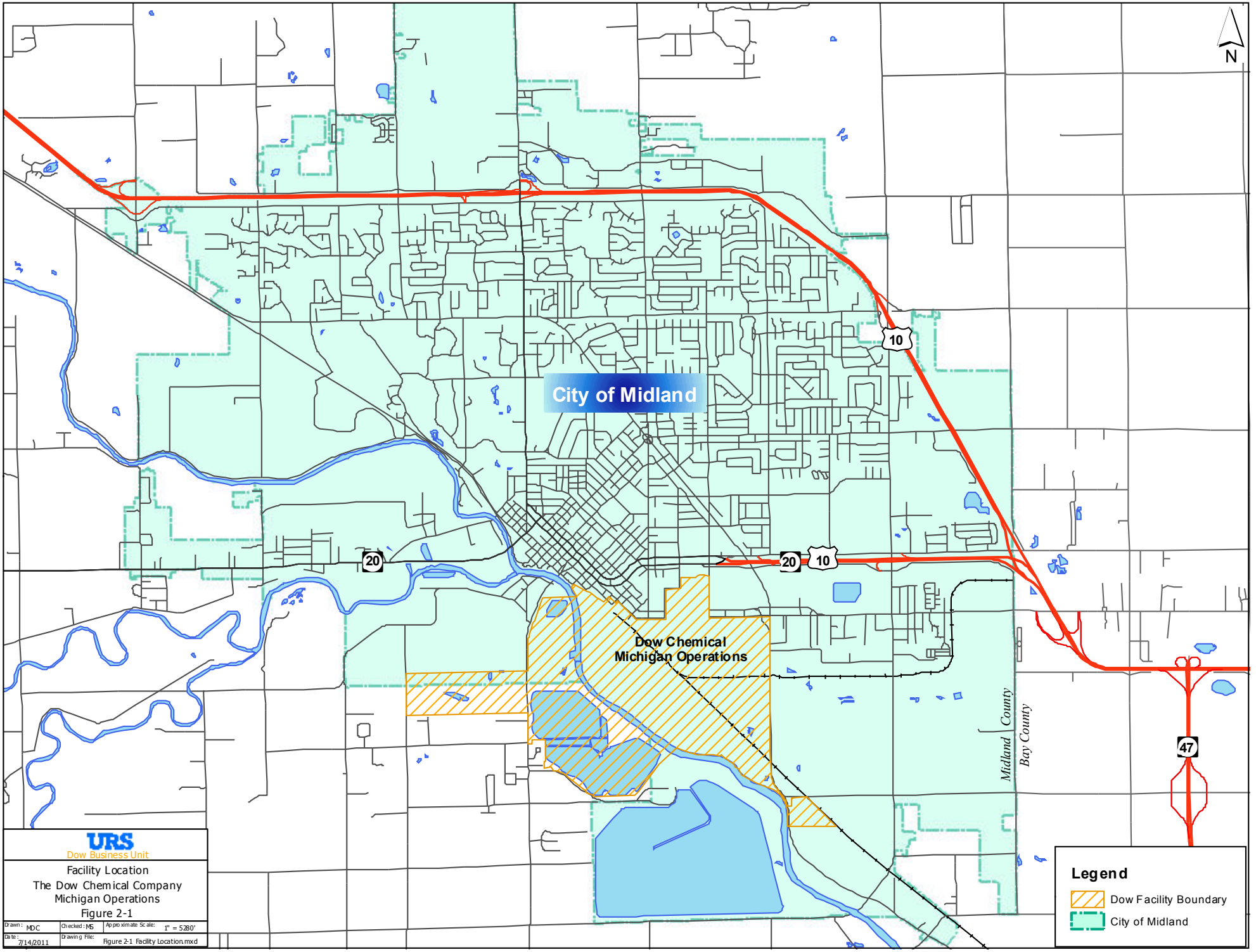

N
City of Midland
10
20
20
10
47
Dow Chemical
Michigan Operations
Midland County
Bay County
URS
Dow Business Unit
Facility Location
The Dow Chemical Company
Michigan Operations
Figure 2-1
Drawn: MDC
Checked: MS
Approximate Scale: 1" = 5280'
Date: 7/14/2011
Drawing File: Figure 2-1 Facility Location.mxd
Legend
Dow Facility Boundary
City of Midland

Wind Rose for Meteorological Station No. 72639 (Dow Midland Plant) Composite for 1987-1991

Source: Incinerator Upgrade Human Health Risk Assessment,
The Dow Chemical Company,
July 2001
Wind Rose originates from monitoring
station on Midland Plant.

Note: Wind rose indicates direction from which wind originates.

