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AREA 5 RESPONSE ACTIVITY PLAN North Kent Study Area

DRAFT

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PREPARED FOR:
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ACRONYMS

AMSL	Above Mean Sea Level
CD	Consent Decree
CFS	Cubic Feet per Second
COVID-19	Coronavirus Disease 2019
CSM	Conceptual Site Model
DoD	United States Department of Defense
DWC	Part 201 Generic Groundwater Cleanup Criteria Protective of Drinking Water for Residential Land Uses
EGLE	Michigan Department of Environmental, Great Lakes and Energy
EPA	United States Environmental Protection Agency
GIS	Geographic Information Systems
GSI	Groundwater-Surface Water Interface
HSDS	House Street Disposal Site
HUC	Hydrologic Unit Code
ID	Identification
MDEQ	Michigan Department of Environmental Quality
MDOT	Michigan Department of Transportation
MGDL	Michigan GIS Data Library
MS/MSD	Matrix Spike/Matrix Spike Duplicates
NE	Northeast
ng/L	Nanogram per Liter
NKLF	North Kent County Landfill
NKSA	North Kent Study Area
PDF	Portable Document Format
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutane Sulfonic Acid
PFHxA	Perfluorohexanoic Acid
PFHxS	Perfluorohexane Sulfonic Acid
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
ppt	Parts Per Trillion
QAPP	Quality Assurance Project Plan [Former Wolverine Tannery, House Street Disposal Area, and Wolven/Jewell Area, Per- and Polyfluoroalkyl Substances Investigation Program]
QA/QC	Quality Assurance/Quality Control
QSM	Quality Systems Manual
R&W/GZA	Rose & Westra, a Division of GZA GeoEnvironmental, Inc.
RAP	Response Activity Plan
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedures
SOW	Schedule of Work
µg/L	Micrograms per Liter
USGS	United States Geological Survey
VAP	Vertical Aquifer Profiling
Wolverine	Wolverine World Wide, Inc.



1.0 INTRODUCTION

On behalf of Wolverine, R&W/GZA, prepared this RAP for the Area 5 investigation in the NKSA. The objective of this RAP is to comply with the CD by refining the current understanding of the conceptual site model and further evaluating the potential of PFAS migration into Area 5.

Area 5 is southwest of the HSDS and south and southwest of the PFOA + PFOS plume from the HSDS. Based on the groundwater contours and groundwater flow direction, Area 5 is located hydraulically down and side-gradient of the HSDS. PFOA + PFOS were mostly absent from residential water samples in Area 5, except a few locations where PFOA + PFOS was at concentrations less than 10 ng/L and no residential wells in Area 5 identified PFOA + PFOS concentrations greater than 70 ng/L. One monitoring well location, HS-MW-26 near the southeast corner of Area 5, had PFOA + PFOS concentration greater than 10 ng/L.

This RAP is prepared pursuant to CD No. 1:18-cv-00039-JTN-SJB, effective February 19, 2020. Specifically, this scope of work is established in Sections 7.4, 7.9(b), and Appendix P of the CD. This RAP is organized into the following sections:

- Introduction
- CSM
- Proposed Statement of Work
- Investigation Methodologies
- Sampling and Analysis Methods and Procedures
- Data Gap
- Data Quality Control and Assurance
- Project Schedule for Field Sampling and Analysis
- Project Schedule for Data Evaluation and Report Submittals

2.0 CONCEPTUAL SITE MODEL

The CSM (as defined in Section 4.4 of the CD) was based on interpretation of the HSDS on-site investigation data, regional geology and hydrogeology, residential water well sampling data in the NKSA, and groundwater investigations performed associated with the former HSDS (i.e., within the House Street Study Area; i.e., portion of NKSA investigated as it pertains to the HSDS). The CSM is focused on the groundwater flow from the HSDS to Area 5, PFAS distribution in groundwater, and the fate and transport of PFAS in groundwater. For the purpose of this RAP, the current understanding of the CSM as related to the human receptors in Area 5 was evaluated and potential data gaps were identified. See **Figure 1** for a layout of the NKSA and the PFAS Investigation Areas. No permanent groundwater monitoring wells have yet been installed in Area 5. See **Tables 1** and **2** for a list of residential water wells and addresses in Area 5 and their associated PFAS analytical results. The following sections discuss source area, hydrology, geology, hydrogeology, PFAS distribution in groundwater, groundwater flow, and PFAS transport.



2.01 HOUSE STREET DISPOSAL SITE

The HSDS, located at 1855 House Street NE, Plainfield Township, Kent County, Michigan encompasses approximately 76 acres (**Figure 1**). The HSDS is currently undeveloped and according to available information, no buildings were previously present. An electric utility right-of-way and associated high-voltage transmission lines cross the northern portion of the HSDS, and an access road from House Street runs south to north across the HSDS.

The properties surrounding the HSDS are primarily undeveloped or residential. Properties to the northwest are undeveloped extending to Clear Bottom Lake and Freska Lake. Properties to the west, southwest, and northeast are primarily residential. House Street abuts the HSDS to the south and southeast. Portions of the eastern HSDS boundary are formed by Herrington Avenue NE. Land owned by MDOT is present south and southeast of the HSDS (US-131 right-of-way), and additional residential properties are located westward along House Street.

PFAS were in Scotchgard™, a waterproofing material manufactured by 3M Company, that was applied to some leather goods manufactured at the former Wolverine tannery site in Rockford, Michigan, over a period of time. It has been determined that the tanning byproducts in which Scotchgard™ was used contained PFOS and PFOA and their precursors, which are part of a larger group of PFAS.

The HSDS was a State of Michigan licensed and regulated disposal facility from the mid-1960s through 1978. Until 1970, the HSDS received leather tanning byproducts over a period of time. EGLE Remediation and Redevelopment Division files indicated that HSDS's waste disposal license expired in 1978, but it appears no waste was disposed by Wolverine at HSDS after 1970. Based on past investigation data at Wolverine's tannery Site (R&W/GZA, 2019), the byproducts also contained other substances which were addressed in the USEPA TCRA removal action. However, the data indicates that only PFOS and PFOA appear to be materially migrating from the HSDS.

Lastly, while not specifically investigated, there are other possible sources of PFAS at residential properties such as those in Area 5, including septic systems, rain deposition, and the use of domestic products that contain PFAS (Schaider et al, 2016; EGLE, 2019a; ITRC, 2020).

2.02 TOPOGRAPHY

As shown in **Figure 1**, the terrain is generally hilly in the region. The ground surface elevation at HSDS ranges from 740 feet to 800 feet. The HSDS is flanked by higher ground to the northeast and southwest, but ground surface generally dips to the northwest toward Clear Bottom Lake and Freska Lake, and to the southeast toward the Rogue River. Ground surface elevations for the area east of the HSDS range from 800 to more than 900 feet AMSL; ground surface elevations for the west to southwest of the HSDS range from 800 to 820 feet AMSL, with lower terrains to the northwest and southeast. Ground surface elevations in the NKSA range from approximately 650 feet AMSL at the Rogue River to more than 900 feet AMSL near the NKL. Ground surface generally dips southeast toward the Rogue River. Area 5 ground surface elevations range from approximately 710 feet to 620 feet AMSL with a general downward gradient to the south-southwest.

2.03 HYDROLOGY

The NKSA is situated within the Rogue River Basin (Basin No. 14F), which is part of the Lower Grand River watershed (HUC 04050006). Based on the Michigan's Major Watersheds – Sub-basins GIS data (EGLE, 2019b) downloaded from MGDL, the HSDS and Area 6 study areas are situated within the Rogue River Basin (Basin No. 14F), which is part of the Lower Grand River watershed (HUC 04050006). The Rogue River Basin consists



of 12 sub-basins. Area 5 is in Rogue River sub-basin HUC 04050006040120 and Lower Grand River HUC 04050006050050. The HSDS is situated on the water divide of two sub-basins: HUC 04050006040080 and HUC 04050006040120. These three sub-basins drain to the Rogue River, which discharges to the Grand River.

The 2016 National Oceanic and Atmospheric Administration climate data report¹ for Grand Rapids, Michigan, indicates that the mean annual precipitation for the 80-year record period is approximately 36 inches. Based on the state-wide GIS data for the estimated annual groundwater, recharge from precipitation at the NKSA ranged from 9 to 15 inches (Michigan State University, 2005).

From 1989 to 2016, the average annual streamflow rate at USGS Gaging Station No. 04118500 in Rockford, Michigan, is approximately 260 cfs, and the average baseflow rate approximately 210 cfs. The gaging station measures the flow for the sub-basin, HUC 04050006040110, and all the upstream sub-basins, representing a drainage area of approximately 234 square miles, according to the USGS record.

2.04 GEOLOGY

Overburden in Kent County is a thick sequence of Pleistocene glacial deposits. The thickness of glacial deposits ranges from 11 to 800 feet in Kent County; however, the majority of glacial deposits range from 200 to 400 feet in thickness (Western Michigan University, 1981; Farrand, 1982). The glacial deposits in the County include till, outwash and lacustrine deposits. Till occurs in end moraines and ground moraines (till plains), interspersed on the surface throughout the County (Stramal, Wisler, & Laird, 1954). For the area near the City of Rockford and Plainfield Township, the Michigan Glacial Land systems (Michigan State University, 2015) indicates that proglacial outwash plain is present along the Rogue River, and end moraines are present either side of the Rogue River extending to the “wide” near the Grand River. End moraines of medium-textured till are present at the NKSA and its vicinity. The ground moraine (till plain) and end moraine belong to the unstratified group of deposits, composed of fine- to coarse-grained material, including silt, sand, gravel, and boulders.

Based upon bedrock maps for the area (MDEQ, 1987), the bedrock beneath the NKSA includes the Michigan basin series. Based on GIS data from EGLE (MDEQ, 1987), Jurassic “red beds” are present in most of the site area and its vicinity, with small areas of Saginaw formation outcrops. The Jurassic “red beds” are often poorly consolidated or unconsolidated and consist primarily of clay, mudstone, siltstone, sandstone, shale, and gypsum. The “red beds” are of low permeability and are considered a confining unit. However, locally in the county, the “red beds” have been documented to supply small quantities of water (Apple & Reeves, 2007). Beneath the “red beds,” bedrock in the region consists of the Mississippian-aged sandstone (Marshall formation), shale (Michigan formation), and the Bayport limestone as well as the Pennsylvanian-aged Saginaw formation. The regional dip is northeasterly toward the center of the Michigan basin.

Based on the Hydrogeologic Atlas of Michigan (Western Michigan University, 1981), the top of bedrock elevation ranges from 500 to 550 feet near the City of Rockford. The top of bedrock elevations at the HSDS area were estimated to range from 540 to 580 feet (R&W/GZA, 2018).

NKSA Geology

This summary of the geology in the NKSA is based on borehole data collected during the subsurface exploration and groundwater monitoring well installation described in **Appendix A** and the residential water well construction information and lithology data downloaded from the online Wellogic System.² The Wellogic System made available individual well logs in PDF, GIS shapefiles of county-wide well locations and construction information,

¹ <https://www.ncdc.noaa.gov/cdo-web/search>

² <https://secure1.state.mi.us/wellogic/Login.aspx?ReturnUrl=%2fwellogic%2fdefault.aspx>



and database files of lithology data for some of the wells. R&W/GZA has attempted to verify the well locations by comparing the well addresses to the Kent County Parcel GIS shapefiles and found that some of the well locations in the Wellogic GIS shapefiles are incorrect. To rectify, the Kent County parcel center coordinates are used for the residential well locations if the well addresses are verified with the Kent County Parcel GIS shapefiles. The majority of the well addresses in the Wellogic System GIS shapefiles were verified, and the parcel center locations were used as their coordinates. For some well locations, the addresses of which were not verifiable, the locations in the Wellogic System GIS files were kept and qualified with a note. In addition, lithology data for some of the wells in the Wellogic System GIS shapefiles were not available; therefore, R&W/GZA downloaded the PDF well logs and compiled the available lithology data into the well lithology database.

The monitoring well locations and the residential water wells with lithology data are shown in **Figure 4**. Geologic cross-sections, A-A', B-B', C-C', and D-D' show the lithology in Area 5. See **Figures 5 through 9** for the geological cross-sections and their locations within Area 5.

Area 5

Area 5 cross-section A-A' (**Figure 6**) begins at the HSDS, following the interpreted groundwater flow direction to the southwest, then to the south toward the Grand River. Cross-section A-A' is located near the western boundary of Area 5. In the majority of the boreholes from the HSDS, along House Street, toward Pine Island Drive, the lithology is predominantly coarse-grained soil. As the A-A' section line turns to the south, fine-grained soil with varying thickness is observed in most of the boreholes. Water bearing units were encountered as shown on the cross-section. The presence of fine-grained soil is expected to affect the flow path locally, but not the primary groundwater flow along this cross-section toward the Grand River

Cross-section B-B' (**Figure 7**) is constructed from the HSDS, passing through MW-11 cluster, toward the Grand River. It runs east of cross-section A-A' and west of C-C'. The lithology is predominantly coarse-grained soil, with the presence of fine-grained soil of varying thickness in a few borings. The fine-grained soil is less prevalent than along cross-section A-A'.

Cross-section C-C' (**Figure 8**) is constructed from HS-MW-17 well clusters, through eastern portion of Area 5, toward the Grand River. Except for HS-MW-17, where the soil encountered was sand from ground surface to an elevation of approximately 560 feet AMSL, fine-grained soil was encountered in most of the boreholes on this cross-section, with thickness ranging from less than 10 feet to approximately 80 feet. However, water-bearing units were encountered in all wells on the cross-section. The presence of fine-grained soil is expected to affect the flow path locally, but not the primary groundwater flow toward the Rogue River or the Grand River.

Cross-section D-D' (**Figure 9**) is constructed to be approximately perpendicular to the groundwater flow direction in the northern portion of Area 5. The lithologies of the wells on cross-section D-D' are generally coarse-grained soil, sand or gravel, with the presence of clay of varying thickness in some boreholes. Fine grained soil of approximately 20 or more feet thick was observed in five boreholes west of monitoring well HS-MW-14. As shown in other cross-sections, water-bearing units were encountered in all wells on the cross-section. The presence of fine-grained soil is expected to affect the flow path only locally.

In general, coarse-grained soil predominates in most of the soil borings and water well logs in the larger HSDS Study Area (i.e. portion of NKSA investigated as it pertains to the HSDS) and Area 5. The presence and thickness of clay and silt deposits varies horizontally and vertically without stratified correlation between borings. The lithologies shown on the cross-sections in the HSDS study area are characteristics of glacial outwash and end moraines, as documented in regional geology. Based on our review of the well log lithologies and interpreted top



of bedrock elevation, the overburden thickness in Area 5 ranges from approximately 90 to 270 feet, and the top of bedrock elevation ranges from approximately 540 to 570 feet in Area 5.

2.05 HYDROGEOLOGY

NKSA House Street Study Area Groundwater Flow

Static water levels were collected from the monitoring wells and the staff gauges throughout the NKSA. Groundwater and surface water elevations were calculated from the surveyed elevations of the top of casing for the monitoring wells or reference points for the staff gauges. In addition, surface water elevations recorded at USGS Gaging Station No. 04118500 were also downloaded and converted to the same datum as the monitoring well survey. See **Table 3** for the well installation information in the NKSA and **Table 4** for a summary of the static groundwater water level measurements. Note these tables include information for NKSA as a whole, while only a portion of the data is relevant to Area 5.

In addition to the R&W/GZA-installed groundwater monitoring wells, EGLE also collected static water level data from the monitoring wells installed by EGLE during the November 2019 monitoring event and requested that NKL collect and provide static water level data in November 2019. In combination, the November 2019 static water level data provided the most complete set of static water levels and elevations for the NKSA.

For the locations where multiple wells were installed at different intervals, R&W/GZA grouped the wells into the shallow zone and deep zone by borehole lithologies, screen intervals, and static water elevations. See **Table 3** for the well grouping designations.

Based on the November 2019 data set, groundwater elevation contours were interpolated from the static water level data. See **Figure 2** for the groundwater elevation contours in the shallow zone and **Figure 3** for the deep zone.

As shown on **Figures 2** and **3**, groundwater in both the deep and shallow zones of the NKSA flows to the Rogue River. The HSDS is situated at or near a groundwater divide. Groundwater predominantly flows from the HSDS to the southeast to the Rogue River, but a portion of the flow is to the northwest. Because of groundwater discharge to Freska Lake and Clear Bottom Lake, the hydraulic gradient to the southwest appears to be flat as compared to the southeast.

Area 5 Groundwater Flow

In Area 5, the shallow groundwater flows to the south and southeast toward the Grand and Rogue Rivers respectively. The deeper groundwater contours show an overall south-southeast flow toward the Grand and Rogue Rivers. However, these contours are interpolated in and near Area 5 because there are no investigative monitoring wells within Area 5. As such, this is one of the data gaps identified in this CSM. Site specific hydraulic conductivity values are not available, as such Area 5-specific groundwater seepage velocity is not estimated.

As shown on **Figure 10** and **Figure 11**, Area 5 appears to be located hydraulically downgradient of the HSDS, but not in the flow path of the primary HSDS plume, which migrates to the southeast to the Rogue River. Groundwater flow in the Area 5 appears to be to the south or southeast toward the Grand River. However, it is important to note that the groundwater contours were based on the surface water elevations and the existing groundwater monitoring well data, and groundwater elevation measurements were sparse in Area 5 and its vicinity; therefore, localized flow directions between Area 5, the HSDS primary plume, and adjacent areas remain to be evaluated.

2.06 PFAS DISTRIBUTION IN GROUNDWATER**Distribution of PFAS in the House Street Study Area**

Groundwater and residential well sampling completed since 2017 has identified one primary PFAS plume within the HSDS Study Area (“House Street Primary Plume”). Groundwater samples collected from the monitoring wells across the House Street Study Area in 2019 identified PFOA and PFOS as the primary PFAS compounds (approximately 11 percent and 60 percent of the total PFAS in monitoring well samples respectively). Note total PFAS analyte lists have varied between 14 and 23 (i.e., the EPA Method 537.1 14-analyte list and the 23 analytes included in the isotope dilution methodology under the most recent DoD QSM revision in effect at the time of sampling). However, given that the percent of the total PFAS mass that is comprised of PFOA + PFOS is relatively high, the slight variations in the total PFAS due to the varied number of analytes is negligible. Specifically, the analytes included on the 23 list that are not on the 14 list (i.e. 9 different compounds) comprise approximately 8 percent of the total PFAS in the monitoring well samples. For consistency in the mapping, the total PFAS presented on **Figure 10** are calculated from the sum of the 12 PFAS compounds that are common between EPA Method 537.1 and the isotope dilution, DoD QSM methodology. However, the total PFAS values used throughout the remainder of this RAP and associated documents are reported as full totals of either the 14 or 23 analytes.

Table 5, below, summarizes the detections, maximum concentration, and frequency of detection in groundwater samples collected in the House Street Study Area for PFOA and PFOS analytes. Analytical data for the residential wells in Area 6 are provided on **Table 2**, and PFAS analytical results for the samples collected from the House Street Study Area in 2019 are provided in **Table 6**. **Figures 10** and **11** depict total PFAS (12 compounds as previously discussed) and PFOA + PFOS in the House Street Study Area near Area 6, respectively.

Table 5: Summary of Combined PFOA + PFOS Data in Groundwater,**2019 HSDS Quarterly Monitoring Well Sampling**

Compound	Total Samples	Number of Detections	Number of Exceedances	Maximum Conc. ($\mu\text{g}/\text{L}$)	Threshold Value ($\mu\text{g}/\text{L}$)	Basis for Value ¹
Combined PFOA + PFOS	256	129	35	111	0.070	DWC
Combined PFOA + PFOS	256	129	91	111	0.010	CD Value ²

1. Discussion of criterion applicability is included in Section 2.08.

2. CD value is not a state-wide criterion, but a performance objective from the CD.

PFAS analytical data from the groundwater monitoring wells, and residential water well samples collected until December 2019 were combined and used for the interpolation of isoconcentration maps for total PFAS (**Figure 10**), and PFOA + PFOS (**Figure 11**). Where data from multiple sampling depths or sampling events are available at one location, the maximum concentrations were used during interpolation. It is important to note that the isoconcentration maps were geostatistically interpolated from spatially distributed point data, therefore they may overestimate the concentrations or extents in areas where data points were relatively sparse. As implied by the method, the isoconcentration maps are estimations only and are not intended to represent measured or true conditions.

The total PFAS isoconcentration map (**Figure 10**) suggests the primary PFAS plume migrated from the HSDS toward the Rogue River, primarily in the southeast direction, along the plume centerline. The PFOA + PFOS isoconcentration map (**Figure 11**) indicates a similar distribution to the total PFAS isoconcentration map, but their extents and the concentration ranges are less than that of total PFAS because the total PFAS isoconcentration map included other compounds, such as PFBS, PFHxA, PFHxS, and PFNA. Area 5 is situated south of the primary



House Street plume. As shown in **Figures 10 and 11**, the primary PFAS plume (consisting of primarily PFOA and PFOS) is located north and northeast of Area 5.

Distribution of PFAS in Area 5

Area 5 appears to be located outside of the primary HSDS PFAS plume; however, the groundwater data within Area 5 is limited to residential wells with generalized lithology (see **Figures 6 through 9**). As shown in **Table 2**, PFAS and PFOA + PFOS were not detected in the majority of the residential water wells in Area 5. Out of the few water wells detected with PFAS, PFOA + PFOS, only one location, 2153 Post Drive, contained PFOA + PFOS at a concentration greater than 10 ppt, but less than the Part 201 Drinking Water Criterion of 70 ppt. Vertically, the residential water wells in Area 5 appear to be screened at a shallower elevation than monitoring wells HS-MW-17D and HS-MW-5D (located north of Area 5), where PFOA + PFOS was detected at concentrations greater than the Part 201 Drinking Water Criterion of 70 ppt. The potential migration of PFAS including PFOA + PFOS in the deep zone into Area 5 remains to be evaluated. Data gaps are described in **Section 2.08**, and data collection to resolve the gaps is discussed in **Section 3.0**.

3-Dimensional Representation of PFAS in Area 5

Due to the lack of monitoring well clusters screened at multiple depths in Area 5, a 3-dimensional representation of PFAS is not practicable at this time. This representation may be completed once the data proposed in **Section 3.0** are collected.

2.07 APPLICABLE PART 201 CLEANUP CRITERIA AND PROJECT ACTION LEVELS

The residents in Area 5 who use groundwater for drinking water are potential receptors of PFOA + PFOS exposure via groundwater ingestion. Therefore, based on EGLE's Part 201 administrative rules, the applicable Part 201 groundwater cleanup criterion for Area 5 is the Part 201 Generic Groundwater Cleanup Criteria Protective of Drinking Water for Residential Land Uses (DWC), which is protective of human health from being exposed to groundwater via ingestion.

For PFAS compounds, Michigan only has Part 201 cleanup criteria for PFOS and PFOA. Section 7.1 of the CD requires preventing exposure to PFOA + PFOS concentration in excess of 10 ng/L as one of the performance objectives.

Compound	Threshold Value ($\mu\text{g}/\text{L}$)	Basis for Value
PFOA	12	GSI
PFOS	0.012	GSI
Combined PFOA + PFOS	0.070	DWC
Combined PFOA + PFOS	0.010	CD Value

The GSI pathway for PFAS and PFOA + PFOS is addressed in a separate RAP submitted to EGLE in April 2020 (R&W/GZA, 2020).

Based on the Part 201 cleanup criteria and the CD requirement, the project action levels for PFOA + PFOS concentrations are set to be 10 ng/L and 70 ng/L. The project objectives are to monitor possible migration of



PFAS/PFOA + PFOS to Area 5 and evaluate if Area 5 receptors are potentially exposed to PFOA + PFOS above 10 ng/L via groundwater ingestion.

2.08 DATA GAPS

Based on the current understanding of the CSM and the above discussions, the following data gaps are identified:

- Groundwater elevation and groundwater flow directions from the HSDS or the primary HSDS PFOA + PFOS, PFAS plume to Area 5; and
- Potential for PFOA + PFOS, PFAS impacted groundwater in the shallow and deep aquifer zones migrating to Area 5.

3.0 PROPOSED STATEMENT OF WORK

The following provides a summary of the proposed investigation, based on the identified data gaps. The proposed sampling locations are shown on **Figure 12**. Actual monitoring well locations may vary slightly from the proposed locations of **Figure 12** during installation. While the target locations are shown, limitations for access on private properties, site conditions, and utilities may require moving monitoring well locations.

- Existing monitoring wells HS-MW-21S, HS-MW-21M, and HS-MW-21D will be utilized as part of the well network for Area 5.
- Five VAP/monitoring well locations, AREA5-RI-1 through AREA5-RI-4 and AREA5-RI-12, are proposed to delineate the extent of plume in the central portion of the eastern boundary of Area 5. (Note, location AREA5-RI-12 is a contingency location and may not be drilled, pending information from other locations.) The proposed wells are located hydraulically upgradient, downgradient, and cross-gradient.
- Three VAP/monitoring well locations, AREA5-RI-5 through AREA5-RI-7, are proposed to delineate the extent of the plume near HS-MW-26. The proposed wells are located hydraulically upgradient, downgradient, and cross-gradient.
- Seven monitoring well locations (HS-PMW-RI-103, HS-PMW-RI-104, HS-PMW-RI-107, AREA5 RI 8, AREA5 RI-9, AREA5-RI-10, and AREA5-RI-11) are proposed to provide detection monitoring of PFAS possibly migrating toward Area 5 from the HSDS. The locations are selected based on groundwater contours and groundwater flow lines backtracking to the HSDS. These seven monitoring well clusters are proposed to provide groundwater analytical data to monitor potential migration of PFOA + PFOS from the primary House Street plume into Area 5. In addition, the proposed groundwater monitoring wells clusters will provide additional groundwater elevation data for the evaluation of groundwater flow west of the primary PFAS plume originated from the HSDS.

