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Ford Motor Company

Subsurface Investigation Work Plan – Work Element 2

Twin Cities Assembly Plant
St. Paul, Minnesota

ARCADIS

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Subsurface Investigation Work Plan – Work Element 2

Twin Cities Assembly Plant
966 South Mississippi Boulevard
St. Paul, Minnesota 55166

Prepared for:
Ford Motor Company

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Our Ref.:
DE000372.0002.00003

Date:
June 6, 2014

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ARCADIS

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Subsurface Investigation Work Plan – Work Element 2

Twin Cities Assembly Plant
966 South Mississippi River Boulevard
St. Paul, Minnesota

1. Introduction

On behalf of Ford Motor Company (Ford), ARCADIS has prepared this *Subsurface Investigation Work Plan – Work Element 2* (Work Plan) for the Twin Cities Assembly Plant (TCAP; Site) in accordance with the requirements of the Minnesota Pollution Control Agency (MPCA) Voluntary Investigation and Cleanup (VIC) Program and Petroleum Brownfields Program (PBP). The property location and layout are depicted on Figure 1.

This Work Plan describes Work Element 2 of subsurface investigation activities with the purpose of evaluating impacts identified during the completion of the Subsurface Investigation - Work Element 1 (WE1). The scope of work consists of the completion of soil borings, installation of temporary monitoring wells, and soil and groundwater sampling within 6 of 11 Focus Areas (FA) (Figure 2). Investigation activities will be implemented and completed within each individual FA as they become available following ongoing Site demolition activities.

1.1 Property Location and Description

The Site is located at 966 South Mississippi River Boulevard in St. Paul, Ramsey County, Minnesota at approximate Latitude (north) 44^{o} 54' 50.8" and Longitude (west) 93^{o} 11' 31.9". The Site is located in a mixed industrial, commercial and residential use area on the eastern shore of the Mississippi River, along the east side of South Mississippi River Boulevard, south of Ford Parkway and west of South Cleveland Avenue (Figure 1).

Operations at the Site formerly consisted of the assembly and painting of light duty trucks (Ford Ranger) using parts manufactured off-Site. Assembly processes included welding, metal cleaning, painting and curing, windshield and trim installation and preparation of the vehicles for final delivery. In addition, a wastewater treatment plant and steam plant operated at the Site and was associated with the former assembly operations. Manufacturing operations at the Site ceased on December 16, 2011 and demolition activities commenced on June 10, 2013.

2. Field Methodology

This section provides a summary of the means and methods to be utilized during this subsurface investigation. Field logbook/documentation procedures and the field quality assurance program will be implemented in accordance with the approved June 2007 Field Sampling Plan (FSP) (ARCADIS 2007) and its amdendment (ARCADIS 2013).

2.1 Utility Clearance

A full utility clearance will be performed prior to initiating any subsurface work at the Site. Activities will include at a minimum:

- Notification of Gopher One Call for marking of all public utility lines servicing the Site,
- Location of private utilities in the areas identified for subsurface work, and
- Surficial inspection using available utility and historic operational maps for each proposed boring location.

After removing any surficial debris (i.e., asphalt or concrete), a hand auger will be used to: 1) confirm the presence/absence of utilities and 2) investigate the top five feet bgs if no utilities exist. When hand augering will not be possible due to subsurface material/utilities a hydro-vacuum unit will be used to clear the area. Note that this will not allow ARCADIS to collect soil samples for analytical testing if the hydro-vacuum unit is utilized.

2.2 Groundwater Investigation

Groundwater elevation and potential impacts will be determined through the installation and sampling of temporary monitoring wells in defined areas within select FAs.

Temporary wells will be installed in select boreholes (presented in Table 1) to determine potential groundwater impacts within the upper water-bearing unit. Temporary wells will be constructed of 1-inch diameter, 5-foot-long polyvinyl chloride (PVC) slotted well screens and associated PVC riser. The temporary wells will be purged of at least one gallon of groundwater using a peristaltic pump and disposable tubing prior to sampling to minimize turbidity. At least one groundwater water sample will be collected from the shallowest groundwater encountered at each location. Groundwater samples collected from temporary monitoring wells will be analyzed for one or more of the following analytes:

- Volatile organic compounds (VOCs) using USEPA Method 8260,
- Semi-volatile organic compounds (SVOCs) using USEPA Method 8270,
- Gasoline range organics (GRO) and diesel range organics (DRO) using the WI Modified Method,
- Dissolved Target Analyte List (TAL) Metals and Lead using USEPA Method 6010, and
- Cyanide using USEPA Method 335.4.

All samples analyzed for metals will be field filtered using a 0.45-micron disposable filter prior to sample collection. A summary of the proposed temporary monitoring well locations and analytical parameters is presented in Table 1.

2.3 Soil Investigation

Soil borings will be advanced using direct push technology in areas of known impacts. Each boring will be logged continuously by an ARCADIS field geologist and screened using a Photoionization Detector (PID) with an 11.7 electron volt (eV) lamp that has been calibrated at least twice a day. Soil boring logs will be created in the field and identify material encountered for each borehole to total depth using the United Soil Classification System (USCS). Upon completion, bentonite chips will be used to abandon each borehole if the borehole is unregulated. If the borehole is classified as a "regulated hole" according to Minnesota Department of Health (MDH) guidelines, the borehole will be sealed in accordance with MDH Guidelines and a Borehole Sealing Record will be prepared.

A minimum of one and up to four soil samples will be collected at each borehole. At proposed delineation locations, one soil sample will be collected from the interval depicting the highest PID reading or potential impacts through visual or olfactory observations. Although this interval is anticipated to correspond with exceedances observed at the original borehole location, additional soil samples may be collected from intervals corresponding to initially observed exceedances or intervals below the observed exceedance to provide vertical delineation.

Soil samples will be collected in laboratory supplied containers and placed on ice pending shipment to the laboratory. Following standard chain-of-custody procedures, all samples will be submitted to a designated laboratory for analysis of one or more of the following analytes:

- VOCs using USEPA Method 8260,
- SVOCs using USEPA Method 8270,
- GRO and DRO using the WI Modified Method,
- TAL metals using USEPA Method 6010,
- Cyanide using USEPA Method 335.4.

