

Ford Motor Company

RESPONSE ACTIVITY PLAN – UTILITY CORRIDOR EVALUATION REVISED

Livonia Transmission Plant

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February 11, 2020



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RESPONSE ACTIVITY PLAN – UTILITY CORRIDOR EVALUATION REVISED

Livonia Transmission Plant
Area of Concern
Court Case: No. 2:1712372-GAD-RSW

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ACRONYMS AND ABBREVIATIONS

cDCE	cis-1,2-dichloroethene
COC	constituent of concern
CSM	conceptual site model
DCE	dichloroethane
EDC	Eastern Diversion Chamber
GLWA	Great Lakes Water Authority
GSI	groundwater/surface water interface
LTP	Livonia Transmission Plant
µg/L	microgram per liter
EGLE	Michigan Department of Environmental, Great Lakes, and Environment
PCE	tetrachloroethene
QAPP	Quality Assurance Project Plan
RespAP	Response Activity Plan
RI	Remedial Investigation
TCE	trichloroethene
tDCE	trans-1,2-dichloroethene
TDL	target detection limit
VC	vinyl chloride
WDC	Western Diversion Chamber

1 INTRODUCTION

Arcadis of Michigan LLC (Arcadis) has prepared the following revised Utility Corridor Response Activity Plan (RespAP) on behalf of Ford Motor Company (Ford) for the Livonia Transmission Plant (LTP) site (the site). The site layout is included as **Figure 1**. This document describes the Remedial Investigation (RI) activities that will be used to comprehensively assess the potential exposure pathway via the utility corridors in accordance with the Consent Decree effective July 27, 2017 (No: 2:1712372-GAD-RSW) and satisfies Section 6.7a response activity plan for conducting an RI.

The proposed response activities will address the comments provided by the Michigan Department of Environmental, Great Lakes, and Energy (EGLE) in the letters dated August 30, 2018, July 9, 2019, December 2, 2019, and a meeting conducted at the Southeast Michigan EGLE office on November 4, 2019. During the meeting at the Southeast Michigan EGLE office, EGLE indicated they will discuss the vapor sampling with EGLE's vapor intrusion technical leader to define and approve sampling methodology and the appropriate criteria. The scope of work outlined within this RespAP will systematically assess the potential exposure pathway related to the utility corridors on-site and off-site. Additional phases of investigation might be required based on the first phase of activities outlined in this RespAP.

This RespAP is organized to describe on-site and off-site RI activities. On-site activities will include:

- Sewer and Compliance Point Sampling
- Compliance Point SL-2 Monitoring and Eastern Diversion Chamber Compliance Determination

Additional off-site RI activities include:

- Offsite Sewer and Compliance Point Sampling

The constituents of concern (COCs) for the site, as defined by the Consent Decree (CD), include:

- Trichloroethene (TCE)
- Tetrachloroethene (PCE)
- 1,1-dichloroethene (DCE)
- Cis-1,2-dichloroethene (cDCE)
- Trans-1,2-dichloroethene (tDCE)
- Vinyl chloride (VC)
- 1,4-Dioxane.

The target detection limits (TDLs) for COCs in soil, groundwater, and vapor are also defined in the Consent Decree. Due to analytical limitations, a separate RespAP requesting a TDL change for TCE and VC in residential groundwater was submitted to the EGLE on November 21, 2017 and approved on December 20, 2017. Therefore, the goal of off-site groundwater criteria for TCE and VC was changed to a TDL of 1.0 microgram per liter ($\mu\text{g/L}$).

RESPONSE ACTIVITY PLAN – UTILITY CORRIDOR EVALUATION

This document provides a framework for the proposed RI activities. Investigation sampling, routine monitoring, and laboratory analyses methodology to be employed during the RI are presented in two Quality Assurance Project Plans (QAPPs; Arcadis 2017b, Arcadis 2017c), prepared and submitted to the EGLE in August 2017. QAPP addenda may be prepared and submitted to EGLE for review and approval should an investigation method require additional description.

