

Appendix N



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PERIMETER WELLS STATEMENT OF WORK North Kent Study Area

January 31, 2020
File No. 16.0062335.60

PREPARED FOR:
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Rockford, Michigan

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1.0 INTRODUCTION

On behalf of Wolverine Worldwide, Inc. (Wolverine), Rose & Westra, a Division of GZA GeoEnvironmental, Inc. (R&W/GZA), prepared this Statement of Work (SOW) summarizing the approach and rationale for proposed perimeter monitoring wells set forth in the Consent Decree (CD) around the municipal water areas in Plainfield and Algoma Townships, Kent County, Michigan. The purpose of this SOW is to propose the locations of groundwater monitoring wells to monitor for per- and polyfluoroalkyl substances (PFAS) at the perimeter of the municipal water areas. Following completion of the tasks in this SOW, R&W/GZA will evaluate the data in consultation with EGLE and determine appropriate next steps. Where appropriate, the related scopes of work are referenced throughout this document.

2.0 GENERAL APPROACH

The monitoring wells were proposed after evaluating the known extent of PFAS and evaluating their potential transport in groundwater. The following data was compiled and evaluated:

- The estimated extent of perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) exceeding 70 nanograms per liter (ng/L) and the extent of total PFAS, based on the test results for the residential drinking water wells, the vertical aquifer profiling samples, and the groundwater monitoring well samples.
- The estimated extent of PFOA+PFOS exceeding 10 ng/L and the estimated extent of seven PFAS compounds greater than the proposed maximum contaminant levels (MCLs) for those seven compounds, based on the test results for the residential drinking water wells, the vertical aquifer profiling samples, and the groundwater monitoring well samples.
- Isoconcentration maps for total PFAS interpolated from the residential water well and the groundwater monitoring data.
- Soil boring logs for the vertical aquifer profiling locations and available residential water well logs.
- Groundwater contours and interpreted groundwater flow direction based on the November 2019 static water levels measured at groundwater monitoring wells and at the staff gages installed in the Rogue River.

3.0 BACKGROUND

This SOW addresses perimeter wells (i.e. near the boundaries of municipal water areas in two investigation areas in the North Kent Study Area. Figure 1 illustrates the municipal water areas. The purpose of the activities in this SOW is to monitor PFAS at the perimeter of the municipal water areas.

SOUTH OF 10 MILE ROAD

PFAS have migrated with the predominant groundwater flow to the southeast toward the Rogue River. As the plume crosses Belmont Avenue, a portion of the plume appears to migrate southerly toward the confluence of the Rogue River and Grand River while the main plume continues southeasterly. While groundwater predominantly flows to the southeast, the groundwater contours indicate that a small fraction of groundwater flow passing through the House Street Site flows to the northwest toward the Freska Lake area, which may explain



the relatively low level PFOA+PFOS concentrations at a few individual locations in that area. Groundwater contours suggest some PFAS migrating toward Area 6 may originate at the North Kent Landfill Area.

NORTH OF 10 MILE ROAD

PFAS were found in the Wellington Ridge neighborhood, located between 10 Mile and 11 Mile Roads, west of Wolven Avenue. In addition, PFAS concentrations were also measured in groundwater monitoring wells near the North Kent Landfill area and in several surface-water samples collected from the unnamed creek to which the North Kent Landfill used to discharge water extracted from the landfill underdrain system. The unnamed creek appears to be a migration pathway for PFAS containing surface water from the North Kent Landfill to the northwest north of 10 Mile Road.

Based on the groundwater contours, there appears to be a groundwater mound in the Wellington Ridge area. Groundwater appears to flow radially outward from the mound. With the presence of fine-grained soil in this area, the transport of the PFAS plume was generally limited to the formations where relatively permeable soils are present. The groundwater monitoring data and residential well data suggest flow to the following areas: northeast (Area 19), the northwest (Wolven Northwest), and southeast (Wolven-Childsdale Area).

4.0 PROPOSED MONITORING WELLS

The following provides a summary of proposed remedial investigation wells for the purpose of plume perimeter delineation and monitoring. See Figure 1 for a well location plan for the proposed perimeter monitoring well network along with the areas selected for municipal water and the areas that will not receive municipal water. Figure 2 presents a well location plan of the proposed perimeter well locations along with the proposed remedial investigation wells and GSI piezometer/pore water sampling locations under other SOWs.