4.0 INVESTIGATION METHODOLOGY

Relevant tasks completed under this RAP will be completed in accordance with the most recent revision of the QAPP prepared for Wolverine by R&W/GZA.

The proposed well cluster locations will be drilled using either hollow-stem auger or rotosonic methods in accordance with SOPs A03 through A06 of the QAPP. When possible, the initial boring at each location will be drilled to the top of bedrock or upon refusal. The borehole terminal depth will also be evaluated based on the depths of adjacent water wells and the presence of confining strata.



As the original borings are drilled at each location, vertical aquifer profiling samples will be collected for PFAS analysis from water-bearing and permeable formation(s) at an interval of 10 feet. VAP will be completed in accordance with *SOP A25, Vertical Aquifer Profiling* included in the QAPP. The turn-around time for laboratory samples will be approximately 3 weeks.

Based on the profiling data, encountered geology, and nearby drinking water well elevations, R&W/GZA will determine the depth(s) of wells installed at each nest location. The monitoring wells will be developed in accordance with *SOP A13, Well Development* in the QAPP. Upon completion, the wells will also be surveyed by a licensed surveyor.

5.0 SAMPLING AND ANALYTICAL PROCEDURES

This section provides a generalized SAP for the Area 5 monitoring well sampling. Specific information regarding sampling procedures and analytical methods is provided in the site-specific QAPP.

Wells will be sampled as follows:

- Initial sampling post installation/development; and
- Annual sampling until substantial completion of the Area 5 well network.

Once the Area 5 well network is substantially complete, all newly-installed wells will be sampled quarterly for one year. (Substantial Completion will be agreed upon by R&W/GZA and EGLE.)

5.01 SAMPLING LOCATIONS

As discussed in **Section 3.0**, the following monitoring well locations are proposed:

Grouping/Area	Well Nomenclature
Existing	HS-MW-21S, HS-MW-21M, and HS-MW-21D
Central portion of the eastern boundary of Area 5	AREA5-RI-1, AREA5-RI-2, AREA5-RI-3, and AREA5-RI-4 (Contingency: AREA5-RI-12)
Delineation near HS-MW-26	AREA5-RI-5, AREA5-RI-6, and AREA5-RI-7
Detection monitoring for potential migration to Area 5	HS-PMW-RI-103, HS-PMW-RI-104, HS-PMW-RI-107, AREA5 RI 8, AREA5 RI-9, AREA5-RI-10, and AREA5-RI-11

5.02 SAMPLE COLLECTION AND LABELING

Samples will be collected for PFAS analysis following the methods summarized in **Section 4.0** and detailed in the sampling SOPs for Groundwater Monitoring Wells (SOP A16; Low Flow Sampling). Detailed field and laboratory requirements are provided in the site-specific QAPP.

Sample identification will consist of nomenclatures that include the unique location identification (see reference table above). If applicable, sample identification for each sample will be repeated for each sampling event with consistent spelling.

To prevent misidentification of samples, legible labels will be affixed to each sample container. The labels will be sufficiently durable to remain legible even when wet. At a minimum, the labels will contain the following information:



- Location ID;
- Name or initials of collector; and
- Date and time of collection.

5.03 SAMPLE SHIPPING

Sample bottles will be placed into the cooler and packed with double-bagged wet ice immediately following collection. Packing material will be used as necessary. A temperature blank will be placed in the cooler prior to shipment. The cooler shall be addressed to the appropriate laboratory and dispatched as soon as practical to ensure timely arrival.

5.04 ANALYTICAL METHOD AND PARAMETERS

PFAS will be analyzed using DoD QSM 5.3 guidelines for PFAS by isotope dilution methodology. The analyte list will include the 28 PFAS compounds specified by EGLE, and reporting limits are provided in Table A.7.7 of the project-specific QAPP.

6.0 DATA QUALITY ASSURANCE AND CONTROL

The following field quality control samples will be collected at a rate of one per 20 samples in accordance with the project-specific QAPP: Field blanks, field duplicates, and MS/MSDs.

- Field blanks will be collected by pouring laboratory-supplied, certified PFAS-free water into a sample container at the point of sample collection. The purpose of field blanks is to assess potential contamination at the sample point.
- Field duplicates will be collected by filling one additional sample container with water from the sample point. The purpose of field duplicates is to assess variability in sample composition. Field duplicates are not intended to be blind duplicates.
- MS/MSD will be collected by filling two additional sets of sample bottles with water from the sample point. MS/MSD analyses are conducted by the analytical laboratory after samples have been collected and submitted. Analysis of known concentrations of analytes spiked in the MS/MSD samples indicate if matrix interference effects are occurring.
- QA/QC samples will be collected using the methods described in **Section 5.0** and the SOPs in the site-specific QAPP. Samples will be labeled as described in **Section 5.0**. The location of QA/QC samples will be entered into the Monitoring Checklist. QA/QC samples will be analyzed using the same analytical methods used for the primary sample.

7.0 INVESTIGATION DERIVED WASTE

Soil cuttings and development/purge water from the well installations and sampling will be containerized and transported to the HSDS property for staging/storage until off-site treatment/disposal or other approved handling can be arranged.



8.0 ANTICIPATED SCHEDULE

The schedule for monitoring well installation will depend greatly on R&W/GZA's ability to procure access to the desired or proximate alternate locations and the potential impact of COVID-19. The following table outlines R&W/GZA's current estimates of the steps and approximate timeframes for the tasks in this RAP (upon EGLE approval).

Task	Estimated Timeframe per Location
Access	1 to 3 months
Initial Drilling	2 to 3 weeks
VAP analysis	3 weeks
Monitoring Wells Installation	1 to 2 weeks
Development Wait Time	2 weeks
First Groundwater Sampling	1 week
First Laboratory Analysis	3 weeks

Assuming one month per location, R&W/GZA estimates this SOW will require 15 months to complete drilling, vertical aquifer profiling and monitoring well installation. This will be completed in conjunction with the other RAPs submitted under the CD. R&W/GZA will coordinate with EGLE to prioritize drilling locations if access is obtained for multiple locations throughout the RAPs simultaneously. Because access will likely be obtained piecemeal, the actual well installation schedule will likely exceed 15 months.

Following the full year of quarterly sampling of the well network, R&W/GZA will evaluate the data in consultation with EGLE and determine appropriate next steps.

9.0 REFERENCES

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DRAFT June 18, 2020

Area 5 Response Activity Plan

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TABLES

TABLE 1
PARCEL LIST AND WELL INFORMATION
Area 5
Plainfield Township, Kent County, MI

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Area	PPN	Address	Note	Well Screen Elevation (feet)
Area 5	411017276001	1425 PARK FOREST CT NE	MUNICIPAL WATER	NA
Area 5	411017276002	1471 PARK FOREST CT NE	SAMPLED BY R&W/GZA	659-654
Area 5	411017276003	1499 PARK FOREST CT NE	SAMPLED BY R&W/GZA	682-672
Area 5	411017276007	1500 PARK FOREST CT NE	SAMPLED BY R&W/GZA	680-675
Area 5	411017276006	1506 PARK FOREST CT NE	SAMPLED BY R&W/GZA	NA
Area 5	411017276005	1508 PARK FOREST CT NE	SAMPLED BY R&W/GZA	612-602
Area 5	411017276004	1510 PARK FOREST CT NE	SAMPLED BY R&W/GZA	648-642
Area 5	411009351006	1601 POST DR NE	MUNICIPAL WATER	NA
Area 5	411009351005	1604 POST DR NE	VACANT	NA
Area 5	411009353004	1615 POST DR NE	VACANT	NA
Area 5	411016103001	1625 CORNERSTONE CT NE	SAMPLED BY R&W/GZA	618-613
Area 5	411016103008	1628 CORNERSTONE CT NE	SAMPLED BY R&W/GZA	628-622
Area 5	411016103002	1633 CORNERSTONE CT NE	SAMPLED BY R&W/GZA	643-638
Area 5	411016101002	1646 POST DR NE	SAMPLED BY R&W/GZA	695-691
Area 5	411016103007	1650 CORNERSTONE CT NE	SAMPLED BY R&W/GZA	656-651
Area 5	411016103003	1651 CORNERSTONE CT NE	SAMPLED BY R&W/GZA	619-614
Area 5	411016103006	1662 CORNERSTONE CT NE	SAMPLED BY R&W/GZA	601-596
Area 5	411016103004	1665 CORNERSTONE CT NE	VACANT	NA
Area 5	411016103005	1678 CORNERSTONE CT NE	SAMPLED BY R&W/GZA	621-611
Area 5	411016101012	1690 POST DR NE	SAMPLED BY R&W/GZA	587-577
Area 5	411016101005	1716 POST DR NE	MUNICIPAL WATER	NA
Area 5	411016101013	1730 POST DR NE	SAMPLED BY R&W/GZA MUNICIPAL WATER	642-638
Area 5	411016101008	1756 POST DR NE	MUNICIPAL WATER	NA
Area 5	411009352003	1762 CHANDLER WOODS CT NE	MUNICIPAL WATER	NA
Area 5	411016101009	1772 POST DR NE	SAMPLED BY R&W/GZA	660-655
Area 5	411009352006	1777 CHANDLER WOODS CT NE	MUNICIPAL WATER	NA
Area 5	411009352004	1778 CHANDLER WOODS CT NE	MUNICIPAL WATER	NA
Area 5	411009352007	1785 CHANDLER WOODS CT NE	MUNICIPAL WATER	NA
Area 5	411016101010	1788 POST DR NE	MUNICIPAL WATER	NA
Area 5	411009352005	1790 CHANDLER WOODS CT NE	MUNICIPAL WATER	NA
Area 5	411016102007	1790 POST DR NE	SAMPLED BY R&W/GZA	593-590
Area 5	411009352008	1791 CHANDLER WOODS CT NE	MUNICIPAL WATER	NA
Area 5	411016101011	1798 POST DR NE	MUNICIPAL WATER	NA
Area 5	411009352009	1799 CHANDLER WOODS CT NE	MUNICIPAL WATER	NA
Area 5	411016365022	1799 ROGUE RIVER RD NE	SAMPLED BY R&W/GZA	632-627
Area 5	411016102008	1800 POST DR NE	MUNICIPAL WATER	NA
Area 5	411016126021	1815 POST DR NE	SAMPLED BY R&W/GZA	667-662
Area 5	411016176001	1818 POST DR NE	MUNICIPAL WATER	NA
Area 5	411016126002	1825 POST DR NE	SAMPLED BY R&W/GZA	690-685
Area 5	411016126010	1845 POST DR NE	SAMPLED BY R&W/GZA	684-680
Area 5	411016126013	1861 POST DR NE	SAMPLED BY R&W/GZA	697-691
Area 5	411016376009	1867 ROGUE RIVER RD NE	SAMPLED BY R&W/GZA	NA

TABLE 1
PARCEL LIST AND WELL INFORMATION
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Plainfield Township, Kent County, MI

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Area	PPN	Address	Note	Well Screen Elevation (feet)
Area 5	411016376016	1879 ROGUE RIVER RD NE	SAMPLED BY R&W/GZA	NA
Area 5	411016126007	1881 POST DR NE	SAMPLED BY R&W/GZA	675-670
Area 5	411016376017	1881 ROGUE RIVER RD NE	MUNICIPAL WATER	NA
Area 5	411016126025	1901 POST DR NE	SAMPLED BY R&W/GZA	676-671
Area 5	411016376010	1901 ROGUE RIVER RD NE	SAMPLED BY R&W/GZA	641-638
Area 5	411016126026	1939 POST DR NE	SAMPLED BY R&W/GZA	670-660
Area 5	411016176012	1970 POST DR NE	SAMPLED BY R&W/GZA	NA
Area 5	411016126018	1977 POST DR NE	SAMPLED BY R&W/GZA	667-662
Area 5	411016176013	1978 POST DR NE	SAMPLED BY R&W/GZA	660-654
Area 5	411016176024	1990 POST DR NE	SAMPLED BY R&W/GZA	644-639
Area 5	411016201002	2001 POST DR NE	SAMPLED BY R&W/GZA	648-644
Area 5	411016251008	2030 POST DR NE	VACANT	NA
Area 5	411016201009	2035 POST DR NE	SAMPLED BY R&W/GZA	640-635
Area 5	411016451080	2047 REINIER CT NE	MUNICIPAL WATER	NA
Area 5	411016451093	2050 REINIER CT NE	POSSIBLE NEW CONSTRUCTION	NA
Area 5	411016451088	2055 REINIER CT NE	MUNICIPAL WATER	NA
Area 5	411016451087	2058 REINIER CT NE	MUNICIPAL WATER	NA
Area 5	411016251007	2062 POST DR NE	SAMPLED BY R&W/GZA	637-632
Area 5	411016451072	2063 REINIER CT NE	MUNICIPAL WATER	NA
Area 5	411016201015	2069 POST DR NE	SAMPLED BY R&W/GZA	658-653
Area 5	411016251005	2086 POST DR NE	SAMPLED BY R&W/GZA	626-621
Area 5	411016251003	2088 POST DR NE	VACANT	NA
Area 5	411016201011	2101 POST DR NE	SAMPLED BY R&W/GZA	649-644
Area 5	411016201007	2141 POST DR NE	SAMPLED BY R&W/GZA	650-646
Area 5	411016201017	2153 POST DR NE	SAMPLED BY R&W/GZA	656-648
Area 5	411016251002	2200 POST DR NE	VACANT	NA
Area 5	411016376044	6057 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	592-587
Area 5	411016376043	6075 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	630-625
Area 5	411016451030	6088 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	604-600
Area 5	411016451035	6100 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	619-614
Area 5	411016376005	6111 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	607-599
Area 5	411016451052	6114 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	574-569
Area 5	411016451094	6118 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	600-595
Area 5	411016376045	6129 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	646-643
Area 5	411016376015	6145 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	574-569
Area 5	411016365045	6152 GEORGE ANN CT NE	SAMPLED BY R&W/GZA	NA
Area 5	411016451092	6160 MAKSIMOWSKI AVE NE	MUNICIPAL WATER	NA
Area 5	411016376022	6175 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	NA
Area 5	411016365060	6176 GEORGE ANN CT NE	MUNICIPAL WATER	NA
Area 5	411016365061	6188 GEORGE ANN CT NE	MUNICIPAL WATER	NA
Area 5	411016365054	6191 GEORGE ANN CT NE	MUNICIPAL WATER	NA
Area 5	411016376035	6191 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	622-617
Area 5	411016365062	6196 GEORGE ANN CT NE	MUNICIPAL WATER	NA

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Area	PPN	Address	Note	Well Screen Elevation (feet)
Area 5	411016376034	6201 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	594-584
Area 5	411016365053	6203 GEORGE ANN CT NE	MUNICIPAL WATER	NA
Area 5	411016451082	6206 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	NA
Area 5	411016451006	6210 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	547-544
Area 5	411016326002	6215 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	NA
Area 5	411016451085	6240 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	632-627
Area 5	411016326003	6243 MAKSIMOWSKI AVE NE	WELL INACTIVE	NA
Area 5	411016451084	6260 MAKSIMOWSKI AVE NE	SAMPLED BY R&W/GZA	550-540
Area 5	411016301020	6274 SAMRICK AVE NE	VACANT	NA
Area 5	411017426003	6335 SAMRICK AVE NE	SAMPLED BY R&W/GZA	NA
Area 5	411016301027	6346 SAMRICK AVE NE	VACANT	NA
Area 5	411016301026	6350 SAMRICK AVE NE	MUNICIPAL WATER	NA
Area 5	411017426002	6355 SAMRICK AVE NE	SAMPLED BY R&W/GZA	621-616
Area 5	411016301029	6378 SAMRICK AVE NE	SAMPLED BY R&W/GZA	650-643
Area 5	411017426008	6393 SAMRICK AVE NE	SAMPLED BY R&W/GZA	693-688
Area 5	411016176009	6400 BOTANY BLUFF DR NE	SAMPLED BY R&W/GZA	613-593
Area 5	411016151005	6408 SAMRICK AVE NE	MUNICIPAL WATER	NA
Area 5	411016176031	6411 BOTANY BLUFF DR NE	VACANT	NA
Area 5	411017277010	6421 SAMRICK AVE NE	SAMPLED BY R&W/GZA	NA
Area 5	411017277009	6433 SAMRICK AVE NE	MUNICIPAL WATER	NA
Area 5	411016176015	6440 BOTANY BLUFF DR NE	SAMPLED BY R&W/GZA	610-595
Area 5	411016176032	6455 BOTANY BLUFF DR NE	SAMPLED BY R&W/GZA WELL INACTIVE	NA
Area 5	411017277001	6464 SAMRICK AVE NE	VACANT	NA
Area 5	411016176008	6480 BOTANY BLUFF DR NE	SAMPLED BY R&W/GZA	601-596
Area 5	411016151002	6490 SAMRICK AVE NE	VACANT	NA
Area 5	411016151008	6512 SAMRICK AVE NE	VACANT	NA
Area 5	411016176023	6520 BOTANY BLUFF DR NE	SAMPLED BY R&W/GZA	634-629
Area 5	411017277003	6521 SAMRICK AVE NE	MUNICIPAL WATER	NA
Area 5	411017277002	6531 SAMRICK AVE NE	SAMPLED BY R&W/GZA	699-694
Area 5	411016151007	6534 SAMRICK AVE NE	SAMPLED BY OTHERS	613-608
Area 5	411016176028	6547 BOTANY BLUFF DR NE	VACANT	NA
Area 5	411016176011	6560 BOTANY BLUFF DR NE	SAMPLED BY OTHERS	629-624
Area 5	411016151006	6580 SAMRICK AVE NE	SAMPLED BY R&W/GZA	615-610
Area 5	411016176019	6600 BOTANY BLUFF DR NE	SAMPLED BY R&W/GZA	628-623
Area 5	411016176027	6601 BOTANY BLUFF DR NE	VACANT	NA
Area 5	411016176021	6605 BOTANY BLUFF DR NE	VACANT	NA
Area 5	411017226002	6611 SAMRICK AVE NE	SAMPLED BY R&W/GZA	601-596
Area 5	411016176026	6623 BOTANY BLUFF DR NE	VACANT	NA
Area 5	411016176017	6630 BOTANY BLUFF DR NE	SAMPLED BY R&W/GZA	610-600
Area 5	411016176025	6635 BOTANY BLUFF DR NE	VACANT	NA
Area 5	411017226008	6635 SAMRICK AVE NE	VACANT	NA
Area 5	411016201025	6648 REDTAIL RIDGE DR NE	SAMPLED BY R&W/GZA	625-617

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Area	PPN	Address	Note	Well Screen Elevation (feet)
Area 5	411017226007	6659 SAMRICK AVE NE	VACANT	NA
Area 5	411017226006	6695 SAMRICK AVE NE	VACANT	NA
Area 5	411016201023	6700 REDTAIL RIDGE DR NE	SAMPLED BY R&W/GZA	592-587
Area 5	411016126017	6701 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	629-624
Area 5	411016201022	6722 REDTAIL RIDGE DR NE	SAMPLED BY R&W/GZA	624-619
Area 5	411016102001	6726 SAMRICK AVE NE	SAMPLED BY R&W/GZA	692-687
Area 5	411017226005	6729 SAMRICK AVE NE	VACANT	NA
Area 5	411016126024	6739 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	614-609
Area 5	411016201021	6744 REDTAIL RIDGE DR NE	SAMPLED BY R&W/GZA	619-614
Area 5	411017226004	6759 SAMRICK AVE NE	SAMPLED BY R&W/GZA	615-605
Area 5	411017226003	6761 SAMRICK AVE NE	SAMPLED BY R&W/GZA	650-645
Area 5	411016201020	6766 REDTAIL RIDGE DR NE	SAMPLED BY R&W/GZA	615-610
Area 5	411016126022	6777 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	NA
Area 5	411016126023	6779 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	643-638
Area 5	411016102009	6780 SAMRICK AVE NE	SAMPLED BY R&W/GZA	619-615
Area 5	411016201019	6788 REDTAIL RIDGE DR NE	SAMPLED BY R&W/GZA	592-587
Area 5	411016126020	6790 CHANDLER DR NE	VACANT	NA
Area 5	411016201018	6799 REDTAIL RIDGE DR NE	SAMPLED BY R&W/GZA	603-598
Area 5	411009376011	6801 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	650-645
Area 5	411008400012	6801 SAMRICK AVE NE	MUNICIPAL WATER	NA
Area 5	411009376012	6803 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	NA
Area 5	411009451009	6810 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	620-616
Area 5	411009376010	6812 CHANDLER DR NE	SAMPLED BY R&W/GZA	661-657
Area 5	411009451008	6830 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	682-677
Area 5	411009376006	6835 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	667-662
Area 5	411009376009	6840 CHANDLER DR NE	SAMPLED BY R&W/GZA	659-654
Area 5	411009352002	6847 CHANDLER WOODS DR NE	MUNICIPAL WATER	NA
Area 5	411009451007	6850 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	628-624
Area 5	411009352011	6850 CHANDLER WOODS DR NE	MUNICIPAL WATER	NA
Area 5	411009451001	6855 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	686-681
Area 5	411009352001	6859 CHANDLER WOODS DR NE	MUNICIPAL WATER	NA
Area 5	411009352012	6862 CHANDLER WOODS DR NE	MUNICIPAL WATER	NA
Area 5	411009451002	6865 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	672-659
Area 5	411009352013	6874 CHANDLER WOODS DR NE	MUNICIPAL WATER	NA
Area 5	411009451003	6875 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	671-667
Area 5	411009451017	6879 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	NA
Area 5	411009451010	6880 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	638-633
Area 5	411009376013	6880 CHANDLER DR NE	SAMPLED BY R&W/GZA	641-637
Area 5	411009352014	6880 CHANDLER WOODS DR NE	MUNICIPAL WATER	NA
Area 5	411009451018	6885 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	652-647
Area 5	411009451005	6887 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	651-646
Area 5	411009352015	6892 CHANDLER WOODS DR NE	MUNICIPAL WATER	NA
Area 5	411009451006	6895 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	628-623

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PARCEL LIST AND WELL INFORMATION
Area 5
Plainfield Township, Kent County, MI

16.0062961.20
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 See Page 5 for Notes

Area	PPN	Address	Note	Well Screen Elevation (feet)
Area 5	411009351007	6895 SAMRICK AVE NE	MUNICIPAL WATER	NA
Area 5	411009451011	6900 BLUE RIDGE DR NE	SAMPLED BY R&W/GZA	639-634
Area 5	411009376005	6916 CHANDLER DR NE	SAMPLED BY R&W/GZA	NA
Area 5	411009376001	6976 CHANDLER DR NE	SAMPLED BY R&W/GZA	657-653
Area 5	411009351004	6977 CHANDLER DR NE	MUNICIPAL WATER	NA
Area 5	411009376002	6986 CHANDLER DR NE	SAMPLED BY R&W/GZA	631-626
Area 5	411009376003	6990 CHANDLER DR NE	SAMPLED BY R&W/GZA	646-641
Area 5	411009376004	6996 CHANDLER DR NE	SAMPLED BY R&W/GZA	630-625
Area 5	411016301028	6390 SAMRICK AVE NE	SAMPLED BY R&W/GZA FUTUER MUNICIPAL WATER (AREA 16)	683-679

Notes:

1. Well screen elevations provided in feet above mean sea level, North American Vertical Datum of 1988 (NAVD 88). Well screen elevations were calculated using well information provided by the State of Michigan's Wellogic database and ground surface elevations of the center of the PPN generated from LiDAR data provided by Kent County. Elevations are rounded to the nearest foot.
2. "NA" indicates not available.

