



Rose & Westra  
A Division of GZA

GEOTECHNICAL  
ENVIRONMENTAL  
ECOLOGICAL  
WATER  
CONSTRUCTION  
MANAGEMENT

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Sent Via Email: [hendershotta@michigan.gov](mailto:hendershotta@michigan.gov)

January 18, 2019  
File: 16.0062677.80

Ms. Abigail Hendershott  
Michigan Department of Environmental Quality  
5<sup>th</sup> Floor – Unit 10  
350 Ottawa Avenue NE  
Grand Rapids, MI 49503

Re: Wolverine World Wide, Inc. (Wolverine)  
Wolven/Jewell Area – Select Residential Well Resampling

Dear Ms. Hendershott:

This letter is in response to your letter dated November 21, 2018. We understood Wolverine was given an extension until January 18, 2019 to respond to the letter. As discussed during technical meetings in the last 6 weeks, Wolverine is proposing an alternative resampling plan for select residential wells. Resampling has already been conducted for 62 wells within the House Street study area. Our next phase of resampling will be within the Wolven/Jewell Study Area.

The following technical approach was used as the basis for this scope of work:

- Use groundwater contours and flow to identify downgradient area of the alleged source. **Figures 1A and Figure 1B** show interpolated groundwater contours using permanent monitoring well static levels from August 3, 2018, supplemented with MDEQ monitoring well static water levels data collected on July 14, 2018. The monitoring wells were grouped into a shallow zone and a deep zone, based on their screening positions. Static water level data from monitoring wells screened in the perched groundwater zone, as observed in wells MW-2S, MW-3S and MW-6S were not used for groundwater contouring. Groundwater contours for the shallow aquifer is shown in Figure 1A, and groundwater contours for the deep aquifer shown in Figure 1B.
- Use PFBS (4-carbon chain PFAS) as a tracer/indicator for potential PFOS+PFOA transport in groundwater. The mole ratio of PFBS to PFOS+PFOA is expected to be consistent for a specific product/waste stream. As PFBS and PFOS+PFOA leach in groundwater and migrate, PFBS is expected to move faster than PFOS+PFOA. Therefore, at the plume front, it is expected to see a higher concentration of PFBS to PFOS+PFOA ratio than in the alleged source area. The ratio of PFBS to PFOS+PFOA is expected to increase at the plume front. **Figure 2** is an interpolated PFBS isoconcentration map based on original drinking water well and monitoring well data.
- Calculate the PFBS to PFOS+PFOA ratio for the Wolven and Jewell areas where the PFOS+PFOA concentration is greater than 70 ppt but less than 1,000 ppt. The average PFBS to PFOS+PFOA ratio is approximately 0.1 for Wolven and Jewell areas. The average PFBS to PFOS+PFOA ratio for the Wolven and Jewell areas is less than the House Street



January 18, 2019

16.0062677.80

Wolven Jewell Area Select Residential Well Resampling

Page | 2

Investigation Area (estimated to be 0.66) indicating the potential for a different waste stream in the Wolven/Jewell areas than that of the House Street Site. Based on this ratio, the 5 ppt PFBS plume line, with approximately 92% certainty, generally captures the addresses where the PFOS+PFOA concentration exceeds 70 ppt. **Figure 3** uses this information, and PFBS isoconcentration mapping to identify the potential extent of PFOS+PFOA in groundwater.

- Homes within the Wolven, Wolven North and West, and Jewell study areas that had detections of PFOA or PFOS were offered Point of Entry Treatment (POET; i.e. whole house filter) system. Homes with a POET system do not need to be resampled, because they are resampled as part of the POET monitoring.

Based on the above information, parcels within the mapped area on **Figure 3** that do not have a POET system installed have been selected for resampling. This results in 138 wells, including some from the Wolven Northeast study area which have Point of Use (POU) filters, which are identified on **Figure 4**.

