

Geologic Review

EGLE-RRD Grand Rapids District

Perfluoroalkyl and Polyfluoroalkyl Substances Plume Evaluation of the

Primary House Street Plume Area

UPDATED: August-2019

*This geologic review is based on the data available as of this report date and is subject to modification as other data becomes available. **This review is an update to a document with the same name dated March 2019.***

Of note and presenting an issue for this review is that a significant number of monitor wells are needed both in an areal extent and vertical extent to better understand the multiple plumes that emanate from the House Street Disposal Site (the Site). This evaluation of perfluoroalkyl and polyfluoroalkyl substance (PFAS) impact encompasses the area southeast of the House Street disposal area to the Belmont/Rogue River area. This geologic review includes the primary House Street plume and uses residential well sample data collected by Wolverine World Wide (WWW) and WWW monitor wells. The Michigan Department of Environment, Great Lakes, and Energy (EGLE) analyzed the drinking water well sample results, screen elevation and surrounding geology to develop this hydro-geologic model. Updated information includes new sample results for the MW-3s, MW-4s, MW-5 nested set, MW-6 nested set, MW-7s MW-8, MW-10 nested set, MW-11 nested set, MW-14 nested set, MW-15 nested set, MW-18 nested set, and MW-19 nested set. New information from the MW-17 nested set and the MW-20 nested set is also included.

The Site sits on a groundwater divide and PFAS groundwater plumes migrate off-site in multiple directions. This review is of the area southeast of the site along what has been described as the primary House Street PFAS groundwater plume. A bedrock high sits to the northeast of the Site and likely in part controls the groundwater direction of flow to the Rogue River. Based on the current data there could be at least seven distinct PFAS plumes migrating to the southeast of the Site from a lateral perspective; an assessment of the number of plumes vertically cannot be completed at this time without the addition of a significant number of additional nested sets of monitor wells. The plumes are identified differently based on their lateral distribution and will be described from west to east on the attached figures differentiated on the map by different colored arrows. Based on the boring logs for MW-10d, MW-11d and MW-17d the lithology is primarily sand to bedrock with occasional clay-silt stringers. This geologic depositional setting changes to the northeast in the vicinity of the MW-9 nested set. The extent of the geologic setting in other directions is currently unknown.

The PFAS Plumes

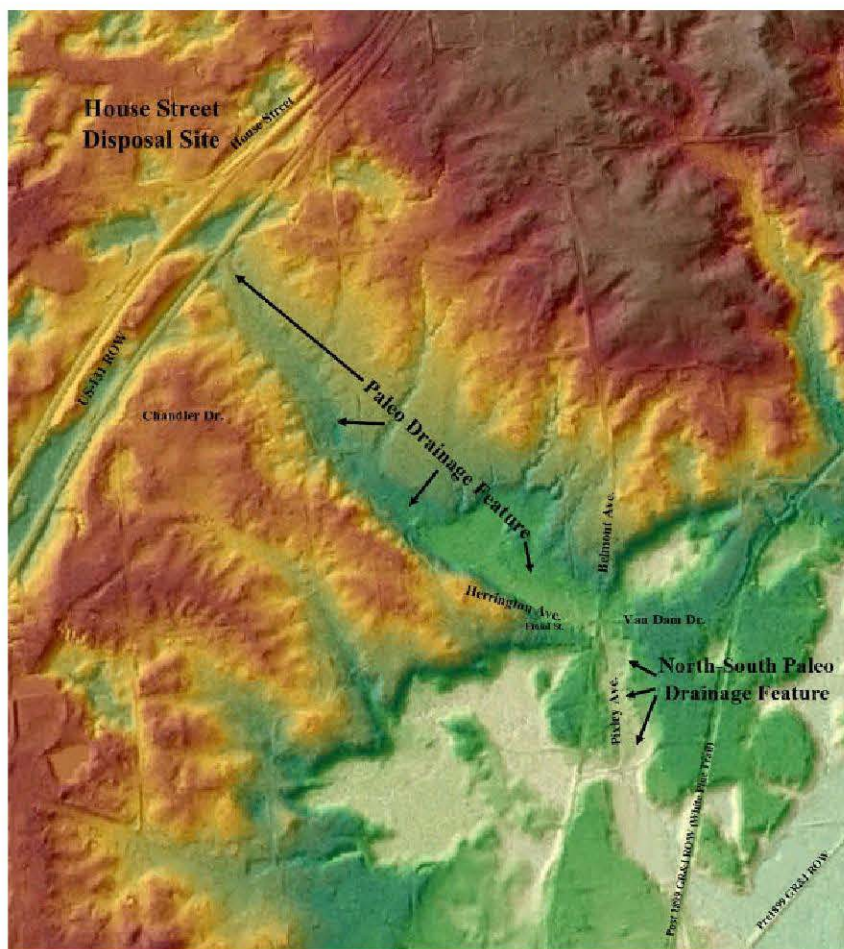
Below is a summary of the currently known/identified PFAS plumes associated with the primary House Street Plume Area:

Gray Plume:

The Grey Plume on attached Figures 3a and 3b, appears to migrate from the western boundary of the House Street Disposal Site looping then to the southeast and exists at least to the Sprucewood neighborhood area, however the end of the plume is currently un-delineated. This plume appears to occur from approximately 655 ft to 585 ft and is marked by a unique ratio of PFOA/PFOS and total PFAS. This relationship is illustrated by the results from 1580 House St. NE, 7422 Chandler Dr. NE, 7410 Chandler Dr. NE, 2055 Korban Woods NE, 2042 Korban Woods NE, 2075 Korban Woods NE, 2066 Meek Dr. NE and 2072 Meek Dr. NE. The vertical and horizontal extent of this plume is currently unknown, and a significant number of monitor wells are necessary to evaluate the risk from this plume.

Red and Blue Plumes

The Red Plume and the Blue Plume as identified on attached Figures 3a and 3b, may be separate plumes or they may be part of the same plume. These plumes emanate from the west side and south side of the Site and contains the highest known concentrations of PFAS groundwater contamination emanating from the Site along with the Black Plume (see below). These plumes loop to the southeast from the Site and parallels or mirrors the paleo-stream channel visible on LIDAR (see below) and clearly present in the field. Near the intersection of Herrington Avenue, Belmont Avenue, Frond Street, Van Dam Drive and Pixley Avenue, the plume or plumes appear to separate into a plume to the south and a separate plume to the east. On LIDAR this area is the location of a paleo-stream channel oriented to the south from the above-mentioned channel. This location is annotated on the LIDAR image below. Additional control of the PFAS plumes may be the bedrock in the area. Based on bedrock data provided by GZA, a bedrock low exists in the area where the PFAS plume takes a southernly turn in the vicinity of Wildwood Creek Drive and Pixley Avenue although additional drilling is necessary to verify if this indeed is controlling groundwater flow direction. The relationships between bedrock and PFAS plumes are illustrated on attached Figure 4. This plume or plumes exist from at least 715 ft to 565 ft. It is currently unclear if this impact is throughout the full extent of the 150 feet or if the PFAS plumes are laminated vertically through distinct elevations. The vertical and horizontal extent of this plume(s) is currently unknown, and a significant number of monitor wells are necessary to evaluate the risk from this plume(s).