TABLE 2
SUMMARY OF DRINKING WATER ANALYTICAL DATA - PFAS
Area 5
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water ²	Proposed MCL ³	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	
PPN			411016376010	411016126026	411016126026	411016126026	411016126026	411016126026	411016176012	411016126018	411016176013	411016176024	411016201002	411016201009	411016201009	411016251007	411016201015	
Address			1901 ROGUE RIVER RD NE	1939 POST DR NE	1939 POST DR NE	1939 POST DR NE	1939 POST DR NE	1939 POST DR NE	1970 POST DR NE	1977 POST DR NE	1978 POST DR NE	1990 POST DR NE	2001 POST DR NE	2035 POST DR NE	2035 POST DR NE	2062 POST DR NE	2069 POST DR NE	
Sample Name			1901 Rogue River Rd	1939 Post Drive NE	1939 Post-IN-11/29 Grab Potable Water	1939 Post Dr-IN-5/30	1939 Post-IN-5/28	1939 Post-IN-12/10	1970 Post	1977 Post Drive NE	1978 Post Dr NE	1990 Post Dr NE	2001 Post Dr NE	2035 Post Drive NE	2035 Post Drive	2062 Post Dr NE	2069 Post Drive NE	
Matrix			Drinking Water	Drinking Water	POET Influent	POET Influent	POET Influent	POET Influent	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	
Laboratory ID			K1711849-016	K1711614-007	9341056	TE31015-002	TK29070-008	UE30027-005	UL12029-006	UA10018-001	K1711614-008	K1711846-005	K1711846-006	K1711716-021	K1711614-009	K1800841-001	K1711846-007	K1711614-010
Sample Date			10/30/2017	10/24/2017	11/29/2017	05/30/2018	11/28/2018	05/28/2019	12/10/2019	01/07/2019	10/24/2017	10/30/2017	10/26/2017	10/24/2017	01/25/2018	10/30/2017	10/24/2017	
Parameter ($\mu\text{g/L}$)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NA	<0.0044	<0.0042	<0.006	-	-	-	-	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NA	<0.0044	<0.0042	<0.009	-	-	-	-	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	NCL	NA	<0.0044	<0.0042	<0.009	-	-	-	-	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)	NCL	NA	-	-	-	<0.0036	<0.0036	<0.0036	<0.0038	-	-	-	-	-	-	-	-	
N-Ethyl perfluoroctane sulfonamidoethanol (N-EtFOSE)	NCL	NA	<0.0044	<0.0042	<0.003	-	-	-	-	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
N-Methyl perfluoroctane sulfonamide (MeFOSA)	NCL	NA	<0.0044	<0.0042	<0.009	-	-	-	-	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)	NCL	NA	-	-	-	<0.0036	<0.0036	<0.0036	<0.0038	-	-	-	-	-	-	-	-	
N-Methyl perfluoroctane sulfonamidoethanol (N-MeFOSE)	NCL	NA	<0.0044	<0.0042	<0.003	-	-	-	-	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluorobutane sulfonic acid (PFBS)	NCL	0.42	<0.0044	<0.0042	0.004	0.0036	0.0036	0.006	0.004	<0.0038	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042
Perfluorodecane sulfonic acid (PFDS)	NCL	NA	<0.0044	<0.0042	<0.002	-	-	-	-	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluorooctadecanoic acid (PFODA)	NCL	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NA	<0.0044	<0.0042	<0.002	-	-	-	-	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluoroctane sulfonamide (FOSA)	NCL	NA	<0.0044	<0.0042	<0.003	-	-	-	-	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluorohexane sulfonic acid (PFHxS)	NCL	0.051	<0.0044	<0.0042	0.003	<0.0036	<0.0036	<0.0036	<0.0038	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluorobutanoic acid (PFBA)	NCL	NA	<0.0088	<0.0083	0.004 J	-	-	-	-	<0.0083	<0.0083	<0.0086	<0.0081	<0.0083	<0.0082	<0.0086	<0.0083	
Perfluorodecanoic acid (PFDA)	NCL	NA	<0.0044	<0.0042	0.001 J	<0.0036	<0.0036	<0.0036	<0.0038	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluorododecanoic acid (PFDoDA)	NCL	NA	<0.0044	<0.0042	<0.001	<0.0036	<0.0036	<0.0036	<0.0038	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluoroheptanoic acid (PFHxA)	NCL	NA	<0.0044	<0.0042	0.002	<0.0036	<0.0036	<0.0036	<0.0038	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluorohexanoic acid (PFHxA)	NCL	400	<0.0044	0.0044	0.005	<0.0036	<0.0036	0.0087	<0.0036	<0.0038	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0042	
Perfluorononanoic acid (PFNA)	NCL	0.006	<0.0044	<0.0042	<0.002	<0.0036	<0.0036	<0.0036	<0.0036	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluoroctanoic acid (PFOA)	0.07 (JU)	0.008	<0.0018	0.0026	0.004	<0.0036	<0.0036	0.0057	0.0042	<0.0038	<0.0017	<0.0017	<0.0016	<0.0017	<0.0016	<0.0017	<0.0017	
Perfluorooctane sulfonic acid (PFOS)	0.07 (JU)	0.016	<0.0044	<0.0042	0.003	<0.0036	<0.0036	<0.0036	<0.0038	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
PFOA + PFOS (Calculated)	0.07	0.01	ND	0.0026	0.007	ND	ND	0.0057	0.0042	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluoropentanoic acid (PFPeA)	NCL	NA	<0.0044	<0.0042	0.004 J	-	-	-	-	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluorotetradecanoic acid (PFTeDA)	NCL	NA	<0.0044	<0.0042	<0.001	<0.0036	<0.0036	<0.0036	<0.0038	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluorotridecanoic acid (PFTrDA)	NCL	NA	<0.0044	<0.0042	<0.001	<0.0036	<0.0036	<0.0036	<0.0038	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041	<0.0043	<0.0042	
Perfluoroundecanoic acid (PFUnDA)	NCL	NA	<0.0044	<0.0042	<0.002	<0.0036	<0.0036	<0.0036	<0.0038	<0.0042	<0.0042	<0.0043	<0.0041	<0.0042	<0.0041</td			

TABLE 2
SUMMARY OF DRINKING WATER ANALYTICAL DATA - PFAS
Area 5
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water ²	Proposed MCL ³	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5		
PPN			411016251005	411016201011	411016201011	411016201011	411016201011	411016201011	411016201007	411016201007	411016201007	411016201007	411016201007	411016201007	411016201007	411016201017	411016201017	411016201017		
Address			2086 POST DR NE	2101 POST DR NE	2101 POST DR NE	2101 POST DR NE	2101 POST DR NE	2101 POST DR NE	2141 POST DR NE	2141 POST DR NE	2141 POST DR NE	2141 POST DR NE	2141 POST DR NE	2141 POST DR NE	2141 POST DR NE	2153 POST DR NE	2153 POST DR NE	2153 POST DR NE		
Sample Name			2086 Post Dr NE	2101 Post Dr NE	2101 Post-IN-12/13 Grab Potable Water	2101 Post-IN-6/13 Grab Potable Water	2101 Post-IN-7/10	2101 Post-IN-1/15	2141 Post Drive NE	2141 Post-IN-12/7 Grab Potable Water	2141 Post-IN-7/24	2141 Post-IN-1/22	2141 Post-IN-7/31	2141 Post-IN-1/29	2153 Post Drive NE	2153 Post-IN-12/12 Grab Potable Water	2153 POST-IN-8/6			
Matrix			Drinking Water	Drinking Water	POET Influent	POET Influent	POET Influent	POET Influent	Drinking Water	POET Influent	POET Influent	POET Influent	POET Influent	POET Influent	Drinking Water	POET Influent	POET Influent			
Laboratory ID			K1711846-008	K1711788-002	9367796	TF14010-012	TL14024-009	UG11014-004	VA16025-003	K1711614-011	9359938	TG25012-006	UA24005-007	UH01045-006	VA30052-011	K1711614-012	9367879	L1830458-02		
Sample Date			10/30/2017	10/27/2017	12/13/2017	06/13/2018	12/12/2018	07/10/2019	01/15/2020	10/24/2017	12/07/2017	07/24/2018	01/22/2019	07/31/2019	01/29/2020	10/24/2017	12/12/2017	08/06/2018		
Parameter ($\mu\text{g/L}$)																				
8:2 Fluorotelomer sulfonic acid (8:2 FTS)			NCL	NA	<0.0043	<0.0042	<0.006	-	-	-	<0.0042	<0.005	-	-	-	-	<0.0042	<0.006	-	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)			NCL	NA	<0.0043	<0.0042	<0.008	-	-	-	<0.0042	<0.008	-	-	-	-	<0.0042	<0.008	-	
N-Ethyl perfluoroctane sulfonamide (EtFOSA)			NCL	NA	<0.0043	<0.0042	<0.008	-	-	-	<0.0042	<0.008	-	-	-	-	<0.0042	<0.008	-	
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)			NCL	NA	-	-	-	<0.0036	<0.0037	<0.0034	<0.0036	-	-	<0.0038	<0.004	<0.0035	<0.0036	-	<0.00386	
N-Ethyl perfluoroctane sulfonamidoethanol (N-EtFOSE)			NCL	NA	<0.0043	<0.0042	<0.003	-	-	-	<0.0042	<0.003	-	-	-	-	<0.0042	<0.003	-	
N-Methyl perfluoroctane sulfonamide (MeFOSA)			NCL	NA	<0.0043	<0.0042	<0.008	-	-	-	<0.0042	<0.008	-	-	-	-	<0.0042	<0.008	-	
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)			NCL	NA	-	-	-	<0.0036	<0.0037	<0.0034	<0.0036	-	-	<0.0038	<0.004	<0.0035	<0.0036	-	<0.00386	
N-Methyl perfluoroctane sulfonamidoethanol (N-MeFOSE)			NCL	NA	<0.0043	<0.0042	<0.003	-	-	-	<0.0042	<0.003	-	-	-	-	<0.0042	<0.003	-	
Perfluorobutane sulfonic acid (PFBS)			NCL	0.42	<0.0043	0.0058	0.006	0.0066	0.0051	<0.0034	<0.0036	0.0097	0.011	0.0069	0.0044	0.0064	0.0048	<0.0042	0.004	<0.00386
Perfluorodecane sulfonic acid (PFDS)			NCL	NA	<0.0043	<0.0042	<0.002	-	-	-	<0.0042	<0.002	-	-	-	-	<0.0042	<0.002	-	
Perfluorooctadecanoic acid (PFODA)			NCL	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Perfluorooctane sulfonic acid (PFHpS)			NCL	NA	<0.0043	<0.0042	<0.002	-	-	-	<0.0042	<0.002	-	-	-	-	<0.0042	<0.002	-	
Perfluoroctane sulfonamide (FOSA)			NCL	NA	<0.0043	<0.0042	<0.003	-	-	-	<0.0042	<0.003	-	-	-	-	<0.0042	<0.003	-	
Perfluorohexane sulfonic acid (PFHxS)			NCL	0.051	<0.0043	<0.0042	0.002 J	<0.0036	<0.0037	<0.0034	<0.0036	<0.0042	0.001 J	<0.0038	<0.004	<0.0035	<0.0036	<0.0042	0.001 J	<0.00386
Perfluorobutanoic acid (PFBA)			NCL	NA	<0.0086	<0.0083	<0.006	-	-	-	<0.0083	0.002 J	-	-	-	-	<0.0083	<0.006	-	
Perfluorodecanoic acid (PFDA)			NCL	NA	<0.0043	<0.0042	0.001 JB	<0.0036	<0.0037	<0.0034	<0.0036	<0.0042	0.001 J	<0.0038	<0.004	<0.0035	<0.0036	<0.0042	<0.002	<0.00386
Perfluorododecanoic acid (PFDoDA)			NCL	NA	<0.0043	<0.0042	<0.009	<0.0036	<0.0037	<0.0034	<0.0036	<0.0042	<0.0009	<0.0038	<0.004	<0.0035	<0.0036	<0.0042	<0.0009	<0.00386
Perfluoroheptanoic acid (PFHxA)			NCL	NA	<0.0043	<0.0042	0.0008 J	<0.0036	<0.0037	<0.0034	<0.0036	<0.0042	0.0009	<0.0038	<0.004	<0.0035	<0.0036	<0.0042	0.0007 J	<0.00386
Perfluorohexanoic acid (PFHxA)			NCL	400	<0.0043	<0.0042	0.002	<0.0036	<0.0037	<0.0034	<0.0036	<0.0042	0.002	<0.0038	<0.004	<0.0035	<0.0036	<0.0042	0.001 J	<0.00386
Perfluorononanoic acid (PFNA)			NCL	0.006	<0.0043	<0.0042	<0.002	<0.0036	<0.0037	<0.0034	<0.0036	<0.0042	<0.002	<0.0038	<0.004	<0.0035	<0.0036	<0.0042	<0.002	<0.00386
Perfluoroctanoic acid (PFOA)			0.07 (JU)	0.008	<0.0017	0.0035	0.003	<0.0036	<0.0037	<0.0034	<0.0036	0.0022	0.003	<0.0038	<0.004	<0.0035	<0.0036	0.0033	0.003	0.00393
Perfluorooctane sulfonic acid (PFOS)			0.07 (JU)	0.016	<0.0043	<0.0042	0.005	<0.0036	<0.0037	<0.0034	<0.0036	<0.0042	0.003	<0.0038	<0.004	<0.0035	<0.0036	<0.0042	0.01	<0.00386
PFOA + PFOS (Calculated)			0.07	0.01	ND	0.0035	0.008	ND	ND	ND	ND	0.0022	0.006	ND	ND	ND	ND	0.0033	0.013	0.0039
Perfluoropentanoic acid (PFPeA)			NCL	NA	<0.0043	<0.0042	<0.006	-	-	-	<0.0042	<0.005	-	-	-	-	<0.0042	<0.006	-	
Perfluorotetradecanoic acid (PFTeDA)			NCL	NA	<0.0043	<0.0042	<0.0009	<0.0036	<0.0037	<0.0034	<0.0036	<0.0042	<0.0009	<0.0038	<0.004	<0.0035	<0.0036	<0.0042	<0.0009	<0.00386
Perfluorotridecanoic acid (PFTrDA)			NCL	NA	<0.0043	<0.0042	<0.000													

TABLE 2
SUMMARY OF DRINKING WATER ANALYTICAL DATA - PFAS
Area 5
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water ²	Proposed MCL ³	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
PPN			411016201017	411016201017	411016201017	411016376044	411016376043	411016451030	411016451035	411016376005	411016451052	411016451094	411016376045	411016365045	411016376022	411016376022	411016376035	
Address			2153 POST DR NE	2153 POST DR NE	2153 POST DR NE	MAKSIMOWSKI AVE NE	6152 GEORGE ANN CT NE	MAKSIMOWSKI AVE NE	MAKSIMOWSKI AVE NE	MAKSIMOWSKI AVE NE								
Sample Name			2153 Post-IN-2/6	2153 Post-IN-8/23	2153 Post-IN-2/6	6057 Maksimowski Dr	6075 Maksimowski Dr	6088 Maksimowski Dr	6100 Maksimowski Dr	6111 Maksimowski Ave	6114 Maksimowski Ave	6118 Maksimowski Dr	6129 Maksimowski Dr	6145 Maksimowski Dr	6152 George Ann Ct NE	6175 Maksimowski Dr	6175 Maksimowski Dr	6191 Maksimowski Dr
Matrix			POET Influent	POET Influent	POET Influent	Drinking Water												
Laboratory ID			UB07040-004	UH24016-005	VB07052-008	K1711849-017	K1711849-001	K1711849-002	K1711849-003	K1711853-013	K1711849-004	K1711849-005	K1711849-006	K1711849-007	K1712064-005	K1711849-008	TL08013-001	K1711849-009
Sample Date			02/06/2019	08/23/2019	02/06/2020	10/30/2017	10/30/2017	10/30/2017	10/30/2017	10/31/2017	10/30/2017	10/30/2017	10/30/2017	10/30/2017	11/03/2017	10/30/2017	12/07/2018	10/30/2017
Parameter ($\mu\text{g/L}$)																		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)			NCL	NA	-	-	-	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	- <0.0043
6:2 Fluorotelomer sulfonic acid (6:2 FTS)			NCL	NA	-	-	-	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	- <0.0043
N-Ethyl perfluoroctane sulfonamide (EtFOSA)			NCL	NA	-	-	-	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	- <0.0043
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)			NCL	NA	<0.0037	<0.0037	<0.0036	-	-	-	-	-	-	-	-	-	<0.0035	-
N-Ethyl perfluoroctane sulfonamidoethanol (N-EtFOSE)			NCL	NA	-	-	-	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	- <0.0043
N-Methyl perfluoroctane sulfonamide (MeFOSA)			NCL	NA	-	-	-	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	- <0.0043
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)			NCL	NA	<0.0037	<0.0037	<0.0036	-	-	-	-	-	-	-	-	-	<0.0035	-
N-Methyl perfluoroctane sulfonamidoethanol (N-MeFOSE)			NCL	NA	-	-	-	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	- <0.0043
Perfluorobutane sulfonic acid (PFBS)			NCL	0.42	0.0037	<0.0037	0.0039	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0035 <0.0043
Perfluorodecane sulfonic acid (PFDS)			NCL	NA	-	-	-	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	- <0.0043
Perfluorooctadecanoic acid (PFODA)			NCL	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluoroheptane sulfonic acid (PFHpS)			NCL	NA	-	-	-	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	- <0.0043
Perfluoroctane sulfonamide (FOSA)			NCL	NA	-	-	-	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	- <0.0043
Perfluorohexane sulfonic acid (PFHxS)			NCL	0.051	<0.0037	<0.0037	<0.0036	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0035 <0.0043
Perfluorobutanoic acid (PFBA)			NCL	NA	-	-	-	<0.0087	<0.0087	<0.0087	<0.0087	<0.011	<0.0088	<0.0088	<0.0088	<0.0088	<0.0088	- <0.0087
Perfluorodecanoic acid (PFDA)			NCL	NA	<0.0037	<0.0037	<0.0036	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0035 <0.0043
Perfluorododecanoic acid (PFDoDA)			NCL	NA	<0.0037	<0.0037	<0.0036	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0035 <0.0043
Perfluoroheptanoic acid (PFHPA)			NCL	NA	<0.0037	<0.0037	<0.0036	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0035 <0.0043
Perfluorohexanoic acid (PFHxA)			NCL	400	<0.0037	<0.0037	<0.0036	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0035 <0.0043
Perfluorononanoic acid (PFNA)			NCL	0.006	<0.0037	<0.0037	<0.0036	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0035 <0.0043
Perfluoroctanoic acid (PFOA)			0.07 (JJ)	0.008	0.0037	<0.0037	<0.0036	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0035 <0.0017
Perfluorooctane sulfonic acid (PFOS)			0.07 (JJ)	0.016	<0.0037	<0.0037	<0.0036	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0035 <0.0043
PFOA + PFOS (Calculated)			0.07	0.01	0.0037	ND												
Perfluoropentanoic acid (PFPeA)			NCL	NA	-	-	-	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	- <0.0043
Perfluorotetradecanoic acid (PFTeDA)			NCL	NA	<0.0037	<0.0037	<0.0036	<0.0043	<0.0043	<0.0043	<0.0043	<0.0054	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0035 <0

TABLE 2
SUMMARY OF DRINKING WATER ANALYTICAL DATA - PFAS
Area 5
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water ²	Proposed MCL ³	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5						
PPN			411016376034	411016376034	411016451082	411016451082	411016451006	411016451006	411016326002	411016326002	411016451085	411016451085	411016451084	411016451084	411016451084	411017426003	411017426002	411016301029	411017426008
Address			0201	0201	0200	0200	0210	0210	0215	0215	0240	0240	0240	0240	0240	6335 SAMRICK AVE NE	6355 SAMRICK AVE NE	6378 SAMRICK AVE NE	6393 SAMRICK AVE NE
Sample Name			MAKSIMOWSKI AVE	MAKSIMOWSKI AVE	MAKSIMOWSKI AVE	MAKSIMOWSKI AVE	MAKSIMOWSKI AVE	MAKSIMOWSKI AVE	MAKSIMOWSKI AVE	MAKSIMOWSKI AVE	MAKSIMOWSKI AVE	6335 Samrick Ave NE	6355 Samrick Ave NE	6378 Samrick Ave NE	6393 Samrick Ave NE				
Matrix			6201 Maksimowski Dr	6201 Maksimowski Dr	6206 Maksimowski Dr	6206 Maksimowski Dr	6210 Maksimowski Dr-10/30	6210 Maksimowski Dr-10/31	6215 Maksimowski Dr-10/08	6240 Maksimowski Dr-10/31	6240 Maksimowski Dr-11/08	6240 Maksimowski Dr-11/02	6260 Maksimowski Dr-11/02	6260 Maksimowski Dr-11/02	6335 Samrick Ave NE	6355 Samrick Ave NE	6378 Samrick Ave NE	6393 Samrick Ave NE	
Laboratory ID			K1711849-010	TK01046-009	K1711849-011	TK01046-010	K1712267-004	TK01049-001	K1711849-012	TK01019-001	K1711849-013	TK01049-002	K1711849-014	TK03010-007	K1711787-015	K1711787-012	K1711787-011	K1711787-010	
Sample Date			10/30/2017	10/30/2018	10/30/2017	10/31/2018	11/09/2017	10/31/2018	10/08/2018	10/30/2017	10/30/2017	10/31/2018	10/30/2017	10/30/2017	11/02/2018	10/27/2017	10/27/2017	10/27/2017	
Parameter ($\mu\text{g/L}$)																			
8:2 Fluorotelomer sulfonic acid (8:2 FTS)			NCL	NA	<0.005	-	<0.0046	-	<0.0042	-	<0.0044	-	<0.0044	-	<0.0044	<0.0044	<0.0044	<0.0043	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)			NCL	NA	<0.005	-	<0.0046	-	<0.0042	-	<0.0044	-	<0.0044	-	<0.0044	<0.0044	<0.0043	<0.0043	
N-Ethyl perfluoroctane sulfonamide (EtFOSA)			NCL	NA	<0.005	-	<0.0046	-	<0.0042	-	<0.0044	-	<0.0044	-	<0.0044	<0.0044	<0.0043	<0.0043	
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)			NCL	NA	-	<0.0035	-	<0.0037	-	<0.0037	-	<0.0034	-	<0.0036	-	-	-	-	
N-Ethyl perfluoroctane sulfonamidoethanol (N-EtFOSE)			NCL	NA	<0.005	-	<0.0046	-	<0.0042	-	<0.0044	-	<0.0044	-	<0.0044	<0.0044	<0.0043	<0.0043	
N-Methyl perfluoroctane sulfonamide (MeFOSA)			NCL	NA	<0.005	-	<0.0046	-	<0.0042	-	<0.0044	-	<0.0044	-	<0.0044	<0.0044	<0.0043	<0.0043	
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)			NCL	NA	-	<0.0035	-	<0.0037	-	<0.0037	-	<0.0034	-	<0.0036	-	-	-	-	
N-Methyl perfluoroctane sulfonamidoethanol (N-MeFOSE)			NCL	NA	<0.005	-	<0.0046	-	<0.0042	-	<0.0044	-	<0.0044	-	<0.0044	<0.0044	<0.0043	<0.0043	
Perfluorobutane sulfonic acid (PFBS)			NCL	0.42	<0.005	<0.0035	0.067	0.04	<0.0042	<0.0037	<0.0044	<0.0034	<0.0044	<0.0036	<0.0044	<0.0036	<0.0044	<0.0043	<0.0043
Perfluorodecane sulfonic acid (PFDS)			NCL	NA	<0.005	-	<0.0046	-	<0.0042	-	<0.0044	-	<0.0044	-	<0.0044	<0.0044	<0.0043	<0.0043	
Perfluorooctadecanoic acid (PFODA)			NCL	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Perfluoroheptane sulfonic acid (PFHpS)			NCL	NA	<0.005	-	<0.0046	-	<0.0042	-	<0.0044	-	<0.0044	-	<0.0044	<0.0044	<0.0043	<0.0043	
Perfluoroctane sulfonamide (FOSA)			NCL	NA	<0.005	-	<0.0046	-	<0.0042	-	<0.0044	-	<0.0044	-	<0.0044	<0.0044	<0.0043	<0.0043	
Perfluorohexane sulfonic acid (PFHxS)			NCL	0.051	<0.005	<0.0035	<0.0046	<0.0037	<0.0042	<0.0037	<0.0044	<0.0034	<0.0044	<0.0036	<0.0044	<0.0036	<0.0044	<0.0043	<0.0043
Perfluorobutanoic acid (PFBA)			NCL	NA	<0.01	-	<0.0092	-	<0.0083	-	<0.0088	-	<0.0088	-	<0.0088	<0.0088	<0.0088	<0.0086	<0.0086
Perfluorodecanoic acid (PFDA)			NCL	NA	<0.005	<0.0035	<0.0046	<0.0037	<0.0042	<0.0037	<0.0044	<0.0034	<0.0044	<0.0036	<0.0044	<0.0036	<0.0044	<0.0043	<0.0043
Perfluorododecanoic acid (PFDaDA)			NCL	NA	<0.005	<0.0035	<0.0046	<0.0037	<0.0042	<0.0037	<0.0044	<0.0034	<0.0044	<0.0036	<0.0044	<0.0036	<0.0044	<0.0043	<0.0043
Perfluoroheptanoic acid (PFHpA)			NCL	NA	<0.005	<0.0035	<0.0046	<0.0037	<0.0042	<0.0037	<0.0044	<0.0034	<0.0044	<0.0036	<0.0044	<0.0036	<0.0044	<0.0043	<0.0043
Perfluorohexanoic acid (PFHxA)			NCL	400	<0.005	<0.0035	<0.0046	<0.0037	<0.0042	<0.0037	<0.0044	<0.0034	<0.0044	<0.0036	<0.0044	<0.0036	<0.0044	<0.0043	<0.0043
Perfluorononanoic acid (PFNA)			NCL	0.006	<0.005	<0.0035	<0.0046	<0.0037	<0.0042	<0.0037	<0.0044	<0.0034	<0.0044	<0.0036	<0.0044	<0.0036	<0.0044	<0.0043	<0.0043
Perfluoroctanoic acid (PFOA)			0.07 (JJ)	0.008	<0.002	<0.0035	<0.0018	<0.0037	<0.0017	<0.0037	<0.0018	<0.0034	<0.0018	<0.0036	<0.0018	<0.0036	<0.0017	<0.0017	
Perfluorooctane sulfonic acid (PFOS)			0.07 (JJ)	0.016	<0.005	<0.0035	<0.0046	<0.0037	<0.0042	<0.0037	<0.0044	<0.0034	<0.0044	<0.0036	<0.0044	<0.0044	<0.0043	<0.0043	
PFOA + PFOS (Calculated)			0.07	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluoropentanoic acid (PFPeA)			NCL	NA	<0.005	-	<0.0046	-	<0.0042	-	<0.0044	-	<0.0044	-	<0.0044	<0.0044	<0.0043	<0.0043	
Perfluorotetradecanoic acid (PFTeDA)			NCL	NA	<0.005	<0.0035	<0.0046	<0.0037	<0.0042	<0.0037	<0.0044	<0.0034	<0.0044	<0.0036	<0.0044	<0.0044	<0.0043	<0.0043	
Perfluorotridecanoic acid (PFTrDA)			NCL	NA	<0.005	<0.0035	<0.0046	<0.0037	<0.004										