Anticipated boring depths and laboratory analysis parameters for each boring location is presented in Tables 1.

2.4 Investigation-Derived Waste

Investigation-Derived Waste (IDW) generated during the course of the subsurface investigation will include soil cuttings (i.e., from hand clearing, hydro-vacuum, and drilling), purge water, personal protective equipment (PPE) and disposable sampling equipment (i.e. filters, tubing, PVC).

- Soil cuttings will be segregated in the field prior to disposal pursuant to field screening results; segregation parameters will be of 0 parts per million (ppm) to <100 ppm and greater than 100 ppm. One composite sample will be collected for laboratory analysis from each staging area for every five 55 gallon drums generated. Laboratory analysis will be utilized for the determination of potential site re-use or offsite disposal.

- Purge water generated during groundwater monitoring activities will be drummed for off-site disposal after review of laboratory analysis.

- PPE and disposal sampling equipment will be segregated and disposed of upon review of subsurface investigation results.

2.5 Surveying

All borings and monitoring wells will be surveyed for X, Y and Z (ground surface) coordinates referencing the National Geodetic Vertical Datum of 1929 (NGVD 29) and North American Datum of 1983 (NAD 83) at the completion of subsurface investigation activities.

3. Scope of Work

With consideration of former Site operations, construction, geographical layout, and environmental activities completed to-date, the Site has been divided into 11 FAs as depicted on Figure 2. Furthermore, the FAs have been divided into two groups (A and B) with geographic consideration. Group A includes FA-01 through -07 and FA-09, located east of Mississippi River Boulevard, and Group B includes FA-10 and FA-11 located west of Mississippi River Boulevard.

The total number of borings, depth, and analytical sampling requirements were developed based on analytical results from previous investigations completed at the Site. The investigation activities associated with this Workplan will be conducted concurrently with remaining WE1 investigation activities. The results from WE1 were utilized to determine the need of additional groundwater delineation, where collection of the sample is contingent upon encountering water in the borehole. Detailed sampling and analysis information is presented in Table 1 and presented on Figures 3 through 8.

3.1 Group A

Group A includes FA-01 through FA-09, with the exception of FA-08 (baseball fields). Investigation results for FA-08 was addressed in 2008 and reported in the Response Action Implementation Report – Baseball Fields – Feature 139 (ARCADIS 2008). Investigation activities within Group A FAs will include:

- Delineation of exceedances of residential Soil Reference Values (SRVs) in soil, and
- Delineation of exceedances of MDH HRLs and the USEPA Arsenic MCL in groundwater through the installation and sampling of temporary wells.

3.2 Group B

Group B consists of FA-10 and FA-11, but only includes investigation at FA-11. Investigation results for FA-10 were reported under separate cover to the MPCA in the April 2014 Area C –Comprehensive Site History and Investigation Report (ARCADIS 2014). Investigation activities within Group B will include:

- Delineation of exceedances of recreational SRVs in soil, and
- Delineation of exceedances of MDH HRLs in groundwater through the installation and sampling of temporary wells.

4. Reporting

The results of this investigation will be summarized in a summary report and submitted to the MPCA. The submittal will discuss information collected during the site characterization activities and will include a technical overview of the site characterization, results, findings, and recommendations.

5. Scheduling

The subsurface investigation is anticipated to begin in the third quarter of 2014. The scope of work will be completed independently within each FA when access is available after demolition activities are complete.

6. References

ARCADIS, 2007. Field Sampling Plan, Ford Motor Company, Twin Cities Assembly Plant, St. Paul, Minnesota. June 2007.

ARCADIS, 2008. Response Action Implementation Report – Baseball Fields – Feature 139, Ford Motor Company, Twin Cities Assembly Plant, St. Paul, Minnesota. March 2008.

ARCADIS, 2013. Subsurface Investigation Work Plan – Work Element 1, Ford Motor Company, Twin Cities Assembly Plant, St. Paul, Minnesota. July 2013.

ARCADIS, 2014. Area C –Comprehensive Site History and Investigation Report, Ford Motor Company, Twin Cities Assembly Plant, St. Paul, Minnesota. April 2014.

Tables

Table 1. **Summary of Proposed Sampling Investigation**
Subsurface Investigation Work Plan - Work Element 2
Twin Cities Assembly Plant, St. Paul, Minnesota

