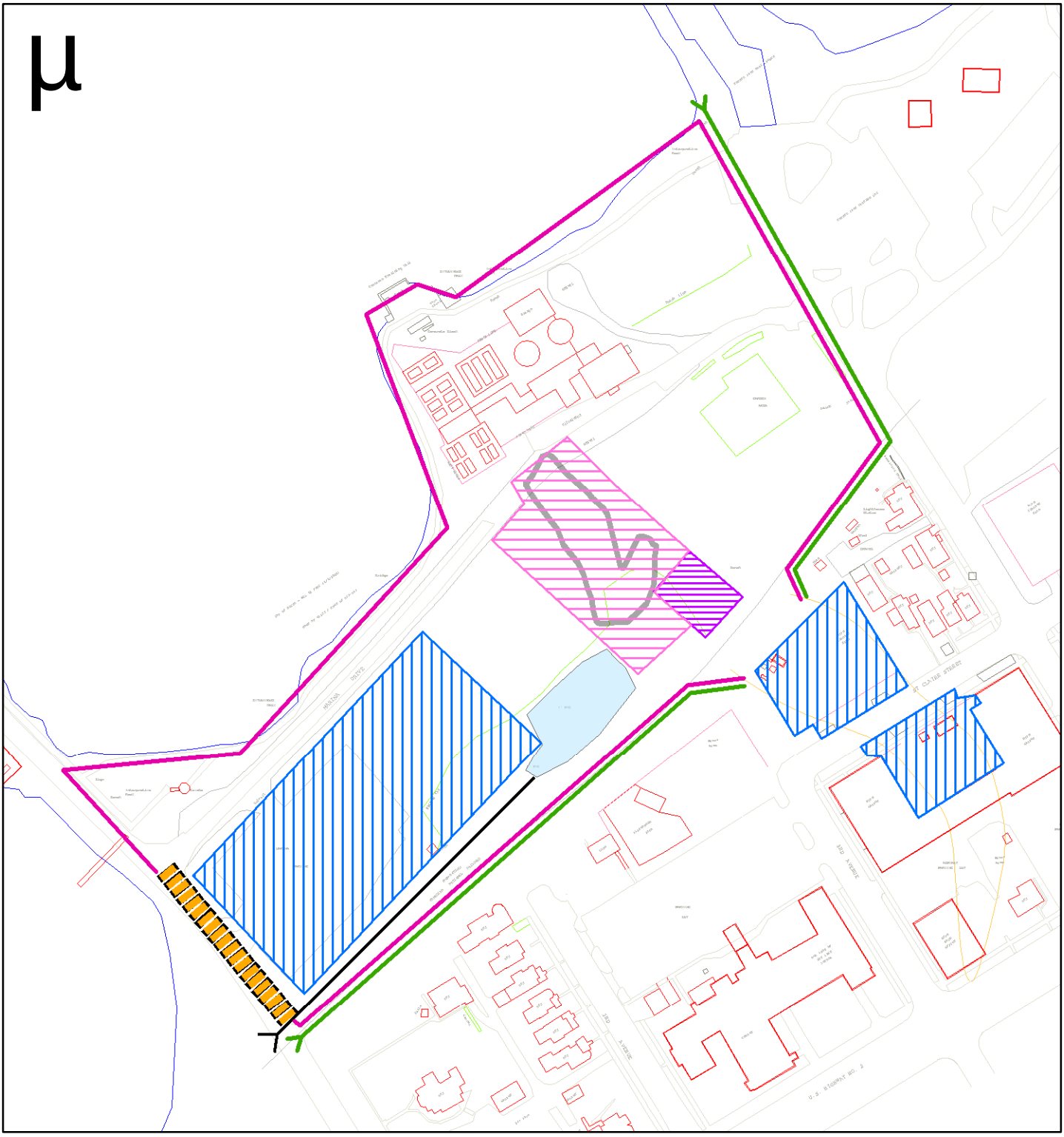
414-831-4100



Legend

- Asphalt pavement (new)
- Low Permeability Clay Cap
- Existing Surface Barrier - Former Seep Area
- Former Coal Tar Dump Area
- PRB Wall
- Vertical Barrier Wall
- Stormwater Diversion Tile
- Stormwater Outfall
- Stormwater Basin

0 75 150 225 300 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-4
Permeable Reactive Barrier Wall & Containment Using Engineered Surface & Vertical Barriers

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-4
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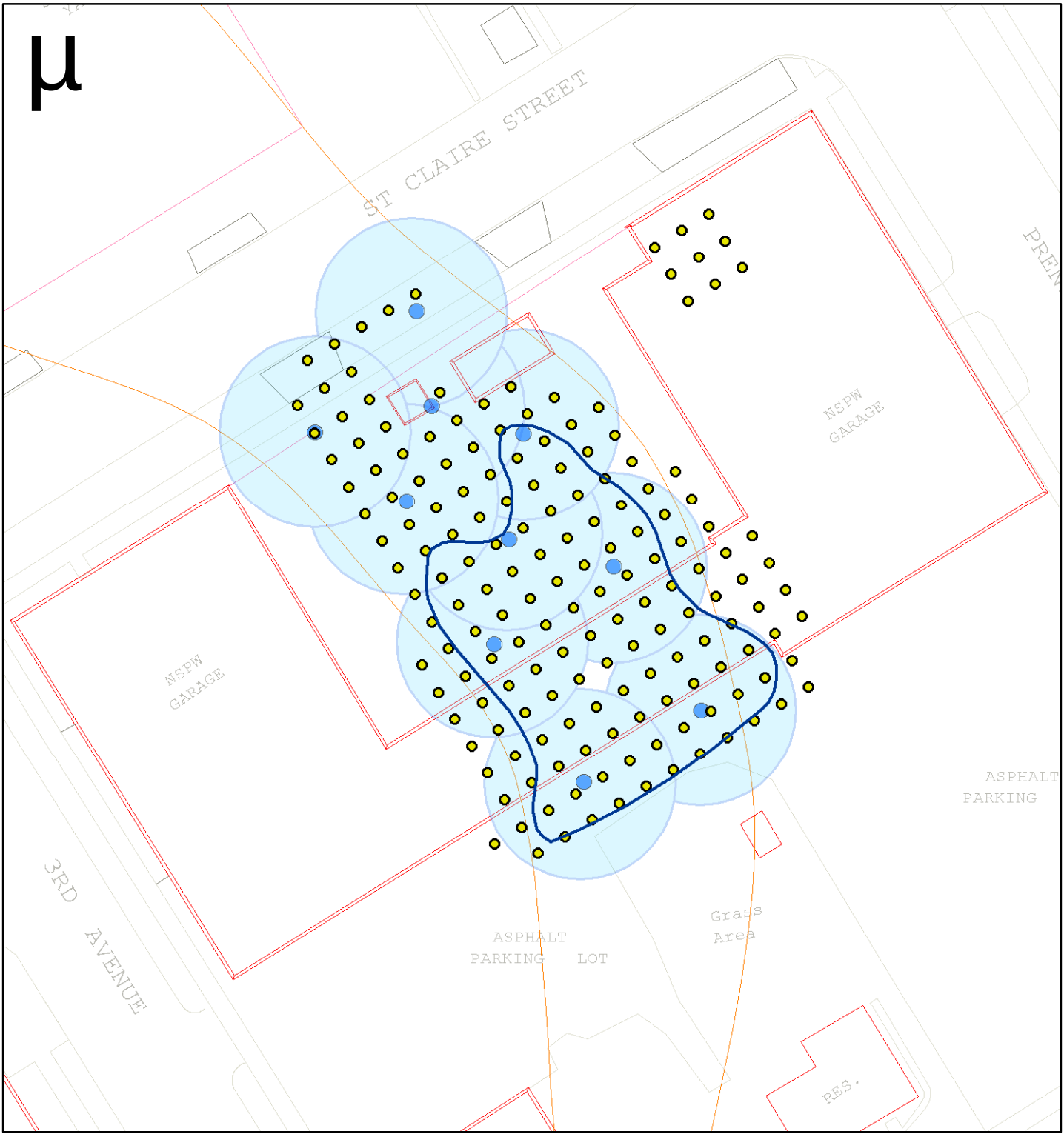

Legend

- DNAPL Extent
- Chemical Oxidation Injection Borings
- Passive Vent Wells
- Passive Vent Wells (Area of Influence)

0 25 50 75 100 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-5A
In-Situ Chemical Oxidation -
Shallow Soil and Groundwater - Upper Bluff Area

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-5A
APPROVED BY:	DPT				

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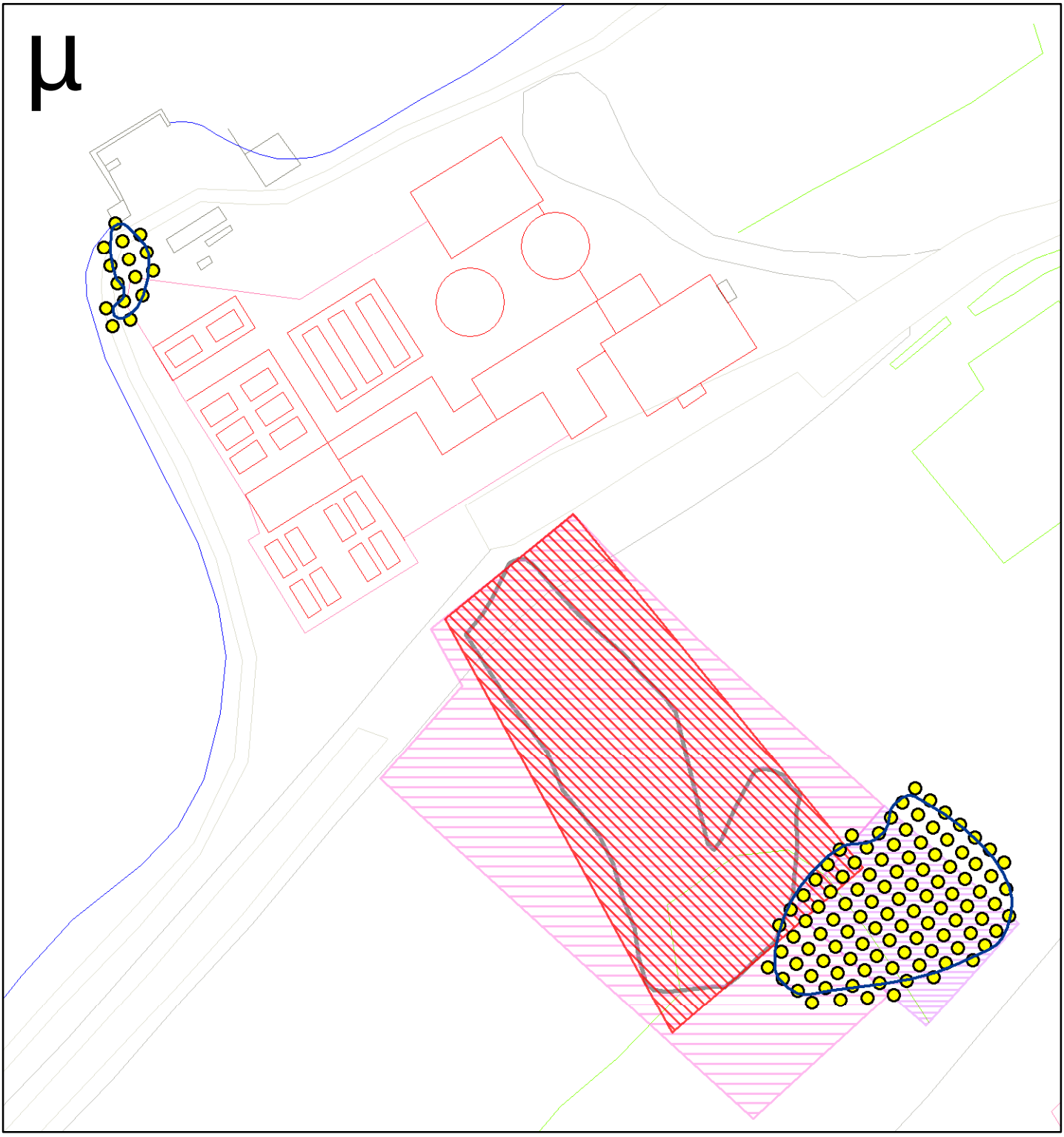
414-831-4100



Legend

- DNAPL extent - Kreher Park
- Chemical Oxidation Injection Borings
- In-situ Treatment Area - Trench Mixing
- Low Permeability Clay Cap
- Existing Surface Barrier - Former Seep Area
- Former Coal Tar Dump Area

0 25 50 75 100 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-5B
In-Situ Chemical Oxidation -
Shallow Soil and Groundwater - Kreher Park