TABLE 2
SUMMARY OF DRINKING WATER ANALYTICAL DATA - PFAS
Area 5
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water ²	Proposed MCL ³	Area 5	Area 5	Area 5	Area 5 (Well Inactive)	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	
PPN			411016176009	411017277010	411016176015	411016176032	411016176008	411016176023	411017277002	411016151007	411016176011	411016151006	411016176019	411017226002	411016176017	411016201025	411016201023	411016126017		
Address			6400 BOTANY BLUFF DR NE	6421 SAMRICK AVE NE	6440 BOTANY BLUFF DR NE	6455 BOTANY BLUFF DR NE	6480 BOTANY BLUFF DR NE	6520 BOTANY BLUFF DR NE	6531 SAMRICK AVE NE	6534 SAMRICK AVE NE	6560 BOTANY BLUFF DR NE	6580 SAMRICK AVE NE	6600 BOTANY BLUFF DR NE	6611 SAMRICK AVE NE	6630 BOTANY BLUFF DR NE	6648 REDTAIL RIDGE DR NE	6700 REDTAIL RIDGE DR NE	6701 BLUE RIDGE DR NE		
Sample Name			6400 Botany Bluff Dr NE	6421 Samrick Ave NE	6440 Botany Bluff Dr NE	6455 Botany Bluff	6480 Botany Bluff 6/6	6520 Botany Bluff-6/6	6531 Samrick Ave NE	WR1712111500JLB	WR1712111440JLB	6580 Samrick	6600 Botany Bluff Dr NE	6611Samrick Ave NE	6630 Botany Bluff Dr NE	6648 Redtail Ridge Dr NE	6700 Redtail Ridge Dr NE	6701 Blue Ridge Dr NE		
Matrix			Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	Drinking Water	
Laboratory ID			K1711846-001	K1711787-009	K1711846-002	UD20010-001	K1711844-004	TF07026-001	K1711716-016	1701971-09	1701971-08	K1712267-006	K1712980-001	K1711787-008	K1711846-003	K1711788-012	K1711788-003	K1711716-007		
Sample Date			10/30/2017	10/27/2017	10/30/2017	04/19/2019	10/31/2017	06/06/2018	10/26/2017	12/11/2017	12/11/2017	11/09/2017	12/01/2017	10/27/2017	10/30/2017	10/27/2017	10/27/2017	10/26/2017		
Parameter ($\mu\text{g/L}$)																				
8:2 Fluorotelomer sulfonic acid (8:2 FTS)			NCL	NA	<0.0043	<0.0043	<0.0044	-	<0.0043	-	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041
6:2 Fluorotelomer sulfonic acid (6:2 FTS)			NCL	NA	<0.0043	<0.0043	<0.0044	-	<0.0043	-	<0.0044	<0.00242	<0.00245	<0.0042	<0.0062	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041
N-Ethyl perfluoroctane sulfonamide (EtFOSA)			NCL	NA	<0.0043	<0.0043	<0.0044	-	<0.0043	-	<0.0044	-	-	<0.0042	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041	
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)			NCL	NA	-	-	-	-	<0.0033	-	<0.0036	-	-	-	-	-	-	-	-	
N-Ethyl perfluoroctane sulfonamidoethanol (N-EtFOSE)			NCL	NA	<0.0043	<0.0043	<0.0044	-	<0.0043	-	<0.0044	-	-	<0.0042	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041	
N-Methyl perfluoroctane sulfonamide (MeFOSA)			NCL	NA	<0.0043	<0.0043	<0.0044	-	<0.0043	-	<0.0044	-	-	<0.0042	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041	
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)			NCL	NA	-	-	-	-	<0.0033	-	<0.0036	-	-	-	-	-	-	-	-	
N-Methyl perfluoroctane sulfonamidoethanol (N-MeFOSE)			NCL	NA	<0.0043	<0.0043	<0.0044	-	<0.0043	-	<0.0044	-	-	<0.0042	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041	
Perfluorobutane sulfonic acid (PFBS)			NCL	0.42	<0.0043	<0.0043	<0.0044	<0.0033	<0.0043	<0.0036	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041
Perfluorodecane sulfonic acid (PFDS)			NCL	NA	<0.0043	<0.0043	<0.0044	-	<0.0043	-	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041
Perfluorooctadecanoic acid (PFODA)			NCL	NA	-	-	-	-	-	-	-	<0.00727	<0.00735	-	-	-	-	-	-	
Perfluoroheptane sulfonic acid (PFHpS)			NCL	NA	<0.0043	<0.0043	<0.0044	-	<0.0043	-	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041
Perfluoroctane sulfonamide (FOSA)			NCL	NA	<0.0043	<0.0043	<0.0044	-	<0.0043	-	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041	
Perfluorohexane sulfonic acid (PFHxS)			NCL	0.051	<0.0043	<0.0043	<0.0044	<0.0033	<0.0043	<0.0036	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0043	<0.0042	<0.0041	0.0047
Perfluorobutanoic acid (PFBA)			NCL	NA	<0.0086	<0.0086	<0.0088	-	<0.0086	-	<0.0088	<0.00242	<0.00245	<0.0085	<0.0086	<0.0086	<0.0086	<0.0083	<0.0081	<0.0081
Perfluorodecanoic acid (PFDA)			NCL	NA	<0.0043	<0.0043	<0.0044	<0.0033	<0.0043	<0.0036	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041	
Perfluorododecanoic acid (PFDoDA)			NCL	NA	<0.0043	<0.0043	<0.0044	<0.0033	<0.0043	<0.0036	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041	
Perfluoroheptanoic acid (PFHxA)			NCL	NA	<0.0043	<0.0043	<0.0044	<0.0033	<0.0043	<0.0036	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041	
Perfluorononanoic acid (PFNA)			NCL	0.006	<0.0043	<0.0043	<0.0044	<0.0033	<0.0043	<0.0036	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041	
Perfluoroctanoic acid (PFOA)			0.07 (JJ)	0.008	<0.0017	<0.0017	<0.0018	<0.0033	<0.0017	<0.0036	<0.0018	<0.00242	<0.00245	<0.0017	0.0092	<0.0017	<0.0017	<0.0016	0.0019	
Perfluorooctane sulfonic acid (PFOS)			0.07 (JJ)	0.016	<0.0043	<0.0043	<0.0044	<0.0033	<0.0043	<0.0036	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041	
PFOA + PFOS (Calculated)			0.07	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0092	ND	ND	ND	ND	0.0019	
Perfluoropentanoic acid (PFPeA)			NCL	NA	<0.0043	<0.0043	<0.0044	-	<0.0043	-	<0.0044	<0.00242	<0.00245	<0.0042	<0.0043	<0.0043	<0.0042	<0.0041	<0.0041	
Perfluorotetradecanoic acid (PTFeDA)			NCL	NA	<0.0043	<0.0043	<0.00													

TABLE 2
SUMMARY OF DRINKING WATER ANALYTICAL DATA - PFAS
Area 5
Algoma and Plainfield Townships, Kent County, MI

Area	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water ²	Proposed MCL ³	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5		
PPN			411009376011	411009376011	411009376011	411009376011	411009376011	411009376012	411009451009	411009451009	411009451008	411009376006	411009376009	411009451007	411009451001	411009451002	411009451003		
Address			6801 BLUE RIDGE DR NE	6801 BLUE RIDGE DR NE	6801 BLUE RIDGE DR NE	6801 BLUE RIDGE DR NE	6801 BLUE RIDGE DR NE	6803 BLUE RIDGE DR NE	6810 BLUE RIDGE DR NE	6812 CHANDLER DR NE	6830 BLUE RIDGE DR NE	6840 CHANDLER DR NE	6850 BLUE RIDGE DR NE	6855 BLUE RIDGE DR NE	6865 BLUE RIDGE DR NE	6875 BLUE RIDGE DR NE			
Sample Name			6801 Blue Ridge Dr NE	6801 Blue Ridge-IN-12/7 Grab Potable Water	6801 Blue Ridge-IN-6/7	6801 Blue Ridge Dr NE-IN-12/6	6801 Blue Ridge-IN-6/18	6801 Blue Ridge Dr NE	6803 Blue Ridge Dr NE	6810 Blue Ridge Dr NE	6812 Chandler Dr NE	6830 Blue Ridge Dr NE	6835 Blue Ridge Dr NE	6840 Chandler Dr NE	6850 Blue Ridge Dr NE	6855 Blue Ridge Dr NE	6865 Blue Ridge Dr NE	6875 Blue Ridge Dr NE	
Matrix			Drinking Water	POET Influent	POET Influent	POET Influent	POET Influent	POET Influent	Drinking Water										
Laboratory ID			K1711716-009	9359944	TF08015-010	TL08016-008	UF20013-010	UL07003-012	K1711716-010	K1711716-011	K1711716-012	K1711716-018	K1711844-003	K1711716-001	K1711788-011	K1711716-012	K1711716-013	K1711658-002	
Sample Date			10/26/2017	12/07/2017	06/07/2018	12/06/2018	06/18/2019	12/05/2019	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/31/2017	10/26/2017	10/27/2017	10/26/2017	10/25/2017		
Parameter ($\mu\text{g/L}$)																			
8:2 Fluorotelomer sulfonic acid (8:2 FTS)			NCL	NA	<0.0043	<0.006	-	-	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0041	<0.0043	<0.0043	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)			NCL	NA	<0.0043	<0.008	-	-	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0041	<0.0043	<0.0043	
N-Ethyl perfluoroctane sulfonamide (EtFOSA)			NCL	NA	<0.0043	<0.008	-	-	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0041	<0.0043	<0.0043	
N-ethylperfluoro-1-octanesulfonamidoacetic acid (EtFOSAA)			NCL	NA	-	-	<0.0036	<0.0038	<0.0035	<0.0037	-	-	-	-	-	-	-		
N-Ethyl perfluoroctane sulfonamidoethanol (N-EtFOSE)			NCL	NA	<0.0043	<0.003	-	-	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0041	<0.0043	<0.0043	
N-Methyl perfluoroctane sulfonamide (MeFOSA)			NCL	NA	<0.0043	<0.008	-	-	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0041	<0.0043	<0.0043	
N-methylperfluoro-1-octanesulfonamidoacetic acid (MeFOSAA)			NCL	NA	-	-	<0.0036	<0.0038	<0.0035	<0.0037	-	-	-	-	-	-	-		
N-Methyl perfluoroctane sulfonamidoethanol (N-MeFOSE)			NCL	NA	<0.0043	<0.003	-	-	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0041	<0.0043	<0.0043	
Perfluorobutane sulfonic acid (PFBS)			NCL	0.42	<0.0043	0.0008 J	<0.0036	<0.0038	<0.0035	<0.0037	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0043	
Perfluorodecane sulfonic acid (PFDS)			NCL	NA	<0.0043	<0.002	-	-	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0041	<0.0043	<0.0043	
Perfluorooctadecanoic acid (PFODA)			NCL	NA	-	-	-	-	-	-	-	-	-	-	-	-	-		
Perfluoroheptane sulfonic acid (PFHpS)			NCL	NA	<0.0043	<0.002	-	-	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0041	<0.0043	<0.0043	
Perfluoroctane sulfonamide (FOSA)			NCL	NA	<0.0043	<0.003	-	-	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0041	<0.0043	<0.0043	
Perfluorohexane sulfonic acid (PFHxS)			NCL	0.051	<0.0043	<0.002	<0.0036	<0.0038	<0.0035	<0.0037	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0043	
Perfluorobutanoic acid (PFBA)			NCL	NA	<0.0086	<0.006	-	-	<0.0081	<0.0086	<0.0088	<0.0086	<0.0083	<0.0086	<0.0083	<0.0081	<0.0086	<0.0086	
Perfluorodecanoic acid (PFDA)			NCL	NA	<0.0043	<0.002	<0.0036	<0.0038	<0.0035	<0.0037	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0041	<0.0043	<0.0043
Perfluorododecanoic acid (PFDaDA)			NCL	NA	<0.0043	<0.0009	<0.0036	<0.0038	<0.0035	<0.0037	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0041	<0.0043	<0.0043
Perfluoroheptanoic acid (PFHxA)			NCL	400	<0.0043	<0.002	<0.0036	<0.0038	<0.0035	<0.0037	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0041	<0.0043	<0.0043
Perfluorononanoic acid (PFNA)			NCL	0.006	<0.0043	<0.002	<0.0036	<0.0038	<0.0035	<0.0037	<0.0041	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0041	<0.0043	<0.0043
Perfluoroctanoic acid (PFOA)			0.07 (JU)	0.008	0.0024	<0.0009	<0.0036	<0.0038	<0.0035	<0.0037	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0041	<0.0043	<0.0043
Perfluorooctane sulfonic acid (PFOS)			0.07 (JU)	0.016	<0.0043	0.003	<0.0036	<0.0038	<0.0035	<0.0037	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0041	<0.0043	<0.0043
PFOA + PFOS (Calculated)			0.07	0.01	0.0024	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluoropentanoic acid (PFPeA)			NCL	NA	<0.0043	<0.006	-	-	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0042	<0.0041	<0.0043	<0.0043	
Perfluorotetradecanoic acid (PFTeDA)			NCL	NA	<0.0043	<0.0009	<0.0036	<0.0038	<0.0035	<0.0037	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0041	<0.0043	<0.0043
Perfluorotridecanoic acid (PFTrDA)			NCL	NA	<0.0043	<0.0009	<0.0036	<0.0038	<0.0035	<0.0037	<0.0041	<0.0043	<0.0044	<0.0043	<0.0042	<0.0043	<0.0041	<0.0043	<0

TABLE 2
SUMMARY OF DRINKING WATER ANALYTICAL DATA - PFAS
Area 5
Algoma and Plainfield Townships, Kent County, MI

TABLE 2 NOTES

Area 5

Algoma and Plainfield Townships, Kent County, MI

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NOTES:

1. Concentration and criteria units are micrograms per Liter ($\mu\text{g}/\text{L}$) or parts per billion (ppb). Calculated criteria and concentrations are rounded to two significant digits. "ND" indicates the parameters used in the calculation were not detected.
2. Michigan Part 201 Groundwater Cleanup Criteria are based on "Table 1, Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Tier I Risk Based Screening Levels," Michigan Administrative Code, Cleanup Criteria Requirements for Response Activity, Rules 299.44 and 299.49, effective December 30, 2013; updated June 25, 2018.

Abbreviations Include:

"NCL" indicates no criterion listed in EGLE Table 1.

Footnotes Include:

(J) - Compliance with the drinking water criteria shall require comparing the sum of the PFOA and PFOS groundwater concentrations to the drinking water criterion of 0.07 $\mu\text{g}/\text{L}$.

3. Proposed Maximum Contaminant Levels (MCLs) were published by EGLE on October 11, 2019. These are included for reference.

Abbreviations Include:

"NA" indicates no Proposed MCL listed.

4. Bold, italic number with thick line border or italic parameter name indicates that parameter was detected above the Michigan Part 201 Groundwater Cleanup Criteria listed.
Proposed MCLs are provided for reference only and results detected above the Proposed MCLs are not bolded or italicized.

5. Abbreviations include:

"< RL" indicates the parameter was analyzed for but not detected above the method detection limit; RL = Reporting Limit.

"DUP" indicates a duplicate sample.

"-" indicates the parameter was not analyzed.

"B" indicates the parameter was also detected in the method blank.

"J" indicates the parameter was detected at a concentration greater than the limit of quantitation (LOQ) but less than the detection limit (DL) and the result is estimated.

TABLE 3
MONITORING WELL INSTALLATION INFORMATION
Area 5
Algoma and Plainfield Townships, Kent County, MI

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Site Location	Well Ownership/ Data Provider	Well Field ID	Top of Casing Elevation (ft)	Ground Surface Elevation (ft)	Top of Screen Depth (ft bgs)	Bottom of Screen Depth (ft bgs)	Casing Diameter (in)	Casing Type	Aquifer Zone	Protective Casing Type
House Street	EGLE	HS-DEQ-MW1D	799.43	799.7	ND	123.82	ND	ND	D	ND
House Street	EGLE	HS-DEQ-MW1I	799.83	800.2	ND	77.58	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW1S	799.42	799.7	ND	56.56	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW3D	857.29	857.9	ND	177.41	ND	ND	D	ND
House Street	EGLE	HS-DEQ-MW3S	857.40	857.9	ND	106.45	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW4-102	733.80	734.4	ND	102.8	ND	ND	D	ND
House Street	EGLE	HS-DEQ-MW4-16	734.23	734.7	ND	16.04	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW4-53	734.33	734.7	ND	53.85	ND	ND	D	ND
House Street	EGLE	HS-DEQ-MW4-80	734.33	734.7	ND	80.09	ND	ND	D	ND
House Street	EGLE	HS-DEQ-MW4-85	733.61	734.4	ND	85.79	ND	ND	D	ND
House Street	EGLE	HS-DEQ-MW4-90	733.99	734.4	ND	89.68	ND	ND	D	ND
House Street	EGLE	HS-DEQ-MW4-97	733.71	734.4	ND	98.81	ND	ND	D	ND
House Street	EGLE	HS-DEQ-MW5D	812.95	813.5	ND	130.16	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW5S	813.12	813.5	ND	47.28	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW6D	795.59	796.4	ND	176.36	ND	ND	D	ND
House Street	EGLE	HS-DEQ-MW6S	796.09	796.4	ND	45.71	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW7-102	775.04	775.4	ND	102.11	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW7-33	775.15	775.4	ND	33.33	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW7-87	775.02	775.4	ND	87.71	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW7-94	775.16	775.4	ND	94.32	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW8D	677.86	678.2	ND	33.37	ND	ND	S	ND
House Street	EGLE	HS-DEQ-MW8S	677.87	678.2	ND	28.28	ND	ND	S	ND
House Street	R&W/GZA	HS-MW-10D	780.94	778.1	188.2	193.2	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-10M	780.64	777.7	126.4	131.4	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-10S	780.06	777.2	48.3	58.3	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-11D	744.75	742.1	153.6	158.6	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-11M	744.96	742.3	96.4	101.4	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-11S	744.78	742.1	21.2	31.2	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-12A	716.50	716.8	15.4	20.4	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-12B	716.36	716.8	51.5	56.5	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-12C	716.17	716.9	127.7	132.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-12D	716.48	717.0	158.7	163.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-12E	716.29	716.8	187.5	192.5	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-13A	ND	ND	79.0	84.0	2	PVC	ND	ND
House Street	R&W/GZA	HS-MW-13B	ND	ND	149.0	154.0	2	PVC	ND	ND
House Street	R&W/GZA	HS-MW-13C	ND	ND	199.5	114.5	2	PVC	ND	ND
House Street	R&W/GZA	HS-MW-14D	673.20	670.7	109.0	114.0	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-14M	673.53	671.0	68.1	73.1	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-14S	673.64	671.2	13.0	23.0	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-15D	642.86	639.7	108.6	118.6	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-15M	640.98	638.0	44.8	49.8	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-15S	640.71	637.5	6.9	16.9	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-17D	784.64	782.3	222.1	227.1	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-17M	784.17	781.9	167.3	172.3	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-17S	784.77	782.0	105.8	110.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-18D	684.73	682.0	140.6	145.6	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-18S	683.93	682.0	12.8	22.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-19D	680.79	677.7	85.9	95.9	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-19S	680.83	677.8	58.4	61.4	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-1D	790.73	788.7	172.3	176.9	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-1S	791.01	788.8	67.4	72.1	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-20D	706.64	703.9	126.1	131.1	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-20M	706.90	704.2	101.5	106.5	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-20S	706.72	703.9	61.1	66.1	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-21D	648.38	645.7	76.2	86.2	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-21M	648.85	645.9	59.0	64.0	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-21S	648.67	645.8	9.8	19.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-23A	791.23	791.7	72.1	77.1	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-23B	791.21	791.5	137.9	142.8	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-23C	791.09	791.4	210.2	215.0	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-23D	791.47	792.0	238.9	243.9	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-24A	776.01	776.3	55.6	60.4	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-24B	775.72	776.2	225.2	230.0	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-25D	650.61	651.1	65.7	70.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-25S	650.83	651.2	51.1	56.1	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-26D	651.75	652.1	79.6	84.6	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-26M	651.31	651.7	61.7	66.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-26S	651.88	652.0	25.8	30.8	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-27A	668.44	668.7	21.6	26.2	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-27B	668.49	668.9	35.4	38.0	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-27C	668.64	669.0	41.3	45.9	2	PVC	S	Flush

TABLE 3
MONITORING WELL INSTALLATION INFORMATION
Area 5
Algoma and Plainfield Townships, Kent County, MI

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Site Location	Well Ownership/ Data Provider	Well Field ID	Top of Casing Elevation (ft)	Ground Surface Elevation (ft)	Top of Screen Depth (ft bgs)	Bottom of Screen Depth (ft bgs)	Casing Diameter (in)	Casing Type	Aquifer Zone	Protective Casing Type
House Street	R&W/GZA	HS-MW-27D	668.54	668.9	52.4	56.4	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-27E	668.56	668.9	58.5	62.5	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-28A	665.88	666.2	39.1	43.7	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-28B	666.14	666.4	43.3	47.9	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-28C	666.16	666.5	49.2	53.8	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-28D	665.89	666.3	62.2	66.8	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-28E	665.61	666.0	82.7	87.3	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-29A	633.13	630.3	3.5	13.5	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-29B	633.89	630.5	16.8	21.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-29C	633.60	630.4	27.2	32.2	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-29D	633.19	630.7	37.1	42.1	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-2S	799.66	797.6	77.9	82.5	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-30A	672.78	673.0	46.9	51.5	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-30B	673.09	673.4	51.5	56.1	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-30C	672.90	673.1	77.4	82.0	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-30D	673.37	673.6	112.7	117.3	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-30E	672.32	672.9	123.2	127.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-31A	639.30	639.5	17.1	21.6	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-31B	639.27	639.3	26.0	30.5	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-31C	639.27	639.4	41.3	45.8	2	PVC	S	Flush
House Street	R&W/GZA	HS-MW-31D	638.96	639.1	48.8	53.4	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-31E	638.95	639.2	64.1	68.7	2	PVC	D	Flush
House Street	R&W/GZA	HS-MW-32A	727.36	724.8	60.9	65.5	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-32B	727.85	725.1	79.1	83.7	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-32C	727.72	725.1	108.8	113.4	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-32D	727.55	725.0	142.3	146.9	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-3P	790.15	787.7	19.3	24.3	2	PVC	P	Stickup
House Street	R&W/GZA	HS-MW-3S	790.69	788.1	70.1	75.0	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-4S	784.88	782.3	70.2	74.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-5D	781.99	779.3	190.5	200.5	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-5P	781.55	779.1	17.7	22.4	2	PVC	P	Stickup
House Street	R&W/GZA	HS-MW-5S	781.79	779.2	60.3	65.0	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-6D	773.44	771.0	157.5	162.5	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-6S	773.34	770.7	58.2	62.9	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-7S	791.09	788.9	69.9	74.5	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-8	745.09	742.2	30.0	35.0	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-9D	820.88	818.2	204.3	209.3	2	PVC	D	Stickup
House Street	R&W/GZA	HS-MW-9M	820.66	817.9	126.8	131.8	2	PVC	S	Stickup
House Street	R&W/GZA	HS-MW-9S	820.20	817.8	26.2	31.2	2	PVC	P	Stickup
North Kent Landfill	NKL	NKLF-MW-35	900.23	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-48	901.64	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-53	893.99	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-54	912.79	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-55	893.11	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-56	867.88	866.4	ND	43.97	ND	ND	S	ND
North Kent Landfill	NKL	NKLF-MW-57	894.35	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-60	844.35	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-61	841.14	839.8	ND	28.47	ND	ND	S	ND
North Kent Landfill	NKL	NKLF-MW-63	840.81	839.1	ND	102.41	ND	ND	D	ND
North Kent Landfill	NKL	NKLF-MW-65	835.27	834.2	ND	21.87	ND	ND	S	ND
North Kent Landfill	NKL	NKLF-MW-66	874.57	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-67	902.72	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-68	900.98	899.2	ND	92.79	ND	ND	S	ND
North Kent Landfill	NKL	NKLF-MW-69	893.04	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-70	897.8	895.6	ND	63.33	ND	ND	S	ND
North Kent Landfill	NKL	NKLF-MW-71	894.71	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-72	882.18	879.5	ND	26.98	ND	ND	S	ND
North Kent Landfill	NKL	NKLF-MW-73	900.19	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-74	880.34	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-75	881.23	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-76	849.47	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-77	837.14	834.2	ND	22.8	ND	ND	S	ND
North Kent Landfill	NKL	NKLF-MW-78	883.89	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-80	888.05	887.4	ND	42.44	ND	ND	S	ND
North Kent Landfill	NKL	NKLF-MW-81	834.71	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-MW-82	896.26	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-TW-02	900.95	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-TW-04	858.20	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-TW-05	838.64	ND	ND	ND	ND	ND	ND	ND
North Kent Landfill	NKL	NKLF-TW-06	883.99	ND	ND	ND	ND	ND	ND	ND
Wolven	EGLE	WV-DEQ-MW10-121	764.74	763.865	ND	120.72	ND	ND	D	ND

TABLE 4
MONITORING WELL STATIC WATER LEVELS
Area 5
Algoma and Plainfield Townships, Kent County, MI