- Three previously proposed monitor well locations, HS-PMW-13, HS-PMW-16, and HS-PMW-22 are previously proposed with access efforts on-going. These well locations were proposed to assist with delineating the east-northeastern boundary of the House Street plume¹. Well location HS-PMW-16 will be utilized as a perimeter monitoring well cluster to evaluate potential PFAS migration to the east.
- Three perimeter well locations, HS-PMW-RI-105, HS-PMW-RI-106, and HS-PMW-RI-101, located northwest, and hydraulically downgradient of the House Street site, are proposed to evaluate potential PFAS migration at the edge of the Freska Lake area toward the edge of the North Kent Study area. In addition, the existing well cluster, HS-MW-32A/B/C/D, will be included as perimeter monitoring wells to evaluate potential PFAS migration to this area.
- Well location HS-PMW-RI-102, located hydraulically downgradient of the House Street Site to the southwest, is proposed to monitor for PFAS migration from the municipal water areas to the southeast.
- For the Wolven West and Wolven Northwest Study Areas, perimeter well locations WV-PMW-RI-101 and WV-PMW-RI-102 are proposed immediately west of the US-131 right-of-way, hydraulically downgradient of the PFAS plume in Wellington Ridge. These wells are proposed to evaluate potential migration of PFAS from Wellington Ridge municipal water area to the west. Well locations WV-PMW-RI-104 and WV-PMW-RI-105 are proposed to delineate the southwest and northeast boundary of the PFAS plume

¹ For the sake of this Work Plan, the edge of the PFAS plume is defined as PFOA+PFOS = 10 ppt. If the applicable PFAS criteria change during the life of this Work Plan and subsequent monitoring, the Work Plan will be reassessed for its adequacy and modified as needed.



within the Wolven Northwest municipal water area. In addition, existing monitoring well clusters, WV-MW-5, WV-MW-4, WV-MW-11, and WV-MW-15 will be included as part of the perimeter monitoring for the Wolven West and Wolven Northwest areas.

- Well locations WV-PMW-RI-106 and WV-PMW-RI-107 are located in the southeastern portion of the Wolven/Jewell area municipal water area. These wells are proposed to evaluate the potential migration of PFAS plume from Wolven Southeast municipal water area to the southeast.
- Well location WV-PMW-RI-108 is located southwest of the North Childsdale municipal water area and is proposed to evaluate flow from that area to the west and south.

5.0 METHODOLOGY

The tasks completed under this abbreviated SOW will be completed in accordance with the *Quality Assurance Project Plan, Former Wolverine Tannery, House Street Disposal Area, and Wolven/Jewell Area, Per- and Polyfluoroalkyl Substances Investigation Program, Revision 2 (QAPP)* prepared for Wolverine World Wide, Inc. by R&W/GZA and dated November 1, 2018. A Conceptual Site Model including additional background and methodology will be provided in a Response Activity Plan that will be prepared following the Effective Date of the CD (see Section 9.0 below).

6.0 WELL INSTALLATION PROCEDURES

The proposed well nest 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 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 from water-bearing and permeable formation(s) at an interval of 10 feet for PFAS analysis. Vertical Aquifer Profiling 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 and the encountered geology, 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 and surveyed by a licensed surveyor.

7.0 SAMPLING

Wells installed as part of this SOW (Figure 1) will be sampled as follows:

- Initial sampling post installation/development;
- Annual sampling until substantial completion of the perimeter well network;
- Once the perimeter well network outlined in this SOW is substantially complete, the wells will be sampled quarterly for one year.

Substantial completion will be agreed upon by R&W/GZA and EGLE.

The sampling will be conducted using methods established in SOPs A14, A15, A16, and B01 of the QAPP. The samples will be analyzed using method EPA Method 537.1, modified isotope dilution.



8.0 INVESTIGATION DERIVED WASTE

Soil cuttings and development/purge water from the well installations and sampling will be containerized and transported to the former Wolverine House Street property for staging/storage until off-site treatment/disposal can be arranged.