Annotated LIDAR image illustrating paleo drainage features southeast of the Site (LIDAR image from Kent County).

Black Plume:

The Black Plume (illustrated on attached Figures 3a and 3b) follows a similar path as the Red and Blue Plumes and may be closely related to those plumes. This plume is highly impacted and has high concentrations of combined PFOA-PFOS as well as total PFAS. This plume is riding the top of bedrock in the area based on the data from MW-17d and MW-20d. Because of the limited number of drinking water installed in this interval the vertical and horizontal extent of this plume(s) is currently unknown, and a significant number of monitor wells are necessary to evaluate the risk from this plume.

Green Plume:

The Green Plume (illustrated on attached Figures 3a and 3b) emanates from the southeast side of the House Street Disposal Site and migrates to the southeast in the vicinity of monitor well MW-10 nested set. This plume follows the northwest to southeast paleo-stream channel noted on the above LIDAR image and migrates to at least the Pine Hill Neighborhood. This impact found from 667 to 588 feet although it is unclear if the aquifer is impacted throughout the entire 79 feet

or the PFAS impact is vertically stratified. The vertical and horizontal extent of this plume is currently unknown, and a significant number of monitor wells are necessary to evaluate the risk from this plume.

Purple Plume:

The Purple Plume (as illustrated on Figure 3a) follows the same path as the Green Plume but may not migrate past Herrington Avenue and exists at shallower depths (728 ft to 685 ft). Again, several monitor wells are necessary to fully evaluate the risk from this plume both in an areal and vertical extent.

Orange Plume:

The Orange Plume (as illustrated on Figure 3a) leaves the House Street Disposal Site from the southeast side and may be short in length and data is very limited. This plume appears to be migrating to the southeast of the site at depths from 695 ft to 672 ft. Additional drilling is necessary to assess the risk from this plume.

Existing Wolverine World Wide Monitor Well Analysis:

The MW-8 location currently exists as only one well. Additional wells should be installed to evaluate the aquifer(s) to bedrock. Although the whole aquifer or aquifers need vetting special attention should be paid to the depths of 625 to 610 feet, the screened interval of a highly impacted adjacent drinking water well and 570 to 564 the highly impacted depth which is illustrated by MW-17d downgradient (138 deeper than the current screen interval).

At the MW-10 location, there is nearby PFAS impact at elevations that are not vetted by the current nested set of monitor wells. The boring log for MW-10d indicates a saturated sand from 717 ft to 652 ft, which is in an area of the aquifer that is not currently being evaluated by this nested set of monitor wells. Additionally, based on the boring log it is unclear if the boring was installed to bedrock which is necessary based on the impact at MW-17d.

At the MW-11 location, the four closest PFAS detections higher than 70ppt are at elevations where the nested set does not have a well screened. These nearby drinking water wells are screened at 638-633 ft, 655-650 ft, 668-664ft and 688-683 ft; the boring log for this location does indicate there are saturated sands at these elevations. Additionally, based on the boring log it is unclear if the boring was installed to bedrock which is necessary based on the impact at MW-17d.

At the MW-17 location, additional monitor wells screened between 613 and 569 feet (the lithology between the existing intermediate well and the existing deeper well) would be beneficial to fully assess the aquifer and determine at what depth the PFAS impact starts.

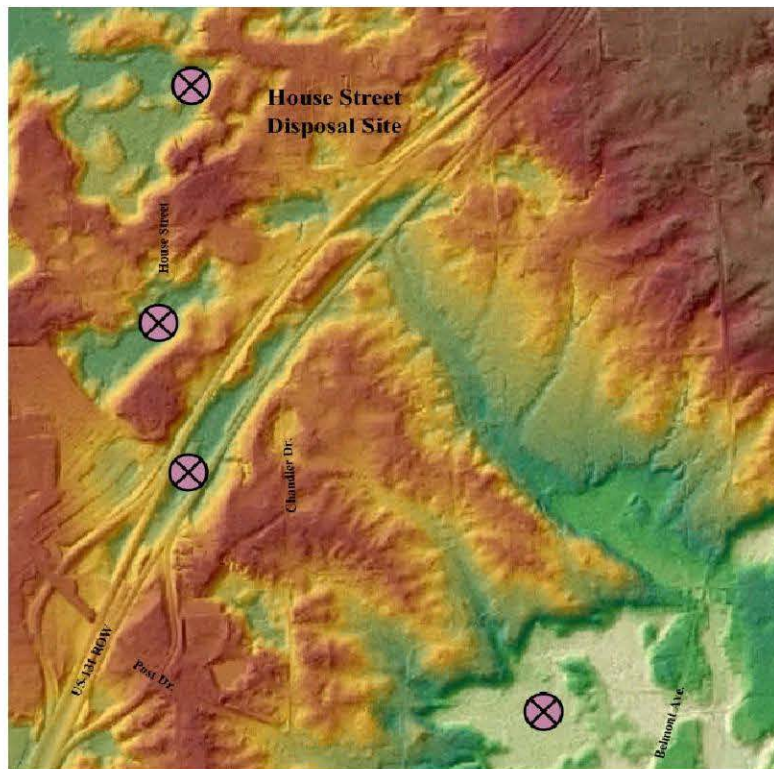
Because of the significant impact at the MW-17d (for the 5-23-2019 sampling event: 1,258ppt PFOA & PFOS and 4,042ppt total PFAS) at approximately 0.8 miles away from the Site, high priority should be given to nested monitor wells to the south of this location to attempt to delineate the side gradient of this deeper PFAS plume.

At the MW-20 location, additional wells are needed to fully assess the aquifer:

- monitoring wells screened between 639 and 605 feet (the lithology between the existing shallow well and the existing intermediate well)
- monitoring wells screened between 598 and 580 feet (between the intermediate well and the deep well).

Other Possible Plumes:

On the attached Figures 3a and 3b there are four locations annotated with a purple circle-x that based on LIDAR could present pathways for PFAS plume migration to areas where there are no existing drinking wells or environmental wells. The groundwater in these areas should be vetted via vertical aquifer profiling or installation of nested well sets in order to evaluate current risks or future risks associated with potential land development (assuming no municipal water is available). These locations are shown on the below LIDAR image. Based on the impact of MW-17d (not available during the March 2019 review), a higher priority should be placed on completing a nested well set the southernmost location.

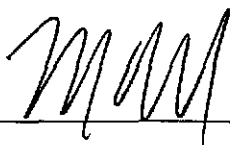


Annotated LIDAR image illustrating areas of groundwater concern (LIDAR image from Kent County).