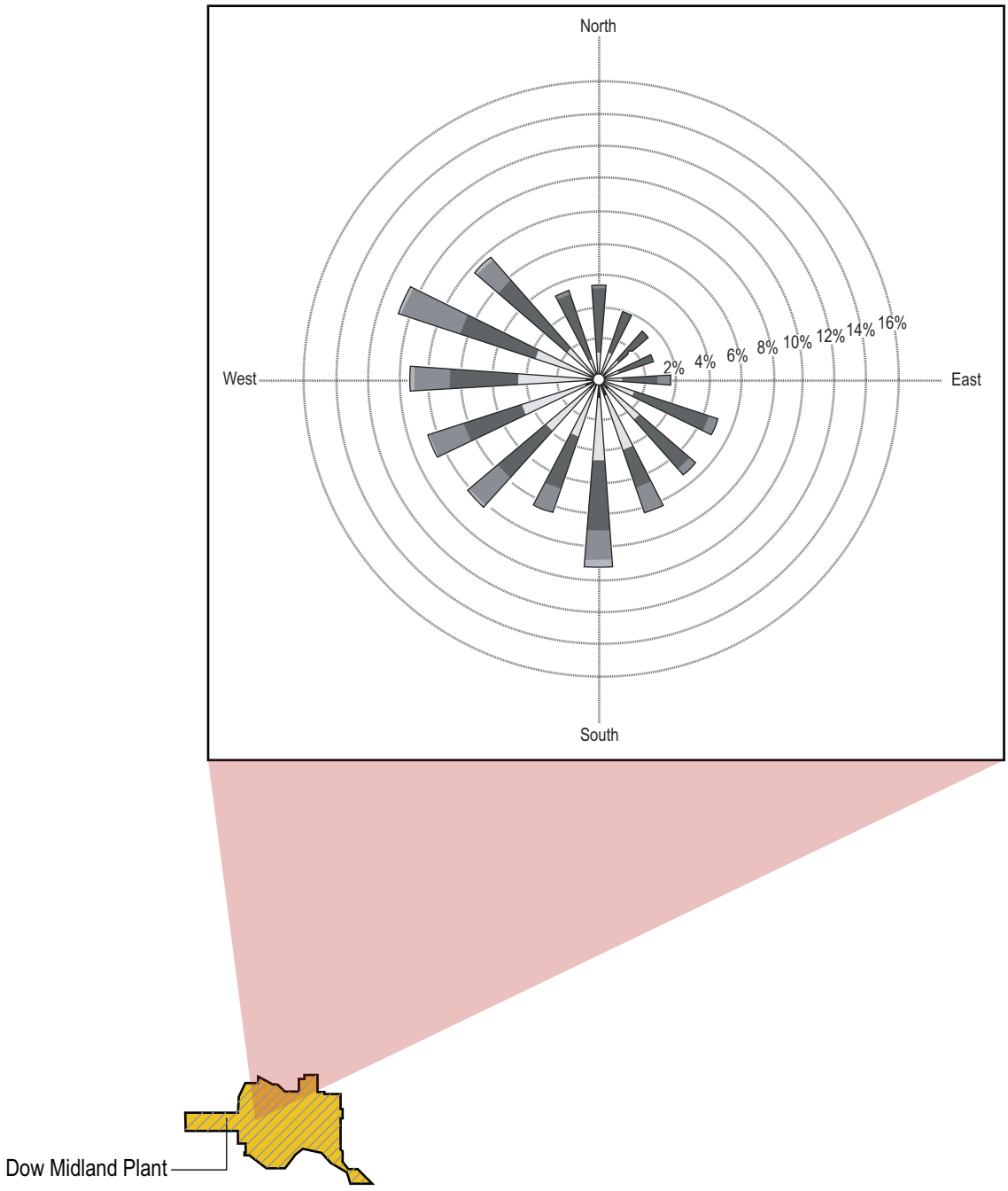


Figure 4-1
Wind Rose Diagram
Midland Area Soils Remedial Investigation Work Plan

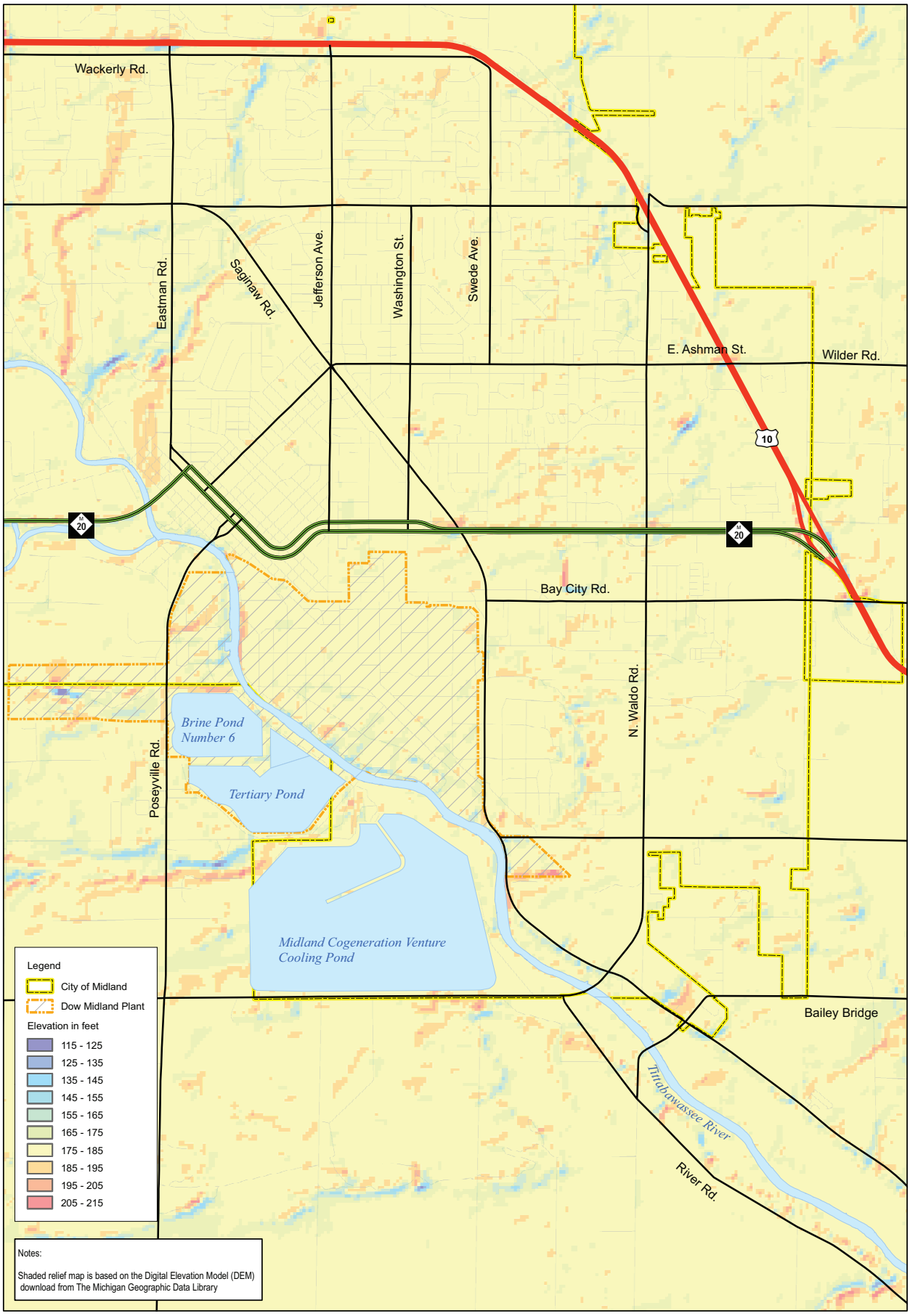
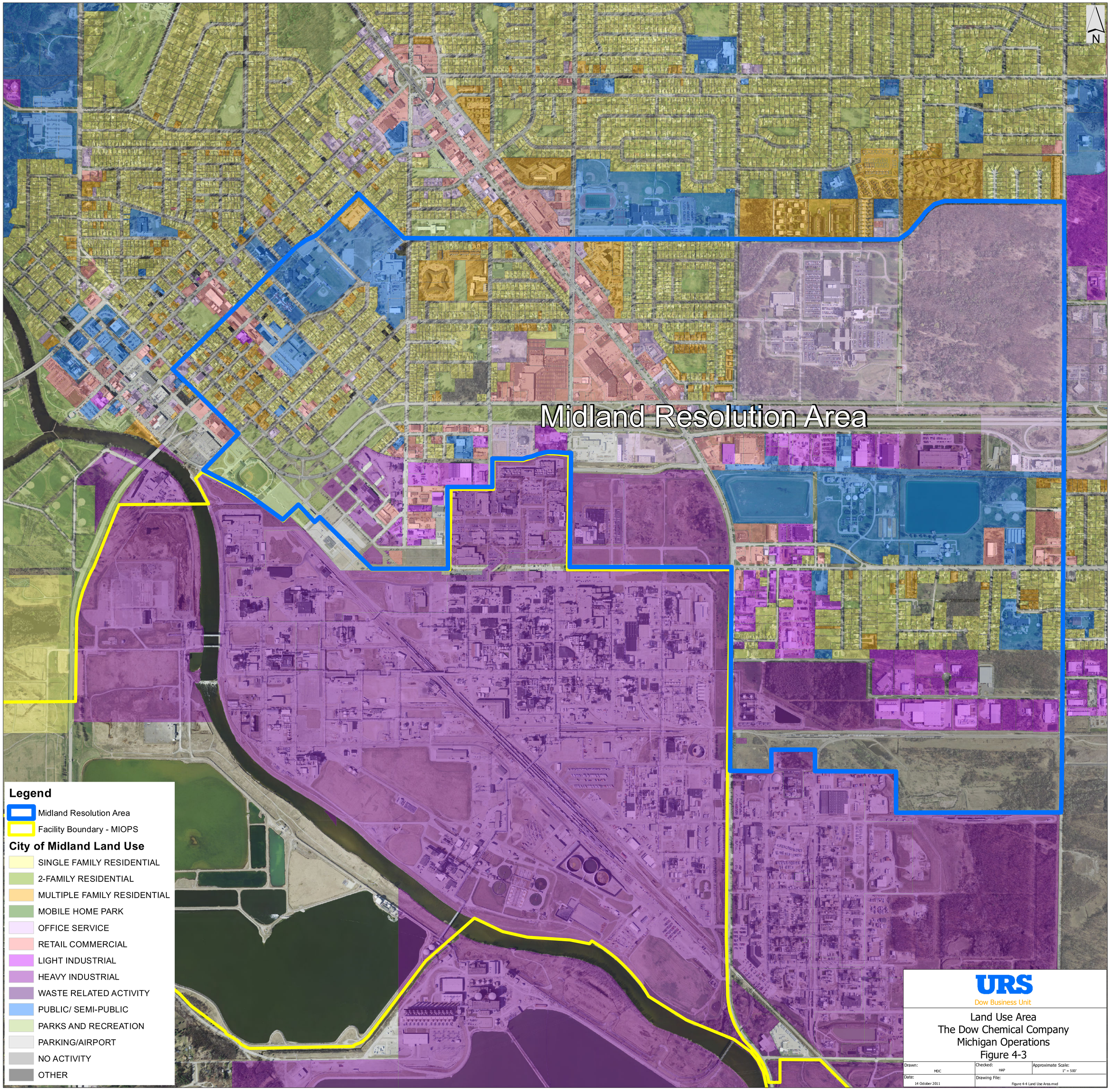
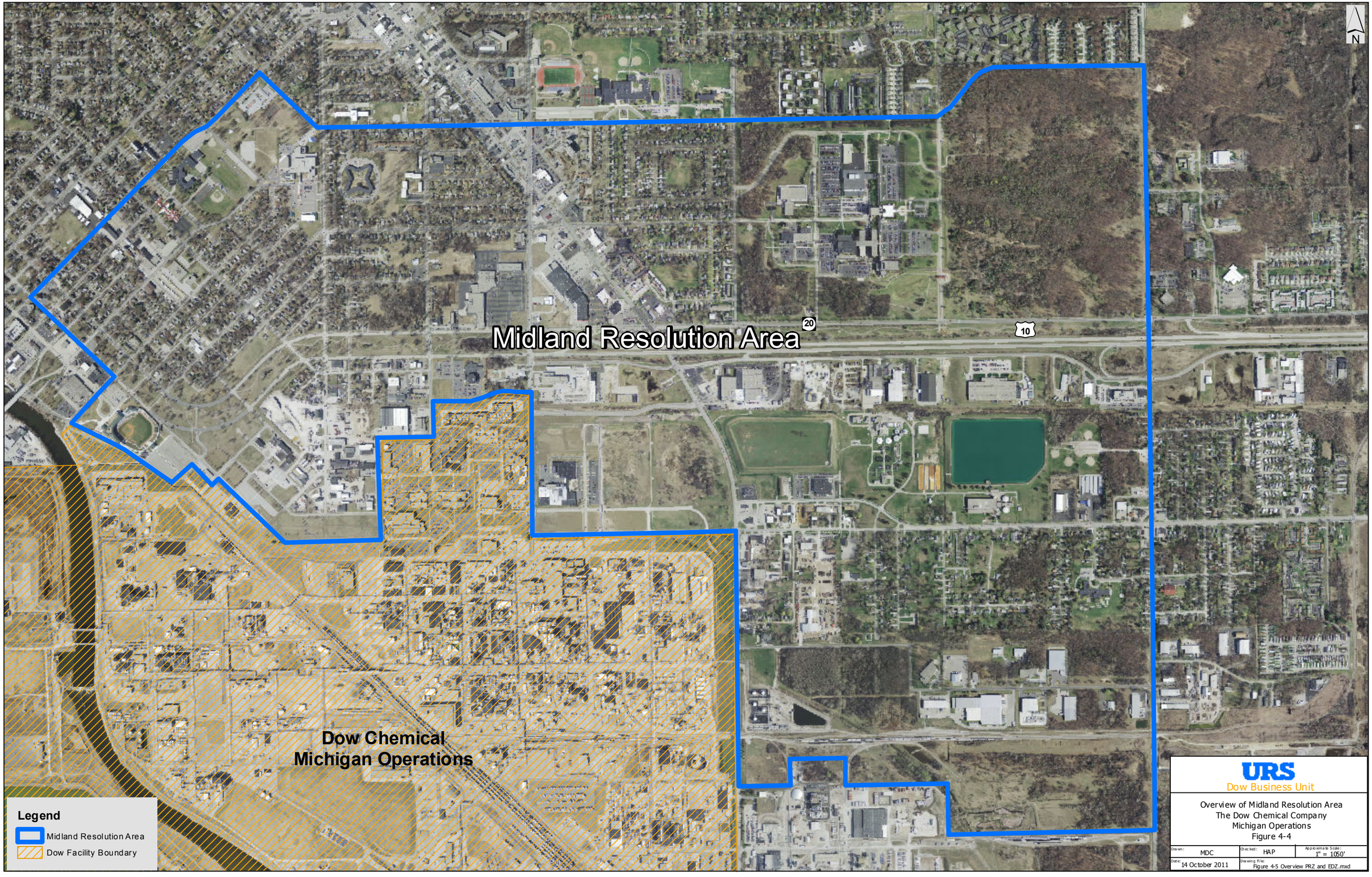


Figure 4 - 2
Midland Topographic Features
Midland Area Soils Remedial Investigation Work Plan

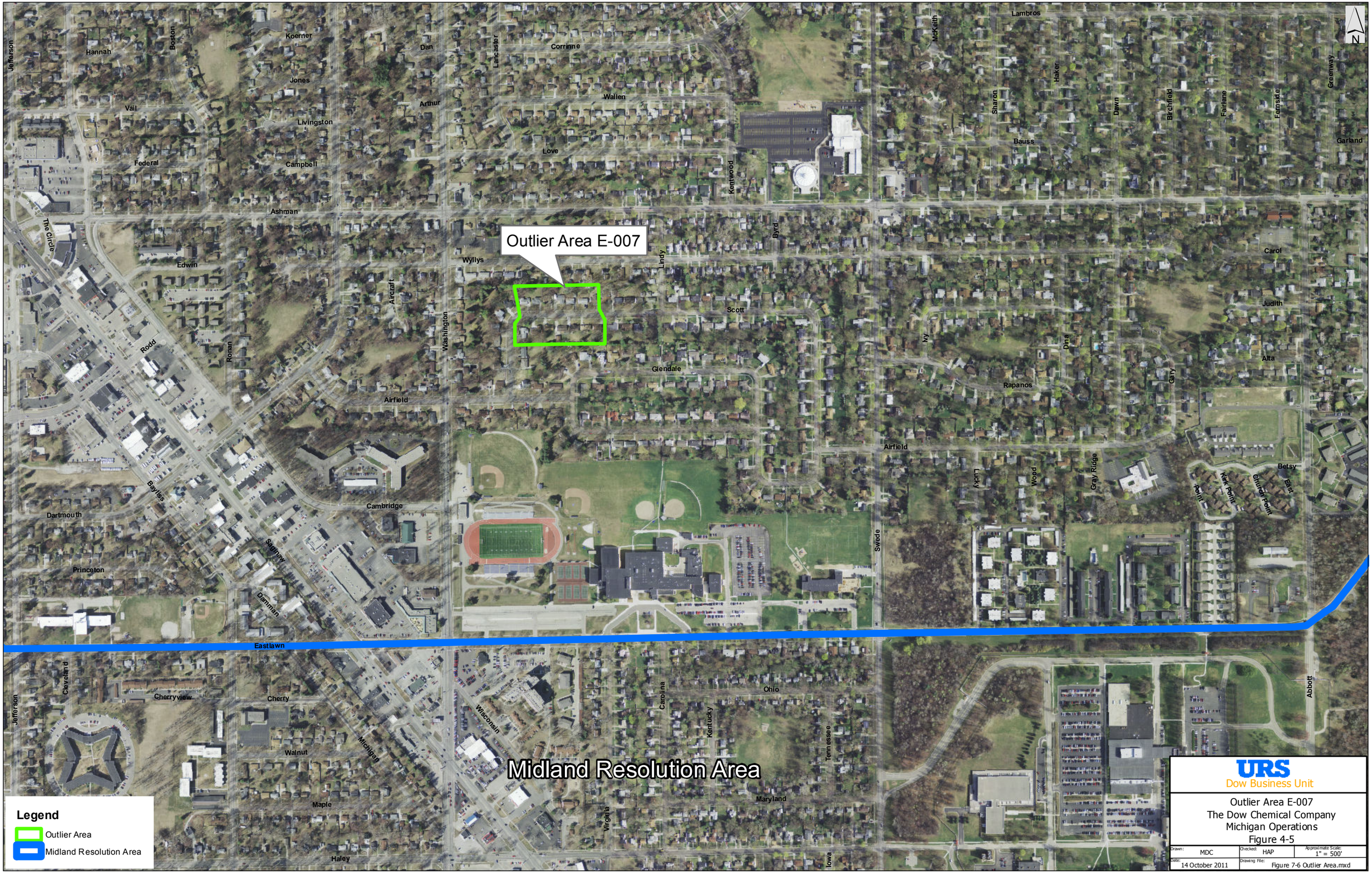

N
Midland Resolution Area
Legend
Midland Resolution Area
Facility Boundary - MIOPS
City of Midland Land Use
SINGLE FAMILY RESIDENTIAL
2-FAMILY RESIDENTIAL
MULTIPLE FAMILY RESIDENTIAL
MOBILE HOME PARK
OFFICE SERVICE
RETAIL COMMERCIAL
LIGHT INDUSTRIAL
HEAVY INDUSTRIAL
WASTE RELATED ACTIVITY
PUBLIC/ SEMI-PUBLIC
PARKS AND RECREATION
PARKING/AIRPORT
NO ACTIVITY
OTHER
URS
Dow Business Unit
Land Use Area
The Dow Chemical Company
Michigan Operations
Figure 4-3
Drawn: MDC
Checked: HAP
Approximate Scale: 1" = 500'
Date: 14 October 2011
Drawing File: Figure 4-4 Land Use Area.mxd