Schedule

The additional activities proposed that were not included in the RI RespAP submitted to the EGLE on April 13, 2018 but are described herein will begin upon approval from the EGLE. A schedule is provided below to show the approximate duration of the proposed response activities. The status of previous activities discussed in the RespAP is also provided below.

Scope Define Below	Duration	Status
Onsite		
Comprehensive Storm and Sanitary Sewer Systems Sampling	July 2017	Completed
Closed-Circuit Televised Sanitary Sewer System	August and September 2017	Completed
Closed-Circuit Televised Remaining Eastern Storm Sewer System	March and April 2018	Completed
Manhole, Invert, and Sump Survey	December 2018- January 2019	Completed
Sediment Sampling – Eastern and Western Diversion Chamber	Quarterly	Completed
Compliance Determination for the EDC	October 2019- December 2019	Completed
On-site Remaining Eastern Storm Sewer System Rehabilitation	February 2020	Ongoing
Monthly Compliance Sampling – Sample Location 2	Monthly	Ongoing
Sampling – vapor sampling during baseflow conditions.	February-March 2020	Pending
Off Site		
Manhole, Invert, and Sump Survey	December 2018	Completed
Shallow Monitoring Well Installation and Groundwater Sampling	4Q2019	Completed
Sampling - liquid and vapor sampling during baseflow conditions	February-March 2020	Pending

2 ON-SITE REMEDIAL INVESTIGATIONS

On-Site Utility Corridors

Preferential Migration Pathways and On-site Sewer Sampling

In December 2018 and January 2019, Arcadis surveyed manhole rims, inverts, and sumps on-site in an effort to understand the relationship between depth of storm and sanitary sewers to the elevation of impacted groundwater on site. The findings of the storm and sanitary sewer survey indicate that a majority of the buried piped infrastructure is submerged and/or in contact with groundwater. Invert and sump elevations were also used to estimate the flow direction between sewer manholes. Flow directions based on survey of inverts (**Figure 1**) are shown on **Figure 2**. It is important to note that on-site storm sewers discharge to the eastern diversion chamber (EDC) and the western diversion chamber (WDC) (See **Figure 2** for the locations). Storm sewer liquid during baseflow conditions that flows to the EDC and WDC is then discharged to the Great Lakes Water Authority (GLWA) treatment facility under Permit 006-27510-IU. Since all storm water from onsite is currently discharged to the GLWA, the Groundwater Surface Water Interface (GSI) pathway is not a relevant pathway and therefore no additional liquid or sediment samples will be collected as part of this RespAP. Vapor samples will be collected from the locations identified on **Figure 2**. In the event that conditions change and Ford ceases to discharge to the GLWA, then the pathway will be reevaluated.

In order to evaluate if potential vapor is interacting with the sewers, Arcadis proposes the following scope of work to be conducted quarterly:

- Collect vapor samples from the locations shown on **Figure 2**;
- Collect a vapor sample from a compliance manhole upgradient of the WDC (intersection of Plymouth Road and Levan Road) to address the upgradient influence of sewer vapors on downgradient discharge locations;
- Collect a sewer vapor sample from sanitary manhole SAMH 1231 to determine if vapor impacts of potential site-related constituents of concern;
- Collect vapor samples from the EDC and the WDC; and
- Collect vapor samples from Sample Location 2 (SL-2) located near the EDC. Sanitary wastewater, industrial wastewater, remediated groundwater, and stormwater are discharged at this location. As part of Ford's discharge permit with the GLWA, monthly samples are collected, which includes the site-related COCs SL-2 has been classified as the downgradient compliance point.

