



Environmental Quality Office
Sustainability, Environment & Safety
Engineering

Ford Motor Company
Fairlane Plaza North
290 Town Center Drive, Suite 800
Dearborn, MI 48126

March 14, 2019

Mr. Paul Owens
District Supervisor, Southeast Michigan District Office
MDEQ Remediation and Redevelopment Division
27700 Donald Court
Warren, Michigan 48092-2793
owensp@michigan.gov

VIA E-MAIL

Re: Ford Livonia Transmission Plant
Additional Response to MDEQ Letter dated February 1, 2019

Dear Paul:

On behalf of Ford Motor Company (Ford), this letter and the attached memo from Arcadis dated March 14, 2019 provide updated information to Ford's March 11, 2019 and February 8, 2019 responses to your February 1, 2019 letter regarding MDEQ review of shallow groundwater data collected in accordance with MDEQ-approved Response Activity Plan-Vapor Intrusion Evaluation and MDEQ's November 27, 2018 letter.

We remain fully committed to protecting human health and the environment. Importantly, as previously shared with you, all indoor air sampling, sub-slab sampling, and sump sampling (if a sump exists) shows no detection of vinyl chloride in the residential neighborhood.

If you have any questions, please feel free to contact me.

Sincerely,

Todd M. Walton
Manager, Global Site Assessment & Remediation

cc: Mr. Kris Hinskey, Arcadis
Mr. Shawn Collins, The Collins Law Firm, PC
Mr. Paul Bernier, City of Livonia
Senator Dayna Polehanki
Representative Laurie Pohutsky
Mr. Brian Negele, MDAG
Mr. Aaron Cooch, DHHS
Ms. Alexandra Rafalski, DHHS
Mr. Darren Bowling, MDEQ
Ms. Cyndi Mollenhour, MDEQ
Ms. Krista Reed, MDEQ
Ms. Beth Vens MDEQ
Mr. Brandon Alger, MDEQ

MEMO

Paul Owens, District Supervisor MDEQ
SE Michigan District Office
27700 Donald Court
Warren, Michigan 48092-2793

owensp@michigan.gov

Copies:

Mr. Brian Negele, MOAG
Mr. Darren Bowling, MDEQ
Ms. Cyndi Mollenhour, MDEQ
Ms. Beth Vens, MDEQ
Ms. Krista Reed, MDEQ
Mr. Brandon Alger, MDEQ
Mr. Todd Walton, Ford

Arcadis of Michigan, LLC
28550 Cabot Drive
Suite 500
Novi
Michigan 48377
Tel 248 994 2240
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From:

Kris Hinskey

Mitch Wacksman

Joseph Quinnan

Date:

March 14, 2019

Arcadis Project No.:

MI001454.0007

Subject:

Livonia Transmission Plant
Memo – Multiple Lines of Evidence Supporting Monitoring at Specific
Properties
36200 Plymouth Road, Livonia, Wayne County, Michigan
MDEQ Site ID No. 82002970

On behalf of Ford Motor Company (Ford), this memo has been prepared by Arcadis of Michigan, LLC for the Livonia Transmission Plant (LTP) site (site) to update our March 11, 2019 memo based on recent shallow groundwater data results. This memo summarizes the key elements of the off-site conceptual model and provides multiple lines of evidence to support continued monitoring rather than pre-emptive mitigation at the following properties as shown on **Figure 1**:

- 34990 Beacon (**Attachment 1**)
- 34682 Beacon (**Attachment 2**)
- 34591 Beacon (**Attachment 3**)
- 12017 Brewster (**Attachment 4**)
- 34367 Capitol (**Attachment 5**)
- 34480 Capitol (**Attachment 6**)
- 34940 Beacon (**Attachment 7**)

Memo Regarding Recent Off-site Shallow Groundwater Sampling and Pre-Emptive Mitigation

In a letter dated February 1, 2019, MDEQ provided site-specific groundwater criteria for volatilization to indoor air pathway (VIAP). Based on that letter, the threshold for pre-emptive mitigation for buildings with crawlspaces or slab-on-grade construction groundwater concentrations with groundwater depths greater than 1.18 meters (3.9 ft) below grade is 1.4 µg/L. The corresponding threshold for groundwater in contact (GWIC), or groundwater levels less than 1.18 meter (3.9 ft) is 1.0 µg/L.

Consistent with ongoing discussions related to the implementation of the “Response Activity Plan – Vapor Intrusion Evaluation” that was approved with modification on August 30, 2018 as part of the July 27, 2017 Consent Decree for the site, additional shallow groundwater monitoring wells have been installed in the neighborhood east of the LTP to evaluate the potential vapor intrusion to indoor air pathway (VIAP). Based on agreement with Michigan Department of Environmental Quality (MDEQ), shallow groundwater wells would be installed at each property where sub-slab soil vapor samples could not be collected due to limitations in building construction (i.e., crawl spaces) or the presence of shallow groundwater that may be in contact with a structure. These shallow groundwater data were used to update the “delineation line” and 100-foot off-set line and presented to MDEQ on March 11, 2019.

The off-site conceptual site model (CSM) and property-specific CSMs are presented in the following sections.

Off-Site Conceptual Site Model

The Conceptual Site Model (CSM), Livonia Transmission Plant (August 2017) summarized the results of ongoing characterization activities on- and off-site. The following paragraphs summarize key features of the CSM, including data collected through March 8, 2019.

Figure 2 (from the 4th Quarterly Progress Report 2018) presents groundwater sampling results from the 19 off-site groundwater monitoring well network installed to monitor vinyl chloride impacts. The majority of these wells were constructed at intermediate (7 to 14 ft) and deep (14 to 20 ft) intervals to monitor the vinyl chloride impacts based on the 3D interpretations. Results indicate that wells demonstrating detectable levels of vinyl chloride north of Beacon Street are consistent in measured concentrations. Wells demonstrating non-detectable concentrations (or qualified detections less than 1 µg/L) are also consistently non-detect. Data collected since monitoring began in the third quarter of 2017 are consistent, indicating that the lateral extents of impacts are generally stable. **Table 1** summarizes the groundwater sampling results from the quarterly events and recent shallow monitoring well sampling.

Figure 3 shows the results of shallow groundwater monitoring (i.e. water table wells with samples collected within the upper 2-feet of the water column) completed between December 2018 and March 2019 at 98 locations. The green circles indicate shallow wells where vinyl chloride was not detected above 1.0 µg/L. Orange circles highlight shallow wells where vinyl chloride was detected above 1.0 µg/L, ranging from 1.0 to 7.8 µg/L. This figure also shows a delineation line (shown as a blue dashed line), which defines the extents of vinyl chloride impacts in groundwater less than 1 µg/L, and a 100 foot off-set line (shown as an orange dashed line), which illustrates the 100-ft buffer. It is notable that concentrations of vinyl chloride greater than 1.0 µg/L are limited to two locations along Boston Post, where sumps exist, and seven locations near the northern end of Brewster Street.

Figure 4 illustrates the geologic cross section and groundwater sampling results along an east-west line parallel to Beacon Street. The vertical extents of vinyl chloride impacts were mapped using VAP sampling, quarterly monitoring wells, and recently installed shallow monitoring wells within 75 feet of the cross-section line. The geology is depicted using a gray-scale based on the hydraulic profiling (HPT) data completed as part of the initial delineation effort. In general, the gray scale illustrates the permeable sand zones (white), the silty to clayey fine-sand zones (gray) and clay zones (black). The cross-section map of

Memo Regarding Recent Off-site Shallow Groundwater Sampling and Pre-Emptive Mitigation

the vinyl chloride impacts in groundwater is consistent with the CSM 3D model, which shows the primary vinyl chloride impacts in the intermediate and deeper intervals of the shallow aquifer (CSM Report, 2017). Addition of the shallow monitoring well sampling results to the cross-section aids in understanding the vertical distribution of shallow vinyl chloride impacts. Near the two Boston Post well locations, the surrounding shallow wells are less than 1 ug/L; apparently the deeper impacts are pulled upward in response to pumping at sumps in this area. Near Brewster Street, the aquifer thins, and vinyl chloride distributions follow the underlying clay topography, which rises in elevation. This explains the shallow groundwater impacts on Boston Post and along Brewster Street.

The lateral extents of vinyl chloride in groundwater have been consistent over six consecutive quarters of monitoring. Recent shallow groundwater data corroborate the CSM interpretations that shallow groundwater vinyl chloride impacts are limited – 9 wells out of 98 shallow wells sampled through March 8, 2019 showed concentrations above the reporting limit of 1.0 µg/L. The two areas of shallow groundwater impacts are explained by the off-site CSM. The two wells along Boston Post appear to be related to pumping at sumps, which would draw deeper water upward. The shallow impacts in wells along Brewster Street are caused by the thinning of the aquifer due to clay topography and shallow depths to groundwater.

Figure 5 presents the 2018 results of the soil vapor monitoring program that was implemented beginning in 2017 as part of the Response Action Plan – Vapor Intrusion (2017). None of the soil vapor monitor points (SVMPs) collected over 8 consecutive quarters have shown detectable concentrations of vinyl chloride in soil vapor. Reporting limits were consistently in single digit microgram per cubic meter (µg/m³), which is more than one order of magnitude below MDEQ provide residential volatilization to indoor air screening level of 54 µg/m³. Arcadis collected SVMPs at low flow rates using helium tracers in accordance with MDEQ Vapor Intrusion Guidance (2013). The lack of observed helium leakage above the 5% threshold prescribed in the guidance indicates that the sampling results are valid, even in shallow groundwater conditions. The fact that up to 8 repeat events at individual SVMP locations were consistently non-detect reflects the fact that only two areas vinyl chloride impacts were encountered in shallow groundwater and is consistent with the low-levels encountered.

Site Specific Conceptual Site Models

Site specific CSMs were developed for each of the 6 properties to document site conditions and evaluate multiple lines of evidence that support continued monitoring in lieu of pre-emptive mitigation at this time. Data considered in the evaluation includes depth to groundwater, groundwater quality data, indoor air and sub-slab soil vapor sampling, and exterior soil vapor sampling. Each of these properties are located between the delineation line (1 µg/L) and the 100-foot offset. The site specific CSMs are provided in **Attachment 1** through **Attachment 7**. **Figure 6** shows the property address and building structure type superimposed on the shallow groundwater monitoring results for reference.

Quarterly groundwater gauging and elevation measurements have been performed on monitoring wells in the area since May 2017. As shown on **Figure 3**, monitoring wells MW-74S, MW-84S, MW-79SR, MW-78S, MW-80SR, MW-81S, MW-82SR, MW-83, and MW-85 are in the area under consideration for pre-emptive mitigation. Historical groundwater elevations varied across a range between approximately 1.3 and 3.1 ft at these wells since May 2017. However, groundwater elevations in the 4th quarter 2018 are higher than in 2017, resulting a range between 0.14 and 1.4 ft less than maximum observed elevations at these wells. Groundwater elevation ranges for each of the properties are presented in the site-specific CSMs.

Memo Regarding Recent Off-site Shallow Groundwater Sampling and Pre-Emptive Mitigation

Three of the properties have structures with crawlspaces or slab-on-grade construction with depth to water greater than 1.18 meters (3.9 feet) as prescribed in MDEQ letter dated February 1, 2019, indicating that the site-specific screening level for vinyl chloride for these properties should be 1.4 µg/L.

- 34682 Beacon
- 34367 Capitol
- 34480 Capitol

Because each of these structures is located between the 1.0 µg/L and buffer line, the groundwater concentrations are below the 1.4 µg/L site-specific screening level provide by MDEQ for crawlspaces and slab-on-grade structures. Both 34367 and 34480 Capitol (**Attachment 5** and **Attachment 6**, respectively) are on the 100-ft offset from the 1.0 µg/L delineation line. 34682 Beacon (**Attachment 2**) has a monitoring well adjacent to the building that was non-detect (e.g. less than 1.0 µg/L). Based on data collected for the vapor intrusion evaluation (indoor air and/or sub-slab as appropriate), none of the buildings on each of the properties showed vinyl chloride concentrations above detectable levels. Therefore, it is appropriate to continue to monitor groundwater and complete the vapor intrusion evaluation in accordance with the Response Activity Plan – Vapor Intrusion Evaluation.

Two properties have a partial or full basement, but groundwater depths are such that it is not in contact with the structure:

- 34990 Beacon
- 34940 Beacon

At 34990 and 34940 Beacon (**Attachment 1** and **Attachment 7**, respectively), vinyl chloride was not detected in groundwater above the reporting limit of 1.0 µg/L. Exterior soil vapor has been collected within 100 feet of the residences and vinyl chloride has not been detected over eight rounds of sampling at SVMP-08 conducted between 2017 and 2018. Indoor air samples have been collected at the properties, and vinyl chloride has not been detected in any of the samples. Therefore, it is appropriate to continue to monitor groundwater and complete the vapor intrusion evaluation in accordance with the Response Activity Plan – Vapor Intrusion Evaluation.

Two of the properties have crawlspaces and/or slab-on-grade structures, with depth to water measured at less than 1.18 m including:

- 34591 Beacon
- 12017 Brewster

In each of these cases it is necessary to evaluate the site-specific multiple lines of evidence to determine whether pre-emptive mitigation is warranted. As presented in **Attachment 3** and **Attachment 4**, multiple lines of evidence are available to aid in the evaluation of each property. Based on soil borings and groundwater gauging, groundwater does not appear to be in contact with any of the structures or the associated footers. Vinyl chloride was not detected above the reporting limit of 1.0 µg/L in groundwater sampling at 34591 Beacon and 12017 Brewster. Exterior soil vapor has been collected within 70 feet of each residence and vinyl chloride has not been detected over eight rounds of sampling conducted between 2017 and 2018. Indoor air samples have been collected from crawl spaces, and first floors of each property, as appropriate, and vinyl chloride has not been detected in any of the samples.

Therefore, it is appropriate to continue to monitor groundwater and complete the vapor intrusion evaluation in accordance with the Response Activity Plan – Vapor Intrusion Evaluation.

Memo Regarding Recent Off-site Shallow Groundwater Sampling
and Pre-Emptive Mitigation

Closing

All indoor air sampling, sub-slab sampling, and sump sampling (if a sump exists) shows no detection of vinyl chloride in the residential neighborhood. We believe that a data-driven, multiple lines of evidence approach is protective of the community.

Ford will continue to implement the vapor intrusion assessment including groundwater sampling consistent with the Response Action Plan - Vapor Intrusion Evaluation. If groundwater data changes or multiple lines of evidence indicate that a different approach is warranted, Arcadis will notify the MDEQ.

TABLE



**Table 1 – Summary of Off-Site Shallow Groundwater Sampling Results
Ford Livonia**

Location:						MW-160S	MW-161S	MW-162S	MW-163S	MW-163S	MW-164S	MW-167S	MW-168S
Date:						2/27/2019	2/27/2019	2/28/2019	2/28/2019	2/28/2019	2/22/2019	2/25/2019	2/25/2019
Sample Name:						MW-160S_022719	MW-161S_022719	MW-162S-022819	MW-163S-022819	DUP-04-022819	MW-164S-022219	MW-167S_022519	MW-168S_022519
Screen Interval (ft. bgs):						4-9	2.5-7.5	3-8	2-7	2-7	3-8	5-10	2-7
Lab SDG #:						108721-1	108720-1	108810-1	108808-1	108808-1	108468-1	108557-1	108561-1
analytic_method	chemical_name	fraction	cas_rn	Ford_LTP _Offsite Res DW	MI GW (DEQ2018) NON-RES DW								
SW8468260BBYSIM	1,4-Dioxane	T	123-91-1	7.2	350	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
SW8260B	1,1-Dichloroethene	T	75-35-4	7.0	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	cis-1,2-Dichloroethene	T	156-59-2	70	70	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	Tetrachloroethene	T	127-18-4	5.0	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	trans-1,2-Dichloroethene	T	156-60-5	100	100	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J
SW8260B	Trichloroethene	T	79-01-6	1.0	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	Vinyl chloride	T	75-01-4	1.0	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Location:						MW-169S	MW-170S	MW-171S	MW-172S	MW-173S	MW-174S	MW-175S	MW-176S
Date:						2/25/2019	3/6/2019	2/23/2019	2/28/2019	2/28/2019	2/28/2019	3/1/2019	3/5/2019
Sample Name:						MW-169S_022519	MW-170S_030619	MW-171S-022319	MW-172S-022819	MW-173S-022819	MW-174S-022819	MW-175S-030119	MW-176S_030519
Screen Interval (ft. bgs):						2-7	4.5-9.5	2-7	4.5-9.5	5.5-10.5	5.5-10.5	6-11	5-10
Lab SDG #:						108555-1	109088-1	108503-1	108806-1	108812-1	108804-1	108807-1	109011-1
analytic_method	chemical_name	fraction	cas_rn	Ford_LTP _Offsite Res DW	MI GW (DEQ2018) NON-RES DW								
SW8468260BBYSIM	1,4-Dioxane	T	123-91-1	7.2	350	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
SW8260B	1,1-Dichloroethene	T	75-35-4	7.0	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	cis-1,2-Dichloroethene	T	156-59-2	70	70	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	Tetrachloroethene	T	127-18-4	5.0	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	trans-1,2-Dichloroethene	T	156-60-5	100	100	< 1.0	< 1.0	< 1.0	0.21 J	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	Trichloroethene	T	79-01-6	1.0	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.14 J	< 1.0	< 1.0
SW8260B	Vinyl chloride	T	75-01-4	1.0	2	0.21 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

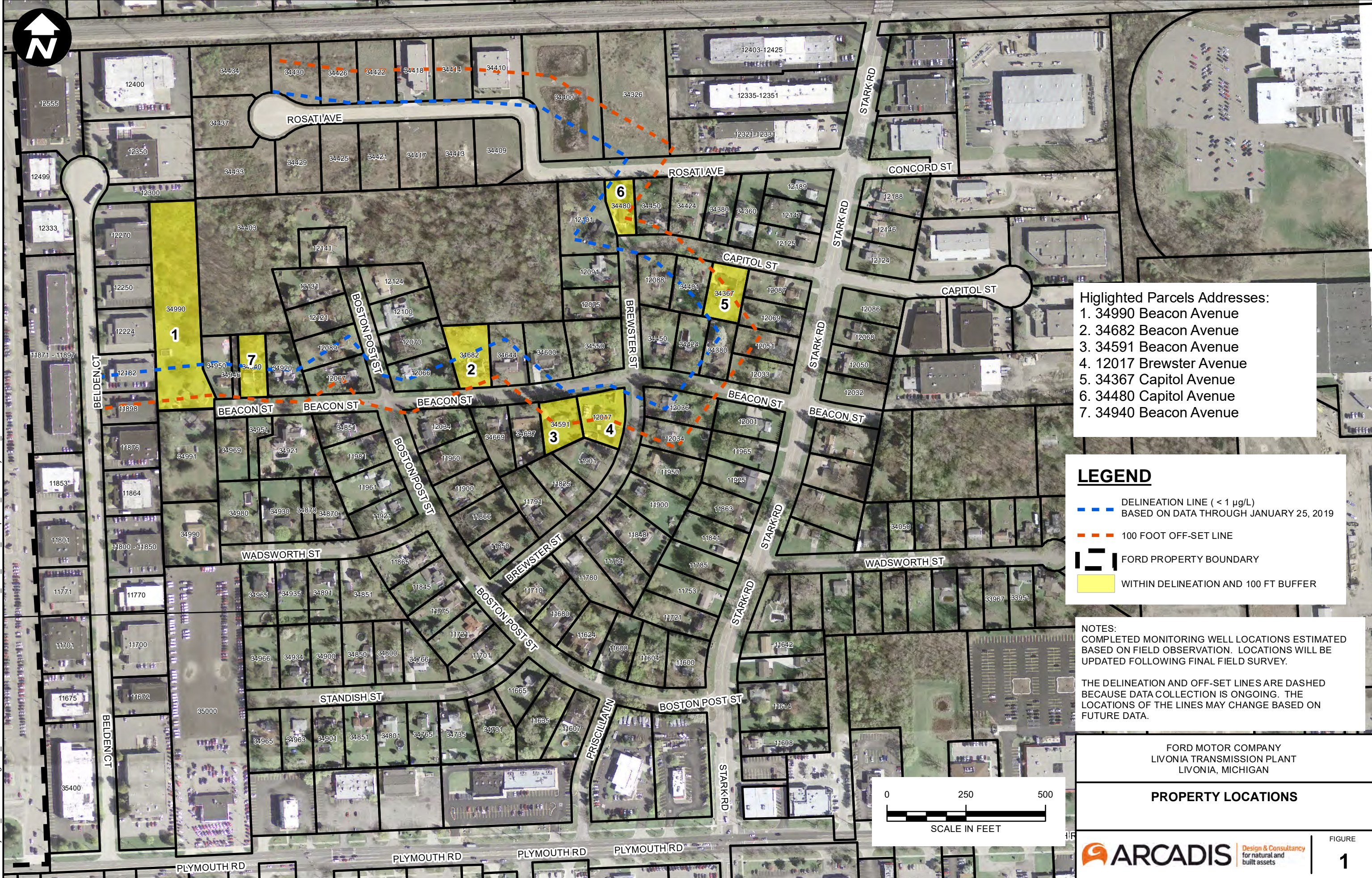
Location:						MW-177S	MW-178S	MW-179S	MW-181S	MW-182S	MW-182S	MW-183S
Date:						3/5/2019	3/4/2019	3/4/2019	3/4/2019	3/5/2019	3/5/2019	3/1/2019
Sample Name:						MW-177S_030519	MW-178S_030419	MW-179S_030419	MW-181S_030419	MW-182S_030519	DUP-05_030519	MW-183S-030119
Screen Interval (ft. bgs):						4-9	4.5-9.5	6-11	3.5-8.5	4-9	4-9	8-13
Lab SDG #:						109013-1	108923-1	108922-1	108920-1	109010-1	109010-1	108813-1
analytic_method	chemical_name	fraction	cas_rn	Ford_LTP _Offsite Res DW	MI GW (DEQ2018) NON-RES DW							
SW8468260BBYSIM	1,4-Dioxane	T	123-91-1	7.2	350	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
SW8260B	1,1-Dichloroethene	T	75-35-4	7.0	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	cis-1,2-Dichloroethene	T	156-59-2	70	70	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	Tetrachloroethene	T	127-18-4	5.0	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	trans-1,2-Dichloroethene	T	156-60-5	100	100	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	Trichloroethene	T	79-01-6	1.0	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
SW8260B	Vinyl chloride	T	75-01-4	1.0	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Notes:
All units are measured in micrograms per liter.