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-5B
APPROVED BY:	DPT				

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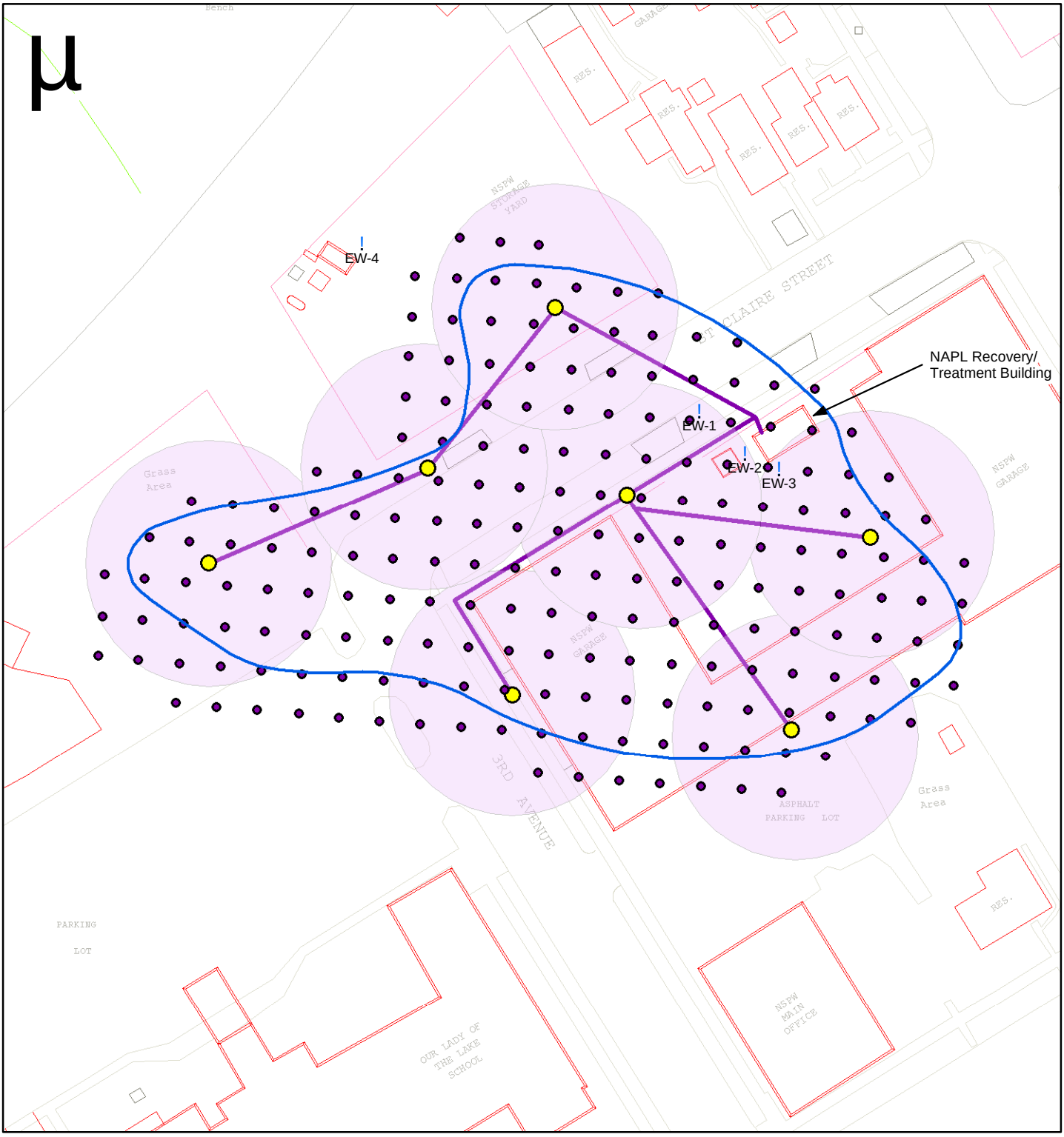

Legend

- NAPL Extent - Copper Falls aquifer
- Existing Extraction Wells
- Copper Falls Chemical Oxidation Borings
- Copper Falls Recovery Wells
- Copper Falls Recovery Wells (Area of Influence)
- Lateral Piping

0 25 50 75 100 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE ASHLAND, WISCONSIN			
TITLE: Figure 7-5C In-Situ Chemical Oxidation - Copper Falls Aquifer			
DRAWN BY: DDZ	SCALE: AS SHOWN	PROJECT: 25688375	
CHECKED BY: MSM	DATE: 15.MAY.2008	SHEET: 7-5C	
APPROVED BY: DPT			

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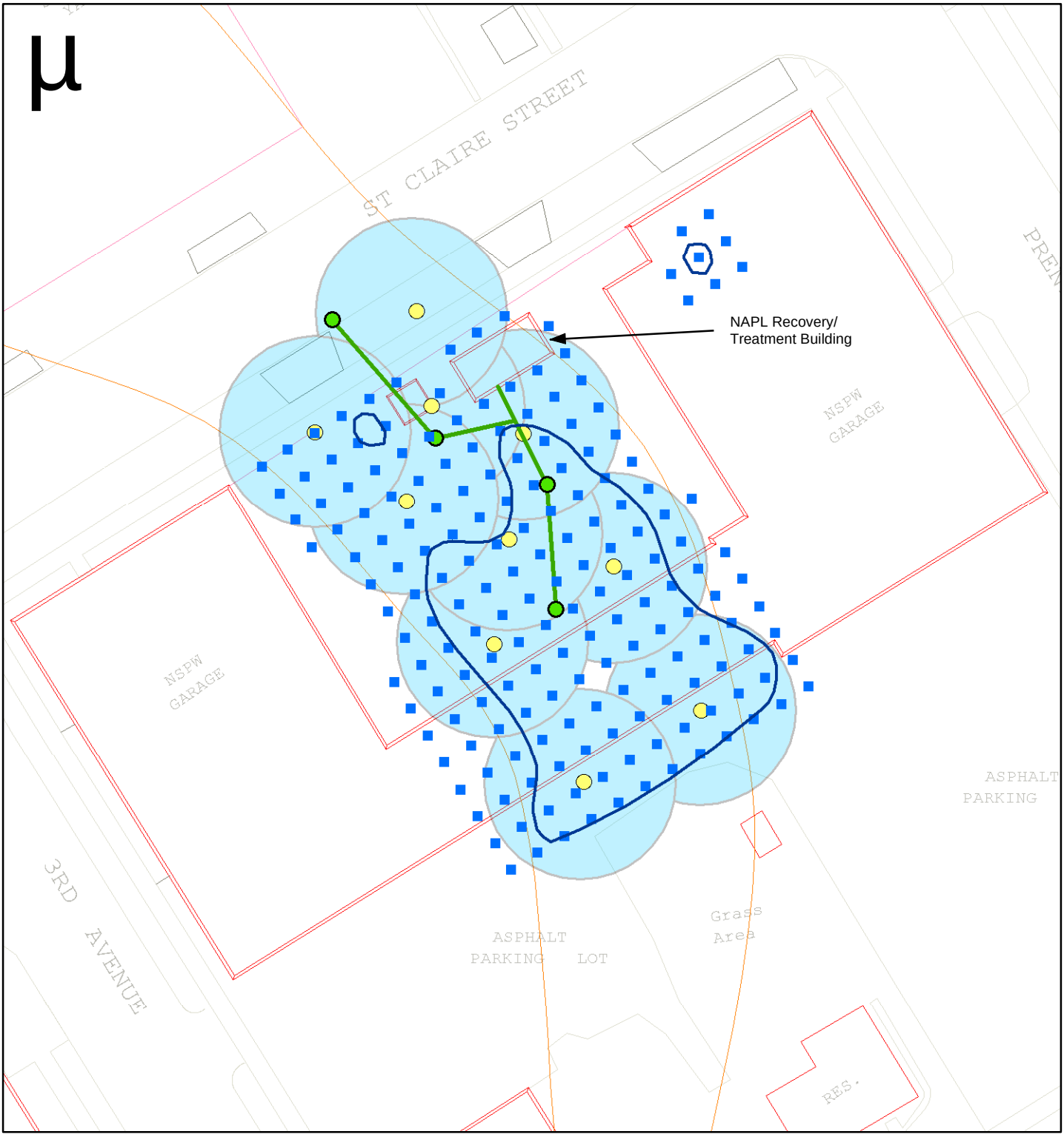

Legend

- DNAPL Extent
- Electrical Resistance Heating Electrodes
- Recovery Well
- Recovery Well Lateral Piping
- Passive Vent Wells
- Passive Vent Wells (Area of Influence)

0 20 40 60 80 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-6A
In-Situ Electrical Resistance Heating -
Shallow Soil and Groundwater in Upper Bluff Area

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-6A
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Legend

- Former Coal Tar Dump Area
- DNAPL extent - Kreher Park
- Extraction Well
- Extraction Well Lateral Piping
- Electrical Resistance Heating Electrodes
- Passive Vent Well (area of influence)

0 25 50 75 100 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-6B
In-Situ Electrical Resistance Heating -
Shallow Soil and Groundwater - Kreher Park

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-6B
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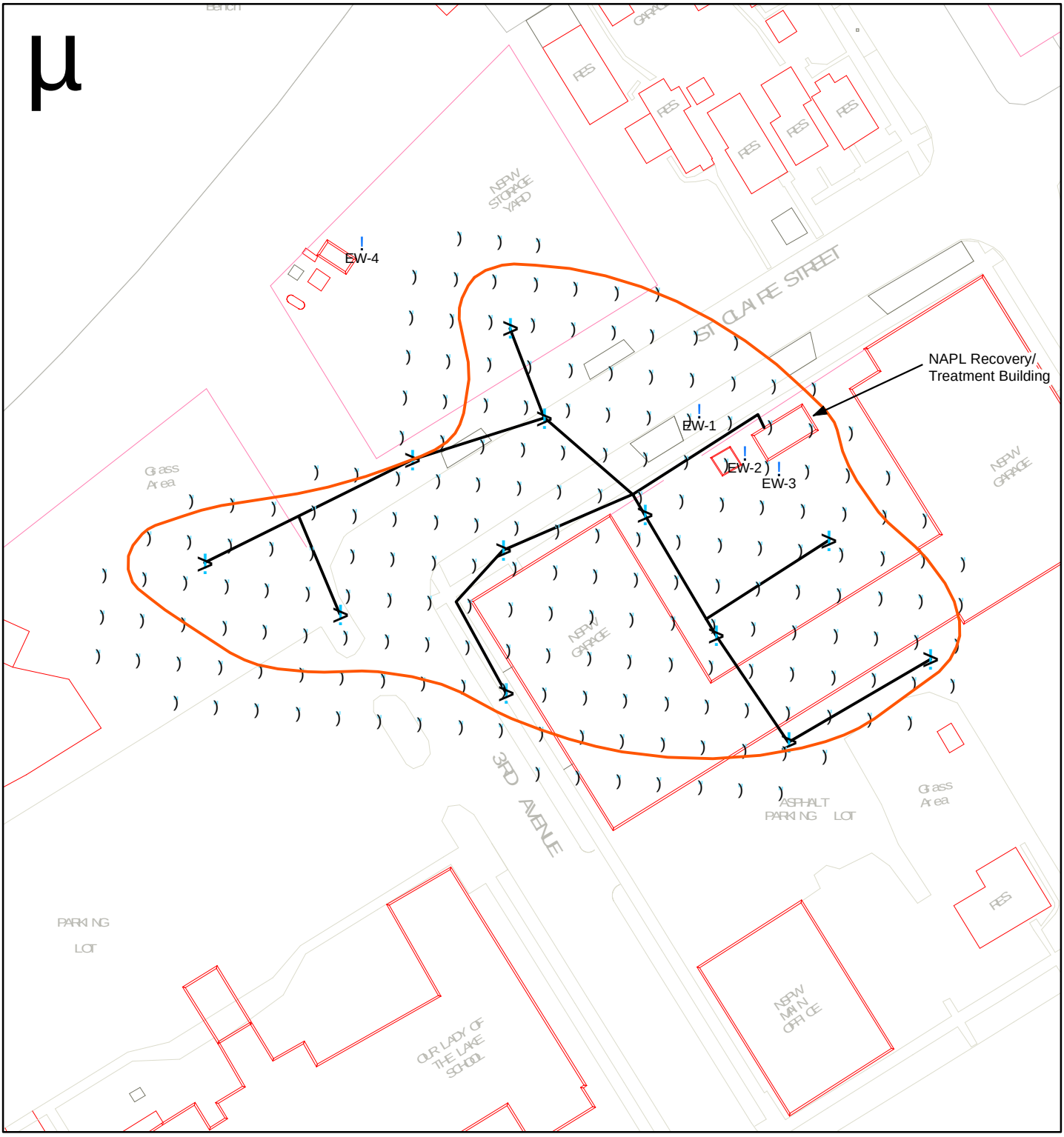

Legend

- ! Existing Extraction Wells
- NAPL Extent - Copper Falls aquifer
-) Copper Falls ERH Electrodes
- Copper Falls ERH Recovery Wells
- ERH Lateral Piping

0 25 50 75 100 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE ASHLAND, WISCONSIN			
TITLE: Figure 7-6C In-Situ Electrical Resistance Heating - Copper Falls Aquifer			
DRAWN BY: DDZ	SCALE: AS SHOWN	PROJECT: 25688375	
CHECKED BY: MSM	DATE: 15.MAY.2008	SHEET: 7-6C	
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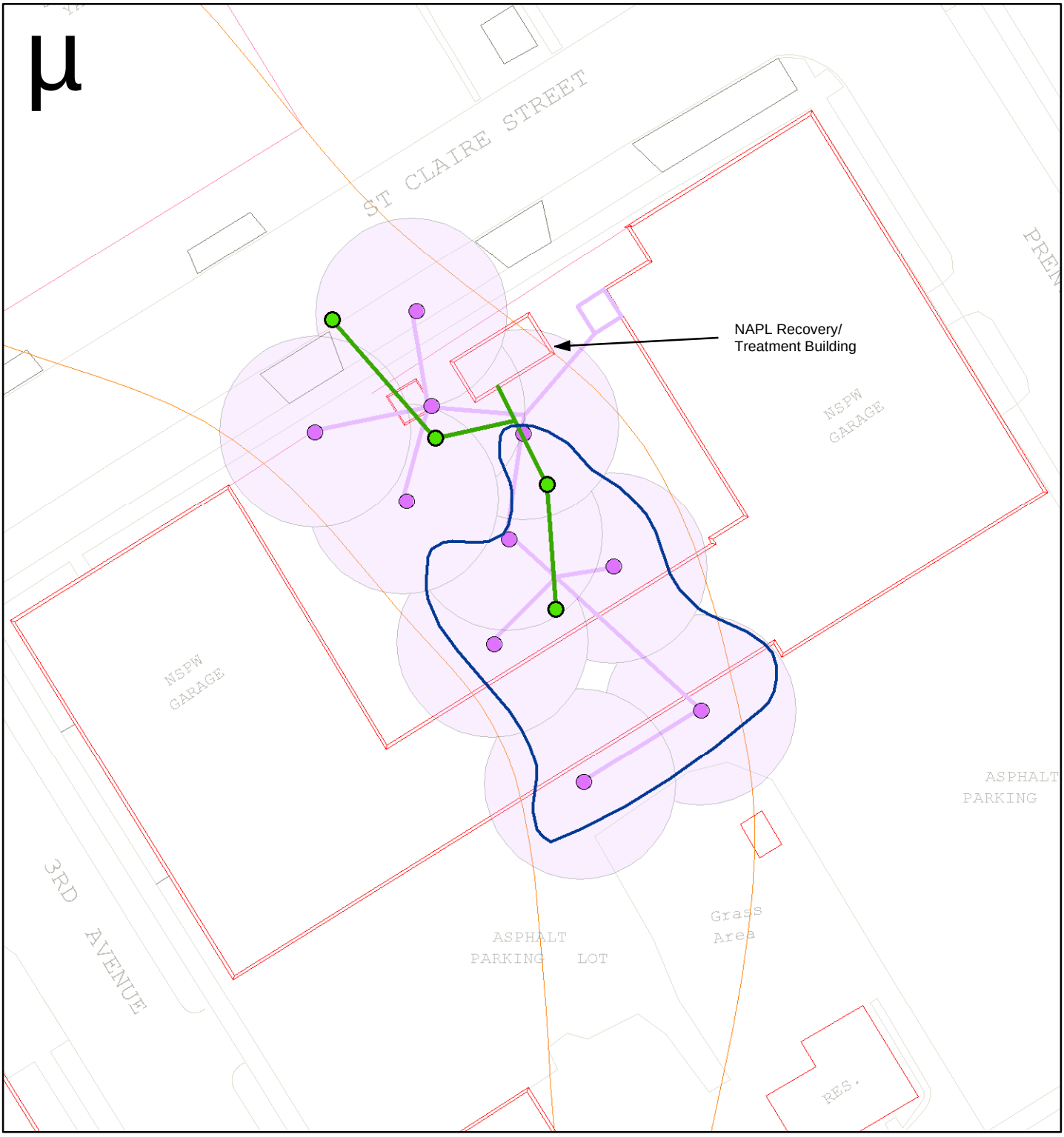

