



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)

October 16, 2018  
File: 16.0062335.54

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)  
House Street Area – Select Residential Well Resampling

Dear Ms. Hendershott:

Based on our on-going discussions with you regarding possible resampling of selected residential wells within the House Street Study Area, R&W/GZA is providing this scope of work on behalf of Wolverine.

The purpose of this resampling effort is to gather additional data points to assist with the House Street Study Area groundwater assessment. 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 source. **Figure 1** shows interpolated groundwater flow using permanent monitoring well static levels from September 4, 2018.
- 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 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 House Street area (0.65 for locations where the PFOS+PFOA concentration is greater than 70 ppt but less than 1,000 ppt). Based on this ratio, a 5 ppt PFBS plume line captures, with 95% certainty, the addresses where the PFOS+PFOA concentration exceeds 70 ppt. **Figure 3** uses this information, the groundwater flow interpretation, and PFBS isoconcentration mapping to identify the potential extent of PFOS+PFOA above 70 ppt in groundwater.
- Homes within the House Street original study area and buffer zone that have accepted Wolverine's offer of a Point of Entry Treatment (POET; i.e. whole house filter) system do not need to be resampled, as these homes are already 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 76 wells (this includes the wells identified in the August 15, 2018 resampling letter). The selected parcels are identified on **Figure 4**. However, note one of the wells has a PFOS+PFOA concentration above 70 ppt but has not accepted a POET system. This well will not be resampled as it was just recently sampled.

R&W/GZA will contact the above identified property owners on behalf of Wolverine to arrange resampling of their wells. 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 promptly after receipt of the data.

All of the 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.

Loretta J. Powers  
Senior Project Manager

Mark Westra  
Associate Principal

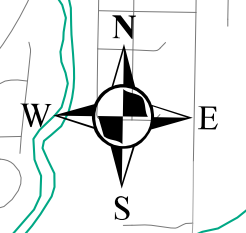
ljp/maw

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

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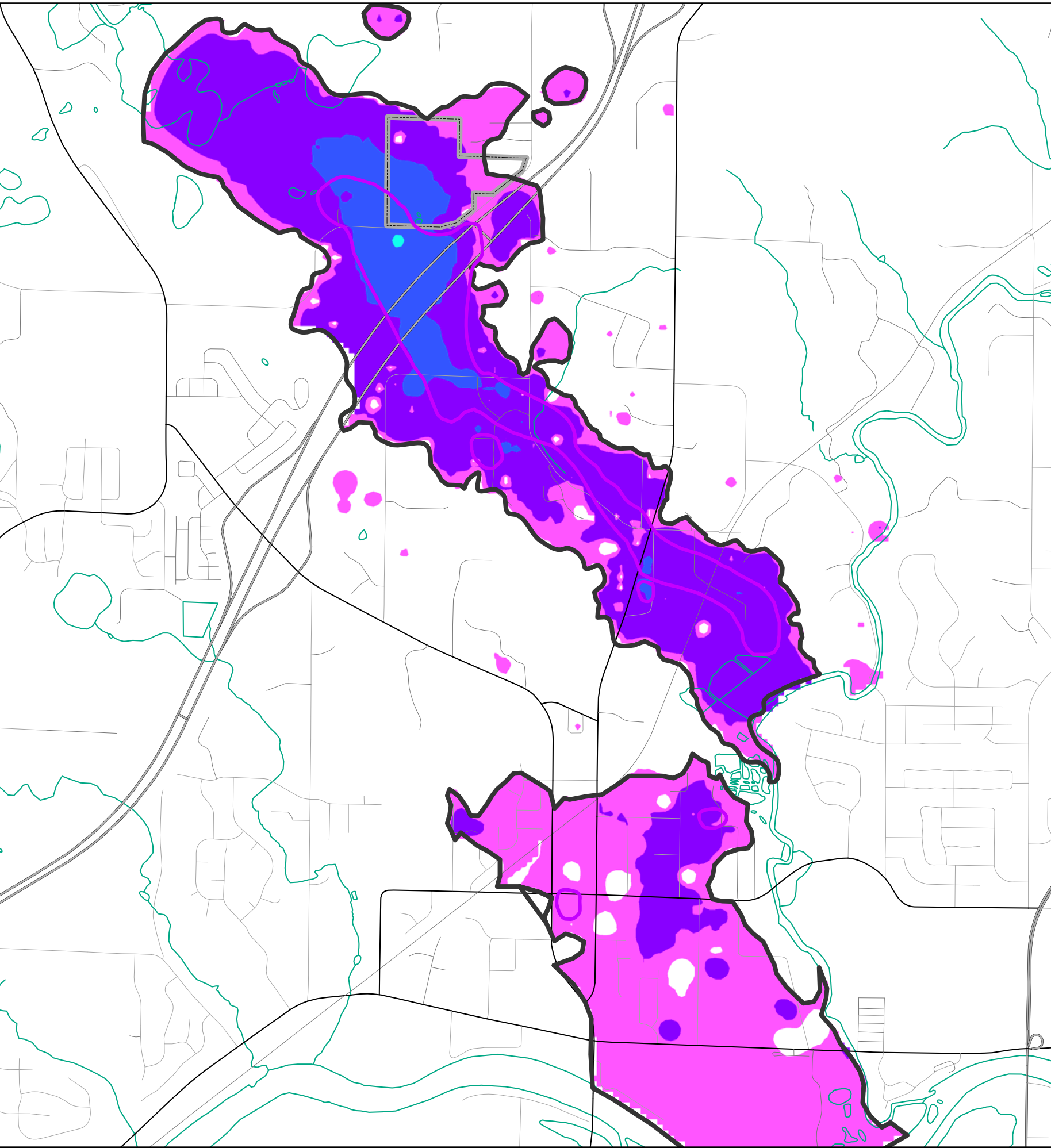
**Legend**