In the July 8, 2019 letter, EGLE requested additional information regarding potential contaminant migration during non-base flow conditions, specifically downgradient of the onsite diversion chambers. A robust monthly data set has been accumulated pre and post rehabilitation of the eastern storm sewer system. Ford and Arcadis propose to provide EGLE with a groundwater surface water interface (GSI) pathway compliance option per the *2018 Groundwater Surface Water Interface Pathway Compliance Options Guidance Document* within the utility corridor remedial investigation report. The GSI pathway compliance option or options will be used to demonstrate compliance with the GSI pathway when water has the potential to discharge to an open water body. Vapor within the EDC will also be evaluated to

RESPONSE ACTIVITY PLAN – UTILITY CORRIDOR EVALUATION

determine if COCs are present. Results of the compliance option and the vapor results will be provided to EGLE in 1Q2020 under a separate memorandum.

Groundwater elevations from existing monitoring well locations will be compared to the elevations of adjacent sanitary and storm sewer system pipes and manholes to determine if existing wells are appropriate for monitoring groundwater adjacent to site utilities. Shallow sediments at the Site consist of varying amounts of fill material to depths between 0 and 5 feet below ground surface (ft bgs) followed by sandy outwash from approximately 5 to 12 ft bgs. The hydraulic conductivity of the sediments range from approximately 20 to 80 feet per day (ft/day), followed by interbedded fine sands with hydraulic conductivities ranging from 1 to 10 ft/day. These permeabilities are likely similar to, or higher than, fill material placed around the sewers. Typically, sewers are backfilled with the native material, or at most a poorly sorted gravelly sand. Multiple investigations have occurred on-site and, numerous soil boring logs have been reviewed to understand the geology on-site. Based on the soil boring logs and data collected from the hydraulic profiling tool the fill material will not have a great enough contrast in hydraulic conductivity to affect groundwater flow and contaminant transport in a significant way. Transport along sewer bedding is most common in low permeability settings where native materials consist of clayey soils with orders of magnitude lower permeability than the bedding material. In addition, the high-resolution-site characterization has not shown a deflection of the groundwater impacts or groundwater contours related to the location/depth of the sewers. The distribution of groundwater impacts is consistent with ambient groundwater flow patterns that have been documented in detail at the LTP site. Further characterization of the fill material placed around sewers poses a risk of a utility strike and is not warranted given the documented site conditions.

Off-Site Utility Corridors

Survey Results and Proposed Offsite Sampling

In December 2018, Arcadis surveyed in total 105 storm and sanitary sewer system manholes located in and around the Alden Village Subdivision. The survey was completed to determine the depths of manhole rims, inverts, sumps, and to determine flow direction. The survey focused in the Alden Village Subdivision, Belden Court, Rosati Avenue, and Stark Road. Results from this survey indicate that the average depth to inverts is between 5 and 12 feet below ground surface. Based on these depths, the sewers off-site are potentially or have the potential to be contact with groundwater. Invert and sump elevations were also used to estimate the flow direction between sewer manholes (**Figure 3**). Estimated flow directions are shown on **Figure 4**.

In order to evaluate if off-site impacted groundwater is interacting with the off-site sewers, Arcadis will collect one groundwater and one vapor sample from the sewers at eight sampling locations (manholes) shown on **Figure 4**.

Sample locations were strategically selected based on the presence of vinyl chloride in shallow groundwater and flow direction in the sewers. The following scope of work is proposed to evaluate potential groundwater and vapor impacts.

- Seven sample locations are located in approximately the center and on the perimeter of the off-site vinyl chloride groundwater plume to address sewers that directly interface with off-site impacted groundwater. Each location will have a liquid, sediment, and vapor sample collected.

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- Three sample locations are located on the outer fringe of the northern impacts. The purpose of the additional locations is to understand if there is a potential for vapor migration within the combined storm sewers. Each location will only have a vapor sample collected.
- The other six sampling locations were selected at overall off-site sewer discharge points based on estimated flow direction. These sampling locations will serve to demonstrate compliance (compliance points) for discharges that might be entering “waters of the state”. Each location will have a liquid, sediment, and vapor samples collected.