Abbreviations:
ft bgs Feet below ground surface

FIGURES





Highlighted Parcels Addresses:

1. 34990 Beacon Avenue
2. 34682 Beacon Avenue
3. 34591 Beacon Avenue
4. 12017 Brewster Avenue
5. 34367 Capitol Avenue
6. 34480 Capitol Avenue
7. 34940 Beacon Avenue

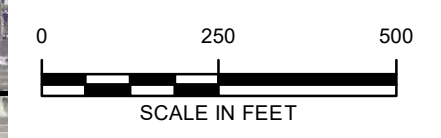
LEGEND

- DELINEATION LINE (< 1 µg/L) BASED ON DATA THROUGH JANUARY 25, 2019
- 100 FOOT OFF-SET LINE
- FORD PROPERTY BOUNDARY
- WITHIN DELINEATION AND 100 FT BUFFER

NOTES:
 COMPLETED MONITORING WELL LOCATIONS ESTIMATED BASED ON FIELD OBSERVATION. LOCATIONS WILL BE UPDATED FOLLOWING FINAL FIELD SURVEY.
 THE DELINEATION AND OFF-SET LINES ARE DASHED BECAUSE DATA COLLECTION IS ONGOING. THE LOCATIONS OF THE LINES MAY CHANGE BASED ON FUTURE DATA.

FORD MOTOR COMPANY
 LIVONIA TRANSMISSION PLANT
 LIVONIA, MICHIGAN

PROPERTY LOCATIONS





LEGEND

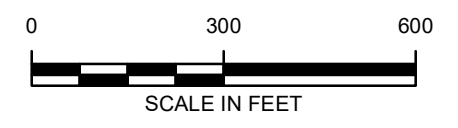
- PROPERTY BOUNDARY
- FORD PROPERTY BOUNDARY
- OFF-SITE MONITORING WELL
VINYL CHLORIDE ≤ 1.0 µg/L
- OFF-SITE MONITORING WELL
VINYL CHLORIDE > 1.0 µg/L
- TEXT EXCEEDANCE OF THE TDL FROM
PAST AND PRESENT SAMPLING EVENTS

NOTES:
 FIGURE ONLY SHOWS THE FOUR MOST RECENT QUARTERS OF DATA (FEBRUARY 2018, MAY 2018, AUGUST 2018, AND OCTOBER 2018). FULL SET OF DATA CAN BE FOUND IN THE CORRESPONDING TABLES.

µg/L - MICROGRAMS PER LITER (PARTS PER BILLION)
 ≤ - LESS THAN OR EQUAL TO
 > - GREATER THAN
 TDL - TARGET DETECTION LIMIT
 THE PUBLISHED 2016 MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY REMEDIATION AND REDEVELOPMENT DIVISION TARGET DETECTION LIMIT FOR VINYL CHLORIDE IS 1.0 µg/L.

FT = FEET BELOW GROUND SURFACE
 J = ESTIMATED CONCENTRATION ABOVE THE METHOD DETECTION LIMIT AND BELOW THE REPORTING LIMIT.
 "ND", "<" INDICATES VALUE IS BELOW THE LABORATORY REPORTING LIMIT OF 1.0 µg/L FOR VINYL CHLORIDE.
 MW = MONITORING WELL
 MDEQ = MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

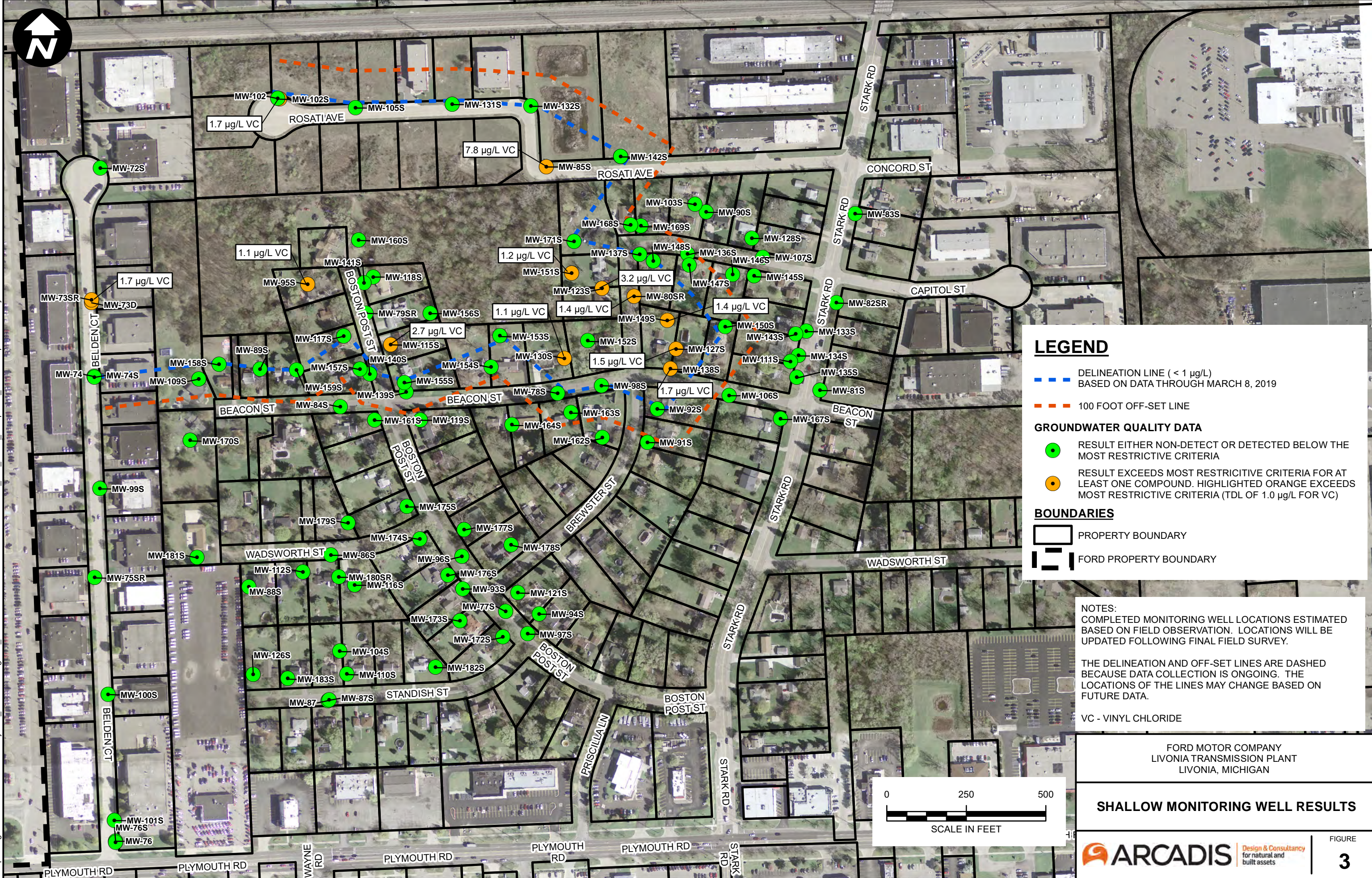
BLUE BOX INDICATES EXCEEDANCE OF THE TARGET DETECTION LIMIT FOR VINYL CHLORIDE ASSOCIATED WITH THE MOST RECENT SAMPLING EVENT POSSIBLE



FORD MOTOR COMPANY
 LIVONIA TRANSMISSION PLANT
 LIVONIA, MICHIGAN

**OFF-SITE MONITORING WELLS
 VINYL CHLORIDE IN GROUNDWATER**

CITY: Novi; DIV: ENV; DB: MG; PIC: R. ELLIS; PM: K. HINSKEY; PROJECT NUMBER: M1001322.0001; COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl; \\\\corporate\Data\ArcGisData\GISProjects\ENV\Novi\Brighton_MilFordLivonia\GIS\docs\2019-03\Offline_MW_Install_Completed_ContoursUpdatedSurvey.mxd; PLOTTED: 3/14/2019 11:19:19 AM; BY: dolexa



LEGEND

- DELINEATION LINE (< 1 µg/L) BASED ON DATA THROUGH MARCH 8, 2019
- 100 FOOT OFF-SET LINE

GROUNDWATER QUALITY DATA

- RESULT EITHER NON-DETECT OR DETECTED BELOW THE MOST RESTRICTIVE CRITERIA
- RESULT EXCEEDS MOST RESTRICTIVE CRITERIA FOR AT LEAST ONE COMPOUND. HIGHLIGHTED ORANGE EXCEEDS MOST RESTRICTIVE CRITERIA (TDL OF 1.0 µg/L FOR VC)

BOUNDARIES

- ▭ PROPERTY BOUNDARY
- ▭ FORD PROPERTY BOUNDARY

NOTES:
 COMPLETED MONITORING WELL LOCATIONS ESTIMATED BASED ON FIELD OBSERVATION. LOCATIONS WILL BE UPDATED FOLLOWING FINAL FIELD SURVEY.

THE DELINEATION AND OFF-SET LINES ARE DASHED BECAUSE DATA COLLECTION IS ONGOING. THE LOCATIONS OF THE LINES MAY CHANGE BASED ON FUTURE DATA.

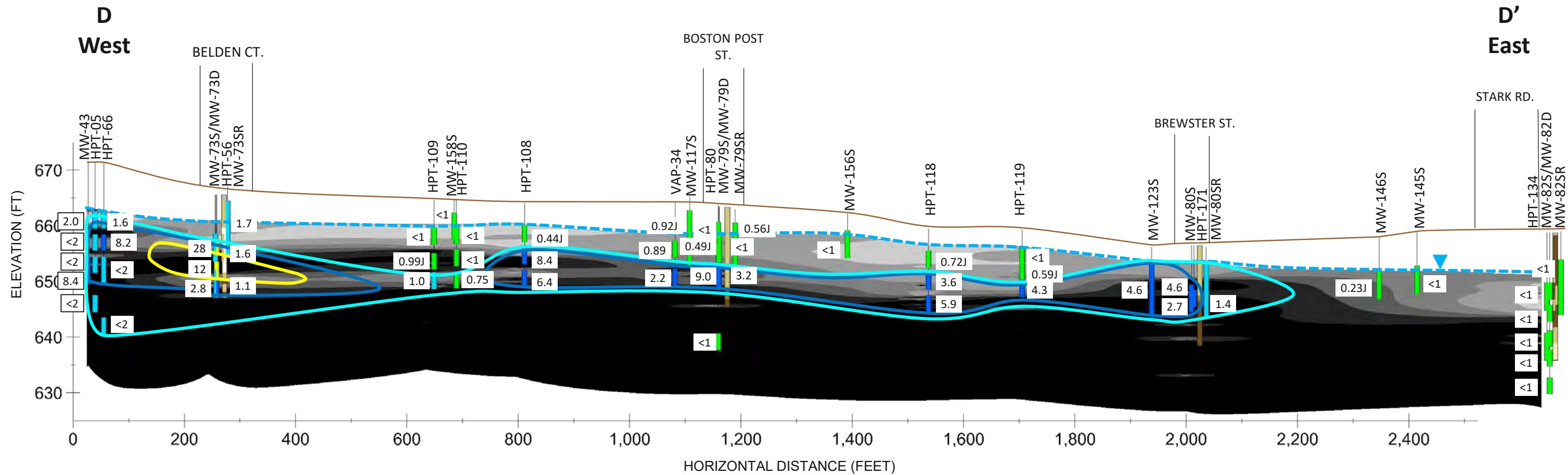
VC - VINYL CHLORIDE

FORD MOTOR COMPANY
 LIVONIA TRANSMISSION PLANT
 LIVONIA, MICHIGAN

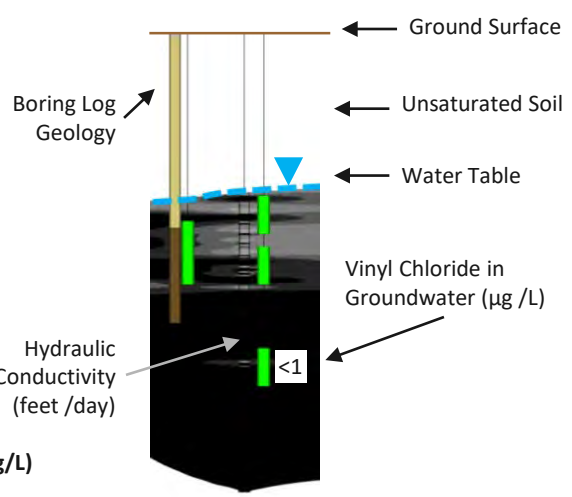
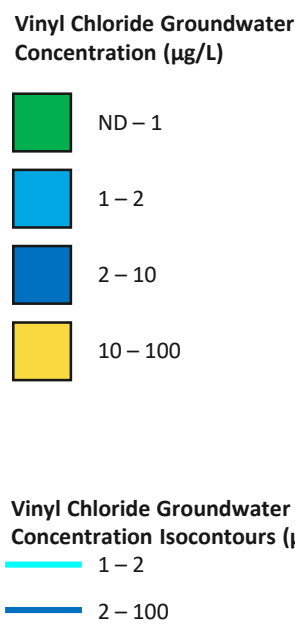
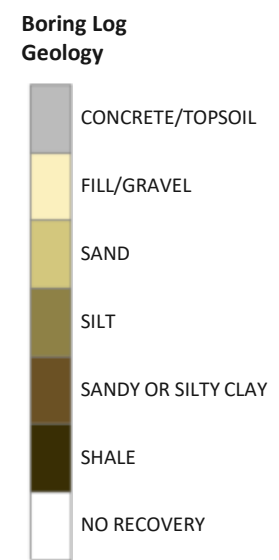
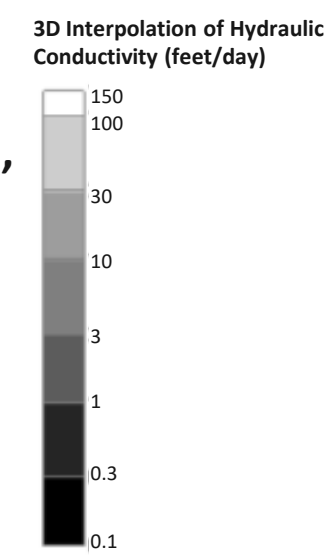
SHALLOW MONITORING WELL RESULTS



CITY: Novi DIV: ENV DB: MG PROJECT NUMBER: M001322.0001 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
 G:\COMMON\FordLivonia\04 Draft Reports\17-08-21 CSMP\Figures\Figure 26 - Cross Section D, pdf PLOTTED: 8/23/2017 BY: ayamites
 3/13/2019 5:01:23 PM



LEGEND



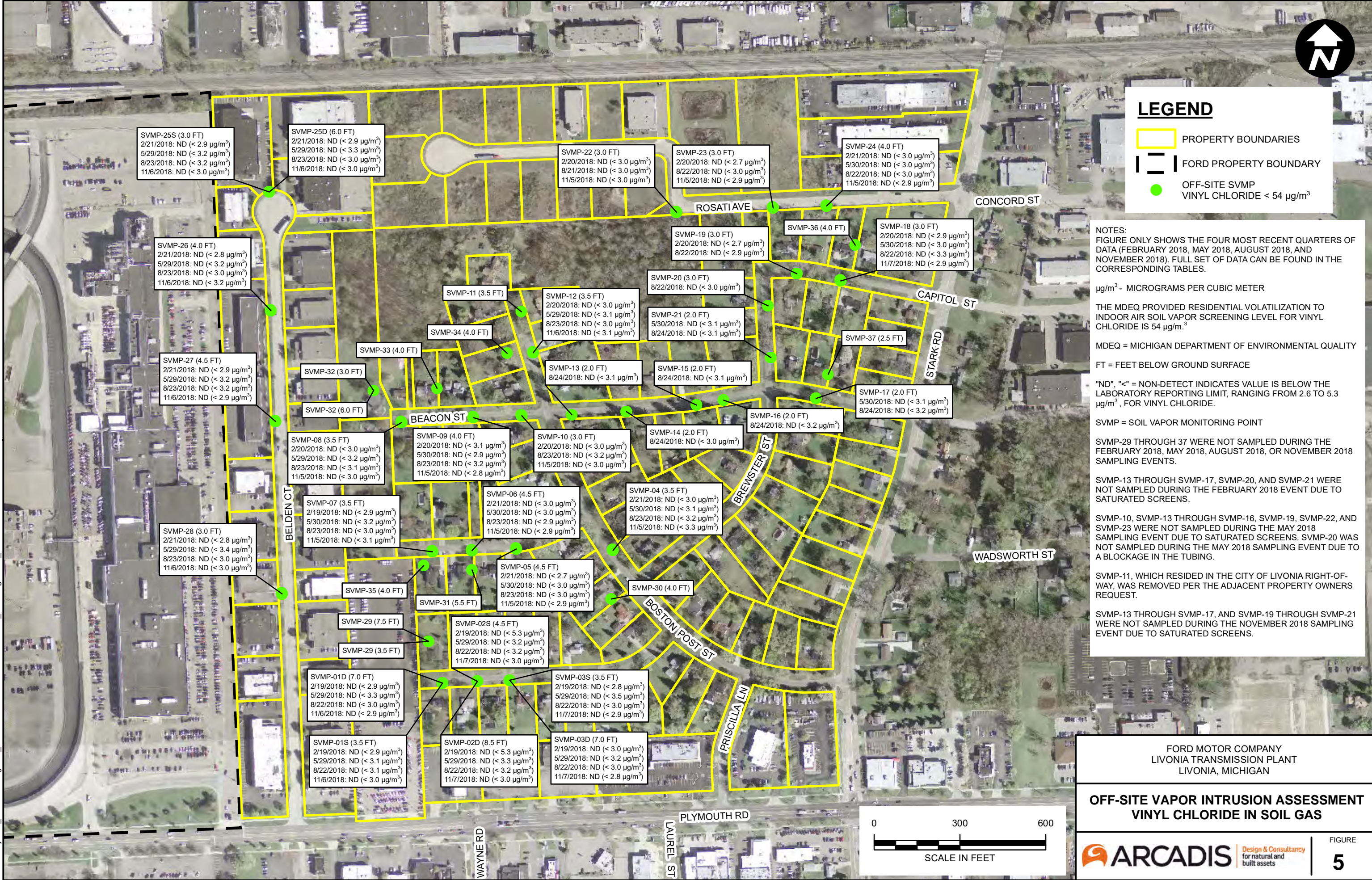
Notes:
 1. µg /L = Micrograms per Liter
 2. Vertical Exaggeration = 10X
 3. The Michigan Department of Environmental Quality Nonresidential Drinking Water criteria for Vinyl Chloride is 2.0 µg/L

FORD MOTOR COMPANY
 LIVONIA TRANSMISSION PLANT
 LIVONIA, MICHIGAN

CROSS SECTION D-D' - VINYL CHLORIDE AND HYDRAULIC CONDUCTIVITY

ARCADIS Design & Consultancy for natural and built assets

FIGURE 4



LEGEND

- PROPERTY BOUNDARIES
- FORD PROPERTY BOUNDARY
- OFF-SITE SVMP VINYL CHLORIDE < 54 µg/m³

NOTES:
 FIGURE ONLY SHOWS THE FOUR MOST RECENT QUARTERS OF DATA (FEBRUARY 2018, MAY 2018, AUGUST 2018, AND NOVEMBER 2018), FULL SET OF DATA CAN BE FOUND IN THE CORRESPONDING TABLES.