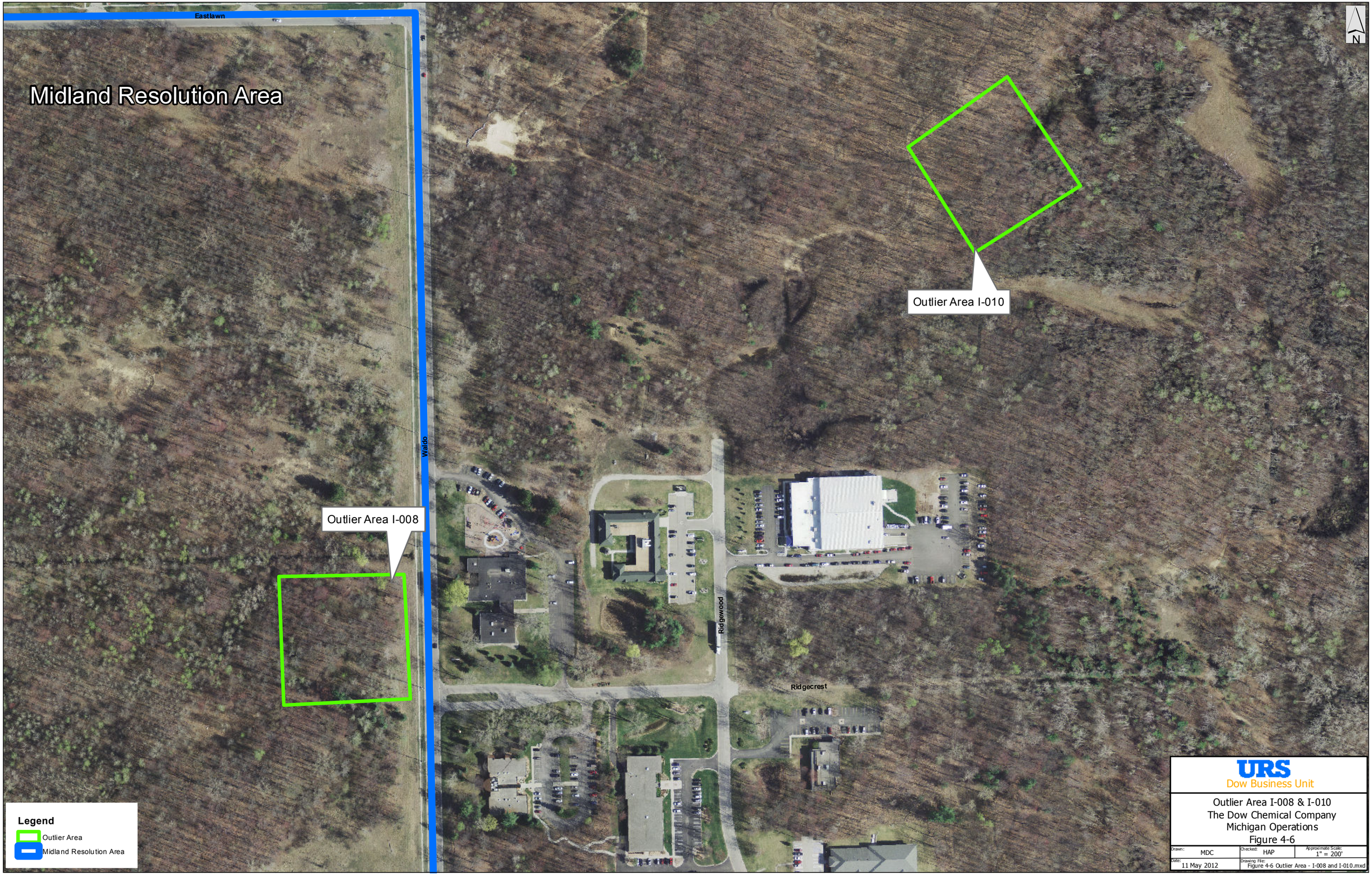


URS
Dow Business Unit

Overview of Midland Resolution Area
The Dow Chemical Company
Michigan Operations
Figure 4-4

Drawn: MDC	Checked: HAP	Approximate Scale: 1" = 1050'
Date: 14 October 2011	Drawing File: Figure 4-5 Overview PRZ and EDZ.mxd	


Outlier Area E-007
Midland Resolution Area
N
Jefferson
Hannah
Boston
Koerner
Dan
Lancaster
Corrinne
McKeith
Lambros
Jones
Wallen
Haker
Sharon
Greenway
Vail
Arthur
Livingston
Dawn
Birchfield
Fairlane
Farnside
Bauss
Garland
Federal
Love
Campbell
Kentwood
Ashman
The Circle
Byrd
Edwin
Wyllys
Lindy
Carol
Aircraft
Scott
Judith
Washington
Ivy
Dina
Rodd
Ronan
Glendale
Alta
Gary
Rapanos
Airfield
Airfield
Lucky
Wood
Gray Ridge
Betsy
Fast
Mark Point
Church Point
Point
Bayliss
Cambridge
Dartmouth
Swede
Saginaw
Princeton
Danman
Eastlawn
Cleveland
Cherryview
Cherry
Jefferson
Wisconsin
Carolina
Ohio
Kentucky
Michigan
Walnut
Tennessee
Abbott
Maple
Maryland
Virginia
Haley
Iowa
Legend
Outlier Area
Midland Resolution Area
URS
Dow Business Unit
Outlier Area E-007
The Dow Chemical Company
Michigan Operations
Figure 4-5
Drawn: MDC
Checked: HAP
Approximate Scale: 1" = 500'
Date: 14 October 2011
Drawing File: Figure 7-6 Outlier Area.mxd

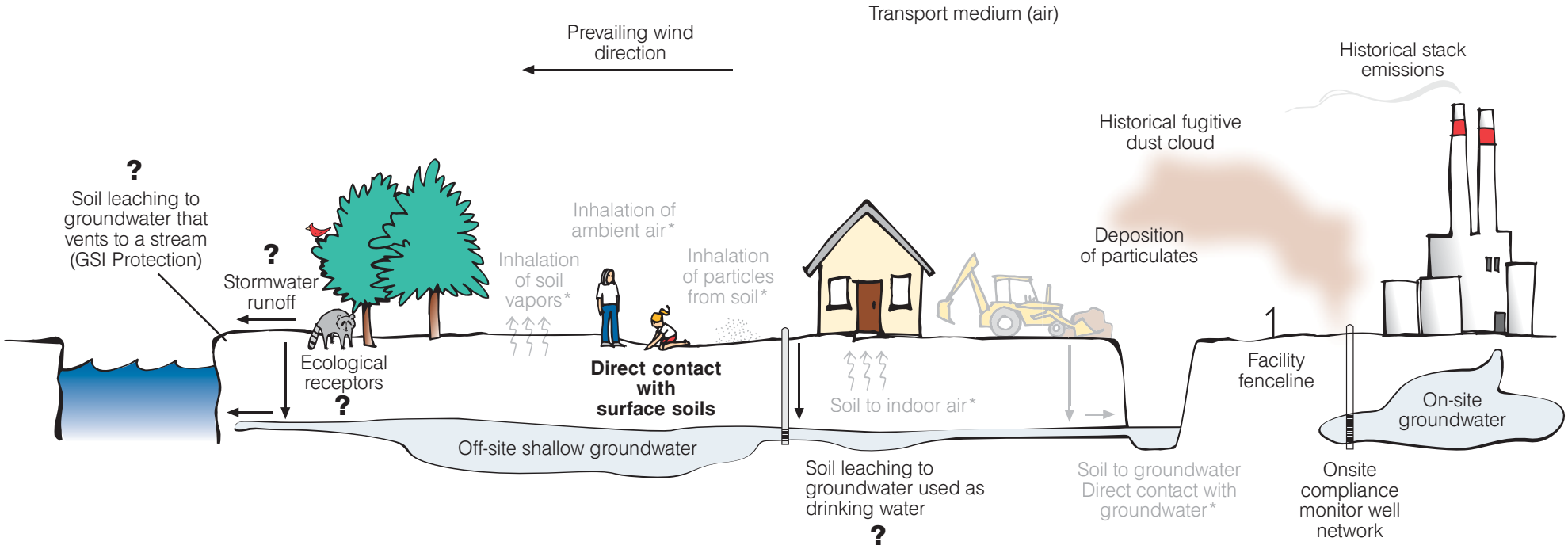


URS
Dow Business Unit

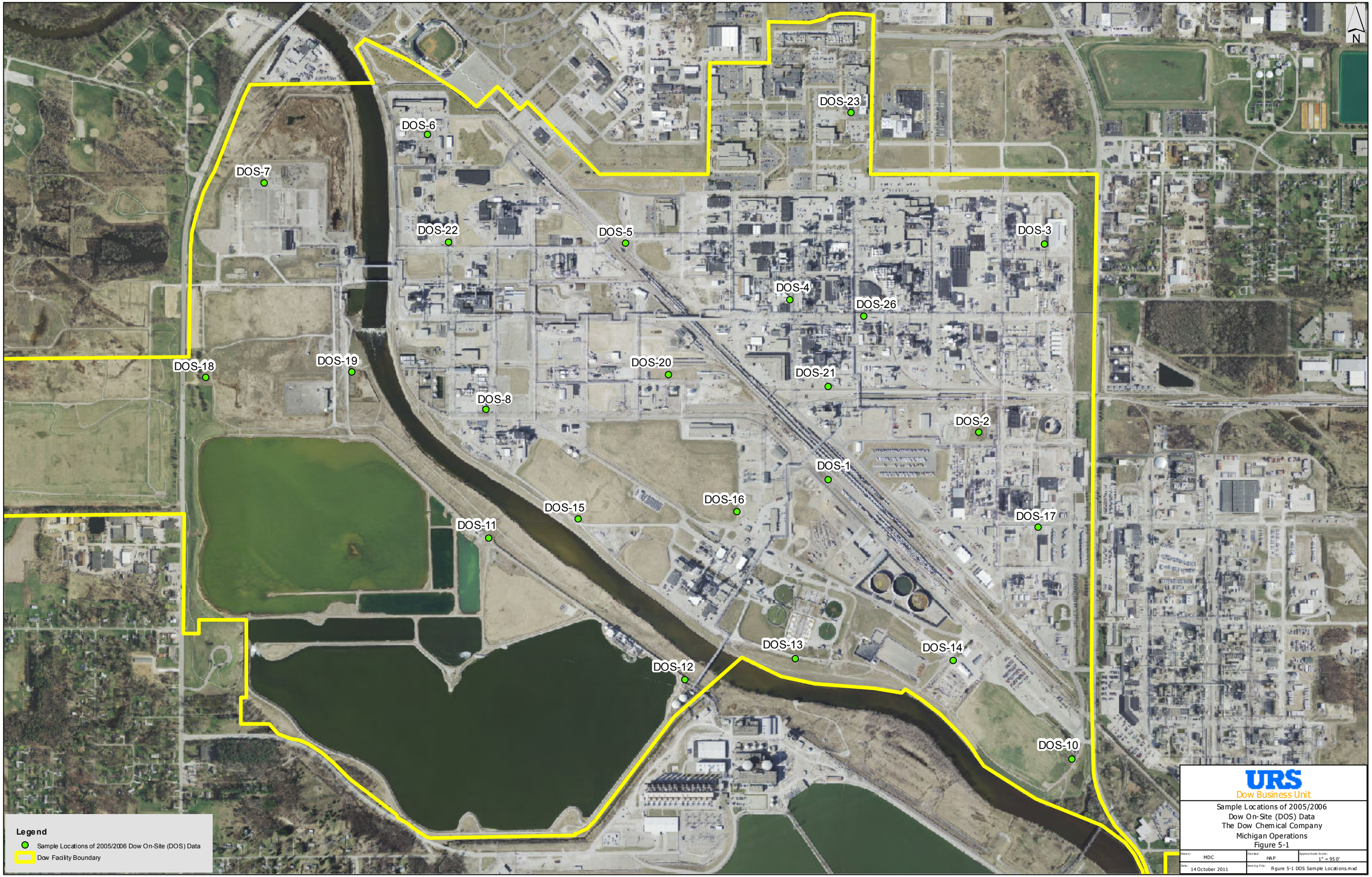
Outlier Area I-008 & I-010
The Dow Chemical Company
Michigan Operations
Figure 4-6

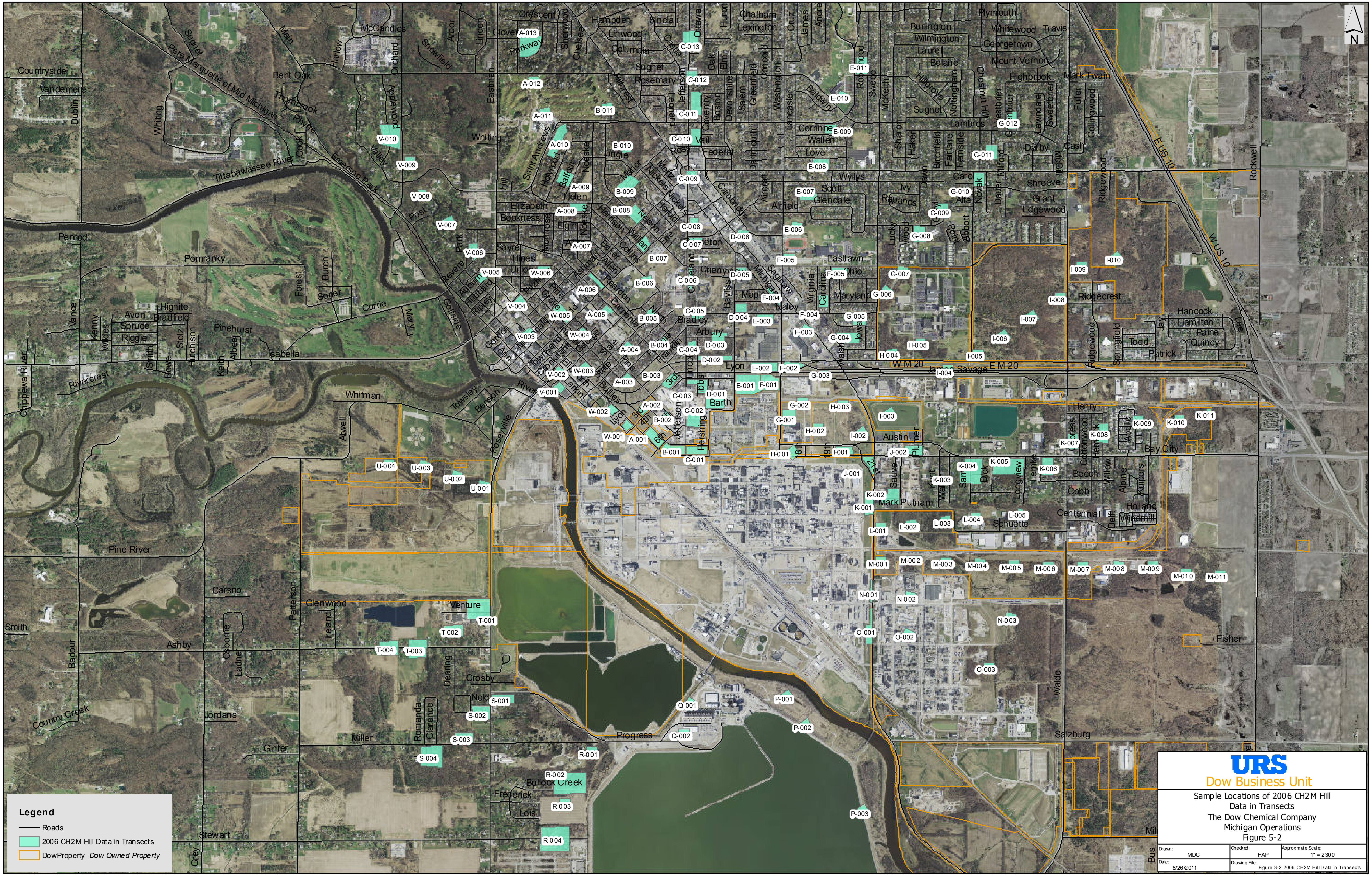
Drawn:	Checked:	Approximate Scale:
MDC	HAP	1" = 200'
Date:	Drawing File:	
11 May 2012	Figure 4-6 Outlier Area - I-008 and I-010.mxd	

Figure 4-7



* The analytical results were compared to the screening criterion for this pathway. There were no analytes detected above the criterion and therefore, exposure via this pathway is not a risk to human health or the environment.