Attachments:

- Figure 1a – Total PFAS – Analysis of Drinking Water Well Results of the Main House Street Plume – West
- Figure 1b – Total PFAS – Analysis of Drinking Water Well Results of the Main House Street Plume – East
- Figure 2a – PFOS/PFOA – Analysis of Drinking Water Well Results of the Main House Street Plume – West
- Figure 2b – PFOS/PFOA – Analysis of Drinking Water Well Results of the Main House Street Plume – East
- Figure 3a - Total PFAS with Plumes– Analysis of Drinking Water Well Results of the Main House Street Plume – West
- Figure 3b - Total PFAS with Plumes– Analysis of Drinking Water Well Results of the Main House Street Plume – East
- Figure 4 – Area Bedrock with Total PFAS Plumes– Analysis of Drinking Water Well Results of the Main House Street Plume – East
- Table 1 – Summary of PFAS Analytical Results for House Street Monitor Wells

Geologist Signature: _____



Date: 8-13-19

Mark Worrall, District Geologist

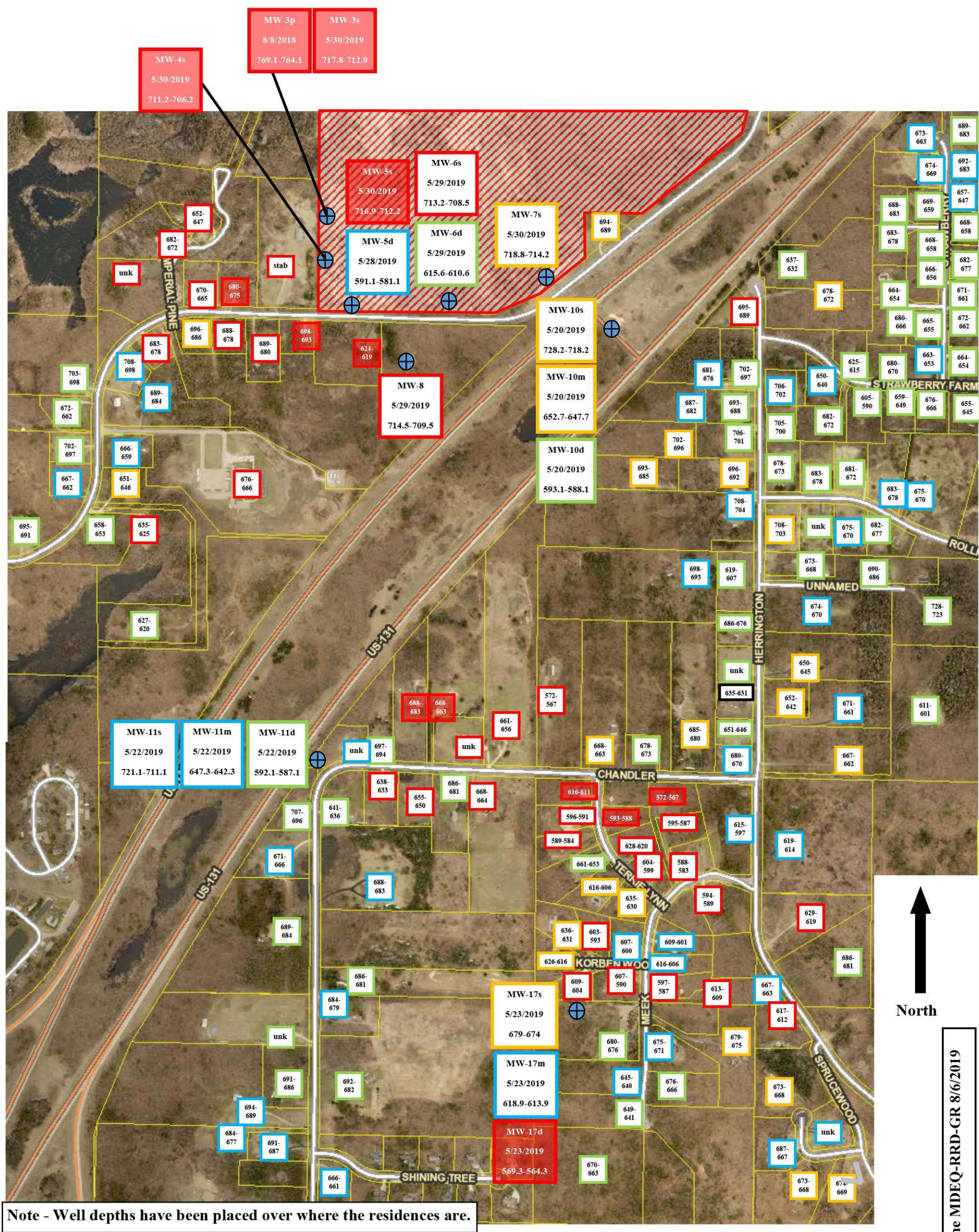


Figure 1a—Total PFAS
Analysis of Drinking Water Well
Results of the Main House
Street Plume - West
Plainfield Township MI

House Street Disposal Area

Below Method Detection Level

Total PFAS: <20ppt

Total PFAS: 20 to 70ppt

Total PFAS: >70ppt

Total PFAS: >1,000ppt

WWW Monitor Well Location

Elevation of Well Screen (Top of Screen-Bottom of Screen)