Liquid, Sediment, and Vapor Sampling Procedure and Methodology:

Grab liquid samples will be collected from sewers during baseflow conditions at each manhole locations on- and off-site using low flow methods and analyzed for site-related COCs via United States Environmental Protection Agency (USEPA) Method 8260 or 8265. During the water sampling event, one field duplicate will be collected. Liquid and vapor samples will not be collected within 48 hours of a precipitation event as recorded by Michigan State’s Enviroweather station in Commerce Township, Michigan.

Sediment samples will be collected from sewers during baseflow conditions from each manhole locations on- and off-site. The sediment samples will be collected with a sampling cup and placed into the appropriate containers. In the event there is over a foot of sediment in the sump, Arcadis will attempt to collect discrete samples every six inches. The sampling cup or discrete sampler will be deconned each time prior to collecting a sediment sample. The samples will be analyzed for EPA SW-846 Method 8260B.

Prior to collecting a grab vapor sample from the sample and compliance points, locations will be screened with a Landtec GEM 2000 to determine if methane is present. Grab vapor samples will be collected from sewers at manhole locations using tubing attached to one-liter SUMMA® canisters. Storm sewers with grated lids will be sampled 24 to 48 hours after a vapor barrier has been applied to the opening.

Collection of vapor samples from the storm sewers will be weather dependent to avoid isolate potential flooding. A small opening will be made in the liner 24-48 hours after the vapor barrier has been applied. Tubing will be placed through the opening in the manhole down to the opening of the pipe, but above any water in the sump. If no hole is present, the sewer manhole will be lifted slightly to allow the entry of the tubing into the sewer. Samples will be collected from the sewer via the tubing into the SUMMA® canister and analyzed for site-related COCs via USEPA Method TO-15. During the vapor sampling event, one field duplicate will be collected.

Arcadis will also attempt to place flow meters in the pipe prior to applying the vapor barrier to evaluate flow conditions. The evaluation will include the installation of Teledyne Isko 2150 Flow meters in storm sewers. The flow meter will be installed for a month to evaluate storm sewer volume fluctuation. The flow meters will be installed in the storm sewer compliance locations offsite.

Arcadis will complete the quarterly sampling events of the above-mentioned on- and off-site locations. If site-related COCs are present in either the liquid, sediment, or vapor samples, Ford will discuss next steps with the EGLE prior to the next sampling event.

3 CLOSING

The goal of the revised UC RespAP outlined above is to document how Ford will address the data gaps identified in the CSM (Arcadis 2017a), address the EGLE comments to the original and revised UC RespAP, and to address comments provided by EGLE in the meeting conducted on November 4, 2019. Quarterly progress updates and a utility corridor remedial investigation report will be submitted to EGLE throughout the RI process.

4 REFERENCES

Arcadis of Michigan LLC (Arcadis). 2017a. Conceptual Site Model. Livonia Transmission Plant. August.

