Rose & Westra
A Division of GZA

GEOTECHNICAL
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MEMORANDUM

To: Abby Hendershott, MDEQ

From: Leslie Nelson, Rose & Westra, a Division of GZA GeoEnvironmental, Inc.

Date: August 10, 2018

File No.: 16.0062677.81 Task 001

Re: Wolverine World Wide, Inc. (Wolverine) – Wolven/Jewell RI – Progress Report

This Progress Report (PR) is being provided at the request of the MDEQ to provide an update regarding the implementation of the December 13, 2017 Source Area Investigation Work Plan (WP) related to per- and polyfluorinated alkyl substances (PFAS) detected in residential wells in the Wolven/Jewell study area.

According to the MDEQ, historical aerial photographs from as early as 1953 through at least 1965 show a gravel pit and interviews with a former area resident suggested the gravel pit may have been used as a disposal location for Wolverine waste. This former gravel pit, located south of Royal Hannah Drive in Algoma Township, is approximately 0.5 mile west of Wolven Avenue.

The purpose of this investigation is to assess groundwater quality in the vicinity of the gravel pit and delineate the vertical and lateral extents of PFAS in groundwater.

ACTIONS PERFORMED

During the initial phase of the WP implementation, which encompasses the period from January 4, 2018 through July 31, 2018, GZA has done the following tasks:

1. Prepared general cross sections based on available residential well logs;
2. Negotiated access with property owners in eight locations to allow monitoring well installation;
3. Drilled using a hollow stem auger drill rig and characterized soil, along with collecting vertical aquifer profiling samples for analysis of PFAS every 10 feet in most locations.
4. Installed, developed, surveyed, and sampled 14 monitoring wells.
5. Prepared boring logs and monitoring well installation logs for each monitoring well.
6. Prepared additional cross sections using monitoring well drilling data along with available residential well drilling data.

Table 1 summarizes the monitoring well information for the wells installed during this reporting period. The monitoring well locations are shown on attached Figure 1.

Static water level measurements were taken from the monitoring wells on August 3, 2018 and are summarized on Table 2. Figure 2 presents a groundwater flow map based on site-specific information collected on August 3, 2018. As shown on Figure 2, shallow groundwater flow is primarily to the northwest. Deeper groundwater flow is primarily to the southwest.

Three cross sections were developed utilizing both the drilling information and area residential well logs. Figure 1 shows the cross-section cuts in plan view. Figures 3, 4, and 5 are sections A-A', B-B' and C-C', respectively.

ANALYTICAL DATA RECIEVED

Tables 3 (PFAS), 4 (organic compounds) and 5 (inorganic compounds) summarize the analytical data received through August 4, 2018. This data includes both vertical profile data and data from the permanent monitoring wells.

PFAS

During the vertical aquifer profiling, PFAS compounds were detected in all of the well locations that were vertically profiled at one or more depths. However, only samples from PMW-WV2, PMW-WV-3, PMW-WV-8 and PMW-WV-9 had at least one concentration of PFOA/PFOS greater than the combined criteria of 70 ppt. In the permanent monitoring wells, concentrations of PFOA/PFOS greater than the combined criteria of 70 ppt were detected in MW-WV-1, MW-WV-2S, MW-WV-2D, MW-WV-3S, MW-WV-8S, and MW-WV-9. Data from both the vertical profiling and the permanent well sampling are included in Table 1.

Organics

The groundwater samples were analyzed for volatile organic compounds (VOCs). There were no VOCs detected at concentrations greater than Michigan's Part 201 generic residential criteria in any of the monitoring wells.

Inorganics

The groundwater samples were analyzed for Michigan 18 metals and general chemistry (nitrate/nitrite, ammonia, sodium, potassium, calcium, magnesium, chloride, sulfate, and alkalinity). The only inorganics measured above Michigan's Part 201 generic residential drinking water criteria were iron and chloride. Iron was identified in most of the wells at concentrations between 110 and 3,600 µg/L (aesthetic criterion is 300 µg/L, health-based criterion is 2,000 µg/L). Chloride was identified in two wells, MW-WV-6s and MW-WV-6D, at concentrations greater than the criterion of 250,000 µg/L.

Based on this data, an additional monitoring well may be warranted at MW-WV-9 to monitor the zone from 79 to 84 feet bgs. As illustrated on the cross sections, the PFAS concentrations are higher in shallower portions of each water-bearing unit. In the deeper wells within each unit, concentrations are reduced or the compounds are not detected.

ANTICIPATED ACTIONS AND SCHEDULE FOR NEXT REPORTING PERIOD

During the next reporting period, August 4 to September 30, 2018, R&W/GZA anticipates commencing the Lamoreaux Farms soil investigation. This effort is estimated to take three weeks, but the length of the effort will be better estimated once it is underway. The scope of work for this effort is summarized in our August 3, 2018 letter to DEQ.

GZA also anticipates conducting an additional round of monitoring well sampling at Lamoreaux Farms, which is estimated to take approximately 7 working days. This work will not be conducted until the Lamoreaux Farms soil investigation is complete and therefore will not be completed prior to the next report.

Table 1
Monitoring Well Information
Wolven/Jewell Investigation
Rockford, Michigan

Well ID	Grade Elevation	Initial Top of Casing Elevation	Screened Interval (ft)	Elevation Midpoint of Well Screen	Screen Length
Monitoring wells					
MW-WV-1	859.20	859.24	135-140	721.70	5.0
MW-WV-2D	790.50	791.36	30-35	758.00	5.0
MW-WV-3S	820.60	823.31	5-10	813.10	5.0
MW-WV-3D	820.70	823.28	56-61	762.20	5.0
MW-WV-4	852.36	854.89	130-135	719.86	5.0
MW-WV-5S	862.10	864.93	60-65	799.60	5.0
MW-WV-5D	862.00	865.07	67-72	792.50	5.0
MW-WV-6S	784.42	786.62	13-18	768.92	5.0
MW-WV-6D	784.02	786.51	98-103	683.52	5.0
MW-WV-8S	846.00	845.55	30-35	813.50	5.0
MW-WV-8M	845.90	845.90	60-65	783.40	5.0
MW-WV-8D	846.00	845.80	115-120	728.50	5.0
MW-WV-9	857.37	859.86	92.3-97.3	762.57	5.0
Residential Wells					
2975 Royal Hannah	790.70	Unknown	80-90	705.70	10.0
9190 Lady Lauren	832.86	Unknown	50-60	777.86	10.0
9187 Lady Lauren	838.37	Unknown	55-65	778.37	10.0
9193 Lady Lauren	840.62	Unknown	55-65	780.62	10.0
9169 Lady Lauren	837.43	Unknown	53-63	779.43	10.0
3069 Royal Hannah	798.19	Unknown	200-210	593.19	10.0
3081 Royal Hannah	801.22	Unknown	70-80	726.22	10.0
3099 Royal Hannah	801.07	Unknown	80-90	716.07	10.0
3070 Royal Hannah	821.87	Unknown	112-122	704.87	10.0
8922 Lady Lauren	897.90	Unknown	128-138	764.90	10.0
8903 Lady Lauren	864.80	Unknown	138-148	721.80	10.0
Notes					

1. Monitoring wells were surveyed by Excel Engineering.
2. Residential well grade elevations were surveyed by Excel Engineering.
3. Residential well data other than grade elevation were collected from well logs available on Wellogic.

Table 2
Static Water Levels
Wolven/Jewell Investigation
Rockford, MI

Well Number	Wellscreen Interval	Top of Casing Elevation	Measured on 8/3/2018	
			Depth to Water	Static Water Elevation
MW-WV-1	135-140	859.24	117.21	742.03
MW-WV-2S	20-25	793.39	3.48	789.91
MW-WV-2D	30-35	791.36	9.77	781.59
MW-WV-3S	5-10	823.31	6.01	817.30
MW-WV-3D	56-61	823.28	23.63	799.65
MW-WV-4	130-135	854.89	109.93	744.96
MW-WV-5S	60-65	864.93	64.60	800.33
MW-WV-5D	67-72	865.07	64.82	800.25
MW-WV-6S	13-18	786.62	8.13	778.49
MW-WV-6D	98-103	786.51	28.20	758.31
MW-WV-8S	30-35	849.99	24.37	825.62
MW-WV-8M	60-65	849.74	24.54	825.20
MW-WV-8D	115-120	849.80	100.01	749.79
MW-WV-9	92.3-97.3	859.86	38.29	821.57

TABLE 3
SUMMARY OF GROUNDWATER ANALYTICAL DATA - PFAS
WOLVEN AND JEWELL STUDY AREAS
PLAINFIELD TOWNSHIP, MICHIGAN

LOCATION	PART 201 GENERIC RESIDENTIAL GROUNDWATER CLEANUP CRITERIA - DRINKING WATER	PART 201 GENERIC GROUNDWATER CLEANUP CRITERIA - GROUNDWATER SURFACE WATER INTERFACE	MW-WV-1	MW-WV-2D	MW-WV-2S	MW-WV-3D	MW-WV-3D	MW-WV-3S	MW-WV-4
SAMPLE NAME			MW-WV-1	MW-WV-2D	MW-WV-2S	MW-WV-3D	MW-WV-3D (DUP)	MW-WV-3S	MW-WV-4
LB ID			TC30012-002	TC30012-006	TC30012-010	TC30012-008	TC30012-011	TC30012-009	TE25018-002
SAMPLE DATE			03/28/2018	03/29/2018	03/29/2018	03/29/2018	03/29/2018	03/29/2018	05/23/2018
Parameter (ng/l)									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NA	NA	<7	<7.2	<7.4	<7.5	<7.5	<7	<3.5
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NA	NA	<7	<7.2	<7.4	<7.5	<7.5	<7	<3.5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NA	NA	<7	<7.2	<7.4	<7.5	<7.5	<7	<3.5
N-Ethyl perfluorooctane sulfonamidoethanol	NA	NA							
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NA	NA	<14	<14	<15	<15	<15	<14	<7
N-Methyl perfluorooctane sulfonamidoethanol	NA	NA							
Perfluorobutane sulfonic acid (PFBS)	NA	NA	**46**	**56**	**17**	**6.4**	**6.6**	**4.9**	<3.5
Perfluorobutanoic acid (PFBA)	NA	NA	**31**	**26**	**11**	<3.7	<3.8	5.3 Q	<3.5
Perfluorodecane sulfonic acid (PFDS)	NA	NA	<3.5	<3.6	<3.7	<3.7	<3.8	<3.5	<3.5
Perfluorodecanoic acid (PFDA)	NA	NA	<3.5	<3.6	<3.7	<3.7	<3.8	<3.5	<3.5
Perfluorododecanoic acid (PFDoDA)	NA	NA	<3.5	<3.6	<3.7	<3.7	<3.8	<3.5	<3.5
Perfluoroheptane sulfonic acid (PFHpS)	NA	NA	**230**	**15**	**74**	<3.7	<3.8	**9.2**	<3.5
Perfluoroheptanoic acid (PFHpA)	NA	NA	**250**	**150**	**33**	<3.7	<3.8	**11**	<3.5
Perfluorohexane sulfonic acid (PFHxS)	NA	NA	**1,100**	**350**	**80**	**4.2**	**4.7**	**23**	<3.5
Perfluorohexanoic acid (PFHxA)	NA	NA	**100**	**81**	**23**	<3.7	<3.8	**6.1**	<3.5
Perfluorononanoic acid (PFNA)	NA	NA	**15**	<3.6	**5.8**	<3.7	<3.8	<3.5	<3.5
Perfluorooctane sulfonamide (FOSA)	NA	NA	<7	<7.2	<7.4	<7.5	<7.5	<7	<3.5
Perfluorooctane sulfonic acid (PFOS)	70	12	***7,300***	***64***	***3,200***	<3.7	<3.8	***230***	<3.5
Perfluorooctanoic acid (PFOA)	70	12,000.00	***3,300***	***970***	***320***	<3.7	<3.8	***93***	<1.7
Perfluoropentanoic acid (PFPeA)	NA	NA	**39**	**33**	**14**	<3.7	<3.8	<3.5	<3.5
Perfluorotetradecanoic acid (PFTeDA)	NA	NA	<7	<7.2	<7.4	<7.5	<7.5	<7	<3.5
Perfluorotridecanoic acid (PFTrDA)	NA	NA	<3.5	<3.6	<3.7	<3.7	<3.8	<3.5	<3.5
Perfluoroundecanoic acid (PFUnDA)	NA	NA	<3.5	<3.6	<3.7	<3.7	<3.8	<3.5	<3.5
Perfluorononane sulfonic acid (PFNS)	NA	NA	<7	<7.2	<7.4	<7.5	<7.5	<7	<7
Perfluoropentane sulfonic acid (PFPeS)	NA	NA	**140**	**140**	**18**	<3.7	<3.8	**5**	<3.5

NOTES:
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3. Michigan Part 201 groundwater cleanup criteria protective of drinking water uses were based on MDEQ 's Table 1, Groundwater: Residential and Nonresidential, Part 201 Generic Cleanup cCiteria and Screening Levels, June 2018.