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Site Location	Well Field ID	November 4, 2019 Static Water Level Elevation (ft)
House Street	HS-DEQ-MW1D	739.09
House Street	HS-DEQ-MW1I	748.63
House Street	HS-DEQ-MW1S	749.96
House Street	HS-DEQ-MW3D	748.76
House Street	HS-DEQ-MW3S	839.76
House Street	HS-DEQ-MW4-102	687.91
House Street	HS-DEQ-MW4-16	729.17
House Street	HS-DEQ-MW4-53	688.26
House Street	HS-DEQ-MW4-80	688.11
House Street	HS-DEQ-MW4-85	688.07
House Street	HS-DEQ-MW4-90	688.00
House Street	HS-DEQ-MW4-97	687.77
House Street	HS-DEQ-MW5D	740.83
House Street	HS-DEQ-MW5S	Dry
House Street	HS-DEQ-MW6D	650.30
House Street	HS-DEQ-MW6S	Dry
House Street	HS-DEQ-MW7-102	751.35
House Street	HS-DEQ-MW7-33	751.20
House Street	HS-DEQ-MW7-87	751.33
House Street	HS-DEQ-MW7-94	751.36
House Street	HS-DEQ-MW8D	652.76
House Street	HS-DEQ-MW8S	653.68
House Street	HS-MW-10D	734.19
House Street	HS-MW-10M	726.19
House Street	HS-MW-10S	726.18
House Street	HS-MW-11D	719.37
House Street	HS-MW-11M	719.35
House Street	HS-MW-11S	720.13
House Street	HS-MW-12A	ND
House Street	HS-MW-12B	ND
House Street	HS-MW-12C	ND
House Street	HS-MW-12D	ND
House Street	HS-MW-12E	ND
House Street	HS-MW-13A	ND
House Street	HS-MW-13B	ND
House Street	HS-MW-13C	ND
House Street	HS-MW-14D	660.09
House Street	HS-MW-14M	661.24
House Street	HS-MW-14S	656.70
House Street	HS-MW-15D	635.56
House Street	HS-MW-15M	634.13
House Street	HS-MW-15S	630.84
House Street	HS-MW-17D	689.38
House Street	HS-MW-17M	689.45
House Street	HS-MW-17S	703.64
House Street	HS-MW-18D	663.55
House Street	HS-MW-18S	670.37
House Street	HS-MW-19D	649.16
House Street	HS-MW-19S	651.59
House Street	HS-MW-1D	727.41
House Street	HS-MW-1S	728.00
House Street	HS-MW-20D	648.97
House Street	HS-MW-20M	649.07
House Street	HS-MW-20S	649.12
House Street	HS-MW-21D	638.75
House Street	HS-MW-21M	637.58
House Street	HS-MW-21S	637.79
House Street	HS-MW-23A	723.53
House Street	HS-MW-23B	723.47
House Street	HS-MW-23C	723.48
House Street	HS-MW-23D	723.45
House Street	HS-MW-24A	723.25
House Street	HS-MW-24B	723.21
House Street	HS-MW-25D	627.83
House Street	HS-MW-25S	627.93
House Street	HS-MW-26D	640.12
House Street	HS-MW-26M	639.96
House Street	HS-MW-26S	636.05
House Street	HS-MW-27A	644.51
House Street	HS-MW-27B	644.58
House Street	HS-MW-27C	645.51
House Street	HS-MW-27D	645.74
House Street	HS-MW-27E	645.61
House Street	HS-MW-28A	629.35

TABLE 4
MONITORING WELL STATIC WATER LEVELS
Area 5
Algoma and Plainfield Townships, Kent County, MI

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Site Location	Well Field ID	November 4, 2019 Static Water Level Elevation (ft)
House Street	HS-MW-28B	629.37
House Street	HS-MW-28C	629.30
House Street	HS-MW-28D	630.25
House Street	HS-MW-28E	630.35
House Street	HS-MW-29A	ND
House Street	HS-MW-29B	ND
House Street	HS-MW-29C	ND
House Street	HS-MW-29D	ND
House Street	HS-MW-2S	725.55
House Street	HS-MW-30A	631.99
House Street	HS-MW-30B	632.00
House Street	HS-MW-30C	632.35
House Street	HS-MW-30D	632.53
House Street	HS-MW-30E	632.54
House Street	HS-MW-31A	624.83
House Street	HS-MW-31B	625.05
House Street	HS-MW-31C	624.83
House Street	HS-MW-31D	624.69
House Street	HS-MW-31E	624.77
House Street	HS-MW-32A	720.65
House Street	HS-MW-32B	720.67
House Street	HS-MW-32C	720.90
House Street	HS-MW-32D	720.75
House Street	HS-MW-3P	763.67
House Street	HS-MW-3S	724.86
House Street	HS-MW-4S	724.49
House Street	HS-MW-5D	724.82
House Street	HS-MW-5P	758.61
House Street	HS-MW-5S	724.82
House Street	HS-MW-6D	725.47
House Street	HS-MW-6S	725.44
House Street	HS-MW-7S	726.43
House Street	HS-MW-8	724.19
House Street	HS-MW-9D	744.72
House Street	HS-MW-9M	744.56
House Street	HS-MW-9S	793.72
North Kent Landfill	NKLF-MW-35	867.33
North Kent Landfill	NKLF-MW-48	870.29
North Kent Landfill	NKLF-MW-53	872.08
North Kent Landfill	NKLF-MW-54	877.50
North Kent Landfill	NKLF-MW-55	867.98
North Kent Landfill	NKLF-MW-56	845.56
North Kent Landfill	NKLF-MW-57	862.99
North Kent Landfill	NKLF-MW-60	834.09
North Kent Landfill	NKLF-MW-61	834.67
North Kent Landfill	NKLF-MW-63	752.97
North Kent Landfill	NKLF-MW-65	834.86
North Kent Landfill	NKLF-MW-66	871.83
North Kent Landfill	NKLF-MW-67	863.70
North Kent Landfill	NKLF-MW-68	867.15
North Kent Landfill	NKLF-MW-69	855.72
North Kent Landfill	NKLF-MW-70	848.12
North Kent Landfill	NKLF-MW-71	862.76
North Kent Landfill	NKLF-MW-72	856.81
North Kent Landfill	NKLF-MW-73	895.07
North Kent Landfill	NKLF-MW-74	871.50
North Kent Landfill	NKLF-MW-75	870.84
North Kent Landfill	NKLF-MW-76	848.24
North Kent Landfill	NKLF-MW-77	832.26
North Kent Landfill	NKLF-MW-78	836.08
North Kent Landfill	NKLF-MW-80	867.52
North Kent Landfill	NKLF-MW-81	831.74
North Kent Landfill	NKLF-MW-82	863.27
North Kent Landfill	NKLF-TW-02	863.72
North Kent Landfill	NKLF-TW-04	846.15
North Kent Landfill	NKLF-TW-05	835.50
North Kent Landfill	NKLF-TW-06	854.24
Wolven	WV-DEQ-MW10-121	719.14
Wolven	WV-DEQ-MW10-177	721.88
Wolven	WV-DEQ-MW10-55	723.29
Wolven	WV-DEQ-MW10-84	720.09
Wolven	WV-DEQ-MW10-95	715.81
Wolven	WV-DEQ-MW11-130	757.03
Wolven	WV-DEQ-MW11-137	757.20

TABLE 4
MONITORING WELL STATIC WATER LEVELS
Area 5
Algoma and Plainfield Townships, Kent County, MI

Site Location	Well Field ID	November 4, 2019 Static Water Level Elevation (ft)	
Wolven	WV-DEQ-MW11-145	756.95	
Wolven	WV-DEQ-MW11-57	815.57	
Wolven	WV-DEQ-MW11-95	810.62	
Wolven	WV-DEQ-MW2D	753.80	
Wolven	WV-DEQ-MW2S	826.21	
Wolven	WV-DEQ-MW9-114	711.27	
Wolven	WV-DEQ-MW9-131	711.27	
Wolven	WV-DEQ-MW9-57	703.29	
Wolven	WV-DEQ-MW9-73	711.32	
Wolven	WV-DEQ-MW9-94	711.39	
Wolven	WV-MW-1	751.30	
Wolven	WV-MW-10D	749.49	
Wolven	WV-MW-10M	747.82	
Wolven	WV-MW-10S	742.24	
Wolven	WV-MW-11D	Artesian Conditions	
Wolven	WV-MW-11S	726.20	
Wolven	WV-MW-12D	716.97	
Wolven	WV-MW-12M	716.94	
Wolven	WV-MW-12S	721.81	
Wolven	WV-MW-13D	803.32	
Wolven	WV-MW-13M	820.92	
Wolven	WV-MW-13S	820.91	
Wolven	WV-MW-14D	731.14	
Wolven	WV-MW-14S	861.25	
Wolven	WV-MW-15A	ND	
Wolven	WV-MW-15B	ND	
Wolven	WV-MW-15C	ND	
Wolven	WV-MW-15D	ND	
Wolven	WV-MW-16D	761.52	
Wolven	WV-MW-16S	815.71	
Wolven	WV-MW-2D	785.38	
Wolven	WV-MW-2S	790.29	
Wolven	WV-MW-3D	802.01	
Wolven	WV-MW-3S	819.14	
Wolven	WV-MW-4	753.96	
Wolven	WV-MW-5D	802.39	
Wolven	WV-MW-5S	802.11	
Wolven	WV-MW-6D	765.11	
Wolven	WV-MW-6S	781.51	
Wolven	WV-MW-7D	715.73	
Wolven	WV-MW-7M	715.73	
Wolven	WV-MW-7S	715.71	
Wolven	WV-MW-8D	754.38	
Wolven	WV-MW-8M	823.77	
Wolven	WV-MW-8S	823.75	
Wolven	WV-MW-9	824.90	
Rogue River	Dam Seawall	680.71	
Rogue River	E Bridge Street Bridge	680.34	
Rogue River	Rogue River Road Bridge	618.90	
Rogue River	Jericho Ave Bridge	672.24	
Rogue River	USGS04118500	630.419	
Rogue River	Rogue River at Rum Creek	692.84	

Abbreviations

ND = No data provided/available
ft = feet

Notes

- 1) Elevations are provided in North American Vertical Datum of 1988 (NAVD 88).
- 2) Water level static measurements were completed on November 4, 2019 by R&W/GZA, AECOM (for EGLE), and North Kent Landfill.
- 3) North Kent Landfill elevations converted from NGVD29 to NAVD88 by R&W/GZA by subtracting 0.43 feet from provided elevation.

TABLE 6
SUMMARY OF GROUNDWATER SAMPLE ANALYSIS - PFAS (HSDS, 2019)
Area 5
Algoma and Plainfield Townships, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water ²	Part 201 Generic Residential Groundwater Cleanup Criteria – Groundwater Surface Water Interface ²	Part 201 Generic Residential Groundwater Cleanup Criteria – Groundwater Volatilization to Indoor Air Interim Action Screening Level - Groundwater ³	EGLE Residential Recommended Volatilization to Indoor Air Removal Management Levels ⁴	U.S. EPA Residential Tap Water Regional Removal Management Levels ⁴	HS-MW-19S	HS-MW-20D	HS-MW-20D	HS-MW-20D	HS-MW-20M	HS-MW-20M	HS-MW-20M	HS-MW-20M	HS-GW-MW20M DUP	HS-GW-MW20M	MW-20S	HS-GW-MW20S	HS-GW-MW20S	
Sample Name				HS-GW-MW-19S	HS-MW-20D	HS-GW-MW20D	HS-GW-MW20D	HS-GW-MW20D	HS-MW-20M	HS-GW-MW20M	HS-GW-MW20M	HS-MW-20M	HS-GW-MW20M DUP	HS-GW-MW20M	HS-GW-MW20M	MW-20S	HS-GW-MW20S	HS-GW-MW20S	
Well Screen Interval (Feet below ground surface)				58.4-61.4	126.1-131.1	126.1-131.1	126.1-131.1	126.1-131.1	101.5-106.5	101.5-106.5	101.5-106.5	101.5-106.5	101.5-106.5	101.5-106.5	101.5-106.5	61.1-66.1	61.1-66.1	61.1-66.1	
Laboratory Sample ID(s)				UL12091-016	UC09042-002	UE30036-003	UI19006-022	UK29008-019	UC09042-001	UE30036-002	UI19006-020	UI19006-021	UK29008-002	UC06036-001	UE30036-001	UI19006-019			
Sample Date				12/11/2019	03/06/2019	05/28/2019	09/18/2019	11/27/2019	03/06/2019	05/28/2019	09/18/2019	09/18/2019	09/18/2019	11/26/2019	03/04/2019	05/28/2019	09/18/2019		
Parameter ($\mu\text{g/L}$)																			
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0037	<0.0035	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035		
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035		
N-Methyl perfluoroctane sulfonamide (MeFOSA)	NCL	NCL	NCL	NCL	NCL	<0.0072	<0.0071	<0.0073	<0.007	<0.0069	<0.0074	<0.0069	<0.0069	<0.007	<0.0071	<0.0071	<0.0074	<0.0071	
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	NCL	NCL	1,200	<0.0036	0.16	0.17	0.17	0.071	0.068	0.069	0.07	0.06	0.015	0.016	0.018		
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035		
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0095	0.0088	0.008	0.0084	0.0077	<0.0036	<0.0037	<0.0035	
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	NCL	NCL	NCL	<0.0072	<0.0071	<0.0073	<0.007	<0.0069	<0.0074	<0.0069	<0.0069	<0.007	<0.0071	<0.0074	<0.0071		
Perfluoroctane sulfonamide (FOSA)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0037	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035		
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	NCL	NCL	NCL	<0.0036	0.097	0.098	0.11	0.098	0.083	0.079	0.08	0.085	0.062	0.013	0.013	0.016	
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	NCL	NCL	NCL	<0.0036	0.042	0.042	0.046	0.043	0.16	0.16	0.15	0.14	0.13	0.014	0.017	0.019	
Perfluorobutanoic acid (PFBA)	NCL	NCL	NCL	NCL	NCL	<0.0036	0.047	0.052	0.05	0.049	0.015	0.015	0.015	0.014	0.014	0.0042	0.0043	0.0047	
Perfluorodecanoic acid (PFDA)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035		
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035		
Perfluorohexanoic acid (PFHxA)	NCL	NCL	NCL	NCL	NCL	<0.0036	0.088	0.1	0.1	0.1	0.038	0.038	0.036	0.034	0.034	0.0068	0.0085	0.0093	
Perfluorononanoic acid (PFNA)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035		
Perfluoroctanoic acid (PFOA)	0.07 (JJ)	12	ID	NLV	NCL	<0.0018	0.09	0.12	0.12	0.11	0.16	0.17	0.17	0.17	0.15	0.016	0.022		
Perfluoroctane sulfonic acid (PFOS)	0.07 (JJ)	0.012	NLV	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	0.04	0.034	0.033	0.032	0.029	<0.0036	<0.0037	<0.0035	
PFOA + PFOS (Calculated)	0.07	NCL	NCL	NCL	NCL	ND	0.09	0.12	0.12	0.11	0.2	0.2	0.2	0.2	0.18	0.016	0.022	0.022	
Perfluoropentanoic acid (PFPeA)	NCL	NCL	NCL	NCL	NCL	<0.0036	0.045	0.054	0.052	0.049	0.017	0.017	0.015	0.016	0.014	<0.0036	0.0039	0.0045	
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035	
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	NCL	NCL	NCL	<0.0036	<0.0035	<0.0036	<0.0035	<0.0035	<0.0037	<0.0035	<0.0035	<0.0035	<0.0036	<0.0037	<0.0035		
Total PFAS (Calculated)	NCL	NCL	NCL	NCL	NCL	ND	0.64	0.71	0.73	0.68	0.64	0.63	0.62	0.61	0.54	0.075	0.093	0.1	

TABLE 6
SUMMARY OF GROUNDWATER SAMPLE ANALYSIS - PFAS (HSDS, 2019)
Area 5
Algoma and Plainfield Townships, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water ²	Part 201 Generic Residential Groundwater Cleanup Criteria – Groundwater Surface Water Interface ²	Part 201 Generic Residential Groundwater Cleanup Criteria – Groundwater Volatilization to Indoor Air Interim Action Screening Level - Groundwater ³	EGLE Residential Recommended Volatilization to Indoor Air Removal Management Levels ⁴	U.S. EPA Residential Tap Water Regional Removal Management Levels ⁴	HS-MW-20S	HS-MW-21D	HS-MW-21D	HS-GW-MW21D DUP	HS-GW-MW21D	HS-GW-MW21D	HS-GW-MW21D DUP	HS-MW-21D	HS-MW-21M	HS-MW-21M	HS-MW-21M	HS-MW-21M	HS-MW-21S	HS-MW-21S
Sample Name						HS-GW-MW-20S	HS-MW-21D	HS-GW-MW21D		HS-GW-MW21D	HS-GW-MW21D		HS-MW-21M	HS-GW-MW21M	HS-GW-MW21M	HS-GW-MW21M	HS-MW-21S	HS-GW-MW21S	
Well Screen Interval (Feet below ground surface)						61.1-66.1	76.2-86.2	76.2-86.2	76.2-86.2	76.2-86.2	76.2-86.2	76.2-86.2	59-64	59-64	59-64	59-64	9.8-19.8	9.8-19.8	
Laboratory Sample ID(s)						UK29008-001	UB28086-003	UE18016-001	UE18016-002	UI19006-003	UL12091-001	UL12091-002	UB28086-002	UE18016-003	UI19006-004	UK29008-020	UB28086-001	UE18016-004	
Sample Date						11/26/2019	02/27/2019	05/16/2019	05/16/2019	09/16/2019	12/09/2019	12/09/2019	02/27/2019	05/16/2019	09/16/2019	11/27/2019	02/27/2019	05/16/2019	
Parameter ($\mu\text{g/L}$)																			
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	0.0058	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	
N-Methyl perfluoroctane sulfonamide (MeFOSA)	NCL	NCL	NCL	NCL	NCL	<0.007	<0.0072	<0.0073	<0.0073	<0.0072	<0.0072	<0.0071	<0.0075	<0.0073	<0.0071	<0.0074	<0.0073	<0.0074	
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	NCL	NCL	1,200	0.018	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluoroheptane sulfonic acid (PFHxS)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	NCL	NCL	NCL	<0.007	<0.0072	<0.0073	<0.0073	<0.0072	<0.0072	<0.0071	<0.0075	<0.0073	<0.0071	<0.0074	<0.0073	<0.0074	
Perfluoroctane sulfonamide (FOSA)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	NCL	NCL	NCL	0.012	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	NCL	NCL	NCL	0.013	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluorobutanoic acid (PFBA)	NCL	NCL	NCL	NCL	NCL	0.0067	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluorodecanoic acid (PFDA)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluorohexanoic acid (PFHxA)	NCL	NCL	NCL	NCL	NCL	0.013	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluorononanoic acid (PFNA)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluoroctanoic acid (PFOA)	0.07 (JJ)	12	ID	NCL	NCL	0.023	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0019	<0.0019	<0.0018	<0.0019	0.0028	0.0026	
Perfluoroctane sulfonic acid (PFOS)	0.07 (JJ)	0.012	NLV	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
PFOA + PFOS (Calculated)	0.07	NCL	NCL	NCL	NCL	0.023	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0028	0.0026
Perfluoropentanoic acid (PFPeA)	NCL	NCL	NCL	NCL	NCL	0.0064	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	NCL	NCL	NCL	<0.0035	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0035	<0.0037	<0.0036	<0.0036	<0.0037	<0.0037	<0.0037	
Total PFAS (Calculated)						0.1	ND	ND	ND	0.0058	ND	ND	ND	ND	ND	ND	ND	0.0028	0.0026

TABLE 6
SUMMARY OF GROUNDWATER SAMPLE ANALYSIS - PFAS (HSDS, 2019)
Area 5
Algoma and Plainfield Townships, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water ²	Part 201 Generic Residential Groundwater Cleanup Criteria – Groundwater Surface Water Interface ²	Part 201 Generic Residential Groundwater Cleanup Criteria – Groundwater Volatilization to Indoor Air Interim Action Screening Level - Groundwater ³	EGLE Residential Recommended Volatilization to Indoor Air Removal Management Levels ⁴	U.S. EPA Residential Tap Water Regional Removal Management Levels ⁴	HS-MW-21S	HS-MW-21S	HS-MW-23A	HS-MW-23A	HS-MW-23B	HS-MW-23B	HS-MW-23C	HS-MW-23C	HS-MW-23D	HS-MW-23D	HS-MW-24A	HS-MW-24B	HS-MW-25D		
Sample Name						HS-GW-MW21S	HS-GW-MW21S	HS-GW-MW23A	HS-GW-MW23A	HS-GW-MW23B	HS-GW-MW23B	HS-GW-MW23C	HS-GW-MW23C	HS-GW-MW23D	HS-GW-MW23D	HS-GW-MW24A	HS-GW-MW24B	HS-MW-25D		
Well Screen Interval (Feet below ground surface)						9.8-19.8	9.8-19.8	72.1-77.1	72.1-77.1	137.9-142.8	137.9-142.8	210.2-215	210.2-215	238.9-243.9	238.9-243.9	55.6-60.4	225.2-230	65.7-70.7		
Laboratory Sample ID(s)						UI19006-006	UK29008-022	UI21016-007	UL05055-032	UI21016-009	UL05055-033	UI26001-001	UL05055-034	UI21016-008	UL12091-008	UL12091-009	UL12091-015	UC02020-009		
Sample Date						09/16/2019	11/27/2019	09/20/2019	12/06/2019	09/20/2019	12/06/2019	09/23/2019	12/06/2019	09/20/2019	12/10/2019	12/10/2019	12/11/2019	03/01/2019		
Parameter ($\mu\text{g/L}$)																				
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
N-Methyl perfluoroctane sulfonamide (MeFOSA)	NCL	NCL	NCL	NCL	NCL	<0.0074	<0.007	<0.0072	<0.0071	<0.0068	<0.007	<0.007	<0.0071	<0.0069	<0.0072	<0.007	<0.0074	<0.0072		
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	NCL	NCL	1,200	<0.0037	0.0036	0.02	0.018	0.015	0.014	0.26	0.28	0.23	0.14	<0.0035	<0.0037	0.016		
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	NCL	NCL	NCL	<0.0074	<0.007	<0.0072	<0.0071	<0.0068	<0.007	<0.007	<0.0071	<0.0069	<0.0072	<0.007	<0.0074	<0.0072		
Perfluoroctane sulfonamide (FOSA)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	0.008		
Perfluorobutanoic acid (PFBA)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	0.064	0.067	0.067	0.043	<0.0035	<0.0037	0.0054
Perfluorodecanoic acid (PFDA)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
Perfluorohexanoic acid (PFHxA)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	0.0047	<0.0035	0.0061	0.0044	0.22	0.26	0.24	0.16	<0.0035	<0.0037	0.011		
Perfluorononanoic acid (PFNA)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	0.0047	<0.0035	0.0061	0.0044	0.22	0.26	0.24	0.16	<0.0035	<0.0037	0.011		
Perfluoroctanoic acid (PFOA)	0.07 (JJ)	12	ID	NCL	NCL	0.0034	0.0031	0.013	0.012	0.0075	0.0082	0.03	0.03	0.013	0.0056	<0.0017	<0.0018	0.016		
Perfluoroctane sulfonic acid (PFOS)	0.07 (JJ)	0.012	NLV	NCL	NCL	<0.0037	<0.0035	0.0042	0.015	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	0.072		
PFOA + PFOS (Calculated)	0.07	NCL	NCL	NCL	NCL	0.0034	0.0031	0.017	0.027	0.0075	0.0082	0.03	0.03	0.013	0.0056	ND	ND	0.088		
Perfluoropentanoic acid (PFPeA)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	0.1	0.11	0.13	0.08	<0.0035	<0.0037	0.0091		
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	NCL	NCL	NCL	<0.0037	<0.0035	<0.0036	<0.0035	<0.0034	<0.0035	<0.0035	<0.0035	<0.0035	<0.0036	<0.0035	<0.0037	<0.0036		
Total PFAS (Calculated)	NCL	NCL	NCL	NCL	NCL	0.0034	0.0067	0.073	0.073	0.056	0.049	1	1.1	0.88	0.54	ND	ND	0.14		

TABLE 6
SUMMARY OF GROUNDWATER SAMPLE ANALYSIS - PFAS (HSDS, 2019)
Area 5
Algoma and Plainfield Townships, Kent County, MI

Sample Location	Part 201 Generic Residential Groundwater Cleanup Criteria – Drinking Water ²	Part 201 Generic Groundwater Cleanup Criteria – Groundwater Surface Water Interface ²	Part 201 Generic Residential Groundwater Cleanup Criteria – Groundwater Volatilization to Indoor Air Interim Action Screening Level - Groundwater ³	EGLE Residential Recommended Volatilization to Indoor Air Interim Action Screening Level - Groundwater ³	U.S. EPA Residential Tap Water Regional Removal Management Levels ⁴	HS-MW-32A	HS-MW-32B	HS-MW-32B	HS-MW-32B	HS-MW-32C	HS-MW-32C	HS-MW-32C	HS-MW-32D	HS-MW-32D	HS-MW-32D
						HS-GW-MW-32A	HS-GW-MW32B	HS-GW-MW32B	HS-GW-MW-32B	HS-GW-MW32C	HS-GW-MW32C	HS-GW-MW-32C	HS-GW-MW32D	HS-GW-MW32D	HS-GW-MW-32D
Well Screen Interval (Feet below ground surface)					60.9-65.5	79.1-83.7	79.1-83.7	79.1-83.7	108.8-113.4	108.8-113.4	108.8-113.4	142.3-146.9	142.3-146.9	142.3-146.9	
Laboratory Sample ID(s)					UK29008-003	UE25011-006	UI07020-003	UK29008-004	UE25011-007	UI07020-002	UK29008-005	UE25011-008	UI07020-004	UK29008-006	
Sample Date					11/26/2019	05/24/2019	09/06/2019	11/26/2019	05/24/2019	09/06/2019	11/26/2019	05/24/2019	09/06/2019	11/26/2019	
Parameter ($\mu\text{g/L}$)															
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0035
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035	<0.0035
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NCL	NCL	NCL	NCL		<0.0068	<0.0074	<0.0069	<0.0069	<0.0076	<0.0071	<0.0074	<0.0074	<0.0069	<0.0071
Perfluorobutane sulfonic acid (PFBS)	NCL	NCL	NCL	NCL	1,200	<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorodecane sulfonic acid (PFDS)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluoroheptane sulfonic acid (PFHpS)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorononane sulfonic acid (PFNS)	NCL	NCL	NCL	NCL		<0.0068	<0.0074	<0.0069	<0.0069	<0.0076	<0.0071	<0.0074	<0.0074	<0.0069	<0.0071
Perfluoroctane sulfonamide (FOSA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluoropentane sulfonic acid (PFPeS)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorohexane sulfonic acid (PFHxS)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0035	<0.0035	<0.0035
Perfluorobutanoic acid (PFBA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	0.0044	<0.0035
Perfluorodecanoic acid (PFDA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorododecanoic acid (PFDoDA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluoroheptanoic acid (PFHpA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorohexanoic acid (PFHxA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorononanoic acid (PFNA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluoroctanoic acid (PFOA)	0.07 (jj)	12	ID	NCL		<0.0017	<0.0018	<0.0017	<0.0017	<0.0019	<0.0018	<0.0019	<0.0018	<0.0017	<0.0018
Perfluorooctane sulfonic acid (PFOS)	0.07 (jj)	0.012	NLV	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
PFOA + PFOS (Calculated)	0.07	NCL	NCL	NCL		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorotetradecanoic acid (PFTeDA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluorotridecanoic acid (PFTrDA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Perfluoroundecanoic acid (PFUnDA)	NCL	NCL	NCL	NCL		<0.0034	<0.0037	<0.0035	<0.0035	<0.0038	<0.0036	<0.0037	<0.0037	<0.0035	<0.0035
Total PFAS (Calculated)						ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0044

TABLE 6 NOTES
Area 5
Algoma and Plainfield Townships, Kent County, MI

NOTES:

- Concentration and criteria units are micrograms per Liter ($\mu\text{g}/\text{L}$) or parts per billion (ppb). Calculated criteria and concentrations are rounded to two significant digits. "ND" indicates the parameters used in the calculation were not detected. "NC" indicates not calculated.