9.0 ANTICIPATED SCHEDULE

A formal Work Plan will be prepared for this work and submitted to EGLE no later than 180 days following the Effective Date of the CD between EGLE and Wolverine.

The schedule for installation of the well nest locations will depend on R&W/GZA's ability to obtain access to the desired locations or proximate alternate locations. The following table outlines R&W/GZA's current estimates of the steps and approximate timeframes for the work in this SOW.

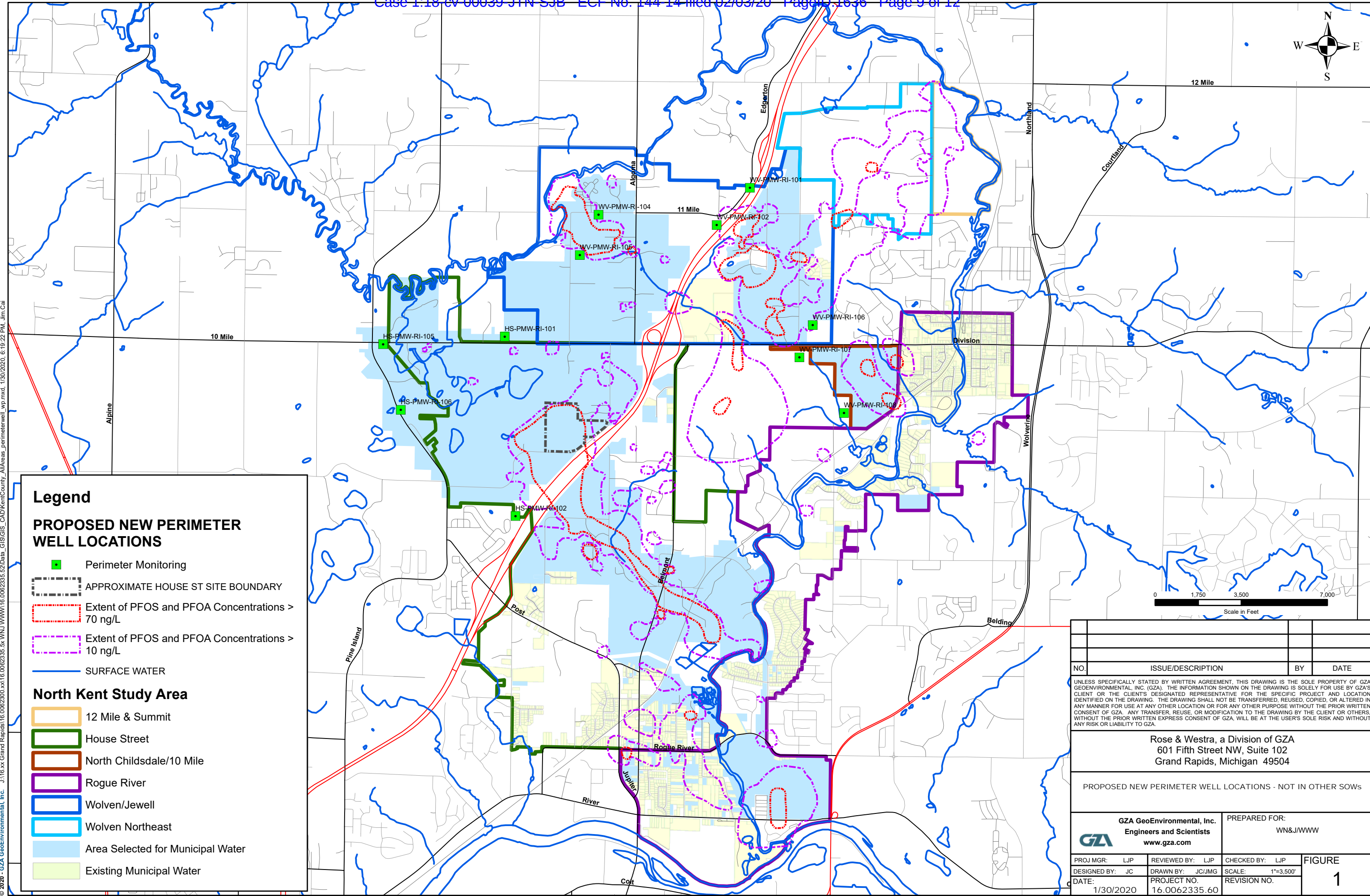
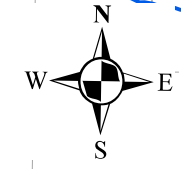
Task	Estimated Timeframe per Location
Access	1 to 3 months
Drilling	2 to 3 weeks
VAP analysis	3 weeks
Monitoring Well Installation	1 to 2 weeks
Development wait time	2 weeks
First Groundwater Sampling	1 week
First Laboratory Analysis	3 weeks