µg/m³ - MICROGRAMS PER CUBIC METER
 THE MDEQ PROVIDED RESIDENTIAL VOLATILIZATION TO INDOOR AIR SOIL VAPOR SCREENING LEVEL FOR VINYL CHLORIDE IS 54 µg/m³.
 MDEQ = MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
 FT = FEET BELOW GROUND SURFACE

"ND", "<" = NON-DETECT INDICATES VALUE IS BELOW THE LABORATORY REPORTING LIMIT, RANGING FROM 2.6 TO 5.3 µg/m³, FOR VINYL CHLORIDE.

SVMP = SOIL VAPOR MONITORING POINT
 SVMP-29 THROUGH 37 WERE NOT SAMPLED DURING THE FEBRUARY 2018, MAY 2018, AUGUST 2018, OR NOVEMBER 2018 SAMPLING EVENTS.

SVMP-13 THROUGH SVMP-17, SVMP-20, AND SVMP-21 WERE NOT SAMPLED DURING THE FEBRUARY 2018 EVENT DUE TO SATURATED SCREENS.

SVMP-10, SVMP-13 THROUGH SVMP-16, SVMP-19, SVMP-22, AND SVMP-23 WERE NOT SAMPLED DURING THE MAY 2018 SAMPLING EVENT DUE TO SATURATED SCREENS. SVMP-20 WAS NOT SAMPLED DURING THE MAY 2018 SAMPLING EVENT DUE TO A BLOCKAGE IN THE TUBING.

SVMP-11, WHICH RESIDED IN THE CITY OF LIVONIA RIGHT-OF-WAY, WAS REMOVED PER THE ADJACENT PROPERTY OWNERS REQUEST.

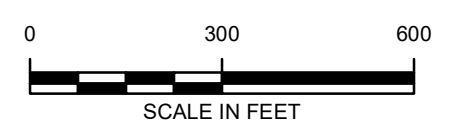
SVMP-13 THROUGH SVMP-17, AND SVMP-19 THROUGH SVMP-21 WERE NOT SAMPLED DURING THE NOVEMBER 2018 SAMPLING EVENT DUE TO SATURATED SCREENS.

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 LIVONIA, MICHIGAN

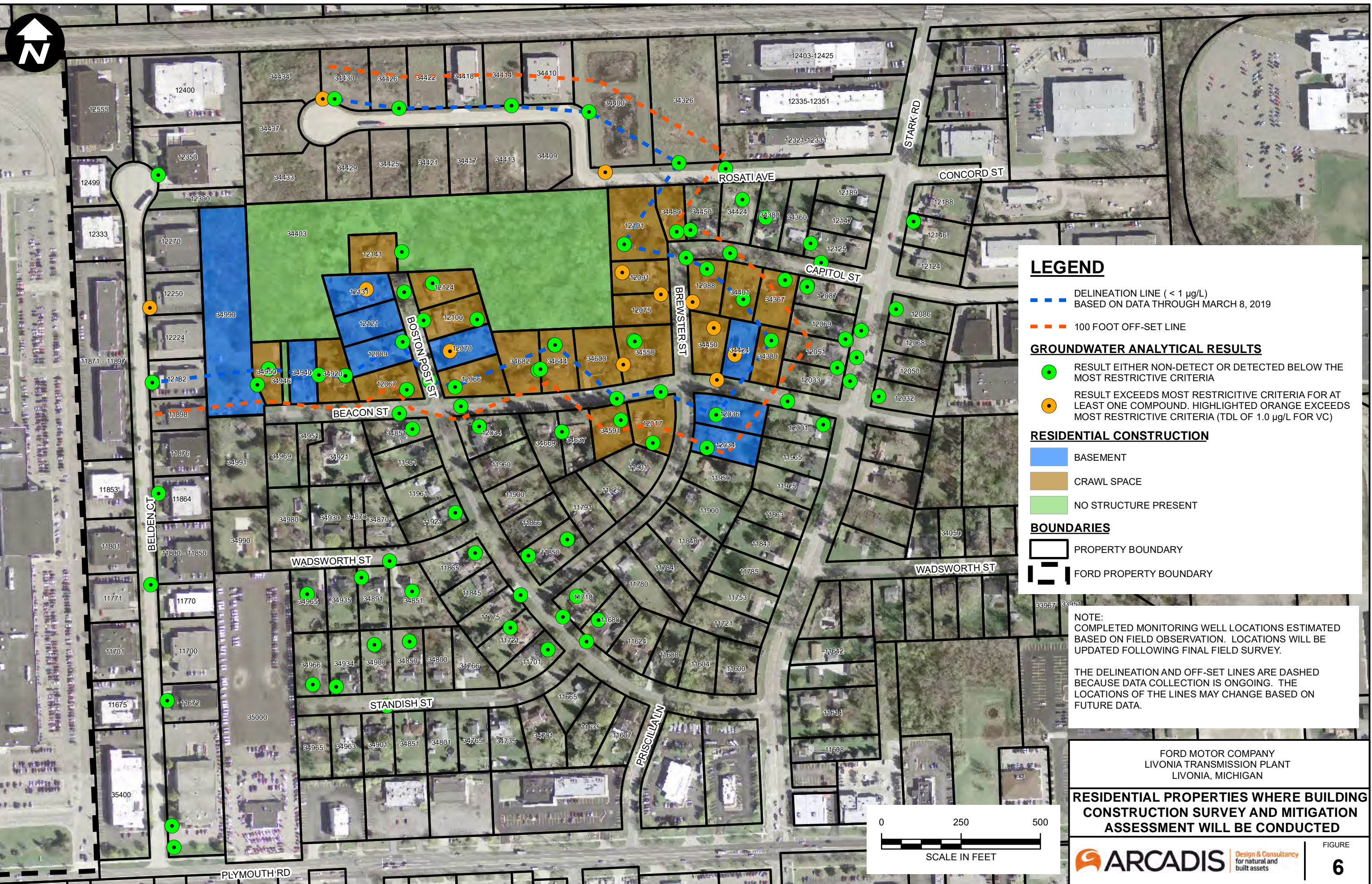
**OFF-SITE VAPOR INTRUSION ASSESSMENT
 VINYL CHLORIDE IN SOIL GAS**

Design & Consultancy for natural and built assets

FIGURE
5



CITY: Novi; DIV: ENV; DB: MG; PIC: R. ELLIS; PM: K. HINSKEY; PROJECT NUMBER: M1001322.0001; COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl; Z:\GISProjects\ENV\Novi\Brighton_MilFordLivonia\GISdocs\2019-03\OffsiteBuildingConstructionSummaryContours_03122019.mxd; PLOTTED: 3/12/2019 7:48:49 AM; BY: Iyarbrough



LEGEND

- DELINEATION LINE (< 1 µg/L) BASED ON DATA THROUGH MARCH 8, 2019
- 100 FOOT OFF-SET LINE

GROUNDWATER ANALYTICAL RESULTS

- RESULT EITHER NON-DETECT OR DETECTED BELOW THE MOST RESTRICTIVE CRITERIA
- RESULT EXCEEDS MOST RESTRICTIVE CRITERIA FOR AT LEAST ONE COMPOUND. HIGHLIGHTED ORANGE EXCEEDS MOST RESTRICTIVE CRITERIA (TDL OF 1.0 µg/L FOR VC)

RESIDENTIAL CONSTRUCTION

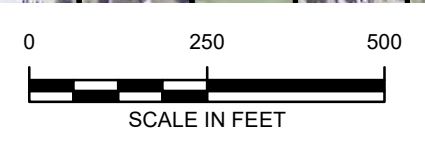
- BASEMENT
- CRAWL SPACE
- NO STRUCTURE PRESENT

BOUNDARIES

- PROPERTY BOUNDARY
- FORD PROPERTY BOUNDARY

NOTE:
COMPLETED MONITORING WELL LOCATIONS ESTIMATED BASED ON FIELD OBSERVATION. LOCATIONS WILL BE UPDATED FOLLOWING FINAL FIELD SURVEY.

THE DELINEATION AND OFF-SET LINES ARE DASHED BECAUSE DATA COLLECTION IS ONGOING. THE LOCATIONS OF THE LINES MAY CHANGE BASED ON FUTURE DATA.



FORD MOTOR COMPANY
LIVONIA TRANSMISSION PLANT
LIVONIA, MICHIGAN

RESIDENTIAL PROPERTIES WHERE BUILDING CONSTRUCTION SURVEY AND MITIGATION ASSESSMENT WILL BE CONDUCTED

ATTACHMENTS



ATTACHMENT 1

34990 Beacon



34990 BEACON STREET

The subject property is located at 34990 Beacon Street. The location of the residence, surrounding properties, other nearby monitoring wells, and relevant analytical results are summarized on **Figure 1-1**. A cross-section illustrating the home construction, local geology and groundwater elevation is included as **Figure 1-2**. The soil boring log for monitoring well MW-109S is included as **Attachment 1-1**. Each section below includes tables summarizing the groundwater, soil vapor and indoor air data, as appropriate.

Home Construction

The home construction is illustrated on **Figure 1-2**, and photographs of the residence are included below. Key features of the home include:

- Detached garage. Subfloor consists of a partial basement, partial crawlspace.
- Crawlspace is on grade. Approximate depth to the basement floor is approximately 4.6 feet below ground surface (ft bgs).
- Ground surface at base of residence is 667.4 feet above mean sea level (ft msl). Elevation of the basement floor is approximately 662.8 ft msl.



Exhibit 1. Front view of the residence at 34990 Beacon Street



Exhibit 2. Crawlspace at 34990 Beacon Street



Exhibit 3. Basement at 34990 Beacon Street

Geology

A soil boring was completed at monitoring well MW-109S. A cross-section depicting the location of the soil boring relative to the residence is included as **Figure 1-2**. The boring log for monitoring well MW-109S is included as **Attachment 1-1**.

- The soil boring was completed to a total depth of 15 feet below ground surface (ft bgs).
- Sediments encountered at the boring location included fine to medium sand with trace of silt to 8.5 ft bgs, fine to coarse sand with a trace of granules to 14 ft bgs, and very fine sand with a little silt to 15 ft bgs.
- Groundwater was noted in the soil boring at 7 ft bgs.

Groundwater Data

The location of monitoring well MW-109S is shown on **Figure 1-1**. Groundwater elevation and analytical data are summarized in tables included below.

- Monitoring well MW-109S was installed with a screen depth of 2.5-12.5 ft bgs and is located 9.0 feet from the north corner of the residence.
- Depth of groundwater at MW-109S was measured at 6.20 feet below the top of the well casing (ft btoc) on December 28, 2018 (groundwater elevation: 660.21 ft msl).
- Monitoring well MW74S is located east of the property. The range in measured groundwater elevations since May 2017 is 659.90 to 662.08 ft msl. Groundwater elevations obtained in November 2018 were 661.77 ft msl, approximately 0.31 ft less than the maximum observed elevation.
- Estimated elevation of the residence subfloor is 662.8 ft msl.
- Distance of the subfloor to the water table was approximately 2.6 feet.
- Distance from the residence to the nearest shallow groundwater exceedance (i.e. vinyl chloride > 1.0 micrograms per liter) is approximately 400 feet (MW-73SR located on Belden Court).
- All groundwater contaminants of concern (COCs) were below appropriate groundwater vapor intrusion screening levels.

Elevation Data - 34990 Beacon Street- Partial Basement

Well ID	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft btoc)	Groundwater Elevation (ft msl)	Base of the Residence Elevation (ft msl)	Depth to Basement Floor (ft bgs)	Elevation of Basement Floor (ft msl)	Distance from Lowest Subfloor to Water Table (ft)
MW-109S	666.41	6.20	660.20	667.4	4.6	662.8	+ 2.6*

*a negative (-) value represents a water table above the lowest subfloor, a positive (+) value represents water table below the lowest subfloor

ft msl = feet above mean sea level

ft btoc = feet below top of casing

ft bgs = feet below ground surface

ft = feet

Groundwater Analytical Summary - 34990 Beacon Street

Sample Location	Sample ID	Distance to House	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
MW-109S	MW-109S_12/28/2018	9.0 ft	12/28/2018	< 1.0	0.45 J	0.25 J	< 2.0	< 1.0	< 1.0	0.28 J

µg/L - micrograms per liter

J - Result less than the RL but greater than or equal to the MDL and the concentration is an approximate value

Exterior Soil Vapor Data

The location of exterior soil vapor probe SVMP-32 and right-of way soil vapor probe SVMP-08 is included on **Figure 1-1**. Soil vapor analytical data is summarized in the table below.

- Soil vapor probe SVMP-32 was installed at a depth of 3.0 and 6.0 ft bgs at approximately 10 feet from the residence.
- Soil vapor probe SVMP-08 was installed at a depth of 3.5 ft bgs and is located approximately 90 feet from the residence.
- All soil vapor COCs were below appropriate vapor screening levels.

Soil Vapor Probe Analytical Summary - 34990 Beacon Street

Sample Location	Sample Depth (ft bgs)	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
SVMP-08	3.5	6/15/2017	NA	NA	NA	NA	NA	< 6.5	< 3.1
		9/20/2017	< 4.7	< 4.7	< 4.7	< 17	< 8.1	< 6.4	< 3.0
		11/20/2017	< 4.6	< 4.6	< 4.6	< 17	< 7.9	< 6.2	< 3.0
		2/20/2018	< 4.6	< 4.6	< 4.6	< 17	< 7.9	< 6.3	< 3.0
		5/29/2018	< 5.0	< 5.0	< 5.0	< 18	< 8.6	11	< 3.2
		8/23/2018	< 4.8	< 4.8	< 4.8	< 17	< 8.2	< 6.5	< 3.1
		11/5/2018	< 4.6	< 4.6	< 4.6	< 17	< 7.9	< 6.3	< 3.0
SVMP-32	3	6/15/2017	NA	NA	NA	NA	NA	< 6.4	< 3.0
	6	6/15/2017	NA	NA	NA	NA	NA	< 6.5	< 3.1

Samples analyzed via US EPA Method TO-15

µg/m³ = micrograms per cubic meter

ft bgs = feet below ground surface

NA = not analyzed

< denotes not detected above reporting limit

Indoor Air and Sub-Slab Sample Results

The building construction consists of partial basement and partial crawl space. Interior sampling results are summarized on the table below.

- Sub-slab soil vapor monitoring points were not installed at this residence at the request of the homeowner.
- An ambient air sample was collected outside, southwest of the residence using a 24-hour flow controller.
- Indoor air samples were collected from 5 locations inside, using 24-hour flow controllers.
 - Two samples were collected from the crawl space.

- One sample was collected from the main floor.
- One sample was collected from the garage.
- One sample was collected from the basement.
- All indoor air COCs were below appropriate air screening levels.

Indoor Air Analytical Summary - 34990 Beacon									
Sample Location	Sample ID	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
Main Floor IA (IAF)	IAF-34990Beacon-02_121818	12/19/2018	< 0.65	< 0.65	< 0.65	< 0.59	< 1.1	< 0.89	< 0.42
Garage IA (IAG)	IAG-34990Beacon-01_121818	12/19/2018	< 0.62	< 0.62	< 0.62	1.1	< 1.1	< 0.84	< 0.40
Basement IA (IAB)	IAB-34990Beacon-03_121818	12/19/2018	< 0.68	< 0.68	< 0.68	< 0.62	< 1.2	< 0.92	< 0.44
Crawl Space (IACS)	IACS-34990Beacon-04_121818	12/19/2018	< 0.62	< 0.62	< 0.62	< 0.56	< 1.1	< 0.84	< 0.40
	IACS-34990Beacon-05_121818	12/19/2018	< 0.63	< 0.63	< 0.63	< 0.57	< 1.1	< 0.85	< 0.40
Ambient Air (AA)	AA-34990Beacon-01_121818	12/19/2018	< 0.58	< 0.58	< 0.58	< 0.53	< 1.0	< 0.79	< 0.38
µg/m3 - micrograms per cubic meter < denotes not detected above reporting limit									









FIGURES



CITY: NOVI DIV: ENV DB: MG PIC: R. ELLIS PM: K. HINSKEY TR: P. CURRY PROJECT NUMBER: M001373.0001.00003 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet
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LEGEND:

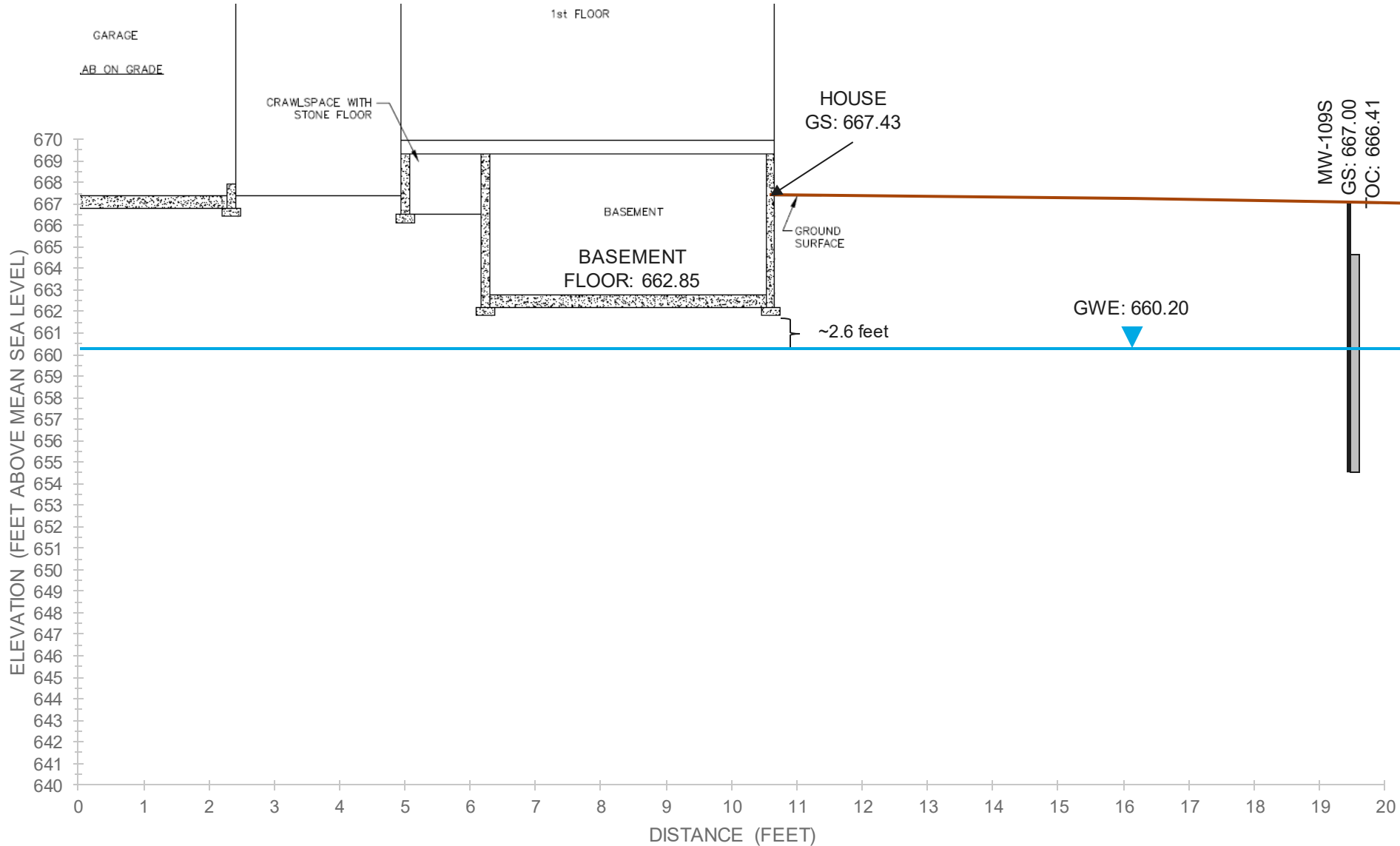
-  INDOOR AIR LOCATION
-  AMBIENT AIR LOCATION
-  SOIL BORING LOCATION
-  SUB-SLAB MONITORING POINT LOCATION
-  VAPOR PROBE
-  SHALLOW GROUNDWATER RESULT EITHER NON-DETECT OR DETECTED BELOW THE MOST RESTRICTIVE CRITERIA
-  SHALLOW GROUNDWATER RESULT EXCEEDS MOST RESTRICTIVE CRITERIA FOR AT LEAST ONE COMPOUND. HIGHLIGHTED ORANGE EXCEEDS MOST RESTRICTIVE CRITERIA (TDL OF 1.0 µg/L FOR VC)
-  PROPERTY BOUNDARIES

FORD MOTOR COMPANY
 LIVONIA TRANSMISSION PLANT
 LIVONIA, MICHIGAN

**34990 BEACON STREET
 SAMPLE LOCATIONS**




**FIGURE
 1-1**



NOTES:

1. Residential house not represented to scale on horizontal scale.
2. Horizontal scale used to measure distance of monitoring well to the house.
3. Groundwater elevation measured on December 28th, 2018.