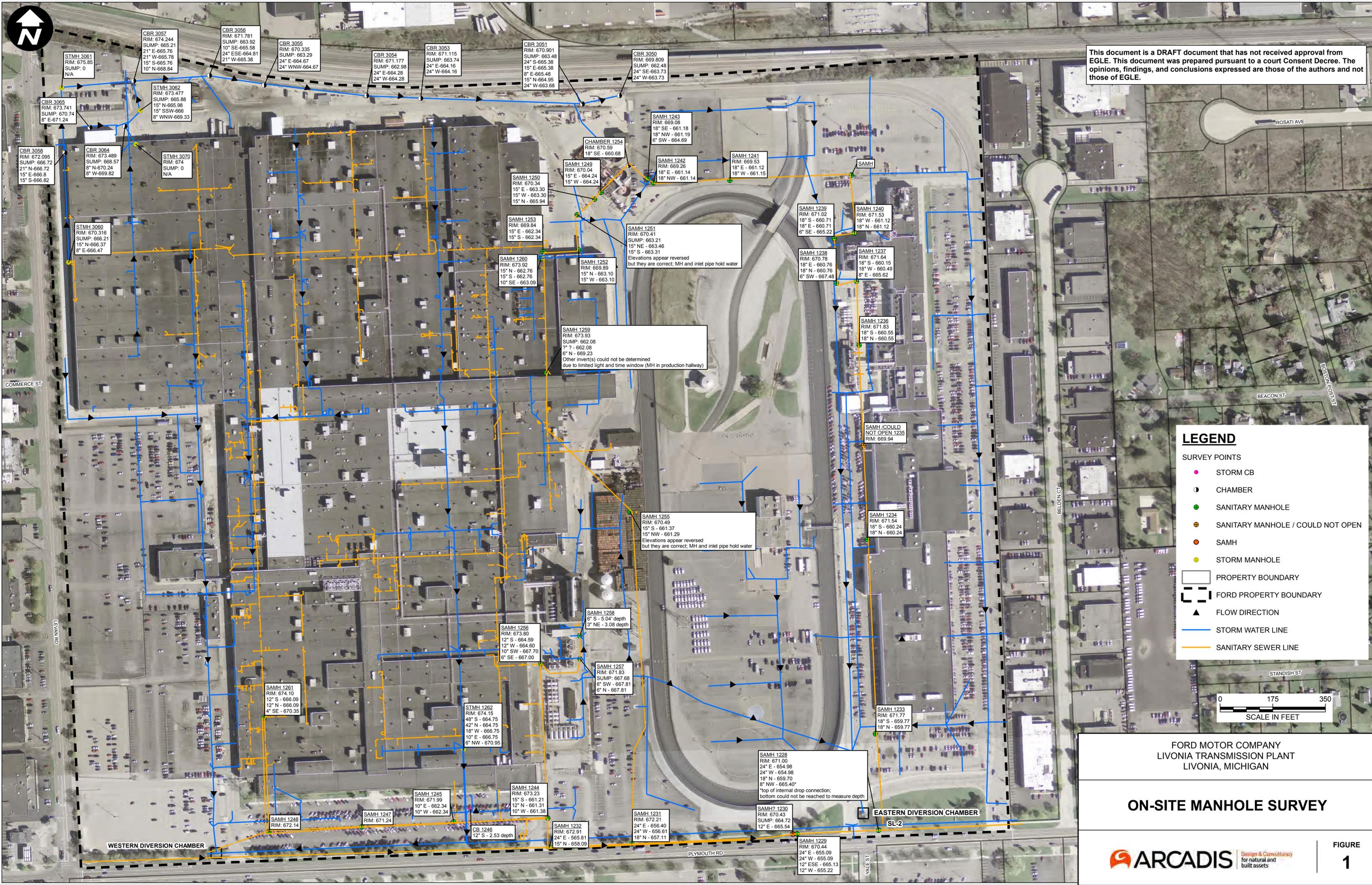
Arcadis. 2017b. Quality Assurance Project Plan – On-Site. Livonia Transmission Plant, Livonia, Michigan. August.

Arcadis. 2017c. Quality Assurance Project Plan – Off-Site. Livonia Transmission Plant, Livonia, Michigan. August.

FIGURES



CITY: Novi, DIV: ENV, DE: MG, PIC: R. ELLIS, PM: K. HINSKEY, PROJECT NUMBER: M001322.0001, COORDINATE SYSTEM: NAD 1983, StatePlane, Michigan, South FIPS 2113, Feet, Intl, Z:\GIS\Projects\ENW\Novi\Brighton_Mi\FordLivonia\GIS\docs\2020-01\FINAL\Final2\Office Compliance and Stamping Locations\Figure 1 Manhole_Survey_Online_02272019.mxd PLOTTED: 1/7/2020 10:46:00 AM BY: msmiller



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LEGEND

SURVEY POINTS

- STORM CB
- CHAMBER
- SANITARY MANHOLE
- SANITARY MANHOLE / COULD NOT OPEN
- SAMH
- STORM MANHOLE
- ▭ PROPERTY BOUNDARY
- ▭ FORD PROPERTY BOUNDARY
- ▲ FLOW DIRECTION
- STORM WATER LINE
- SANITARY SEWER LINE