- ESTIMATED EXTENT OF PFOS & PFOA > 70 ng/L
- ESTIMATED EXTENT OF PFBS GREATER THAN 5 PPT
- APPROXIMATE HOUSE ST SITE BOUNDARY
- hydro\_line\_Clip83SPft

**HOUSE ST SITE, ORIGINAL DRINKING WATER WELL & GROUNDWATER DATA - INTERPOLATED PFBS ISOCONCENTRATION (PPT)**

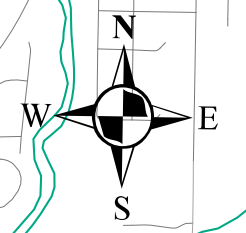
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	ESTIMATED EXTENT OF PFBS CONCENTRATION GREATER THAN 5 PPT AS AN INDICATOR FOR PFOS & PFOA TRANSPORT		
	<b>GZA GeoEnvironmental, Inc.</b> Engineers and Scientists www.gza.com		PREPARED FOR: WN&J/WWW
PROJ MGR:	LIP	REVIEWED BY:	LIP
DESIGNED BY:	JC	DRAWN BY:	JC/JMG
DATE:	10-16-2018	PROJECT NO.:	16.0062355.52
		CHECKED BY:	LIP
		SCALE:	1"=1500'
		REVISION NO.:	
		<b>FIGURE</b>	
		<b>2</b>	

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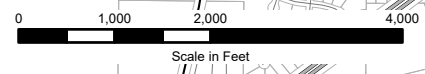
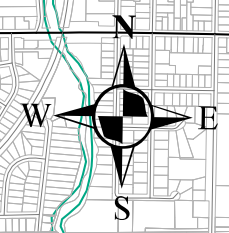
**Legend**

- ESTIMATED EXTENT OF PFOS & PFOA > 70 ng/L
- PARCEL - PFOS & PFOA CHANGING FROM <70 to >70 PPT
- POTENTIAL EXTENT OF PFOS & PFOA MIGRATION - BASED ON GROUNDWATER FLOW AND PFBS DATA
- APPROXIMATE HOUSE ST SITE BOUNDARY
- hydro\_line\_Clip83SPft

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ESTIMATED EXTENT OF PFOS & PFOA MIGRATION BASED ON GROUNDWATER FLOW AND PFBS DATA			
<b>GZA GeoEnvironmental, Inc.</b> Engineers and Scientists <a href="http://www.gza.com">www.gza.com</a>		PREPARED FOR: WN&J/WWW	
PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: LIP	<b>FIGURE</b> <b>3</b>
DESIGNED BY: JC	DRAWN BY: JC/JMG	SCALE: 1"=150'	
DATE: 10-16-2018	PROJECT NO. 16.0062355.52	REVISION NO.	