4. The cleanup criteria of 70 ppt was established for the combined concentrations of PFOA and PFOS.

TABLE 3
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WOLVEN AND JEWELL STUDY AREAS
PLAINFIELD TOWNSHIP, MICHIGAN

LOCATION	PART 201 GENERIC RESIDENTIAL GROUNDWATER CLEANUP CRITERIA - DRINKING WATER	PART 201 GENERIC GROUNDWATER CLEANUP CRITERIA - GROUNDWATER SURFACE WATER INTERFACE	MW-WV-5D	MW-WV-5S	MW-WV-6D	MW-WV-6S	MW-WV-8D	MW-WV-8M	MW-WV-8S
SAMPLE NAME			MW-WV-5D	MW-WV-5S	MW-WV-6D	MW-WV-6S	MW-WV-8D	MW-WV-8M	MW-WV-8S
LB ID			TC30012-004	TC30012-003	TD12014-001	TD12014-003	TG07028-003	TG07028-002	TG07028-001
SAMPLE DATE			03/28/2018	03/28/2018	04/11/2018	04/11/2018	07/05/2018	07/05/2018	07/05/2018
Parameter (ng/l)									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NA	NA	<7.2	<7.1	<7.5	<7.3	<3.5	<3.5	<3.5
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NA	NA	<7.2	<7.1	<7.5	<7.3	<3.5	<3.5	<3.5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NA	NA	<7.2	<7.1	<7.5	<7.3	<3.5	<3.5	<3.5
N-Ethyl perfluorooctane sulfonamidoethanol	NA	NA							
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NA	NA	<14	<14	<15	<15	<6.9	<7	<6.9
N-Methyl perfluorooctane sulfonamidoethanol	NA	NA							
Perfluorobutane sulfonic acid (PFBS)	NA	NA	**8.3**	**6**	**18**	**7.8**	<3.5	**73**	**18**
Perfluorobutanoic acid (PFBA)	NA	NA	<3.6	<3.6	**5**	<3.6	<3.5	**8.5**	**6**
Perfluorodecane sulfonic acid (PFDS)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	<3.5	<3.5
Perfluorodecanoic acid (PFDA)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	<3.5	<3.5
Perfluorododecanoic acid (PFDoDA)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	<3.5	<3.5
Perfluoroheptane sulfonic acid (PFHpS)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	<3.5	<3.5
Perfluoroheptanoic acid (PFHpA)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	**4.2**	**5.1**
Perfluorohexane sulfonic acid (PFHxS)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	**10**	**16**
Perfluorohexanoic acid (PFHxA)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	**8.7**	**4.5**
Perfluorononanoic acid (PFNA)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	<3.5	<3.5
Perfluorooctane sulfonamide (FOSA)	NA	NA	<7.2	<7.1	<7.5	<7.3	<3.5	<3.5	<3.5
Perfluorooctane sulfonic acid (PFOS)	70	12	<3.6	<3.6	<3.8	**4.8**	<3.5	**4.5**	***42***
Perfluorooctanoic acid (PFOA)	70	12,000.00	<3.6	<3.6	<3.8	**6.9**	**4.8**	**28**	**50**
Perfluoropentanoic acid (PFPeA)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	**8.1**	<3.5
Perfluorotetradecanoic acid (PFTeDA)	NA	NA	<7.2	<7.1	<7.5	<7.3	<3.5	<3.5	<3.5
Perfluorotridecanoic acid (PFTrDA)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	<3.5	<3.5
Perfluoroundecanoic acid (PFUnDA)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	<3.5	<3.5
Perfluorononane sulfonic acid (PFNS)	NA	NA	<7.2	<7.1	<7.5	<7.3	<6.9	<7	<6.9
Perfluoropentane sulfonic acid (PFPeS)	NA	NA	<3.6	<3.6	<3.8	<3.6	<3.5	<3.5	**4**

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WOLVEN AND JEWELL STUDY AREAS
PLAINFIELD TOWNSHIP, MICHIGAN

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SAMPLE NAME			MW-WV-9	PMV-WV-2 (31-36)	PMW-WV-2 (13-18)	PMW-WV-3 (13-18)	PMW-WV3 (34-39)	PMW-WV3 (44-49)	PMW-WV-3 (5-10)
LB ID			TG07028-004	K1801591-001	K1801515-002	K1801320-002	K1801365-002	K1801365-004	K1801320-001
SAMPLE DATE			07/05/2018	02/16/2018	02/14/2018	02/08/2018	02/12/2018	02/12/2018	02/08/2018
Parameter (ng/l)									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NA	NA	<3.5	<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NA	NA	<3.5	<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NA	NA	<3.5	<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
N-Ethyl perfluorooctane sulfonamidoethanol	NA	NA		<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NA	NA	<7	<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
N-Methyl perfluorooctane sulfonamidoethanol	NA	NA		<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
Perfluorobutane sulfonic acid (PFBS)	NA	NA	**11**	**50**	**20**	**12**	<4.4	**5.2**	**4.9**
Perfluorobutanoic acid (PFBA)	NA	NA	**6.3**	**20**	<9.4	<8.5	<8.9	<8.9	**9**
Perfluorodecane sulfonic acid (PFDS)	NA	NA	<3.5	<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
Perfluorodecanoic acid (PFDA)	NA	NA	<3.5	<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
Perfluorododecanoic acid (PFDoDA)	NA	NA	<3.5	<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
Perfluoroheptane sulfonic acid (PFHpS)	NA	NA	**26**	**24**	**130**	<4.2	<4.4	<4.4	**21**
Perfluoroheptanoic acid (PFHpA)	NA	NA	**40**	**150**	**35**	**60**	<4.4	<4.4	**29**
Perfluorohexane sulfonic acid (PFHxS)	NA	NA	**110**	**240**	**86**	**110**	**24**	<4.4	**45**
Perfluorohexanoic acid (PFHxA)	NA	NA	**19**	**61**	**23**	**24**	<4.4	<4.4	**13**
Perfluorononanoic acid (PFNA)	NA	NA	<3.5	<5.1	**5.7**	<4.2	<4.4	<4.4	<4.2
Perfluorooctane sulfonamide (FOSA)	NA	NA	**31**	<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
Perfluorooctane sulfonic acid (PFOS)	70	12	***590***	***96***	***2,700***	<4.2	***28***	<4.4	***340***
Perfluorooctanoic acid (PFOA)	70	12,000.00	***470***	***720***	***280***	***130***	**28**	<1.8	***190***
Perfluoropentanoic acid (PFPeA)	NA	NA	**7.1**	**25**	**14**	**5.1**	<4.4	<4.4	**5.9**
Perfluorotetradecanoic acid (PFTeDA)	NA	NA	<3.5	<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
Perfluorotridecanoic acid (PFTrDA)	NA	NA	<3.5	<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
Perfluoroundecanoic acid (PFUnDA)	NA	NA	<3.5	<5.1	<4.7	<4.2	<4.4	<4.4	<4.2
Perfluorononane sulfonic acid (PFNS)	NA	NA	<7						
Perfluoropentane sulfonic acid (PFPeS)	NA	NA	**33**						

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SAMPLE NAME			PMW-WV3 (54-59)	PMW-WV-4 (118-123)	PMW-WV-4 (125-130)	PMW-WV-5	PMW-WV-6 (13-18)	PMW-WV-6 (98-103)	PMW-WV-8 (109-114)
LB ID			K1801365-005	K1802438-001	K1802438-002	K1802089-001	K1802550-001	K1802656-003	TE09005-001
SAMPLE DATE			02/12/2018	03/14/2018	03/14/2018	03/06/2018	03/19/2018	03/21/2018	05/08/2018
Parameter (ng/l)									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
N-Ethyl perfluorooctane sulfonamidoethanol	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<7
N-Methyl perfluorooctane sulfonamidoethanol	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	
Perfluorobutane sulfonic acid (PFBS)	NA	NA	**5.3**	<5.1	<4.6	**8**	**8.3**	**17**	<3.5
Perfluorobutanoic acid (PFBA)	NA	NA	<8.7	**16**	<9.3	<9.6	<9.8	<9.6	<3.5
Perfluorodecane sulfonic acid (PFDS)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluorodecanoic acid (PFDA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluorododecanoic acid (PFDoDA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluoroheptane sulfonic acid (PFHpS)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluoroheptanoic acid (PFHpA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluorohexane sulfonic acid (PFHxS)	NA	NA	**6.1**	<5.1	<4.6	**6.9**	<4.9	<4.8	**4.7**
Perfluorohexanoic acid (PFHxA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluorononanoic acid (PFNA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluorooctane sulfonamide (FOSA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluorooctane sulfonic acid (PFOS)	70	12	<4.4	<5.1	<4.6	<4.8	**5.8**	<4.8	<3.5
Perfluorooctanoic acid (PFOA)	70	12,000.00	<1.7	**4.4**	<1.9	**4.3**	**9**	**2.9**	**11**
Perfluoropentanoic acid (PFPeA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluorotetradecanoic acid (PFTeDA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluorotridecanoic acid (PFTrDA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluoroundecanoic acid (PFUnDA)	NA	NA	<4.4	<5.1	<4.6	<4.8	<4.9	<4.8	<3.5
Perfluorononane sulfonic acid (PFNS)	NA	NA							<7
Perfluoropentane sulfonic acid (PFPeS)	NA	NA							<3.5

NOTES:
1. Concentration and criteria units are nano-grams per liter (ng/L) or parts per trillion (ppt); "< RL" indicates the compound was analyzed for but not detected above the method detection limit; RL = Reporting Limit

2. Bold indicates that compound was detected above the RL. Italic number with thick line border or italic chemical indicates that compound was detected above the USEPA Health Advisory for Drinking Water Uses.

3. Michigan Part 201 groundwater cleanup criteria protective of drinking water uses were based on MDEQ 's Table 1, Groundwater: Residential and Nonresidential, Part 201 Generic Cleanup cCiteria and Screening Levels, June 2018.

4. The cleanup criteria of 70 ppt was established for the combined concentrations of PFOA and PFOS.

TABLE 3
SUMMARY OF GROUNDWATER ANALYTICAL DATA - PFAS
WOLVEN AND JEWELL STUDY AREAS
PLAINFIELD TOWNSHIP, MICHIGAN

LOCATION	PART 201 GENERIC RESIDENTIAL GROUNDWATER CLEANUP CRITERIA - DRINKING WATER	PART 201 GENERIC GROUNDWATER CLEANUP CRITERIA - GROUNDWATER SURFACE WATER INTERFACE	PMW-WV-8	PMW-WV-8	PMW-WV-8	PMW-WV-8	PMW-WV-8	PMW-WV-9	PMW-WV-9
SAMPLE NAME			PMW-WV-8 (119-124)	PMW-WV-8 (30-35)	PMW-WV-8 (40-45)	PMW-WV-8 (50-55)	PMW-WV-8 (60-65)	PMW-WV-9 (79-84)	PMW-WV-9 (89-94)
LB ID			TE09005-002	TE03004-001	TE03004-002	TE03004-003	TE03004-004	TE12011-001	TE12011-002
SAMPLE DATE			05/08/2018	05/01/2018	05/01/2018	05/01/2018	05/01/2018	05/10/2018	05/10/2018
Parameter (ng/l)									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NA	NA	<3.5	<3.5	<3.5	<3.5	<3.6	<3.8	<3.6
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NA	NA	<3.5	<3.5	<3.5	<3.5	<3.6	<3.8	<3.6
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	NA	NA	<3.5	<3.5	<3.5	<3.5	<3.6	<3.8	<3.6
N-Ethyl perfluorooctane sulfonamidoethanol	NA	NA							
N-Methyl perfluorooctane sulfonamide (MeFOSA)	NA	NA	<7	<7.1	<6.9	<6.9	<7.2	<7.6	<7.3
N-Methyl perfluorooctane sulfonamidoethanol	NA	NA							
Perfluorobutane sulfonic acid (PFBS)	NA	NA	**3.8**	**16**	**23**	**54**	**25**	<3.8	**11**
Perfluorobutanoic acid (PFBA)	NA	NA	<3.5	**6.5**	**5.8**	**7.7**	**5.6**	**6.9**	**7.3**
Perfluorodecane sulfonic acid (PFDS)	NA	NA	<3.5	<3.5	<3.5	<3.5	<3.6	<3.8	<3.6
Perfluorodecanoic acid (PFDA)	NA	NA	<3.5	<3.5	<3.5	<3.5	<3.6	<3.8	<3.6
Perfluorododecanoic acid (PFDoDA)	NA	NA	<3.5	<3.5	<3.5	<3.5	<3.6	<3.8	<3.6
Perfluoroheptane sulfonic acid (PFHpS)	NA	NA	<3.5	**3.9**	<3.5	<3.5	<3.6	**22**	**25**
Perfluoroheptanoic acid (PFHpA)	NA	NA	<3.5	**9.2**	**6.9**	**4.9**	**4.3**	**17**	**45**
Perfluorohexane sulfonic acid (PFHxS)	NA	NA	**4.1**	**21**	**20**	**11**	**12**	**42**	**130**
Perfluorohexanoic acid (PFHxA)	NA	NA	<3.5	**12**	**11**	**9.6**	**6.7**	**8.3**	**21**
Perfluorononanoic acid (PFNA)	NA	NA	<3.5	<3.5	<3.5	<3.5	<3.6	<3.8	<3.6
Perfluorooctane sulfonamide (FOSA)	NA	NA	<3.5	<3.5	<3.5	<3.5	<3.6	**200**	**26**
Perfluorooctane sulfonic acid (PFOS)	70	12	<3.5	***39***	**6.5**	**6.1**	**3.9**	***1,600***	***360***
Perfluorooctanoic acid (PFOA)	70	12,000.00	**5.9**	***85***	**60**	**31**	**37**	***210***	***470***
Perfluoropentanoic acid (PFPeA)	NA	NA	<3.5	**6.8**	**7.4**	**7.4**	**4.7**	<3.8	**7.6**
Perfluorotetradecanoic acid (PFTeDA)	NA	NA	<3.5	<3.5	<3.5	<3.5	<3.6	<3.8	<3.6
Perfluorotridecanoic acid (PFTrDA)	NA	NA	<3.5	<3.5	<3.5	<3.5	<3.6	<3.8	<3.6
Perfluoroundecanoic acid (PFUnDA)	NA	NA	<3.5	<3.5	<3.5	<3.5	<3.6	<3.8	<3.6
Perfluorononane sulfonic acid (PFNS)	NA	NA	<7	<7.1	<6.9	<6.9	<7.2	<7.6	<7.3
Perfluoropentane sulfonic acid (PFPeS)	NA	NA	<3.5	**4.3**	**5.1**	<3.5	<3.6	**7.4**	**31**

NOTES:
1. Concentration and criteria units are nano-grams per liter (ng/L) or parts per trillion (ppt); "< RL" indicates the compound was analyzed for but not detected above the method detection limit; RL = Reporting Limit

2. Bold indicates that compound was detected above the RL. Italic number with thick line border or italic chemical indicates that compound was detected above the USEPA Health Advisory for Drinking Water Uses.

3. Michigan Part 201 groundwater cleanup criteria protective of drinking water uses were based on MDEQ 's Table 1, Groundwater: Residential and Nonresidential, Part 201 Generic Cleanup cCiteria and Screening Levels, June 2018.