Well Screen Information Unknown

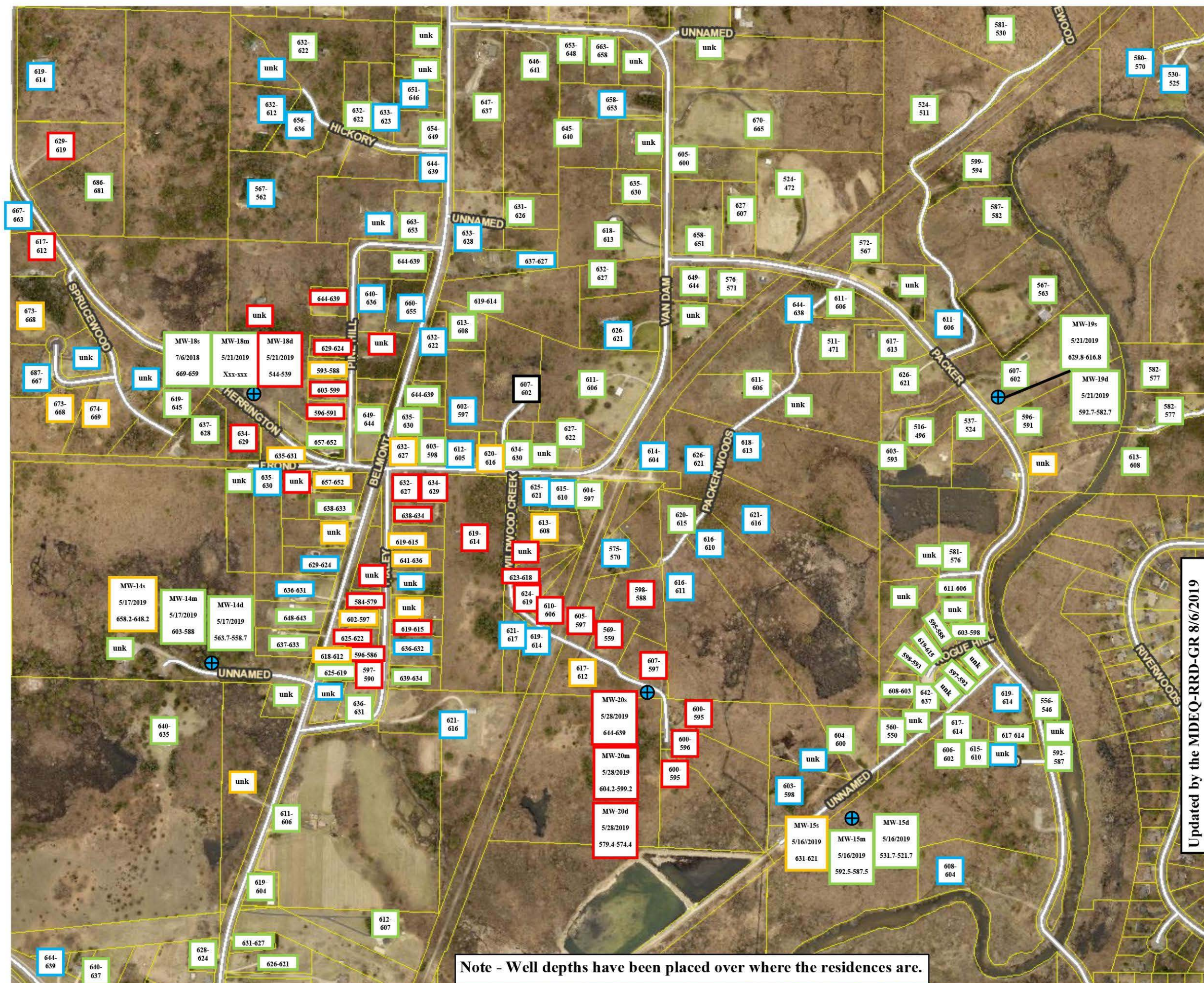
Exact Well Location Unknown

WWW Monitor Well Name
Sample Date Used
Screen Elevation

Updated by the MDEQ-RRD-GR 8/6/2019



- Elevation of Well Screen (Top of Screen-Bottom of Screen)**
- Well Screen Information Unknown**
- Exact Well Location Unknown**
- Below Method Detection Level**
- Total PFAS: <20ppt**
- Total PFAS: 20 to 70ppt**
- Total PFAS: >70ppt**
- WWW Monitor Well Name**
- Sample Date Used**
- Screen Elevation**
- WWW Monitor Well Location**



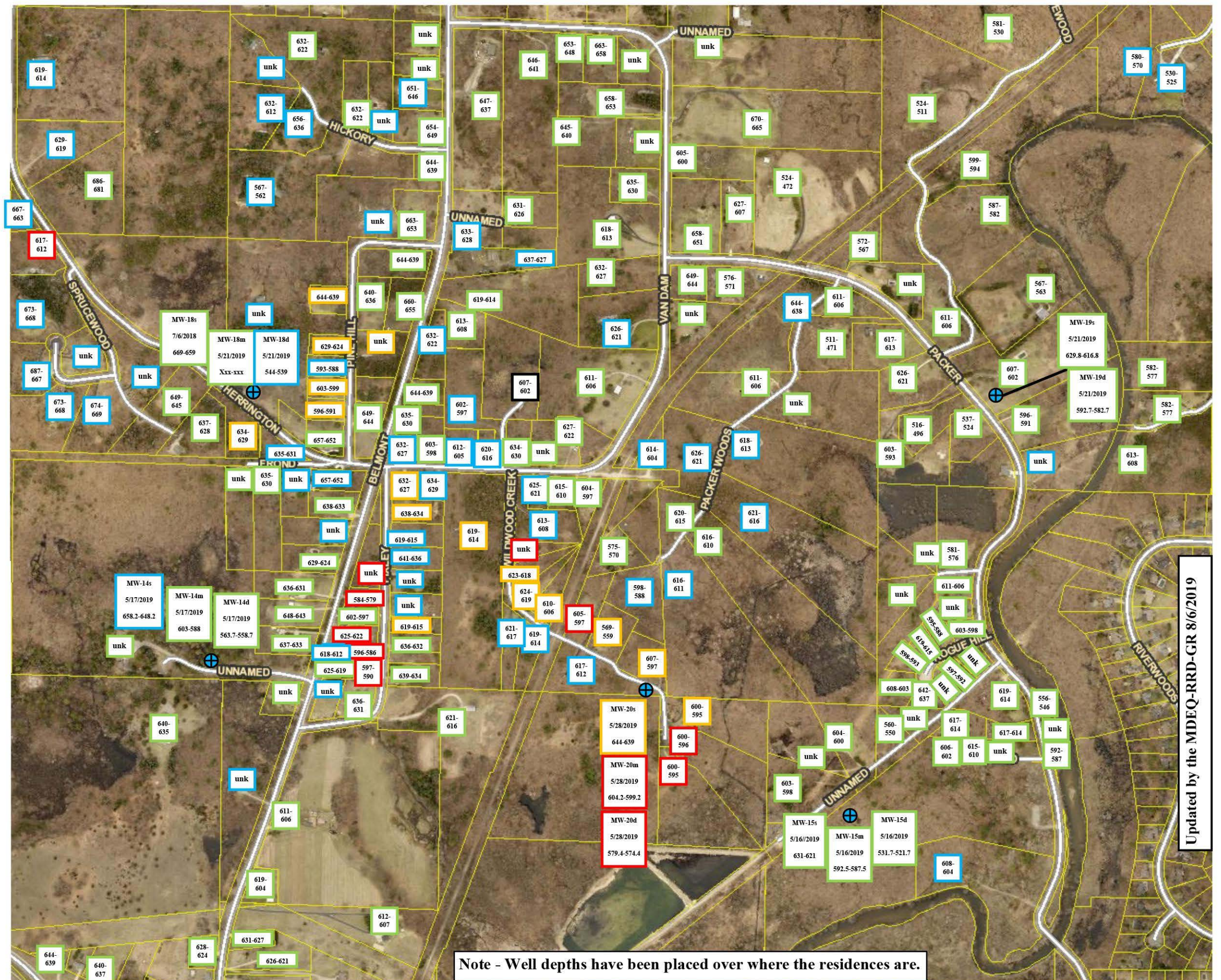
Updated by the MDEQ-RRD-GR 8/6/2019



North

- 663-658** Elevation of Well Screen (Top of Screen-Bottom of Screen)
- unk** Well Screen Information Unknown
- unk** Exact Well Location Unknown
- 709-704** Below Method Detection Level
- 736-731** PFOA & PFOS: <20ppt
- 703-693** PFOA & PFOS: 20 to 70ppt
- 704-695** PFOA & PFOS: >70ppt
- MW-11m** WWW Monitor Well Name
8/2/18 Sample Date Used
647.3-642.3 Screen Elevation
- +** WWW Monitor Well Location

Figure 2b—PFOA & PFOS
Analysis of Drinking Water Well
Results of the Main House
Street Plume - East
Plainfield Township MI