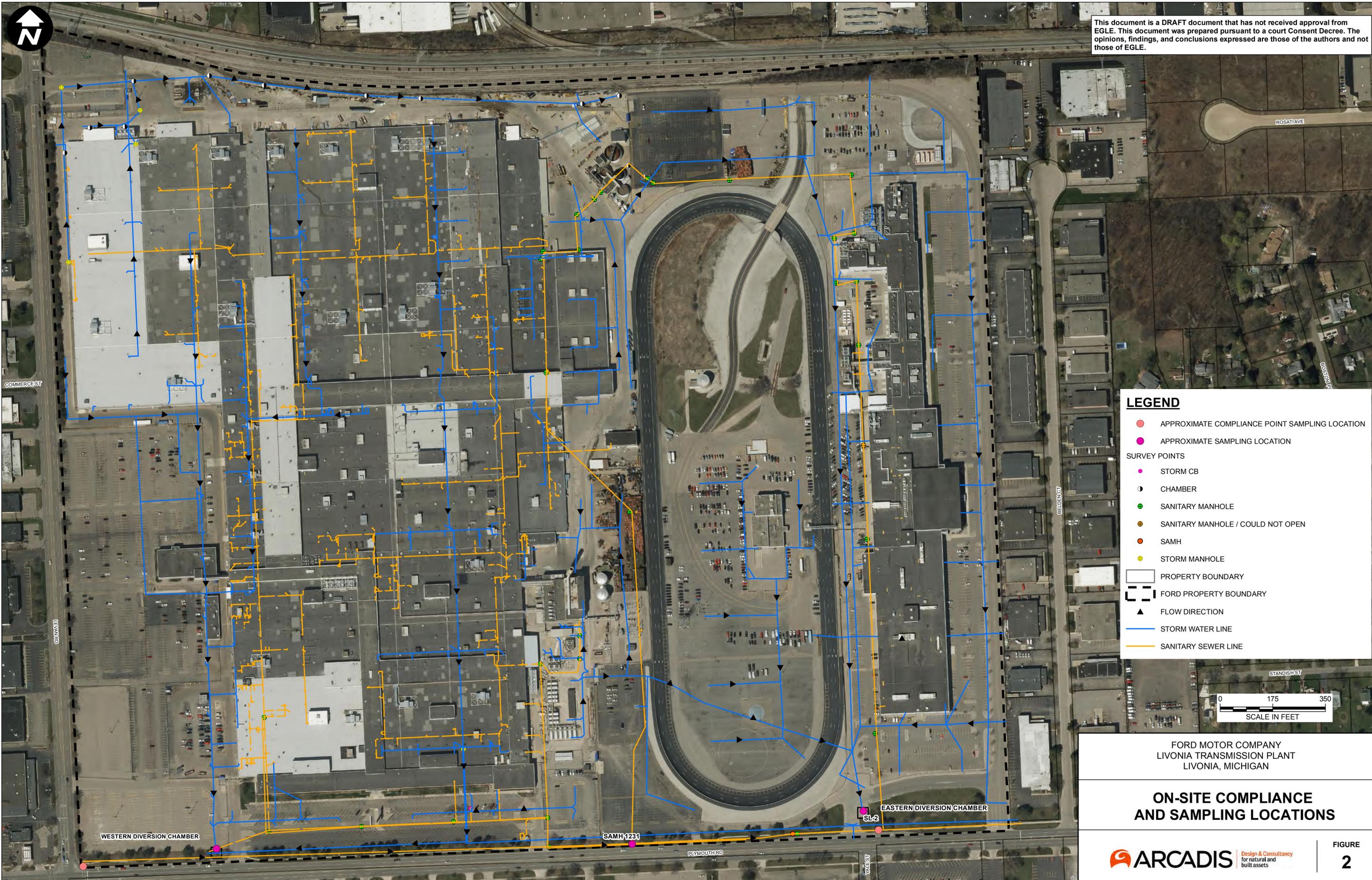


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LIVONIA TRANSMISSION PLANT
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ON-SITE MANHOLE SURVEY