GS – Ground Surface
 GWE – Groundwater Elevation

FORD MOTOR COMPANY LIVONIA TRANSMISSION PLANT LIVONIA, MI	
34990 BEACON STREET	
	Design & Consultancy for natural and built assets
FIGURE 1-2	

ATTACHMENTS



Soil Boring Log

Project Name: Ford LTP
 Project Number: MI001454.0003.00002
 Project Location: Livonia, MI

Date Started: 12/17/2018 Date Completed: 12/17/2018
 Logger: I. Drost Editor: NA
 Weather Conditions: Cloudy 55° F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
-1									
0								Flush mount	
0.0							(0.0-0.5') Topsoil, very fine to medium, subrounded; trace silt; well sorted; dry; dark brown (10YR 3/3).	Cement (0-1ft)	
1							(0.5-2.0') SAND, very fine to medium, subrounded; little silt; trace sand; poorly sorted; dry; brown (10YR 4/3).	6" dia. drilled hole	
2								Bentonite Pellets (1-2 ft)	
2			60				(2.0-8.5') SAND, fine to medium, subrounded; trace silt; well sorted; dry; yellowish brown (10YR 5/8).	2" dia. PVC Casing	
3									
4									
5							Note: color change to grayish brown (10YR 5/2) at 5.0' bgs.	Sand Pack (2-15 ft)	
6									
7							At 7.0' bgs, wet.	2" dia. Stainless-Steel Sch 40 PVC	
8			48					0.010" slot Well Screen (2.5-12.5 ft)	
9							(8.5-14.0') SAND, fine to coarse, subrounded to subangular; some very coarse sand, subangular; trace granules, subangular; poorly sorted; wet; grayish brown (10YR 5/2).		
10									
11									
12									
13			52						
14									
15							(14.0-15.0') SAND, very fine; rounded; little silt; well sorted; wet; grayish brown (10YR 5/2).		
16							End of boring at 15.0 ft bgs.		

Drilling Co.: Fibertech Sampling Method: 5' Macrocore
 Driller: Nick Wiseman/Jake Turnage Sampling Interval: Continuous
 Drilling Method: Hand Auger/Geoprobe Water Level Start (ft. bgs.): 7.0
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: ' / ft = feet; " / in = inch; bgs = below ground surface; Converted to Well: Yes No
ppm = parts per million; NA = not available or not applicable. Hand Auger to 5.0' Surface Elev.: NA
bgs. North Coor.: NA
 East Coor.: NA

LTP-BORINGS_D-BORING_LOGS\TP-SOIL-BORING_LOGS\WORKING\ADDITIONAL BORING LOGS\GINT TEMPLATE (EXISTING)\BPL-TP RAVINDRA.GPJ ARCADIS GDT 2/11/19

ATTACHMENT 2

34682 Beacon



34682 BEACON STREET

The subject property is located at 34682 Beacon Street. The location of the residence, surrounding properties, other nearby monitoring wells, and relevant analytical results are summarized on **Figure 2-1**. A cross-section illustrating the home construction, local geology and groundwater elevation is included as **Figure 2-2**. The soil boring log for monitoring well MW-154S is included as **Attachment 2-1**. Each section below includes tables summarizing the groundwater, soil vapor and indoor air data, as appropriate.

Home Construction

The home construction is illustrated on **Figure 2-2**, and photographs of the residence are included below. Key features of the home include:

- Attached garage. Subfloor consists of a partial crawlspace and partial concrete slab.
- Crawlspace is approximately 2.2 feet below ground surface (ft bgs) and the concrete slab is on-grade.
- Ground surface at base of residence is 664.77 feet above mean sea level (ft msl).
Elevation of the crawlspace floor is approximately 662.6 ft msl.



Exhibit 1. Front view of the residence at 34682 Beacon Street



Exhibit 2. Crawlspace at 34682 Beacon Street



Exhibit 3. Attached Garage at 34682 Beacon Street

Geology

A soil boring was completed at monitoring well MW-154S. A cross-section depicting the location of the soil boring relative to the residence is included as **Figure 2-2**. The boring log for monitoring well MW-154S is included as **Attachment 2-1**.

- The soil boring was completed to a total depth of 10 feet below ground surface (ft bgs)
- Sediments encountered at the boring location included very fine sand and silt to 6.3 ft bgs, fine to coarse sand to 8.5 ft bgs and very fine to fine sand with some silt to 10 ft bgs.
- Groundwater was noted in the soil boring at 4.0 ft bgs.

Groundwater Data

The location of monitoring well MW-154S is shown on **Figure 2-1**. Groundwater elevation and analytical data are summarized in tables included below.

- Monitoring well MW-154S was installed with a screen depth of 2-7 ft bgs and is located 23 feet east of the residence.
- Depth of groundwater at MW-154S was measured at 3.65 feet below the top of the well casing (ft btoc) on February 21, 2019 (groundwater elevation: 656.65 ft msl).
- Estimated elevation of the residence subfloor is 662.6 ft msl.
- Distance of the subfloor to the water table was approximately 6.0 feet.
- Monitoring well MW84S is located south of the property. The range in measured groundwater elevations since May 2017 is 656.90 to 659.68 ft msl. Groundwater elevations obtained in November 2018 were 658.94 ft msl, approximately 0.66 ft less than the maximum observed elevation.
- Due to the depth of the water table below the residence (i.e. greater than 1.18 meters [3.9 ft]) the groundwater screening criteria of 1.4 µg/L for vinyl chloride applies.
- Distance from the residence to the nearest shallow groundwater exceedance (i.e. vinyl chloride > 1.4 micrograms per liter) is approximately 250 feet (MW-115S located at 12070 Boston Post Street).
- All groundwater contaminants of concern (COCs) were below appropriate groundwater vapor intrusion screening levels.

Elevation Data - 34682 Beacon - Crawlspace							
Well ID	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft btoc)	Groundwater Elevation (ft msl)	Ground Surface Elevation at Residence (ft msl)	Depth of Crawlspace (ft)	Elevation of Crawlspace Floor (ft msl)	Distance from Subfloor to Water Table (ft)
MW-154S	660.30	3.65	656.65	664.77	2.2	662.6	+ 6.0*
*a negative (-) value represents a water table above the lowest subfloor, a positive (+) value represents water table below the lowest subfloor ft msl = feet above mean sea level ft btoc = feet below top of casing ft bgs = feet below ground surface ft = feet							

Groundwater Analytical Summary - 34682 Beacon										
Sample Location	Sample ID	Distance to House	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
MW-154S	MW-154S_022119	23 ft	2/21/2019	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0
µg/L - micrograms per liter < denotes not detected above reporting limit										

Exterior Soil Vapor Data

The locations of nearby exterior soil gas probes are included on **Figure 2-1**. Soil gas analytical data is summarized in the table below.

- Soil vapor probe SVMP-14 was installed at a depth of 2.0 ft bgs at approximately 85 feet from the residence
- All soil vapor COCs were below appropriate vapor screening levels

Soil Vapor Analytical Summary - 34682 Beacon

Sample Location	Sample Depth (ft bgs)	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
SVMP-14	2	6/16/2017	NA	NA	NA	NA	NA	< 6.4	< 3.0
		9/19/2017	< 4.5	< 4.5	< 4.5	< 16	< 7.8	< 6.2	< 2.9
		11/21/2017	< 4.1	< 4.1	< 4.1	< 15	< 7.0	< 5.6	< 2.6
		2/19/2018	NS	NS	NS	NS	NS	NS	NS
		5/31/2018	NS	NS	NS	NS	NS	NS	NS
		8/24/2018	< 4.7	< 4.7	< 4.7	< 17	< 8.1	< 6.4	< 3.0
		11/7/2018	NS	NS	NS	NS	NS	NS	NS

Samples analyzed via US EPA Method TO-15

µg/m³ = micrograms per cubic meter

ft bgs = feet below ground surface

NA = not analyzed

NS = not sampled

< denotes not detected above reporting limit

Indoor Air and Sub-Slab Sample Results

The building construction consists of a combination slab-on-grade and crawl space. Interior sub slab and indoor air sampling results are summarized on the table below.

- Sub-slab samples:
 - SSMP-34682 Beacon-01 was installed in the garage.
 - SSMP-34682 Beacon-02 was installed in the laundry room.
- Indoor air samples were collected from four locations, using 24-hour flow controllers.
 - Two samples were collected from the first floor.
 - One sample was collected from the crawl space.
 - One sample was collected from the garage.
- All sub-slab and indoor air COCs were below appropriate vapor screening levels.

Indoor Air Analytical Summary - 34682 Beacon									
Sample Location	Sample ID	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
Main Floor IA (IAF)	IAF-34682BEACON-02_103018	10/31/2018	< 0.66	< 0.66	0.64 J	0.098 J	0.16 J	< 0.89	< 0.42
	IAF-34682BEACON-03_103018	10/31/2018	< 0.67	< 0.67	0.72	0.17 J	0.16 J	< 0.91	< 0.43
Garage IA (IAG)	IAG-34682BEACON-01_103018	10/31/2018	< 0.66	< 0.66	< 0.66	< 0.60	0.31 J	< 0.89	< 0.42
Crawl Space (IACS)	IACS-34682BEACON-04_103018	10/31/2018	< 0.64	< 0.64	4.8	< 0.58	0.21 J	< 0.87	< 0.41
Garage Sub-slab (SSMP)	SSMP-34682BEACON-01_103118	10/31/2018	< 4.7	< 4.7	< 4.7	< 17	< 8.1	< 6.4	< 3.0
Laundry Room Sub-slab (SSMP)	SSMP-34682BEACON-02_103118	10/31/2018	< 4.8	< 4.8	4.0 J	< 18	< 8.2	< 6.5	< 3.1

µg/m3 - micrograms per cubic meter
 J - Result less than the RL but greater than or equal to the MDL and the concentration is an approximate value
 < denotes not detected above reporting limit

FIGURES



CITY: NOVI DIV: ENV DB: MG PIC: R. ELLIS PM: T. STEVENS TR: P. CURRY PROJECT NUMBER: M001373.0001.00003 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet
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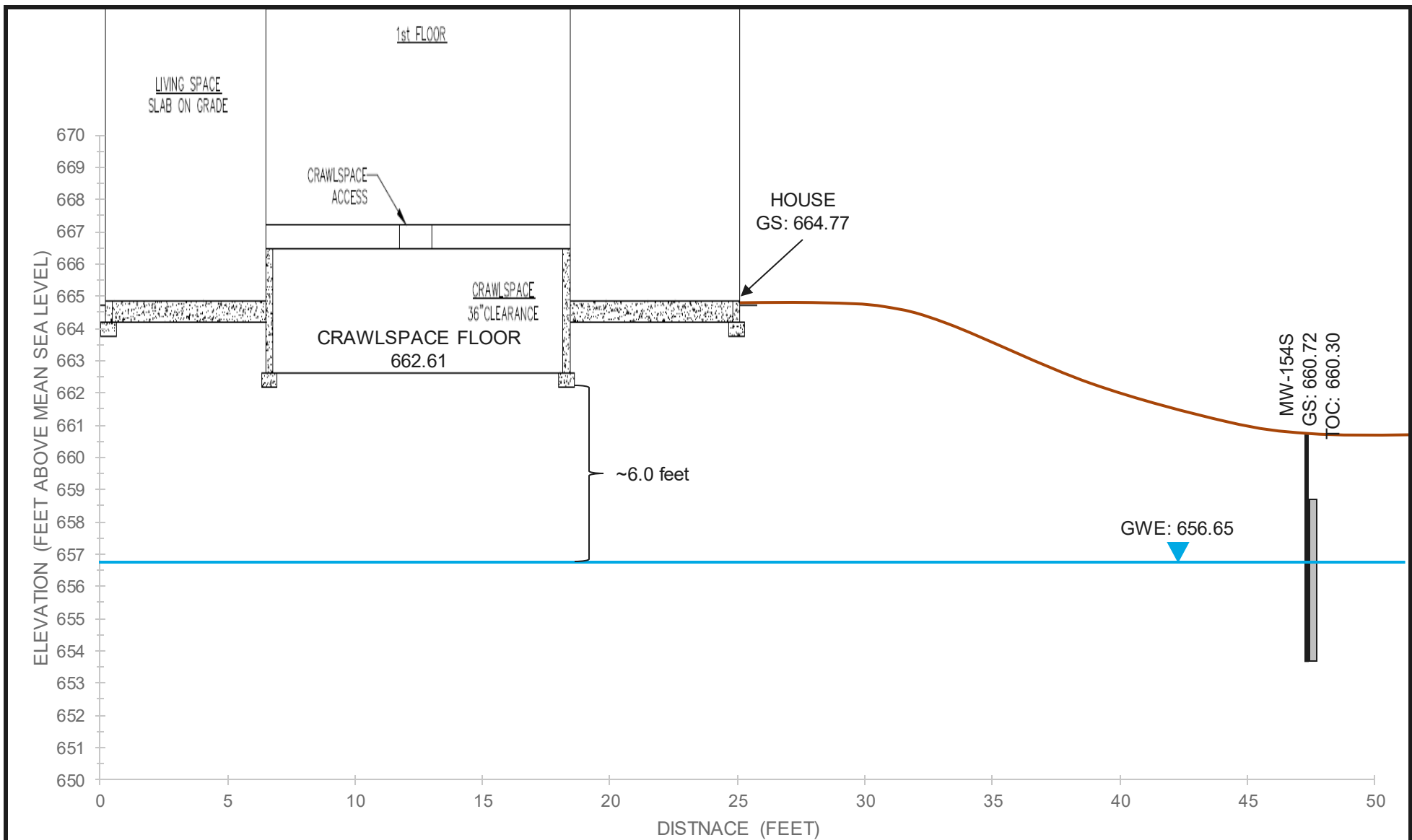
- INDOOR AIR LOCATION
- AMBIENT AIR LOCATION
- ⊕ SOIL BORING LOCATION
- SUB-SLAB MONITORING POINT LOCATION
- VAPOR PROBE
- PROPERTY BOUNDARIES
- SHALLOW GROUNDWATER RESULT EITHER NON-DETECT OR DETECTED BELOW THE MOST RESTRICTIVE CRITERIA
- SHALLOW GROUNDWATER RESULT EXCEEDS MOST RESTRICTIVE CRITERIA FOR AT LEAST ONE COMPOUND. HIGHLIGHTED ORANGE EXCEEDS MOST RESTRICTIVE CRITERIA (TDL OF 1.0 µg/L FOR VC)

FORD MOTOR COMPANY
 LIVONIA TRANSMISSION PLANT
 LIVONIA, MICHIGAN

**34682 BEACON STREET
 SAMPLE LOCATIONS**



**FIGURE
 2-1**



NOTES:

1. Residential house not represented to scale on horizontal scale.
2. Horizontal scale used to measure distance of monitoring well to the house.
3. Groundwater elevation measured on February 21st, 2019.

GS – Ground Surface
 GWE – Groundwater Elevation

FORD MOTOR COMPANY LIVONIA TRANSMISSION PLANT LIVONIA, MI	
34682 BEACON STREET	
	Design & Consultancy for natural and built assets
FIGURE 2-2	

ATTACHMENTS



Soil Boring Log

Project Name: Ford Livonia Automatic Transmissions Plant Date Started: 02/18/2019 Logger: S. Johnson
 Project Number: MI001454.0003 Date Completed: 02/18/2019 Editor: Troy Stevens
 Project Location: Livonia, MI Weather Conditions: Cloudy, 28F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0	(0.0-0.3') TOPSOIL		(0.0-2.0') 2" PVC riser	
2			60		0.0	(0.3-1.0') SAND, very fine, subangular to subrounded; some silt; well sorted; dry; grayish brown (10YR 3/2). (1.0-3.0') SAND, very fine, subangular to subrounded; and SILT; well sorted; dry; yellowish brown (10YR 5/6).		(0.5-2.0' bgs) Bentonite	
3					0.0				
4					0.0	(3.0-6.3') SILT, rapid dilatency, non-plastic; and SAND, very fine, subangular to subrounded; soft; moist; grayish brown (10YR 5/2). NOTE: Wet at 4.0' bgs.		(2.0-10.0' bgs) Sand Filter Pack	
5					0.0			(2.0-7.0' bgs) Well Screen	
6					0.0				
7			58		0.0	(6.3-8.2') SAND, fine to coarse, angular to subrounded; some granule to small pebbles, subangular to subrounded; poorly sorted; wet; dark gray (10YR 4/1).			
8					0.0				
9					0.0	(8.2-8.5') SAND, fine to medium, subangular to subrounded; trace granule; well sorted; wet; dark gray (10YR 4/1).			
10					0.0	(8.5-10.0') SAND, very fine to fine, subangular to subrounded; some silt; well sorted; wet; stiff; dark gray (10YR 4/1). End of boring at 10.0' bgs.			
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade Sampling Method: 5' Macrocore
 Driller: Rich and Adrian Sampling Interval: Continuous
 Drilling Method: Direct Push (Hollow Stem Augers for Well Installation) Water Level Start (ft. btoc.): 4.0
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Hand Auger to 5.0' bgs. Converted to Well: Yes No
34682 Beacon Street Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

ATTACHMENT 3

34591 Beacon



34591 BEACON STREET

The subject property is located at 34591 Beacon Street. The location of the residence, surrounding properties, other nearby monitoring wells, and relevant analytical results are summarized on **Figure 3-1**. A cross-section illustrating the home construction, local geology and groundwater elevation is included as **Figure 3-2**. The soil boring log for monitoring well MW-163S is included as **Attachment 3-1**. Each section below includes tables summarizing the groundwater, soil vapor and indoor air data, as appropriate.

Home Construction

The home construction is illustrated on **Figure 3-2**, and photographs of the residence are included below. Key features of the home include:

- Subfloor consists of a partial crawlspace and slab-on-grade.
- Crawlspace is approximately 2.3 feet below ground surface (ft bgs) at its deepest point.
- Ground surface at base of residence is 659.2 feet above mean sea level (ft msl).
Elevation of the crawlspace floor is approximately 656.8 ft msl.



Exhibit 1. Front view of the residence at 34591 Beacon Street



Exhibit 2. Crawlspace at 34591 Beacon Street

Geology

A soil boring was completed at monitoring well MW-163S. A cross-section depicting the location of the soil boring relative to the residence is included as **Figure 3-2**. The boring log for monitoring well MW-163S is included as **Attachment 3-1**.

- The soil boring was completed to a total depth of 10 feet below ground surface (ft bgs)
- Sediments encountered at the boring location included very fine to coarse sand with trace of silt to 4.0 ft bgs, then interbedded silty sands and coarser sands to a depth of 10 ft bgs.
- Groundwater was noted in the soil boring at 3.0 ft bgs.

Groundwater Data

The location of monitoring well MW-163S is shown on **Figure 3-1**. Groundwater elevation and analytical data are summarized in tables included below.

- Monitoring well MW-163S was installed with a screen depth of 2-7 ft bgs and is located 16 feet east of the residence.
- Depth of groundwater at MW-163S was measured at 3.00 feet below the top of the well casing (ft btoc) on February 28, 2019 (groundwater elevation: 655.48 ft msl).

- Estimated elevation of the residence subfloor is 656.8 ft msl.
- Distance of the subfloor to the water table was approximately 1.4 feet.
- Monitoring well MW78S is located northwest of the property. The range in measured groundwater elevations since May 2017 is 653.68 to 655.69 ft msl. Groundwater elevations obtained in November 2018 were 655.55 ft msl, approximately 0.14 ft less than the maximum observed elevation.
- Distance from the residence to the nearest shallow groundwater exceedance (i.e. vinyl chloride > 1.0 micrograms per liter) is approximately 170 feet (MW-130S located at 34600 Beacon Street).
- All groundwater contaminants of concern (COCs) were below appropriate groundwater vapor intrusion screening levels.

Elevation Data - 34591 Beacon, Crawlspace							
Well ID	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft btoc)	Groundwater Elevation (ft msl)	Ground Surface Elevation at Residence (ft msl)	Depth of Crawlspace (ft)	Elevation of Lowest Subfloor (ft msl)	Distance from Crawlspace to Water Table (ft)
MW-163S	658.48	3.00	655.48	659.2	2.3	656.8	+ 1.4*

*a negative (-) value represents a water table above the lowest subfloor, a positive (+) value represents water table below the lowest subfloor
 ft msl = feet above mean sea level
 ft btoc = feet below top of casing
 ft bgs = feet below ground surface
 ft = feet

Groundwater Analytical Summary - 34591 Beacon										
Sample Location	Sample ID	Distance to House	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
MW-163S	MW-163S_022819	16.0 ft	2/28/2019	< 1.0	<1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0

µg/L - micrograms per liter
 < denotes not detected above reporting limit

Exterior Soil Vapor Data

The locations of nearby exterior soil gas probes are included on **Figure 3-1**. Soil gas analytical data is summarized in the table below.

- Soil probe SVMP-15 was installed at a depth of 2.0 ft bgs at approximately 70 feet from the residence.
- Soil probe SVMP-16 was installed at a depth of 2.0 ft bgs at approximately 100 feet from the residence.
- All soil vapor COCs were below appropriate vapor screening levels.