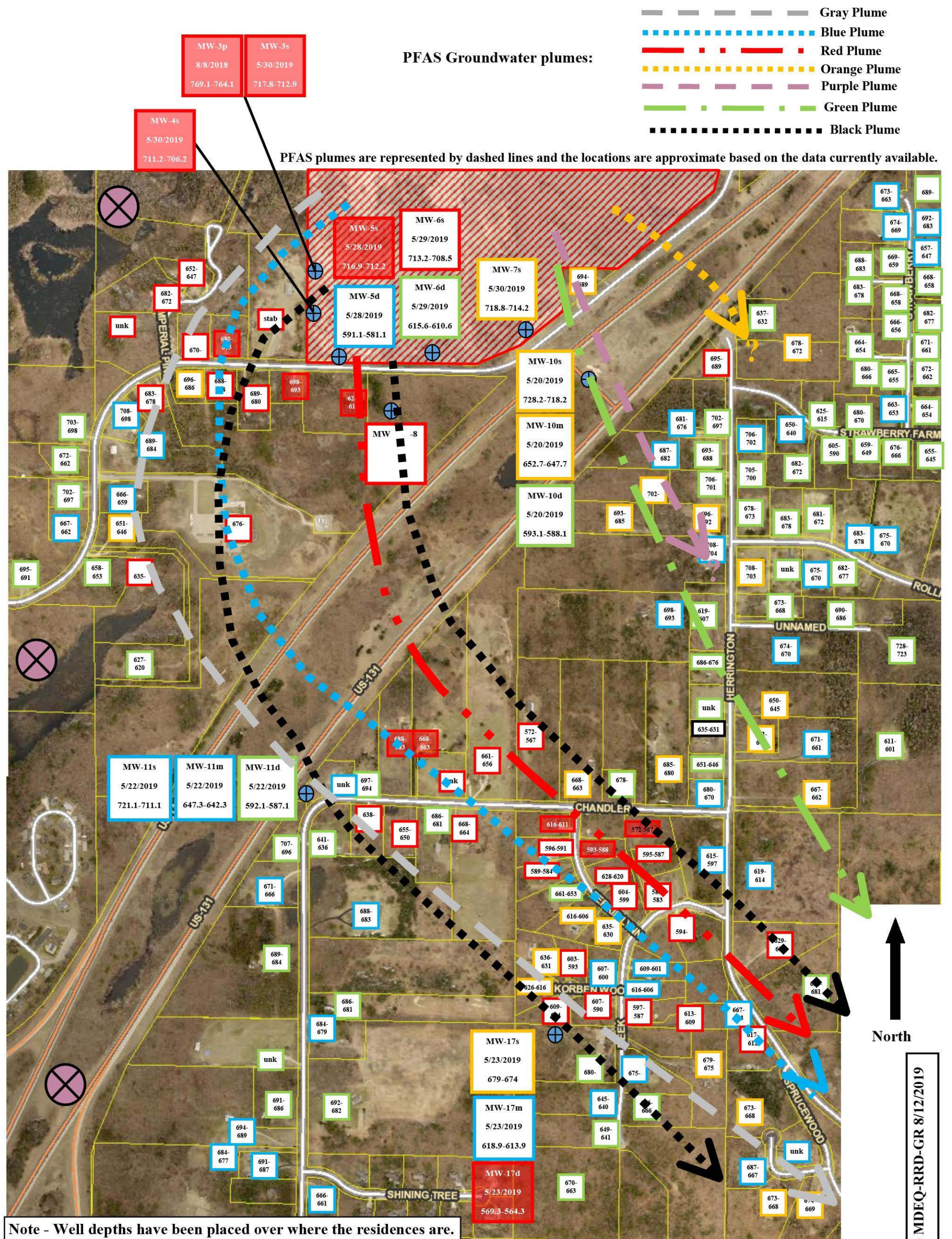
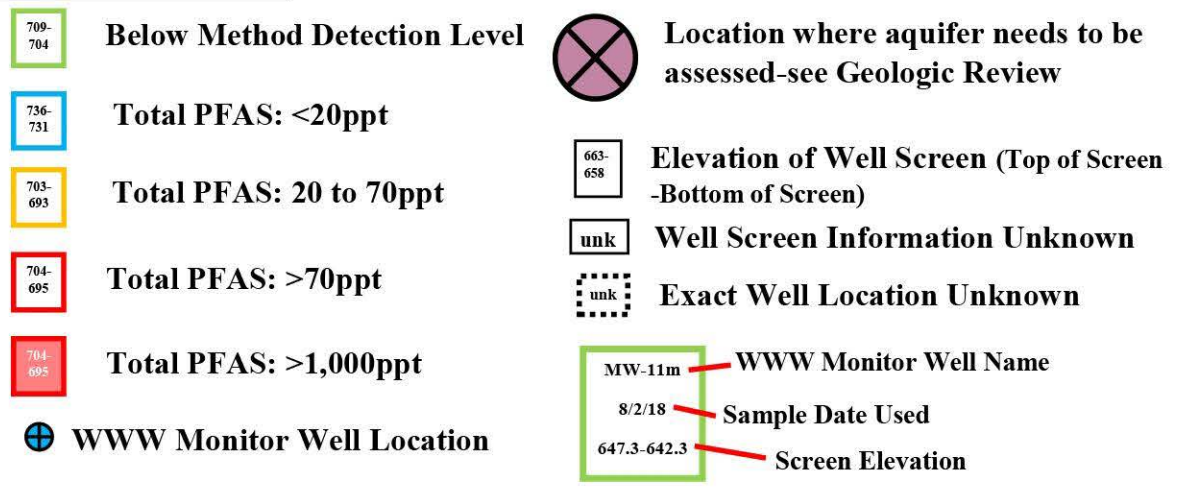