N
DOS-23
DOS-6
DOS-7
DOS-22
DOS-5
DOS-3
DOS-4
DOS-26
DOS-18
DOS-19
DOS-20
DOS-21
DOS-8
DOS-2
DOS-1
DOS-16
DOS-15
DOS-17
DOS-11
DOS-13
DOS-14
DOS-12
DOS-10
Legend
Sample Locations of 2005/2006 Dow On-Site (DOS) Data
Dow Facility Boundary
URS
Dow Business Unit
Sample Locations of 2005/2006
Dow On-Site (DOS) Data
The Dow Chemical Company
Michigan Operations
Figure 5-1
Drawn: MDC
Checked: HAP
Approximate Scale: 1" = 950'
Date: 14 October 2011
Drawing File: Figure 5-1 DOS Sample Locations.mxd


N
Legend
Roads
2006 CH2M Hill Data in Transects
DowProperty Dow Owned Property
URS
Dow Business Unit
Sample Locations of 2006 CH2M Hill
Data in Transects
The Dow Chemical Company
Michigan Operations
Figure 5-2
Drawn: MDC
Checked: HAP
Approximate Scale 1" = 2300'
Date: 8/26/2011
Drawing File: Figure 3-2 2006 CH2M Hill Data in Transects
Tittabawassee River
Venture
Bullock Creek
Salzburg
Waldo
Progress
Saginaw
E M 20
W M 20
E US 10
W US 10

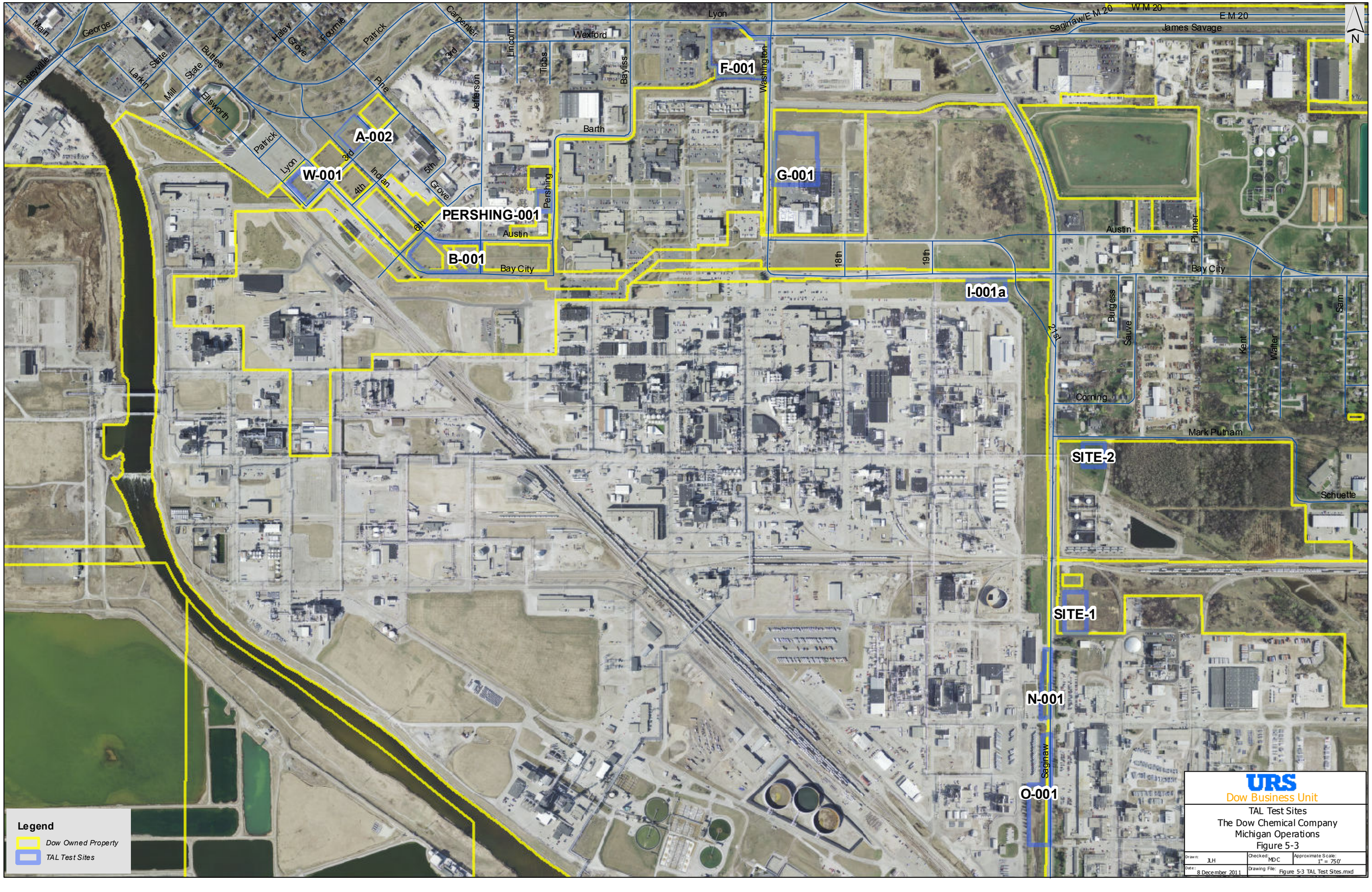

A-002
W-001
PERSHING-001
B-001
F-001
G-001
I-001a
N-001
O-001
SITE-1
SITE-2
Main
George
Posey ville
Larkin
State
Mill
Butties
Ellsworth
Haley
Grove
Fournie
Patrick
Carpenter
Jefferson
Lincoln
Tibbs
Wexford
Bayliss
Barth
Lyon
3rd
4th
5th
6th
Indian
Pershing
Austin
Bay City
Washington
18th
19th
21st
Saginaw/E M 20
W M 20
E M 20
James Savage
Plumer
Burgess
Sauve
Kent
Walter
Sam
Corning
Mark Putnam
Schuette
Saginaw
N
Legend
Dow Owned Property
TAL Test Sites
URS
Dow Business Unit
TAL Test Sites
The Dow Chemical Company
Michigan Operations
Figure 5-3
Drawn: JLH
Checked: MDC
Approximate Scale: 1" = 750'
Date: 8 December 2011
Drawing File: Figure 5-3 TAL Test Sites.mxd

Figure 5-4

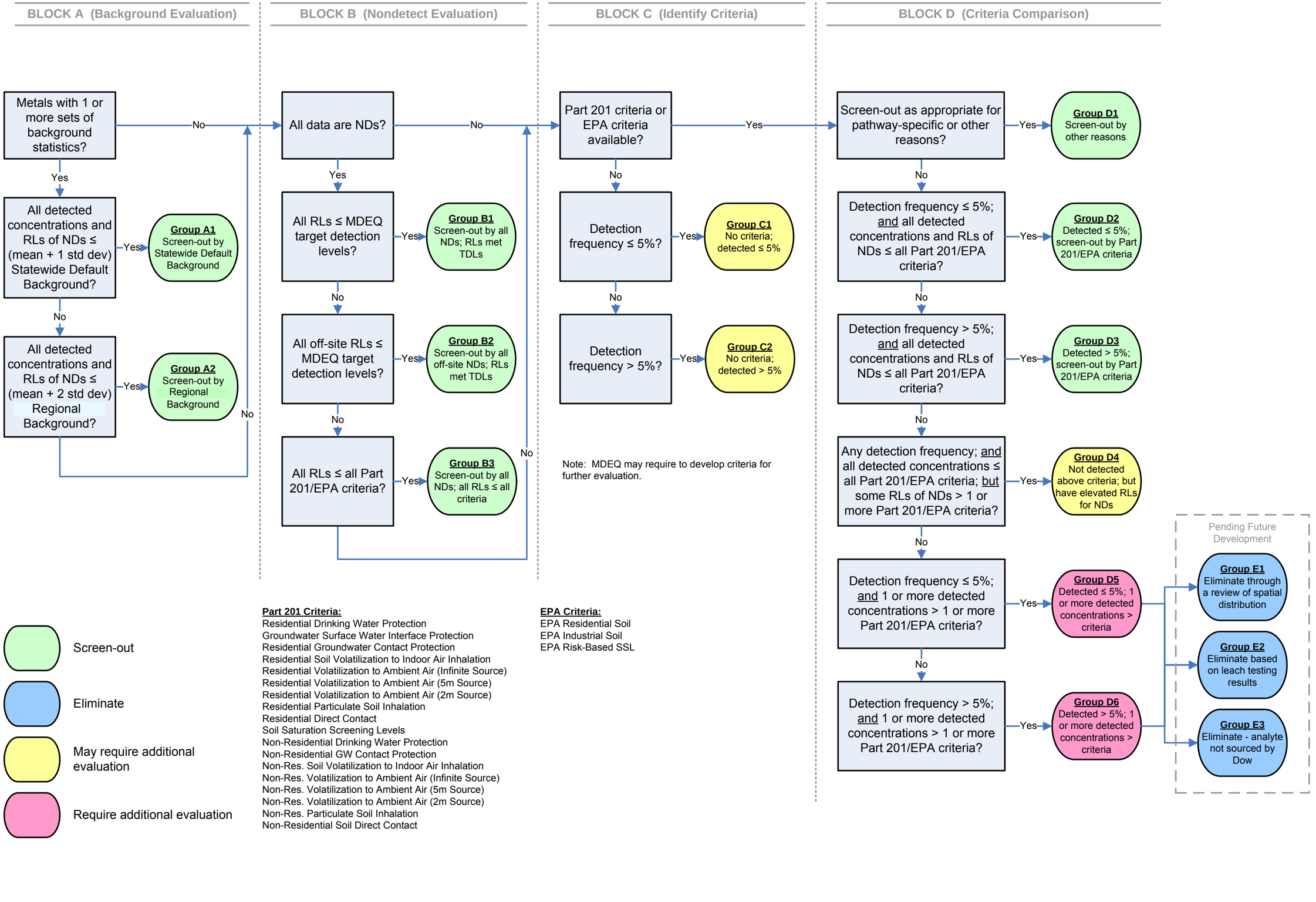
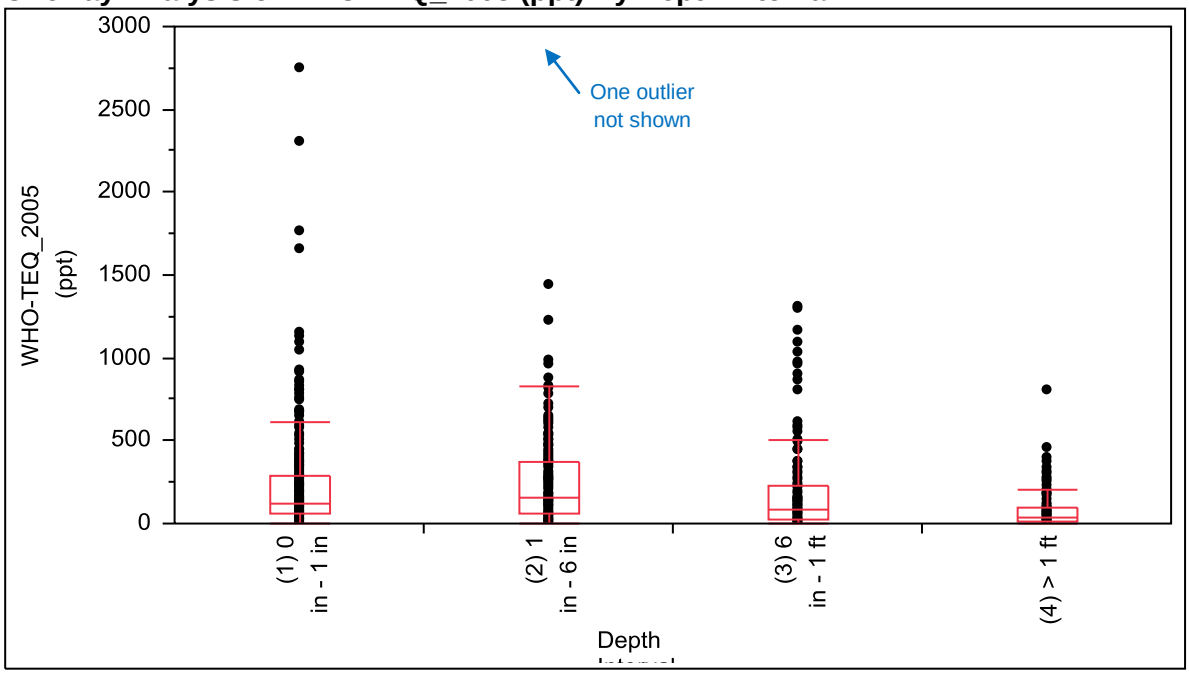
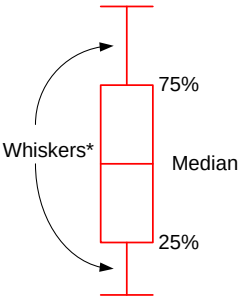