R&W/GZA will contact the above identified property owners on behalf of Wolverine to arrange resampling of their wells starting in February 2019. The resampling will occur as access is provided and our schedule allows. The samples will be collected for analysis using US EPA Method 537, 1.1.

R&W/GZA will provide the results to the MDEQ, KCHD, and MDHHS as received. R&W/GZA will also provide notice to the property owners within one week after receipt of the data.

Residents in this area are still eligible to receive bottled water delivery service. With respect to filtration, Wolverine will evaluate the resampling data and determine what, if any, offers will be made.

Please let us know if you have any questions about implementation of this resampling effort.

Sincerely,

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

Leslie M. Nelson, P.E.  
Senior Project Manager

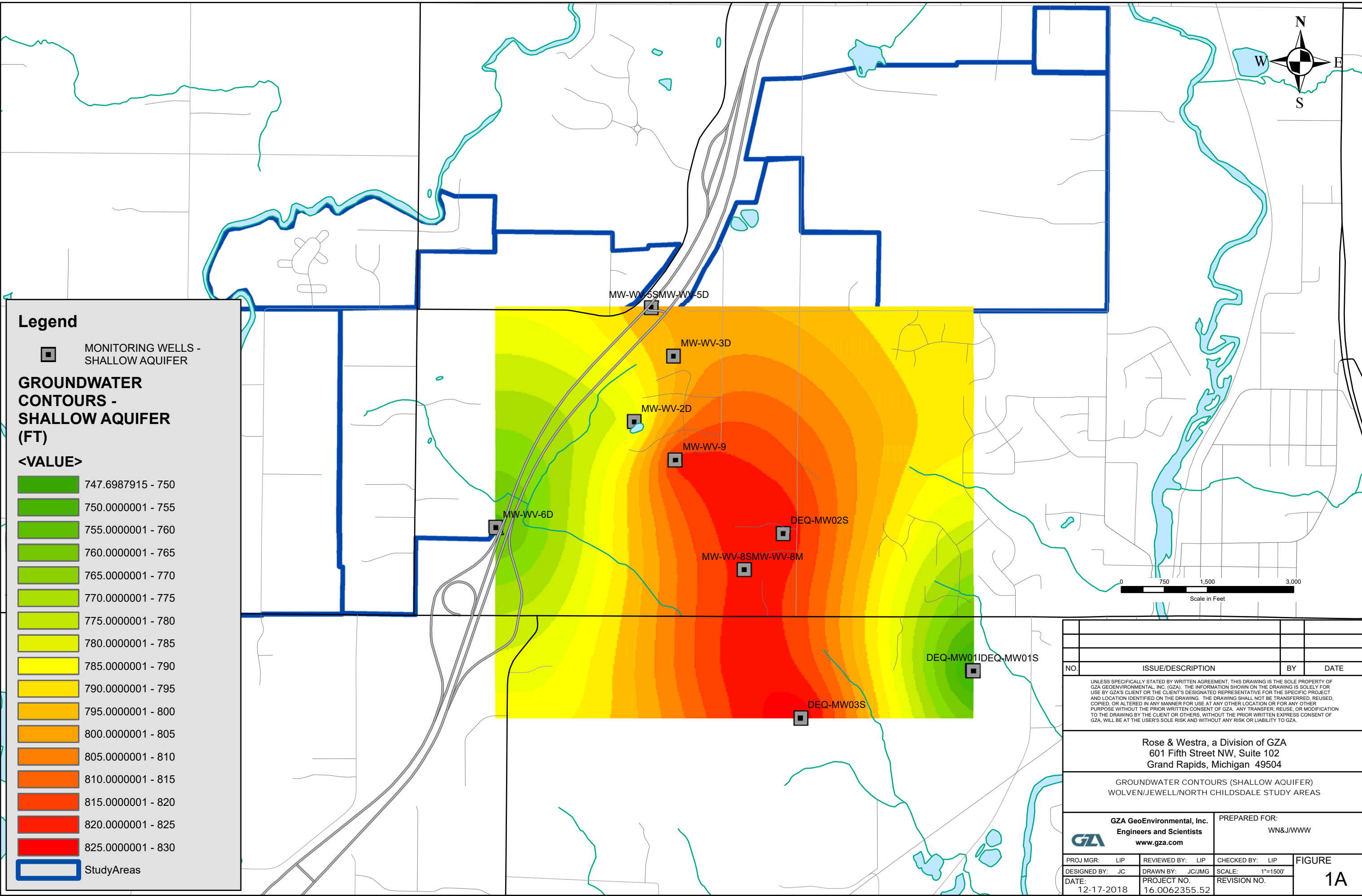
Mark Westra  
Associate Principal

lmn/maw

c/enc: Mr. Dave Latchana – Wolverine World Wide, Inc.  
Mr. John V. Byl – Warner Norcross & Judd LLP

j:\62000\626xx\62677.80 - wolven\resampling proposal\wolven-jewell-pfbs-based-proposal-f.doc

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**Legend**

MONITORING WELLS - SHALLOW AQUIFER

**GROUNDWATER CONTOURS - SHALLOW AQUIFER (FT)**

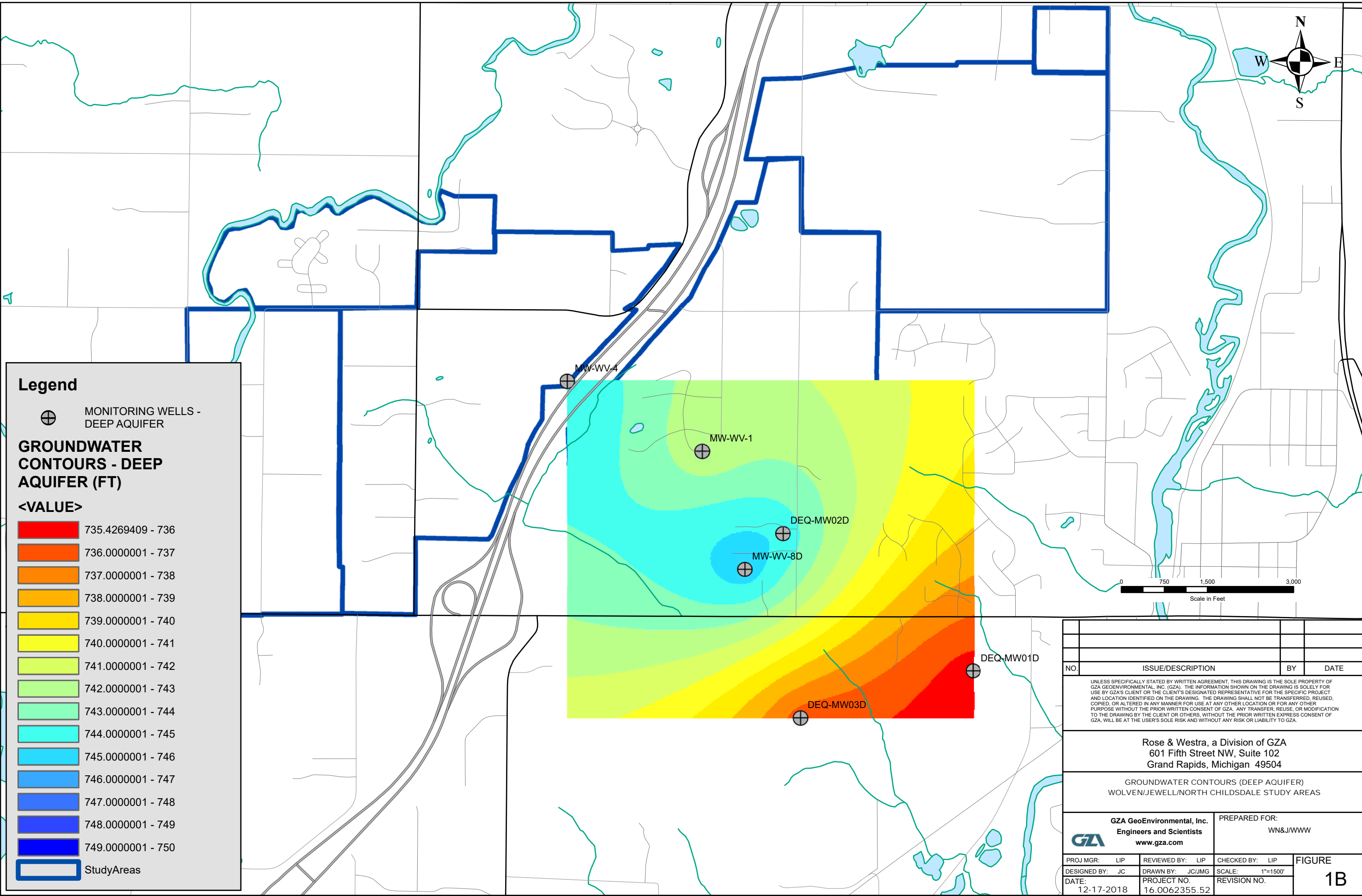
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	747.6987915 - 750
	750.0000001 - 755
	755.0000001 - 760
	760.0000001 - 765
	765.0000001 - 770
	770.0000001 - 775
	775.0000001 - 780
	780.0000001 - 785
	785.0000001 - 790
	790.0000001 - 795
	795.0000001 - 800
	800.0000001 - 805
	805.0000001 - 810
	810.0000001 - 815
	815.0000001 - 820
	820.0000001 - 825
	825.0000001 - 830