Soil Vapor Analytical Summary - 34591 Beacon									
Sample Location	Sample Depth (ft bgs)	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
SVMP-15	2	6/16/2017	NA	NA	NA	NA	NA	< 6.3	< 3.0
		9/19/2017	< 4.7	< 4.7	< 4.7	< 17	< 8.1	< 6.4	< 3.0
		11/20/2017	< 4.4	< 4.4	< 4.4	< 16	< 7.6	< 6.0	< 2.9
		2/19/2018	NS	NS	NS	NS	NS	NS	NS
		5/31/2018	NS	NS	NS	NS	NS	NS	NS
		8/24/2018	< 4.8	< 4.8	< 4.8	< 17	< 8.2	< 6.5	< 3.1
		11/7/2018	NS	NS	NS	NS	NS	NS	NS
SVMP-16	2	6/16/2017	NA	NA	NA	NA	NA	< 6.4	< 3.0
		9/19/2017	< 4.5	< 4.5	< 4.5	< 16	< 7.8	< 6.2	< 2.9
		11/20/2017	< 4.3	< 4.3	< 4.3	< 16	< 7.4	< 5.9	< 2.8
		2/19/2018	NS	NS	NS	NS	NS	NS	NS
		5/31/2018	NS	NS	NS	NS	NS	NS	NS
		8/24/2018	< 5.0	< 5.0	< 5.0	< 18	< 8.5	< 6.8	< 3.2
		11/7/2018	NS	NS	NS	NS	NS	NS	NS

Samples analyzed via US EPA Method TO-15
 µg/m³ = micrograms per cubic meter
 ft bgs = feet below ground surface
 NA = not analyzed
 NS = not sampled
 < denotes not detected above reporting limit

Indoor Air and Sub-Slab Sample Results

The building construction consists of a combination of slab-on-grade and crawl space. Interior sub-slab and indoor air sampling results are summarized on the table below.

- Sub-slab monitoring points were not installed at this property given the presence of a false floor above the concrete floor precluding installation.
- An ambient air sample was collected outside, north of the residence using a 24-hour flow controller.

- Indoor air samples were collected from three locations, using 24-hour flow controllers.
 - One sample was collected from the crawl space.
 - Two samples were collected from the first floor.
- All sub-slab and indoor air COCs were below appropriate vapor screening levels.

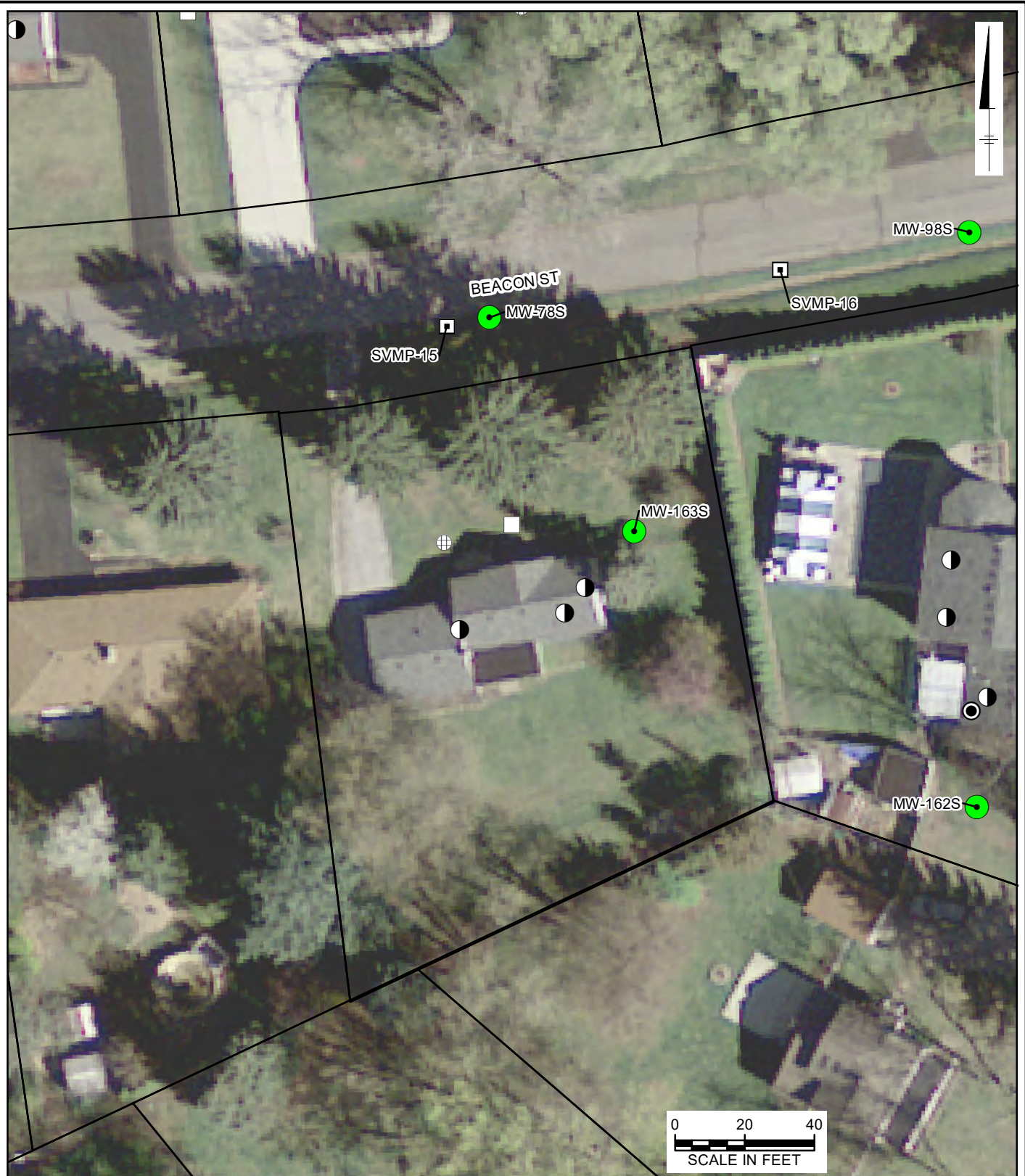
Indoor Air Analytical Summary - 34591 Beacon									
Sample Location	Sample ID	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
Main Floor IA (IAF)	IAF-34591Beacon-01_102518	10/26/2018	< 0.63	< 0.63	< 0.63	0.087 J	0.30 J	< 0.85	< 0.40
	IAF-34591Beacon-02_102518	10/26/2018	< 0.64	< 0.64	< 0.64	0.13 J	0.24 J	< 0.86	< 0.41
Crawl Space (IACS)	IACS-34591Beacon-03_102518	10/26/2018	< 0.76	< 0.76	< 0.76	< 0.69	0.22 J	< 1.0	< 0.49
Ambient Air (AA)	AA-34591Beacon-01_102518	10/25/2018	< 0.62	< 0.62	< 0.62	< 0.56	0.28 J	< 0.84	< 0.40

µg/m3 - micrograms per cubic meter
 J - Result less than the RL but greater than or equal to the MDL and the concentration is an approximate value
 < denotes not detected above reporting limit










FIGURES




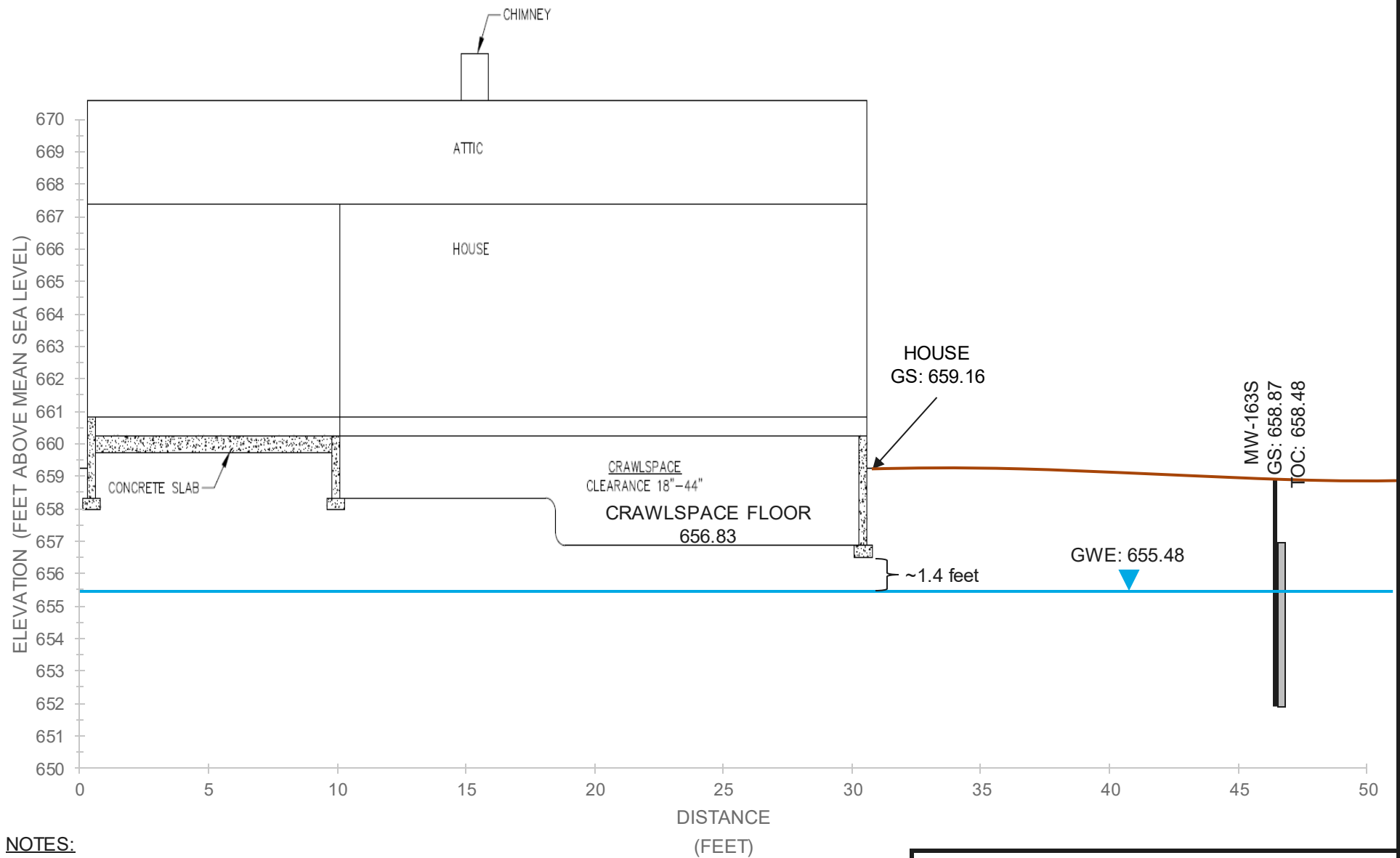
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LEGEND:

-  INDOOR AIR LOCATION
-  AMBIENT AIR LOCATION
-  SOIL BORING LOCATION
-  SUB-SLAB MONITORING POINT LOCATION
-  VAPOR PROBE
-  SHALLOW GROUNDWATER RESULT EITHER NON-DETECT OR DETECTED BELOW THE MOST RESTRICTIVE CRITERIA
-  SHALLOW GROUNDWATER RESULT EXCEEDS MOST RESTRICTIVE CRITERIA FOR AT LEAST ONE COMPOUND. HIGHLIGHTED ORANGE EXCEEDS MOST RESTRICTIVE CRITERIA (TDL OF 1.0 µg/L FOR VC)
-  BUILDING
-  PROPERTY BOUNDARIES

FORD MOTOR COMPANY LIVONIA TRANSMISSION PLANT LIVONIA, MICHIGAN	
34591 BEACON STREET SAMPLE LOCATIONS	
	<i>Design & Consultancy for natural and built assets</i>
FIGURE 3-1	



NOTES:

1. Residential house not represented to scale on horizontal scale.
2. Horizontal scale used to measure distance of monitoring well to the house.
3. Groundwater elevation measured on February 28th, 2019.

GS – Ground Surface
 GWE – Groundwater Elevation

FORD MOTOR COMPANY LIVONIA TRANSMISSION PLANT LIVONIA, MI	
34591 BEACON STREET	
	Design & Consultancy for natural and built assets
FIGURE 3-2	

ATTACHMENTS



Soil Boring Log

Project Name: Ford Livonia Automatic Transmissions Plant Date Started: 02/19/2019 Logger: Christina Weaver
 Project Number: MI001454.0003 Date Completed: 02/19/2019 Editor: Troy Stevens
 Project Location: Livonia, MI Weather Conditions: P. Cloudy, 22F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0	(0.0-0.3') TOPSOIL		(0.0-2.0') 2" PVC riser	
2			60		0.0	(0.3-3.0') SAND, very fine to medium, subangular to subrounded; little silt; poorly sorted; dry; brown (10YR 5/3).		(0.5-2.0' bgs) Bentonite	
3					0.0	(3.0-4.0') SAND, fine to coarse, subangular to subrounded; trace silt; poorly sorted; wet; yellowish brown (10YR 5/4).			
4					0.0	(4.0-5.5') SILT, little clay, slow dilatency, medium plasticity; trace medium to coarse sand; trace medium pebbles; poorly sorted; wet; grayish brown (10YR 5/2).		(2.0-10' bgs) Sand Filter Pack	
5					0.0	(5.5-6.0') SAND, very fine to very coarse, and GRANULES, trace small pebbles, subrounded to subangular; little silt; poorly sorted; wet; grayish brown (10YR 5/2).		(2.0-7.0' bgs) Well Screen	
6			60		0.0	(6.0-7.5') SILT, slow dilatency, non-plastic; and SAND, fine to medium; subrounded to subangular; poorly sorted; wet; pale brown (10YR 6/3).			
7					0.0	(7.5-8.0') SAND, very fine to very coarse, subrounded to subangular; some granule, trace small pebbles; trace silt; poorly sorted; wet; pale brown (10YR 6/3).			
8					0.0	(8.0-10.0') SAND, very fine to medium, subangular to subrounded; little silt; poorly sorted; wet; grayish brown (10YR 5/2).			
9					0.0				
10					0.0				
11							End of boring at 10.0' bgs.		
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade Sampling Method: 5' Macrocore
 Driller: T. Grossman Sampling Interval: Continuous
 Drilling Method: Direct Push (Hollow Stem Augers for Well Installation) Water Level Start (ft. btoc.): 3.0
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Hand Auger to 5.0' bgs. Converted to Well: Yes No
34591 Beacon Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

ATTACHMENT 4

12017 Brewster



12017 BREWSTER STREET

The subject property is located at 12017 Brewster Street. The location of the residence, surrounding properties, other nearby monitoring wells, and relevant analytical results are summarized on **Figure 4-1**. A cross-section illustrating the home construction, local geology and groundwater elevation is included as **Figure 4-2**. The soil boring log for monitoring well MW-162S is included as **Attachment 4-1**. Each section below includes tables summarizing the groundwater, soil vapor and indoor air data, as appropriate.

Home Construction

The home construction is illustrated on **Figure 4-2**, and photographs of the residence are included below. Key features of the home include:

- Attached garage. Subfloor consists of crawlspace and slab-on-grade.
- Crawlspace is approximately 0.8 feet below ground surface (ft bgs) at its deepest point.
- Ground surface at base of residence is 657.1 feet above mean sea level (ft msl).
Elevation of the crawlspace floor is approximately 656.4 ft msl.



Exhibit 1. Front view of the residence at 12017 Brewster Street



Exhibit 2. Crawlspace at 12017 Brewster Street



Exhibit 3. Attached Garage at 12017 Brewster Street

Geology

A soil boring was completed at monitoring well MW-162S. A cross-section depicting the location of the soil boring relative to the residence is included as **Figure 4-2**. The boring log for monitoring well MW-162S is included as **Attachment 4-1**.

- The soil boring was completed to a total depth of 10 feet below ground surface (ft bgs)
- Sediments encountered at the boring location included very fine to medium sand with trace of silt to 6.5 ft bgs, a thin layer of silt and clay to 6.8 ft bgs, and fine to coarse sand with a trace of silt and granules to 10 ft bgs.
- Groundwater was noted in the soil boring at 5.0 ft bgs.

Groundwater Data

The location of monitoring well MW-162S is shown on **Figure 4-1**. Groundwater elevation and analytical data are summarized in tables included below.

- Monitoring well MW-162S was installed with a screen depth of 3-8 ft bgs and is located 23 feet south of the residence.
- Depth of groundwater at MW-162S was measured at 4.41 feet below the top of the well casing (ft btoc) on February 28, 2019 (groundwater elevation: 655.08 ft msl).
- Estimated elevation of the residence subfloor is 656.4 ft msl.
- Distance of the subfloor to the water table was approximately 1.4 feet.
- Monitoring well MW78S is located north of the property. The range in measured groundwater elevations since May 2017 is 653.68 to 655.69 ft msl. Groundwater elevations obtained in November 2018 were 655.55, approximately 0.14 ft less than the maximum observed elevation.
- Distance from the residence to the nearest shallow groundwater exceedance (i.e. vinyl chloride > 1.0 micrograms per liter) is approximately 190 feet (MW-130S located at 34600 Beacon Street).
- All groundwater contaminants of concern (COCs) were below appropriate groundwater vapor intrusion screening levels.

Elevation Data - 12017 Brewster, Crawlspace							
Well ID	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft btoc)	Groundwater Elevation (ft msl)	Ground Surface Elevation at Residence (ft msl)	Depth of Crawlspace (ft)	Elevation of Lowest Subfloor (ft msl)	Distance from Crawlspace to Water Table (ft)
MW-162S	659.49	4.41	655.08	657.1	0.7	656.4	+ 1.4*

*a negative (-) value represents a water table above the lowest subfloor, a positive (+) value represents water table below the lowest subfloor
ft msl = feet above mean sea level
ft btoc = feet below top of casing
ft bgs = feet below ground surface
ft = feet

Groundwater Analytical Summary - 12017 Brewster										
Sample Location	Sample ID	Distance to House	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
MW-162S	MW-162S_022819	23 ft	2/28/2019	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0

µg/L - micrograms per liter
< denotes not detected above reporting limit

Exterior Soil Vapor Data

The location of exterior soil gas probes near the residence are included on **Figure 4-1**. Soil gas analytical data is summarized in the table below.

- Soil probe SVMP-16 was installed at a depth of 2.0 ft bgs at approximately 50 feet from the residence.
- All soil vapor COCs were below appropriate vapor screening levels.

Soil Vapor Analytical Summary - 12017 Brewster

Sample Location	Sample Depth (ft bgs)	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
SVMP-16	2	6/16/2017	NA	NA	NA	NA	NA	< 6.4	< 3.0
		9/19/2017	< 4.5	< 4.5	< 4.5	< 16	< 7.8	< 6.2	< 2.9
		11/20/2017	< 4.3	< 4.3	< 4.3	< 16	< 7.4	< 5.9	< 2.8
		2/19/2018	NS	NS	NS	NS	NS	NS	NS
		5/31/2018	NS	NS	NS	NS	NS	NS	NS
		8/24/2018	< 5.0	< 5.0	< 5.0	< 18	< 8.5	< 6.8	< 3.2
		11/7/2018	NS	NS	NS	NS	NS	NS	NS

Samples analyzed via US EPA Method TO-15
 µg/m³ = micrograms per cubic meter
 ft bgs = feet below ground surface
 NA = not analyzed
 NS = not sampled
 < denotes not detected above reporting limit

Indoor Air and Sub-Slab Sample Results

The building construction consists of a combination crawl space and slab-on-grade. Interior sub slab and indoor air sampling results are summarized on the table below.

- Sub-slab sample SSMP-12017 Brewster-01 was installed in the garage.
- An ambient air sample was collected outside, south of the residence using a 24-hour flow controller.
- Indoor air samples were collected from three locations, using 24-hour flow controllers
 - One sample was collected from the garage.
 - One sample was collected from the first floor.
 - One sample was collected from the crawl space.
- All sub-slab and indoor air COCs were below appropriate vapor screening levels.