			Original Location		Drilling/Inspection		Soil Analytical						Groundwater Analytical**						
Focus Area	**Sample ID**	**Comments**	**Location ID**	**Rationale[1]**	**Initial Number of Borings**	**Initial Target Depth (ft bgs)**	**VOCs (8260)**	**SVOCs (8270)**	**GRO (Wi)**	**DRO (Wi)**	**TAL Metals (6010)**	**Cyanide (335.4)**	**VOCs (8260)**	**SVOCs (8270)**	**GRO (Wi)**	**DRO (Wi)**	**Dissolved TAL Metals (6010)**	**Dissolved Lead (6010)**	**Cyanide (335.4)**
1	ASB-0115	Western delineation of **VOCs** (*Soil*) observed within the ASB-0103 (east) and ASB-0208 (south) clusters. Eastern delineation of **VOCs** (*GW*) observed at west investigation clusters ASB-0107 and ASB-0108.	ASB-123/ASB-0103	**6-8 / 6-7, 7-7.5, 7.5-8, 8-8.5,** 11-12	1	10	X						X						
	ASB-0101N	Northern delineation of **VOCs** (*GW*) observed at ASB-0101 along the north property edge.	ASB-115/ASB-0101W	**4-9 / 2-7**	1	12							X			X			
	ASB-0116	Northern delineation of **VOCs** *(Soil/GW)* associated with the former transfer lines and diesel shack as defined by ASB-0202, ASB-0207, and ASB-0208 clusters.	ASB-0208N	2-3, **6-8,** 8-9	1	12	X		X	X			X		X	X			
	ASB-0117	Eastern delineation of **VOCs** (*Soil*) observed within the ASB-0103 (east) and ASB-0207 (south) clusters. Eastern delineation of **VOCs** (*GW*) observed at west investigation clusters ASB-0107 and ASB-0108.	ASB-0207E/ASB-2028S	**8-13 / 6-11**	1	13	X		X	X			X		X	X			
	ASB-0118	Northern delineation of **Arsenic** *(Soil)* observed within the extent of Focus Area 7 as defined by ASB-0708 and ASB-256 through ASB-261.	ASB-0708NB	**1-3**	1	10					X								
2	ASB-0212	Northwestern delineation of **VOCs** *(Soil/GW)* associated with the former transfer lines and diesel shack as defined by ASB-0202, ASB-0207, and ASB-0208 clusters.	ASB-047	**5-10**	1	12	X	X			X		X	X			X		
	ASB-0213	Northwestern delineation of **VOCs/SVOCs/Lead** *(GW)* observed at ASB-0107 and ASB-030.	ASB-030/AMW-17	**3-8 / 2.75-7.75**	1	10							X	X				X	
	ASB-0214	Southwestern delineation of **VOCs/SVOCs/Lead** (*Soil/GW*) observed at ASB-0107 and ASB-030.	Feature 5	4-6	1	10	X		X	X			X		X	X			
	ASB-0215	Eastern delineation of **VOCs** (*Soil/GW*) associated with the former transfer lines and diesel shack as defined by ASB-0202, ASB-0207, and ASB-0208 clusters.	ASB-0207E	**8-13**	1	15							X	X	X	X			
4	ASB-0410	Northern delineation of **SVOCs** (*Soil*) defined by ASB-0401 and ASB0404 clusters.	ASB-0401	**0-2**, 8-10	1	10		X											
	ASB-0411	Western delineation of **SVOCs/Arsenic** (*Soil*) defined by ASB-0401 and ASB0404 clusters.	ASB-0401/ ASB-0404	**0-2,** 8-10 / **0-2,** 4-6, 6-8	1	10		X			X								
	ASB-0412	Northern delineation of **Arsenic** (*Soil*) defined by ASB-0405 and ASB-171 clusters.	ASB-165/ASB-0703N/ASB-0405	**0-2 / 0-2 / 1-3, 3-5**	1	8					X								
	ASB-0413	Western delineation of **Arsenic** *(Soil)* defined by ASB-0405 and ASB-171 clusters; northern delineation of **SVOCs** (*Soil*) defined by ASB-0406 cluster.	ASB-0405/ASB-0406W	**1-3, 3-5 / 2-3,** 4-6	1	11		X			X								
6	ASB-0612	Northern delineation of **VOCs/SVOCs** (*Soil*) defined by ASB-0607, ASB-182, and ASB-0712 clusters.	ASB-0607N	**2-4, 5-6.5,** 6.5-8	1	8	X	X											
	ASB-0613	Eastern delineation of **VOCs/SVOCs** (*Soil*) defined by ASB-0607, ASB-182, and ASB-0712 clusters.			1	8	X	X											
	ASB-0614	Southern delineation of **VOCs/SVOCs** (*Soil*) defined by ASB-0607, ASB-182, and ASB-0712 clusters.	ASB-0607S	**2-4**, 5-7	1	8	X												
7	ASB-0714	Northern delineation of **Arsenic** *(Soil)* defined by ASB-0702, ASB-0703, ASB-0706, ASB-0707.	ASB-0703N/ASB-167	**0-2 / 0-2,** 6-8, 8-10	1	8					X								
	ASB-0715	Eastern delineation of **Arsenic** *(Soil)* defined by ASB-0702, ASB-0703, ASB-0706, ASB-0707; northern delineation of **Antimony** *(Soil)* defined by ASB-166, ASB-167, ASB-172.			1	8					X								
	ASB-0716	Eastern delineation of **SVOCs/Arsenic/Mercury** *(Soil)* defined by ASB-0707 cluster.	ASB-0707E	**4-6**	1	12		X			X								
11	ASB-1110	Western delineation of **SVOCs** *(Soil)* defined by ASB-195/ASB-1103	ASB-195/ASB-1103	**6-8, 8-10 / 2-4**	1	BR	X	X				X	X	X					X
	ASB-1111	Northern delineation of MGP *(Soil)*	ASB-1108	**2-4, 20-21.5,** 26-28	1	BR	X	X				X	X	X					X
	ASB-1112	Northern delineation of MGP *(Soil)*			1	BR	X	X				X	X	X					X

Notes, Acronyms & Abbreviations:

[1] Indicates analyzed interval (ft bgs) within the original boring/well or the need for additional characterization (i.e. data gap); **bolded interval indicates location of previously observed exceedances**

** All temporary well groundwater samples are contingent on the presence of groundwater in the borehole

ft bgs feet below ground surface
ASB ARCADIS Soil Boring
BR Bedrock
DRO Diesel Range Organics
GRO Gasoline Range Organics
MS/MSD Matrix spike/matrix spike duplicate
NA Not Applicable
PCBs Polychlorinated biphenyls
RCRA Resource Conservation and Recovery Act
SVOCs Semi-volatile organic compounds
TAL Target Analyte List
VOCs Volatile organic compounds
Wi Wisconsin