Legend

- Recovery Well
- Recovery Well Lateral Piping
- Steam Injection Well
- Steam Injection Well (Area of Influence)
- Steam Injection Well Lateral Piping
- DNAPL Extent

0 25 50 75 100 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-7A
In-Situ Steam Injection -
Shallow Soil and Groundwater in Upper Bluff Area

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-7A
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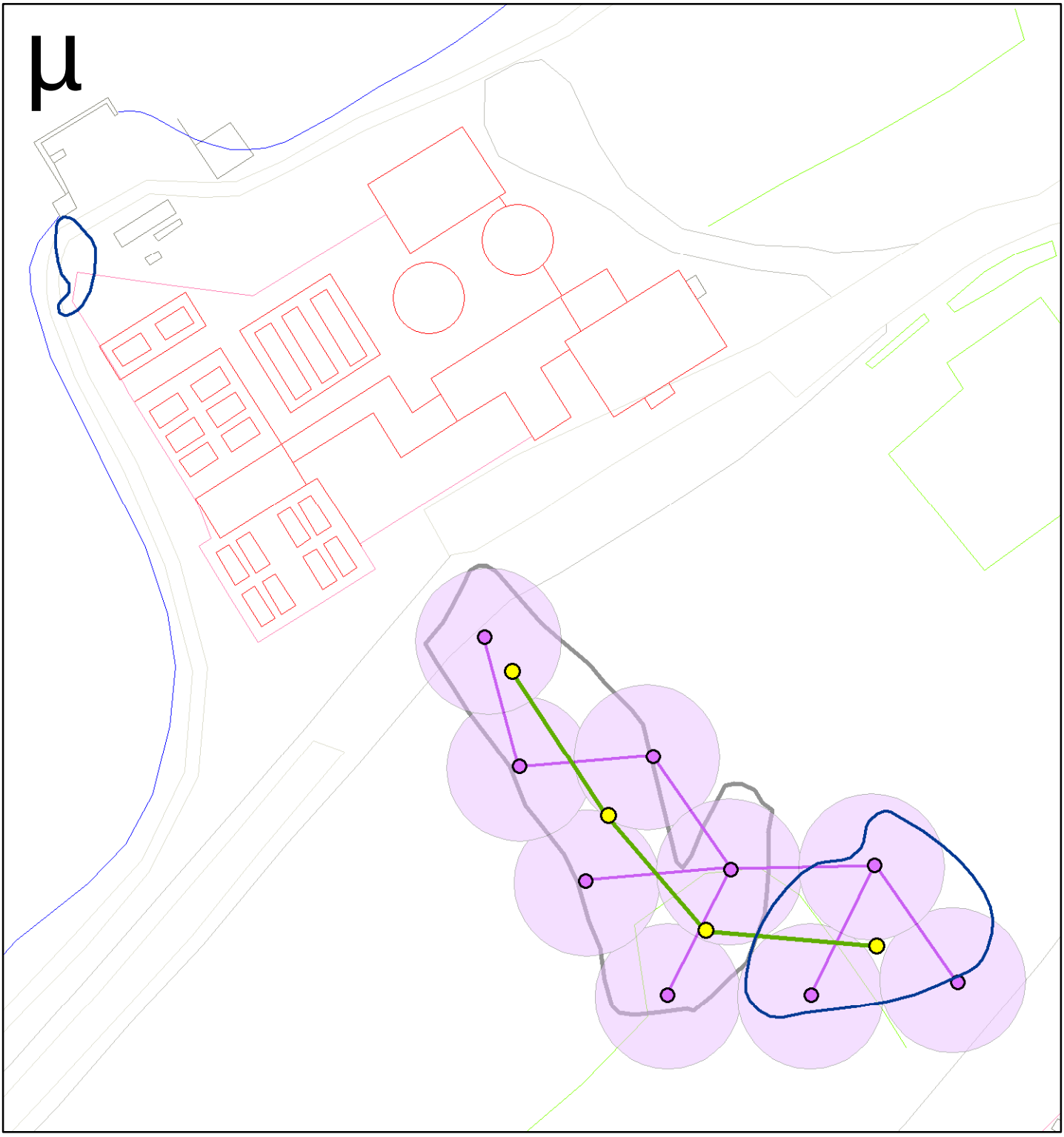

Legend

- DNAPL extent - Kreher Park
- Former Coal Tar Dump Area
- Recovery Well
- Recovery Well Lateral Piping
- Steam Injection Well (Area of Influence)
- Steam Injection Well Lateral Piping
- Steam Injection Well

0 25 50 75 100 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-7B
In-Situ Steam Injection -
Shallow Soil and Groundwater - Kreher Park

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-7B
APPROVED BY:	DPT				

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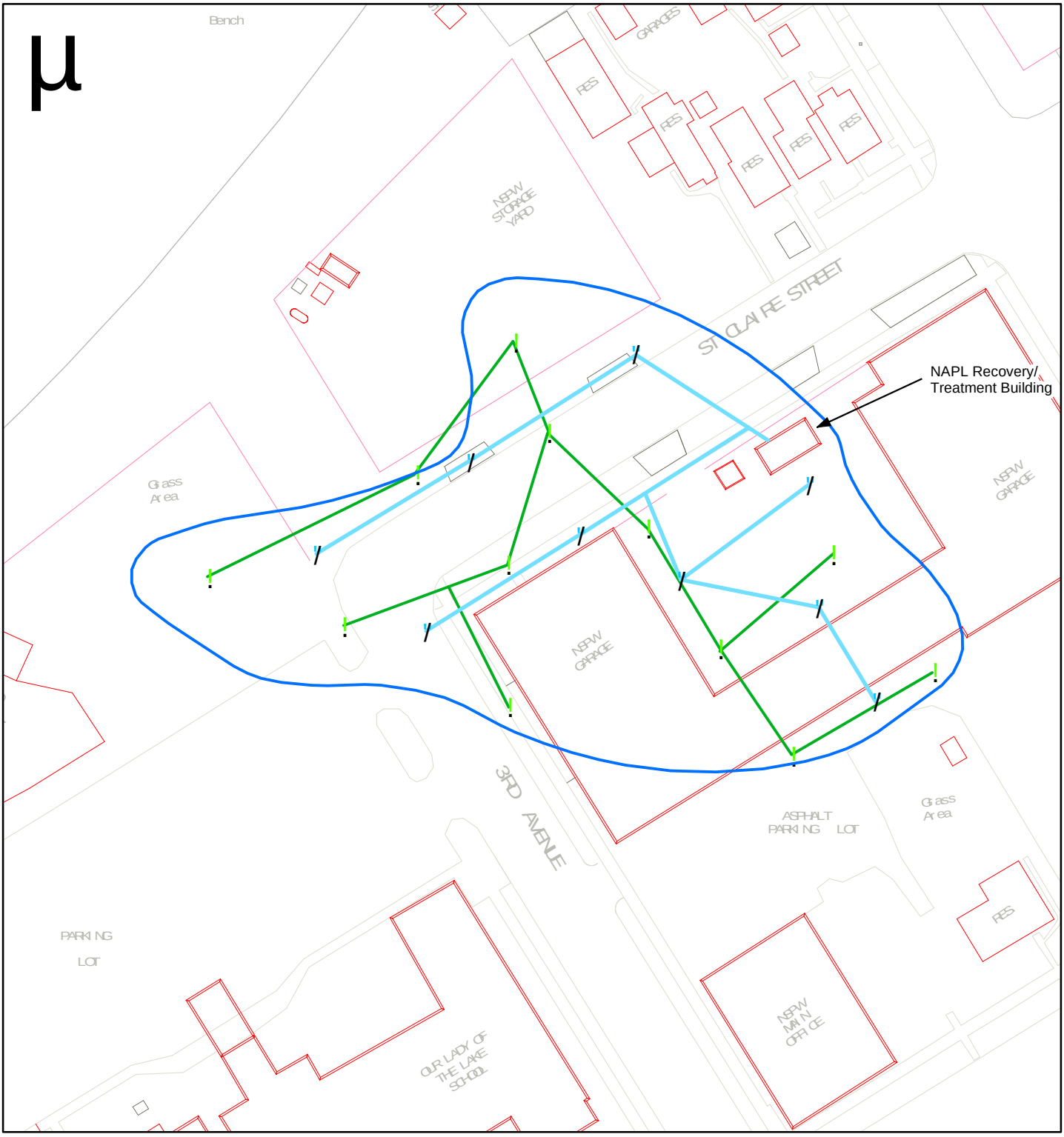

Legend

NAPL Extent - Copper Falls

Copper Falls Steam Injection wells

Description

- Injection Well
- DUS Recovery Well/Electrode
- Recovery Well Lateral Piping
- Steam Injection Well Lateral Piping

0 25 50 75 100 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-7C
In-Situ Steam Injection - Copper Falls aquifer

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-7C
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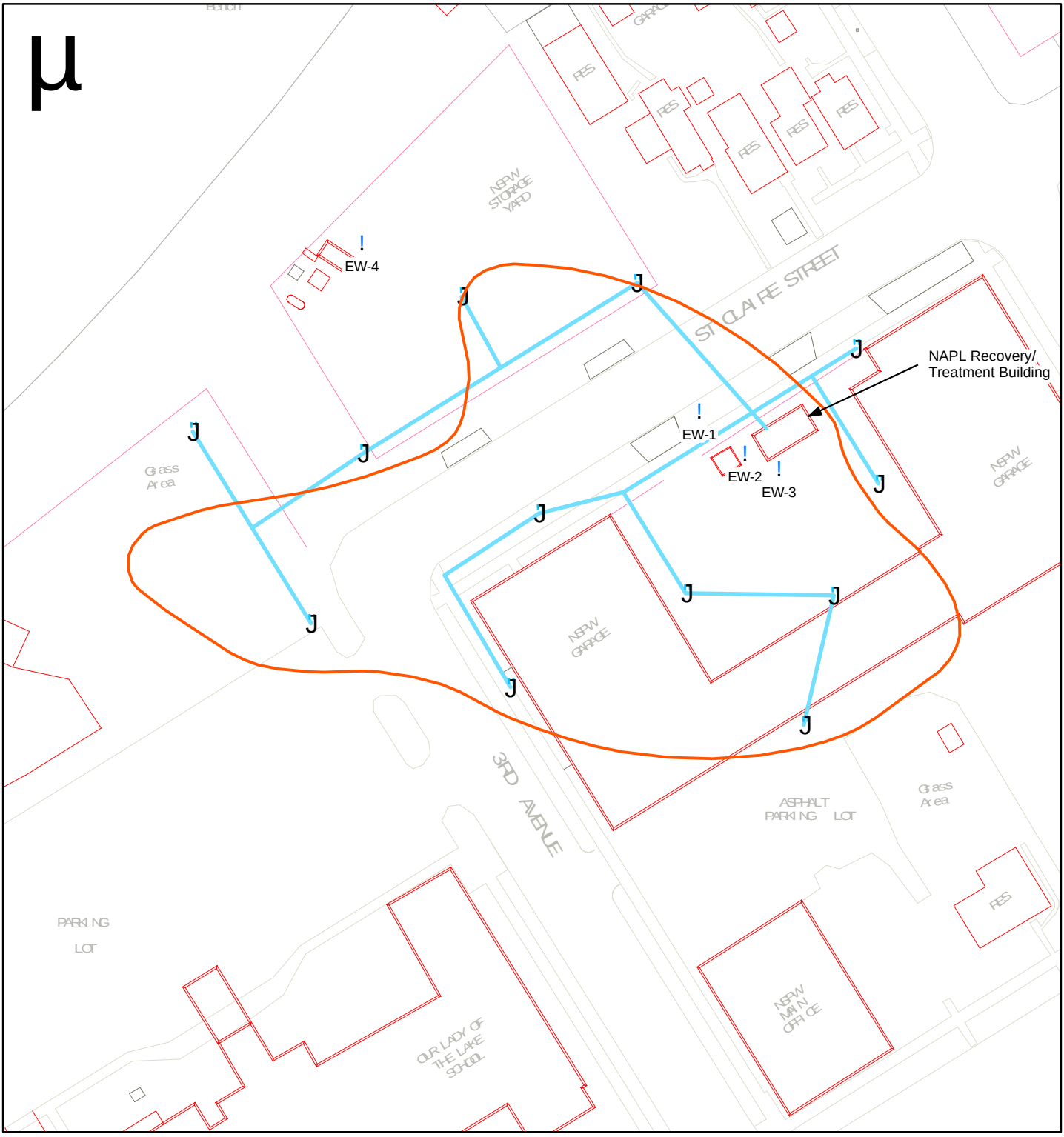

Legend

- NAPL Extent - Copper Falls aquifer
- Copper Falls GW Extraction Well
- Copper Falls GW Extraction Lateral Piping
- Existing Extraction Well

0 25 50 75 100 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE ASHLAND, WISCONSIN			
TITLE: Figure 7-8A Removal Using Groundwater Extraction - Copper Falls Aquifer & Ravine Fill			
DRAWN BY: DDZ	SCALE: AS SHOWN	PROJECT: 25688375	
CHECKED BY: MSM	DATE: 15.MAY.2008	SHEET: 7-8A	
APPROVED BY: DPT			