BLOCK A (Background Evaluation)
BLOCK B (Nondetect Evaluation)
BLOCK C (Identify Criteria)
BLOCK D (Criteria Comparison)
Metals with 1 or more sets of background statistics?
No
Yes
All detected concentrations and RLs of NDs ≤ (mean + 1 std dev) Statewide Default Background?
Yes
Group A1 Screen-out by Statewide Default Background
No
All detected concentrations and RLs of NDs ≤ (mean + 2 std dev) Regional Background?
Yes
Group A2 Screen-out by Regional Background
No
All data are NDs?
No
Yes
All RLs ≤ MDEQ target detection levels?
Yes
Group B1 Screen-out by all NDs; RLs met TDLs
No
All off-site RLs ≤ MDEQ target detection levels?
Yes
Group B2 Screen-out by all off-site NDs; RLs met TDLs
No
All RLs ≤ all Part 201/EPA criteria?
Yes
Group B3 Screen-out by all NDs; all RLs ≤ all criteria
No
Part 201 criteria or EPA criteria available?
Yes
No
Detection frequency ≤ 5%?
Yes
Group C1 No criteria; detected ≤ 5%
No
Detection frequency > 5%?
Yes
Group C2 No criteria; detected > 5%
Screen-out as appropriate for pathway-specific or other reasons?
Yes
Group D1 Screen-out by other reasons
No
Detection frequency ≤ 5%; and all detected concentrations and RLs of NDs ≤ all Part 201/EPA criteria?
Yes
Group D2 Detected ≤ 5%; screen-out by Part 201/EPA criteria
No
Detection frequency > 5%; and all detected concentrations and RLs of NDs ≤ all Part 201/EPA criteria?
Yes
Group D3 Detected > 5%; screen-out by Part 201/EPA criteria
No
Any detection frequency; and all detected concentrations ≤ all Part 201/EPA criteria; but some RLs of NDs > 1 or more Part 201/EPA criteria?
Yes
Group D4 Not detected above criteria; but have elevated RLs for NDs
No
Detection frequency ≤ 5%; and 1 or more detected concentrations > 1 or more Part 201/EPA criteria?
Yes
Group D5 Detected ≤ 5%; 1 or more detected concentrations > criteria
No
Detection frequency > 5%; and 1 or more detected concentrations > 1 or more Part 201/EPA criteria?
Yes
Group D6 Detected > 5%; 1 or more detected concentrations > criteria
Pending Future Development
Group E1 Eliminate through a review of spatial distribution
Group E2 Eliminate based on leach testing results
Group E3 Eliminate - analyte not sourced by Dow
Note: MDEQ may require to develop criteria for further evaluation.
Screen-out
Eliminate
May require additional evaluation
Require additional evaluation
Part 201 Criteria:
Residential Drinking Water Protection
Groundwater Surface Water Interface Protection
Residential Groundwater Contact Protection
Residential Soil Volatilization to Indoor Air Inhalation
Residential Volatilization to Ambient Air (Infinite Source)
Residential Volatilization to Ambient Air (5m Source)
Residential Volatilization to Ambient Air (2m Source)
Residential Particulate Soil Inhalation
Residential Direct Contact
Soil Saturation Screening Levels
Non-Residential Drinking Water Protection
Non-Residential GW Contact Protection
Non-Res. Soil Volatilization to Indoor Air Inhalation
Non-Res. Volatilization to Ambient Air (Infinite Source)
Non-Res. Volatilization to Ambient Air (5m Source)
Non-Res. Volatilization to Ambient Air (2m Source)
Non-Res. Particulate Soil Inhalation
Non-Residential Soil Direct Contact
EPA Criteria:
EPA Residential Soil
EPA Industrial Soil
EPA Risk-Based SSL

Figure 5-5
Oneway Analysis of WHO-TEQ_2005 (ppt) By Depth Interval



Box-and-Whisker Plot Legend



*from the ends of the box to the outermost data point that falls within upper/lower quartile +/- (1.5 × interquartile range)

Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
(1) 0 in - 1 in	2.5	29.26	61.85	123	285.5	495.6	2750
(2) 1 in - 6 in	2.9	20.64	62.3	155	377	564	10500
(3) 6 in - 1 ft	0.49	5.814	22.025	85.3	231	569.2	1310
(4) > 1 ft	0.231	2.111688	8.295368	35.59355	92.96923	212.2579	806.5071

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
(1) 0 in - 1 in	361	221.142	294.852	15.519	190.62	251.66
(2) 1 in - 6 in	173	303.207	817.180	62.129	180.57	425.84
(3) 6 in - 1 ft	138	195.723	282.452	24.044	148.18	243.27
(4) > 1 ft	154	76.793	109.450	8.820	59.37	94.22

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.56903	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value
(2) 1 in - 6 in	(1) 0 in - 1 in	23.270	14.26754	1.63097	0.3611
(3) 6 in - 1 ft	(2) 1 in - 6 in	-38.455	10.26321	-3.74687	0.0010*
(4) > 1 ft	(3) 6 in - 1 ft	-41.934	9.89749	-4.23685	0.0001*
(3) 6 in - 1 ft	(1) 0 in - 1 in	-48.259	14.43111	-3.34412	0.0046*
(4) > 1 ft	(2) 1 in - 6 in	-91.600	10.47394	-8.74550	<.0001*
(4) > 1 ft	(1) 0 in - 1 in	-137.013	14.32274	-9.56613	<.0001*