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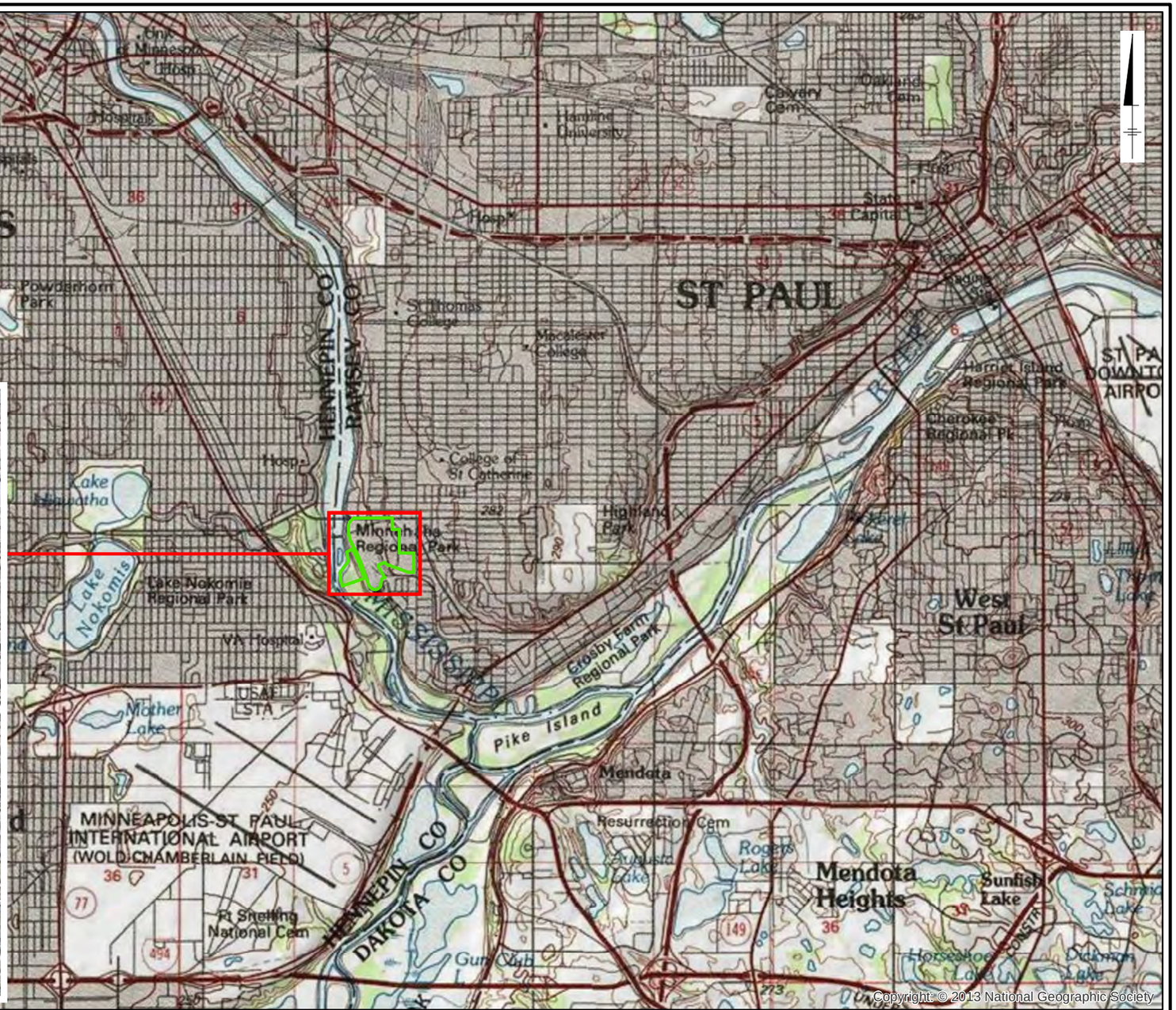
Figures



LEGEND:

Ford Property Boundary

NOTES:

Imagery Source: United States Geological Survey
High Resolution Orthoimagery for the Minneapolis-St. Paul, Minnesota Urban Area

Topographic Map Source:
© 2007 National Geographic Society

Twin Cities Assembly Plant
Ford Motor Company
St. Paul, Minnesota

Site Location / Property Layout

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FIGURE
1

CITY: Minneapolis, MN DB: MGress PM: BZinda
Project MN000593
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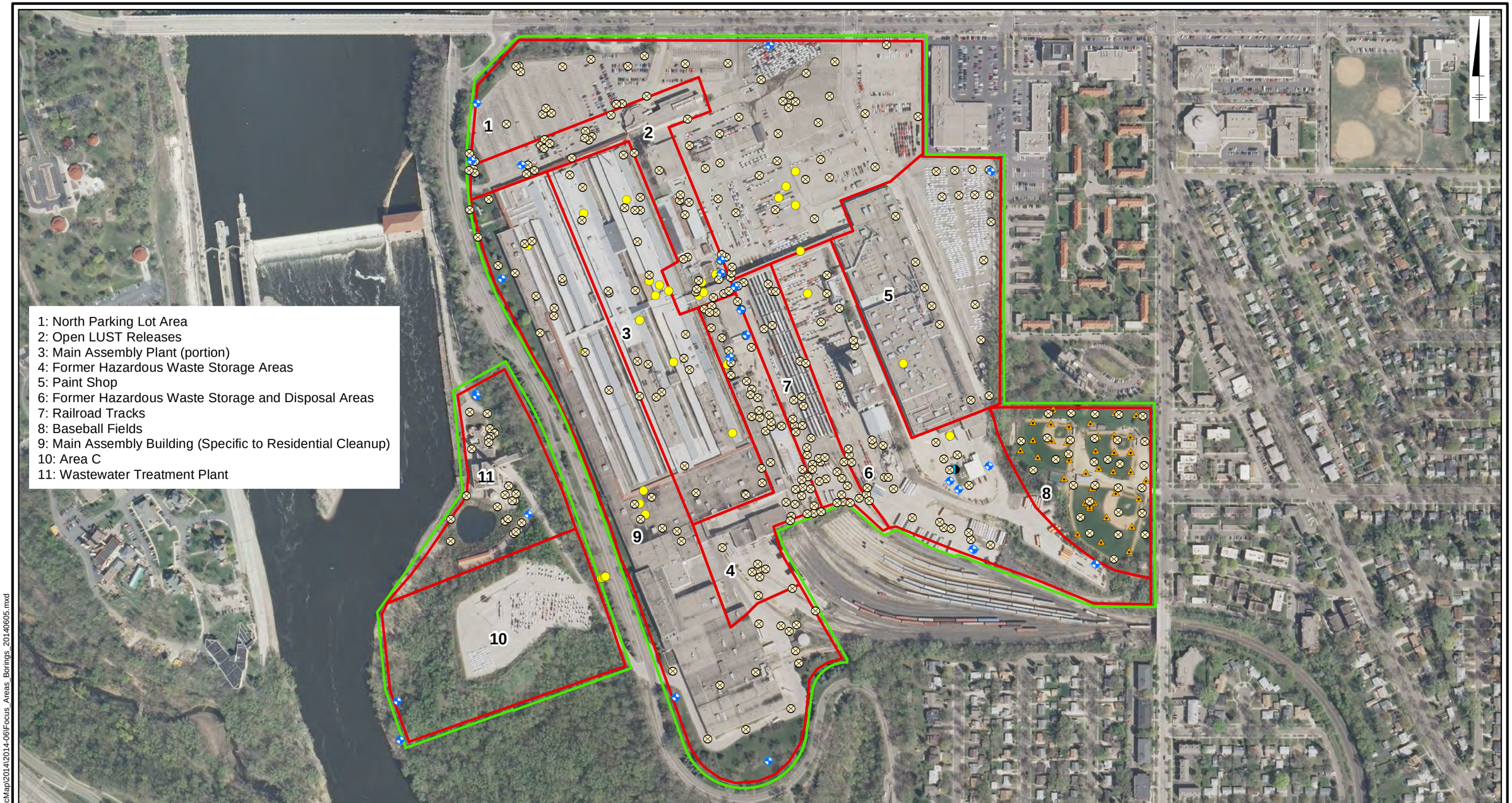