Assuming one month per location, R&W/GZA estimates this SOW will require 11 months to complete drilling, vertical aquifer profiling and monitoring well installation. This work will be completed in conjunction with the other SOWs submitted under the CD. R&W/GZA will coordinate with EGLE to prioritize drilling locations if access is obtained for multiple locations throughout the SOWs simultaneously. Because access will likely be obtained piecemeal, the actual well installation schedule will likely exceed 11 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.



FIGURES



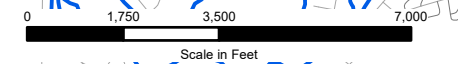
Legend

PROPOSED NEW PERIMETER WELL LOCATIONS

- Perimeter Monitoring
- APPROXIMATE HOUSE ST SITE BOUNDARY
- Extent of PFOS and PFOA Concentrations > 70 ng/L
- Extent of PFOS and PFOA Concentrations > 10 ng/L
- SURFACE WATER

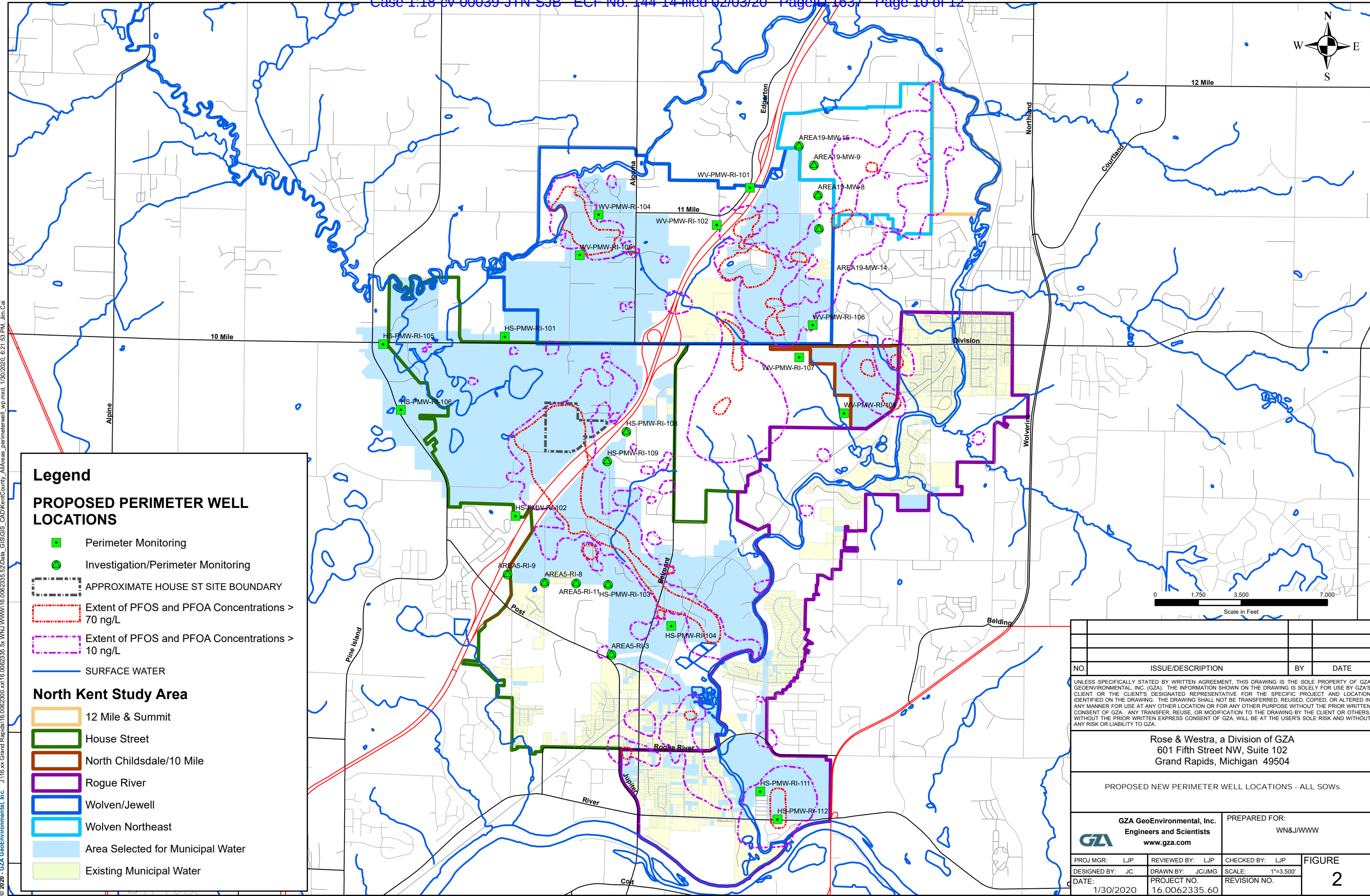
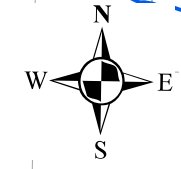
North Kent Study Area