4. The cleanup criteria of 70 ppt was established for the combined concentrations of PFOA and PFOS.

TABLE 4
SUMMARY OF GROUNDWATER SAMPLE ANALYSIS - VOC
WOLVEN/JEWELL STUDY AREA
PLAINFIELD TOWNSHIP, MICHIGAN

LOCATION	PART 201 GENERIC RESIDENTIAL GROUNDWATER CLEANUP CRITERIA - DRINKING WATER	PART 201 GENERIC GROUNDWATER CLEANUP CRITERIA - GROUNDWATER SURFACE WATER INTERFACE	PART 201 GENERIC RESIDENTIAL GROUNDWATER CLEANUP CRITERIA - INDOOR INHDALATION	MW-WV-1	MW-WV-2D	MW-WV-2S	MW-WV-3D	MW-WV-3S	MW-WV-4	MW-WV-5D	MW-WV-5S	MW-WV-6D	MW-WV-6S	MW-WV-8D	MW-WV-8M	MW-WV-8S	MW-WV-9	WV-DUP-1
SAMPLE NAME				MW-WV-1	MW-WV-2D	MW-WV-2S	MW-WV-3D	MW-WV-3S	MW-WV-4	MW-WV-5D	MW-WV-5S	MW-WV-6D	MW-WV-6S	MW-WV-8D	MW-WV-8M	MW-WV-8S	MW-WV-9	WV-DUP-1
SAMPLE DATE				43187	43188	43188	43188	43188	43243	43187	43187	43215	43215	43286	43286	43286	43286	43188
LAB ID				TC30010-002	TC30010-009	TC30010-005	TC30010-008	TC30010-007	TE25018-002	TC30010-001	TC30010-003	TD28005-001	TD28005-002	TG07028-003	TG07028-002	TG07028-001	TG07028-004	TC30010-006
Parameter (ug/L)																		
Acetone	730	1,700.00	1,000,000,000.00	<20	**32**	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Benzene	5	200	5,600.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	80	NA	4,800.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	80	NA	470,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane (Methyl bromide)	10	4	4,000.00	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Carbon disulfide	800	NA	250,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**7.6**	<1	<1	<1	<1
Carbon tetrachloride	5	38	370	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	100	25	210,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	430	1,100.00	5,700,000.00	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chloroform	80	350	28,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1.5**	<1
Chloromethane (Methyl chloride)	260	NA	8,600.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cyclohexane	NA	NA	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane (DBCP)	0.2	NA	220	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	80	NA	14,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane (Ethylene dibromide)	0.05	5.7	2,400.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	600	13	160,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	6.6	28	18,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	75	17	16,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	1,700.00	NA	220,000.00	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,1-Dichloroethane	880	740	1,000,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	5	360	9,600.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethylene	7	130	200	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethylene	70	620	93,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethylene	100	1,500.00	85,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	5	230	16,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	NA	NA	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	NA	NA	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	74	18	110,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Hexanone	1,000.00	NA	4,200,000.00	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Isopropyl benzene	800	28	56,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl acetate	NA	NA	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl ethyl ketone (2-Butanone)	13,000.00	2,200.00	240,000,000.00	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methyl isobutyl ketone	1,800.00	NA	20,000,000.00	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methyl tertiary butyl ether (MTBE)	40	7,100.00	47,000,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	1,500.00	220,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**3**	<1
Styrene	100	80	170,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	8.5	78	12,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethylene	5	60	25,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	790	270	530,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloro-1,2,2-trifluoroethane	170,000.00	32	170,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	70	99	300,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	89	660,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	5	330	17,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethylene	5	200	2,200.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	2,600.00	NA	1,100,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	2	13	1,100.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m,p-Xylene	280	41	190,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
o-Xylene	NA	NA	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylcyclohexane	NA	NA	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Xylenes	280	41	190,000.00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

NOTES:
1. Concentration and criteria units are micro-grams per liter (ng/L) or parts per billion (ppt); "< RL" indicates the compound was analyzed for but not detected above the method detection limit; RL = Reporting Limit

2. Bold indicates that compound was detected above the RL. Italic number with thick line border or italic chemical indicates that compound was detected above the USEPA Health Advisory for Drinking Water Uses.

3. Michigan Part 201 groundwater cleanup criteria protective of drinking water uses were based on MDEQ 's Table 1, Groundwater: Residential and Nonresidential, Part 201 Generic Cleanup Citeria and Screening Levels, June 2018.

TABLE 5
SUMMARY OF GROUNDWATER SAMPLE ANALYSIS - INORGANIC
WOLVEN/JEWELL STUDY AREA
PLAINFIELD TOWNSHIP, MICHIGAN

LOCATION	PART 201 GENERIC RESIDENTIAL GROUNDWATER CLEANUP CRITERIA - DRINKING WATER	PART 201 GENERIC GROUNDWATER CLEANUP CRITERIA - GROUNDWATER SURFACE WATER INTERFACE	PART 201 GENERIC RESIDENTIAL GROUNDWATER CLEANUP CRITERIA - INDOOR INHDALATION	MW-WV-1	MW-WV-2D	MW-WV-2S	MW-WV-3D	MW-WV-3S	MW-WV-4
SAMPLE NAME				MW-WV-1	MW-WV-2D	MW-WV-2S	MW-WV-3D	MW-WV-3S	MW-WV-4
SAMPLE DATE				3/28/2018	3/29/2018	3/29/2018	3/29/2018	3/29/2018	5/23/2018
LAB ID				TC30010-002	TC30010-009	TC30010-005	TC30010-008	TC30010-007	TE25018-002
Parameter (ug/L)									
Antimony	6	130	NA	<2	<2	<2	<2	<2	<2
Arsenic	10	10	NA	<2	<2	<2	<2	<2	<2
Barium	2,000.00	NA	NA	**190**	**97**	**42**	**25**	**50**	**86**
Beryllium	4	NA	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Cadmium	5	NA	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Calcium	NA	NA	NA	**87,000**	**120,000**	**86,000**	**74,000**	**16,000**	**49,000**
Chloride	250,000.00	NA	NA	**32,000**	**78,000**	**55,000**	**64,000**	**34,000**	**3,500**
Chromium	NA	NA	NA	<5	<5	<5	<5	<5	<5
Cobalt	40	100	NA	<5	<5	<5	<5	<5	<5
Copper	1,000.00	NA	NA	<5	<5	<5	<5	<5	<5
Iron	300	NA	NA	***1,600***	***480***	**230**	**230**	***3,600***	***690***
Lead	4	NA	NA	<1	<1	<1	<1	<1	<1
Magnesium	400,000.00	NA	NA	**33,000**	**30,000**	**27,000**	**24,000**	**6,300**	**16,000**
Mercury	2	0.0013	56	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Molybdenum	73	3,200.00	NA	<10	<10	<10	<10	<10	<10
Nickel	100	NA	NA	<5	**8.9**	<5	<5	<5	<5
Potassium	NA	NA	NA	**2,300**	**3,800**	**2,400**	**1,100**	**1,700**	**1,500**
Selenium	50	5	NA	<5	<5	<5	<5	<5	<5
Silver	34	0.2	NA	<1	<1	<1	<1	<1	<1
Sodium	NA	NA	NA	**17,000**	**12,000**	**31,000**	**25,000**	**9,500**	**10,000**
Sulfate	250,000.00	NA	NA	**43,000**	**44,000**	**15,000**	**11,000**	<1,000	**11,000**
Thallium	2	3.7	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vanadium	4.5	27	NA	<5	<5	<5	<5	<5	<5
Zinc	2,400.00	NA	NA	<10	<10	<10	<10	<10	<10
Alkalinity	NA	NA	NA	**300,000**	**38,000**	**290,000**	**230,000**	**41,000**	**210,000**
Nitrate-Nitrite (as N)	NA	NA	NA	<20	<20	**4,200**	**2,200**	**30**	**39**
Nitrogen, Ammonia (As N)	NA	NA	NA	<100	<100	<100	**280**	**650**	**410**

NOTES:
1. Concentration and criteria units are micro-grams per liter (ng/L) or parts per billion (ppt); "< RL" indicates the compound was analyzed for but not detected above the method detection limit; RL = Reporting Limit

2. Bold indicates that compound was detected above the RL. Italic number with thick line border or italic chemical indicates that compound was detected above the USEPA Health Advisory for Drinking Water Uses.

3. Michigan Part 201 groundwater cleanup criteria protective of drinking water uses were based on MDEQ 's Table 1, Groundwater: Residential and Nonresidential, Part 201 Generic Cleanup cCiteria and Screening Levels, June 2018.

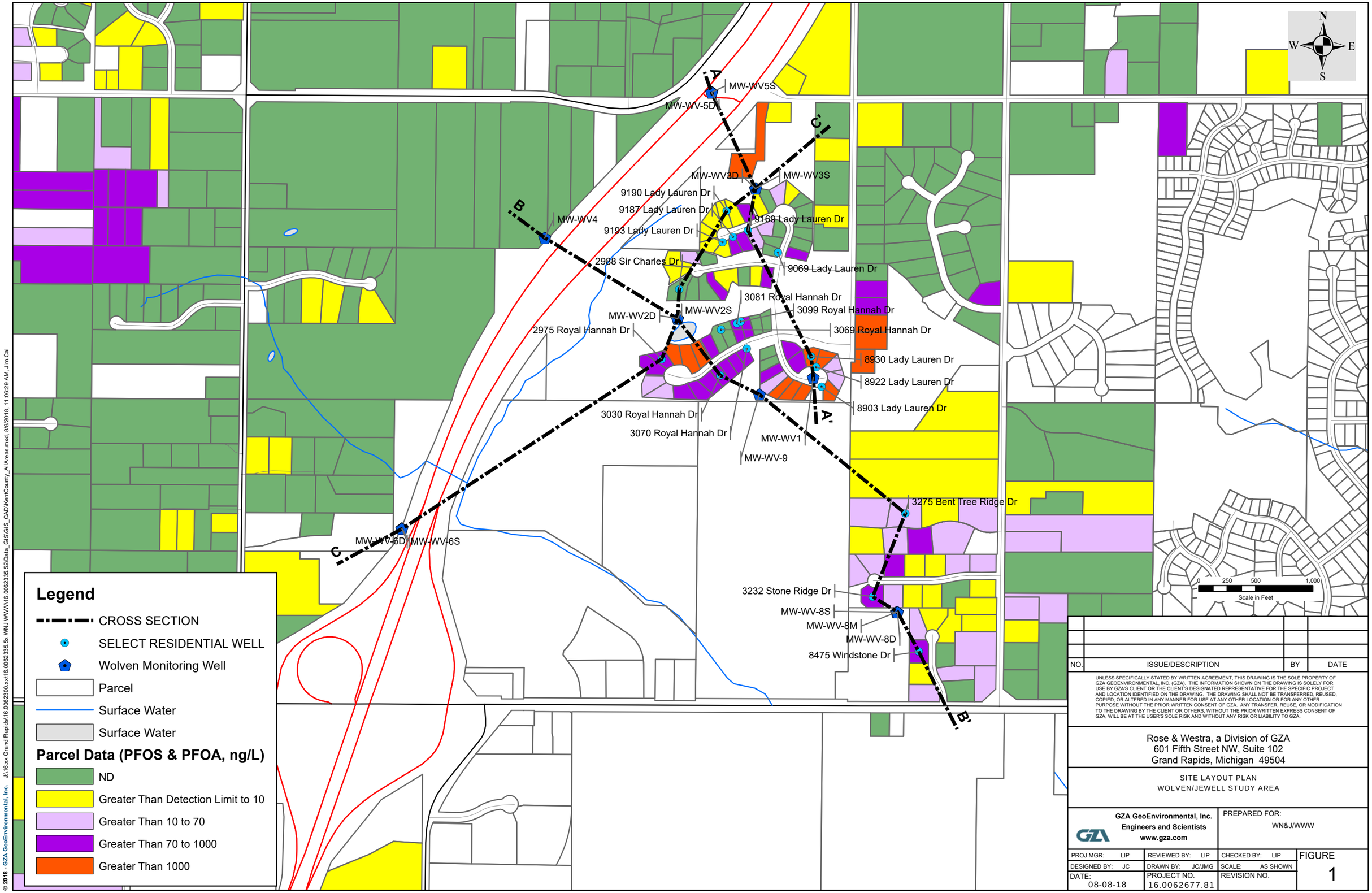
TABLE 5
SUMMARY OF GROUNDWATER SAMPLE ANALYSIS - INORGANIC
WOLVEN/JEWELL STUDY AREA
PLAINFIELD TOWNSHIP, MICHIGAN

LOCATION	PART 201 GENERIC RESIDENTIAL GROUNDWATER CLEANUP CRITERIA - DRINKING WATER	PART 201 GENERIC GROUNDWATER CLEANUP CRITERIA - GROUNDWATER SURFACE WATER INTERFACE	PART 201 GENERIC RESIDENTIAL GROUNDWATER CLEANUP CRITERIA - INDOOR INHDALATION	MW-WV-5D	MW-WV-5S	MW-WV-6D	MW-WV-6S	MW-WV-8D	MW-WV-8M	MW-WV-8S	MW-WV-9	WV-DUP-1
SAMPLE NAME				MW-WV-5D	MW-WV-5S	MW-WV-6D	MW-WV-6S	MW-WV-8D	MW-WV-8M	MW-WV-8S	MW-WV-9	WV-DUP-1
SAMPLE DATE				3/28/2018	3/28/2018	4/25/2018	4/25/2018	7/5/2018	7/5/2018	7/5/2018	7/5/2018	3/29/2018
LAB ID				TC30010-001	TC30010-003	TD28005-001	TD28005-002	TG07028-003	TG07028-002	TG07028-001	TG07028-004	TC30010-006
Parameter (ug/L)												
Antimony	6	130	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2
Arsenic	10	10	NA	<2	<2	<2	<2	**2.9**	<2	<2	<2	<2
Barium	2,000.00	NA	NA	**24**	**22**	**93**	**23**	**62**	**88**	**17**	**73**	**25**
Beryllium	4	NA	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Cadmium	5	NA	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Calcium	NA	NA	NA	96,000 S	**99,000**	61,000 S	**61,000**	**46,000**	150,000 S	**99,000**	**66,000**	**69,000**
Chloride	250,000.00	NA	NA	**42,000**	**36,000**	***310,000***	***430,000***	**38,000**	<1,000	**150,000**	**14,000**	**64,000**
Chromium	NA	NA	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5
Cobalt	40	100	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5
Copper	1,000.00	NA	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5
Iron	300	NA	NA	**250**	**200**	***360***	**110**	**260**	***500***	***360***	***1,500***	***400***
Lead	4	NA	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1
Magnesium	400,000.00	NA	NA	**30,000**	**30,000**	**32,000**	**17,000**	**16,000**	49,000 S	**30,000**	**27,000**	**22,000**
Mercury	2	0.0013	56	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Molybdenum	73	3,200.00	NA	<10	<10	<10	<10	**12**	<10	<10	**13**	<10
Nickel	100	NA	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5
Potassium	NA	NA	NA	**1,400**	**1,300**	**4,200**	**2,000**	**5,900**	**2,000**	**1,500**	**4,700**	**1,100**
Selenium	50	5	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5
Silver	34	0.2	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sodium	NA	NA	NA	**33,000**	**24,000**	210,000 S	**290,000**	**15,000**	230,000 S	**67,000**	**8,900**	**23,000**
Sulfate	250,000.00	NA	NA	**16,000**	**15,000**	**20,000**	**17,000**	**32,000**	**110,000**	**24,000**	**34,000**	**11,000**
Thallium	2	3.7	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vanadium	4.5	27	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5
Zinc	2,400.00	NA	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10
Alkalinity	NA	NA	NA	**350,000**	**340,000**	**350,000**	**350,000**	**170,000**	**310,000**	**300,000**	**310,000**	**230,000**
Nitrate-Nitrite (as N)	NA	NA	NA	**1,200**	**4,500**	**34**	**1,600**	**210**	5,600 B	4,500 B	<20	**2,100**
Nitrogen, Ammonia (As N)	NA	NA	NA	<100	<100	<100	<100	**460**	<100	<100	<100	<100

NOTES:
1. Concentration and criteria units are micro-grams per liter (ng/L) or parts per billion (ppt); "< RL" indicates the compound was analyzed for but not detected above the method detection limit; RL = Reporting Limit

2. Bold indicates that compound was detected above the RL. Italic number with thick line border or italic chemical indicates that compound was detected above the USEPA Health Advisory for Drinking Water Uses.

3. Michigan Part 201 groundwater cleanup criteria protective of drinking water uses were based on MDEQ 's Table 1, Groundwater: Residential and Nonresidential, Part 201 Generic Cleanup cCiteria and Screening Levels, June 2018.