- Michigan Part 201 Groundwater Cleanup Criteria are based on "Table 1, Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Tier I Risk Based Screening Levels," Michigan Administrative Code, Cleanup Criteria Requirements for Response Activity, Rules 299.44 and 299.49, effective December 30, 2013; updated June 25, 2018.

Abbreviations Include:

"ID" indicates insufficient data to develop criterion.

"NA" indicates a criterion or value is not available or, in the case of background, not applicable.

"NCL" indicates no criterion listed in EGLE Table 1.

"NLV" indicates the substance is not likely to volatilize under most conditions.

Footnotes Include:

(A) - The criterion is the State of Michigan drinking water standard.

(D) - The calculated criterion exceeds 100 percent, hence it is reduced to 100 percent or $1.0\text{E}+9$ ppb.

(E) - Criterion is the aesthetic drinking water value.

(F) - Criterion is based on adverse impacts to plant life and phytotoxicity.

(G) - Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water.

EGLE's Footnote (G) GSI/GSIPC Calculation spreadsheet was utilized to calculate GSI criterion presented. The Rogue River is the receiving surface water for the Site. Hardness (220 mg CaCO₃/L) and pH (7.5 standard units) used in the calculations were the lowest (most-conservative) of the calculated mean and median of the Rogue River surface water samples collected in Rockford, MI at the former tannery (TA-SW-01, TA-SW-02, TA-SW-03, TA-SW-05, and TA-SW-07) rounded to two significant digits and water hardness or pH for the Rogue River near Rockford published in United States Geological Survey Circular 323, "Water Resources of the Grand Rapids Area, Michigan," Table 1, 1954.

(L) - Criteria for lead are derived using a biologically based model. The generic residential drinking water criterion of 4 $\mu\text{g}/\text{L}$ is linked to the generic residential soil direct contact criterion of 400 mg/kg.

(M) - Calculated criterion is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.

(N) - The concentrations of all potential sources of nitrate-nitrogen (e.g., ammonia-N, nitrite-N, nitrate-N) in groundwater that is used as a source of drinking water shall not, when added together, exceed the nitrate drinking water criterion of 10,000 $\mu\text{g}/\text{L}$.

(P) - Amenable cyanide methods or method OIA-1677 shall be used to quantify cyanide concentrations for compliance with all groundwater criteria.

(S) - Criterion defaults to the hazardous substance-specific water solubility limit.

(V) - Criterion is the aesthetic drinking water value.

(W) - Concentrations of trihalomethanes in groundwater shall be added together to determine compliance with the Michigan drinking water standard of 80 $\mu\text{g}/\text{L}$.

(AA) - Use 10,000 $\mu\text{g}/\text{L}$ where groundwater enters a structure through the use of a water well, sump or other device. Use 28,000 $\mu\text{g}/\text{L}$ for all other uses.

(CC) - The generic GSI criteria are based on the toxicity of unionized ammonia (NH₃); the criteria are 29 $\mu\text{g}/\text{L}$ and 53 $\mu\text{g}/\text{L}$ for cold water and warm water surface water, respectively. As a result, the GSI criterion shall be compared to the percent of the total ammonia concentration in the groundwater that will become NH₃ in the surface water. This percent NH₃ is a function of the pH and temperature of the receiving surface water and was estimated using the table of this footnote titled "Percent NH₃ in Aqueous Ammonia Solutions for 0-30°C and pH 6-10." This approach uses a default temperature of 68°F and 85°F for cold water and warm water surface water, respectively. The percent conversion factor in the table for cold water (20°C or 68°F) and pH (8.0 standard units) is 3.82%.

(EE) - The applicable GSI criteria for phosphorus is 1,000 $\mu\text{g}/\text{L}$.

(FF) - The chloride GSI criteria shall not apply for surface waters of the state that are not designated as a public water supply source.

(JJ) - Compliance with the drinking water criteria shall require comparing the sum of the PFOA and PFOS groundwater concentrations to the drinking water criterion of 0.07 $\mu\text{g}/\text{L}$.

- EGLE Residential Groundwater Recommended Volatilization to Indoor Air Interim Action Screening Levels (RIASLs) for were based on EGLE's Toxics Steering Group's "Media-Specific Interim Action Screening Levels," published in August 2017. The EGLE published the RIASLs in August 2017, and recently removed the RIASLs from the EGLE website. The EGLE is reportedly evaluating the RIASLs for appropriate use and applicability. These are included for reference.

Abbreviations Include:

"NCL" indicates no value listed in the Media-Specific Interim Action Screening Levels table.

Footnotes Include:

(M) - Site-specific criterion may be below target detection limits (TDL).

- U.S. EPA Residential Tap Water Regional Removal Management Levels (RMLs) were based on "Generic RML Tables," updated November 2018.

- Bold, italic number with thick line border or italic parameter name indicates that parameter was detected above the Michigan Part 201 Groundwater Cleanup Criteria or Media-Specific Interim Action Screening Levels. U.S. EPA RMLs are provided for reference only and results detected above the EPA RMLs are not bolded or italicized.

- Abbreviations include:

"< RL" indicates the parameter was analyzed for but not detected above the method detection limit; RL = Reporting Limit.

"DUP" indicates a duplicate sample.

"B" indicates the parameter was also detected in the method blank.

"H" indicates the sample was analyzed out of holding time.

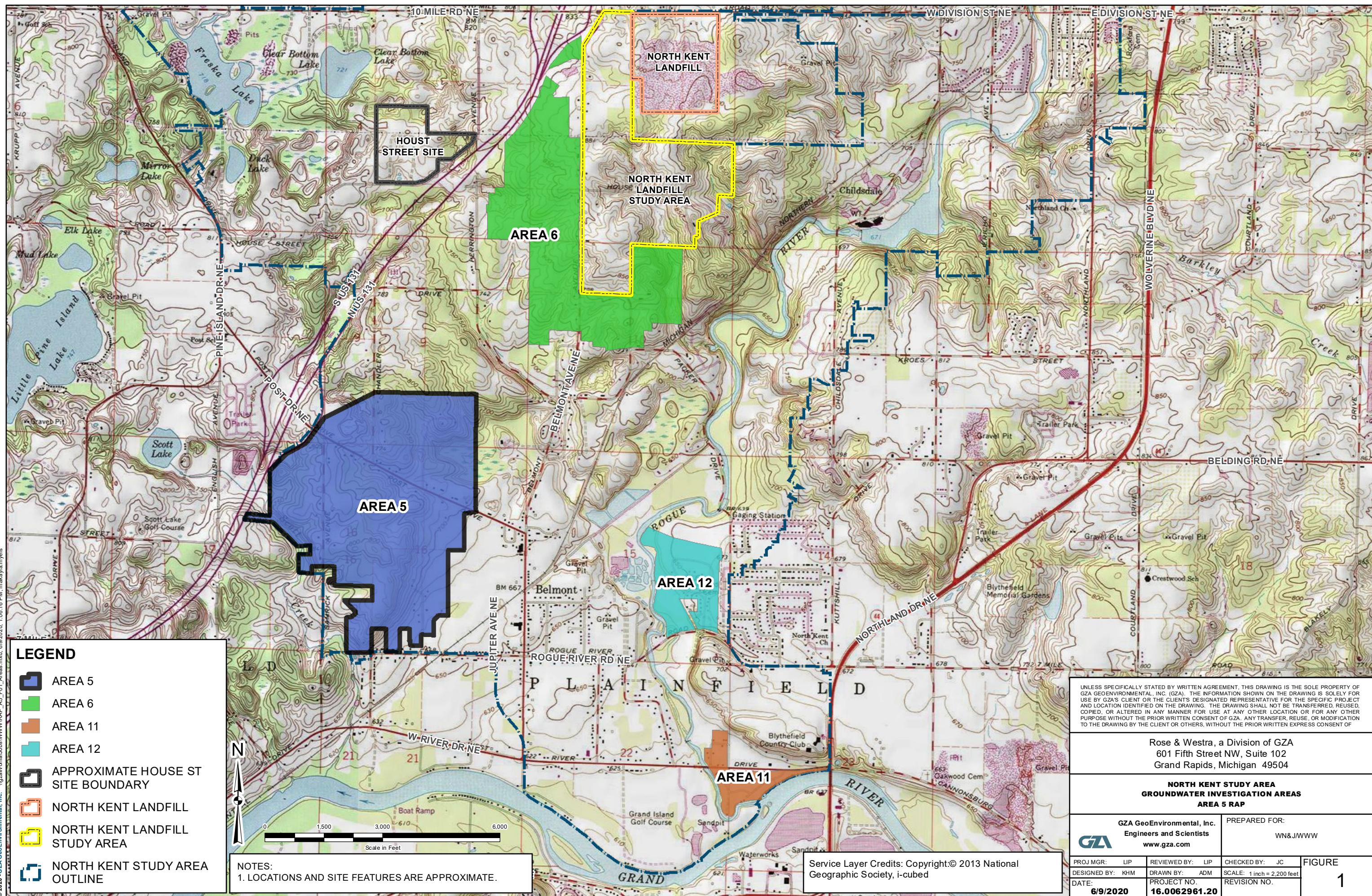
"I" indicates the parameter was detected at a concentration greater than the limit of quantitation (LOQ) but less than the detection limit (DL) and the result is estimated.

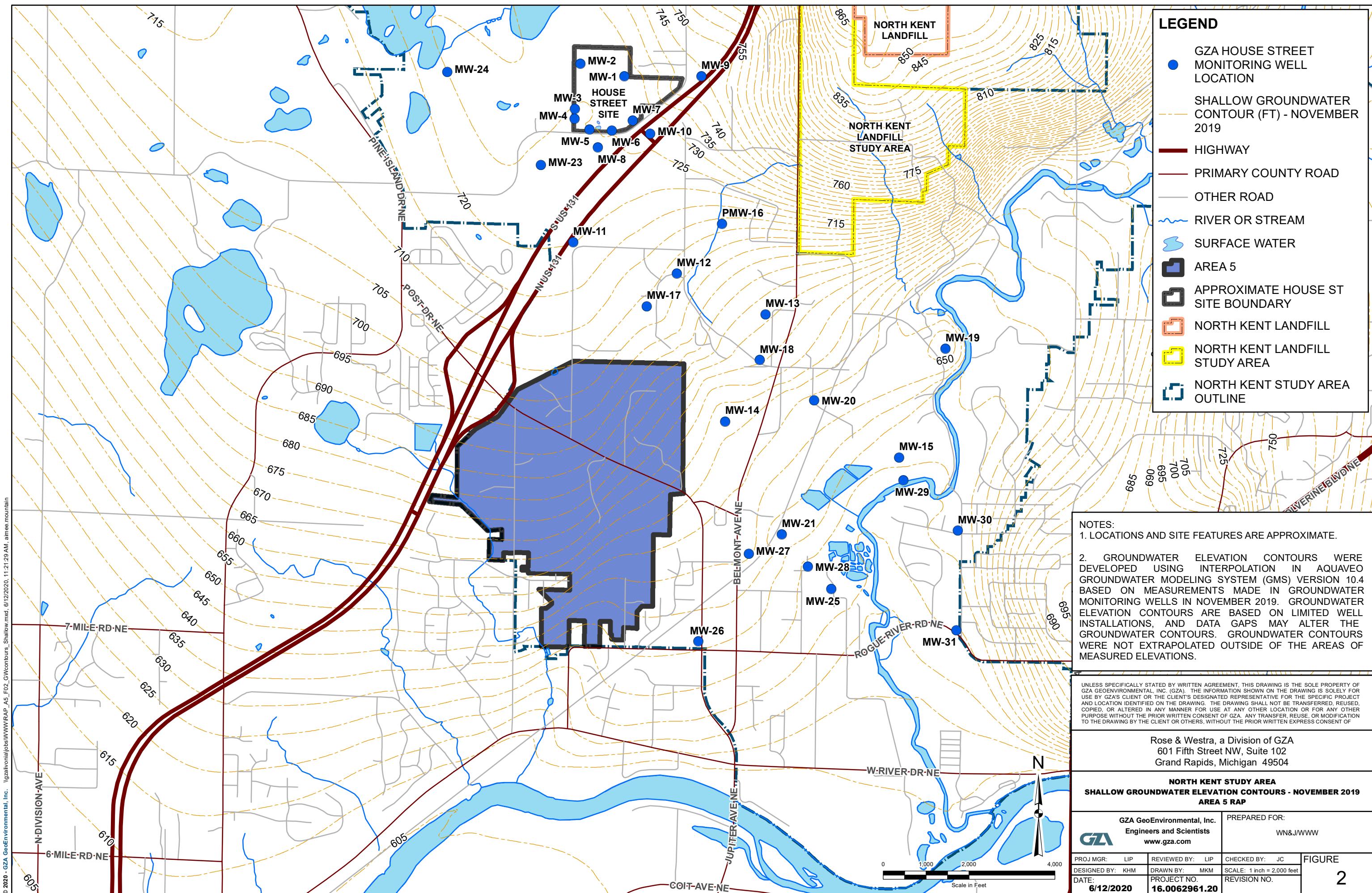
- Sample names presented are from Shealy Environmental Services, Inc. laboratory reports. Sample names presented in ALS Environmental lab reports may have minor differences based on laboratory interpretation of the chains of custody.

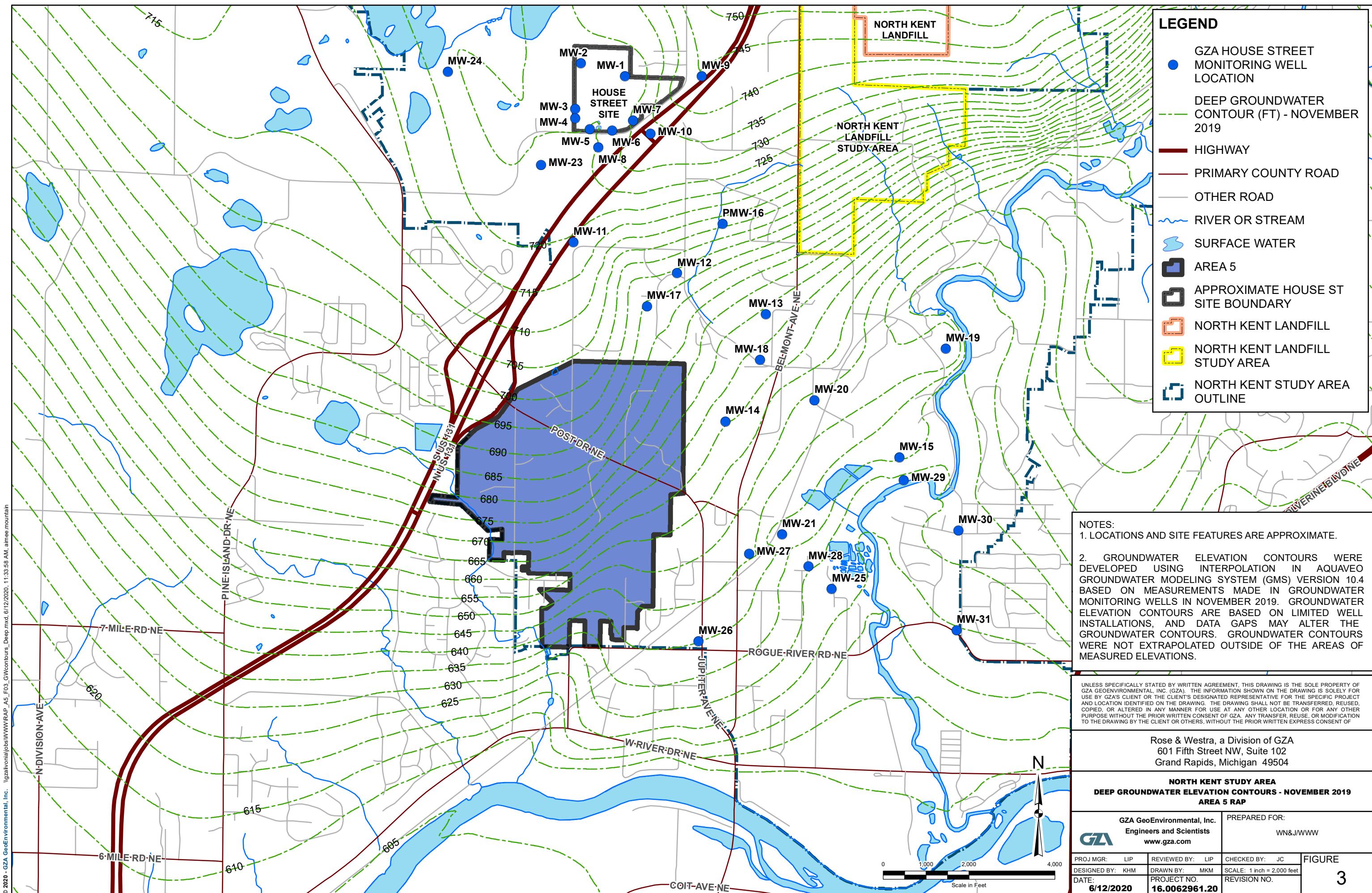
- Well screen interval presented is the top of the well screen to the bottom of the well screen in feet below ground surface.