StudyAreas

NO.	ISSUE/DESCRIPTION	BY	DATE
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GROUNDWATER CONTOURS (SHALLOW AQUIFER) WOLVEN/JEWELL/NORTH CHILDSDALE STUDY AREAS			
<b>GZA GeoEnvironmental, Inc.</b> Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW	
PROJ MGR: LIP DESIGNED BY: JC DATE: 12-17-2018	REVIEWED BY: LIP DRAWN BY: JC/JMG PROJECT NO. 16.0062355.52	CHECKED BY: LIP SCALE: 1"=1500' REVISION NO.	<b>FIGURE 1A</b>

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**Legend**

⊕ MONITORING WELLS - DEEP AQUIFER

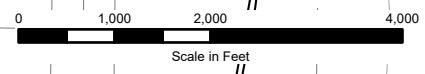
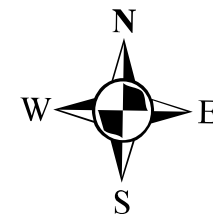
**GROUNDWATER CONTOURS - DEEP AQUIFER (FT)**

<VALUE>

Red	735.4269409 - 736
Orange	736.0000001 - 737
Light Orange	737.0000001 - 738
Yellow-Orange	738.0000001 - 739
Yellow	739.0000001 - 740
Light Yellow	740.0000001 - 741
Light Green	741.0000001 - 742
Green	742.0000001 - 743
Light Blue	743.0000001 - 744
Cyan	744.0000001 - 745
Blue	745.0000001 - 746
Dark Blue	746.0000001 - 747
Very Dark Blue	747.0000001 - 748
Dark Blue	748.0000001 - 749
Blue	749.0000001 - 750

StudyAreas

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GROUNDWATER CONTOURS (DEEP AQUIFER) WOLVEN/JEWELL/NORTH CHILDSDALE STUDY AREAS			
<b>GZA GeoEnvironmental, Inc.</b> Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW	
PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: LIP	<b>FIGURE 1B</b>
DESIGNED BY: JC	DRAWN BY: JC/JMG	SCALE: 1"=1500'	
DATE: 12-17-2018	PROJECT NO: 16.0062355.52	REVISION NO.	