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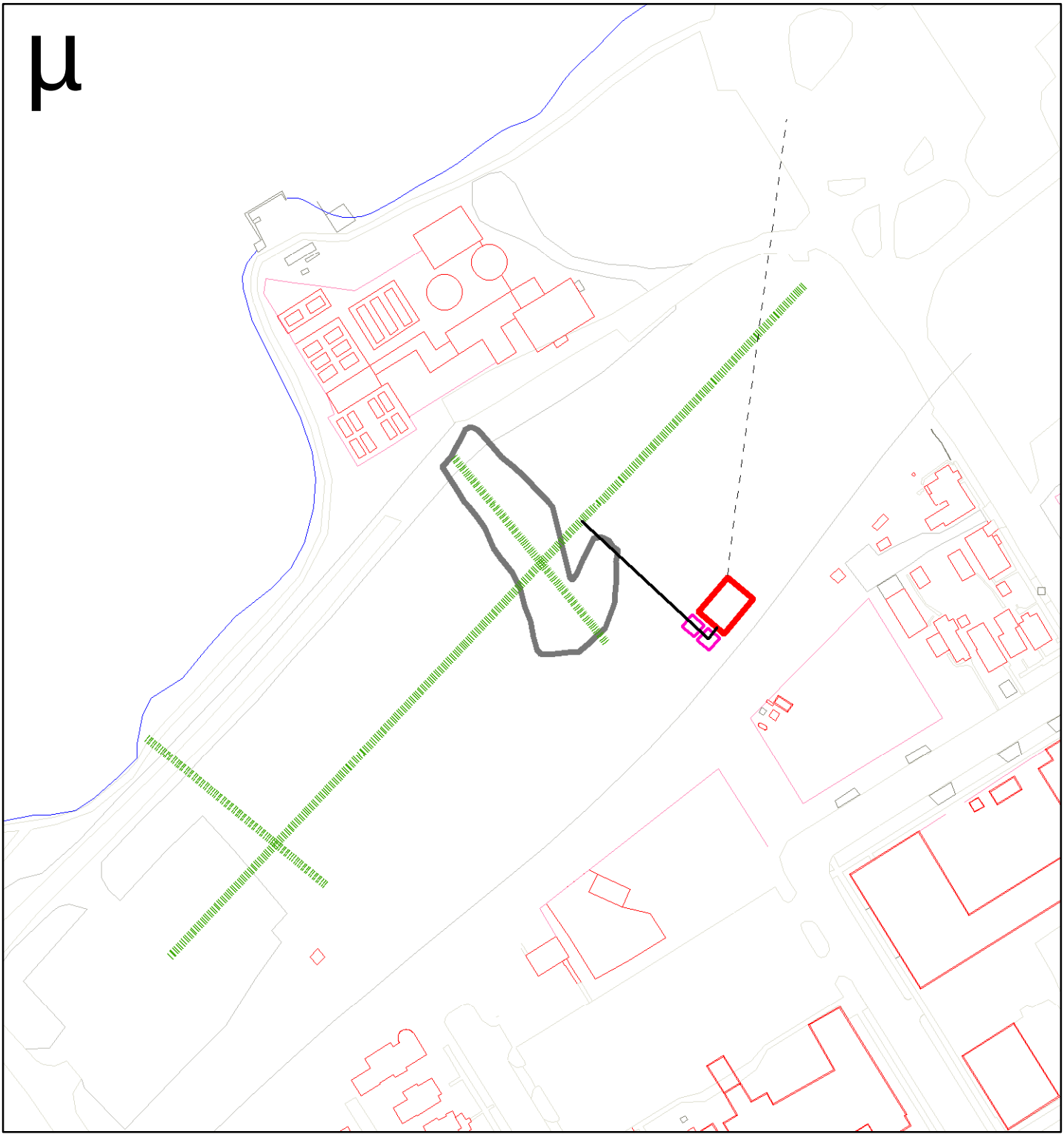

Legend

Groundwater Extraction Trench

Description

- Effluent Discharge Line
- GW Extraction Trench
- Influent Line
- Oil/Water Separator Tanks
- Treatment Bldg
- Former Coal Tar Dump Area

0 75 150 225 300 Feet

PROJECT: ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

TITLE: Figure 7-8B
Removal Using Groundwater Extraction - Shallow Groundwater in Kreher Park

DRAWN BY:	DDZ	SCALE:	AS SHOWN	PROJECT:	25688375
CHECKED BY:	MSM	DATE:	15.MAY.2008	SHEET:	7-8B
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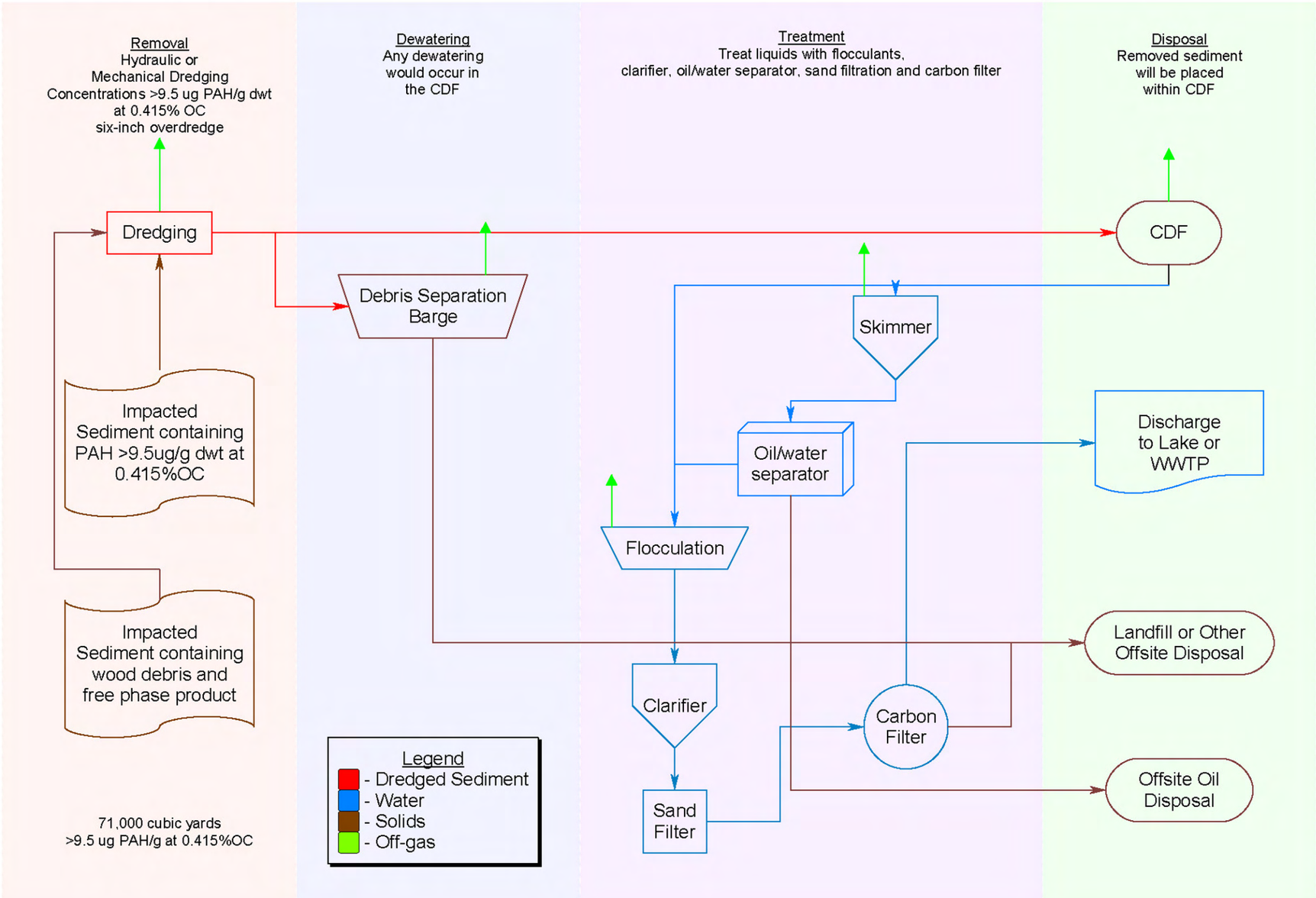
Alternative 2: Construct CDF over sediment containing significant wood debris and sediment with free phase, remove sediment >9.5 ug PAH/g dwt at 0.415%OC outside the CDF footprint and place in CDF; monitor sediment areas>5.6 ug PAH/g dwt at 0.415%OC; No treatment



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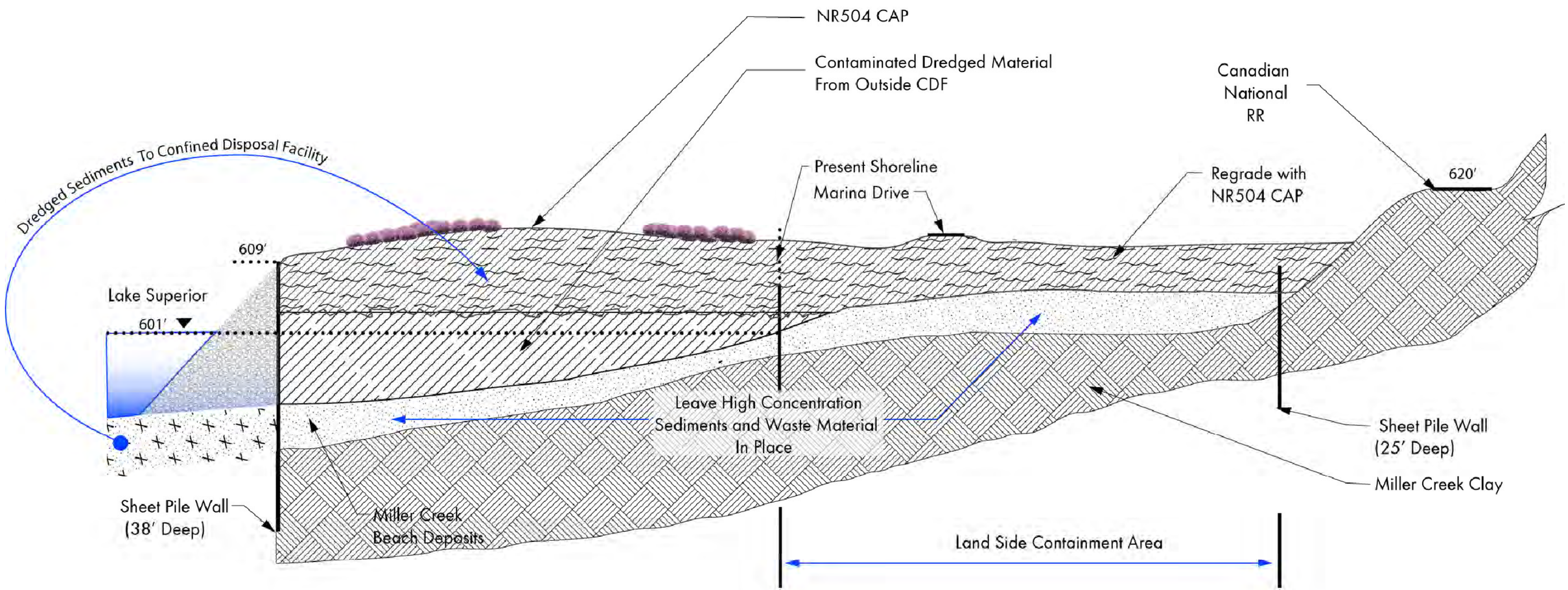
PROCESS FLOW DIAGRAM
ALTERNATIVE SED-2-CDF
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

DRN BY: TS	DATE: 4/30/08	PROJECT NO.	FIG. NO.
CHK'D BY: HHH	DATE: 4/30/08	25688375.73000	8-1

PLOT DATE: Jan 30, 2006 1:12pm DISK FILE NAME: (16:1) V:\Envir Mngt\Projects\Xcel Energy\Ashland\FS\EPA comments\CADD\Figure8_1.dwg



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(312) 939-4198 Fax

ASHLAND/NSP LAKEFRONT SITE–
SECTION CONCEPT (FOR CDF)

DRN BY:	KP	DATE:	4/30/08	PROJECT NO.	FIG. NO.
CHK'D BY:	JVH	DATE:	4/30/08	25688375.76000	8–2

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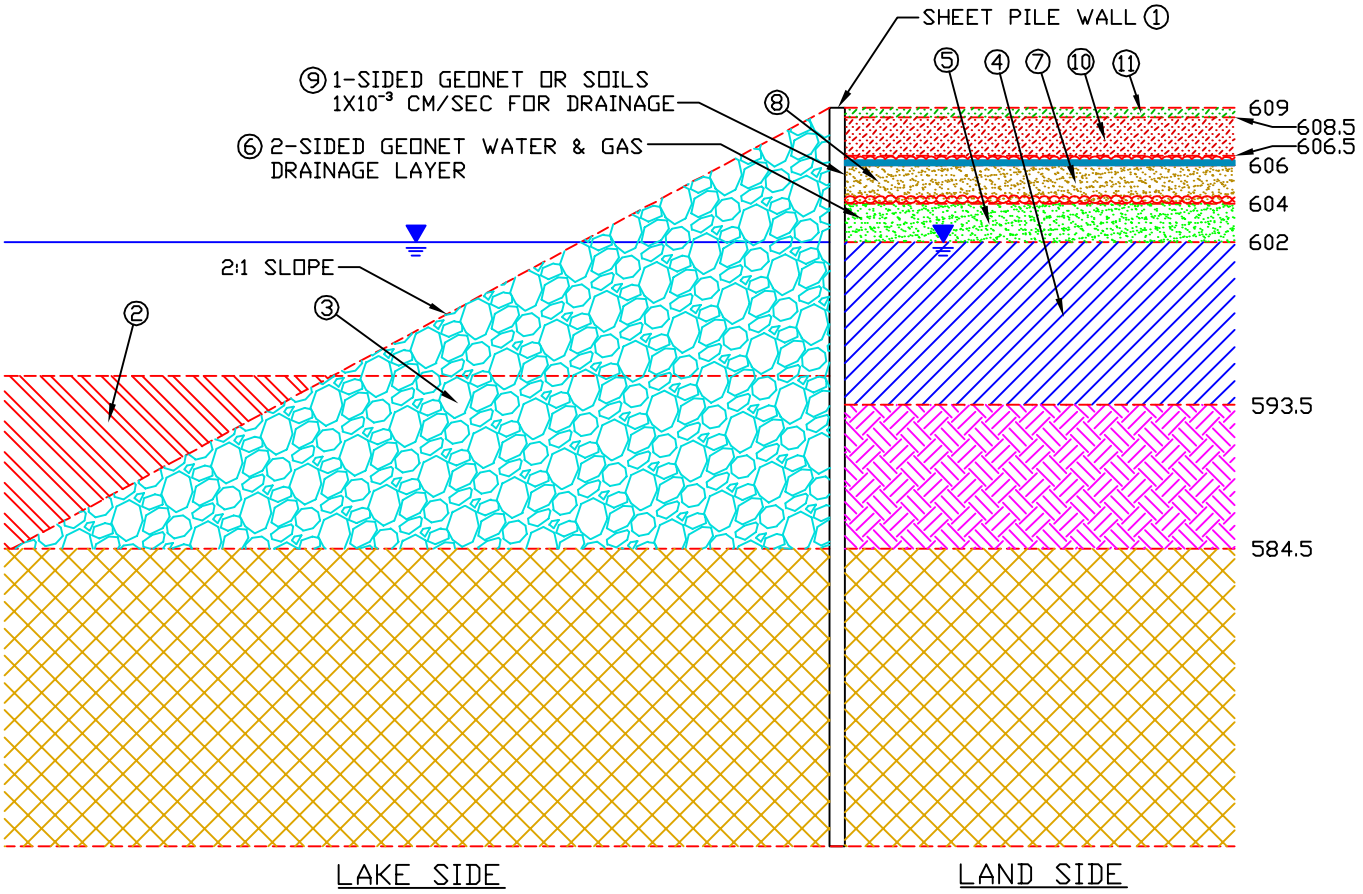
ASHLAND/NSP LAKEFRONT SITE–
REDEVELOPMENT CONCEPT PLAN (FOR CDF)