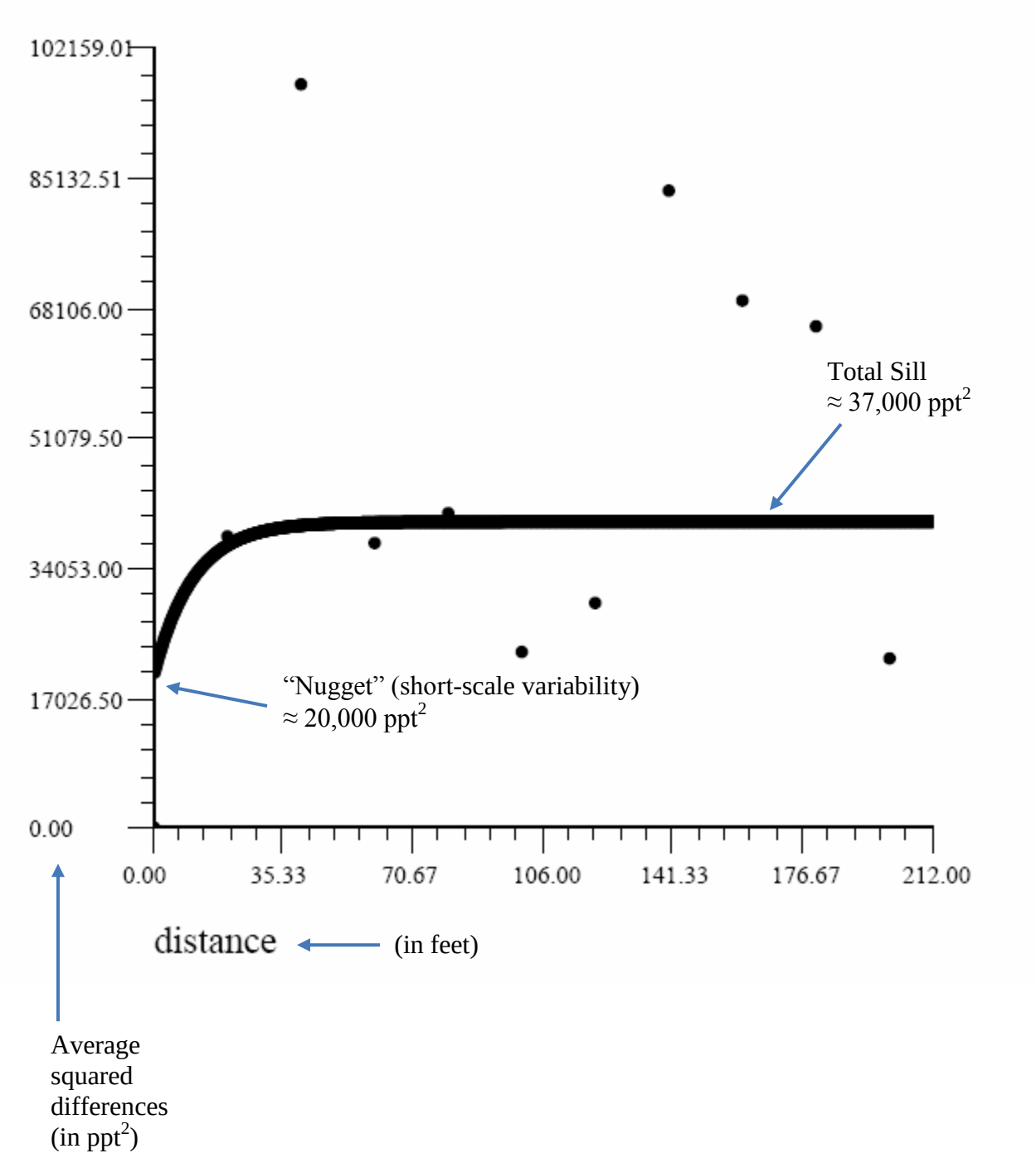


Figure 5-6. Omni-directional Short-Range Variogram

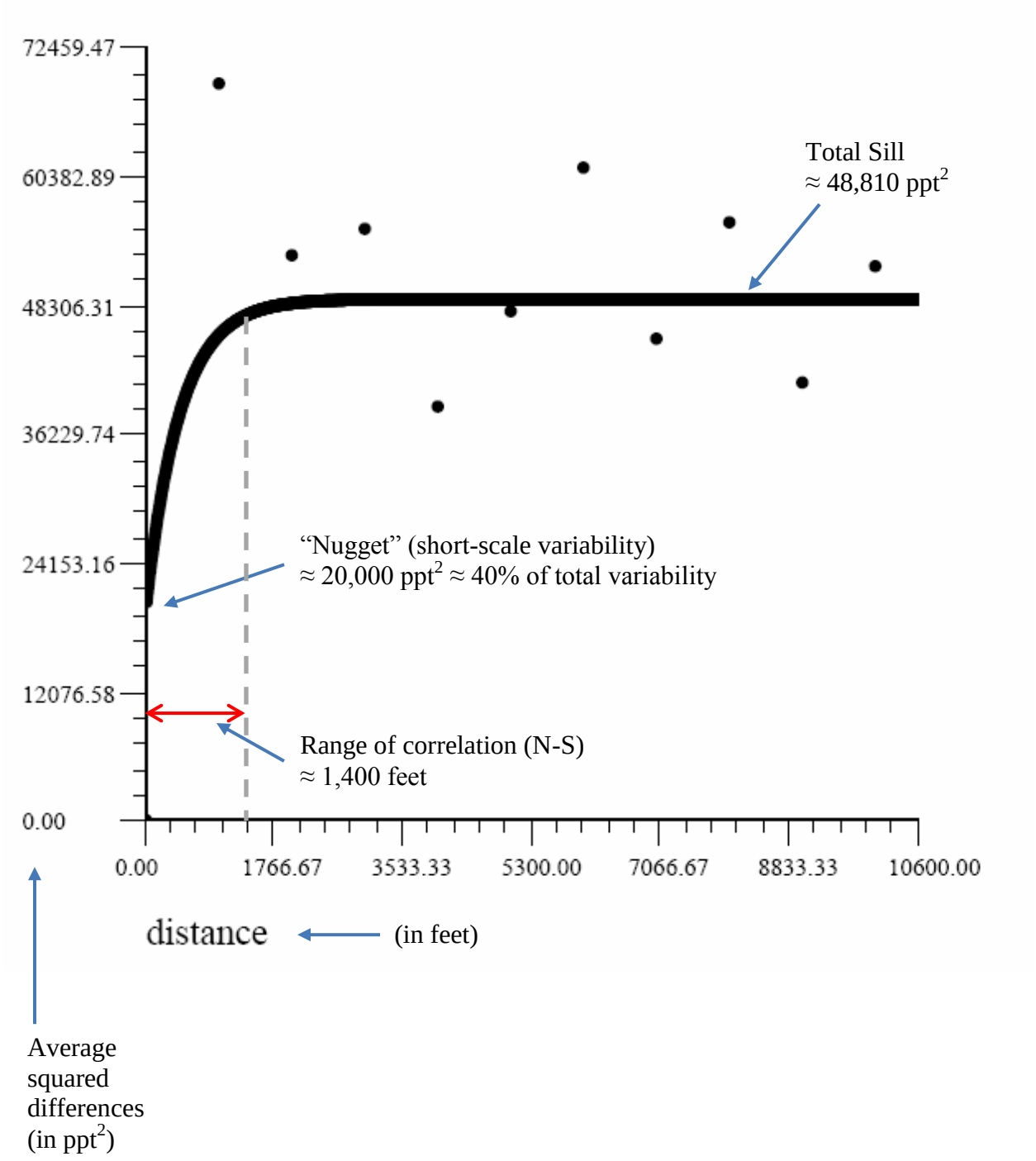


Figure 5-7. North-South Directional Long-Range Variogram

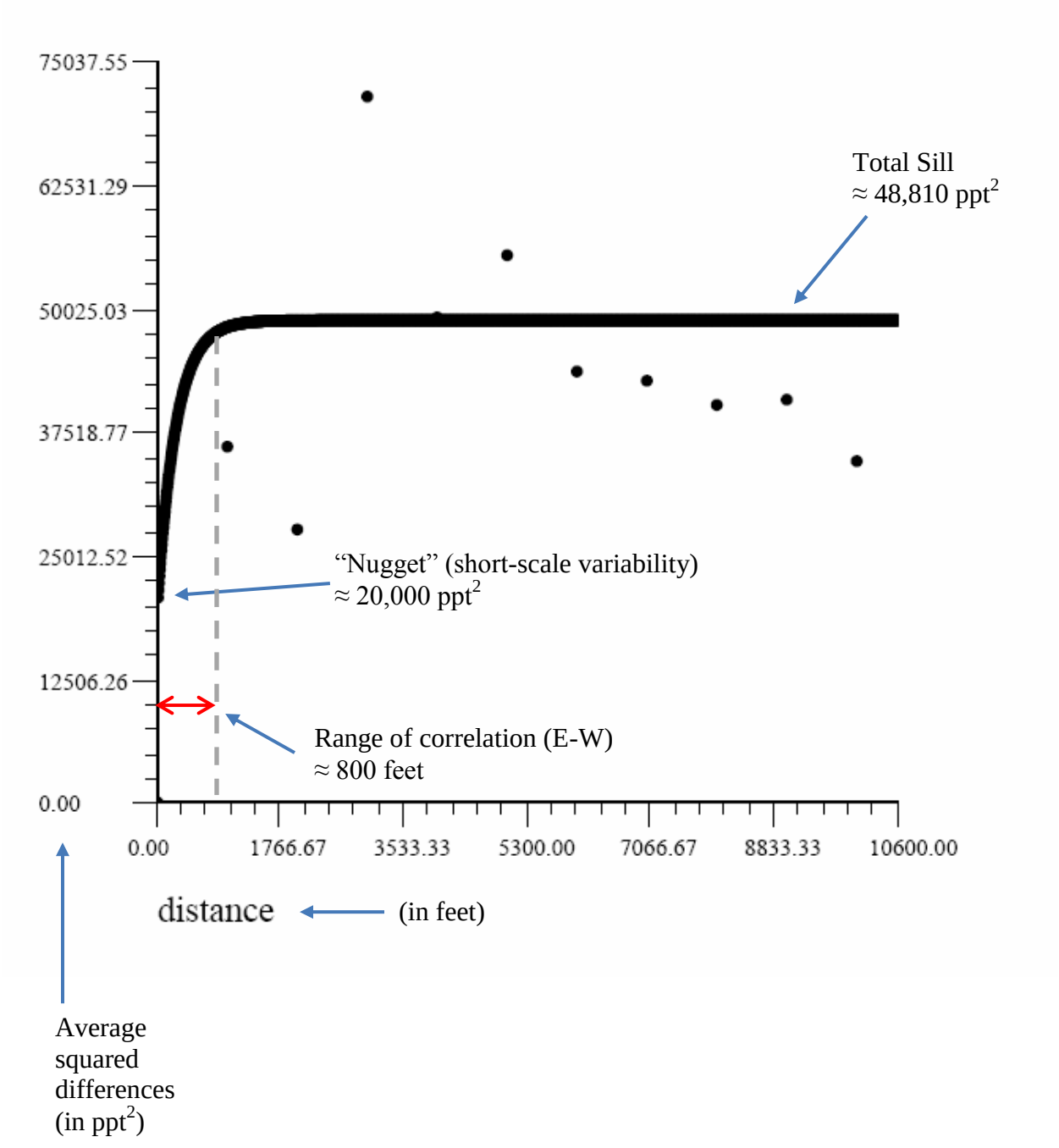
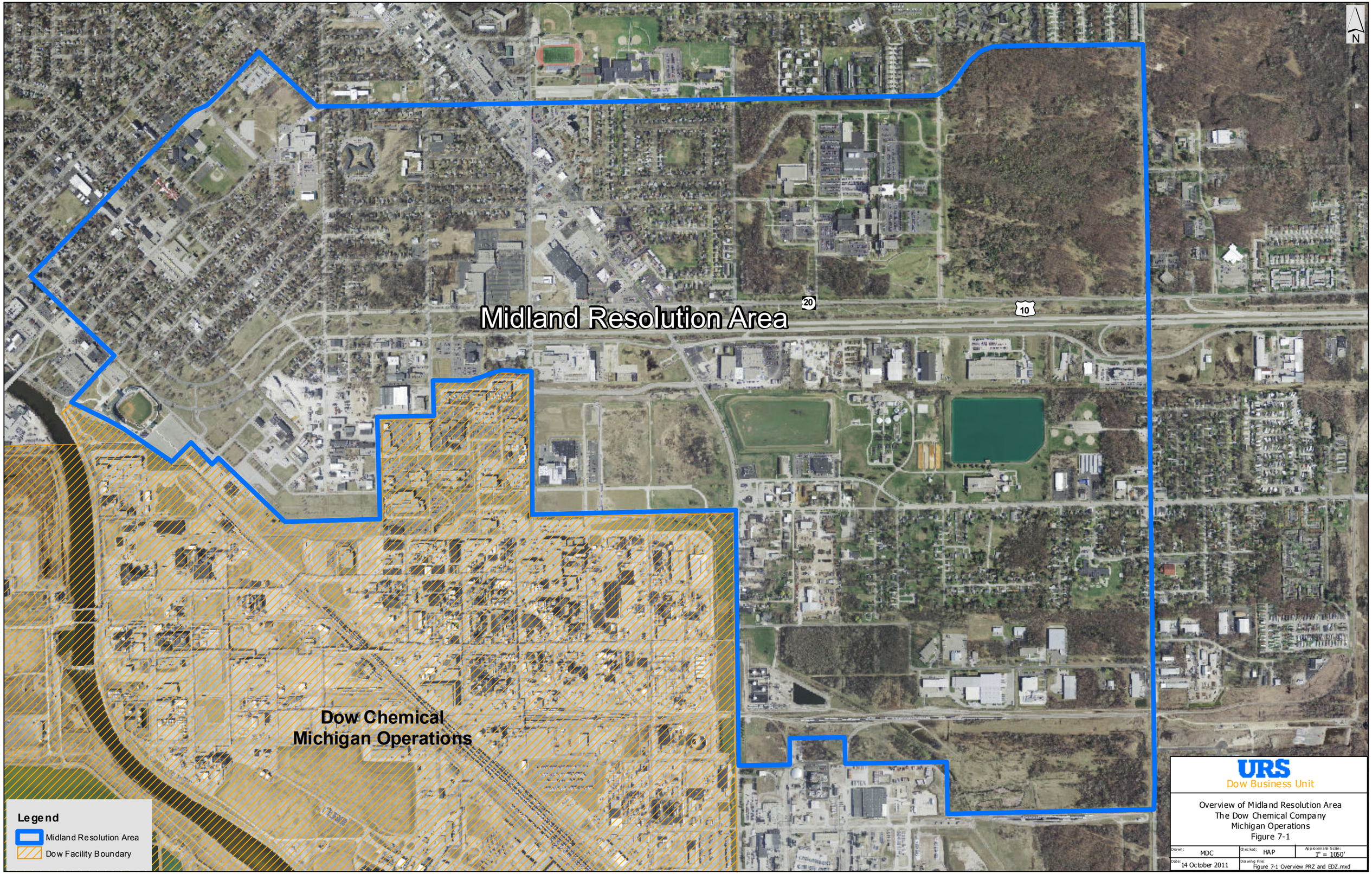
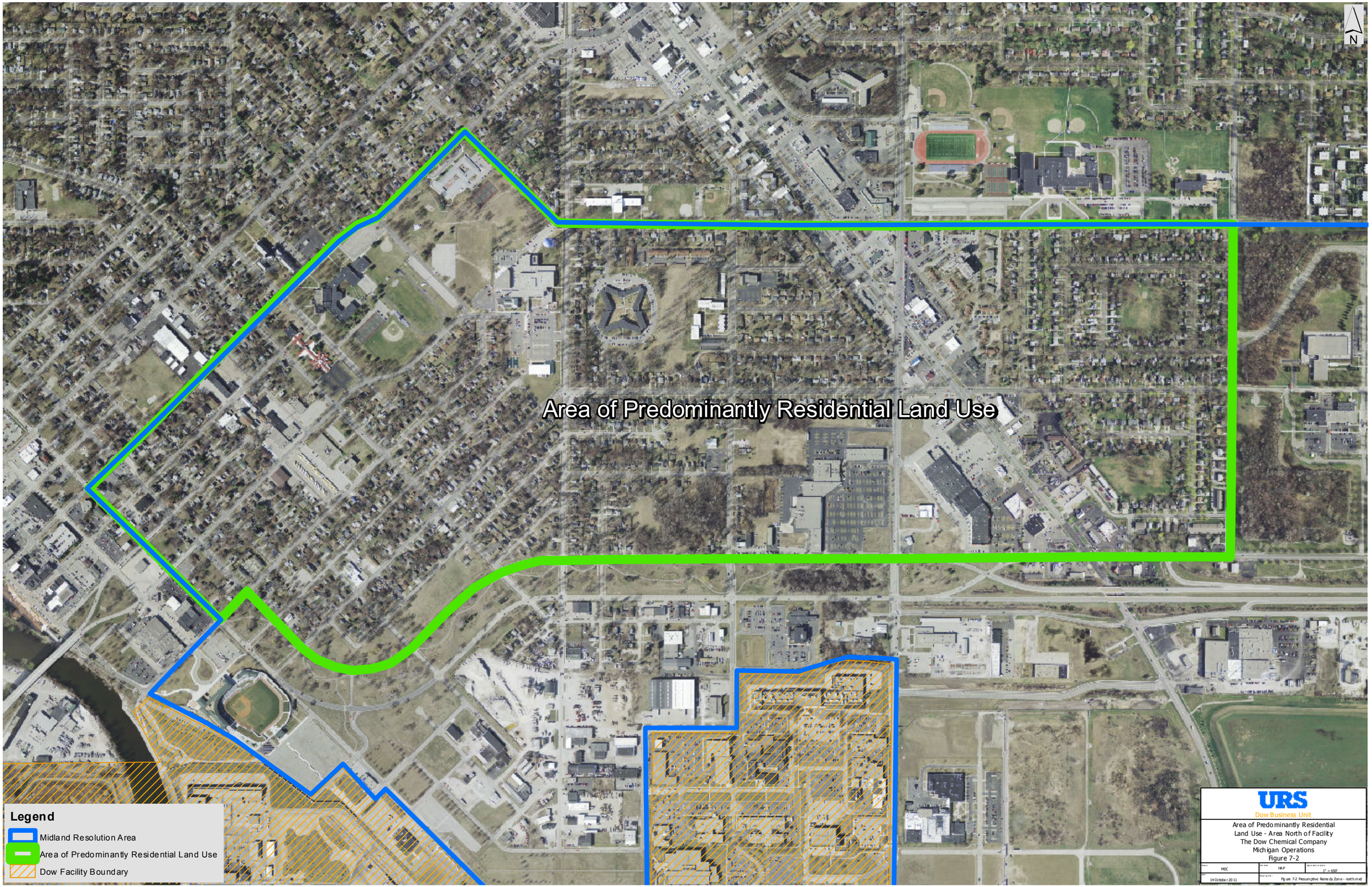


Figure 5-8. East-West Directional Long-Range Variogram


Midland Resolution Area
20
10
Dow Chemical
Michigan Operations
N
Legend
Midland Resolution Area
Dow Facility Boundary
URS
Dow Business Unit
Overview of Midland Resolution Area
The Dow Chemical Company
Michigan Operations
Figure 7-1
Drawn: MDC
Checked: HAP
Approximate Scale: 1" = 1050'
Date: 14 October 2011
Drawing File: Figure 7-1 Overview PRZ and EDZ.mxd