Figure 3a—Total PFAS-with Plumes

Analysis of Drinking Water Well Results of the Main House Street Plume - West

Plainfield Township MI



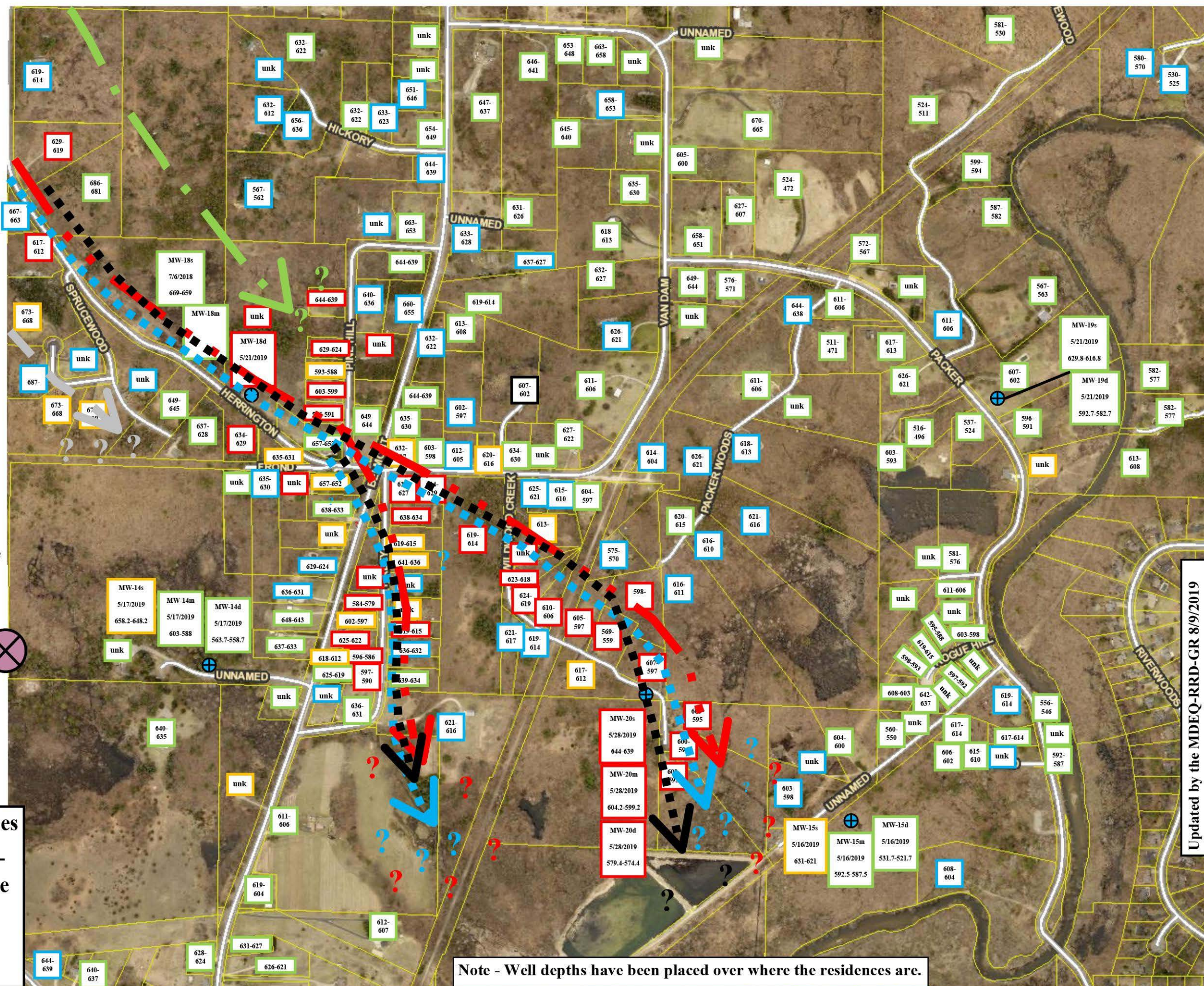
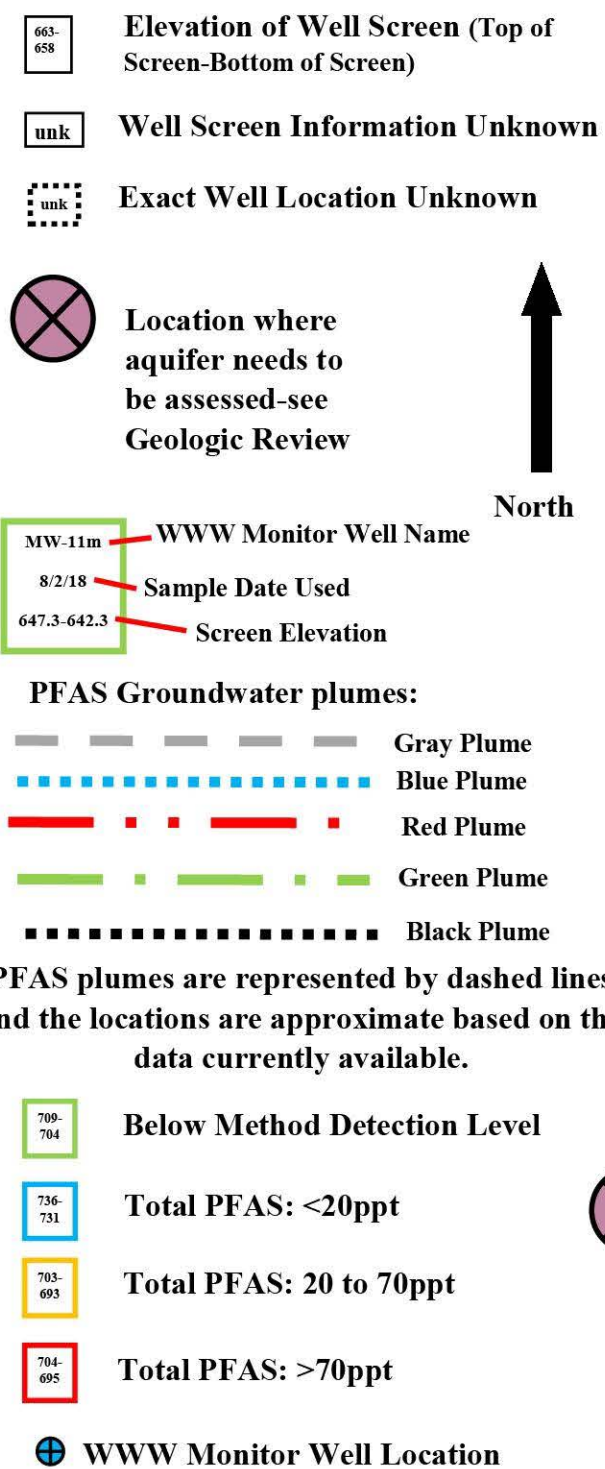


Figure 3b—Total PFAS—with Plumes
Analysis of Drinking Water Well Re-
sults of the Main House Street Plume
- East
Plainfield Township MI

Tabulation of WWW Monitoring Well Results House Street Area - Table 1						
Monitor Well:	Location:	Sample Date	PFOS + PFOA	Total PFAS		
MW-1s	WWW Property	10/12/2017	4.2	76.2		
MW-1d	WWW Property	10/12/2017	ND	ND		
MW-2	WWW Property	10/12/2017	ND	ND		
MW-3s	WWW Property	10/13/2017	402	2,525		
MW-3p	WWW Property					
MW-4s	WWW Property	10/13/2017	2,830	6,143		
MW-5s	WWW Property	10/13/2017	46,800	51,878		
MW-5p (MW-5m)	WWW Property					
MW-5d	WWW Property	1/22/2018	34.9	61		
MW-6s	WWW Property	10/16/2017	9.8	23.8		
MW-6d	WWW Property	12/7/2017	ND	ND		
MW-7s	WWW Property	10/16/2017	8	14.9		
MW-8	MDOT property	12/7/2017	750	1,386		
MW-9s (MW-9A)	US131 ROW	12/6/2017	2.4	7.4		
MW-9m (MW-9B)	US131 ROW	12/6/2017	ND	ND		
MW-9d (MW-9C)	US131 ROW	12/6/2017	ND	6.4		
MW-10s (MW-19A)	US131 ROW	1/22/2018	52	68.5		
MW-10m (MW-10B)	US131 ROW	1/22/2018	21.3	34.2		
MW-10d (MW-10C)	US131 ROW	1/22/2018	ND	ND		
MW-11s (MW-11A)	Chandler curve	12/8/2017	ND	ND		
MW-11m (MW-11B)	Chandler curve	12/8/2017	ND	ND		
MW-11d (MW-11C)	Chandler curve	12/8/2017	ND	ND		
MW-14s	Convent					4/10/2018NDND
MW-14m	Convent					4/10/2018NDND
MW-14d	Convent					4/10/2018NDND
MW-15s	Rogue River Park					
MW-15m	Rogue River Park					
MW-15d	Rogue River Park					
MW-17s	Meek					4/17/2018NDND
MW-17m	Meek					4/17/2018NDND
MW-17d	Meek					4/17/20181,3724,323
MW-18s	Herrington & Belmont					
MW-18m	Herrington & Belmont					
MW-18d	Herrington & Belmont					
MW-19s	Packer					
MW-19d	Packer					
MW-20s	Wildwood Creek					
MW-20m	Wildwood Creek					
MW-20d	Wildwood Creek					
MW-21s	Rogue River Park					
MW-21m	Rogue River Park					
MW-21d	Rogue River Park					
MW-23						
MW-25s	in Belmont					
SB-25/MW-25m	in Belmont					
MW-25d	in Belmont					
MW-26s	Jupiter & Rogue River					
MW-26m	Jupiter & Rogue River					
MW-26d	Jupiter & Rogue River					
MW-27						
MW-28						
MW-30A	Gold Dust & Packer					
MW-30B	Gold Dust & Packer					
MW-30C	Gold Dust & Packer					
MW-30D	Gold Dust & Packer					
MW-30E	Gold Dust & Packer					
MW-31A	Plainfield Cemetary					
MW-31B	Plainfield Cemetary					
MW-31C	Plainfield Cemetary					
MW-31D	Plainfield Cemetary					
MW-31E	Plainfield Cemetary					
MW-32A	along 10 Mile					
MW-32B	along 10 Mile					
MW-32C	along 10 Mile					
MW-32D	along 10 Mile					