DRN BY: KP	DATE: 4/30/08	PROJECT NO.	FIG. NO.
CHK'D BY: JVH	DATE: 4/30/08	25688375.76000	8–3



- CLAY
- SAND
- DREDGED CONTAMINATED SEDIMENT
- UNDISTURBED SEDIMENT
- UNDISTURBED SILTY CLAY
- RIP RAP
- LOCAL SOILS
- TOP SOIL
- CONTAMINATED SEDIMENT
- GEOTEXTILE DRAINAGE LAYERS
- GEOMEMBRANE

① DRIVE SHEET PILE WALL FROM ELEVATION 593.5 DOWN TO 569.0 THROUGH WOOD AND CONTAMINATED SEDIMENT LAYER, INTO UNDISTURBED SILTY CLAYS.

② EXCAVATE SEDIMENT FROM LAKE SIDE, PLACE INSIDE CONTAINMENT STRUCTURE BUT AWAY FROM SHEET PILE WALL INITIALLY.

③ CONSTRUCT REVETMENT ON BAY SIDE OF SHEET PILE WALL, CONSTRUCTED OF 24"Ø MAX RIP RAP.

④ BACKFILL LAND SIDE OF SHEET PILE WALL WITH CONTAMINATED SEDIMENT TO ELEVATION 602.0 (NOMINAL).

⑤ PLACE ONE TO TWO FEET OF SAND SUPPORT LAYER.

⑥ PLACE 2-SIDED GEONET DRAINAGE LAYER.

⑦ CAP WITH TWO FEET OF COMPACTED CLAY.

⑧ INSTALL 40 MIL GEOMEMBRANE BARRIER LAYER ABOVE CLAY LAYER.

⑨ ONE-SIDED GEONET DRAINAGE LAYER OR 1X10-3 DRAINAGE SOIL.

⑩ TWO FEET OF LOCAL SOILS.

⑪ ONE-HALF FOOT OF TOPSOIL.

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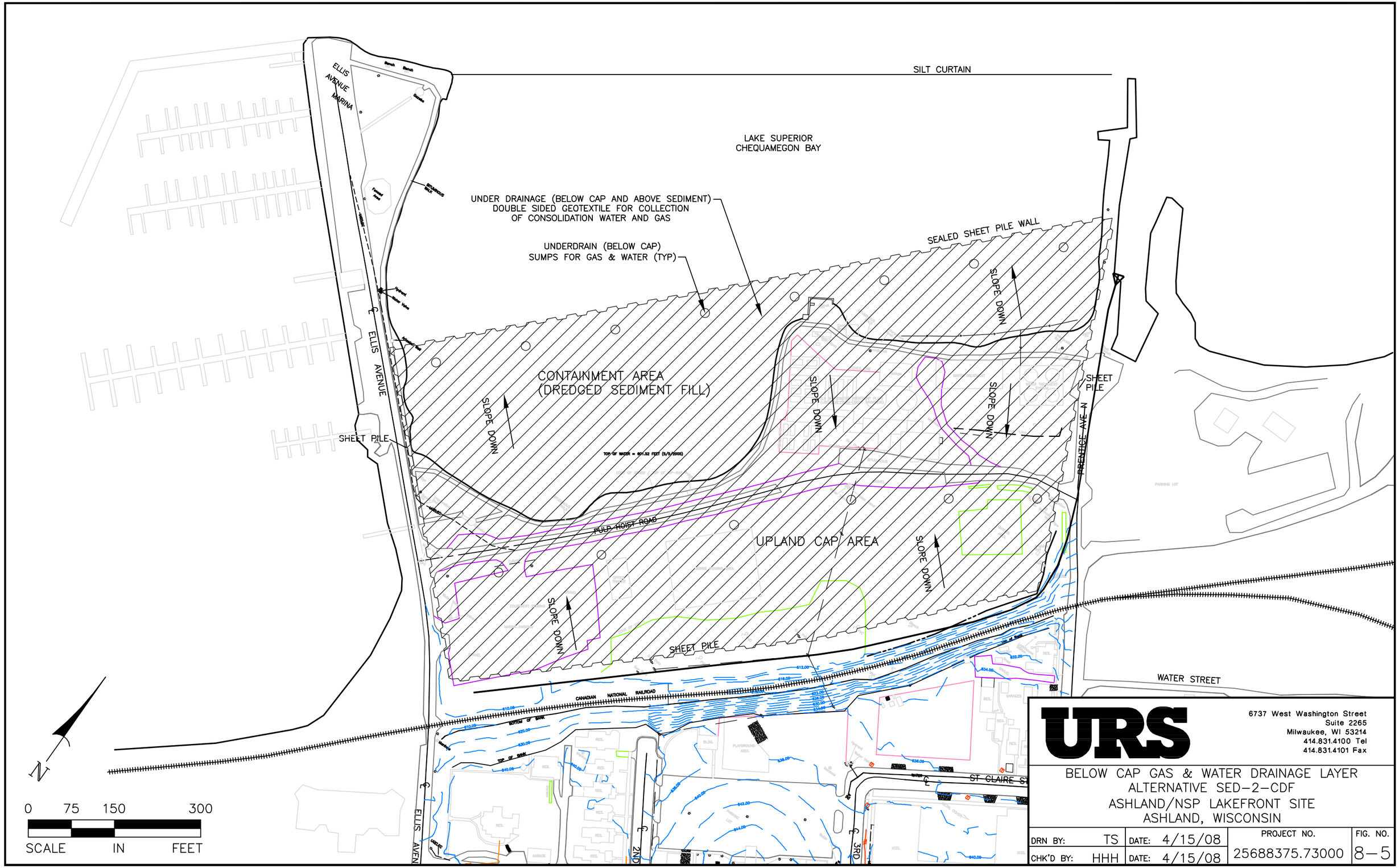
FINAL CONSTRUCTION – SHEET PILE WALL CROSS SECTION
ALTERNATIVE SED-2-CDF
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

DRN BY:	TS	DATE:	4/15/08	PROJECT NO.	FIG. NO.
CHK'D BY:	HH	DATE:	4/15/08	25688375.75000	8-4

PLOT DATE: January 04, 2007 10:15am DISK FILE NAME: V:\Envir Mngt\Projects\Xcel Energy\Ashland\NSP\EPA Comments\CADD\Figure8_4.dwg



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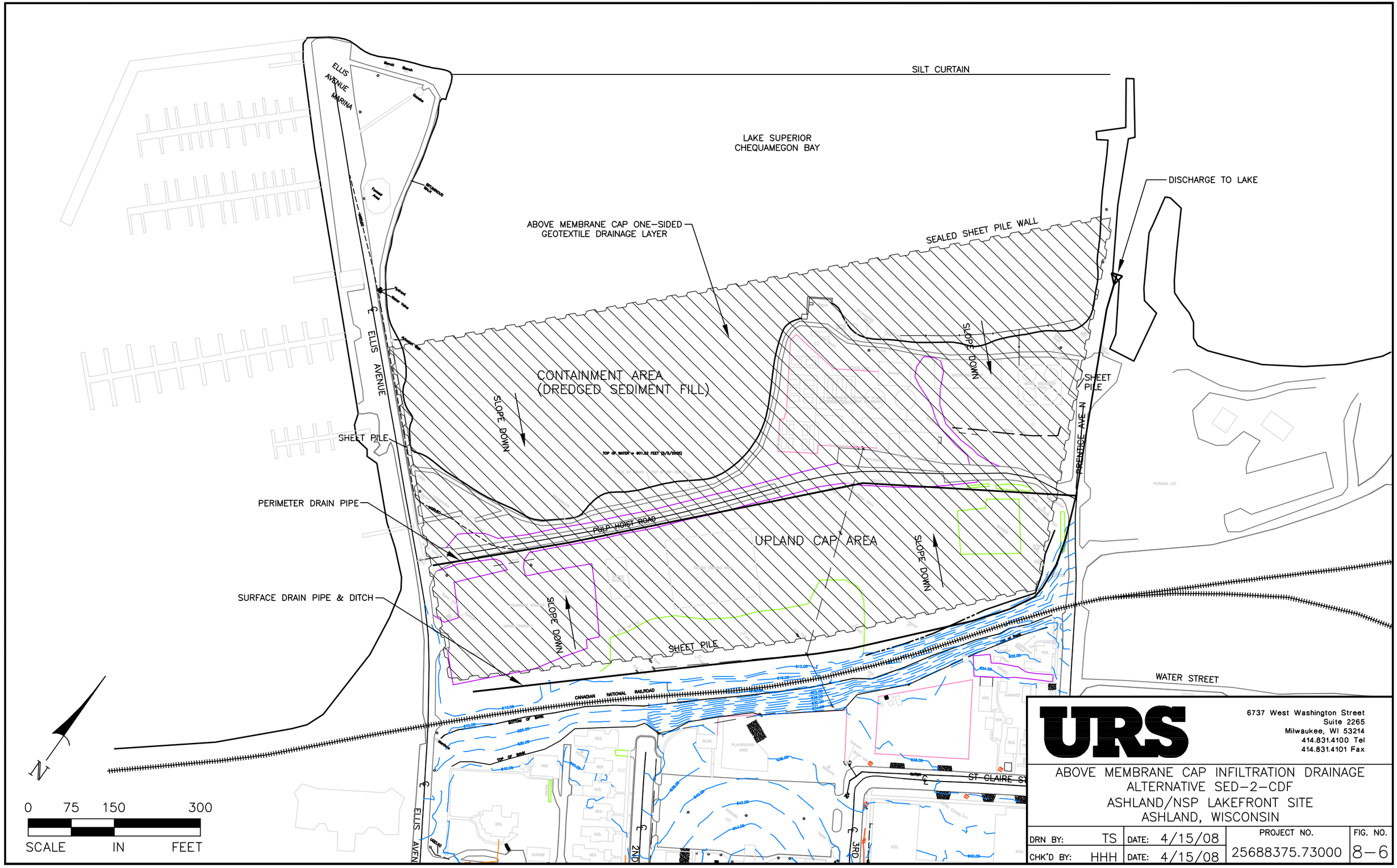
BELOW CAP GAS & WATER DRAINAGE LAYER
ALTERNATIVE SED-2-CDF
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

DRN BY:	TS	DATE:	4/15/08	PROJECT NO.	FIG. NO.
CHK'D BY:	HHH	DATE:	4/15/08	25688375.73000	8-5

PLOT DATE: Jan 30, 2006 1:12pm DISK FILE NAME: (16.1) V:\Envir Mng(\Projects\Xcel Energy\Ashland\FS\EPA comments\CADD\Figure8_5&6.dwg



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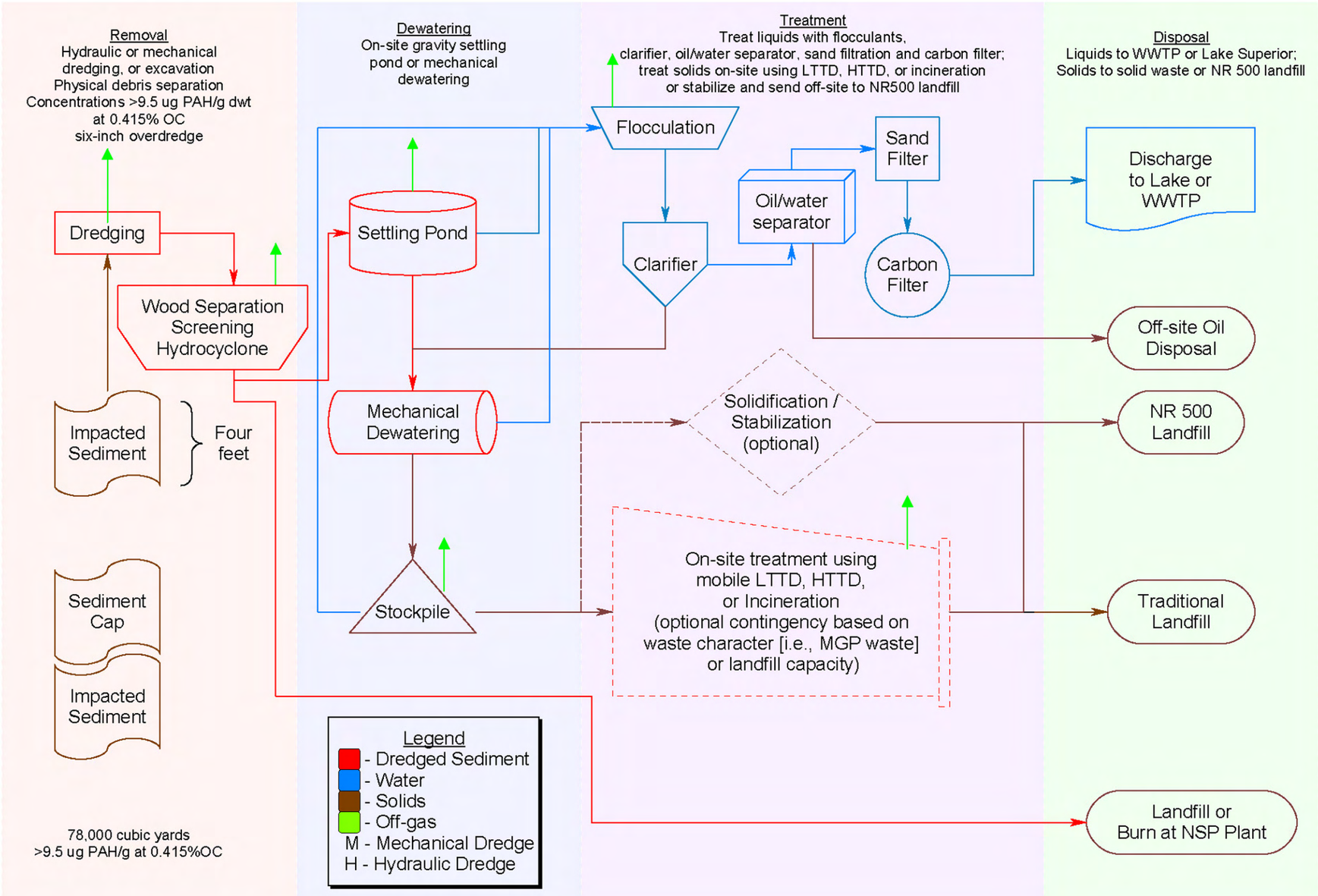
ABOVE MEMBRANE CAP INFILTRATION DRAINAGE
ALTERNATIVE SED-2-CDF
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