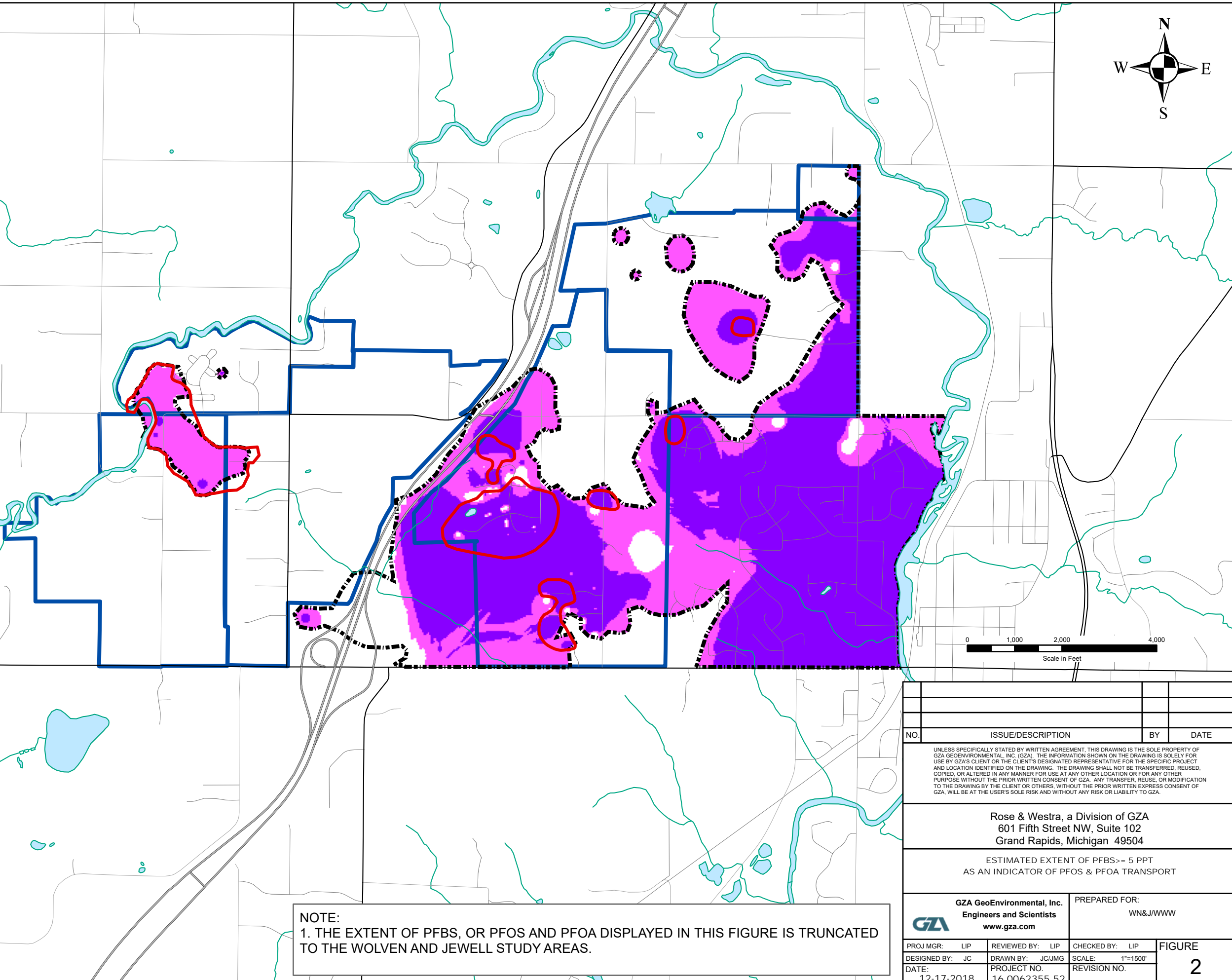


**Legend**

- Estimated Extent of PFOS & PFOA > 70 ng/L
- APPROXIMATE EXTENT OF PFBS >= 5 PPT
- Study Areas