Tabulation of WWW Monitoring Well Results
House Street Area - Table 1

Monitor Well:	Location:	Sample Date	PFOS + PFOA	Total PFAS	Sample Date	PFOS + PFOA	Total PFAS
MW-1s	WWW Property	7/23/2018	7.9	63.5	10/24/2018	14	73.5
MW-1d	WWW Property	7/24/2018	8.1	16.2	10/24/2018	8.9	18.3
MW-2	WWW Property	7/23/2018	4.8	338.8	10/24/2018	9.8	572.8
MW-3s	WWW Property	7/24/2018	537	2,901	10/23/2018	609	3,405
MW-3p	WWW Property						
MW-4s	WWW Property	7/26/2018	8,600	17,675.1	10/23/2018	6,400	11,961.2
MW-5s	WWW Property	7/25/2018	87,200	100,450	10/23/2018	52,608	63,730
MW-5p (MW-5m)	WWW Property						
MW-5d	WWW Property	7/25/2018	30.1	60.6	10/22/2018	7.6	11.6
MW-6s	WWW Property	7/26/2018	28	103.7	10/22/2018	49.9	275
MW-6d	WWW Property	7/26/2018	ND	ND	10/22/2018	ND	ND
MW-7s	WWW Property	7/27/2018	5.8	16.8	10/23/2018	6.4	21.5
MW-8	MDOT property	7/27/2018	665	1,358	10/24/2018	770	1333.1
MW-9s (MW-9A)	US131 ROW	7/31/2018	ND	ND	10/24/2018	5.5	5.5
MW-9m (MW-9B)	US131 ROW	7/30/2018	ND	6.4	10/25/2018	ND	ND
MW-9d (MW-9C)	US131 ROW	7/31/2018	ND	ND	10/25/2018	ND	ND
MW-10s (MW-19A)	US131 ROW	7/31/2018	55	74.5	10/26/2018	56	72.2
MW-10m (MW-10B)	US131 ROW	8/1/2018	19.3	30.7	10/25/2018	23.2	42.1
MW-10d (MW-10C)	US131 ROW	8/1/2018	ND	ND	10/25/2018	ND	ND
MW-11s (MW-11A)	Chandler curve	8/2/2018	ND	ND	10/26/2018	1.8	18
MW-11m (MW-11B)	Chandler curve	8/2/2018	ND	ND	10/26/2018	ND	6.1
MW-11d (MW-11C)	Chandler curve	8/2/2018	ND	14	10/26/2018	ND	ND
MW-14s	Convent						
MW-14m	Convent						
MW-14d	Convent						
MW-15s	Rogue River Park						
MW-15m	Rogue River Park						
MW-15d	Rogue River Park						
MW-17s	Meek						
MW-17m	Meek						
MW-17d	Meek						
MW-18s	Herrington & Belmont	7/6/2018	ND	ND			
MW-18m	Herrington & Belmont						
MW-18d	Herrington & Belmont	7/6/2018	9.2	108.5			
MW-19s	Packer						
MW-19d	Packer						
MW-20s	Wildwood Creek						
MW-20m	Wildwood Creek						
MW-20d	Wildwood Creek						
MW-21s	Rogue River Park						
MW-21m	Rogue River Park						
MW-21d	Rogue River Park						
MW-23							
MW-25s	in Belmont						
SB-25/MW-25m	in Belmont						
MW-25d	in Belmont						
MW-26s	Jupiter & Rogue River						
MW-26m	Jupiter & Rogue River						
MW-26d	Jupiter & Rogue River						
MW-27							
MW-28							
MW-30A	Gold Dust & Packer						
MW-30B	Gold Dust & Packer						
MW-30C	Gold Dust & Packer						
MW-30D	Gold Dust & Packer						
MW-30E	Gold Dust & Packer						
MW-31A	Plainfield Cemetary						
MW-31B	Plainfield Cemetary						
MW-31C	Plainfield Cemetary						
MW-31D	Plainfield Cemetary						
MW-31E	Plainfield Cemetary						
MW-32A	along 10 Mile						
MW-32B	along 10 Mile						
MW-32C	along 10 Mile						
MW-32D	along 10 Mile						