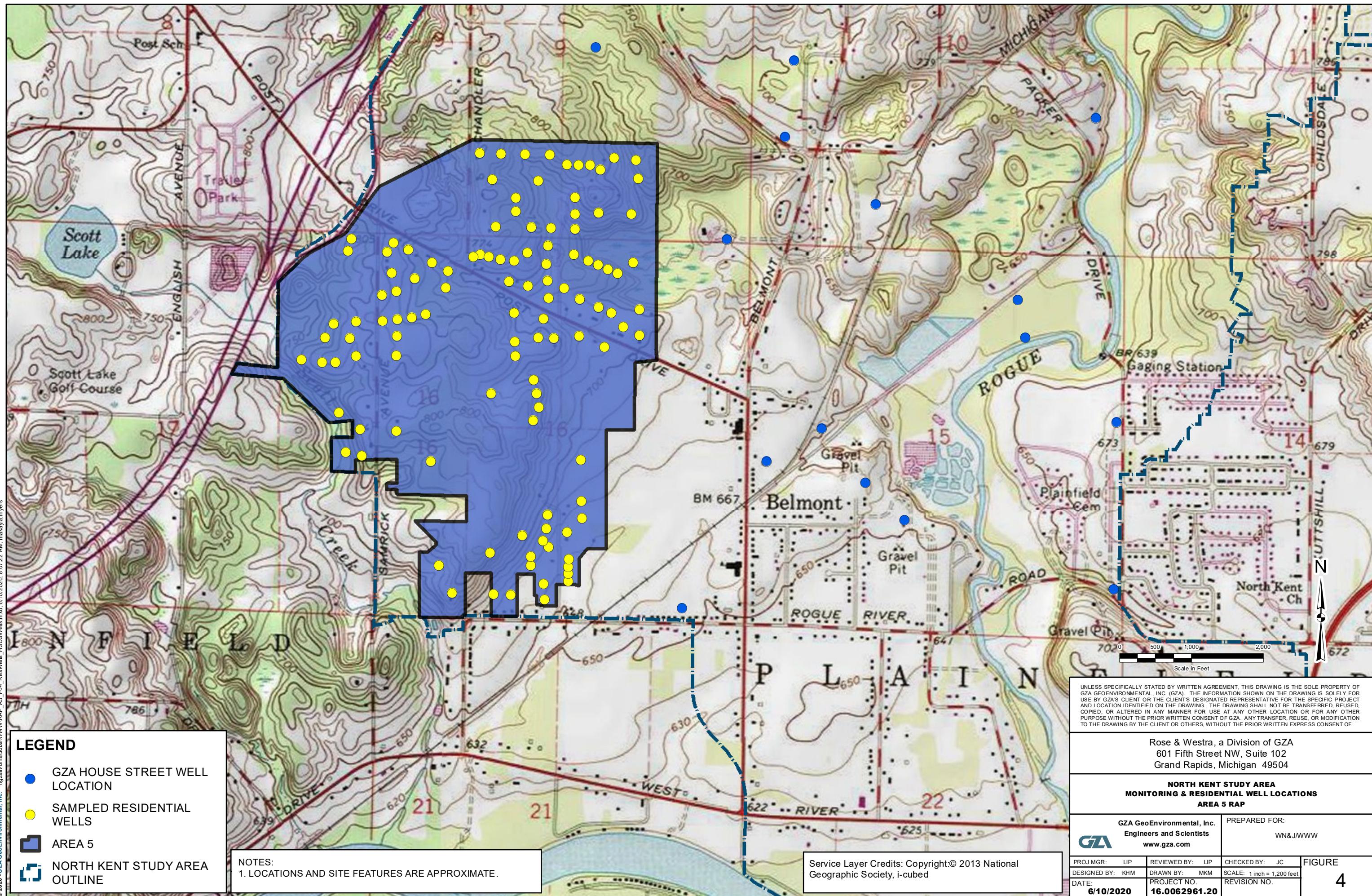


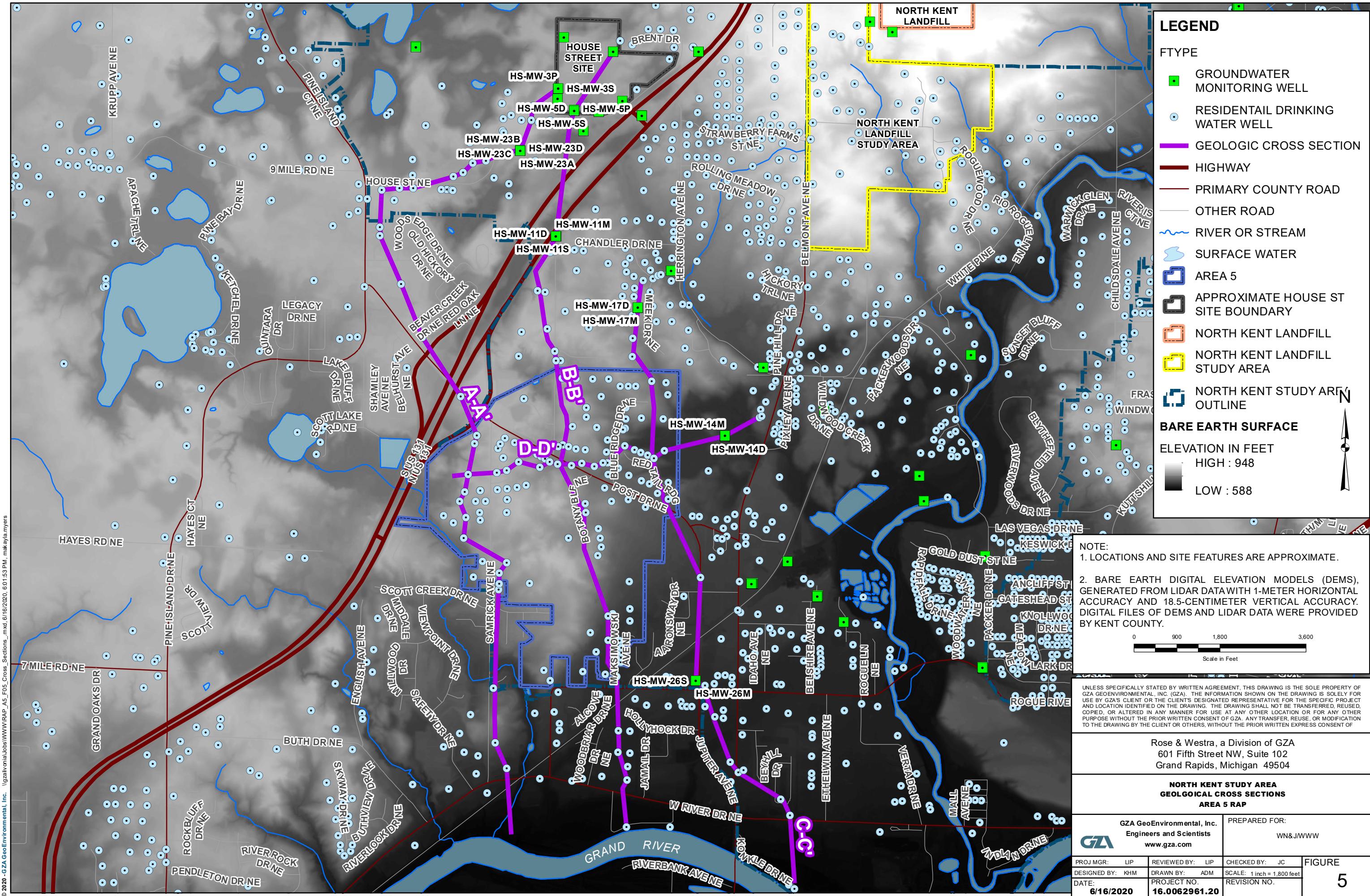
FIGURES

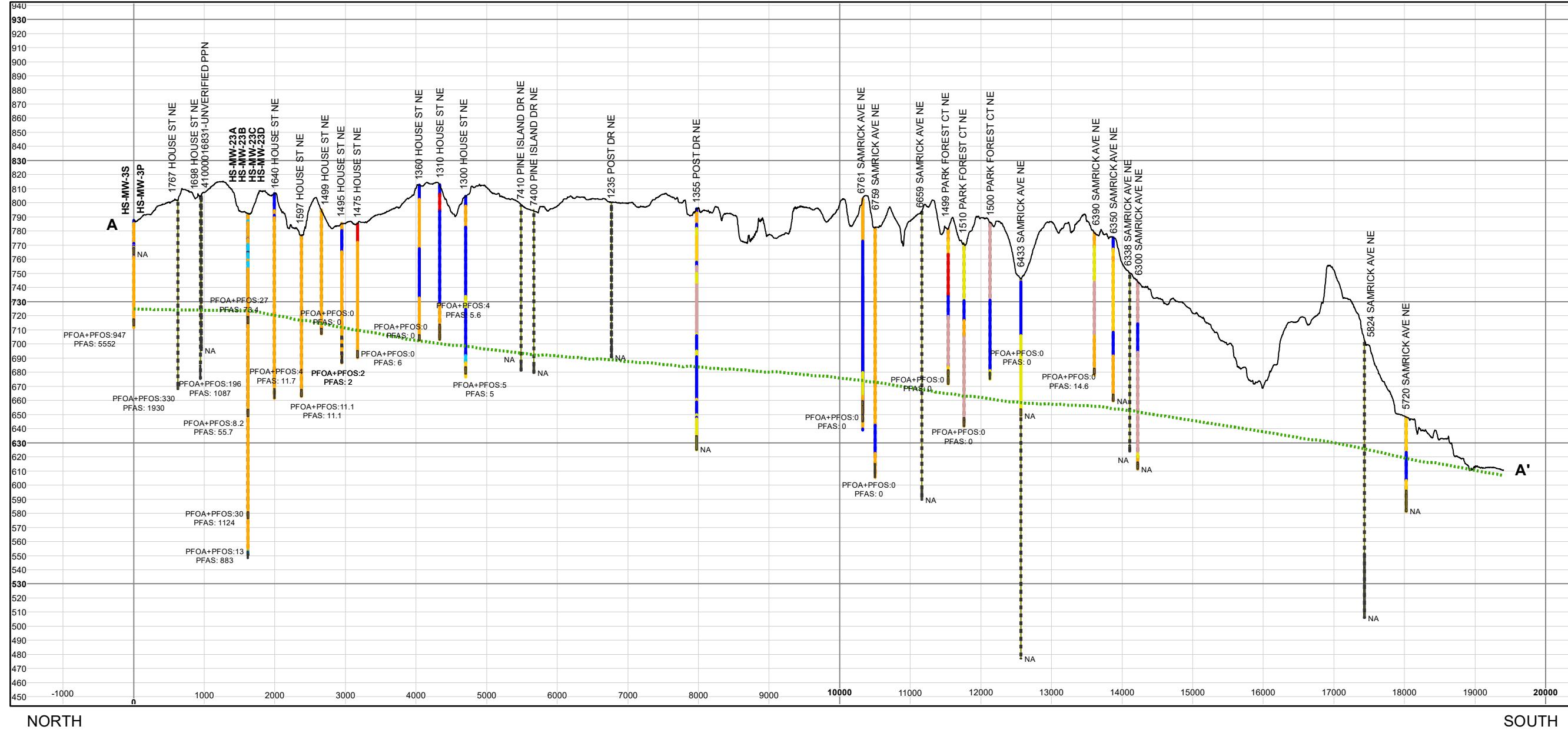












NORTH

SOUTH

CROSS SECTION LEGEND

WELL SCREEN
 PFOA+PFOS (ng/L)
 PFAS (ng/L)
 0 = NOT DETECTED
 NA = NOT AVAILABLE

ESTIMATED GROUNDWATER TABLE (11/2019)

GROUND SURFACE

BOREHOLE LITHOLOGY

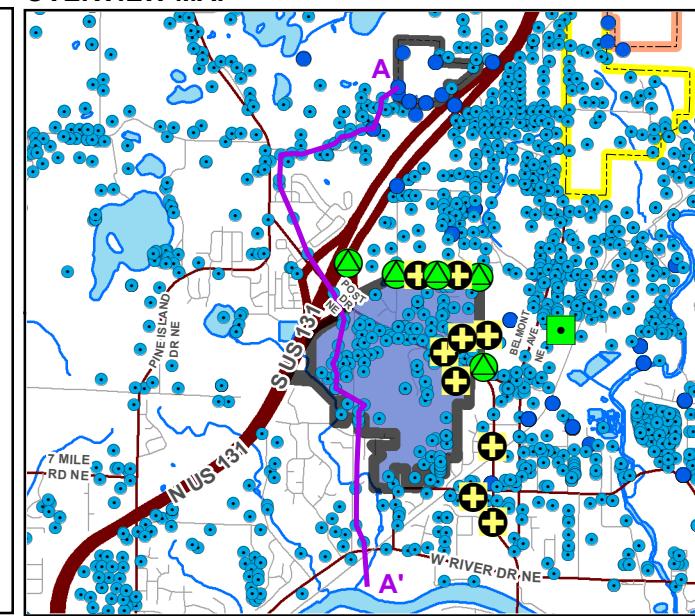
- PFOA+PFOS (ng/L)
- PFAS (ng/L)
- 0 = NOT DETECTED
- NA = NOT AVAILABLE
- ESTIMATED GROUNDWATER TABLE (11/2019)
- GROUND SURFACE

- SILT
- GRAVEL
- SAND AND GRAVEL
- SAND
- SAND/GRAVEL WITH CLAY/SILT
- CLAY
- TOP SOIL
- CLAY/SILT WITH SAND/GRAVEL
- ■ ■ NOT AVAILABLE

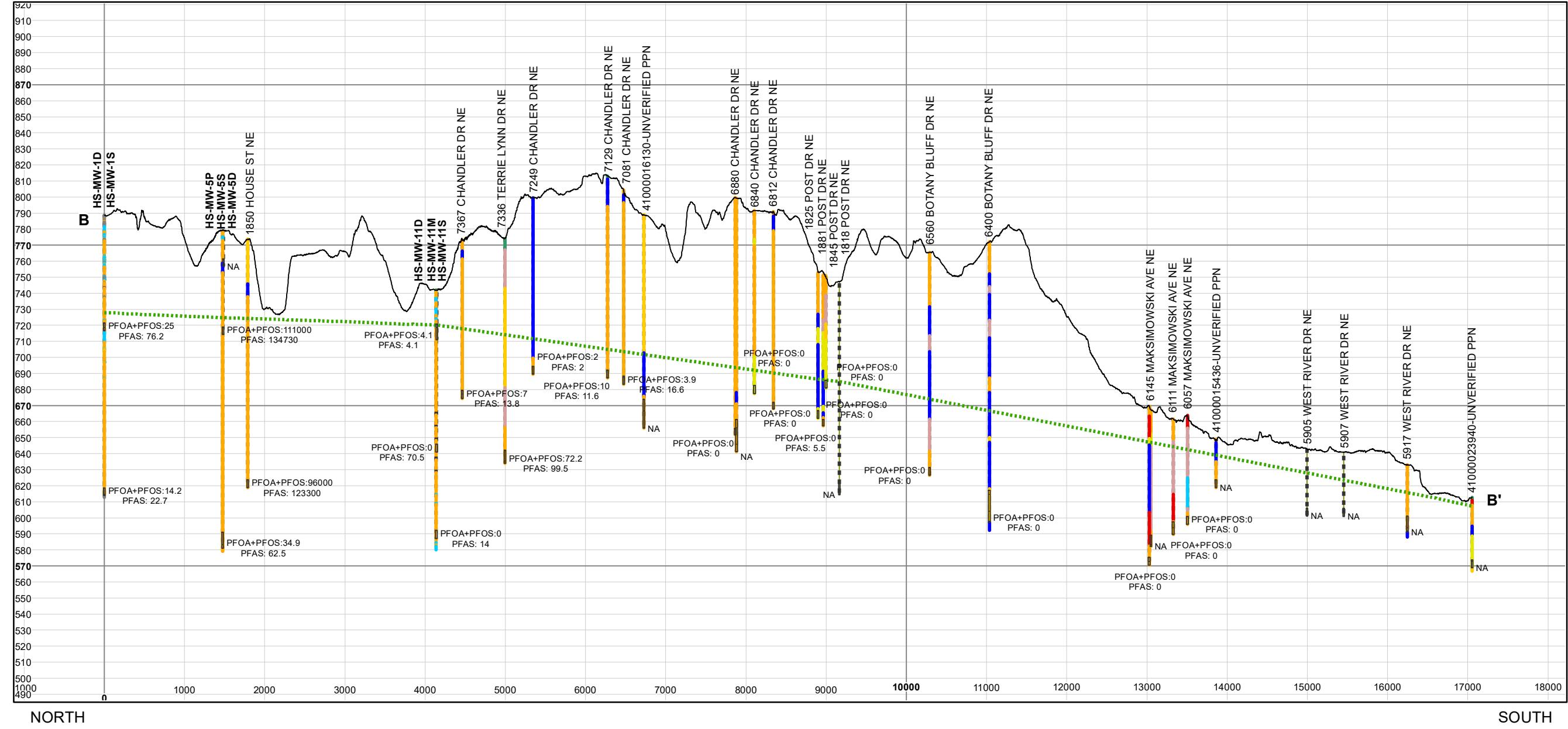
OVERVIEW MAP LEGEND

- PROPOSED PERIMETER MONITORING WELL
- PROPOSED INVESTIGATION MONITORING WELL
- PROPOSED INVESTIGATION / PERIMETER MONITORING WELL
- RESIDENTIAL WATER WELL
- MONITORING WELL
- CROSS SECTION LINE
- HIGHWAY
- PRIMARY COUNTY ROAD
- OTHER ROAD
- RIVER OR STREAM
- SURFACE WATER
- AREA 5
- APPROXIMATE HOUSE ST SITE BOUNDARY
- NORTH KENT LANDFILL
- NORTH KENT LANDFILL STUDY AREA

NOTES:
 1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.
 2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMs), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.
 3. ESTIMATED GROUNDWATER TABLE WAS DEVELOPED BASED ON MEASUREMENTS MADE IN GROUNDWATER MONITORING WELLS IN NOVEMBER 2019. GROUNDWATER ELEVATIONS WERE NOT MEASURED FROM RESIDENTIAL WATER SUPPLY WELLS.
 4. WELL SCREEN ELEVATIONS PROVIDED IN FEET ABOVE MEAN SEA LEVEL, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). RESIDENTIAL WELL SCREEN ELEVATIONS AND BOREHOLE LITHOLOGY ELEVATIONS WERE CALCULATED USING WELL INFORMATION PROVIDED BY THE STATE OF MICHIGAN'S WELLOGIC DATABASE AND GROUND SURFACE ELEVATIONS OF THE CENTER OF THE PPN GENERATED FROM LIDAR DATA PROVIDED BY KENT COUNTY. ELEVATIONS ARE ROUNDED TO THE NEAREST FOOT.
 5. CONCENTRATIONS OF TOTAL PFAS AND PFOA+PFOS DEPICTED ARE MAXIMUM CONCENTRATIONS DETECTED AT THE SPECIFIED LOCATION.

OVERVIEW MAP

SCALE IN FEET		
0	3,000	6,000
N		
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601 FIFTH STREET NW, SUITE 102		
GRAND RAPIDS, MICHIGAN 49504		
NORTH KENT STUDY AREA		
GEOLOGICAL CROSS SECTION A-A'		
AREA 5 RAP		
PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com	PREPARED FOR: WN&J/WWW	
PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN
DESIGNED BY: JC	DRAWN BY: JC	SCALE: 1:72,000
DATE: 06/10/2020	PROJECT NO: 16.0062961.20	REVISION NO:
FIGURE 6		



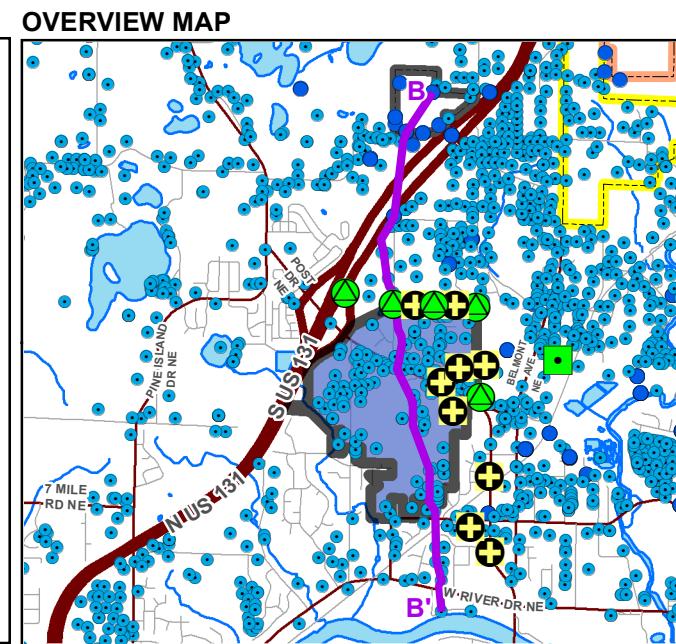
CROSS SECTION LEGEND

WELL SCREEN	BOREHOLE LITHOLOGY
PFOA+PFOS (ng/L)	GRAVEL
PFAS (ng/L)	CLAY AND SILT
0 = NOT DETECTED	SAND AND GRAVEL
NA = NOT AVAILABLE	CLAY
ESTIMATED GROUNDWATER TABLE (11/2019)	SAND
GROUND SURFACE	TOP SOIL
	SAND/GRAVEL WITH CLAY/SILT
	CLAY/SILT WITH SAND/GRAVEL

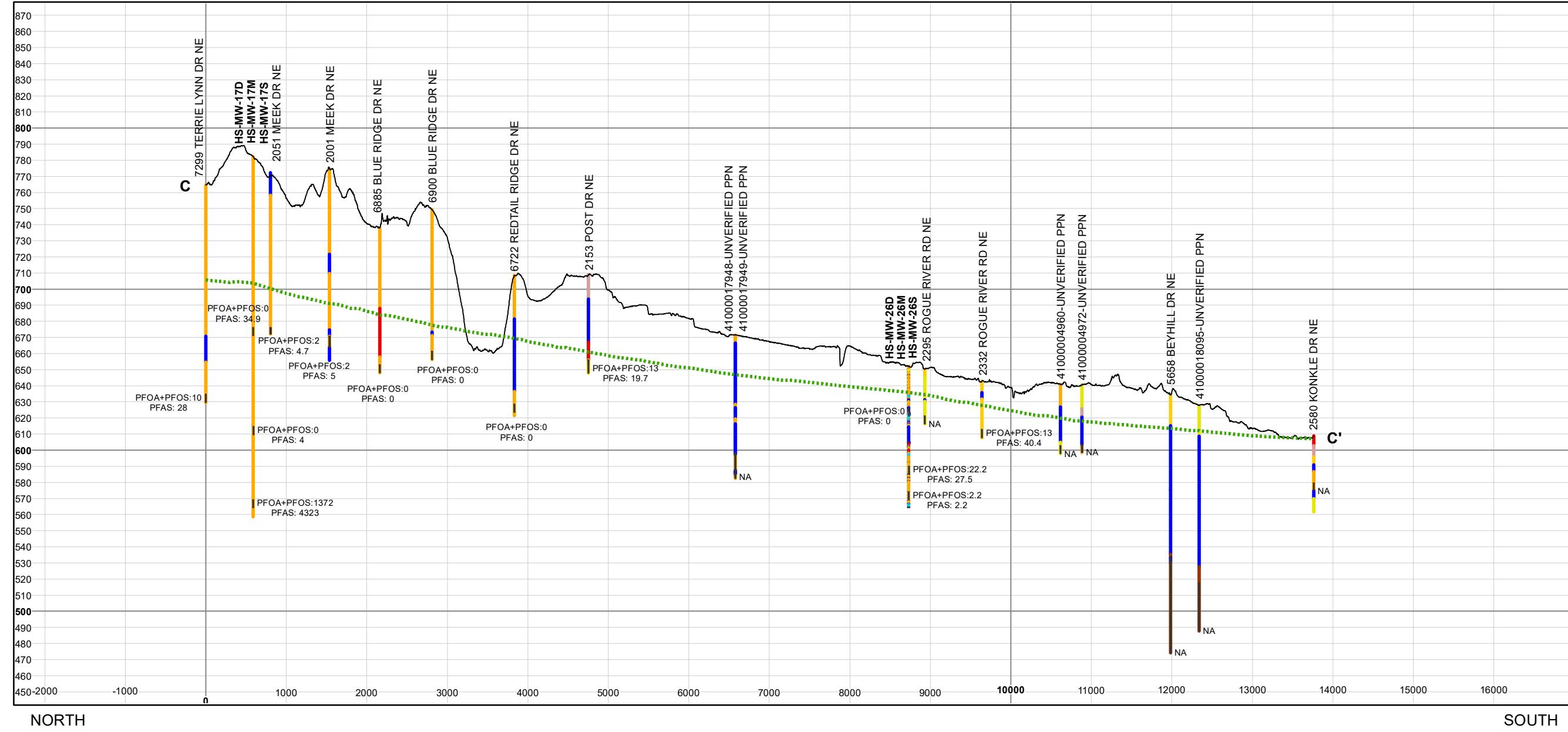
OVERVIEW MAP LEGEND

PROPOSED PERIMETER MONITORING WELL	CROSS SECTION LINE	AREA 5
PROPOSED INVESTIGATION MONITORING WELL	HIGHWAY	APPROXIMATE HOUSE ST SITE BOUNDARY
PROPOSED INVESTIGATION / PERIMETER MONITORING WELL	PRIMARY COUNTY ROAD	NORTH KENT LANDFILL
RESIDENTIAL WATER WELL	OTHER ROAD	NORTH KENT LANDFILL STUDY AREA
MONITORING WELL	RIVER OR STREAM	SURFACE WATER

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.
2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMS), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.
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5. CONCENTRATIONS OF TOTAL PFAS AND PFOA+PFOS DEPICTED ARE MAXIMUM CONCENTRATIONS DETECTED AT THE SPECIFIED LOCATION.



SCALE IN FEET		
0	3,000	6,000
12,000		
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NORTH KENT STUDY AREA GEOLOGICAL CROSS SECTION B-B' AREA 5 RAP		
PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		
PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN
DESIGNED BY: JC	DRAWN BY: JC	SCALE: 1:72,000
DATE: 06/10/2020	PROJECT NO: 16.0062961.20	REVISION NO:
FIGURE 7		



NORTH

SOUTH

CROSS SECTION LEGEND

WELL SCREEN
 PFOA+PFOS (ng/L)
 PFAS (ng/L)
 0 = NOT DETECTED
 NA = NOT AVAILABLE

ESTIMATED GROUNDWATER TABLE (11/2019)

GROUND SURFACE

BOREHOLE LITHOLOGY
 ■ SILT
 ■ GRAVEL
 ■ SAND AND GRAVEL
 ■ SAND
 ■ CLAY
 ■ SAND/GRAVEL WITH CLAY/SILT
 ■ CLAY/SILT WITH SAND/GRAVEL
 ■ ■ ■ NOT AVAILABLE

OVERVIEW MAP LEGEND

PROPOSED PERIMETER MONITORING WELL
PROPOSED INVESTIGATION MONITORING WELL
PROPOSED INVESTIGATION / PERIMETER MONITORING WELL
RESIDENTIAL WATER WELL
MONITORING WELL

CROSS SECTION LINE
HIGHWAY
PRIMARY COUNTY ROAD
OTHER ROAD
RIVER OR STREAM
SURFACE WATER

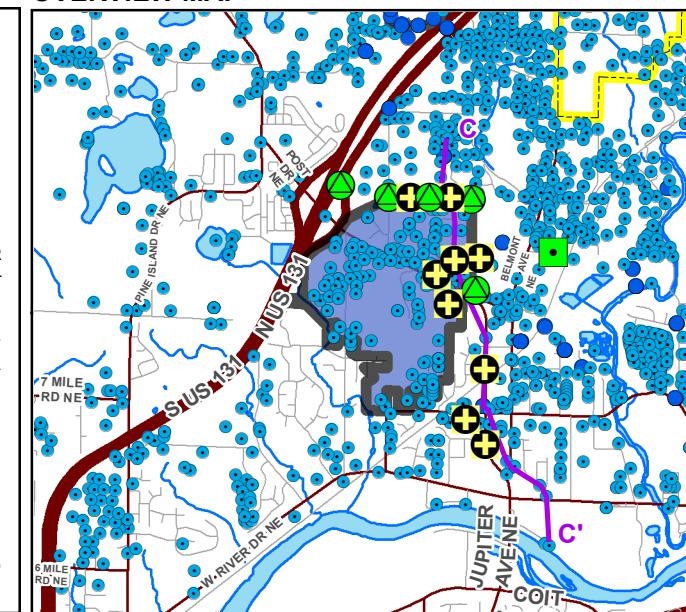
AREA 5
APPROXIMATE HOUSE ST SITE BOUNDARY
NORTH KENT LANDFILL STUDY AREA

NOTES:
 1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.
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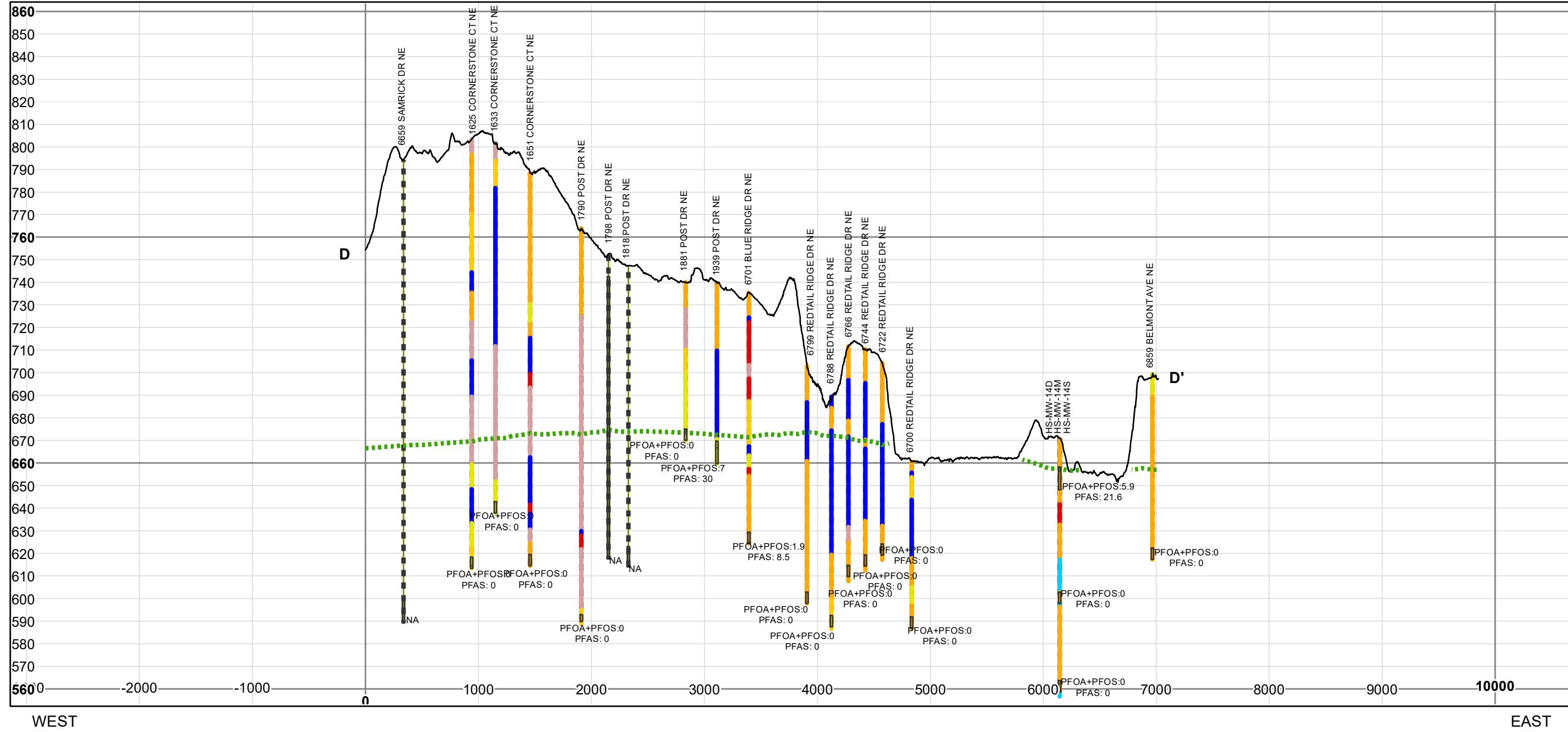
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5. CONCENTRATIONS OF TOTAL PFAS AND PFOA+PFOS DEPICTED ARE MAXIMUM CONCENTRATIONS DETECTED AT THE SPECIFIED LOCATION.