Legend

- CROSS SECTION
- SELECT RESIDENTIAL WELL
- Wolven Monitoring Well
- Parcel
- Surface Water
- Surface Water

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

NO.	ISSUE/DESCRIPTION	BY	DATE

Rose & Westra, a Division of GZA
601 Fifth Street NW, Suite 102
Grand Rapids, Michigan 49504

SITE LAYOUT PLAN
WOLVEN/JEWELL STUDY AREA

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

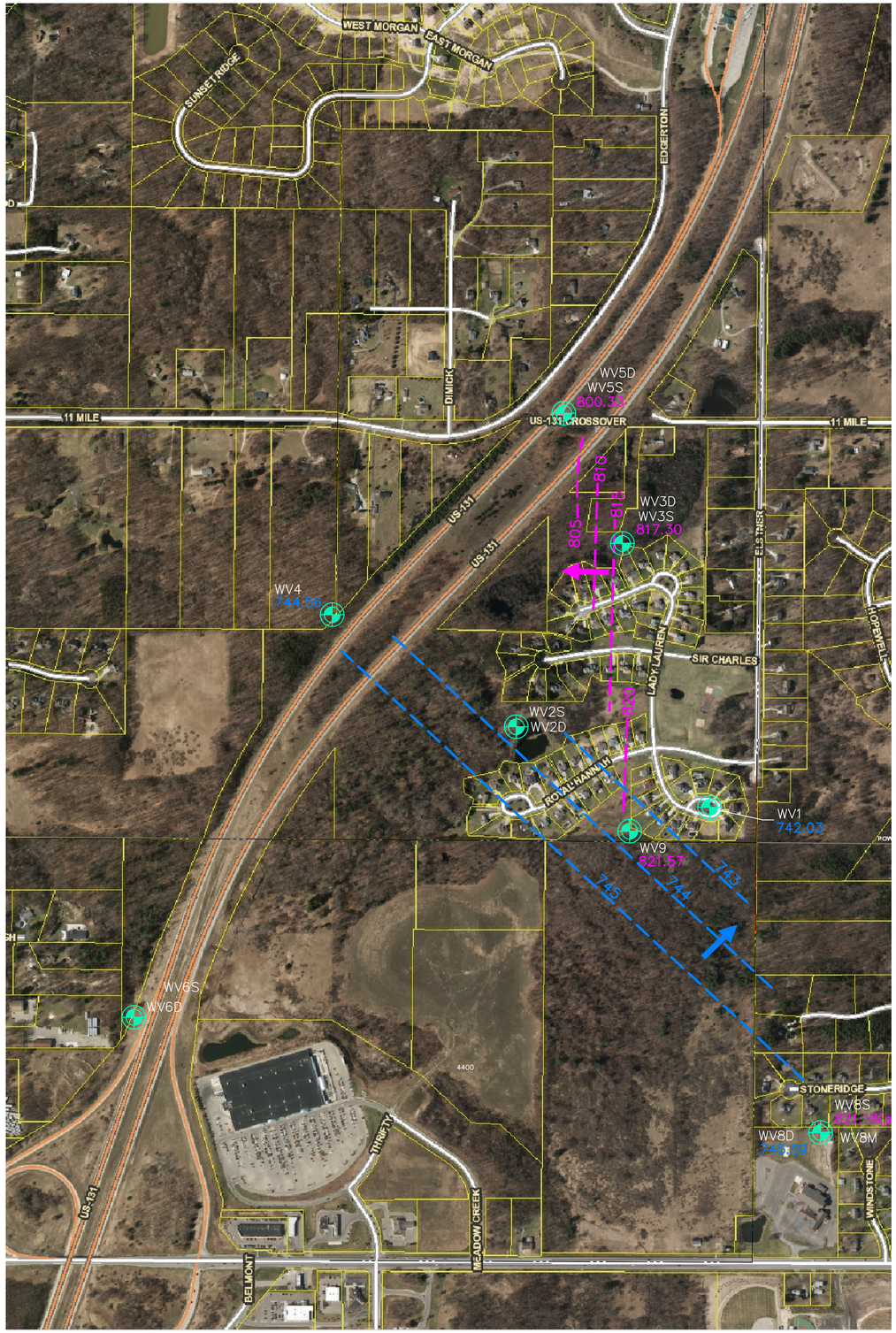
PREPARED FOR:
WN&J/WWW

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: LIP	FIGURE 1
DESIGNED BY: JC	DRAWN BY: JC/JMG	SCALE: AS SHOWN	
DATE: 08-08-18	PROJECT NO. 16.0062677.81	REVISION NO.	

J:\16.xx Grand Rapids\16.0062300.xx\16.0062335.5x WNJ WWW\16.0062335.52\Data_GIS\GIS_CAD\KentCounty_AllAreas.mxd, 8/8/2018, 11:06:29 AM, Jim.Cai

WELLINGTON RIDGE AREA WELLS W/ SECTION CUTS

SCALE: 1" = 400'



GROUNDWATER CONTOURS BASED ON AUG. 2018 MEASUREMENTS

SCALE: 1" = 400'

LEGEND

= APPROX. DIRECTION OF GROUNDWATER FLOW (SHALLOW AQUIFER)

= APPROX. DIRECTION OF GROUNDWATER FLOW (DEEP AQUIFER)

DRAWN BY	KJB	DESIGN BY	LMN	DATE	8/2/18

FILE NO.: 62677.81_SECT

NO.	BY	DATE	REVISIONS
			REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS

WNJ/WWW
WOLVEN/JEWELL
AUG. 10th PROGRESS REPORT

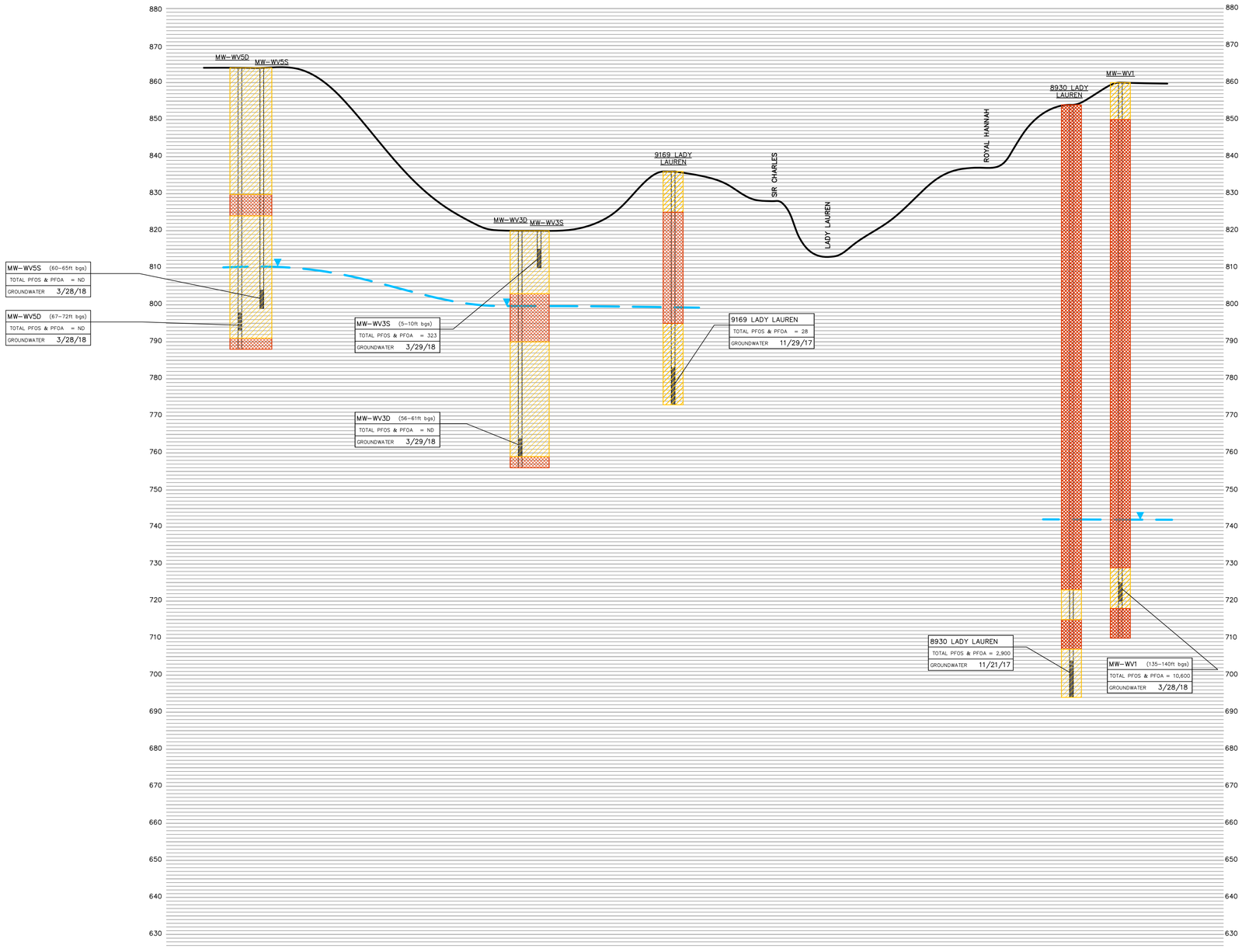
ROSE & WESTRA
A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL- ENVIRONMENTAL- ECOLOGICAL- WATER- CONSTRUCTION MANAGEMENT

PROJECT NO.
16.0062677.81

SHEET NO.
2

NORTHWEST
WVA

SOUTHEAST
WVA'



GEOLOGY LEGEND
(SIMPLIFIED)

= SAND AND/OR SAND/GRAVEL (MORE PERVIOUS MATERIALS)

= CLAY, SILT, SILTY CLAY AND/OR SANDY CLAY (LESS PERVIOUS MATERIALS)

NORTHWEST–SOUTHEAST GEOLOGIC CROSS–SECTION WVA–WVA' W/ PFOS and PFOA DATA

HORIZONTAL SCALE: 1" = 175'
VERTICAL SCALE: 1" = 15'

DRAWN BY KJB | DESIGN BY LMN | DATE 8/7/18

FILE NO.: 626778I_SECT

NO.	REVISIONS	BY	DATE
	REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS		

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WOLVEN/JEWELL
AUG. 10th PROGRESS REPORT

ROSE & WESTRA
A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL- ENVIRONMENTAL- ECOLOGICAL- WATER- CONSTRUCTION MANAGEMENT

PROJECT NO.
16.0062677.81

SHEET NO.
3

NORTHWEST

WVB

SOUTHEAST

WVB'

880 870 860 850 840 830 820 810 800 790 780 770 760 750 740 730 720 710 700 690 680 670 660 650 640 630 620 610

MW-WV4

US-131 (SOUTHBOUND)

US-131 (NORTHBOUND)

MW-WV2D MW-WV2S

3003 ROYAL HANNAH

3030 ROYAL HANNAH

MW-WV9

3275 BENT TREE RIDGE

3232 STONE RIDGE

MW-WV8D MW-WV8M MW-WV8S

8475 WIND STONE

MW-WV4 (130-135ft bgs)
TOTAL PFOS & PFOA = ND
GROUNDWATER 5/23/18

MW-WV2S (20-25ft bgs)
TOTAL PFOS & PFOA = 3,520
GROUNDWATER 3/29/18

MW-WV2D (30-35ft bgs)
TOTAL PFOS & PFOA = 1,034
GROUNDWATER 3/29/18

3003 ROYAL HANNAH
TOTAL PFOS & PFOA = 9,500
GROUNDWATER 11/15/17

MW-WV9 (92.3-97.3ft bgs)
TOTAL PFOS & PFOA = 1,080
GROUNDWATER 7/5/18

3030 ROYAL HANNAH
TOTAL PFOS & PFOA = 236.8
GROUNDWATER 11/15/17

3275 BENT TREE RIDGE
TOTAL PFOS & PFOA = 69
GROUNDWATER 11/20/17

3232 STONE RIDGE
TOTAL PFOS & PFOA = 92
GROUNDWATER 11/21/17

MW-WV8S (30-35ft bgs)
TOTAL PFOS & PFOA = 92
GROUNDWATER 7/5/18

MW-WV8M (60-65ft bgs)
TOTAL PFOS & PFOA = 32.5
GROUNDWATER 7/5/18

MW-WV8D (115-120ft bgs)
TOTAL PFOS & PFOA = 4.8
GROUNDWATER 7/5/18

8475 WIND STONE
TOTAL PFOS & PFOA = 84.2
GROUNDWATER 11/20/17

GEOLOGY LEGEND
(SIMPLIFIED)

= SAND AND/OR SAND/GRAVEL (MORE PERVIOUS MATERIALS)

= CLAY, SILT, SILTY CLAY AND/OR SANDY CLAY (LESS PERVIOUS MATERIALS)

NORTHWEST-SOUTHEAST GEOLOGIC CROSS-SECTION WVB-WVB'
W/ PFOS and PFOA DATA

HORIZONTAL SCALE: 1" = 175'
VERTICAL SCALE: 1" = 15'

DRAWN BY KJB | DESIGN BY LMN | DATE 8/7/18

FILE NO.: 626778I_SECT

NO.	BY	DATE	REVISIONS
			REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS

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A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL- ENVIRONMENTAL- ECOLOGICAL- WATER- CONSTRUCTION MANAGEMENT