DRN BY:	TS	DATE:	4/15/08	PROJECT NO.	FIG. NO.
CHK'D BY:	HHH	DATE:	4/15/08	25688375.73000	8-6

Alternative 3: Remove sediment >9.5 ug PAH/g dwt at 0.415%OC to a depth of 4 feet; cap; treat sediment on-site, dispose of sediment off-site; monitor sediment areas >5.6 ug PAH/g dwt at 0.415%OC



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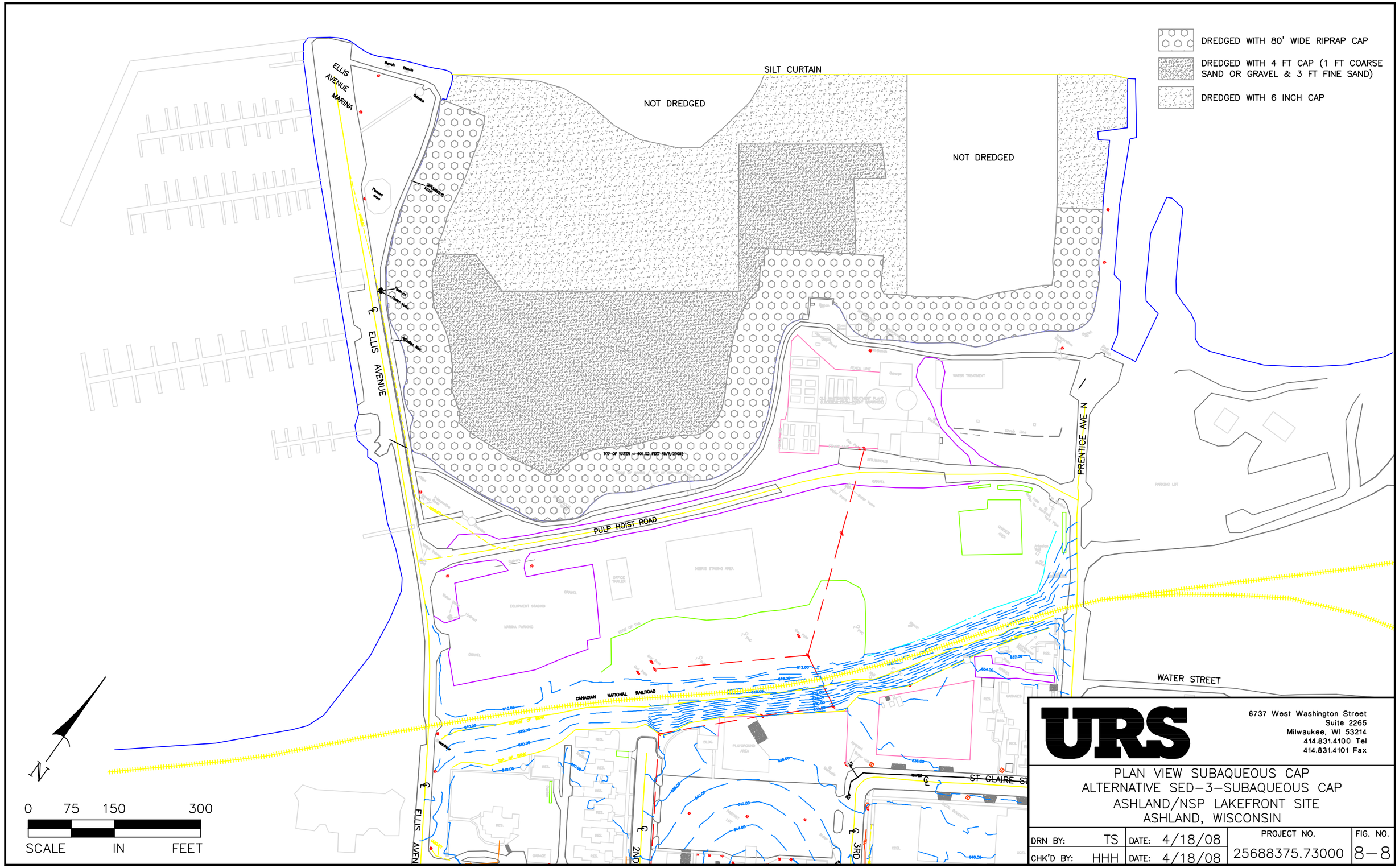
PROCESS FLOW DIAGRAM
ALTERNATIVE SED-3-SUBAQUEOUS CAP
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

DRN BY: TS	DATE: 4/30/08	PROJECT NO.	FIG. NO.
CHK'D BY: HHH	DATE: 4/30/08	25688375.73000	8-7

PLOT DATE: Jan 30, 2006 1:12pm DISK FILE NAME: (16.1) V:\Envir Mngt\Projects\Xcel Energy\Ashland\FS\EPA comments\CADD\Figure8_7.dwg



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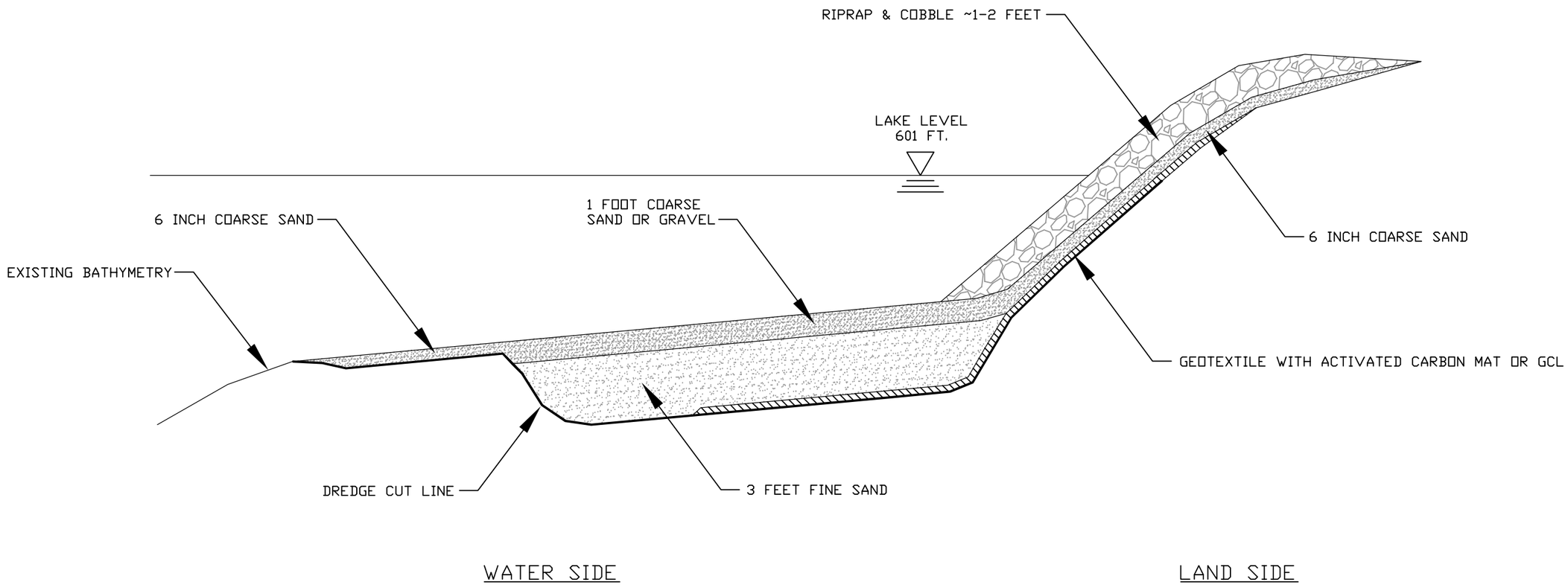
PLAN VIEW SUBAQUEOUS CAP
ALTERNATIVE SED-3-SUBAQUEOUS CAP
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

DRN BY:	TS	DATE:	4/18/08	PROJECT NO.	FIG. NO.
CHK'D BY:	HHH	DATE:	4/18/08	25688375.73000	8-8

PLOT DATE: Jan 30, 2006 1:12pm DISK FILE NAME: (16.1) V:\Envir Mngt\Projects\Xcel Energy\Ashland\FS\EPA comments\CADD\Figure8_8.dwg



NOT TO SCALE

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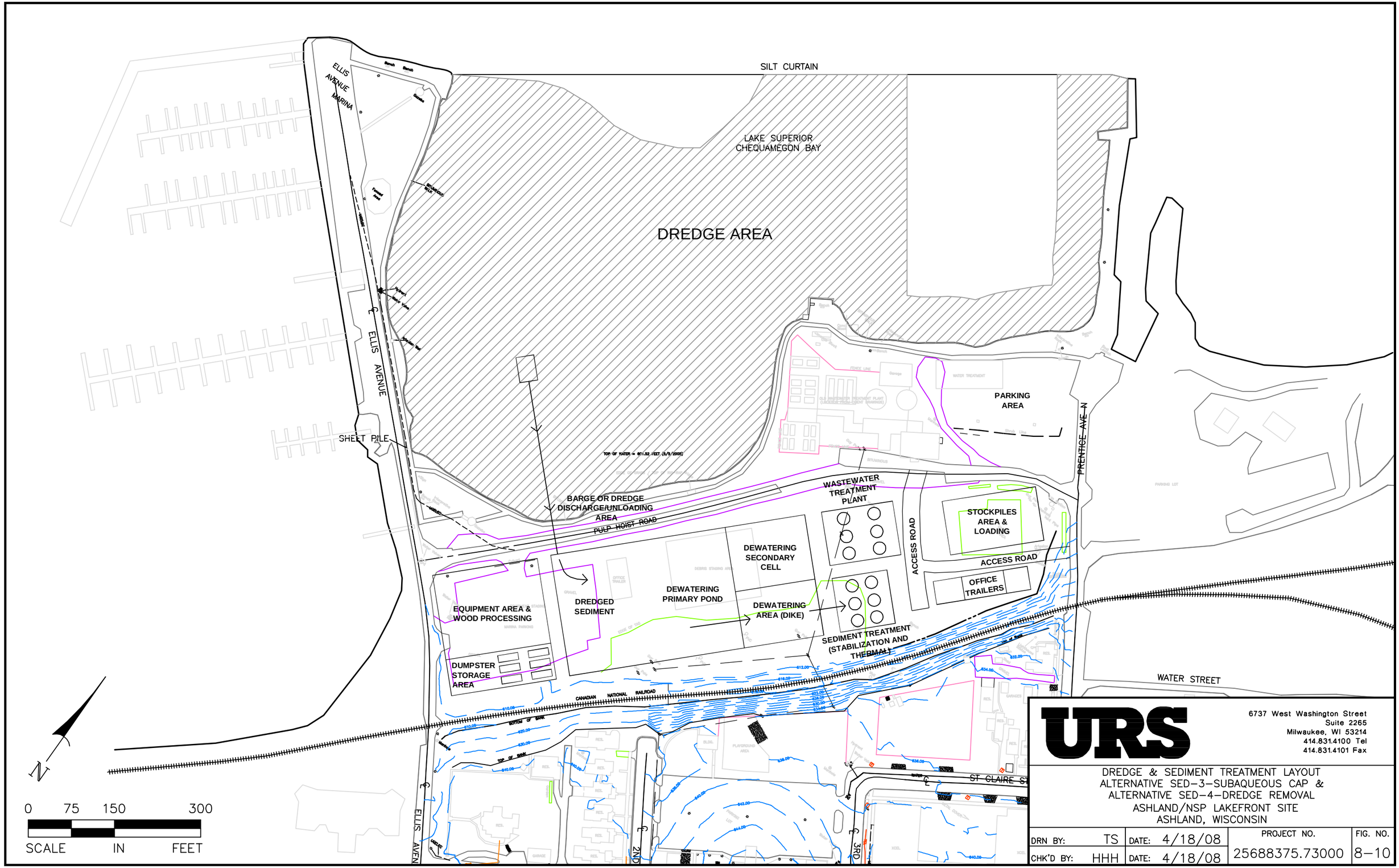
CAPPING CROSS SECTION – SUBAQUEOUS CAP
ALTERNATIVE SED-3-SUBAQUEOUS CAP
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

DRN BY: TS	DATE: 4/18/08	PROJECT NO.	FIG. NO.
CHK'D BY: HHH	DATE: 4/18/08	25688375.73000	8-9

PLOT DATE: Jan 30, 2006 1:12pm DISK FILE NAME: (16.1) V:\Envir Mngt\Projects\Xcel Energy\Ashland\FS\EPA comments\CADD\Figure8_9.dwg