Indoor Air Analytical Summary - 12017 Brewster									
Sample Location	Sample ID	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
Main Floor IA (IAF)	IAF-12017Brewster-03_110718	11/8/2018	< 0.68	< 0.68	< 0.68	< 0.62	< 1.2	< 0.92	< 0.44
Garage IA (IAG)	IAG-12017Brewster-01_110718	11/8/2018	< 0.65	< 0.65	< 0.65	< 0.59	< 1.1	< 0.89	< 0.42
Crawl Space (IACS)	IACS-12017Brewster-02_110718	11/8/2018	< 0.67	< 0.67	< 0.67	< 0.61	< 1.2	< 0.91	< 0.43
Garage Sub-slab (SSMP)	SSMP-12017Brewster-01_110818	11/8/2018	< 4.8	< 4.8	< 4.8	< 17	< 8.1	< 6.4	< 3.1
Ambient Air (AA)	AA-12017Brewster-01_110718	11/7/2018	< 0.58	< 0.58	< 0.58	< 0.53	< 1.0	< 0.79	< 0.38
µg/m ³ - micrograms per cubic meter < denotes not detected above reporting limit									










FIGURES



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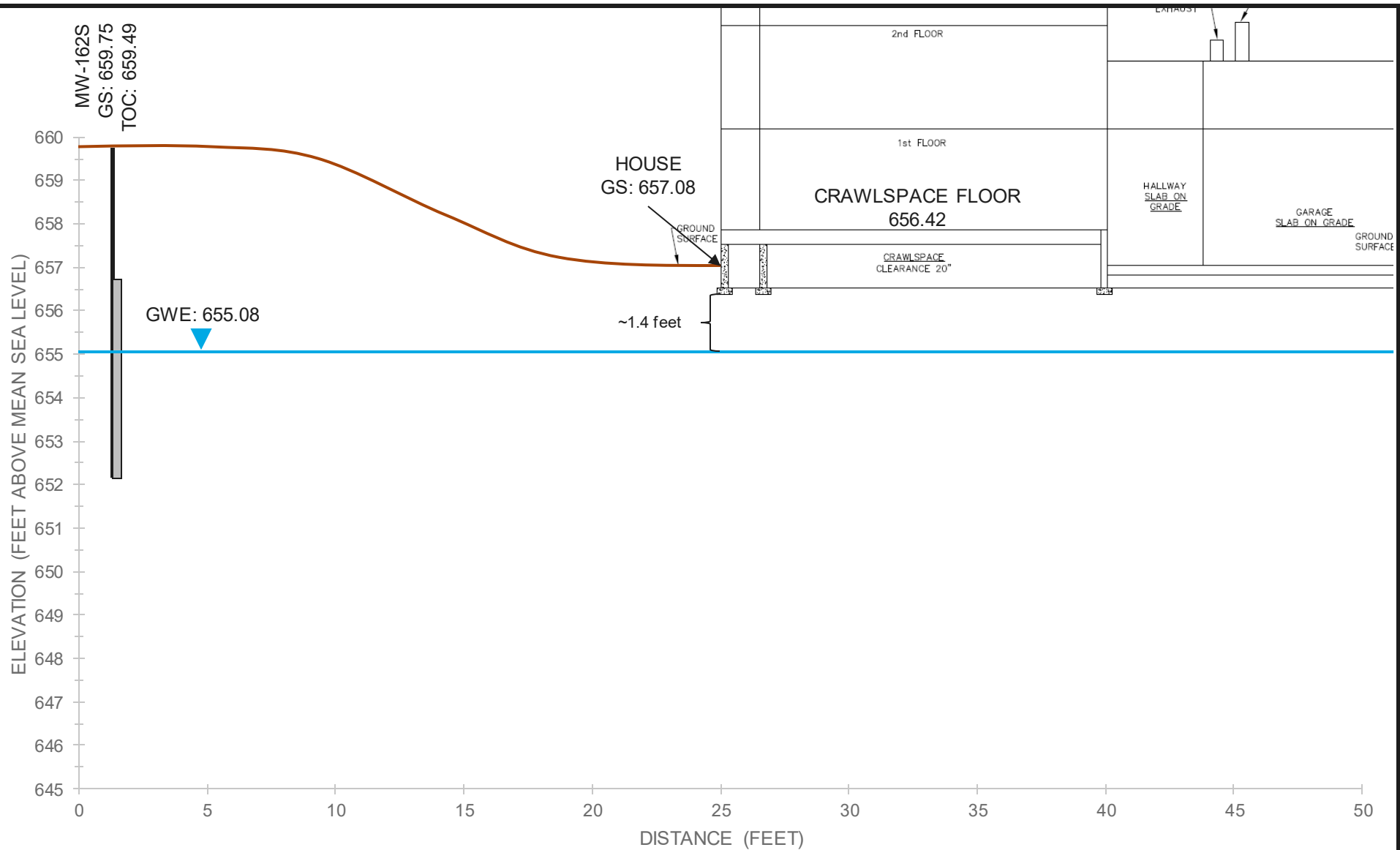
-  INDOOR AIR LOCATION
-  AMBIENT AIR LOCATION
-  SOIL BORING LOCATION
-  SUB-SLAB MONITORING POINT LOCATION
-  VAPOR PROBE
-  SHALLOW GROUNDWATER RESULT EITHER NON-DETECT OR DETECTED BELOW THE MOST RESTRICTIVE CRITERIA
-  SHALLOW GROUNDWATER RESULT EXCEEDS MOST RESTRICTIVE CRITERIA FOR AT LEAST ONE COMPOUND. HIGHLIGHTED ORANGE EXCEEDS MOST RESTRICTIVE CRITERIA (TDL OF 1.0 µg/L FOR VC)
-  BUILDING
-  PROPERTY BOUNDARIES

FORD MOTOR COMPANY
 LIVONIA TRANSMISSION PLANT
 LIVONIA, MICHIGAN

**12017 BREWSTER STREET
 SAMPLE LOCATIONS**

 **ARCADIS** Design & Consultancy for natural and built assets

**FIGURE
4-1**



NOTES:

1. Residential house not represented to scale on horizontal scale.
2. Horizontal scale used to measure distance of monitoring well to the house.
3. Groundwater elevation measured on February 28th, 2019.

GS – Ground Surface
 GWE – Groundwater Elevation

FORD MOTOR COMPANY LIVONIA TRANSMISSION PLANT LIVONIA, MI
12017 BREWSTER STREET
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <p>ARCADIS</p> </div> <div style="font-size: small;"> <p>Design & Consultancy for natural and built assets</p> </div> <div style="text-align: right;"> <p>FIGURE 4-2</p> </div> </div>

ATTACHMENTS



Soil Boring Log

Project Name: Ford Livonia Automatic Transmissions Plant Date Started: 02/20/2019 Logger: S. Johnson
 Project Number: MI001454.0003 Date Completed: 02/20/2019 Editor: Troy Stevens
 Project Location: Livonia, MI Weather Conditions: Cloudy, 32F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0	(0.0-0.3') TOPSOIL		(0.0-3.0') 2" PVC riser	
2			60		0.0	(0.3-3.0') SAND, very fine, subangular to subrounded; little silt; well sorted; dry; dark yellowish brown (10YR 4/6).		(1.0-3.0' bgs) Bentonite	
3					0.0				
4					0.0	(3.0-4.0') SAND, very fine to fine, subangular to subrounded; well sorted; dry; yellowish brown (10YR 5/4).			
5					0.0	(4.0-6.5') SAND, fine to medium, subangular to subrounded; well sorted; moist; yellowish brown (10YR 5/4).			
6					0.0			(3.0-10' bgs) Sand Filter Pack	
7			54		0.0	(6.5-6.8') SILT and CLAY, medium plasticity, slow dilatency; wet; soft; gray (10YR 5/1).		(3.0-8.0' bgs) Well Screen	
8					0.0	(6.8-7.5') SAND, fine to coarse, subangular to subrounded; some granule to small pebbles, little medium pebble, subangular to subrounded; poorly sorted; moist; dark gray (10YR 4/1).			
9					0.0	(7.5-8.7') SAND, fine to medium, subangular to subrounded; trace medium pebbles, subrounded to subangular; well sorted; moist; gray (10YR 5/1).			
10					0.0	(8.7-10.0') SAND, fine to medium, subangular to subrounded; trace granule; well sorted; moist; gray (10YR 5/1). End of boring at 10.0' bgs.			
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade Sampling Method: 5' Macrocore
 Driller: Chris and Adrian Sampling Interval: Continuous
 Drilling Method: Direct Push (Hollow Stem Augers for Well Installation) Water Level Start (ft. bgs.): 5.0
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Hand Auger to 5.0' bgs. Converted to Well: Yes No
12017 Brewster Surface Elev.: NA
 North Coor: _____
 East Coor: _____

ATTACHMENT 5

34367 Capitol



34367 CAPITOL STREET

The subject property is located at 34367 Capitol Street. The location of the residence, surrounding properties, other nearby monitoring wells, and relevant analytical results are summarized on **Figure 5-1**. A cross-section illustrating the home construction, local geology and groundwater elevation is included as **Figure 5-2**. The soil boring log for monitoring well MW-146S is included as **Attachment 5-1**. Each section below includes tables summarizing the groundwater, soil vapor and indoor air data, as appropriate.

Home Construction

The home construction is illustrated on **Figure 5-2**, and photographs of the residence are included below. Key features of the home include:

- Detached garage. Subfloor consists of crawlspace and slab-on-grade.
- Crawlspace is approximately 0.2 ft bgs.
- Ground surface at base of residence is 657.5 feet above mean sea level (ft msl).
Elevation of the crawlspace floor is approximately 657.3 ft msl.



Exhibit 1. Front view of the residence at 34367 Capitol Street



Exhibit 2. Crawlspace at 34367 Capitol Street.



Exhibit 3. Attached Garage at 34367 Capitol Street

Geology

A soil boring was completed at monitoring well MW-146S. A cross-section depicting the location of the soil boring relative to the residence is included as **Figure 5-2**. The boring log for monitoring well MW-146S is included as **Attachment 5-1**.

- The soil boring was completed to a total depth of 10 feet below ground surface (ft bgs).
- Sediments encountered at the boring location included very fine to medium sand with trace of pebbles to 6.0 ft bgs, a layer of silt 7.0 ft bgs, and fine to coarse sand with a trace of silt and granules to 10 ft bgs.
- Groundwater was noted in the soil boring at 7.5 ft bgs.

Groundwater Data

The location of monitoring well MW-146S is shown on **Figure 5-1**. Groundwater elevation and analytical data are summarized in tables included below.

- Monitoring well MW-146S was installed with a screen depth of 6-11 ft bgs and is located 12 feet north of the residence.
- Depth of groundwater at MW-146S was measured at 5.38 feet below the top of the well casing (ft btoc) on February 20, 2019 (groundwater elevation: 652.43 ft msl).
- Estimated elevation of the residence subfloor is 657.3 ft msl.
- Distance of the subfloor to the water table was approximately 4.9 feet.
- Monitoring well MW82S is located east of the property. The range in measured groundwater elevations since May 2017 is 649.55 to 651.70 ft msl. Groundwater elevations obtained in November 2018 were 651.01 ft msl, approximately 0.69 ft less than the maximum observed elevation.
- Due to the depth of the water table below the residence (i.e. greater than 1.18 meters [3.9 ft]) the groundwater screening criteria of 1.4 µg/L for vinyl chloride applies.
- Distance from the residence to the nearest shallow groundwater exceedance (i.e. vinyl chloride > 1.4 micrograms per liter) is approximately 360 feet (MW-123S located at 12075 Brewster Street).

- All groundwater contaminants of concern (COCs) were below appropriate groundwater vapor intrusion screening levels.

Elevation Data - 34367 Capitol - Crawlspace							
Well ID	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft btoc)	Groundwater Elevation (ft msl)	Ground Surface Elevation at Residence (ft msl)	Depth of Crawlspace (ft)	Elevation of Lowest Subfloor (ft msl)	Distance from Crawlspace to Water Table (ft)
MW-146S	657.81	5.38	652.43	657.5	0.2	657.3	+ 4.9*

*a negative (-) value represents a water table above the lowest subfloor, a positive (+) value represents water table below the lowest subfloor
 ft msl = feet above mean sea level
 ft btoc = feet below top of casing
 ft bgs = feet below ground surface
 ft = feet

Groundwater Analytical Summary - 34367 Capitol										
Sample Location	Sample ID	Distance to House	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
MW-146S	MW-146S_022019	12 ft	2/20/2019	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	0.23 J

µg/L - micrograms per liter
 J - Result less than the RL but greater than or equal to the MDL and the concentration is an approximate value
 < denotes not detected above reporting limit

Exterior Soil Vapor Data

The locations of exterior soil vapor probes near the residence are included on **Figure 5-1**. Soil gas analytical data is summarized in the table below.

- Soil vapor monitoring point SVMP-18 was installed at a depth of 3.0 ft bgs at a distance of approximately 60 feet from the residence.
- All soil vapor COCs were below appropriate vapor screening levels.

Soil Vapor Analytical Summary - 34367 Capitol									
Sample Location	Sample Depth (ft bgs)	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
SVMP-18	3	6/16/2017	NA	NA	NA	NA	NA	< 6.6	< 3.2
		9/18/2017	< 4.6	< 4.6	< 4.6	< 17	< 7.9	< 6.3	< 3.0
		11/17/2017	< 4.3	< 4.3	< 4.3	< 16	< 7.3	< 5.8	< 2.8
		2/20/2018	< 4.5	< 4.5	< 4.5	< 16	< 7.8	< 6.2	< 2.9
		5/30/2018	< 4.7	< 4.7	< 4.7	< 17	< 8.1	< 6.4	< 3.0
		8/22/2018	< 5.1	< 5.1	< 5.1	< 18	< 8.8	< 6.9	< 3.3
		11/7/2018	< 4.6	< 4.6	< 4.6	< 16	< 7.8	< 6.2	< 2.9
Samples analyzed via US EPA Method TO-15 µg/m ³ = micrograms per cubic meter ft bgs = feet below ground surface NA = not analyzed NS = not sampled < denotes not detected above reporting limit									

Indoor Air and Sub-Slab Sample Results

The building construction consists of a crawl space. Interior sub slab and indoor air sampling results are summarized on the table below.

- Sub-slab sample SSMP-34367 Capitol-01 was installed in the garage.
- An ambient air sample was collected outside, north of the residence using a 24-hour flow controller.
- Indoor air samples were collected from three locations, using 24-hour flow controllers.
 - Two samples were collected from the first floor.
 - One sample was collected from the garage.
- All sub-slab and indoor air COCs were below appropriate vapor screening levels.

Indoor Air Analytical Summary - 34367 Capitol St									
Sample Location	Sample ID	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
Main Floor IA (IAF)	IAF-34367Capitol-01_120318	12/4/2018	< 0.64 [<0.65]	< 0.64 [<0.65]	< 0.64 [<0.65]	0.27 J [<0.59]	< 1.1 [<1.1]	< 0.86 [<0.88]	< 0.41 [<0.42]
	IAF-34367Capitol-02_120318	12/4/2018	< 0.61	< 0.61	< 0.61	< 0.56	< 1.0	< 0.83	< 0.40
Garage IA (IAG)*	IAG* [DUP-34367Capitol-02_120318]	12/4/2018	[< 0.61]	[< 0.61]	[< 0.61]	[< 0.55]	[< 1.0]	[< 0.82]	[< 0.39]
Ambient Air (AA)*	AA* [DUP-34367Capitol-03_120318]	12/4/2018	[< 0.62]	[< 0.62]	[< 0.62]	[< 0.56]	[< 1.0]	[< 0.84]	[< 0.40]
Garage Sub-slab (SSMP)	SSMP-34367Capitol-01_120418	12/4/2018	< 4.4	< 4.4	< 4.4	< 16	2.8 J	< 6.0	< 2.9

µg/m3 - micrograms per cubic meter

J - Result less than the RL but greater than or equal to the MDL and the concentration is an approximate value

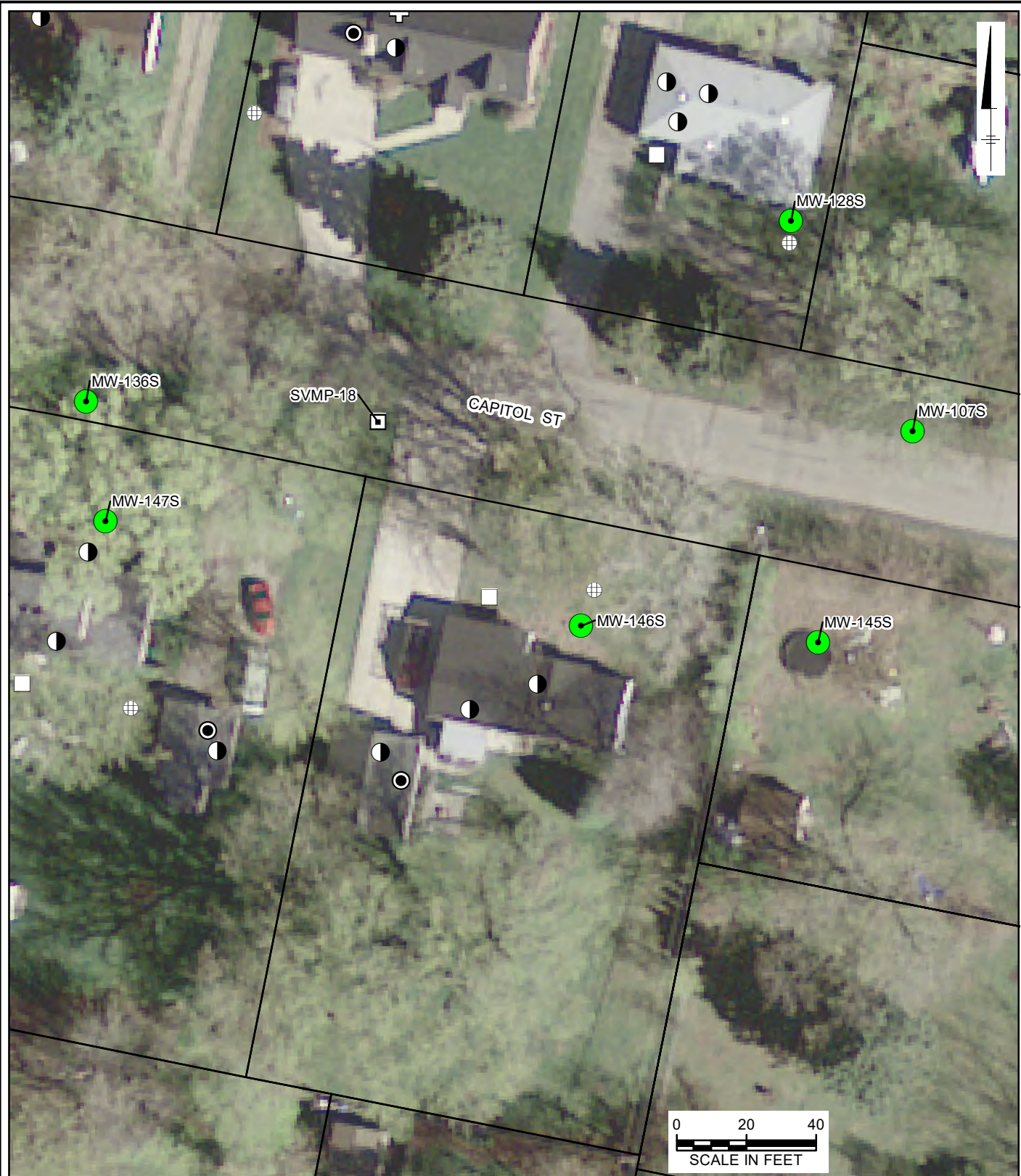
[] - represents analytical results from a duplicate sample

* - duplicate results present, parent sample rejected for not meeting data quality objectives

FIGURES



CITY: NOVI DIV: ENV DB: MG PIC: R. ELLIS PM: K. HINSKEY TR: T. STEVENS TR: P. CURRY PROJECT NUMBER: M001373.0001.00003 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet
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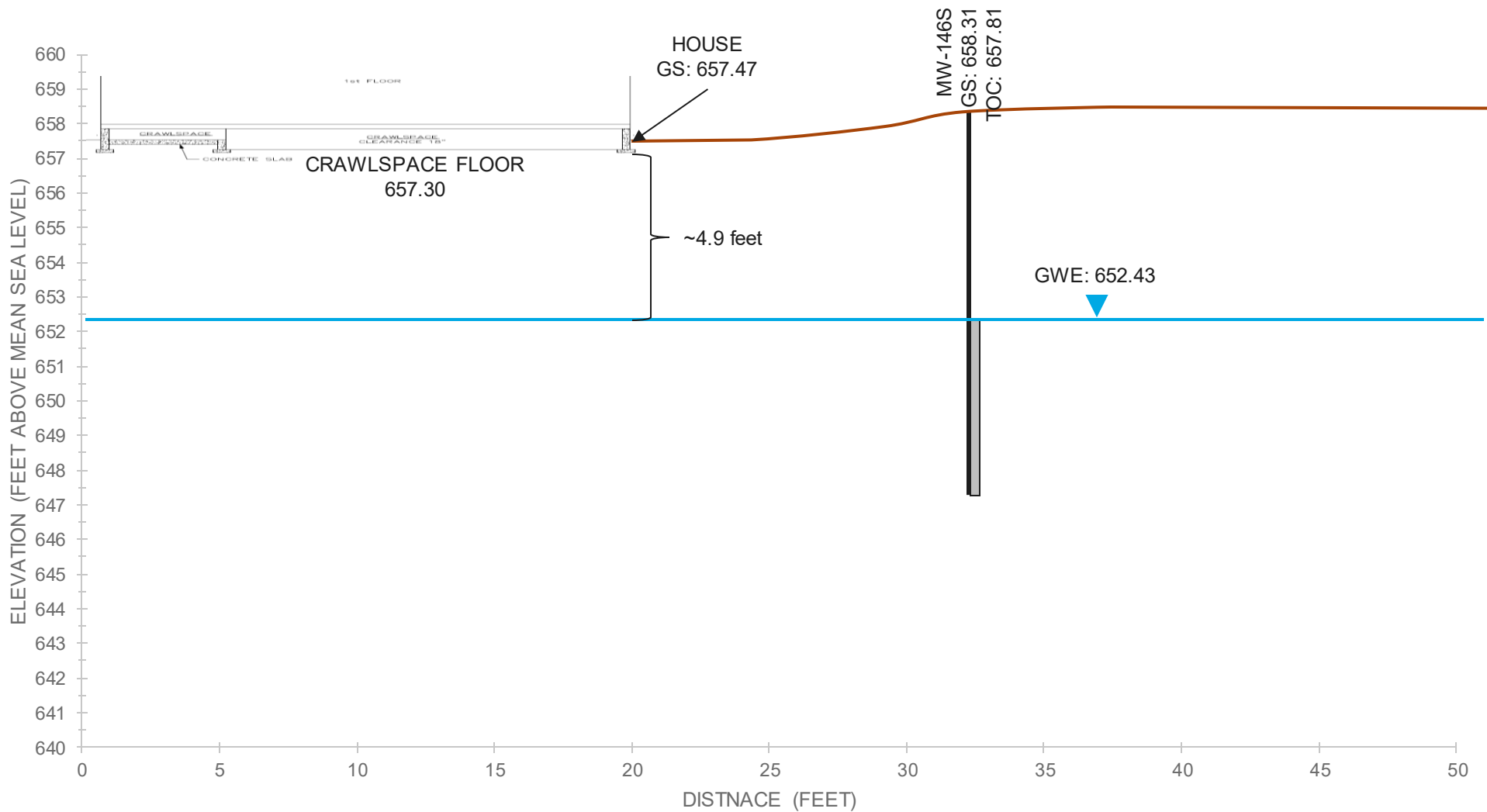
LEGEND:

- | | | | |
|--|------------------------------------|--|---|
| | INDOOR AIR LOCATION | | SHALLOW GROUNDWATER RESULT EITHER NON-DETECT OR DETECTED BELOW THE MOST RESTRICTIVE CRITERIA |
| | AMBIENT AIR LOCATION | | SHALLOW GROUNDWATER RESULT EXCEEDS MOST RESTRICTIVE CRITERIA FOR AT LEAST ONE COMPOUND. HIGHLIGHTED ORANGE EXCEEDS MOST RESTRICTIVE CRITERIA (TDL OF 1.0 µg/L FOR VC) |
| | SOIL BORING LOCATION | | PROPERTY BOUNDARIES |
| | SUB-SLAB MONITORING POINT LOCATION | | |
| | VAPOR PROBE | | |

FORD MOTOR COMPANY
 LIVONIA TRANSMISSION PLANT
 LIVONIA, MICHIGAN

**34367 CAPITOL STREET
 SAMPLE LOCATIONS**

	Design & Consultancy for natural and built assets	FIGURE 5-1
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NOTES:

1. Residential house not represented to scale on horizontal scale.
2. Horizontal scale used to measure distance of monitoring well to the house.
3. Groundwater elevation measured on February 20th, 2019.