PROJECT NO.
16.0062677.81

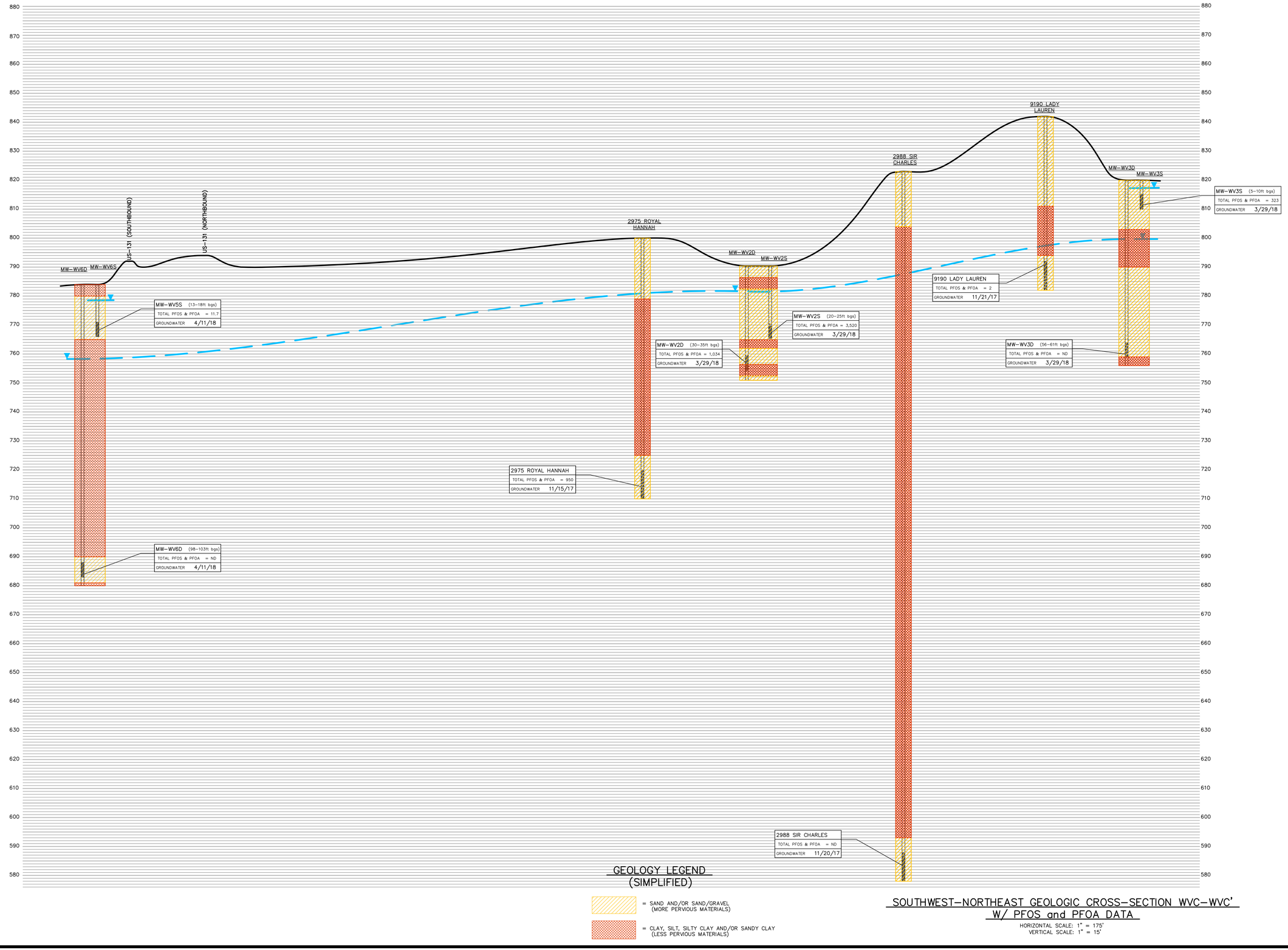
SHEET NO.
4

SOUTHWEST

WVC

NORTHEAST

WVC'



GEOLOGY LEGEND
(SIMPLIFIED)

= SAND AND/OR SAND/GRAVEL (MORE PERVIOUS MATERIALS)

= CLAY, SILT, SILTY CLAY AND/OR SANDY CLAY (LESS PERVIOUS MATERIALS)

SOUTHWEST-NORTHEAST GEOLOGIC CROSS-SECTION WVC-WVC'
W/ PFOS and PFOA DATA

HORIZONTAL SCALE: 1" = 175'
VERTICAL SCALE: 1" = 15'

DRAWN BY KJB | DESIGN BY LMN | DATE 8/1/18

FILE NO.: 626778I_SECT

NO.	BY	DATE	REVISIONS
			REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS

WNJ/WWW
WOLVEN/JEWELL
AUG. 10th PROGRESS REPORT

ROSE & WESTRA
A DIVISION OF GZA
Grand Rapids, Michigan
GEOTECHNICAL- ENVIRONMENTAL- ECOLOGICAL- WATER- CONSTRUCTION MANAGEMENT

PROJECT NO.
16.0062677.81

SHEET NO.
5

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV1
Page: 1 **of** 5
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: SAC / JTM
Date Start/Finish: 1-29-18 / 2-5-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

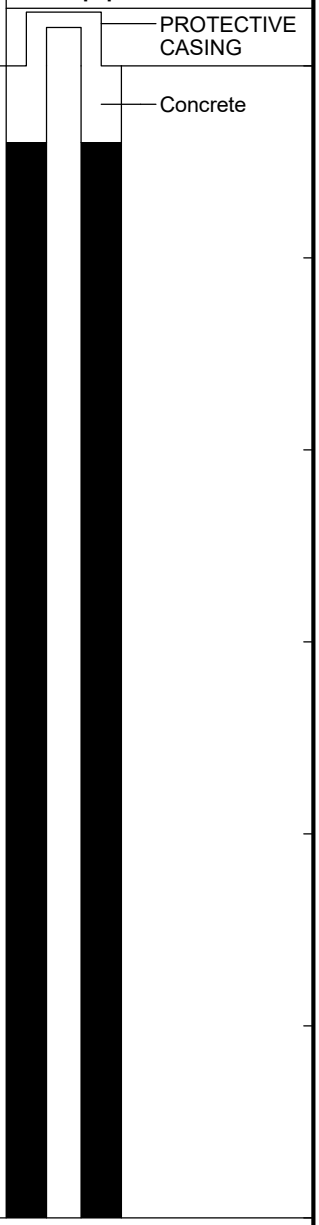
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/24	0-2	8-7 3-3	ND	SAND, TOPSOIL and ORGANIC MATTER (roots)(FILL). Changing at 0.2 feet to: Loose, orange, fine SAND, moist (FILL).	0.2' SAND / TOPSOIL / ORGANIC MATTER (FILL)	1
2	2	24/18	2-4	4-3 3-4	ND	Loose, brown, SILT and SAND, moist.	2' SAND (FILL)	
3							SAND	
4	3	24/24	4-6	2-2 2-2	ND	Very loose, brown, fine SAND, some Silt, moist.		
6	4	24/24	6-8	6-9 11-15	ND	Medium dense, brown, fine SAND, some Silt, trace small Gravel, dry.		
8	5	24/24	8-10	4-7 10-3	ND	Medium dense, brown, fine SAND, some Silt, trace small Gravel, dry. (1.0 inch Gravel at 9.0 feet)		
10	6	24/24	10-12	2-4 10-12	ND	Medium dense, brown, SILT, some fine Sand, trace Gravel, dry.	10' SILT	
12	7	24/24	12-14	2-4 14-17	ND	Medium dense, brown, SILT, some fine Sand, trace Gravel, Iron staining in fractures, dry.		
14	8	24/24	14-16	6-12 20-21	ND	Dense, brown, SILT, some fine Sand, trace Gravel, Iron staining in fractures, dry.		
16	9	24/24	16-18	6-10 15-19	ND	Medium dense, brown, SILT, some fine Sand, trace Gravel, Iron staining in fractures, dry.		
18	10	24/24	18-20	3-8 15-17	ND	Medium dense, brown, SILT, some fine Sand, trace Gravel, dry. (1.0 inch Gravel at 19.0 feet)		
20	11	24/24	20-22	4-13 16-18	ND	Medium dense, brown, SILT, some fine Sand, trace Gravel, Iron staining in fractures, dry.		
22	12	24/24	22-24	28-10 19-20	ND	Medium dense, brown grading to grayish brown at 23.5 feet, SILT, some very fine Sand, trace Gravel, dry.		
24	13	24/24	24-26	5-8 11-12	ND	Medium dense, grayish brown, SILT, some fine Sand (Gray, Clay from 24.5 to 24.75 feet, dry).		
26	14	24/24	26-28	5-7 11-13	ND	Medium dense, gray, SILT, some Clay, trace fine Sand, trace Gravel, dry.		
28	15	24/24	28-30	3-4 6-7	ND	Medium dense, gray, SILT, some Clay, moist to wet.		
29								

Equipment Installed



REMARKS

1. Field screeing of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV1

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV1
Page: 2 **of** 5
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
31	16	24/24	30-32	2-3 6-0	ND	Loose, gray, SILT, some Clay, moist.	SILT	2	
32 33	18	24/0	32-34	27-37 41-27	-	Rock stuck in tip of split spoon.			
34 35	19	24/24	34-36	2-5 12-12	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
36 37	20	24/24	36-38	4-7 11-12	ND	Medium dense, gray, SILT, some Clay, moist. (1.0 inch Gravel at 36.5 feet)			
38 39	21	24/24	38-40	3-9 12-13	ND	Medium dense, gray, SILT, some Clay, some Gravel, moist.			
40 41	22	24/24	40-42	5-9 11-16	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
42 43	23	24/24	42-44	4-8 10-13	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist. (Sand from 43.0 to 43.25 feet)			
44 45	24	24/24	44-46	5-11 15-18	ND	Medium dense, gray, SILT, some Clay, trace Gravel. (1.0-inch Sand seam at 45.0 feet)			
46 47	25	24/24	46-48	4-7 14-15	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
48 49	26	24/24	48-50	6-4 14-15	ND	Medium dense, gray, SILT, some Clay, moist. (very moist to wet ground Rock at 49.0 feet)			
50 51	27	24/24	50-52	2-2 5-9	ND	Loose, gray, SILT, some Clay, trace Gravel, moist. (very moist Sand seams from 51.0 to 51.2 feet)			
52 53	28	24/24	52-54	2-8 11-14	ND	Medium dense, gray, SILT, some Clay, moist. (trace Gravel at 53.5 feet)			
54 55	30	24/24	54-56	6-10 14-15	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
56 57	31	24/24	56-58	5-8 14-16	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
58 59	32	24/24	58-60	5-11 16-17	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
60 61	33	24/24	60-62	3-8 13-13	ND	Loose, gray, SILT, some Clay, trace Gravel, moist.			
62 63	34	24/24	62-64	5-7 14-15	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
64	35	24/24	64-66	6-11 15-18	ND	Medium dense, gray, SILT, some Clay,			Bentonite Grout

REMARKS

2. Groundwater was encountered at approximately 31.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV1

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV1
Page: 3 **of** 5
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
66	36	24/24	66-68	4-10 14-15	ND	trace Gravel, moist. Changing at 64.5 feet to: Gray, SILT, some Clay, trace Gravel, moist.	SILT		
67						Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
68	37	24/24	68-70	4-5 11-14	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
69									
70	38	24/24	70-72	6-12 10-21	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
71									
72	39	24/24	72-74	5-8 22-17	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist. (loose, wet seam at 73.0 feet)			
73									
74	40	24/24	74-76	12-20 21-24	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
75									
76	41	24/24	76-78	6-11 16-22	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
77									
78	42	24/24	78-80	5-13 17-20	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
79									
80	43	24/24	80-82	8-12 15-21	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
81									
82	44	24/24	82-84	4-9 13-18	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
83									
84	45	24/24	84-86	6-13 17-26	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
85									
86	46	24/24	86-88	7-14 22-28	ND	Dense, gray, SILT, some Clay, trace Gravel, moist. (1.0-inch Gravel at 87.5 feet)			
87									
88	47	24/24	88-90	7-15 28-27	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
89									
90	48	24/24	90-92	10-18 26-29	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
91									
92	49	24/12	92-94	8-16 24-31	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
93									
94	50	24/24	94-96	11-27 33-37	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
95									
96	51	24/24	96-98	10-24 36-39	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
97									
98	52	24/24	98-100	7-17 26-27	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
99									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV1
Page: 4 **of** 5
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
101	53	24/24	100-102	8-20 25-28	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.	SILT		
102 103	54	24/24	102-104	10-21 27-39	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
104 105	55	24/21	104-106	8-17 23-27	ND	Dense, gray, SILT, some Clay, trace Gravel, moist. (0.5-inch sand seam at 105.3 feet)			
106 107	56	24/24	106-108	9-18 27-35	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
108 109	58	24/12	108-110	10-28 36-45	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
110 111	59	24/24	110-112	15-23 31-47	ND	Very dense, gray, SILT, some Clay, trace Gravel, moist.			
112 113	60	24/24	112-114	10-22 29-44	ND	Very dense, gray, SILT, some Clay, trace Gravel, moist.			
114 115	61	24/24	114-116	7-24 27-35	ND	Very dense, gray, SILT, some Clay, trace Gravel, moist. (1.0 inch gravel piece at 115.0 feet)			
116 117	62	24/24	116-118	18-28 34-40	ND	Very dense, gray, SILT, some Clay, trace Gravel, moist.			
118 119	63	24/18	118-120	10-12 15-27	ND	Medium dense, gray, SILT, some Clay, trace Gravel, moist.			
120 121	64	24/24	120-122	14-23 27-35	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
122 123	65	24/24	122-124	13-19 25-32	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
124 125	65	24/24	124-126	9-14 21-27	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
126 127	66	24/24	126-128	11-15 22-30	ND	Dense, gray, SILT, some Clay, trace Gravel, moist.			
128 129	67	24/24	128-130	6-10 16-24	ND	Medium dense, grayish brown, SILT, some Clay, little fine Sand, trace Gravel, moist. Changing at 129.0 feet to: Grayish brown,			2--Inch PVC Riser
130 131	68	24/24	130-132	6-8 9-9	ND	SILT, some Clay, little fine Sand, trace Gravel, moist to wet.	131'		
132 133	70	24/0	132-134	6-7 8-11	-	Medium dense, grayish brown, SILT, some Clay, little fine Sand, trace Gravel, moist to wet. Changing at 131.0 feet to: Tan, fine SAND, wet.	SAND		
134	71	24/12	134-136	18-25 42-50	ND	NO RECOVERY. Very dense, tan, fine SAND, wet.			

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV1
Page: 5 **of** 5
File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
136	72	24/24	136-138	4-50/3"	ND	Very dense, tan, fine SAND, wet.	SAND		Filter Sand
137									
138									2-Inch PVC Well Screen
139									
140	73	24/12	140-142	42-50/5"	3.2 ppmv	Very dense, Grayish brown, well sorted, fine to medium SAND, trace Silt, trace Clay, moist to wet.			
141									
142	74	24/18	142-144	23-37 20/6"--	3.4 ppmv	Hard, dark gray, SILT & CLAY, trace Sand, trace Gravel, moist.	142' SILT & CLAY		
143									
144	75	24/18	144-146	22-41-50->50	4.1 ppmv	Hard, dark gray, SILT & CLAY, trace Sand, trace Gravel, moist.			
145									
146									
147									
148	76	24/18	148-150	23-31-50->50	4.3 ppmv	Hard, dark gray, poorly sorted, SILT & CLAY, trace Sand, trace Gravel, plastic, cohesive, moist.	150'		
149									
150						Bottom of Borehole at 150.0 Feet		3	
151									
152									
153									
154									
155									
156									
157									
158									
159									
160									
161									
162									
163									
164									
165									
166									
167									
168									
169									

REMARKS

3. Monitoring well was installed in borehole upon completion. Well screen set from 135.0 to 140.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV2
Page: 1 **of** 2
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 2-14-18 / 2-14-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

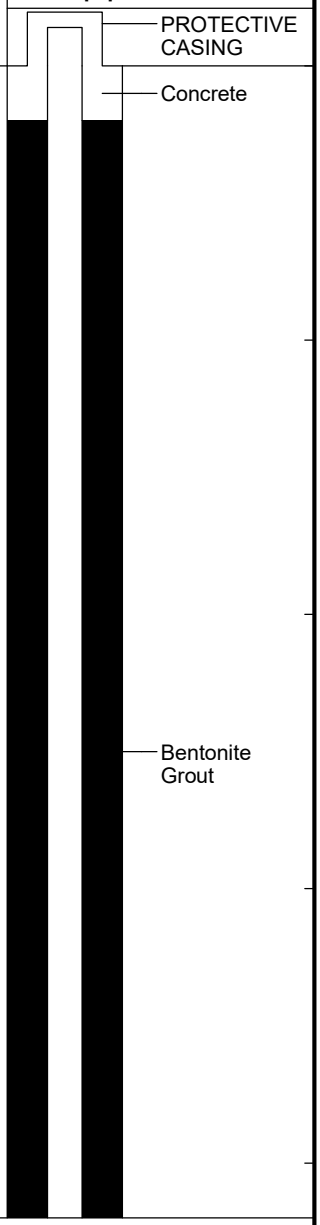
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/24	0-2	1-1 1-1	ND	Very loose, black, fine to medium SAND and SILT, trace Clay.	SAND and SILT	1
2	2	24/18	2-4	1-1 1-1	ND	Very loose, black, fine to medium SAND and SILT, some Wood Fragments.		
4	3	24/4	4-6	0-1 1-1	ND	Very loose, black, SILT and fibrous PEAT.	4' SILT and PEAT	
6	4	24/12	6-8	0-0 1-1	ND	Very loose, black, SILT and fibrous PEAT, wet.		
8	5	24/18	8-10	1-0 1-1	ND	Very loose, brown, fine SAND, some Silt, wet.	8' SAND and SILT	
10	6	24/18	10-12	2-2 1-1	ND	Very loose, brown, fine SAND and SILT, wet.		
12	7	24/24	12-14	1-4 4-4	ND	Loose, brown, fine to medium SAND and SILT, some Gravel, Some Clay lenses, wet.		2
14	8	24/17	14-16	1-2 3-2	ND	Loose, brown, fine to medium SAND and SILT, some Gravel, wet.		
16	9	24/12	16-18	1-1 3-3	ND	Loose, brown, fine SAND and SILT, wet.		
18	10	24/18	18-20	1-2 2-3	ND	Loose, brown, fine SAND and SILT, trace Clay, wet.		
20	11	24/12	20-22	1-2 2-2	ND	Loose, brown, fine SAND and SILT, trace Clay, wet.		