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Z:\GIS\Projects\ENW\Novi\Brighton_MIFordLivonia\GISdocs\2020-01\2020-02\Figure 2 - On-site Compliance and Sampling Locations.mxd PLOTTED: 2/5/2020 8:20:29 AM BY: msamiller

LEGEND

- APPROXIMATE COMPLIANCE POINT SAMPLING LOCATION
- APPROXIMATE SAMPLING LOCATION
- SURVEY POINTS
 - STORM CB
 - CHAMBER
 - SANITARY MANHOLE
 - SANITARY MANHOLE / COULD NOT OPEN
 - SAMH
 - STORM MANHOLE
- ▭ PROPERTY BOUNDARY
- ▭ FORD PROPERTY BOUNDARY
- ▲ FLOW DIRECTION
- STORM WATER LINE
- SANITARY SEWER LINE



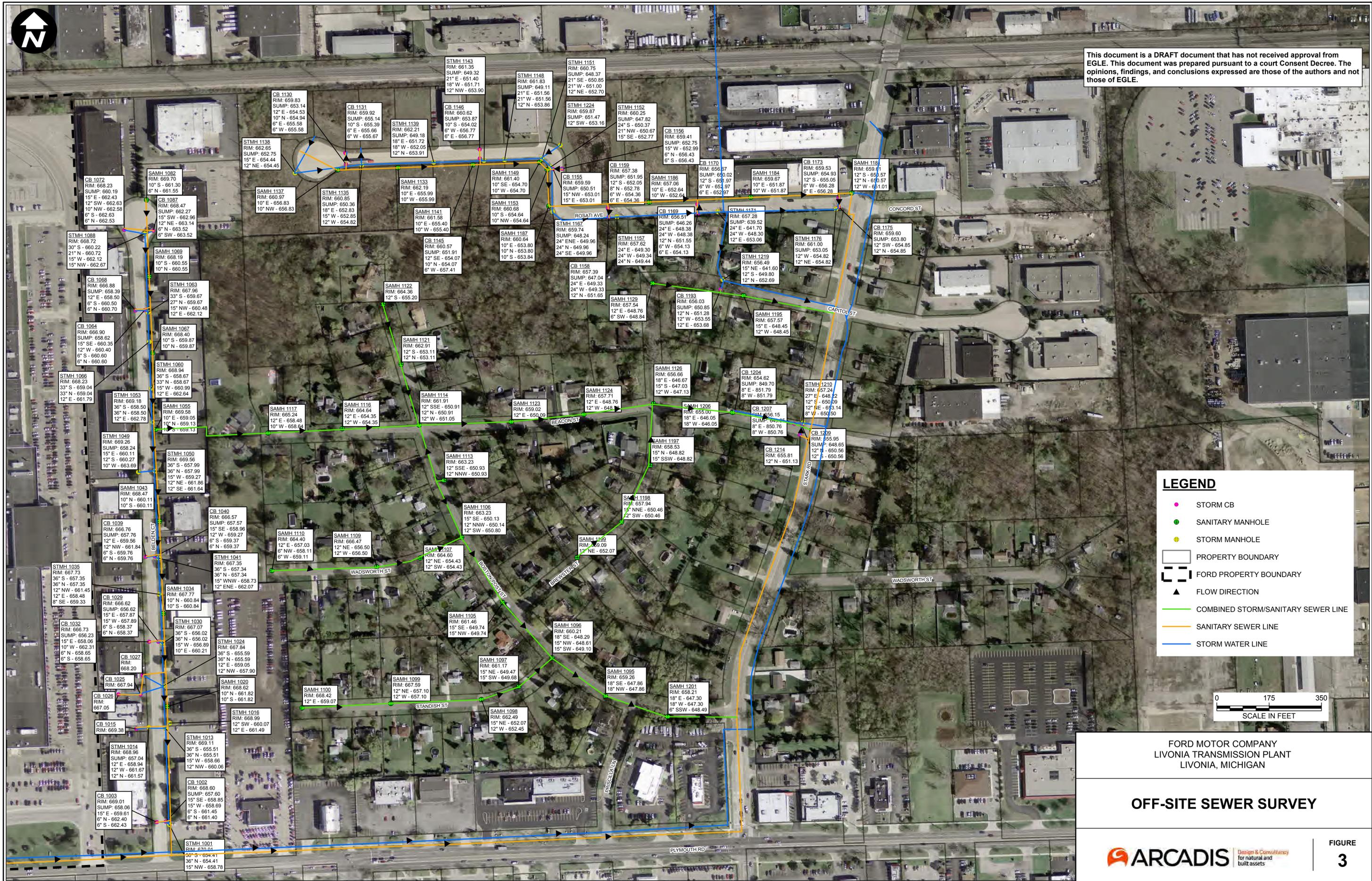
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LIVONIA TRANSMISSION PLANT
LIVONIA, MICHIGAN