GS – Ground Surface
 GWE – Groundwater Elevation

FORD MOTOR COMPANY LIVONIA TRANSMISSION PLANT LIVONIA, MI	
34367 CAPITOL STREET	
 Design & Consultancy for natural and built assets	FIGURE 5-2

ATTACHMENTS



Soil Boring Log

Project Name: Ford Livonia Automatic Transmissions Plant Date Started: 02/15/2019 Logger: Christina Weaver
 Project Number: MI001454.0003 Date Completed: 02/15/2019 Editor: Troy Stevens
 Project Location: Livonia, MI Weather Conditions: Cloudy, 31F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0	(0.0-0.3') TOPSOIL		(0.0-6.0') 2" PVC riser	
2			60		0.0	(0.3-6.2') SAND, very fine to medium, subrounded to subangular; trace small pebbles, round to subangular; well sorted; dry; yellowish brown (10YR 5/6).			
3					0.0				
4					0.0			(1.0-6.0') bgs) Bentonite	
5					0.0				
6					0.0				
7			58		0.0	(6.2-7.1') SILT, slow dilatency, no plasticity; little very fine to fine sand; well sorted; wet; light gray (10YR 7/1).			
8					0.0	(7.1-7.2') SAND, very fine to very coarse, subrounded to subangular; little small pebbles, subrounded to subangular; trace silt; poorly sorted; wet; light gray (10YR 7/1).			
9					0.0	(7.2-7.4') SILT, rapid dilatency, no plasticity; and SAND, very fine to fine; well sorted; wet; light gray (10YR 7/1).		(6.0-11.0' bgs) Sand Filter Pack	
10					0.0	(7.4-9.0') SILT, slow dilatency, no plasticity; some fine to coarse sand, trace granule to small pebbles, subrounded to subangular; poorly sorted; wet; light gray (10YR 7/1).		(6.0-11.0' bgs) Well Screen	
11						(9.0-9.2') SAND, fine to very coarse, subrounded to subangular; some silt; trace granule; poorly sorted; wet; grayish brown (10YR 5/2).			
12						(9.2-9.8') SILT, rapid dilatency, no plasticity; trace very fine to fine sand; well sorted; wet; gray (10YR 5/1).			
13						(9.8-10.0') CLAY, trace silt, slow dilatency, medium plasticity; wet, soft; gray (10YR 5/1).			
14						End of boring at 10.0' bgs.			
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade Sampling Method: 5' Macrocore
 Driller: M. Leadingham Sampling Interval: Continuous
 Drilling Method: Direct Push (Hollow Stem Augers for Well Installation) Water Level Start (ft. bgs.): 8.0
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Hand Auger to 5.0' bgs. Converted to Well: Yes No
34367 Capitol Street Surface Elev.: NA
 North Coor.: _____
 East Coor.: _____

SOIL BORING LOG, 2013 © COMMON FORD LIVING NOTES AND DATA BORING LOGS FOR LTP BORING LOGS GFI, ARCADIS GDT, 3/12/19

ATTACHMENT 6

34480 Capitol



34480 CAPITOL STREET

The subject property is located at 34480 Capitol Street. The location of the residence, surrounding properties, other nearby monitoring wells, and relevant analytical results are summarized on **Figure 6-1**. A cross-section illustrating the home construction, local geology and groundwater elevation is included as **Figure 6-2**. The soil boring log for monitoring well MW-168S is included as **Attachment 6-1**. Each section below includes tables summarizing the groundwater, soil vapor and indoor air data, as appropriate.

Home Construction

The home construction is illustrated on **Figure 6-2**, and photographs of the residence are included below. Key features of the home include:

- Detached garage. Subfloor consists of crawlspace and slab-on-grade.
- Crawlspace is approximately 0.6 feet below ground surface (ft bgs).
- Ground surface at base of residence is 663.1 feet above mean sea level (ft msl).
Elevation of the crawlspace floor is approximately 662.5 ft msl.



Exhibit 1. Front view of the residence at 34480 Capitol Street



Exhibit 2. Crawlspace at 34880 Capitol Street.



Exhibit 3. Detached Garage at 34880 Capitol Street

Geology

A soil boring was completed at monitoring well MW-168S. A cross-section depicting the location of the soil boring relative to the residence is included as **Figure 6-2**. The boring log for monitoring well MW-168S is included as **Attachment 6-1**.

- The soil boring was completed to a total depth of 10 feet below ground surface (ft bgs)
- Sediments encountered at the boring location included very fine to medium sand with trace of pebbles and silt to 3.0 ft bgs, very fine to very coarse sand and granules and pebbles to 4.0 ft bgs, and very fine to coarse sand and silt 10 ft bgs.
- Groundwater was noted in the soil boring at 4.0 ft bgs.

Groundwater Data

The location of monitoring well MW-168S is shown on **Figure 6-1**. Groundwater elevation and analytical data are summarized in tables included below.

- Monitoring well MW-168S was installed with a screen depth of 2-7 ft bgs and is located 11 feet south of the residence.
- Depth of groundwater at MW-168S was measured at 2.15 feet below the top of the well casing (ft btoc) on February 25, 2019 (groundwater elevation: 654.88 ft msl).
- Estimated elevation of the residence subfloor is 662.5 ft msl.
- Distance of the subfloor to the water table was approximately 7.6 feet.
- Monitoring well MW80SR is located south of the property. The range in measured groundwater elevations since May 2017 is 651.89 to 654.85 ft msl. Groundwater elevations obtained in November 2018 were 653.91 ft msl, approximately 0.94 ft less than the maximum observed elevation.
- Due to the depth of the water table below the residence (i.e. greater than 1.18 meters [3.9 ft]) the groundwater screening criteria of 1.4 µg/L for vinyl chloride applies.
- Distance from the residence to the nearest shallow groundwater exceedance (i.e. vinyl chloride > 1.4 micrograms per liter) is approximately 210 feet (MW-123S located at 12075 Brewster Street).

- All groundwater contaminants of concern (COCs) were below appropriate groundwater vapor intrusion screening levels.

Elevation Data - 34480 Capitol, Crawlspace							
Well ID	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft btoc)	Groundwater Elevation (ft msl)	Ground Surface Elevation at Residence (ft msl)	Depth to Crawlspace Floor (ft bgs)	Elevation of Lowest Subfloor (ft msl)	Distance from Crawlspace Floor to Water Table (ft)
MW-168S	657.03	2.15	654.88	663.1	0.6	662.5	+ 7.6*

*a negative (-) value represents a water table above the lowest subfloor, a positive (+) value represents water table below the lowest subfloor
 ft msl = feet above mean sea level
 ft btoc = feet below top of casing
 ft bgs = feet below ground surface
 ft = feet

Groundwater Analytical Summary - 34480 Capitol										
Sample Location	Sample ID	Distance to House	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
MW-168S	MW-168S_022519	11 ft	2/25/2019	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0

µg/L - micrograms per liter
 ND - Analyte/compound tested for, but not detected
 < denotes not detected above reporting limit

Exterior Soil Vapor Data

The locations of exterior soil vapor probes near the residence are included on **Figure 6-1**. Soil vapor analytical data is summarized in the table below.

- Soil vapor monitoring point SVMP-23 was installed at a depth of 3.0 ft bgs at approximately 110 feet from the residence.
- Soil vapor monitoring point SVMP-19 was installed at a depth of 3.0 ft bgs at approximately 130 feet from the residence.
- All soil vapor COCs were below appropriate vapor screening levels.

Soil Vapor Analytical Summary - 34480 Capitol									
Sample Location	Sample Depth (ft bgs)	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
SVMP-19	3	6/16/2017	NA	NA	NA	NA	NA	< 6.4	< 3.0
		9/18/2017	< 5.1	< 5.1	< 5.1	< 18	< 8.8	< 6.9	< 3.3
		11/17/2017	< 4.3	< 4.3	< 4.3	< 16	< 7.4	< 5.9	< 2.8
		2/20/2018	< 4.1	< 4.1	< 4.1	< 15	< 7.1	< 5.6	< 2.7
		5/31/2018	NS	NS	NS	NS	NS	NS	NS
		8/22/2018	< 4.5	< 4.5	< 4.5	< 16	< 7.7	< 6.1	< 2.9
		11/7/2018	NS	NS	NS	NS	NS	NS	NS
SVMP-23	3	6/19/2017	NA	NA	NA	NA	NA	< 6.4	< 3.1
		9/18/2017	< 4.6	< 4.6	< 4.6	< 17	< 7.9	< 6.3	< 3.0
		11/17/2017	< 4.3	< 4.3	< 4.3	< 16	< 7.4	< 5.8	< 2.8
		2/20/2018	< 4.2	< 4.2	< 4.2	< 15	< 7.2	< 5.7	< 2.7
		5/31/2018	NS	NS	NS	NS	NS	NS	NS
		8/22/2018	< 4.6	< 4.6	< 4.6	< 17	< 7.9	< 6.3	< 3.0
		11/5/2018	< 4.5	< 4.5	< 4.5	< 16	< 7.7	< 6.1	< 2.9
Samples analyzed via US EPA Method TO-15 µg/m ³ = micrograms per cubic meter ft bgs = feet below ground surface NA = not analyzed NS = not sampled < denotes not detected above reporting limit									

Indoor Air and Sub-Slab Sample Results

The building construction consists of a partial crawl space, partial slab-on-grade. Interior sub slab soil vapor and indoor air sampling results are summarized on the table below.

- Sub-slab samples:
 - SSMP-34480 Capitol-01 was installed in the garage.
 - SSMP-34480 Capitol-02 was installed in the living room.
- An ambient air sample was collected outside, northwest of the residence using a 24-hour flow controller.

- Indoor air samples were collected from four locations, using 24-hour flow controllers
 - One sample was collected from the garage.
 - One sample was collected from the crawl space.
 - Two samples were collected from the first floor.
- All sub-slab and indoor air COCs were below appropriate screening levels.

Indoor Air Analytical Summary - 34480 Capitol St									
Sample Location	Sample ID	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
Main Floor IA (IAF)	IAF-34480CAPITOL-01_102918	10/30/2018	< 0.71	< 0.71	< 0.71	0.24 J	0.32 J	< 0.96	< 0.46
	IAF-34480CAPITOL-02_102918	10/30/2018	< 0.69	< 0.69	< 0.69	< 0.63	0.29 J	< 0.94	< 0.45
Garage IA (IAG)	IAG-34480CAPITOL-03_102918	10/30/2018	< 0.63	< 0.63	< 0.63	< 0.57	0.23 J	< 0.85	< 0.40
Crawl Space (IACS)	IACS-34480CAPITOL-01_102918	10/30/2018	< 0.72	< 0.72	< 0.72	< 0.66	0.29 J	< 0.98	< 0.47
Garage Sub-slab (SSMP)	SSMP-34480CAPITOL-01_103018	10/30/2018	< 4.7	< 4.7	< 4.7	< 17	< 8.0	< 6.3	< 3.0
Living Room Sub-slab (SSMP)	SSMP-34480CAPITOL-02_103018	10/30/2018	< 4.8	< 4.8	< 4.8	< 18	< 8.3	< 6.6	< 3.1
Ambient Air (AA)	AA-34480CAPITOL-01_102918	10/29/2018	< 0.60	< 0.60	0.14 J	< 0.55	0.34 J	< 0.82	< 0.39

µg/m³ - micrograms per cubic meter
J - Result less than the RL but greater than or equal to the MDL and the concentration is an approximate value

FIGURES



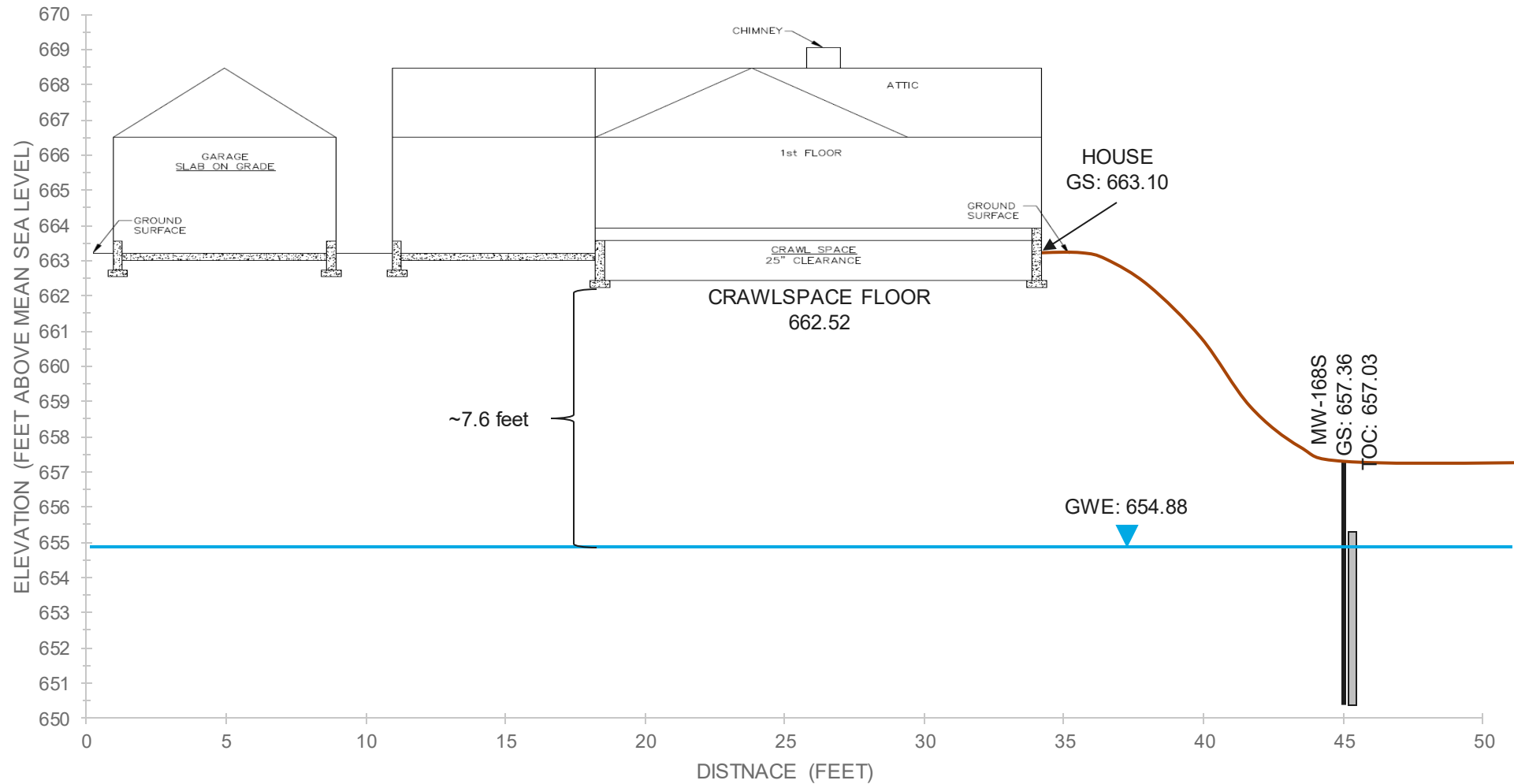
CITY: NOVI DIV: ENV DB: MG PIC: R. ELLIS PM: K. HINSKEY TR: P. CURRY PROJECT NUMBER: M001373.0001.00003 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet
 Z:\GIS\Projects\ ENV\NovBrighton_Mil\FordLivonia\GIS\docs\2019-03\Report\34480Capitol_Locations.mxd PLOTTED: 3/12/2019 2:15:24 PM BY: msmiller



LEGEND:

- | | | | |
|---|------------------------------------|---|---|
| ● | INDOOR AIR LOCATION | ● | SHALLOW GROUNDWATER RESULT EITHER NON-DETECT OR DETECTED BELOW THE MOST RESTRICTIVE CRITERIA |
| □ | AMBIENT AIR LOCATION | ● | SHALLOW GROUNDWATER RESULT EXCEEDS MOST RESTRICTIVE CRITERIA FOR AT LEAST ONE COMPOUND. HIGHLIGHTED ORANGE EXCEEDS MOST RESTRICTIVE CRITERIA (TDL OF 1.0 µg/L FOR VC) |
| ⊕ | SOIL BORING LOCATION | □ | PROPERTY BOUNDARIES |
| ● | SUB-SLAB MONITORING POINT LOCATION | | |
| □ | VAPOR PROBE | | |

FORD MOTOR COMPANY LIVONIA TRANSMISSION PLANT LIVONIA, MICHIGAN	
34480 CAPITOL STREET SAMPLE LOCATIONS	
	<i>Design & Consultancy for natural and built assets</i>
FIGURE 6-1	



NOTES:

1. Residential house not represented to scale on horizontal scale.
2. Horizontal scale used to measure distance of monitoring well to the house.
3. Groundwater elevation measured on February 25th, 2019.