N
Area of Predominantly Residential Land Use
Legend
Midland Resolution Area
Area of Predominantly Residential Land Use
Dow Facility Boundary
URS
Dow Business Unit
Area of Predominantly Residential
Land Use - Area North of Facility
The Dow Chemical Company
Michigan Operations
Figure 7-2
MDC
HAP
1" = 650'
14 October 2011
Figure 7-2 Presumptive Remedy Zone - north.mxd

Area of Predominantly Residential Land Use

N

Legend

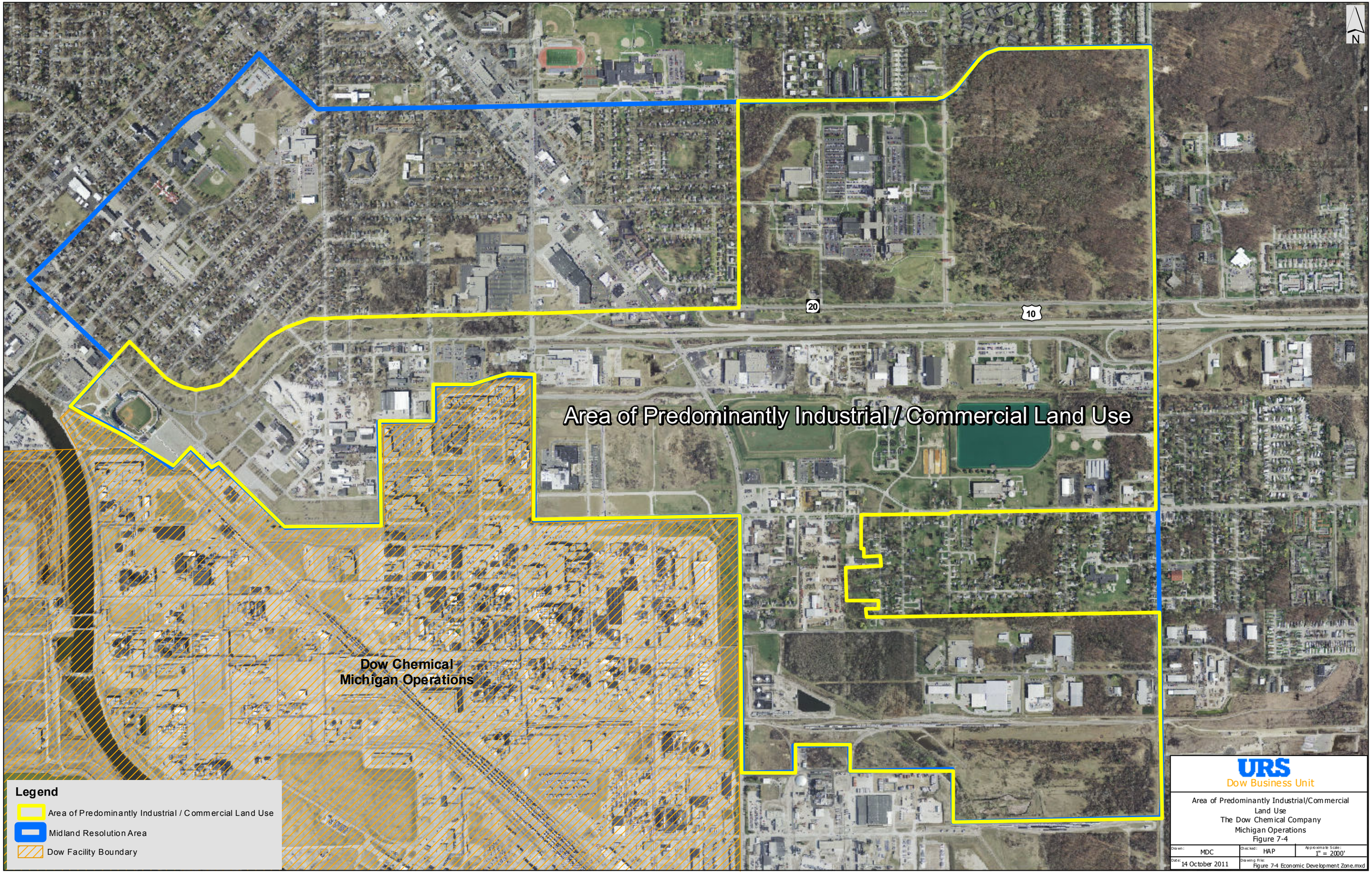
- Midland Resolution Area
- Area of Predominantly Residential Land Use
- Dow Facility Boundary

URS

Dow Business Unit

Area of Predominantly Residential
Land Use - Area East of Facility
The Dow Chemical Company
Michigan Operations
Figure 7-3

MDC	HAP	1" = 440'
14 October 2011	Figure 7-3 Presumptive Remedy Zone east.mxd	


Area of Predominantly Industrial / Commercial Land Use
Dow Chemical
Michigan Operations
20
10
N
Legend
Area of Predominantly Industrial / Commercial Land Use
Midland Resolution Area
Dow Facility Boundary
URS
Dow Business Unit
Area of Predominantly Industrial/Commercial Land Use
The Dow Chemical Company
Michigan Operations
Figure 7-4
Drawn: MDC
Checked: HAP
Approximate Scale: 1" = 2000'
Date: 14 October 2011
Drawing File: Figure 7-4 Economic Development Zone.mxd

2014

2017 (as required)

2016 (as required)

2015 (as required)

2014

2017 (as required)

2017 (as required)

2016 (as required)

2015 (as required)

2014

2013

2012

2013 (as required)

2016 (as required)

2013

2012

2015 (as required)

2014

2016 (as required)

2013 (as required)

Legend

- Property Group A
- Property Group B
- Property Group C
- Property Group D (As Required)
- Property Group E (As Required)
- Property Group F (As Required)
- Economic Development Zone Residences, as necessary

URS
Dow Business Unit

Six-Year
Resolution Area Implementation Plan
The Dow Chemical Company
Michigan Operations
Figure 7-5

Drawn:	Checked:	Approximate Scale:
MDC	HAP	1" = 500'
Date: 14 October 2011	Drawing File: Figure 7-5 Six-Year Presumptive Remedy Implementation Plan.mxd	

Decision Rules

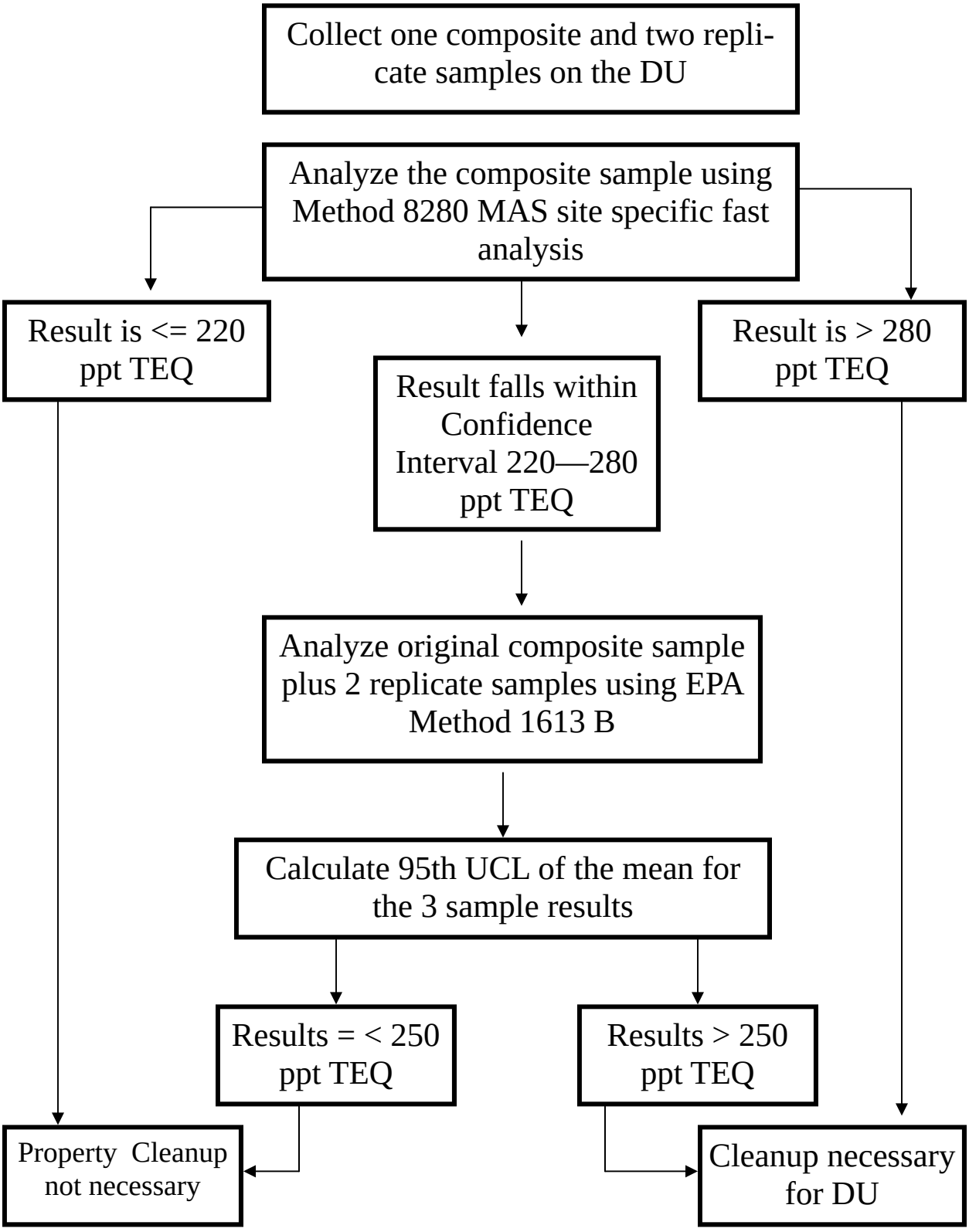
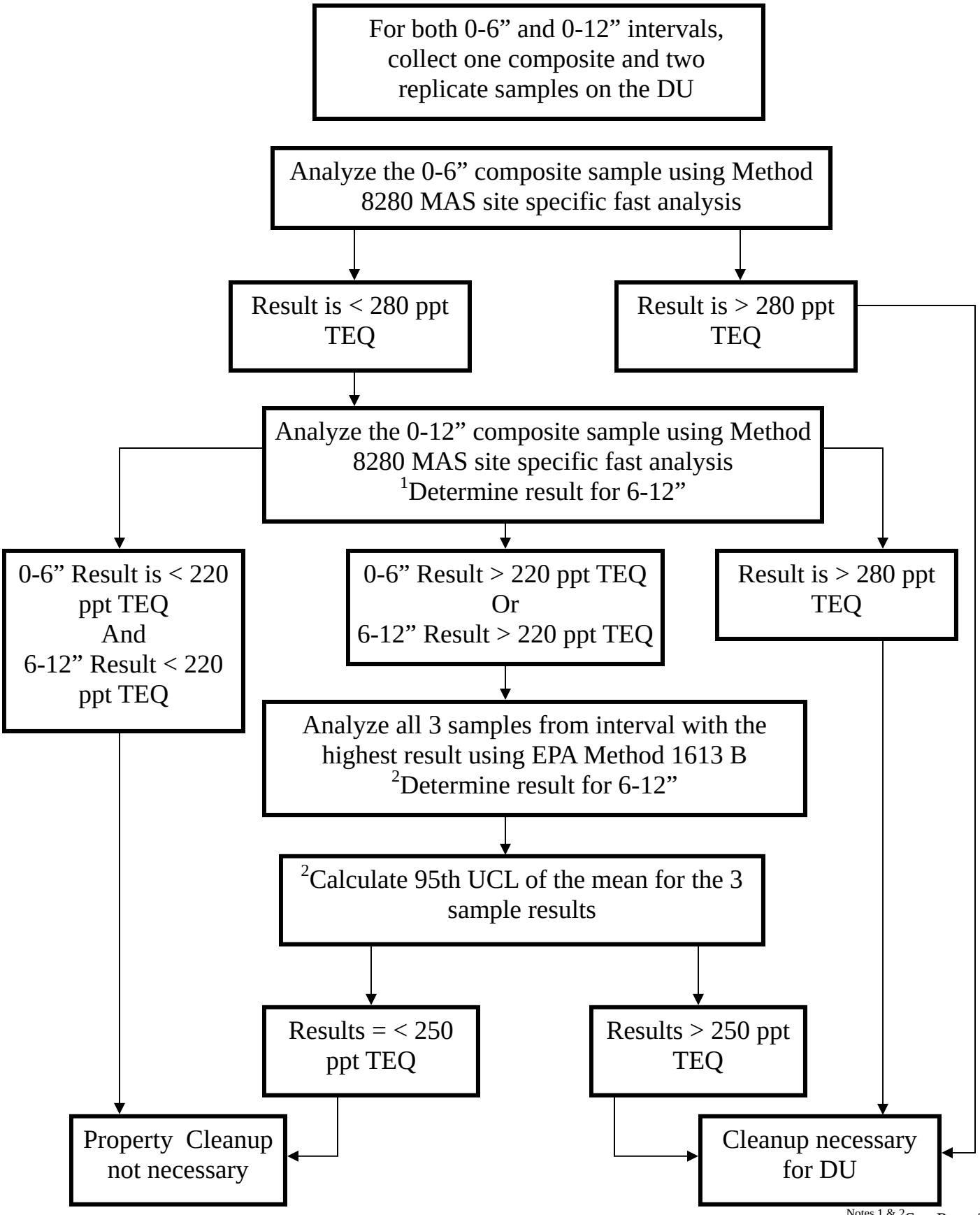


Figure 7-6. Decision Rules for Residential or Residential –Like DUs

Decision Rules



Notes 1 & 2See Page 2

Figure 7-7. Decision Rules for Residential or Residential –Like DUs with Extensive Landscaping.