Tabulation of WWW Monitoring Well Results								
House Street Area - Table 1								
Monitor Well:	Location:	Sample Date	PFOS + PFOA	Total PFAS	Sample Date	PFOS + PFOA	Total PFAS	
MW-1s	WWW Property				3/11/2019	14.1	65.1	
MW-1d	WWW Property				3/11/2019	13.3	18.9	
MW-2	WWW Property				3/11/2019	8.8	328.3	
MW-3s	WWW Property				3/13/2019	722	4,009	
MW-3p	WWW Property							
MW-4s	WWW Property				3/15/2019	6,000	10,397	
MW-5s	WWW Property				3/14/2019	50,500	69,010	
MW-5p (MW-5m)	WWW Property							
MW-5d	WWW Property				3/14/2019	5.3	5.3	
MW-6s	WWW Property				3/20/2019	52.7	304.1	
MW-6d	WWW Property				3/20/2019	ND	ND	
MW-7s	WWW Property				3/21/2019	2.9	19	
MW-8	MDOT property				3/21/2019	520	883.1	
MW-9s (MW-9A)	US131 ROW	11/7/2018	ND	ND	3/19/2019	ND	ND	
MW-9m (MW-9B)	US131 ROW				3/19/2019	ND	ND	
MW-9d (MW-9C)	US131 ROW				3/19/2019	ND	ND	
MW-10s (MW-19A)	US131 ROW				3/18/2019	52	62.7	
MW-10m (MW-10B)	US131 ROW				3/18/2019	21.4	34.7	
MW-10d (MW-10C)	US131 ROW				3/18/2019	ND	ND	
MW-11s (MW-11A)	Chandler curve				3/14/2019	2.4	2.4	
MW-11m (MW-11B)	Chandler curve				3/14/2019	ND	14	
MW-11d (MW-11C)	Chandler curve				3/14/2019	ND	ND	
MW-14s	Convent							
MW-14m	Convent							
MW-14d	Convent							
MW-15s	Rogue River Park				2/27/2019	ND	7.3	
MW-15m	Rogue River Park				2/27/2019	ND	ND	
MW-15d	Rogue River Park				2/27/2019	ND	ND	
MW-17s	Meek				3/6/2019	ND	18.1	
MW-17m	Meek				3/7/2019	ND	4	
MW-17d	Meek				3/7/2019	1,060	3,832	
MW-18s	Herrington & Belmont							
MW-18m	Herrington & Belmont							
MW-18d	Herrington & Belmont							
MW-19s	Packer							
MW-19d	Packer							
MW-20s	Wildwood Creek							
MW-20m	Wildwood Creek				3/6/2019	90	639	
MW-20d	Wildwood Creek				3/6/2019	200	636.5	
MW-21s	Rogue River Park				2/27/2019	2.8	2.8	
MW-21m	Rogue River Park				2/27/2019	ND	ND	
MW-21d	Rogue River Park				2/27/2019	ND	ND	
MW-23								
MW-25s	in Belmont							
SB-25/MW-25m	in Belmont							
MW-25d	in Belmont							
MW-26s	Jupiter & Rogue River							
MW-26m	Jupiter & Rogue River							
MW-26d	Jupiter & Rogue River							
MW-27								
MW-28								
MW-30A	Gold Dust & Packer							
MW-30B	Gold Dust & Packer							
MW-30C	Gold Dust & Packer							
MW-30D	Gold Dust & Packer							
MW-30E	Gold Dust & Packer							
MW-31A	Plainfield Cemetary							
MW-31B	Plainfield Cemetary							
MW-31C	Plainfield Cemetary							
MW-31D	Plainfield Cemetary							
MW-31E	Plainfield Cemetary							
MW-32A	along 10 Mile							
MW-32B	along 10 Mile							
MW-32C	along 10 Mile							
MW-32D	along 10 Mile							

Tabulation of WWW Monitoring Well Results					House Street Area - Table 1		
Monitor Well:	Location:	Sample Date	PFOS + PFOA	Total PFAS			
MW-1s	WWW Property	5/29/2019	25	73.8			
MW-1d	WWW Property	5/29/2019	14.2	19.9			
MW-2	WWW Property	5/30/2019	19	403			
MW-3s	WWW Property	5/30/2019	947	5,552			
MW-3p	WWW Property						
MW-4s	WWW Property	5/30/2019	4,600	8,741			
MW-5s	WWW Property	5/28/2019	111,000	134,730			
MW-5p (MW-5m)	WWW Property						
MW-5d	WWW Property	5/28/2019	13.8	13.8			
MW-6s	WWW Property	5/29/2019	33.9	98.7			
MW-6d	WWW Property	5/29/2019	ND	ND			
MW-7s	WWW Property	5/30/2019	7.2	22.1			
MW-8	MDOT property	5/29/2019	401	663.3			
MW-9s (MW-9A)	US131 ROW	5/22/2019	4.9	4.9			
MW-9m (MW-9B)	US131 ROW	5/22/2019	ND	ND			
MW-9d (MW-9C)	US131 ROW	5/22/2019	ND	ND			
MW-10s (MW-19A)	US131 ROW	5/20/2019	51	68.3			
MW-10m (MW-10B)	US131 ROW	5/20/2019	19.2	29.1			
MW-10d (MW-10C)	US131 ROW	5/20/2019	ND	ND			
MW-11s (MW-11A)	Chandler curve	5/22/2019	2.8	2.8			
MW-11m (MW-11B)	Chandler curve	5/22/2019	ND	13			
MW-11d (MW-11C)	Chandler curve	5/22/2019	ND	ND			
MW-14s	Convent	5/17/2019	4.7	21.6			
MW-14m	Convent	5/17/2019	ND	ND			
MW-14d	Convent	5/17/2019	ND	ND			
MW-15s	Rogue River Park	5/16/2019	ND	58			
MW-15m	Rogue River Park	5/16/2019	ND	ND			
MW-15d	Rogue River Park	5/16/2019	ND	ND			
MW-17s	Meek	5/23/2019	ND	30.2			
MW-17m	Meek	5/23/2019	ND	3.9			
MW-17d	Meek	5/23/2019	1,258	4,042			
MW-18s	Herrington & Belmont						
MW-18m	Herrington & Belmont	5/21/2019	ND	ND			
MW-18d	Herrington & Belmont	5/21/2019	15	140.2			
MW-19s	Packer	5/21/2019	ND	ND			
MW-19d	Packer	5/21/2019	ND	ND			
MW-20s	Wildwood Creek	5/28/2019	22	92.9			
MW-20m	Wildwood Creek	5/28/2019	204	631.8			
MW-20d	Wildwood Creek	5/28/2019	120	714			
MW-21s	Rogue River Park	5/16/2019	2.6	2.6			
MW-21m	Rogue River Park	5/16/2019	ND	ND			
MW-21d	Rogue River Park	5/16/2019	ND	ND			
MW-23							
MW-25s	in Belmont	5/14/2019	80.1	104.5			
SB-25/MW-25m	in Belmont						
MW-25d	in Belmont	5/14/2019	65	111.7			
MW-26s	Jupiter & Rogue River	5/15/2019	ND	ND			
MW-26m	Jupiter & Rogue River	5/15/2019	16.5	21.1			
MW-26d	Jupiter & Rogue River	5/15/2019	ND	ND			
MW-27							
MW-28							
MW-30A	Gold Dust & Packer				7/2/2019	3.3	13.2
MW-30B	Gold Dust & Packer				7/2/2019	6.4	17.3
MW-30C	Gold Dust & Packer				7/3/2019	ND	5.7
MW-30D	Gold Dust & Packer				7/2/2019	ND	4.8
MW-30E	Gold Dust & Packer				7/3/2019	ND	5.5
MW-31A	Plainfield Cemetary				7/1/2019	3.5	21.6
MW-31B	Plainfield Cemetary				7/1/2019	27.9	77.5
MW-31C	Plainfield Cemetary				7/1/2019	17.7	66.8
MW-31D	Plainfield Cemetary				7/1/2019	11.7	53.2
MW-31E	Plainfield Cemetary				7/3/2019	ND	ND
MW-32A	along 10 Mile	5/24/2019	ND	ND			
MW-32B	along 10 Mile	5/24/2019	ND	ND			
MW-32C	along 10 Mile	5/24/2019	ND	ND			
MW-32D	along 10 Mile	5/24/2019	ND	ND			