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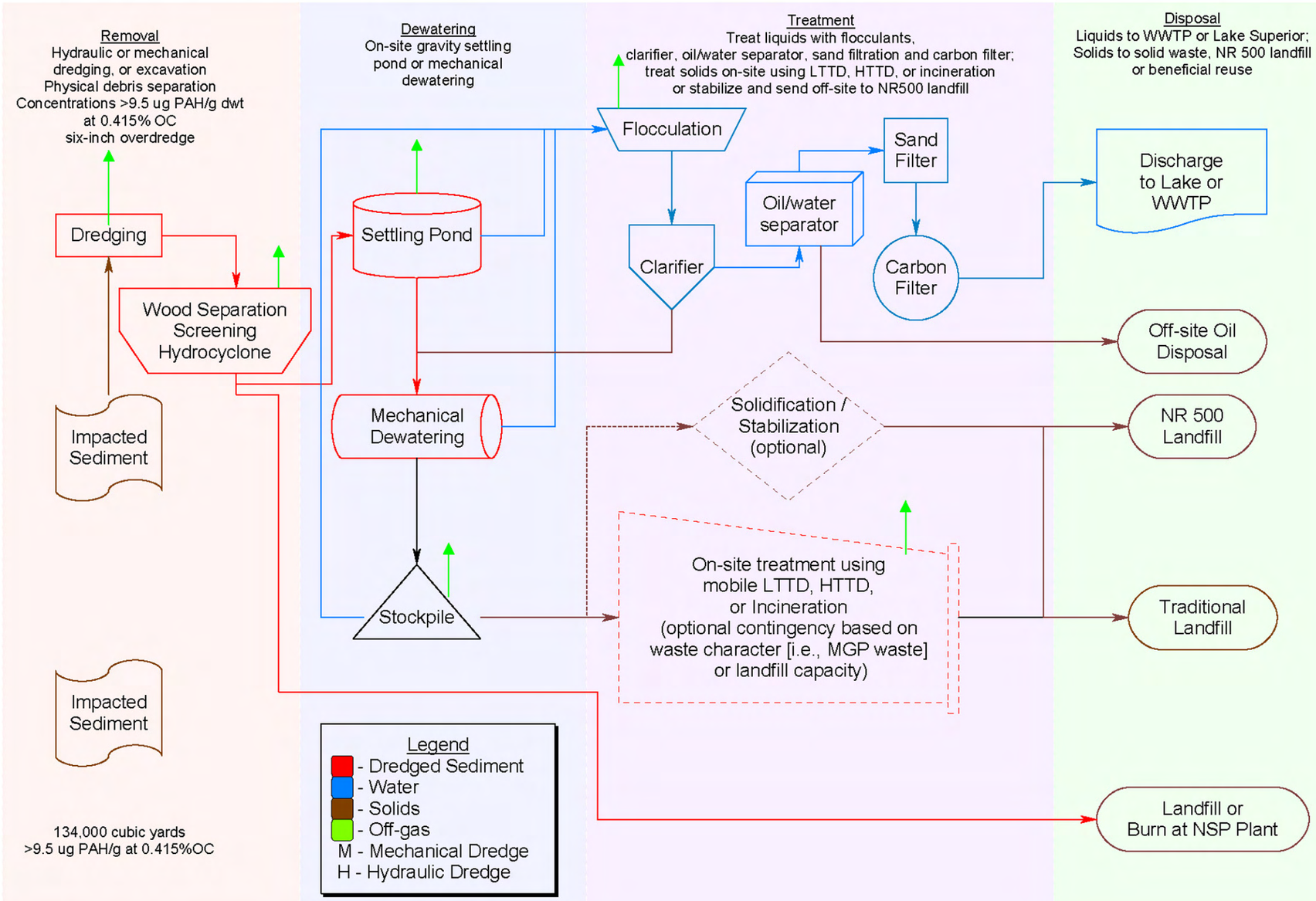
DREDGE & SEDIMENT TREATMENT LAYOUT
ALTERNATIVE SED-3-SUBAQUEOUS CAP &
ALTERNATIVE SED-4-DREDGE REMOVAL
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

DRN BY:	TS	DATE:	4/18/08	PROJECT NO.	FIG. NO.
CHK'D BY:	HHH	DATE:	4/18/08	25688375.73000	8-10

PLOT DATE: Jan 30, 2006 1:12pm DISK FILE NAME: (16.1) V:\Envir Mngt\Projects\Xcel Energy\Ashland\FS\EPA comments\CADD\Figure8_10.dwg

Alternative 4: Remove sediment >9.5 ug PAH/g dwt at 0.415%OC; treat sediment on-site, dispose of sediment off-site; monitor sediment areas >5.6 ug PAH/g dwt at 0.415%OC



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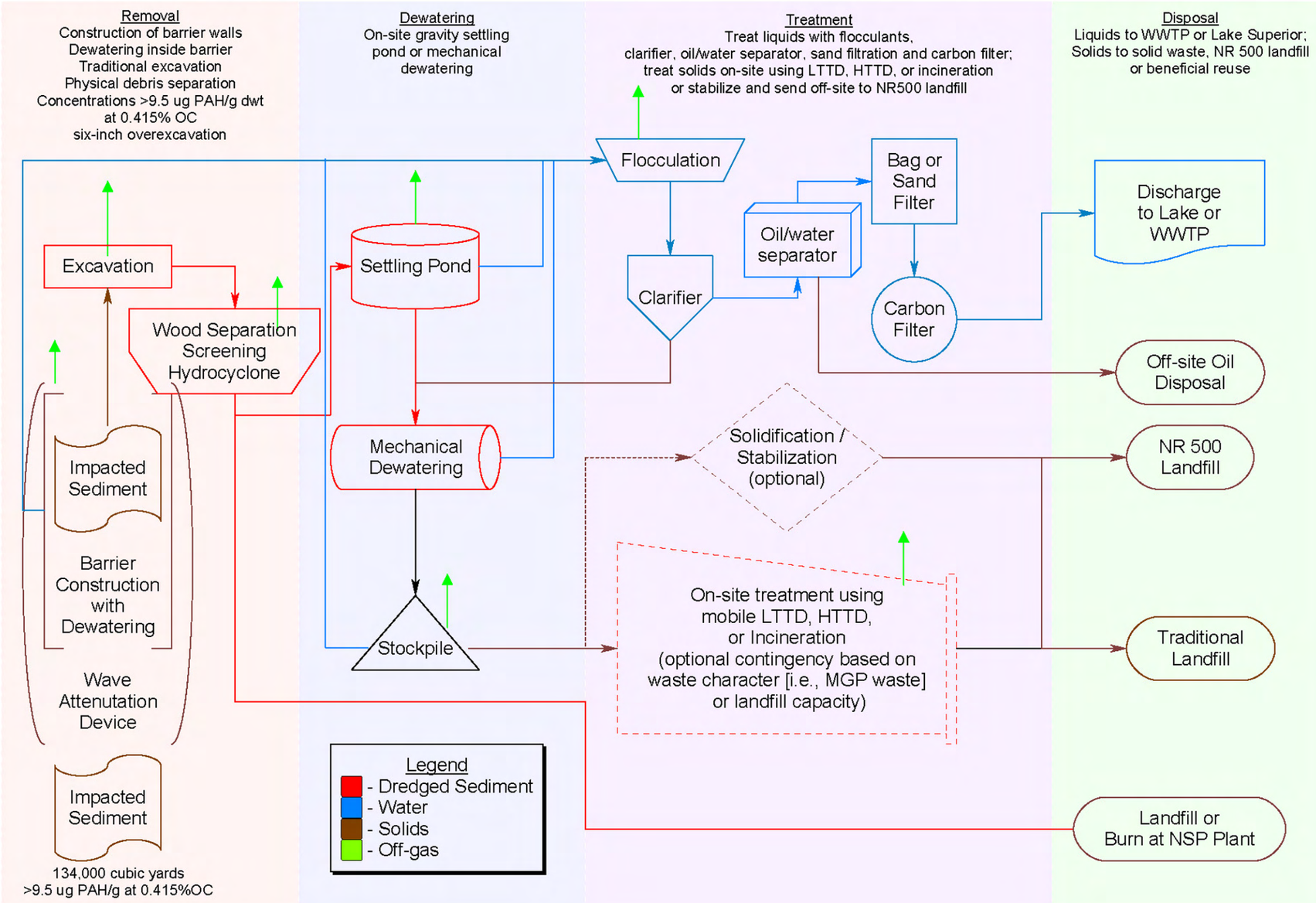
PROCESS FLOW DIAGRAM
ALTERNATIVE SED-4-DREDGE REMOVAL
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

DRN BY: TS	DATE: 4/30/08	PROJECT NO.	FIG. NO.
CHK'D BY: HHH	DATE: 4/30/08	25688375.73000	8-11

PLOT DATE: Jan 30, 2006 1:12pm DISK FILE NAME: (16.1) V:\Envir Mngt\Projects\Xcel Energy\Ashland\FS\EPA comments\CADD\Figure8_11.dwg

Alternative 5: Remove sediment >9.5 ug PAH/g dwt at 0.415%OC; treat sediment on-site, dispose of sediment off-site; monitor sediment areas >5.6 ug PAH/g dwt at 0.415%OC



File: projects/ashland/process diagrams/Alt 5 rrf rev 2..flo

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PROCESS FLOW DIAGRAM
ALTERNATIVE SED-5-DRY EXCAVATION
ASHLAND/NSP LAKEFRONT SITE
ASHLAND, WISCONSIN

DRN BY: TS	DATE: 4/30/08	PROJECT NO.	FIG. NO.
CHK'D BY: HHH	DATE: 4/30/08	25688375.73000	8-12

PLOT DATE: Jan 30, 2006 1:12pm DISK FILE NAME: (16:1) V:\Envir Mngt\Projects\Xcel Energy\Ashland\FS\EPA comments\CADD\Figure8_12.dwg

NORTH

SCALE IN FEET

0 50 100 150 200

LEGEND:

= NPL SITE BOUNDARY

= SURFACE CONTOUR MAJOR

= SURFACE CONTOUR MINOR

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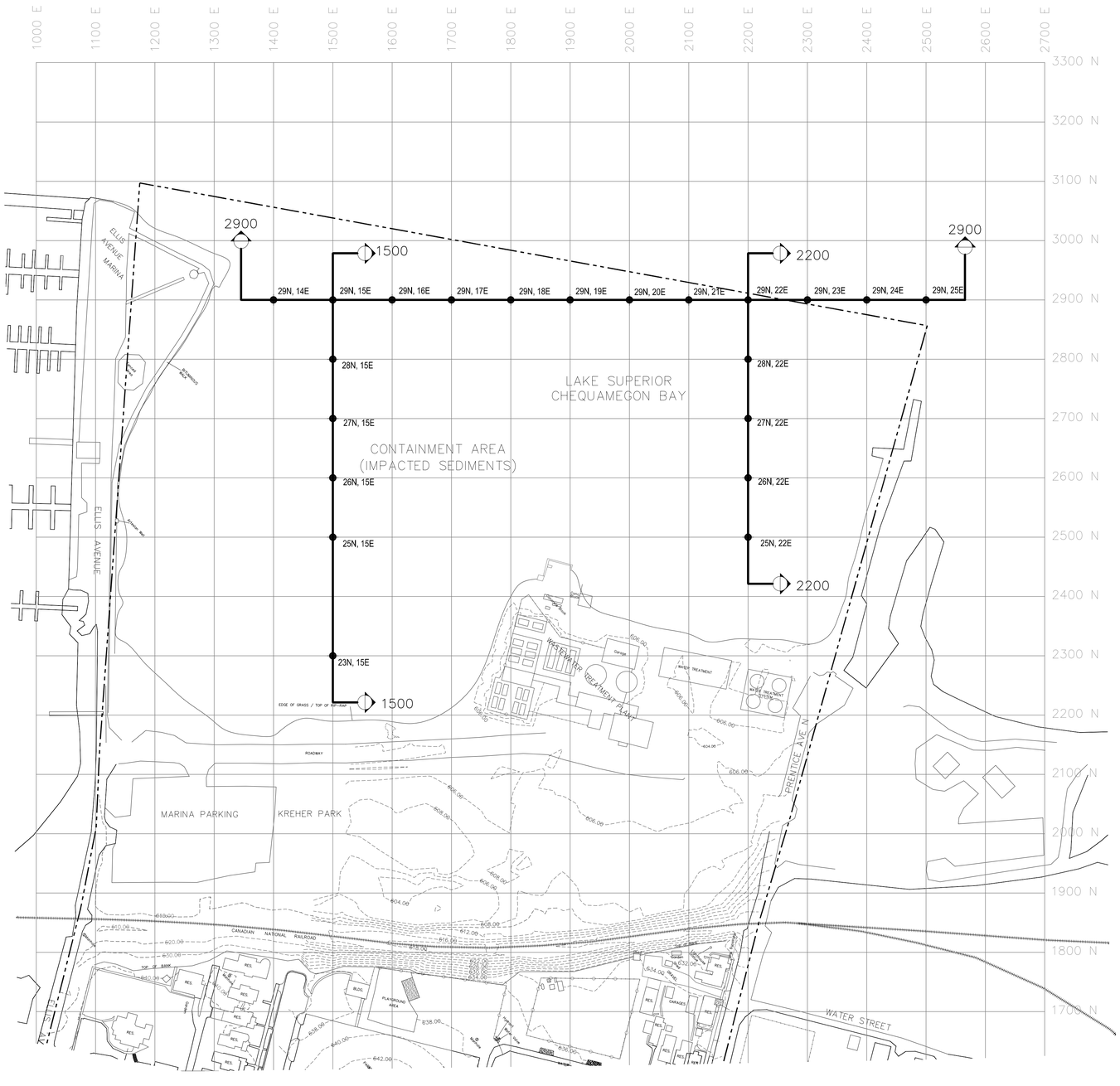
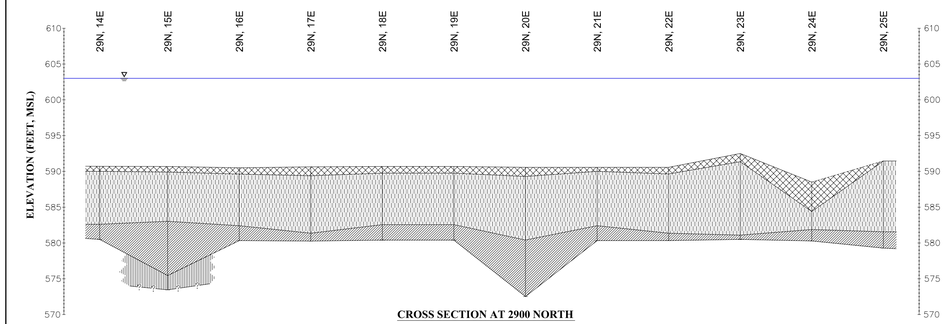
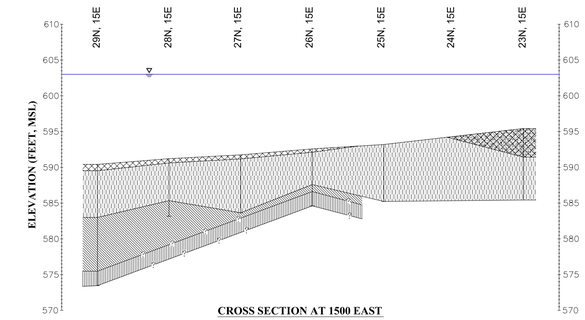
SITE PLAN WITH EXISTING CONDITIONS
DRY EXCIVATION ALTERNATIVE ASHLAND/NSP
LAKEFRONT SITE
ASHLAND, WISCONSIN