- 12 Mile & Summit
- House Street
- North Childsdale/10 Mile
- Rogue River
- Wolven/Jewell
- Wolven Northeast
- Area Selected for Municipal Water
- Existing Municipal Water



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<p>PROPOSED NEW PERIMETER WELL LOCATIONS - NOT IN OTHER SOWs</p>			
<p>GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com</p>		<p>PREPARED FOR: WN&J/WWW</p>	
PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: LJP	<p>FIGURE 1</p>
DESIGNED BY: JC	DRAWN BY: JC/JMG	SCALE: 1"=3,500'	
DATE: 1/30/2020	PROJECT NO. 16.0062335.60	REVISION NO.	

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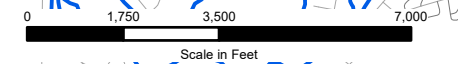
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PROPOSED PERIMETER WELL LOCATIONS

- Perimeter Monitoring
- Investigation/Perimeter Monitoring
- APPROXIMATE HOUSE ST SITE BOUNDARY
- Extent of PFOS and PFOA Concentrations > 70 ng/L
- Extent of PFOS and PFOA Concentrations > 10 ng/L
- SURFACE WATER

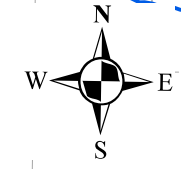
North Kent Study Area

- 12 Mile & Summit
- House Street
- North Childsdale/10 Mile
- Rogue River
- Wolven/Jewell
- Wolven Northeast
- Area Selected for Municipal Water
- Existing Municipal Water



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PROPOSED NEW PERIMETER WELL LOCATIONS - ALL SOWs			
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PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: LJP	FIGURE 2
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Legend

PROPOSED LOCATIONS

- Perimeter Monitoring
- ⊕ Investigation
- Investigation/Perimeter Monitoring
- APPROXIMATE HOUSE ST SITE BOUNDARY