Decision Rules (notes)

Note 1:

$$[6-12''] = \left(\frac{[0-12'']^{8280MAS}}{0.5'} \right) - [0-6'']^{8280MAS}$$

Note 2:

If [0-12”] < [0-6”]

$$[6-12''] = \left(\frac{[0-12'']^{8280MAS}}{0.5'} \right) - [0-6'']^{\substack{1613b \\ 95\%UCL}}$$

If [0-12”] > [0-6”]

$$[6-12''] = \left(\frac{[0-12'']^{1613b}_{95\%UCL}}{0.5'} \right) - [0-6'']^{8280MAS}$$

Figure 7-7. Decision Rules for Residential or Residential –Like DUs with Extensive Landscaping.

2017 (as required)

2016 (as required)

2015 (as required)

2014

2013

2012

2013 (as required)

2017 (as required)

2016 (as required)

2015 (as required)

2014

Dow Owned Non Residential Property

City of Midland Water Plant Operations

Dow Owned Non Residential Property

2013

2012

2014

2015 (as required)

2016 (as required)

2013 (as required)

Dow Owned Non Residential Property

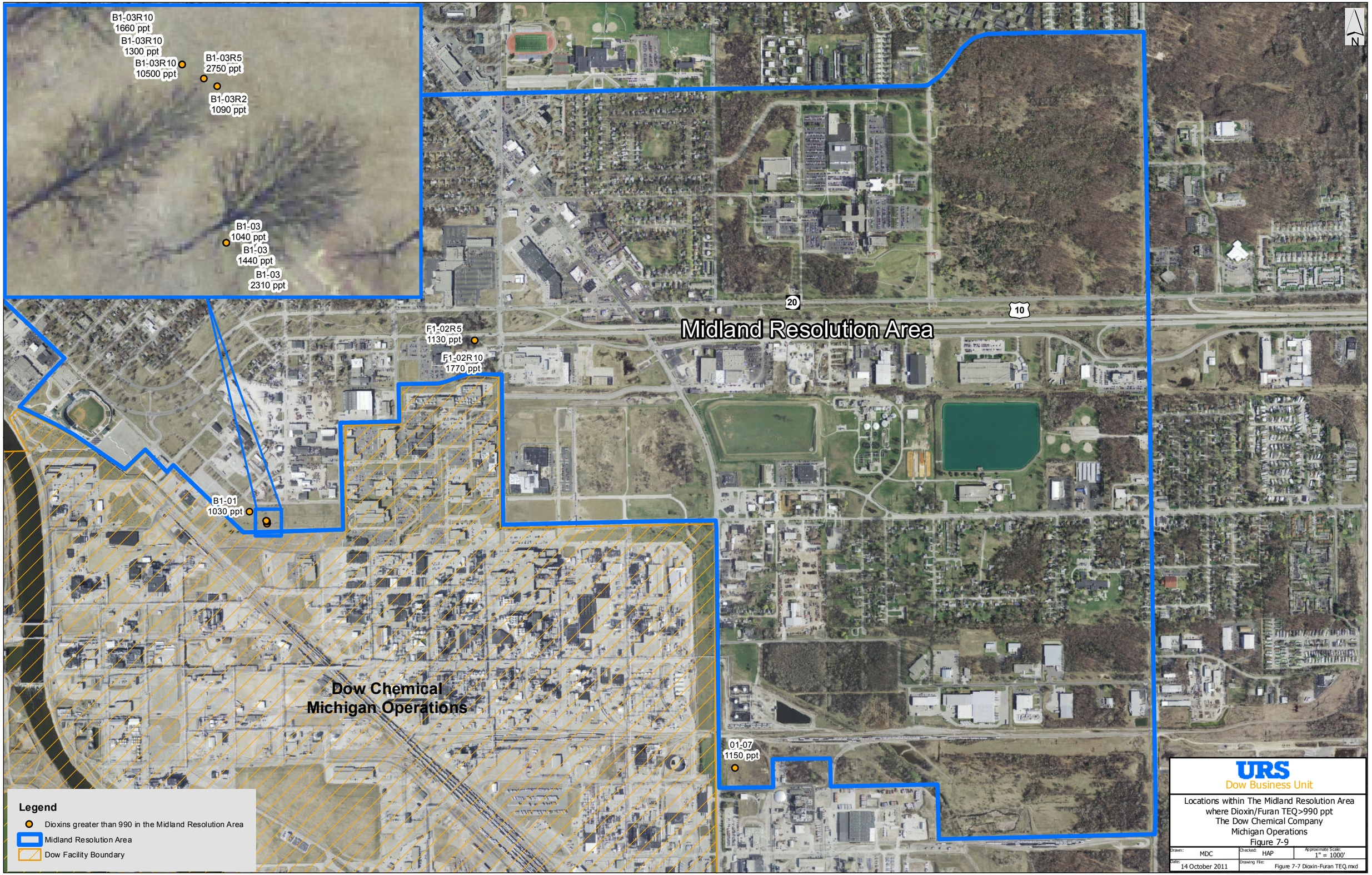
Legend

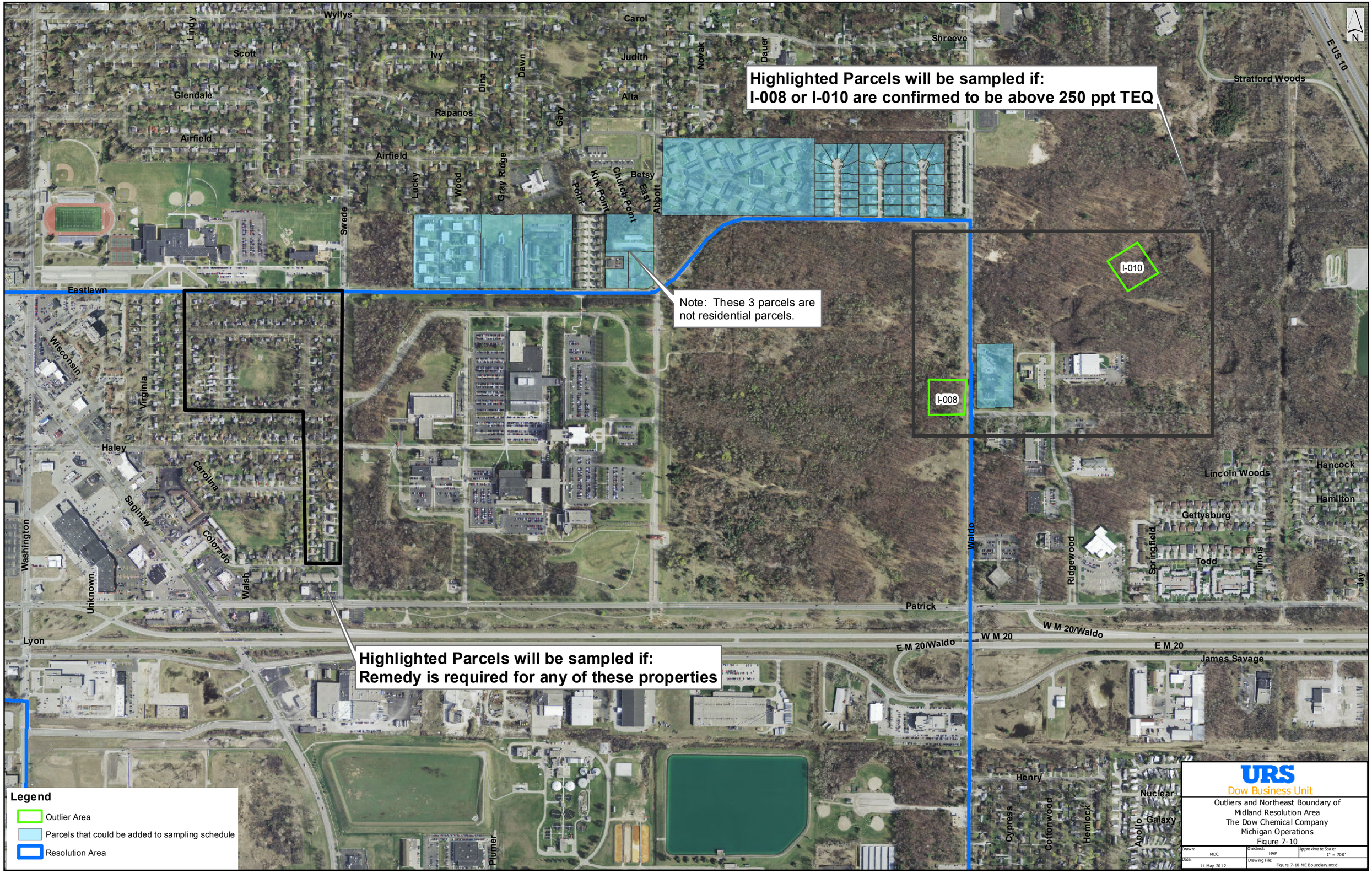
- Commercial Area 2012
- Commercial Area 2013
- Commercial Area 2014
- Commercial Area 2015
- 2017 Study Area - as necessary
- 2016 Study Area - as necessary
- 2015 Study Area - as necessary
- 2014 Study Area
- 2013 Study Area
- 2012 Study Area
- Economic Development Zone Residences, as necessary
- Midland Resolution Area

URS
Dow Business Unit

Schedule for Review of Areas
Designated as Non-Residential
The Dow Chemical Company
Michigan Operations
Figure 7-8

Drawn: MDC	Checked: HAP	Approx scale bar: 1" = 1000'
Date: 11 May 2012	Drawing File: Figure 4-6 Outlier Area - I-008 and I-010.mxd	


B1-03R10
1660 ppt
B1-03R10
1300 ppt
B1-03R10
10500 ppt
B1-03R5
2750 ppt
B1-03R2
1090 ppt
B1-03
1040 ppt
B1-03
1440 ppt
B1-03
2310 ppt
F1-02R5
1130 ppt
F1-02R10
1770 ppt
B1-01
1030 ppt
01-07
1150 ppt
Midland Resolution Area
Dow Chemical
Michigan Operations
20
10
N
Legend
Dioxins greater than 990 in the Midland Resolution Area
Midland Resolution Area
Dow Facility Boundary
URS
Dow Business Unit
Locations within The Midland Resolution Area
where Dioxin/Furan TEQ>990 ppt
The Dow Chemical Company
Michigan Operations
Figure 7-9
Drawn: MDC
Checked: HAP
Approximate Scale: 1" = 1000'
Date: 14 October 2011
Drawing File: Figure 7-7 Dioxin-Furan TEQ.mxd


Highlighted Parcels will be sampled if:
I-008 or I-010 are confirmed to be above 250 ppt TEQ
Note: These 3 parcels are not residential parcels.
Highlighted Parcels will be sampled if:
Remedy is required for any of these properties
I-010
I-008
Wyllys
Lindy
Scott
Ivy
Carol
Judith
Novak
Dauer
Shreeve
Dawn
Dina
Glendale
Rapanos
Alta
Gary
Airfield
Airfield
Lucky
Wood
Gray Ridge
Kirk Point
Point
Church Point
East
Betsy
Abbott
Swede
Stratford Woods
E US 10
N
Eastlawn
Wisconsin
Virginia
Haley
Carolina
Saginaw
Colorado
Washington
Unknown
Walsh
Lyon
Patrick
E M 20/Waldo
W M 20
W M 20/Waldo
E M 20
Waldo
Ridgewood
Springfield
Illinois
Jay
Todd
Gettysburg
Lincoln Woods
Hancock
Hamilton
James Savage
Henry
Nuclear
Galaxy
Apollo
Hemlock
Cottonwood
Cypress
Plumer
Legend
Outlier Area
Parcels that could be added to sampling schedule
Resolution Area
URS
Dow Business Unit
Outliers and Northeast Boundary of
Midland Resolution Area
The Dow Chemical Company
Michigan Operations
Figure 7-10
Drawn: MDC
Checked: HAP
Approximate Scale: 1" = 700'
Date: 11 May 2012
Drawing File: Figure 7-10 NE Boundary.mxd


N
Midland Resolution Area
2012
Legend
2012 Study Area
Midland Resolution Area
Dow Facility Boundary
URS
Dow Business Unit
Midland Resolution Area
Year 1 Properties - Area North of Facility
The Dow Chemical Company
Michigan Operations
Figure 8-1
MDC
HAP
1" = 650'
14 October 2011
Figure 8-1 Year 1 properties-north.mxd

Midland Resolution Area

2012

N

Legend

- 2012 Study Area
- Midland Resolution Area
- Dow Facility Boundary

URS

Dow Business Unit

Midland Resolution Area
Year 1 Properties - Area East of Facility
The Dow Chemical Company
Michigan Operations
Figure 8-2

MDC	HAP	1" = 440'
14 October 2011	Figure 8-2 Year 1 properties-east.mxd	