Equipment Installed



REMARKS

1. Field screeing of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).
2. A groundwater sample was collected from a temporary monitoring with a well screen set at approximately 13.0 to 18.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV2

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV2
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File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
							SAND and SILT		
22–23	12	24/12	22-24	1-1 1-1	ND	Very loose, brown, fine SAND and SILT, wet.			
24–25	13	24/24	24-26	2-3 2-3	ND	Loose, brown, fine to medium SAND and SILT, wet. Changing at 25.5 feet to: Tan, CLAY, wet.			
							25.5' CLAY		2-Inch PVC Riser
26–27	14	24/18	26-28	2-2 2-2	ND	Soft, tan, CLAY, wet (CL).			
28–29	15	24/12	28-30	2-3 11-10	ND	Stiff, tan, CLAY, wet. Changing at 28.5 feet to: Fine to coarse SAND and GRAVEL, wet.	28.5' SAND and GRAVEL	3	Bentonite
30–31	16	24/0	30-32	8-17 18-21	ND	NO RECOVERY.		4	
32–33	17	24/13	32-34	6-8 9-12	ND	Medium dense, brown, fine to coarse SAND and Gravel, trace Silt, wet.			Filter Sand 2-Inch PVC Well Screen
34–35	18	24/6	34-36	7-9 10-21	ND	Medium dense, gray, SILT, trace fine to medium Sand, wet.	34' SILT		
36–37	19	24/15	36-38	10-16 22-45	ND	Hard, gray, CLAY, some Silt, some fine to medium Sand, wet.	36' CLAY		Bentonite and Sand
38–39	20	18/18	38-39.5	12-32-75/6"	ND	Very dense, gray, fine to medium SAND and SILT, some Gravel, wet (GLACIAL TILL).	38' SAND (GLACIAL TILL)		
							39.5'		
40–45						Bottom of Borehole at 39.5 Feet			

REMARKS

3. Gravel stuck in tip of split spoon.
4. Groundwater sample was collected from temporary monitoring well with screen set at approximately 31.0 to 36.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV2

BORING_WELL_6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV2S
Page: 1 **of** 1
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse
Date Start/Finish: 2-14-18 / 2-14-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

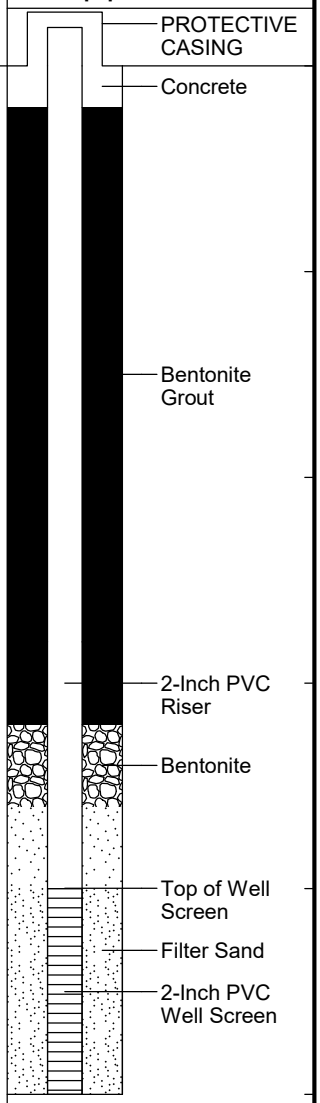
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–24						See MW-WV2 boring log for soil descriptions.		
25						Bottom of Borehole at 25.0 Feet		1
26–27								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 20.0 to 25.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV2S

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV3
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File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: John Morehouse/Anthony Leonido
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

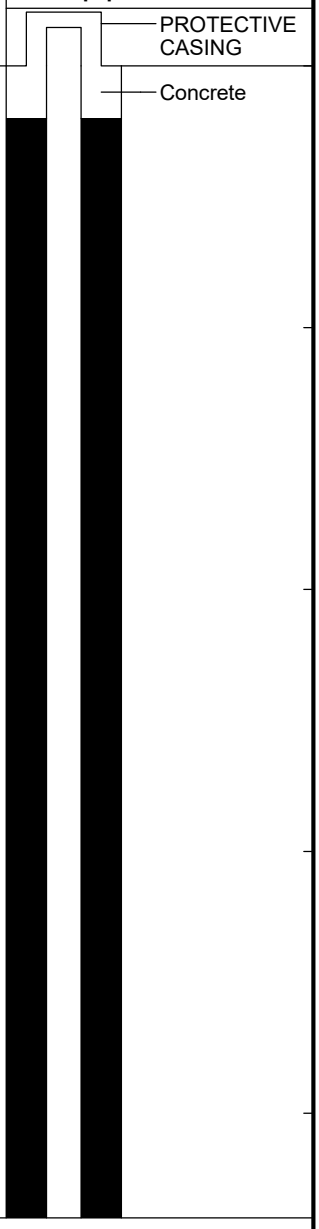
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Info: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/24	0-2	1-1 3-3	ND	Very loose, dark brown, fine to medium SAND, little Clay, little Silt, little Organic Matter (wood, leaves), moist. Changing at 0.3 feet to: Brown, fine to medium SAND, little Silt, moist. Changing at 1.5 feet to: Brown and gray, CLAY & SILT, little fine to medium Sand, trace Organic Matter (roots), moist. Changing at 1.8 feet to: Brown, fine to medium SAND, trace Silt, wet.	SAND 1.5' 1.8' CLAY & SILT SAND	1
2	2	24/19	2-4	3-4 5-6	ND			2
3	3	24/15	4-6	1-1 2-2	ND	Loose, brown, fine to medium SAND, trace Silt, wet. Very loose, gray, fine to medium SAND, trace Silt, trace fine Gravel, wet.		3
6	4	24/16	6-8	0-1 1-2	ND	Very loose, brown, fine to medium SAND, trace Silt, trace Organic Matter (wood fragments, leaves), trace Hair, wet.		
8	5	24/19	8-10	0-0 1-1	ND	Very loose, brown, fine to medium SAND, trace Silt, trace Organic Matter (leaves), trace Hair, wet.		
10	6	24/21	10-12	2-3 3-3	ND	Loose, gray, fine to medium SAND, trace Silt, wet.		
12	7	24/16	12-14	0-1 1-2	ND	Very loose, brown, fine to medium SAND, trace Silt, trace fine Gravel, wet.		
14	8	24/16	14-16	2-3 3-4	ND	Loose, brown, fine to medium SAND, trace Silt, wet.		4
16	9	24/24	16-18	4-6 9-10	ND	Medium dense, fine to medium SAND, trace Silt, wet. Changing at 17.0 feet to: Gray, Silty CLAY, trace fine to coarse Sand, moist.	17' Silty CLAY	
18	10	24/18	18-20	4-8 8-9	ND	Very stiff, gray, Silty CLAY, trace fine to coarse Sand, moist.		
20	11	24/18	20-22	4-8 9-9	ND	Very stiff, gray, SILT, trace Gravel, trace Clay, wet.		

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 2000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).
2. Groundwater was encountered at approximately 1.8 feet below ground surface.
3. A groundwater sample was collected from a temporary well with a well screen set at approximately 5.0 to 10.0 feet below ground surface and submitted for laboratory analytical testing.
4. A groundwater sample was collected from a temporary well with a well screen set at approximately 15.0 to 20.0 feet below ground surface and submitted for laboratory analytical testing.

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Boring No.: MW-WV3

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV3
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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
23	12	24/18	22-24	3-5 6-9	ND	Stiff, gray, Silty CLAY, trace fine Sand, wet.	Silty CLAY		
24 25	13	24/18	24-26	3-8 9-10	ND	Very stiff, brown to gray bands, Silty CLAY, trace fine Sand, wet.			Bentonite Grout
26 27	14	24/17	26-28	5-6 9-7	ND	Stiff, gray, SILT, trace medium Sand, wet.	26' SILT		
28 29	15	24/15	28-30	2-3 4-4	ND	Loose, gray, fine SAND and SILT, trace Clay, wet.	28' SAND and SILT		
30 31	16	24/8	30-32	1-2 2-3	ND	Very loose, brown, fine SAND, trace Silt, wet.	30' SAND		
32 33	17	24/8	32-34	1-2 2-4	ND	Very loose, brown, fine SAND, trace Silt, wet.			
34 35	18	24/12	34-36	1-3 3-5	ND	Loose, brown, fine SAND, trace Silt, wet.		5	
36 37	19	24/9	36-38	1-2 4-5	ND	Loose, brown, fine SAND, trace Silt, wet.			
38 39	20	24/10	38-40	1-1 2-6	ND	Very loose, brown, fine to medium SAND, trace Silt, wet.			
40 41	21	24/11	40-42	3-8 10-11	ND	Medium dense, brown, fine SAND, trace Gravel, trace Silt, wet.			
42 43	22	24/12	42-44	15-19 21-20	ND	Dense, brown, fine to medium SAND, trace Silt, wet.			
44 45	23	24/15	44-46	6-14 21-25	ND	Dense, brown, fine to medium SAND, trace Silt, wet.		6	
46 47	24	24/20	46-48	4-16 23-24	ND	Dense, brown, fine to medium SAND, trace Silt, wet.			

REMARKS

5. A groundwater sample was collected from a temporary well with a well screen from approximately 34.0 to 39.0 feet below ground surface and submitted for laboratory analytical testing.
6. A groundwater sample was collected from a temporary well with a well screen from approximately 44.0 to 49.0 feet below ground surface and submitted for laboratory analytical testing.

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV3
Page: 3 **of** 3
File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
48	25	24/15	48-50	4-8 11-15	ND	Medium dense, brown, fine SAND, wet.	SAND		
49									
50	26	24/15	50-52	8-18 22-35	ND	Dense, fine to medium SAND, trace Silt, wet.			2-Inch PVC Riser
51									
52	27	24/20	52-54	4-9 21-29	ND	Dense, brown, fine SAND, trace Silt, wet.			Bentonite
53									
54	28	24/20	54-56	2-6 17-21	ND	Medium dense, brown, fine to medium SAND, trace Silt, wet.		7	
55									
56	29	24/3	56-58	3-8 12-15	ND	Medium dense, gray and brown, fine to coarse SAND and GRAVEL, wet.	56' SAND and GRAVEL	8	Filter Sand
57									
58	30	24/12	58-60	3-4 13-16	ND	Medium dense, brown, fine to coarse SAND and GRAVEL, wet.			2-Inch PVC Well Screen
59									
60	31	24/18	60-62	4-6 8-9	ND	Medium dense, brown, fine to coarse SAND and Gravel, trace Silt, wet. Changing at 61.0 feet to: Tan, CLAY, wet.	61' CLAY		
61									
62	32	24/20	62-64	8-11 11-12	ND	Very stiff, tan, CLAY, wet.			Bentonite and Sand
63									
64						Bottom of Borehole at 64.0 Feet	64'	8	
65									
66									
67									
68									
69									
70									
71									
72									
73									

REMARKS

7. A groundwater sample was collected from a temporary well with a well screen from approximately 54.0 to 59.0 feet below ground surface and submitted for laboratory analytical testing.
8. Gravel stuck in tip of split spoon.