DRN. BY:	BKR	DATE:	4/30/08	PROJECT NO.	FIG. NO.
CHK'D. BY:	JVH	DATE:	4/30/08	25688375.76000	8-13

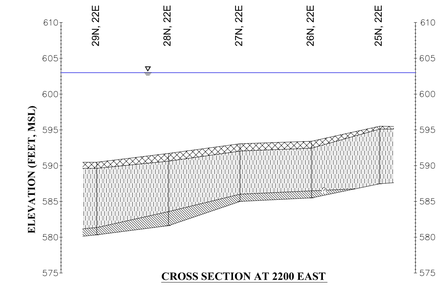




CROSS SECTION AT 2900 NORTH



CROSS SECTION AT 1500 EAST



CROSS SECTION AT 2200 EAST

LEGEND:

- = WOOD
- = SAND AND WOOD
- = SAND/SILT
- = CLAY
- = SILT
- = LAKE ELEVATION
- = INFERRED CONTACT

VERTICAL SCALE IN FEET

0 5 10 15 20

HORIZONTAL SCALE IN FEET

0 50 100 150 200

NORTH

SCALE IN FEET

0 50 100 150 200

LEGEND:

- = NPL SITE BOUNDARY
- = SURFACE CONTOUR MAJOR
- = SURFACE CONTOUR MINOR

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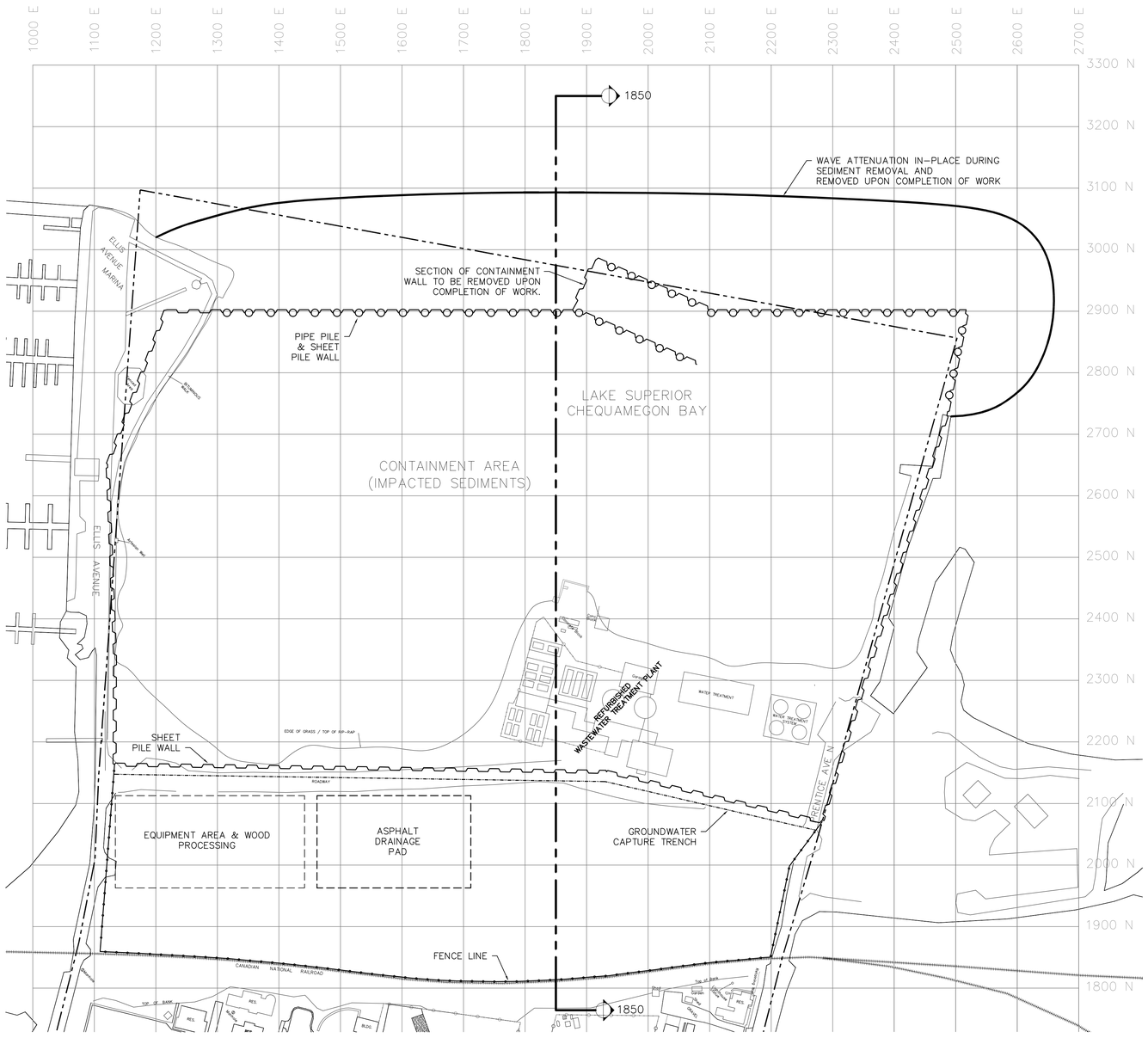
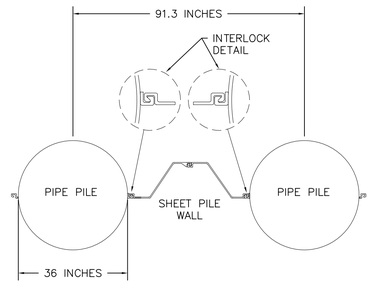
(312) 939-4198 Fax

EXISTING CONDITIONS & CROSS-SECTIONS
DRY EXCAVATION ALTERNATIVE ASHLAND/NSP
LAKEFRONT SITE
ASHLAND, WISCONSIN

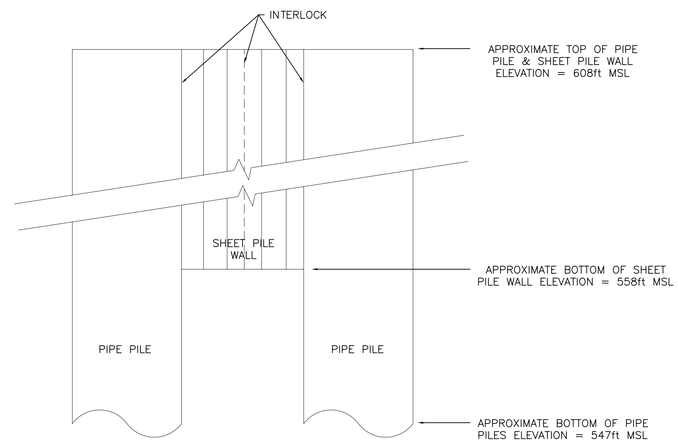
DRN BY:	BKR	DATE:	4/30/08	PROJECT NO.	FIG. NO.
CHK'D BY:	JVH	DATE:	4/30/08	25688375.76000	8-14





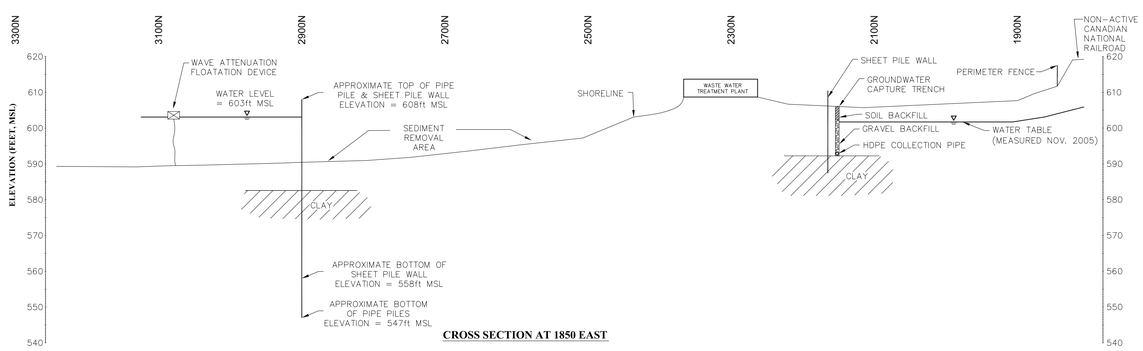
PIPE PILE / AZ SHEET PILE COMBINED WALL SYSTEM
PLAN VIEW

NOT TO SCALE



PROFILE VIEW

NOT TO SCALE



CROSS SECTION AT 1850 EAST

NORTH

SCALE IN FEET

0 50 100 150 200

LEGEND:

- = NPL SITE BOUNDARY
- = SHEET PILE WALL
- = GROUNDWATER CAPTURE TRENCH
- = FENCE LINE

NOTES:

1) SECTIONS OF THE WAVE ATTENUATION DEVICE WOULD BE DESIGNED TO ALLOW BARGE ACCESS FOR INSTALLATION OF THE CONTAINMENT WALL LOCATED WITHIN THE BAY.

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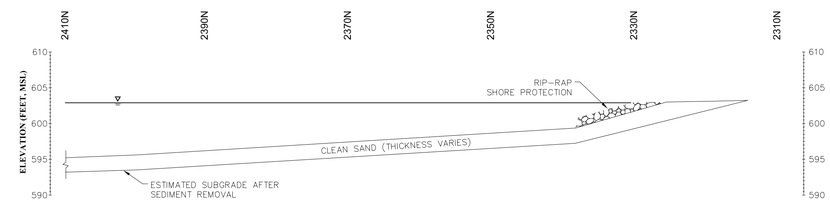
100 S. WACKER DRIVE
SUITE 500
CHICAGO, ILLINOIS 60606
(312) 939-1000 Tel
(312) 939-4198 Fax

PROPOSED CONSTRUCTION ELEMENTS
& CROSS SECTION
DRY EXCAVATION ALTERNATIVE ASHLAND/NSP
LAKEFRONT SITE ASHLAND, WISCONSIN

DRN BY: BKR	DATE: 4/30/08	PROJECT NO.	FIG. NO.
CHK'D BY: JVH	DATE: 4/30/08	25688375.76000	8-15

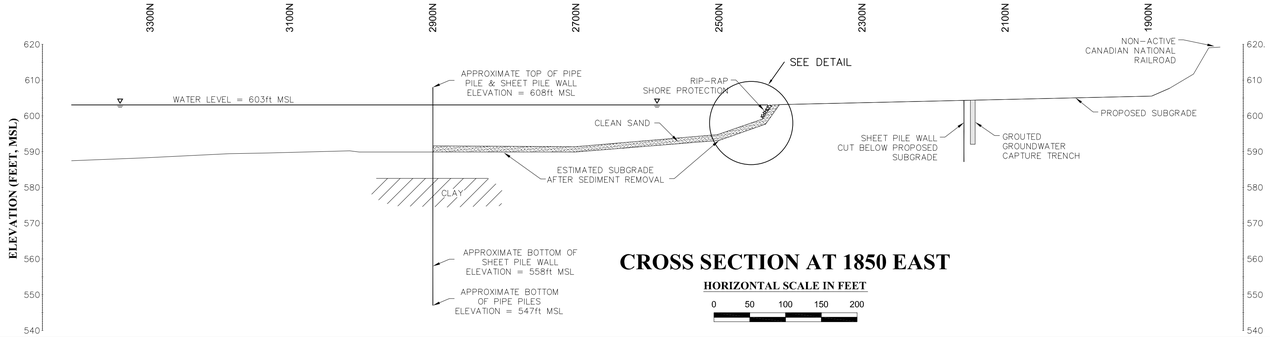
PLOTTED: May 1, 2008 BY: Barnes, Brian CTB USED: JOC-14.ctb PAPER SPACE TAB: Fig 8-15
DWG File: T:\Jobs_A\Ashland\Ashland WI Jobfiles\ 2008 - Dry Dredge\DRY\Jobfiles @ - Dry Proc (For Review Comments).dwg



DETAIL

SCALE IN FEET

0 5 10 15 20



CROSS SECTION AT 1850 EAST

HORIZONTAL SCALE IN FEET

0 50 100 150 200

NORTH

SCALE IN FEET

0 50 100 150 200

LEGEND:

- = NPL SITE BOUNDARY
- = RIP-RAP
- = SAND COVER
- = CUT-DOWN SHEET PILE WALL
- = PIPE PILE & SHEET PILE WALL

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SUITE 500
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(312) 939-1000 Tel
(312) 939-4198 Fax

PROPOSED FINAL SITE FEATURES
PLAN VIEW AND CROSS SECTION
DRY EXCAVATION ALTERNATIVE ASHLAND/NSP
LAKEFRONT SITE ASHLAND, WISCONSIN

DRN BY:	BKR	DATE: 4/30/08	PROJECT NO.	FIG. NO.
CHK'D BY:	JVH	DATE: 4/30/08	25688375.76000	8-16

PLOTTED: May 1, 2008 BY: Barnes, Brian CTB USED: JACK-FULL.CTB PAGE SPACE TYPE: Fig 8-16
DWG Name: \\chi0vs_2\Clients\Ashland\25688375 - Dry Excavation\Figures\Figure 8 - Site Plan Alternative.dwg

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WAVE ATTENUATOR SECTIONS READY FOR SHIPMENT
DRY EXCAVATION ALTERNATIVE ASHLAND/NSP
LAKEFRONT SITE
ASHLAND, WISCONSIN

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CHK'D BY:	JVH	DATE:	4/30/08	25688375.76000	8-17

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WAVE ATTENUATORS DEPLOYED AS BREAKWATER
DRY EXCAVATION ALTERNATIVE ASHLAND/NSP
LAKEFRONT SITE
ASHLAND, WISCONSIN

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CHK'D BY:	JVH	DATE:	4/30/08	25688375.76000	8-18