LEGEND:

- Monitoring Well
- Soil Boring
- Hand Auger
- Surface Soil
- Sump
- Ford Property Boundary
- Proposed Certificate of Completion Focus Areas

NOTES:

1) This Figure is not to be used for completing Land Splits, Land Unit Development, Plats, or generating new Tax Identification numbers.

2) The Figure is not to be used for any Real Estate Planning or Discussion purposes.

3) This Figure is to be used for obtaining Certificates of Completion during the environmental investigation/remediation process only.

4) Imagery Source: MnGeo WMS service, 2010 color 7-county http://geoint.lmic.state.mn.us/cgi-bin/wms? Accessed 6/6/2014

0 400 800 Feet

1 inch = 400 feet

Twin Cities Assembly Plant
Ford Motor Company
St. Paul, Minnesota

Focus Areas Location Map

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FIGURE 2

CITY: Minneapolis, MN DB: MGress PM: Bryan Zinda
Project MN000593
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LEGEND:

- Monitoring Well (No Exceedance)
- Soil Boring (No Exceedance)
- MPCA Tier 1 Residential SRV Exceedance or MPCA Tier 2 Industrial SRV Exceedance
- MDH HRL/HBV/RAA or EPA Arsenic MCL Exceedance
- Work Element 2 (WE2) Delineation Location
- Ford Property Boundary
- Focus Area

NOTES:
AMW = ARCADIS Monitoring Well
ASB = ARCADIS Soil Boring
EPA = Environmental Protection Agency
HA = Hand Auger
HBV = Health Based Value
HRL = Health Risk Limit
MCL - Maximum Contaminant Level
MDH = Minnesota Department of Health
MPCA = Minnesota Pollution Control Agency
RAA = Risk Assessment Advice
SRV = Soil Reference Value
Imagery Source: MnGeo WMS service, 2010 color 7-county http://geoint.lmic.state.mn.us/cgi-bin/wms? Accessed 6/5/2014

0 65 130 260 Feet
1 inch = 130 feet

Twin Cities Assembly Plant
Ford Motor Company
St. Paul, Minnesota

Focus Area 1 - North Parking Lot Area

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FIGURE 3

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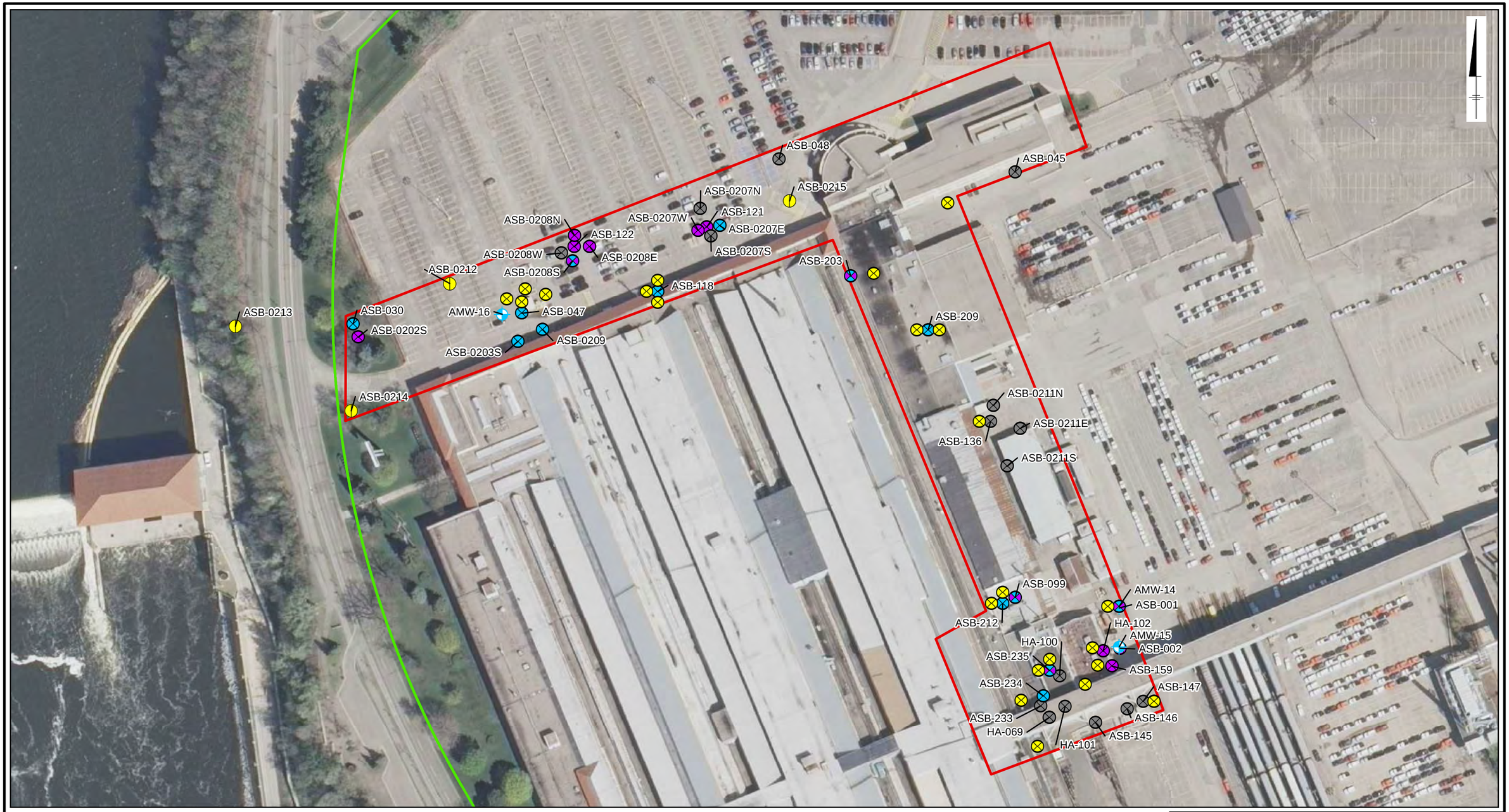