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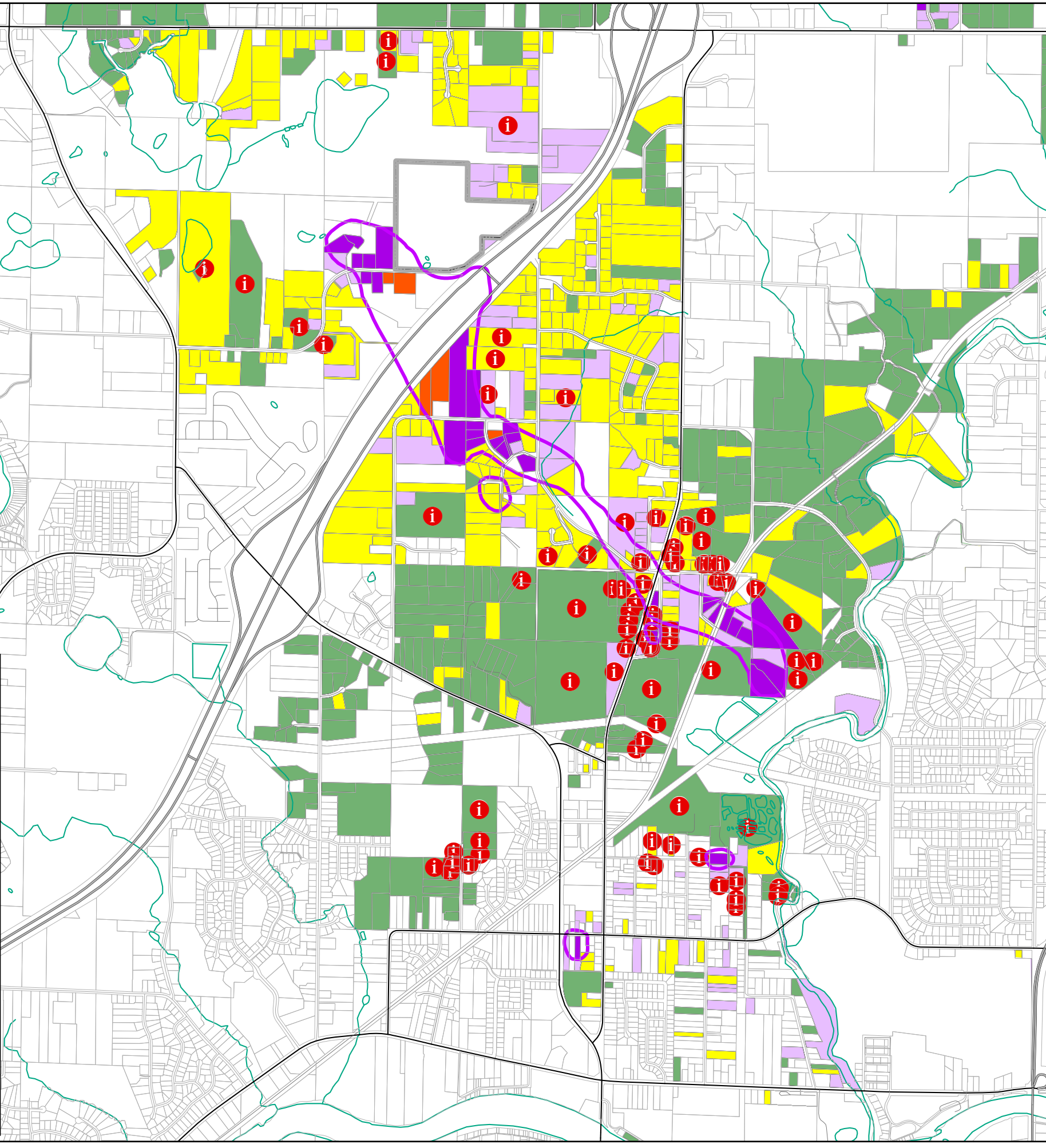
**Legend**

**Parcel\_Data**

- Parcel\_Data
- hydro\_line\_Clip83SPFt
- ESTIMATED EXTENT OF PFOS & PFOA > 70 ng/L
- PROPOSED PARCEL TO SAMPLE
- APPROXIMATE HOUSE ST SITE BOUNDARY

**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



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PROPOSED PARCELS TO SAMPLE IN HOUSE STREET STUDY AREA			
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PROJ MGR: LIP	DESIGNED BY: JC	REVIEWED BY: LIP	CHECKED BY: LIP
DATE: 10-16-2018	DRAWN BY: JC/JMG	PROJECT NO: 16.0062355.52	SCALE: 1"=1500'
			FIGURE <b>4</b>