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Boring No.: MW-WV3

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV3S
Page: 1 **of** 1
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Anthony Leonido
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

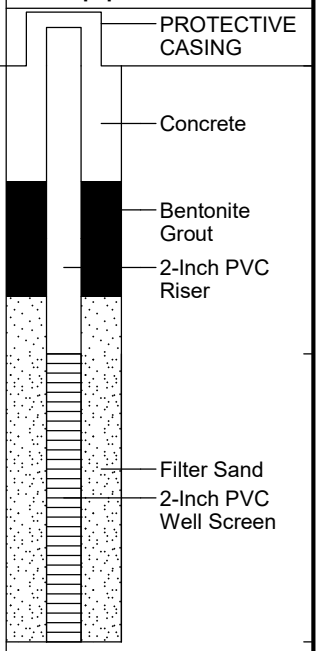
	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1–10						See MW-WV3 boring log for soil descriptions.			
10						Bottom of Borehole at 10.1 Feet		1	



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 5.0 to 10.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV3S

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
Page: 1 of 6
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Anthony Leonido
Date Start/Finish: 3-12-18 / 3-12-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
3/16/18	1600	84.0'	Open	

Surveyed By: NA **Survey Date:**

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/24	0-2	1-1 1-1	ND	TOPSOIL. Changing at 0.5 feet to: Very loose, brown and black, fine to medium SAND and SILT, dry.	0.5' TOPSOIL (LOAM) SAND and SILT	
4	2	24/18	4-6	1-1 2-3	0.1	Very loose, brown, fine SAND, little Silt, dry.		1
9	3	24/20	9-11	3-4 6-6	ND	Loose, brown, fine SAND, trace Silt, dry.	9' SAND	
13							13' SAND and SILT	
14	4	24/18	14-16	4-5 5-7	ND	Loose, brown, fine SAND, dry. Changing at 15.0 feet to: Tan, fine SAND and SILT, dry (SM).		
19	5	24/20	19-21	5-10 19-21	ND	Medium dense, brown, SILT, trace fine Sand, dry.	19' SILT	

Equipment Installed
PROTECTIVE CASING
Concrete

REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million per volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV4

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
Page: 2 **of** 6
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
23							SILT		
24	6	24/20	24-26	8-13 13-17	0.1	Medium dense, brown, fine SAND, trace Silt, dry.	24' SAND		
25									
26									
27									
28									
29	7	24/22	29-31	2-5 8-12	ND	Medium dense, brown, fine SAND, trace Silt, dry.			
30									
31									
32									
33									
34	8	24/20	34-36	3-10 14-15	ND	Medium dense, brown, fine SAND, trace Silt, dry.			
35									
36									
37									
38									
39	9	24/24	39-41	5-12 17-21	ND	Medium dense, brown, fine SAND, trace Silt, dry.			
40									
41									
42									
43									
44	10	24/22	44-46	8-21 22-30	ND	Dense, brown, fine SAND and fine GRAVEL, trace Silt.			
45									
46									
47									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
Page: 3 **of** 6
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
48							SAND		
49	11	24/21	49-51	3-11 22-28	ND	Dense, brown, fine to medium SAND and SILT, dry.	49' SAND and SILT		
50									
51									
52									
53									
54	12	11/11	54-54.9	16-50/5"	ND	Very dense, brown, fine SAND and SILT, some medium Gravel, dry.		2	
55									
56									
57									
58									
59	13	24/24	59-61	21-30 39-50	ND	Very dense, brown, fine to coarse SAND and SILT, trace medium Gravel, dry (GLACIAL TILL).	59' SAND and SILT (GLACIAL TILL)		
60									
61									Bentonite Grout
62									
63									
64	14	24/24	64-66	11-21 24-27	ND	Hard, gray, Silty CLAY, dry.	64' Silty CLAY		
65									
66									
67									
68									
69	15	24/19	69-71	19-43 38-46	ND	Very dense, gray, fine SAND and SILT with Clay lenses, trace medium Sand, dry (GLACIAL TILL).	69' SAND and SILT (GLACIAL TILL)		
70									
71									
72									
73									

REMARKS

2. Split spoon refusal at approximately 55.0 feet.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV4

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
Page: 4 **of** 6
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
74	16	24/24	74-76	8-14 24-31	ND	Dense, gray, fine to medium SAND and SILT, some Clay, damp (GLACIAL TILL).	SAND and SILT (GLACIAL TILL)		
75									
76									
77									
78									
79	17	18/18	79-80.5	13-27 37-0	ND	Dense, gray, fine to medium SAND and SILT, some Clay, damp (GLACIAL TILL).			
80									
81								4	
82									
83									
84	18	10/0	84-84.8	28-50/4"	ND	NO RECOVERY.		3	
85									
86									
87									
88									
89	19	24/24	89-91	8-13 19-25	ND	Dense, gray, fine SAND and SILT, some medium Gravel, moist (GLACIAL TILL).			
90									
91									
92									
93									
94	20	24/24	94-96	14-24 28-41	ND	Very dense, gray, fine SAND and SILT, some medium Gravel, moist (GLACIAL TILL).			
95									
96									
97									
98									

REMARKS

4. Split spoon refusal at approximately 80.5 feet.
3. Gravel stuck in tip of split spoon.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV4

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
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File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
	21	24/24	99-101	19-18 20-31	ND	Dense, gray, fine SAND and SILT, some medium Gravel, dry (GLACIAL TILL).	SAND and SILT (GLACIAL TILL)		
100									
101									
102									
103									
104	22	24/24	104-106	13-20 30-50	ND	Very dense, gray, fine SAND and SILT, some medium Gravel, dry (GLACIAL TILL).			
105									
106									
107									
108									
109	23	24/24	109-111	9-12 24-42	ND	Dense, gray, fine SAND and SILT, some medium Gravel, damp (GLACIAL TILL).			
110									
111									
112									
113									
114	24	24/24	114-116	9-17 28-41	ND	Dense, gray, fine SAND and SILT, some medium Gravel, damp (GLACIAL TILL).			
115									
116									
117									
118									
119	25	24/24	119-121	8-15 31-50	ND	Dense, gray, fine SAND and SILT, some medium Gravel, damp (GLACIAL TILL).			
120									
121									
122									2-Inch PVC Riser
123									
124	26	18/18	124-125.5	9-27-50/6"	10.7	Very dense, gray, fine SAND and SILT,		5	

REMARKS

5. Groundwater was encountered at approximately 123.5 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV4

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV4
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File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
125						some medium Gravel, damp, with green, fine Sand and Silt lenses and blue, fine Sand and Silt lenses, damp (GLACIAL TILL).	SAND and SILT (GLACIAL TILL)	6	Bentonite
126									
127									
128	27	15/12	128-129.3	15-35-50/3"	5.0	Very dense, brown, fine to medium SAND, trace Silt, wet, with layer of green, fine SAND.	128' SAND		
129									
130									Filter Sand
131									
132									
133							133' Silty SAND and CLAY		2-Inch PVC Well Screen
134	28	12/12	134-135	17-50+	ND	Very dense, red and green, fine Silty SAND, some Silty Clay, wet.			
135						Bottom of Borehole at 135.0 Feet	135'	7	
136									
137									
138									
139									
140									
141									
142									
143									
144									
145									
146									
147									
148									
149									
150									

REMARKS

6. A temporary well screen was set from 125.0 to 130.0 below ground surface. Groundwater sample was collected and submitted for laboratory analytical testing.
7. Monitoring well was installed in the borehole upon completion. Well screen set from 130.0 to 135.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV4

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV5D
Page: 1 **of** 3
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Joe Workman
Date Start/Finish: 3-14-18 / 3-14-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

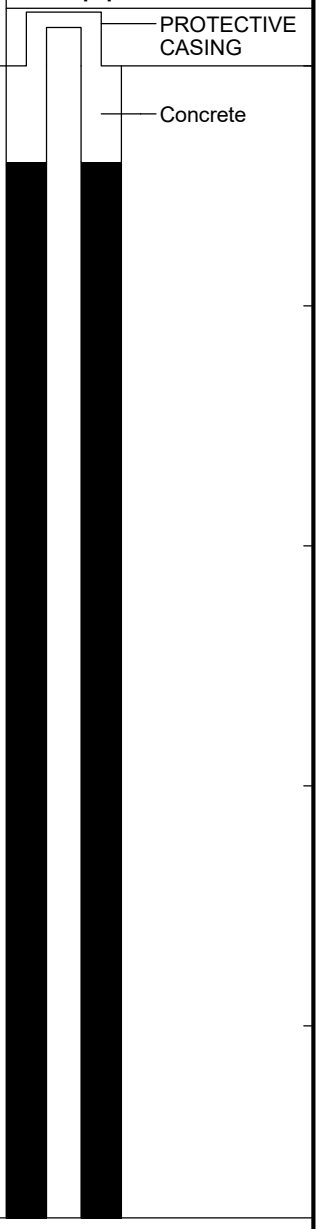
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
3/14/18	1005	64.4'	Top of PVC	

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/13	0-2	2-3 5-6	9.0	Loose, dark brown, fine to medium SAND, trace Organic Matter (roots), trace Clay, trace Silt, damp. Changing at 1.0 foot to: Brown, fine to medium SAND, trace Silt, damp.	SAND	1
2	2	24/11	2-4	3-4 4-5	3.0	Loose, brown, fine to medium SAND, trace Silt, damp (rock fragment in tip of spoon).		
4	3	24/21	4-6	2-2 3-3	10.0	Loose, tan, fine to medium SAND, trace Silt, damp.		
6	4	24/15	6-8	2-2 3-3	ND	Loose, brown, fine to medium SAND, trace fine to coarse Gravel, moist.		
8	5	24/18	8-10	2-2 3-4	ND	Loose, brown, fine to medium SAND, trace Silt, moist.		
10	6	24/22	10-12	3-2 2-2	3.0	Loose, brown, fine to medium SAND, trace Silt, moist.		
12	7	24/23	12-14	2-1 2-3	ND	Loose, brown, fine to medium SAND, trace Silt, moist.		
14	8	24/24	14-16	2-3 3-3	ND	Loose, tan, fine to medium SAND, trace Silt, moist. Changing at approximately 15.8 feet to: Loose, brown, fine to coarse SAND, trace Silt, moist.		
16	9	24/24	16-18	4-5 8-10	ND	Medium dense, brown, fine to medium SAND, trace Silt, damp.		
18	10	24/22	18-20	5-10 11-11	ND	Medium dense, brown, fine to coarse SAND, trace Silt, damp. Changing at approximately 19.7 feet to: Brown, fine to coarse SAND, trace Silt, damp.		
20	11	24/20	20-22	10-9 13-12	ND	Medium dense, brown, fine to medium SAND, trace Silt, damp. Changing at approximately 21.5 feet to: Medium dense, brown, fine to coarse SAND, trace fine to coarse Gravel, trace Silt, damp with 1.0 inch layer of CLAY and SILT at approximately 21.7 feet.		
22	12	24/20	22-24	4-5 10-9	ND	Medium dense, tan, fine to medium SAND,		

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV5D
Page: 2 **of** 3
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
25	13	24/21	24-26	5-5 9-13	ND	trace Silt, damp. Medium dense, tan, fine to medium SAND, trace Silt, damp.	SAND		
26 27	14	24/18	26-28	3-7 7-7	ND	Loose, brown, fine to coarse SAND, trace Silt, trace fine Gravel, damp. Changing at approximately 27.0 feet to: Medium dense, brown, fine to medium SAND, trace Silt,			
28 29	15	24/19	28-30	2-3 4-4	ND	damp. Loose, brown, fine to coarse SAND, trace fine Gravel, trace Silt, damp.			
30 31	16	24/17	30-32	2-3 4-4	ND	Loose, brown, fine to coarse SAND, trace fine Gravel, trace Silt, damp.			Bentonite Grout
32 33	17	24/19	32-34	2-2 2-2	ND	Loose, brown, fine to coarse SAND, trace fine Gravel, trace Silt, damp.		3	
34 35	18	24/24	34-36	2-3 4-7	ND ND	Loose, brown, fine to coarse SAND, trace fine Gravel, trace Silt, moist. Changing at approximately 34.2 feet to: Brown, Silty CLAY, little fine to coarse Sand, trace fine	34.2' Silty CLAY		
36 37	19	24/24	36-38	1-4 3-3	ND	Gravel, damp. Medium, brown, CLAY & SILT, some fine Sand, moist. Changing at approximately 36.4 feet to: Brown, fine to medium SAND,	36' CLAY & SILT	4	
38 39	20	24/20	38-40	1-2 5-5	ND	trace Silt, wet. Changing at approximately 36.6 feet to: Brown, CLAY & SILT, some fine to medium Sand, moist. Medium, brown, CLAY & SILT, some fine to			
40 41	21	24/24	40-42	4-9 9-11	ND	medium Sand, moist. Changing at approximately 39.2 feet to: Medium SAND, trace Silt, damp. Medium dense, brown, fine SAND, trace	40' SAND		
42 43	22	24/22	42-44	10-13 18-19	ND	Silt, wet. Medium dense, brown, fine SAND, trace Silt, wet.			
44 45	23	24/24	44-46	6-10 10-13	ND	Medium dense, brown, fine SAND, trace Silt, wet.			
46 47	24	24/20	46-48	5-12 17-22	ND	Medium dense, brown, fine SAND, trace Silt, wet.			
48 49	25	24/22	48-50	7-16 21-22	ND	Medium dense, brown, fine SAND, trace Silt, wet.			
50 51	26	24/24	50-52	10-11 16-21	ND	Medium dense, brown, fine SAND, trace Silt, wet.			

REMARKS

3. Driller noted some clay present in tip of spoon.
4. Groundwater was encountered at approximately 36.4 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV5D

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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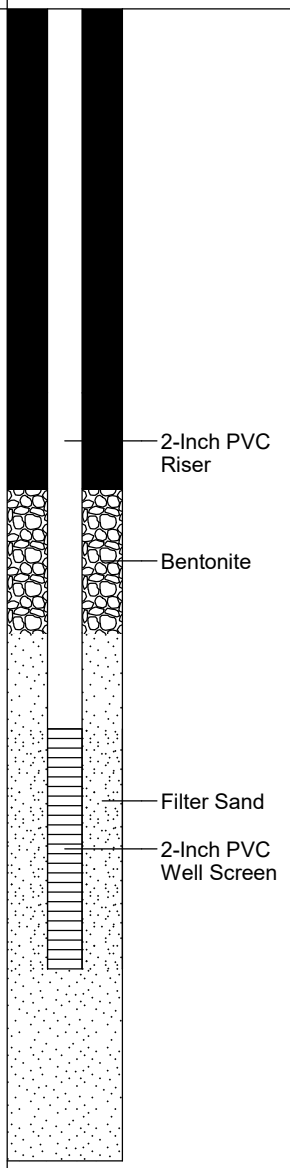
Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV5D
Page: 3 **of** 3
File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
53	27	24/24	52-54	4-11 14-14	ND	Medium dense, brown, fine SAND, trace Silt, wet.	SAND		
54	28	24/24	54-56	5-8 13-19	ND	Medium dense, brown, fine SAND, trace Silt, wet.			
56	29	24/24	56-58	3-5 13-27	ND	Medium dense, brown, fine SAND, trace Silt, wet.			
58	30	24/21	58-60	9-18 10-16	ND	Medium dense, brown, fine SAND, trace Silt, wet. Changing at approximately 58.5 feet to: Brown, fine to coarse SAND, some fine Gravel, wet.			
60	31	24/24	60-62	12-18 19-12	ND	Dense, brown, medium to coarse SAND, some fine Gravel, trace Silt, wet.			
62	32	24/15	62-64	2-3 6-9	ND	Loose, brown, medium to coarse SAND, some fine Gravel, trace Silt, wet.			
64	33	24/18	64-66	1-2 5-9	ND	Loose, brown and gray, fine SAND, trace Silt, wet.			
66	34	24/12	66-68	2-4 7-12	ND	Medium dense, brown and gray, fine SAND, trace Silt, wet.			
68	35	24/10	68-70	1-4 7-10	ND	Medium dense, brown and gray, fine SAND, trace Silt, wet.			
70	36	24/15	70-72	2-4 7-14	ND	Medium dense, brown and gray, fine SAND, trace Silt, wet.			
72	37	24/24	72-74	2-5 10-13	ND	Medium dense, brownish gray, fine SAND, trace Silt, wet. Changing at approximately 73.0 feet to: Brown, CLAY.	73' CLAY		
74	38	24/24	74-76	11-14 26-27	ND	Hard, brown, CLAY. Changing at approximately 75.5 feet to: Gray, CLAY.			
76						Bottom of Borehole at 76.0 Feet	76'	5	
77									
78									
79									



REMARKS

5. Monitoring well was installed in borehole upon completion. Well screen set from 67.0 to 72.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV5D

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV5S
Page: 1 **of** 2
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Joe Workman/Anthony Leonido
Date Start/Finish: 3-14-18 / 3-14-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

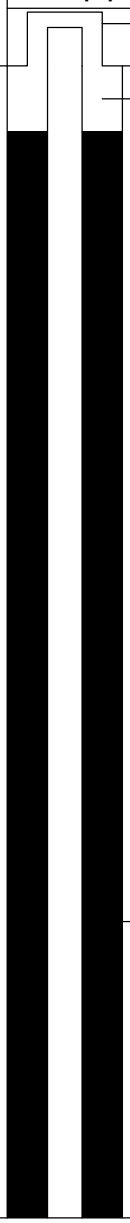
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1						See MW-WV5D boring log for soil descriptions.		