LEGEND:

- Monitoring Well (No Exceedance)
- Soil Boring (No Exceedance)
- MPCA Tier 1 Residential SRV Exceedance or MPCA Tier 2 Industrial SRV Exceedance
- MDH HRL/HBV/RAA or EPA Arsenic MCL Exceedance
- Work Element 2 (WE2) Delineation Location
- Proposed Delineation Location (MPCA Approved)
- Ford Property Boundary
- Focus Area

NOTES:

AMW = ARCADIS Monitoring Well
ASB = ARCADIS Soil Boring
EPA = Environmental Protection Agency
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HRL = Health Risk Limit
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MPCA = Minnesota Pollution Control Agency
RAA = Risk Assessment Advice
SRV = Soil Reference Value
Imagery Source: MnGeo WMS service, 2010 color 7-county http://geoint.lmic.state.mn.us/cgi-bin/wms? Accessed 6/5/2014

0 65 130 260 Feet

1 inch = 130 feet

Twin Cities Assembly Plant
Ford Motor Company
St. Paul, Minnesota

Focus Area 2 - Open LUST Releases

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FIGURE 4

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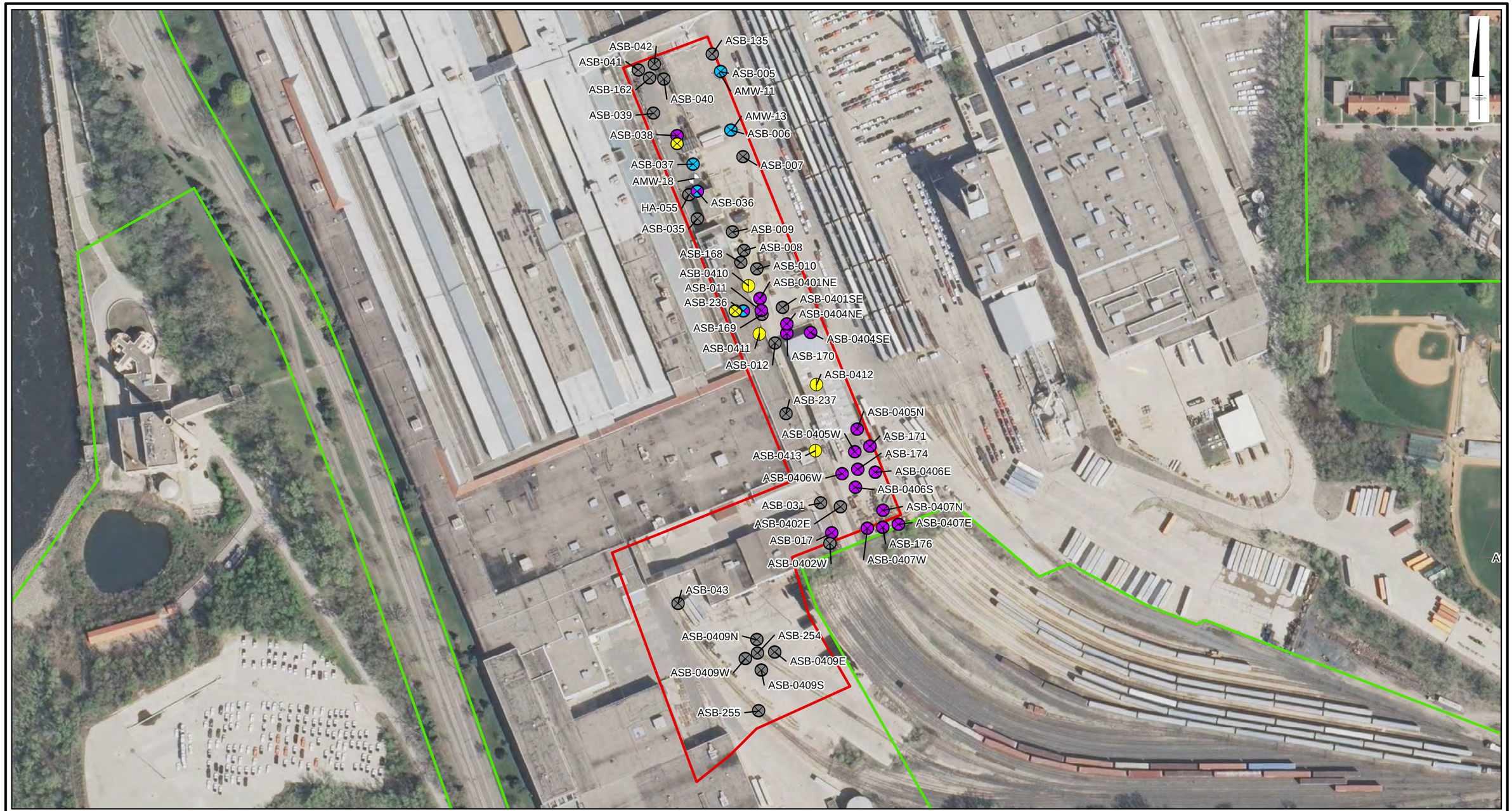