**ON-SITE COMPLIANCE
AND SAMPLING LOCATIONS**



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CITY: Novi, DIV: ENV, DE: MC, PIC: R, ELLIS, PM: K, HINSKEY, PROJECT NUMBER: M001322.0001, COORDINATE SYSTEM: NAD 1983, StatePlane, Michigan, South FIPS 2113, Feet, Intl, ZIGSProjects_ENV\Novi\Brighton_Milford\arcadis\GIS\2020-01\FINAL\Final2\Office Compliance and Sampling Locations\Figure 3 Offsite Sewer Survey.mxd, PLOTTED: 1/7/2020 10:58:59 AM, BY: msmliler



LEGEND

- STORM CB
- SANITARY MANHOLE
- STORM MANHOLE
- PROPERTY BOUNDARY
- FORD PROPERTY BOUNDARY
- ▲ FLOW DIRECTION
- COMBINED STORM/SANITARY SEWER LINE
- SANITARY SEWER LINE
- STORM WATER LINE



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OFF-SITE SEWER SURVEY



CITY: Novi, DIV: ENV, DE: MG, PIC: R. ELLIS, PM: K. HINSKEY, PROJECT NUMBER: M0001322.0001, COORDINATE SYSTEM: NAD 1983, StatePlane Michigan South FIPS 2113, Feet Intl, Z:\GIS\Projects_ENW\Novi\Brighton_MIFordLivonia\GISdocs\2020-02\Figure 4 Off-site Compliance and Sampling Locations.mxd, PLOTTED: 2/11/2020 1:36:10 PM, BY: memiller



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LEGEND

● APPROXIMATE COMPLIANCE POINT SAMPLING LOCATION	▲ FLOW DIRECTION
● APPROXIMATE SAMPLING LOCATION	— COMBINED STORM/SANITARY SEWER LINE
● APPROXIMATE SAMPLING LOCATION (VAPOR SAMPLES ONLY)	— SANITARY SEWER LINE
	— STORM WATER LINE
SURVEY POINTS	VC - GROUNDWATER
● STORM CB	1 - 2 µg/L
● SANITARY MANHOLE	2 - 10 µg/L
● STORM MANHOLE	10 - 100 µg/L
▭ PROPERTY BOUNDARY	
▭ FORD PROPERTY BOUNDARY	

NOTE: THE VC GROUNDWATER CONCENTRATION PLUME SHOWN HAS BEEN MODELED WITH EARTH VOLUMETRIC STUDIOS. THE MODEL USES ACTUAL POINTS OF DATA TO GENERATE A VISUAL WHICH REPRESENTS ITS POTENTIAL CONCENTRATIONS BETWEEN THE ACTUAL POINTS OF DATA.

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LIVONIA TRANSMISSION PLANT
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