HOUSE ST MONITORING WELLS

- Existing Monitoring Wells
- In Progress
- ▲ In Progress/Perimeter

Wolven Monitoring Well

- In Progress
- Existing Well
- ▲ Existing/Perimeter Well

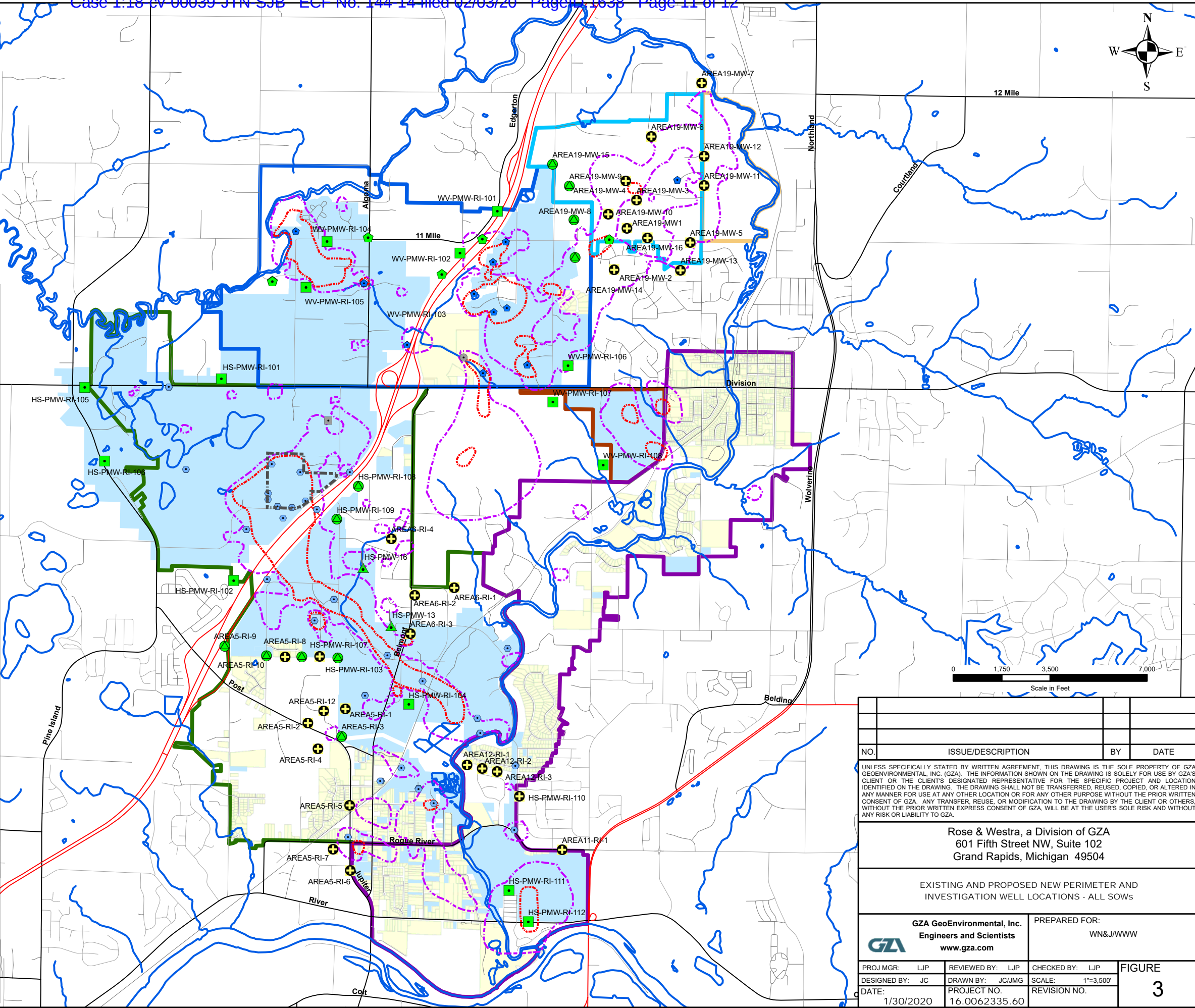
Extent of PFOS and PFOA Concentrations > 70 ng/L (Red dashed line)

Extent of PFOS and PFOA Concentrations > 10 ng/L (Purple dashed line)

— SURFACE WATER (Blue line)

North Kent Study Area

- 12 Mile & Summit (Orange outline)
- House Street (Green outline)
- North Childsdale/10 Mile (Brown outline)
- Rogue River (Purple outline)
- Wolven/Jewell (Blue outline)
- Wolven Northeast (Cyan outline)
- Area Selected for Municipal Water (Light Blue fill)
- Existing Municipal Water (Light Green fill)



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PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: LJP	FIGURE 3
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