LEGEND:

- Monitoring Well (No Exceedance)
- Soil Boring (No Exceedance)
- MPCA Tier 1 Residential SRV Exceedance or MPCA Tier 2 Industrial SRV Exceedance
- MDH HRL/HBV/RAA or EPA Arsenic MCL Exceedance
- Work Element 2 (WE2) Delineation Location
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MPCA = Minnesota Pollution Control Agency
RAA = Risk Assessment Advice
SRV = Soil Reference Value
Imagery Source: MnGeo WMS service, 2010 color 7-county http://geoint.lmic.state.mn.us/cgi-bin/wms? Accessed 6/5/2014

0 90 180 360 Feet

1 inch = 180 feet

Twin Cities Assembly Plant
Ford Motor Company
St. Paul, Minnesota

Focus Area 4 -
Former Hazardous Waste Storage Areas

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FIGURE
5

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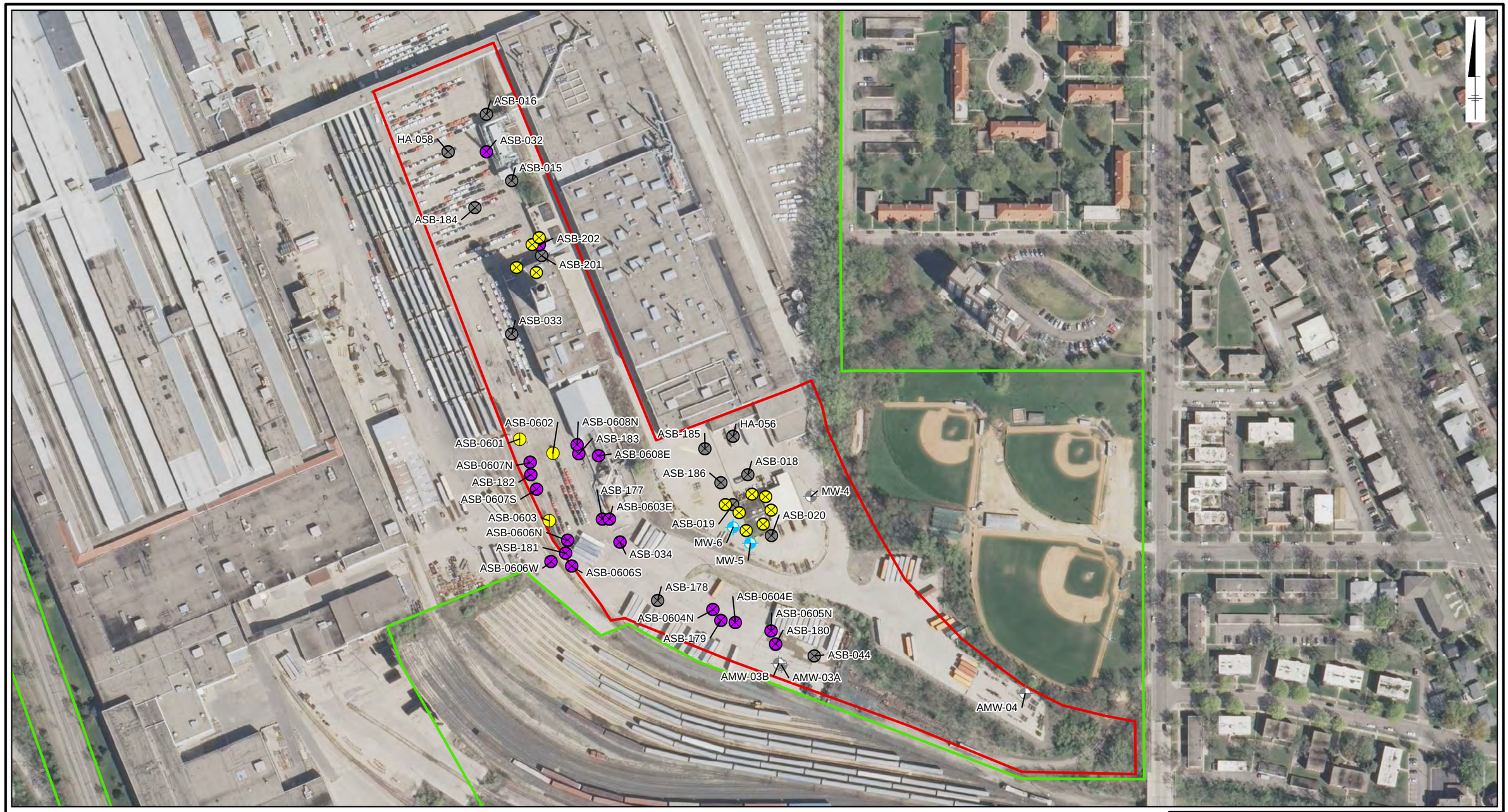

LEGEND:

- Monitoring Well (No Exceedance)
- Soil Boring (No Exceedance)
- MPCA Tier 1 Residential SRV Exceedance or MPCA Tier 2 Industrial SRV Exceedance
- MDH HRL/HBV/RAA or EPA Arsenic MCL Exceedance
- Work Element 2 (WE2) Delineation Location
- Proposed Delineation Location (MPCA Approved)
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MDH = Minnesota Department of Health
MPCA = Minnesota Pollution Control Agency
RAA = Risk Assessment Advice
SRV = Soil Reference Value
Imagery Source: MnGeo WMS service, 2010 color 7-county http://geoint.lmic.state.mn.us/cgi-bin/wms? Accessed 6/6/2014