GS – Ground Surface
 GWE – Groundwater Elevation

FORD MOTOR COMPANY LIVONIA TRANSMISSION PLANT LIVONIA, MI	
34480 CAPITOL STREET	
	Design & Consultancy for natural and built assets
FIGURE 6-2	

ATTACHMENTS



Soil Boring Log

Project Name: Ford Livonia Automatic Transmissions Plant Date Started: 02/20/2019 Logger: Christina Weaver
 Project Number: MI001454.0003 Date Completed: 02/20/2019 Editor: Troy Stevens
 Project Location: Livonia, MI Weather Conditions: P. Cloudy, 30F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
1					0.0	(0.0-0.3') TOPSOIL		(0.0-3.0') 2" PVC riser (0.5-2.0' bgs) Bentonite	
2			60		0.0	(0.3-2.0') SAND, very fine to medium, subangular to subrounded; trace small pebbles; well sorted; dry; dark brown (10YR 3/3).			
3			60		0.0	(2.0-3.0') SAND, very fine to medium, subangular to subrounded; trace silt; well sorted; wet; light brownish gray (10YR 6/2).			
4			60		0.0	(3.0-4.0') SAND, very fine to very coarse, and GRANULES, subrounded to subangular; trace small pebbles; trace silt; poorly sorted; wet; dark yellowish brown (10YR 4/4).			
5			60		0.0	(4.0-7.0') SAND very fine to very coarse, subrounded to subangular; and SILT, rapid dilatency, non-plastic; trace granule; poorly sorted; wet; grayish brown (10YR 5/2).		(2.0-10' bgs) Sand Filter Pack (2.0-7.0' bgs) Well Screen	
6					0.0				
7					0.0				
8			60		0.0	(7.0-9.0') SILT, rapid dilatency, non-plastic; little very fine to fine sand; well sorted; wet; very dark gray (10YR 3/1).			
9					0.0				
10					0.0	(9.0-10.0') SILT, some clay, rapid dilatency, medium plasticity; wet; gray (10YR 5/1).			
11						End of boring at 10.0' bgs.			
12									
13									
14									
15									
16									
17									
18									
19									
20									

Drilling Co.: Cascade Sampling Method: 5' Macrocore
 Driller: T. Grossman Sampling Interval: Continuous
 Drilling Method: Direct Push (Hollow Stem Augers for Well Installation) Water Level Start (ft. btoc.): 4.4
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: Hand Auger to 5.0' bgs. Converted to Well: Yes No
34480 Capitol Surface Elev.: NA
 North Coord.: _____
 East Coord.: _____

SOIL BORING LOG, 2013 © COMMON FORD LIVING NOTES AND DATA BORING LOGS FOR LTP BORING LOGS GFI, ARCADIS GDT, 3/12/19

ATTACHMENT 7

34940 Beacon



34940 BEACON STREET

The subject property is located at 34940 Beacon Street. The location of the residence, surrounding properties, other nearby monitoring wells, and relevant analytical results are summarized on **Figure 7-1**. A cross-section illustrating the home construction, local geology and groundwater elevation is included as **Figure 7-2**. The soil boring log for monitoring well MW-109S is included as **Attachment 7-1**. Each section below includes tables summarizing the groundwater, soil vapor and indoor air data, as appropriate.

Home Construction

The home construction is illustrated on **Figure 7-2**, and photographs of the residence are included below. Key features of the home include:

- Attached garage. Subfloor consists of a basement.
- Approximate depth to the basement floor is approximately 5.5 feet below ground surface (ft bgs).
- Ground surface at base of residence is 665.2 feet above mean sea level (ft msl).
Elevation of the basement floor is approximately 659.7 ft msl.



Exhibit 1. Front view of the residence at 34940 Beacon Street



Exhibit 2. Basement at 34940 Beacon Street

Geology

A soil boring was completed at monitoring well MW-89S. A cross-section depicting the location of the soil boring relative to the residence is included as **Figure 7-2**. The boring log for monitoring well MW-89S is included as **Attachment 7-1**.

- The soil boring was completed to a total depth of 15 feet below ground surface (ft bgs)
- Sediments encountered at the boring location included fine sand and silt to 8.5 ft bgs, fine to coarse sand with a trace of granules and pebbles to 14 ft bgs, and fine sand and silt to 15 ft bgs.
- Groundwater was noted in the soil boring at 5 ft bgs.

Groundwater Data

The location of monitoring well MW-89S is shown on **Figure 7-1**. Groundwater elevation and analytical data are summarized in tables included below.

- Monitoring well MW-89S was installed with a screen depth of 3-13 ft bgs and is located 11.5 feet northeast of the residence.

- Depth of groundwater at MW-89S was measured at 4.43 feet below the top of the well casing (ft btoc) on December 19, 2018 (groundwater elevation: 659.30 ft msl).
- Estimated elevation of the residence subfloor is 659.7 ft msl
- Distance of the subfloor to the water table was approximately 0.4 feet.
- Monitoring well MW74 is located east of the property. The range in measured groundwater elevations since May 2017 is 659.90 to 662.08 ft msl. Groundwater elevations obtained in November 2018 were 661.77 ft msl, approximately 0.31 ft less than the maximum observed elevation.
- Distance from the residence to the nearest shallow groundwater exceedance (i.e. vinyl chloride > 1.0 micrograms per liter) is approximately 300 feet (MW-95S located at 12131 Boston Post).
- A sump is located in the north-eastern section of the basement. A water sample was collected from the sump and is included on the table below.
- All groundwater contaminants of concern (COCs) were below appropriate groundwater vapor intrusion screening levels

Elevation Data - 34940 Beacon - Basement

Well ID	Top of Casing Elevation (ft msl)	Depth to Groundwater (ft btoc)	Groundwater Elevation (ft msl)	Ground Surface Elevation at Residence (ft msl)	Depth to Basement Floor (ft bgs)	Elevation of Basement Floor (ft msl)	Distance from Lowest Subfloor to Water Table (ft)
MW-89S	663.73	4.43	659.30	665.2	5.5	659.7	+ 0.4*

*a negative (-) value represents a water table above the lowest subfloor, a positive (+) value represents water table below the lowest subfloor
 ft msl = feet above mean sea level
 ft btoc = feet below top of casing
 ft bgs = feet below ground surface
 ft = feet

Groundwater Analytical Summary - 34940 Beacon Street

Sample Location	Sample ID	Distance to House	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
MW-89S	MW-89S_121918	11.5 ft	12/19/2018	< 1.0	1.2	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0

SUMP	SUMP-34940BEACON-100418	--	10/4/2018	< 1.0	0.75 J	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0
------	-------------------------	----	-----------	-------	--------	-------	-------	-------	-------	-------

µg/L - micrograms per liter
< denotes not detected above reporting limit
J - Result less than the RL but greater than or equal to the MDL and the concentration is an approximate value

Exterior Soil Vapor Data

The location of exterior soil vapor probe SVMP-33 and SVMP-08 is included on **Figure 7-1**. Soil gas analytical data is summarized in the table below.

- Soil vapor monitoring point SVMP-33 was installed at a depth of 4.0 ft bgs at approximately 10 feet from the residence
- Soil vapor monitoring point SVMP-08 was installed at a depth of 3.5 ft bgs at approximately 105 feet southwest of the residence.
- All soil vapor COCs were below appropriate vapor screening levels

Soil Vapor Analytical Summary - 34940 Beacon

Sample Location	Sample Depth (ft bgs)	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
SVMP-08	3.5	6/15/2017	NA	NA	NA	NA	NA	< 6.5	< 3.1
		9/20/2017	< 4.7	< 4.7	< 4.7	< 17	< 8.1	< 6.4	< 3.0
		11/20/2017	< 4.6	< 4.6	< 4.6	< 17	< 7.9	< 6.2	< 3.0
		2/20/2018	< 4.6	< 4.6	< 4.6	< 17	< 7.9	< 6.3	< 3.0
		5/29/2018	< 5.0	< 5.0	< 5.0	< 18	< 8.6	11	< 3.2
		8/23/2018	< 4.8	< 4.8	< 4.8	< 17	< 8.2	< 6.5	< 3.1
		11/5/2018	< 4.6	< 4.6	< 4.6	< 17	< 7.9	< 6.3	< 3.0
SVMP-33	4	42901	NA	NA	NA	NA	NA	< 6.5	< 3.1

Samples analyzed via US EPA Method TO-15

µg/m³ = micrograms per cubic meter

ft bgs = feet below ground surface

NA = not analyzed

< denotes not detected above reporting limit

Indoor Air and Sub-Slab Sample Results

The building construction consists of a full basement construction. Interior sub slab and indoor air sampling results are summarized on the table below.

- Sub-slab sample SSMP-34940 Beacon-01 was installed in the garage
- An ambient air sample was collected outside, east of the residence using a 24-hour flow controller.

- Indoor air samples were collected from three locations, using 24-hour flow controllers
 - One sample was collected from the first floor.
 - One sample was collected from the basement.
- All sub-slab and indoor air COCs were below appropriate vapor screening levels

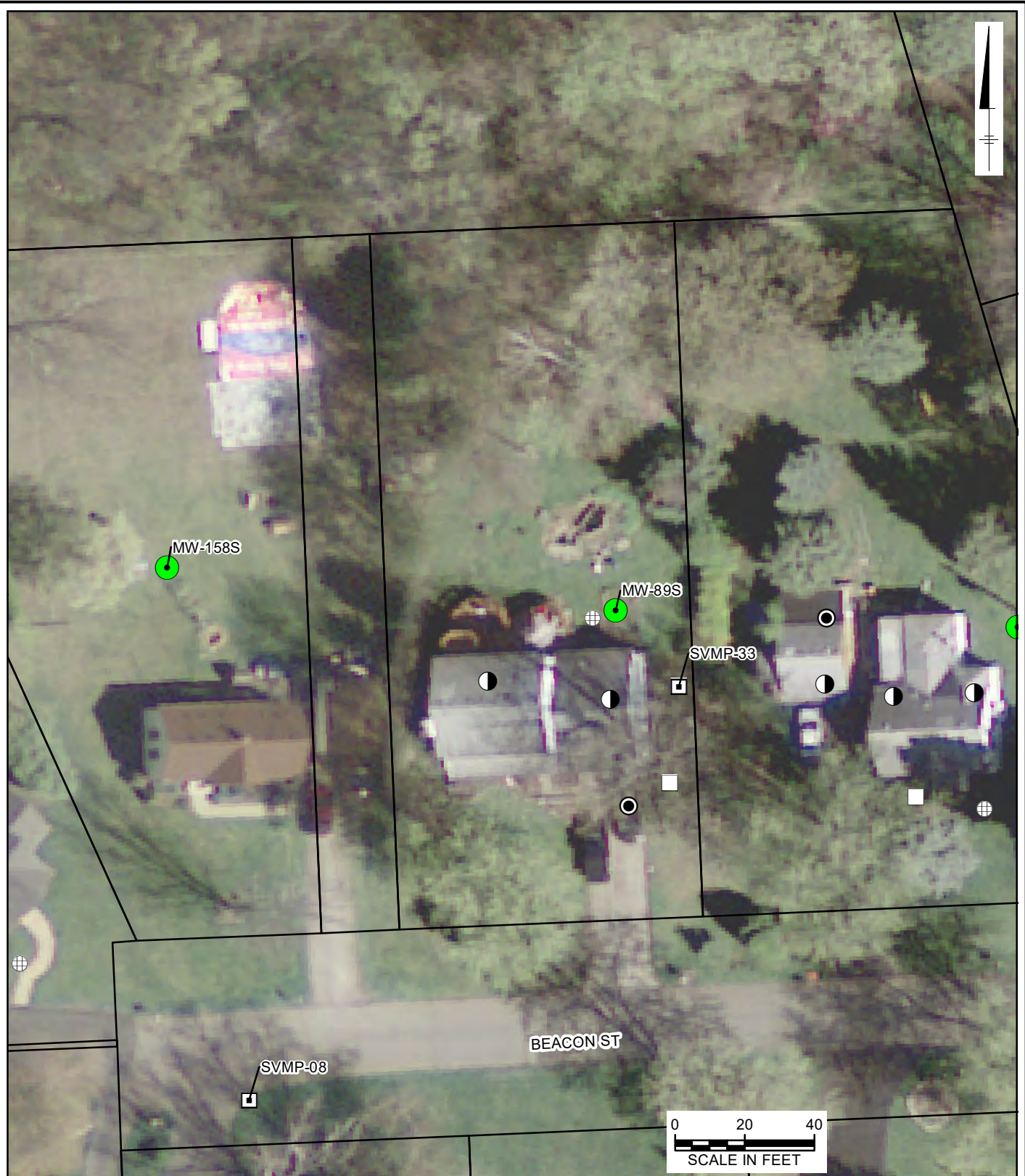
Indoor Air Analytical Summary - 34940 Beacon									
Sample Location	Sample ID	Sample Date	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	1,4-Dioxane	PCE	TCE	VC
Main Floor IA (IAF)	IAF-34940Beacon-01_100318	10/4/2018	< 1.4	< 1.4	< 1.4	< 1.3	< 2.4	< 1.9	< 0.90
Basement IA (IAB)	IAB-34940Beacon-02_100318	10/4/2018	< 0.69	< 0.69	< 0.69	< 0.63	< 1.2	< 0.94	< 0.44
Garage Sub-slab (SSMP)	SSMP-34940Beacon-01_100318	10/4/2018	< 4.7	< 4.7	< 4.7	< 17	2.4 J	< 6.4	< 3.0
Ambient Air (AA)	AA-34940Beacon-01_100318	10/3/2018	< 0.70	< 0.70	< 0.70	< 0.64	< 1.2	< 0.96	< 0.46

µg/m³ - micrograms per cubic meter
 J - Result less than the RL but greater than or equal to the MDL and the concentration is an approximate value
 < denotes not detected above reporting limit

FIGURES



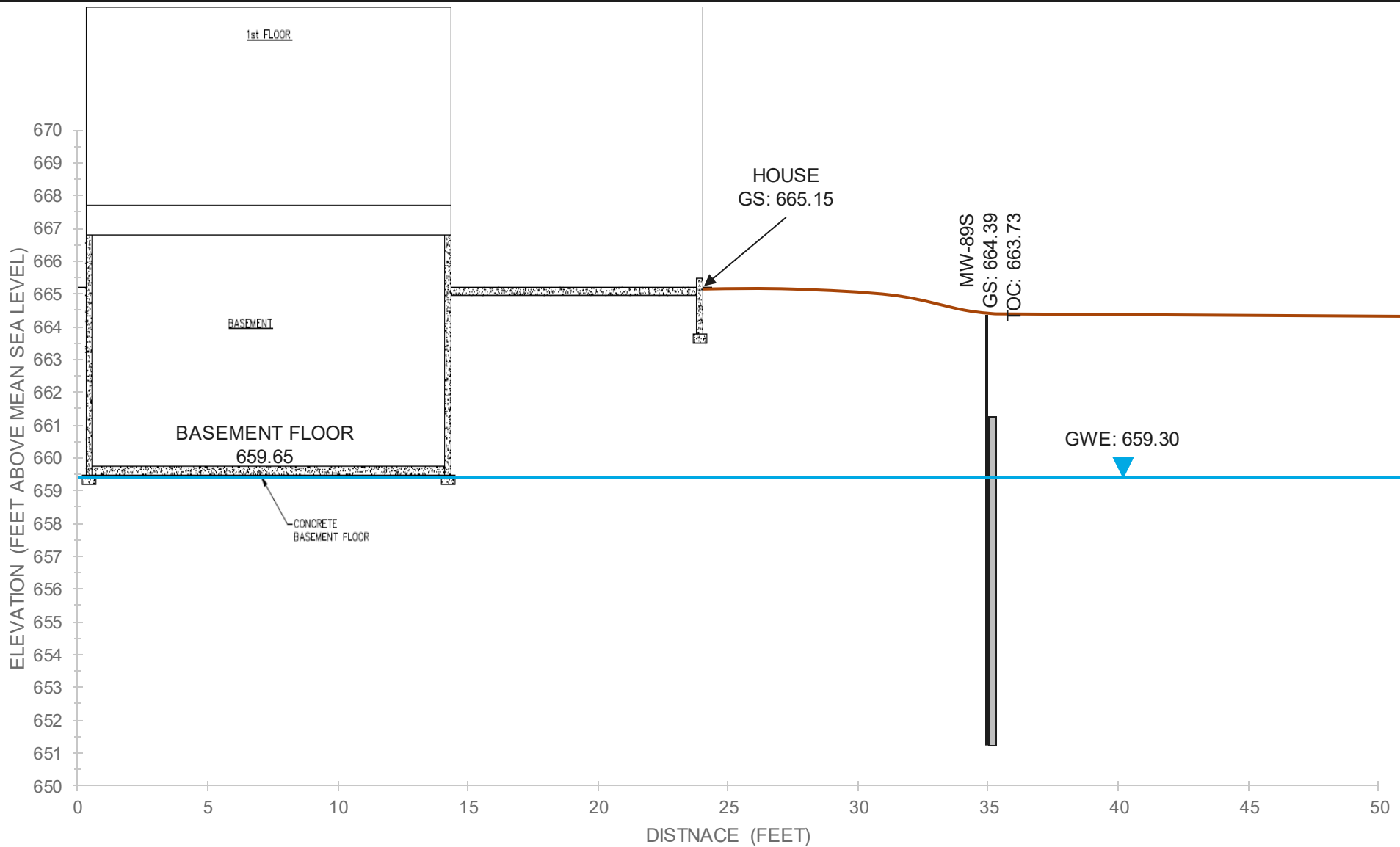
CITY: NOVI DIV: ENV DB: MG PIC: R. ELLIS PM: K. HINSKEY TR: P. CURRY PROJECT NUMBER: M001373.0001.00003 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet
 Z:\GIS\Projects_ENV\NovBrighton_Mil\FordLivonia\GIS\docs\2019-03\Report\34940Beacon_Locations.mxd PLOTTED: 3/13/2019 2:15:46 PM BY: msmliller



LEGEND:

- | | | | |
|--|------------------------------------|--|---|
| | INDOOR AIR LOCATION | | SHALLOW GROUNDWATER RESULT EITHER NON-DETECT OR DETECTED BELOW THE MOST RESTRICTIVE CRITERIA |
| | AMBIENT AIR LOCATION | | SHALLOW GROUNDWATER RESULT EXCEEDS MOST RESTRICTIVE CRITERIA FOR AT LEAST ONE COMPOUND. HIGHLIGHTED ORANGE EXCEEDS MOST RESTRICTIVE CRITERIA (TDL OF 1.0 µg/L FOR VC) |
| | SOIL BORING LOCATION | | PROPERTY BOUNDARIES |
| | SUB-SLAB MONITORING POINT LOCATION | | |
| | VAPOR PROBE | | |

FORD MOTOR COMPANY LIVONIA TRANSMISSION PLANT LIVONIA, MICHIGAN	
34940 BEACON STREET SAMPLE LOCATIONS	
	<i>Design & Consultancy for natural and built assets</i>
FIGURE 7-1	



NOTES:

1. Residential house not represented to scale on horizontal scale.
2. Horizontal scale used to measure distance of monitoring well to the house.
3. Groundwater elevation measured on December 19th, 2018.

GS – Ground Surface
 GWE – Groundwater Elevation

FORD MOTOR COMPANY
 LIVONIA TRANSMISSION PLANT
 LIVONIA, MI

34940 BEACON STREET

3/13/2019 12:17:00 PM

ATTACHMENTS



Soil Boring Log

Project Name: Ford LTP Date Started: 10/31/2018 Logger: J. Barker
 Project Number: MI001454.0003.00002 Date Completed: 10/31/2018 Editor: NA
 Project Location: Livonia, MI Weather Conditions: Cloudy 50° F

Depth (feet)	Sample Interval	Blow Counts	Recovery (in.)	Sample ID	PID (ppm)	USCS Class	Description	Construction Details	Well
-1									
0							(0.0-0.5') Topsoil.	Flush mount 8" dia. drilled hole	
1					5.7		(0.5-1.0') SAND, fine, subangular; well sorted; dry; very dark brown (10YR 2/2).	Backfill (0.5-1ft)	
2			60		3.1		(1.0-2.0') SAND, very fine, subrounded; well sorted; moist; very dark grayish brown (10YR 3/2). Note: Roots.	Bentonite Pellets (1-2.5 ft)	
3					5.3		(2.0-3.0') SAND, subangular to subrounded; and SILT; well sorted; moist; dark grayish brown (10YR 3/2). Note: Roots.	2" dia. PVC Casing	
4					2.4		(3.0-4.0') SAND, subangular to subrounded; and SILT; well sorted; moist; dark grayish brown (10YR 4/2).		
5					2.6		(4.0-8.5') SAND, subangular to subrounded; and SILT; well sorted; moist; dark grayish brown (10YR 4/2).		
6					0.7		Water start at 5.0' bgs.	Sand Pack (2.5-15 ft)	
7			42		0.6				
8					0.6				2" dia. Stainless- Steel Sch 40 PVC
9					0.7		(8.5-9.5') SAND; some pebble, coarse grain, large/medium pebble, subangular to subrounded; wet; yellowish brown (10YR 5/8).	0.010" slot Well Screen (3-13 ft)	
10					0.6		(9.5-14.0') SAND, coarse, angular to subangular; poorly sorted; moist; dark grayish brown (10YR 4/2).		
11					0.7				
12					0.7				
13			42		0.7				
14					0.7				
15					0.7		(14.0-14.2') SAND, fine grain, subangular to subrounded; and SILT; poorly sorted; moist; brown (10YR 5/3). (14.2-15.0') SILT; some fine sand, subangular to subrounded; poorly sorted; moist; gray (10YR 5/1).		
16							End of boring at 15.0 ft bgs.		

Drilling Co.: Fibertech Sampling Method: 5' Macrocore
 Driller: Nick Wiseman/Jake Turnage Sampling Interval: Continuous
 Drilling Method: Hand Auger/Hollow Stem Auger Water Level Start (ft. bgs.): 6.0
 Drilling Fluid: None Water Level Finish (ft. btoc.): NA
 Remarks: ' / ft = feet; " / in = inch; bgs = below ground surface; Converted to Well: Yes No
ppm = parts per million; NA = not available or not applicable. Hand Auger to 5.0' Surface Elev.: NA
bgs. North Coord.: NA
 East Coord.: NA

LTP-BORINGS_D:\BORING LOGS\WORKING\ADDITIONAL BORING LOGS\GINT TEMPLATE (EXISTING)\BPL-LTP RAVINDRA.GPJ ARCADIS.GDT 2/11/19

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