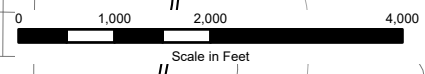
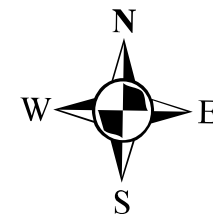
**ORIGINAL DRINKING WATER WELL & GROUNDWATER DATA - INTERPOLATED PFBS ISOCONCENTRATION (PPT)**

0 - 5
5.000000001 - 10
10.000000001 - 100
100.00000001 - 1,000
1,000.0000001 - 10,000
10,000.000001 - 20,000
20,000.000001 - 30,000
30,000.000001 - 40,000
40,000.000001 - 45,000
45,000.000001 - 50,155



**NOTE:**  
 1. THE EXTENT OF PFBS, OR PFOS AND PFOA DISPLAYED IN THIS FIGURE IS TRUNCATED TO THE WOLVEN AND JEWELL STUDY AREAS.

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ESTIMATED EXTENT OF PFBS >= 5 PPT AS AN INDICATOR OF PFOS & PFOA TRANSPORT			
<b>GZA GeoEnvironmental, Inc.</b> Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW	
PROJ MGR: LIP DESIGNED BY: JC DATE: 12-17-2018	REVIEWED BY: LIP DRAWN BY: JC/JMG PROJECT NO. 16.0062355.52	CHECKED BY: LIP SCALE: 1"=1500' REVISION NO.	<b>FIGURE</b>  <b>2</b>



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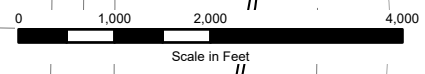
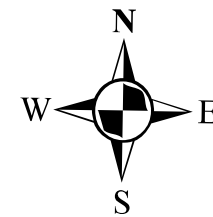
**Legend**

Estimated Extent of PFOS & PFOA > 70 ng/L

PROPOSED SAMPLING AREA - BASED ON EXTENT OF PFBS >= 5 PPT

**NOTE:**  
 1. THE EXTENT OF PFBS, OR THE PROPOSED SAMPLING AREA DISPLAYED IN THIS FIGURE IS TRUNCATED TO THE WOLVEN AND JEWELL STUDY AREAS.

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PROPOSED SAMPLING AREA BASED ON PFBS EXTENT			
<b>GZA GeoEnvironmental, Inc.</b> Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW	
PROJ MGR: LIP DESIGNED BY: JC DATE: 01-18-2019	REVIEWED BY: LIP DRAWN BY: JC/JMG PROJECT NO.: 16.0062355.52	CHECKED BY: LIP SCALE: 1"=1500' REVISION NO.	<b>FIGURE</b>  <b>3</b>



**Legend**

Estimated Extent of PFOS & PFOA > 70 ng/L

APPROXIMATE EXTENT OF PFBS >= 5 PPT

i PROPOSED PARCELS TO SAMPLE - BASED ON PFBS (REVISED)

**Parcel Data (PFOS & PFOA, ng/L)**

ND

Greater Than Detection Limit to 10

Greater Than 10 to 70

Greater Than 70 to 1000

Greater Than 1000

**NOTE:**  
 1. THE EXTENT OF PFBS, PFOS AND PFOA DATA DISPLAYED IN THIS FIGURE IS TRUNCATED TO THE WOLVEN AND JEWELL STUDY AREAS.

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PROPOSED PARCELS TO RESAMPLE WOLVEN AND JEWELL STUDY AREAS			
<b>GZA GeoEnvironmental, Inc.</b> Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW	
PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: LIP	<b>FIGURE 4</b>
DESIGNED BY: JC	DRAWN BY: JC/JMG	SCALE: 1"=1500'	
DATE: 12-17-2018	PROJECT NO: 16.0062355.52	REVISION NO.	

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