0 100 200 400 Feet

1 inch = 200 feet

Twin Cities Assembly Plant
Ford Motor Company
St. Paul, Minnesota

Focus Area 6 - Former Hazardous Waste Storage and Disposal Areas

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FIGURE 6

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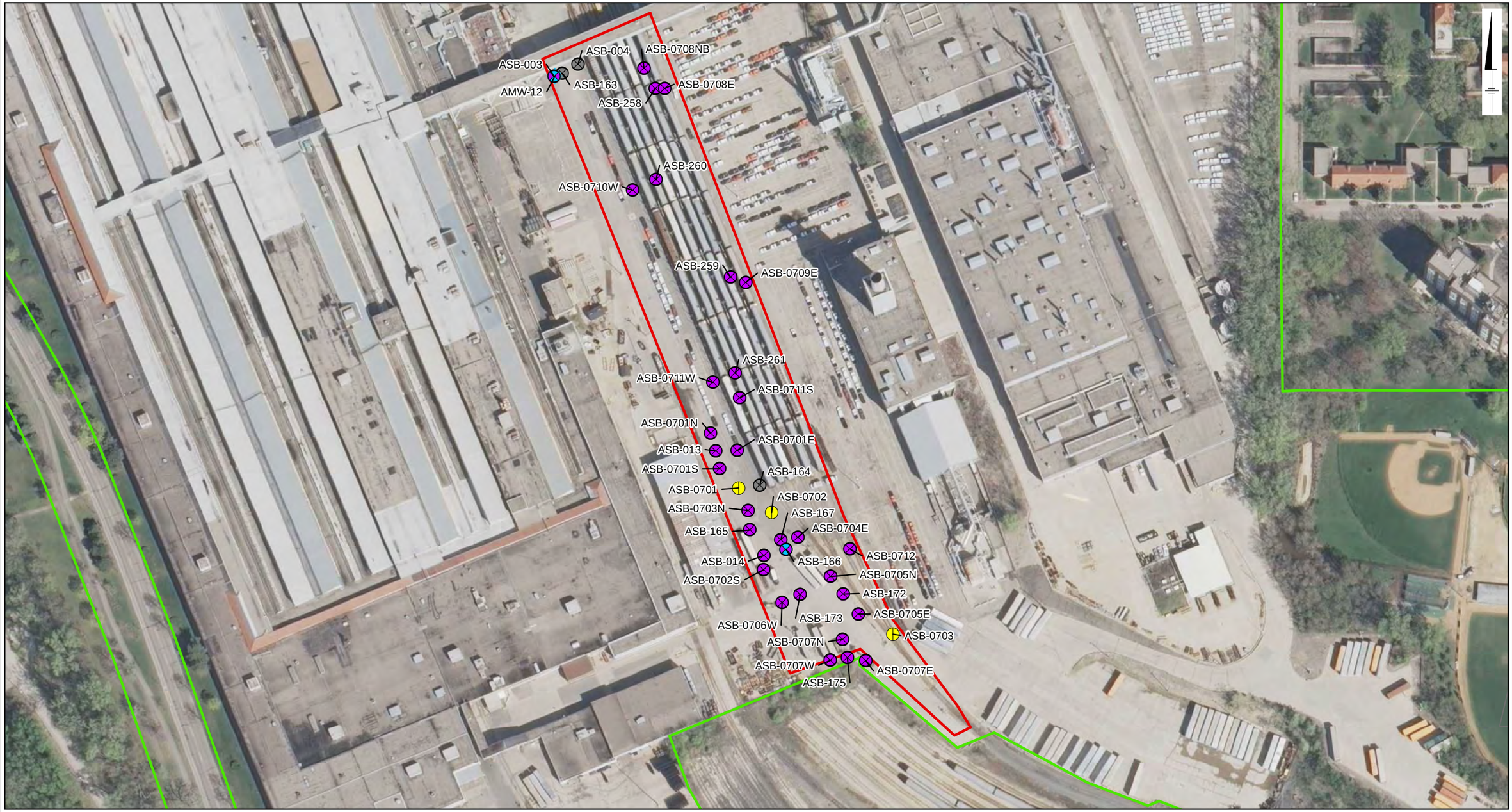

LEGEND:

- Monitoring Well (No Exceedance)
- Soil Boring (No Exceedance)
- MPCA Tier 1 Residential SRV Exceedance or MPCA Tier 2 Industrial SRV Exceedance
- MDH HRL/HBV/RAA or EPA Arsenic MCL Exceedance
- Work Element 2 (WE2) Delineation Location
- Ford Property Boundary
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MPCA = Minnesota Pollution Control Agency
RAA = Risk Assessment Advice
SRV = Soil Reference Value
Imagery Source: MnGeo WMS service, 2010 color 7-county http://geoint.lmic.state.mn.us/cgi-bin/wms? Accessed 6/6/2014

0 75 150 300 Feet

1 inch = 150 feet

Twin Cities Assembly Plant
Ford Motor Company
St. Paul, Minnesota

Focus Area 7 - Railroad Tracks

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FIGURE 7

CITY: Minneapolis, MN DB: MGress PM: Bryan Zinda
Project MN000593
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LEGEND:

- Monitoring Well (No Exceedance)
- Soil Boring (No Exceedance)
- MPCA Tier 1 Residential SRV Exceedance or MPCA Tier 2 Industrial SRV Exceedance
- MDH HRL/HBV/RAA or EPA Arsenic MCL Exceedance
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RAA = Risk Assessment Advice
SRV = Soil Reference Value
Imagery Source: MnGeo WMS service, 2010 color 7-county http://geoint.lmic.state.mn.us/cgi-bin/wms? Accessed 6/6/2014

0 65 130 260 Feet

1 inch = 130 feet

Twin Cities Assembly Plant
Ford Motor Company
St. Paul, Minnesota

Focus Area 11 - Wastewater Treatment Plant

ARCADIS

FIGURE 8

CITY: Minneapolis, MN DB: MGress PM: Bryan Zinda
Project MN000593
Path: G:\GIS\Projects\Ford RangerArcMap\2014\2014-06\FA11_WE2_Proposed_20140605.mxd