OVERVIEW MAP

SCALE IN FEET		
0	3,000	6,000
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NORTH KENT STUDY AREA	GEOLOGICAL CROSS SECTION C-C'	AREA 5 RAP
PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com	PREPARED FOR: WN&J/WWW	
PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN
DESIGNED BY: JC	DRAWN BY: JC	SCALE: 1:72,000
DATE: 06/10/2020	PROJECT NO: 16.0062961.20	REVISION NO:

**CROSS SECTION LEGEND**

WELL SCREEN
PFOA+PFOS (ng/L)
PFAS (ng/L)
0 = NOT DETECTED
NA = NOT AVAILABLE

ESTIMATED GROUNDWATER TABLE (11/2019)

GROUND SURFACE

BOREHOLE LITHOLOGY
GRANULE
SAND AND GRAVEL
SAND
CLAY
NOT AVAILABLE

NOTES:
1. LOCATIONS AND SITE FEATURES ARE APPROXIMATE.
2. GROUND SURFACE ELEVATIONS ARE BASED ON DIGITAL RASTER FILES OF BARE EARTH DIGITAL ELEVATION MODELS (DEMs), GENERATED FROM LIDAR DATA WITH 1-METER HORIZONTAL ACCURACY AND 18.5-CENTIMETER VERTICAL ACCURACY. DIGITAL FILES OF DEMS AND LIDAR DATA WERE PROVIDED BY KENT COUNTY.

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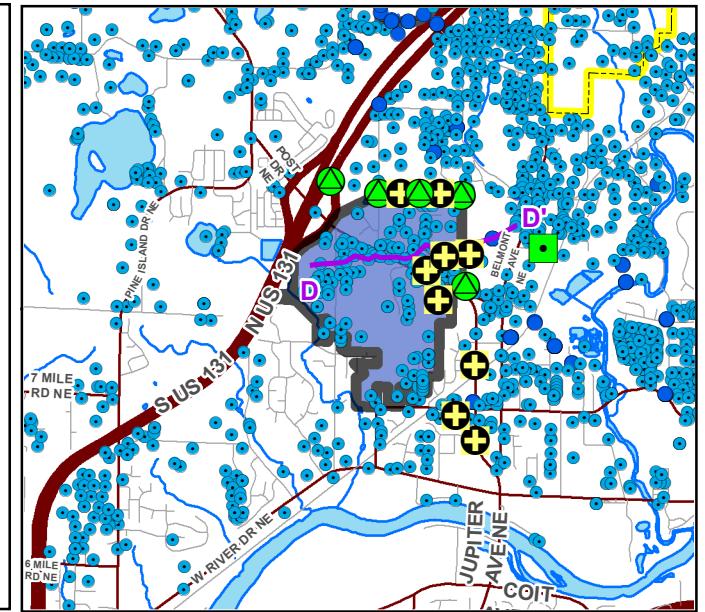
5. CONCENTRATIONS OF TOTAL PFAS AND PFOA+PFOS DEPICTED ARE MAXIMUM CONCENTRATIONS DETECTED AT THE SPECIFIED LOCATION.

OVERVIEW MAP LEGEND

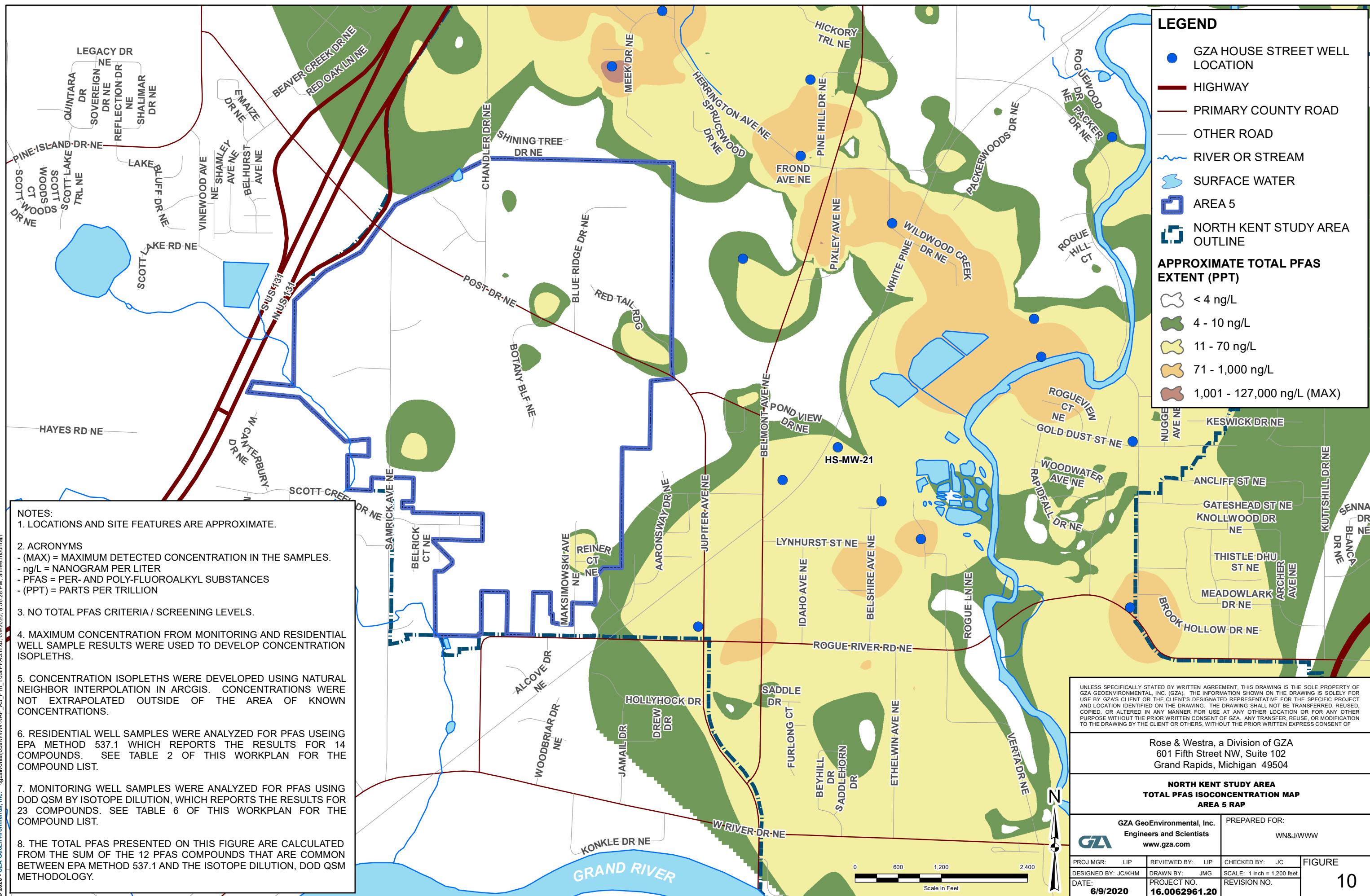
PROPOSED PERIMETER MONITORING WELL
PROPOSED INVESTIGATION MONITORING WELL
PROPOSED INVESTIGATION / PERIMETER MONITORING WELL
RESIDENTIAL WATER WELL
MONITORING WELL

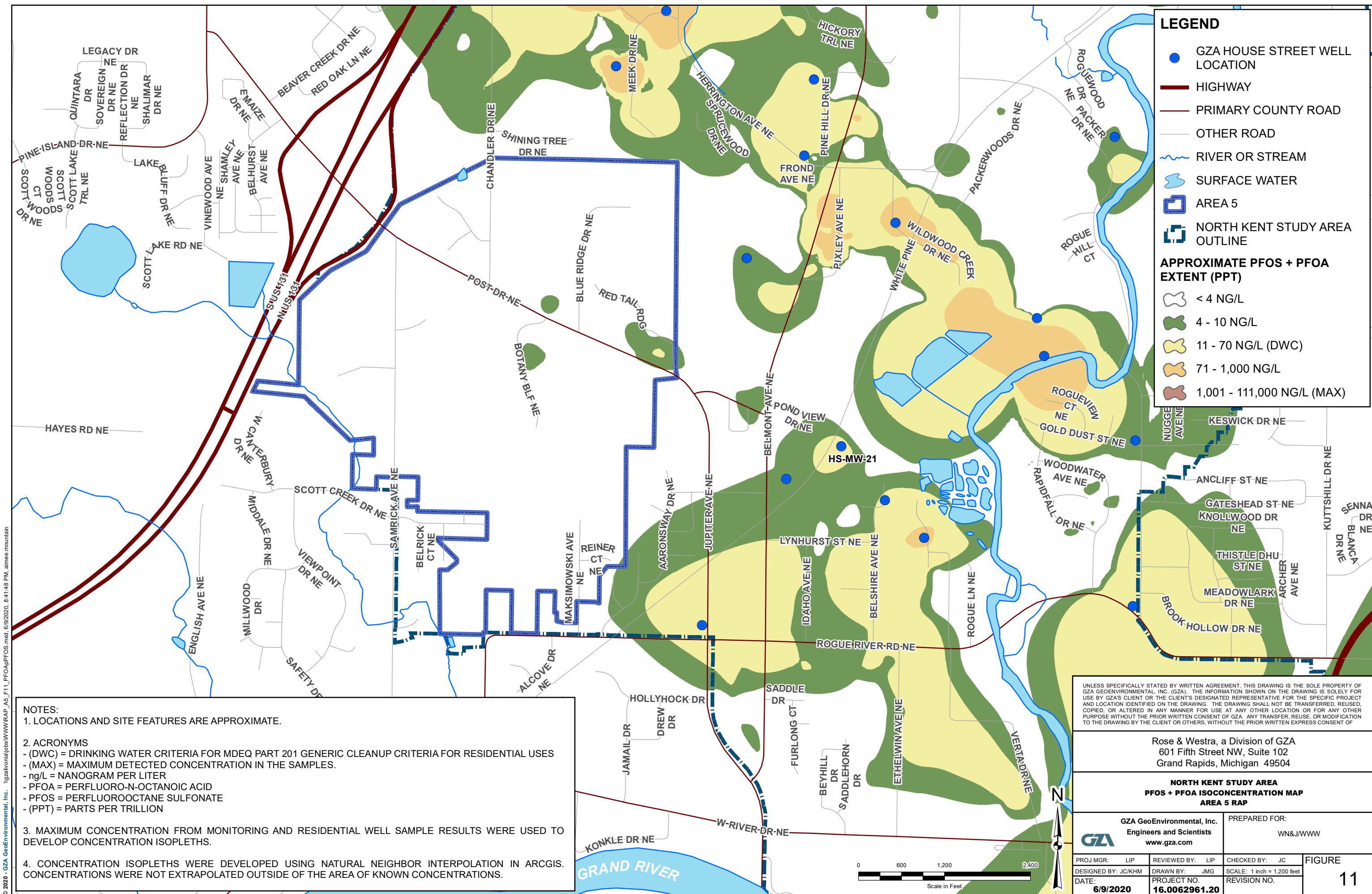
CROSS SECTION LINE
HIGHWAY
PRIMARY COUNTY ROAD
OTHER ROAD
RIVER OR STREAM
SURFACE WATER

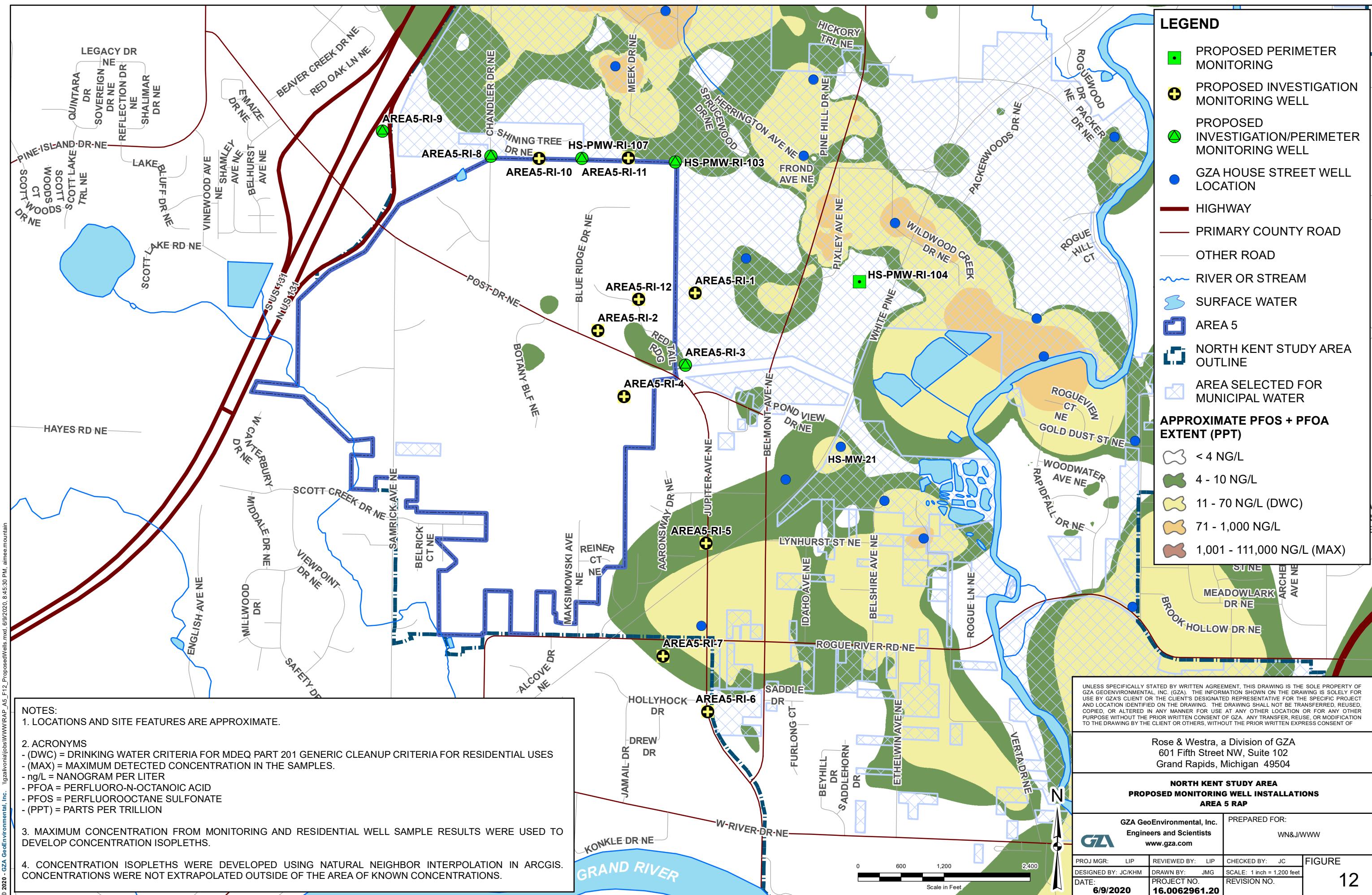
AREA 5
APPROXIMATE HOUSE ST SITE BOUNDARY
NORTH KENT LANDFILL STUDY AREA

OVERVIEW MAP

SCALE IN FEET			
0	3,000	6,000	12,000
N			
ROSE & WESTRA, A DIVISION OF GZA 601 FIFTH STREET NW, SUITE 102 GRAND RAPIDS, MICHIGAN 49504			
NORTH KENT STUDY AREA GEOLOGICAL CROSS SECTION D-D' AREA 5 RAP			
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PROJ MGR: LJP	REVIEWED BY: MW	CHECKED BY: LMN	
DESIGNED BY: JC	DRAWN BY: JC	SCALE: 1:72,000	
DATE: 06/10/2020	PROJECT NO: 16.0062961.20	REVISION NO:	
FIGURE 9			









APPENDIX A – 2019 GROUNDWATER SAMPLING SUPPLEMENTAL MEMORANDUM



Rose & Westra
A Division of GZA

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION
MANAGEMENT



APPENDIX A 2019 GROUNDWATER SAMPLING SUPPLEMENTAL MEMORANDUM

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June 18, 2020
File No. 16.0062961.20

PREPARED FOR:
Wolverine World Wide, Inc.
Rockford, Michigan

Rose & Westra, a Division of GZA GeoEnvironmental, Inc.

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30 Offices Nationwide
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1.0 INTRODUCTION

Since April 2017, Wolverine has voluntarily and proactively worked with EGLE, the Kent County Health Department (KCHD), and Michigan Department of Health and Human Services (MDHHS) to establish zones for drinking water well testing, provided alternate (bottled) water service, point of use (faucet) water filters, and point of entry (whole house) filter systems. As of December 2019, R&W/GZA has installed monitoring wells at twenty-nine (29) locations totaling eighty-four (84) wells within the House Street Study Area as shown on **Figure 4** of the Draft Area 5 Response Activity Plan, North Kent Study Area, submitted to EGLE on June 18, 2020 (Draft Area 5 RAP [R&W/GZA, 2020]). Of the 29 locations, seven (7) are located on the HSDS property, one (1) is on the adjoining Michigan Department of Transportation (MDOT) parcel, three (3) are located on the US-131 right of way (ROW), and the remaining eighteen (18) are placed within or surrounding the PFAS plume.

2.0 INVESTIGATION METHODOLOGY

2.1 GROUNDWATER INVESTIGATIONS

R&W/GZA retained drilling contractors to perform subsurface exploration and monitoring well installation to continue delineation of the extent of PFOA and PFOS both vertically and laterally in the NKSA. Since 2017, R&W/GZA oversaw the installation of eighty-four (84) groundwater monitoring wells at 29 locations in the HSDS study area. At most of the locations, multi-depth cluster wells were installed. The borings were drilled using either hollow stem auguring or rotosonic techniques. Soil samples were collected and logged every 5 feet. At certain locations VAP groundwater samples were collected every 10 feet in the saturated zone and submitted to an independent laboratory for the PFAS analysis using isotope dilution methodology in accordance with the most recent version of the DoD QSM procedures.

Monitoring well screen intervals were selected based on PFAS VAP sampling results and geological conditions. Each monitoring well was constructed of factory-slotted, 0.010-inch, 5-foot long PVC screen (in a few cases, 10-foot), and flush-threaded well casing. The annular space surrounding the well screen was filled with sand filter pack to approximately 3 feet above the top of the well screen, followed by a one- to one-and-one-half-foot-thick hydrated bentonite seal. The remaining annulus was filled with cement and bentonite grout to approximately 1 foot below ground surface. The wells were finished with a steel protective casing set in a concrete pad. A locking expansion cap was placed in the top of the PVC casing. The NKSA-wide soil boring logs and well installation logs were included in the GSI RAP (R&W/GZA 2020). Static water level measurements are provided on **Table 4** of the Draft Area 5 RAP. See **Figure 4** of the Draft Area 5 RAP for the groundwater monitoring well and residential groundwater sampling locations.

Following installation, the newly installed wells were developed to remove sediment from the sand filter pack and well casing. The wells were developed using a 12-volt Mini-Typhoon® submersible pump equipped with dedicated tubing for each well. The pump was decontaminated between wells using a water and Alconox® wash with a water rinse. The wells were developed until the water ran clear. The development water was containerized and staged prior to proper disposal. The tubing and other disposable materials used during the well development were placed in a separate drum and stored for proper disposal.

In addition, surface water level measurement gauges were installed in the following locations in the Rogue River:

- Rockford Dam Seawall;
- East Bridge Street Bridge;



- Rogue River Road Bridge; and
- Jericho Avenue Bridge

The water levels measured from these locations were used in combination with available gaging height data at USGS gaging station, USGS04118500, to evaluate surface water levels in the Rogue River.

2.2 GROUNDWATER SAMPLING METHODS

Groundwater sampling followed the low-flow purging and sampling procedures identified in the project QAPP approved by EGLE in December 2018 (R&W/GZA, 2018). The wells were purged using either a GeoTech Peristaltic Pump or a GeoTech Bladder Pump and control box. Static water levels in the monitoring wells were measured to maintain stabilized drawdowns during purging. Field indicator parameters, temperature, pH, dissolved oxygen, specific conductance, ORP and turbidity, were monitored using a YSI PRO and field turbidity meters in accordance with the low-flow sampling SOP in the project QAPP. Once the field parameters stabilized, a groundwater sample was collected by disconnecting the tubing from the flow-through cell and collecting the sample directly from the tubing.

Groundwater samples were collected in laboratory-supplied sample containers labeled with the well ID, sample time and date, and analytes. The samples were packed in coolers with ice and shipped to the laboratory under chain-of-custody control via overnight express shipping.

As the subsurface exploration and monitoring well installation progressed, the newly installed wells were added to the sampling list in the quarter following their installation and development.

Groundwater sampling was conducted quarterly throughout 2019. See the **Table 1** below for sampling dates. The objective of the groundwater sampling was to provide data to evaluate water quality in the newly installed wells relative to historic, spatial, and temporal concentration trends.

Table 1 – Quarterly Groundwater Sampling Event Dates

Quarter	Dates Sampled
Quarter 1	February 26 – March 31
Quarter 2	May 14 – May 30 ¹
Quarter 3	September 6 – September 27
Quarter 4	November 18 – December 12
Note:	
1. Newly-installed well series 30 and 31 sampled from July 1 through July 3, 2019.	

Due to the well installation schedule all 84 wells were not sampled all four quarters. **Table 2**, below, lists the wells that were sampled during Quarter 1 and those that were added during subsequent sampling rounds. Well construction information is provided **Table 3** of the Draft Area 5 RAP.

**Table 2: House Street Study Area Well Additions**

Quarter	Wells Sampled
Quarter 1	HS-MW-1S, HS-MW-1D, HS-MW-2S, HS-MW-3S, HS-MW-4S, HS-MW-5D, HS-MW-5S, HS-MW-6D, HS-MW-6S, HS-MW-7S, HS-MW-8, HS-MW-9D, HS-MW-9M, HS-MW-9S, HS-MW-10D, HS-MW-10M, HS-MW-10S, HS-MW-11D, HS-MW-11M, HS-MW-11S, HS-MW-15D, HS-MW-15M, HS-MW-15S, HS-MW-17D, HS-MW-17M, HS-MW-17S, HS-MW-18D, HS-MW-18S, HS-MW-19D, HS-MW-19S, HS-MW-20D, HS-MW-20M, HS-MW-20S, HS-MW-21D, HS-MW-21M, HS-MW-21S, HS-MW-25D, HS-MW-25S, HS-MW-26D, HS-MW-26M, HS-MW-26S
Quarter 2	Quarter 1 wells plus: HS-MW-30A, HS-MW-30B, HS-MW-30C, HS-MW-30D, HS-MW-30E, HS-MW-31A, HS-MW-31B, HS-MW-31C, HS-MW-31D, HS-MW-31E, HS-MW-32A, HS-MW-32B, HS-MW-32C, HS-MW-32D
Quarter 3	Quarter 1 and Quarter 2 wells plus: HS-MW-23A, HS-MW-23B, HS-MW-23C, HS-MW-23D, HS-MW-27A, HS-MW-27B, HS-MW-27C, HS-MW-27D, HS-MW-27E, HS-MW-28A, HS-MW-28B, HS-MW-28C, HS-MW-28D, HS-MW-28E
Quarter 4	Quarter 1, Quarter 2, and Quarter 3 wells plus: HS-MW-12A, HS-MW-12B, HS-MW-12C, HS-MW-12D, HS-MW-12E, HS-MW-24A, HS-MW-24B, HS-MW-29A, HS-MW-29B, HS-MW-29C, HS-MW-29D

3.0 STUDY AREA SAMPLING RESULTS

Groundwater analytical results for PFAS are provided on **Table 6** of the Draft Area 5 RAP. The analytical reports and associated electronic data deliverables were previously provided to EGLE.

4.0 QA/QC

Investigative QA/QC procedures are outlined in the project QAPP approved by EGLE in December 2018 and subsequently revised. Selected data have or will be validated according to performance requirements and the QA/QC limits in Table D.1.1 of the project QAPP. In addition, R&W/GZA consulted the general guidance in the EPA Contract Laboratory Program National Functional Guidance for Organic and Inorganic Superfund Data Review and relevant analytical methods to assess data usability.

In R&W/GZA's opinion, the field and laboratory quality control results indicate that the sampling and analyses performed in generating the data described in this Report were generally consistent with the analytical methods and the project QAPP requirements. The project data are acceptable and suitable for site characterization purposes and consequently can be used for decision-making purposes. The limitations identified by the applied qualifiers should be considered when using the data.

5.0 REFERENCES

R&W/GZA. (2018). Quality Assurance Project Plan, Former Wolverine Tannery, House Street Disposal Area, and Wolven/Jewell Area, Per- and Polyfluoroalkyl Substances Investigation Program. Grand Rapids, MI: R&W/GZA.

R&W/GZA. (2020). Area 5 Response Activity Plan, North Kent Study Area. Submitted to EGLE June 18, 2020.



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