Equipment Installed



REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV5S

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV5S
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File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
36–75						Bottom of Borehole at 65.0 Feet		1	2-Inch Riser; Bentonite; Filter Sand; 2-Inch PVC Well Screen

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 60.0 to 65.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV5S

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV6D
Page: 1 **of** 3
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Huntoon
Logged by: Anthony Leonido
Date Start/Finish: 3-19-18 / 3-20-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

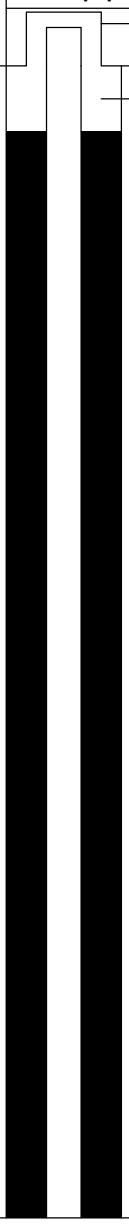
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1	1	24/8	0-2	1-1 2-2	ND	Top 2.0 inches LOAM. Changing to: Loose, brown, fine to medium SAND and SILT, dry.	SAND and SILT	1
4	2	24/12	4-6	2-2 1-1	ND	Loose, brown, fine SAND, trace Silt, dry.	4' SAND and GRAVEL	
9	3	24/12	9-11	2-5 7-7	ND	Medium dense, brown, fine SAND and fine GRAVEL, trace Silt, wet.		
14	4	24/15	14-16	2-5 7-7	ND	Medium dense, brown, fine to coarse SAND and fine GRAVEL, some Silt, wet.		2
19	5	24/18	19-21	2-3 5-16	ND	Medium, brown, SILT, wet.	19' SILT	
24	6	24/18	24-26	4-10 20-11	ND	Very stiff, brown, SILT, trace fine Sand, wet.		
29	7	24/19	29-31	11-25 25-32	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).	29' GLACIAL TILL	
34	8	24/19	34-36	4-14 25-34	ND	Very dense, brown, fine Silty SAND and		

Equipment Installed



REMARKS

1. Field screening of samples for organic vapors was performed with a MiniRae 3000 photoionization detector equipped with a 10.6 eV lamp. Readings above background levels are shown in parts per million by volume (ppmv) of isobutylene. ND indicates nothing detected (<0.1 ppmv).
2. A groundwater sample was collected from a temporary monitoring with well screen set at approximately 13.0 to 18.0 feet below ground surface and submitted for analytical laboratory testing.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV6D

BORING_WELL_6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV6D
Page: 2 **of** 3
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
36						SILT, some Clay, wet (GLACIAL TILL).	GLACIAL TILL		
37									
38									
39	9	12/12	39-40	21-97	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
40									
41									
42									
43									
44									
45									
46									
47									Bentonite Grout
48									
49	10	24/18	49-51	21-38 44-53	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
50									
51									
52									
53									
54	11	24/16	54-56	20-27 44-50	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
55									
56									
57									
58									
59	12	24/17	59-61	20-24 30-46	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
60									
61									
62									
63									
64	13	16/16	64-65.3	45-32-50/4"	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
65									
66									
67									
68									
69	14	16/14	69-70.3	28-46-50/4"	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
70									
71									
72									
73									
74	15	12/10	74-75	35-68	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
75									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV6D

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Algoma Twp, Kent County, Michigan

Boring No.: MW-WV6D
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File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
77							GLACIAL TILL		
78									
79	16	17/15	79-80.4	14-25-50/5"	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
80									
81									
82									
83									
84	17	6/6	84-84.5	50-100/0"	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
85									
86									
87									
88									
89	18	14/10	89-90.2	20-40-50/4"	ND	Very dense, brown, SAND and SILT, some Clay, wet (GLACIAL TILL).			
90									
91									
92									
93									2-Inch PVC Riser
94	19	19/17	94-95.6	40-48 50-40/1"	ND	Very dense, brown, fine SAND, trace Silt, wet.	94' SAND		Bentonite
95									
96									
97									
98									
99	20	24/20	99-101	2-11 26-33	ND	Very dense, brown, fine SAND, trace Silt, wet.			Filter Sand
100									2-Inch PVC Well Screen
101									
102									
103									
104	21	24/18	104-106	16-16 21-21	ND	Dense, brown, fine SAND, trace Silt, wet. Changing at approximately 105.0 feet to: Gray, CLAY, wet.	105' CLAY 106'	3	
105									
106						Bottom of Borehole at 106.0 Feet		4	
107									
108									
109									
110									
111									
112									
113									
114									
115									
116									

REMARKS

3. Groundwater was encountered at approximately 104.0 feet below ground surface.
4. Monitoring well was installed in borehole upon completion. Well screen set from 98.0 to 103.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV6D

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV6S
Page: 1 **of** 1
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Burt Graham
Logged by: Christopher Melby
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

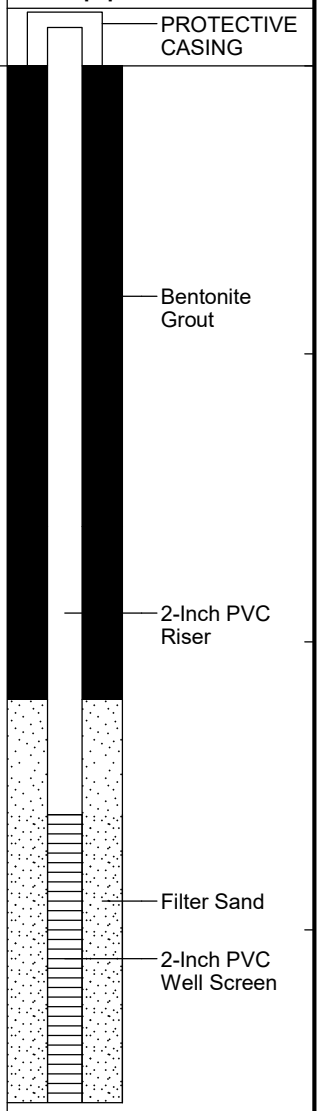
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–18						See MW-WV6D boring log for soil descriptions.		
18						Bottom of Borehole at 18.0 Feet		1
19								

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 13.0 to 18.0 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV6S

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Boring No.: MW-WV8D
Page: 1 **of** 8
File No.: 16.0062677.81
Check:

Contractor: Stearns Drilling Company
Foreman: Burt Graham
Logged by: Christopher Melby
Date Start/Finish: / 5-9-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
0	1	24/21	0-2	3-4 4-3		Dark, yellowish brown, moderately well sorted fine to medium grained SAND, little Silt, slightly cohesive, moist (FILL). Changing at 1.2 feet to: Yellowish brown with occasional dark grayish brown, moderately well sorted fine to medium grained SAND, little Silt, moist.	SAND (FILL)		PROTECTIVE CASING
1							1.2' SAND		Concrete
2	2	24/14	2-4	1-1 1-3		Yellowish brown, well sorted fine to medium grained SAND, trace Silt, moist.			
3									
4	3	24/17	4-6	1-2 2-2		Yellowish brown, well sorted fine to medium grained SAND, trace Silt, moist.			
5									
6	4	24/17	6-8	2-3 2-3		Yellowish brown, well sorted fine to medium grained SAND, trace Silt, moist.			
7									
8	5	24/24	8-10	3-2 3-4		Yellowish brown, well sorted fine to medium grained SAND, trace Silt, moist.			
9									
10	6	24/19	10-12	4-4 4-4		Yellowish brown, well sorted fine to medium grained SAND, trace Silt, moist. Changing at 11.2 feet to: Brown tho yellowish brown, moderately sorted CLAY & SILT, little Sand, plastic, cohesive, moist.	11.2' 11.4' CLAY & SILT SAND		
11									
12	7	24/19	12-14	1-5 5-5		Brown to yellowish brown, moderately sorted CLAY & SILT, little Sand, plastic, cohesive, moist. Changing at 13.0 feet to: Brown to yellowish brown, very well sorted SILT, cohesive, non plastic, moist.	13' 13.2' SILT SAND		
13									
14	8	24/21	14-16	3-4 5-7		Brown to yellowish brown, very well sorted SILT, cohesive, non plastic, moist. Changing at 15.3 feet to: Pale brown to			

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV8D

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
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Boring No.: MW-WV8D
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File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						brown, moderately sorted, fine to coarse grained SAND, trace Silt, moist.	SAND		
16	9	24/17	16-18	2-3 7-7		Pale brown to light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 17 feet o: Yellowish brown, well sorted, CLAY & SILT, trace Sand, plastic, cohesive, moist. Changing at 17.1 feet o: Pale brown to light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, moist.	17' 17.1' CLAY & SILT SAND		
17									
18	10	24/20	18-20	5-5 6-7		Pale brown to light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, moist.			
19									
20	11	24/20	20-22	7-7 8-10		Pale brown to light yellowish brown, very well sorted, fine to medium grained SAND, trace Silt, moist. Changing at 21.1 feet to: Pale brown to brown, moderately well sorted, fine to coarse grained SAND, trace Silt, moist.			
21									
22	12	24/19	22-24	4-7 9-12		Pale brown to brown, moderately well sorted, fine to coarse grained SAND, trace Silt, moist. Changing at 23.3 feet to: Yellowish brown to brown, moderately sorted, fine to coarse grained SAND, some Gravel, trace Silt, moist to wet.		1	
23									
24	13	24/14	24-26	11-12 8-9		Yellowish brown to brown, moderately sorted, fine to coarse grained SAND, some Gravel, trace Silt, moist to wet.			
25									
26	14	24/20	26-28	3-4 6-7		Brown to dark brown, poorly sorted, medium to coarse grained SAND, some Gravel, trace Silt, wet; grains finer.			
27									
28	15	24/19	28-30	4-4 7-8		Brown to dark brown, moderately well sorted, fine to medium SAND, trace Silt, wet.			
29									
30	16	24/19	30-32	3-5 5-8		Brown to dark brown, moderately well sorted, fine to medium SAND, trace Silt, wet. Changing at 30.5 feet to: Brown, poorly sorted, coarse grained SAND, some Gravel, trace Silt, wet. Changing at 30.6 feet to: Brown to dark brown, moderately well sorted, fine to medium SAND, trace Silt, wet.			
31									
32	17	24/14	32-34	6-5 7-6					

REMARKS

1. Groundwater was encountered at approximately 23.3 feet below ground surface.

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Boring No.: MW-WV8D
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File No.: 16.0062677.81
Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
33						Brown to dark brown, moderately well sorted, fine to medium SAND, trace Silt, wet. Changing at 33.2 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, wet.	SAND		
34	18	24/18	34-36	1-2 2-5		Brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 34.3 feet to: Brown, poorly sorted, fine to coarse grained SAND, little Gravel, trace Silt, wet. Changing at 34.4 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 34.8 feet to: Brown, poorly sorted, fine to coarse grained SAND, little Gravel trace Silt, wet. Changing at 35.5 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, wet.			
35									
36	19	24/18	36-38	5-7 9-10					
37									
38	20	24/21	38-40	7-7 8-9		Brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 36.2 feet to: Dark brown, poorly sorted, medium to coarse grained SAND, some Gravel, trace Silt, wet.			
39						Dark brown, poorly sorted, medium to coarse grained SAND, some Gravel, trace Silt, wet.			
40	21	24/12	40-42	6-6 6-6		Brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 41.0 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, wet.			
41									
42	22	24/2	42-44	1-1 1-1		Brown, well sorted, fine to medium grained SAND, trace Silt, wet.			
43									
44	23	24/14	44-46	3-5 6-9		Brown, well sorted, fine to medium grained SAND, trace Silt, wet. Changing at 44.5 feet to: Dark brown, poorly sorted, medium to coarse grained SAND, some Gravel, trace Silt, wet. Changing at 44.6 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, wet.			
45									
46	24	24/15	46-48	2-4 6-6		Dark yellowish brown, moderately well sorted, fine to coarse grained SAND, litle Gravel, trace Silt, wet; grading coarser.			
47									
48	25	24/12	48-50	4-7 6-7		Dark yellowish brown, moderately well sorted, fine to coarse grained SAND, litle Gravel, trace Silt, wet; grading coarser.			
49									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV8D

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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
51	26	24/24	50-52	3-10 15-18		Brown, moderately well sorted, fine to coarse grained SAND, little Silt, trace Gravel, trace Silt, wet. Changing at 51.9 feet to: Brown, poorly sorted, fine to coarse SAND, little Silt, trace Gravel, moist to wet.	SAND		
52	27	24/7	52-54	3-7-50/4"		Dark brown, poorly sorted, medium to coarse grained SAND, some Gravel, trace Silt, wet. Changing at 52.6 feet to: Brown, moderately well sorted, fine to coarse SAND, trace Gravel, trace Silt, wet.			
54	28	24/24	54-56	4-7 23-50		Brown, moderately well sorted, fine to coarse SAND, trace Gravel, trace Silt, wet. Changing at 55.2 feet to: Yellowish brown to dark yellowish brown, very well sorted, fine grained SAND, some Silt, bedded, wet. Changing at 55.7 feet to: Brown, very well sorted, SILT, little fine grained Sand, moderately cohesive, wet; grades coarser. Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet.	55.7' 56' SILT SAND		
56	29	24/14	56-58	4-17-50/6"					Bentonite Grout
58	30	24/23	58-60	16-27 33-45		Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet. Changing at 58.5 feet to: Yellowish brown, very well sorted, SILT, moderately cohesive, non plastic, wet. Changing at 58.6 feet to: Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet. Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet.	58.5' 58.6' SILT SAND		
60	31	24/9	60-62	5-8 38-50/3"					
62	32	24/13	62-64	3-14 42-41		Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet.			
64	33	24/11	64-66	38-50/4.5"		Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet. Changing at 64.5 feet to: Light yellowish brown, very well sorted, SILT, moderately cohesive, non plastic, wet. Changing at 64.7 feet to: Light yellowish brown, well sorted, SILT & CLAY, slightly plastic, moderately cohesive, moist. Changing at 64.9 feet to: Yellowish brown, very well sorted, fine grained SAND and Silt, moderately cohesive, wet.	64.5' 64.7' SILT 64.9' SILT & CLAY SAND 66' SILT 66.5' SAND		
66	34	24/9	66-68	4-15 34-40					

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV8D

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8D
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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
68	35	24/11	68-70	8-14 44-50/4"		Grayish brown very well sorted, SILT, trace fine grained Sand, cohesive, non plastic, bedded, moist. Changing at 66.5 feet to: Grayish brown, very well sorted, fine grained SAND, trace Silt, moist.	SAND		
69						Grayish brown, very well sorted, fine grained SAND, trace Silt, moist. Changing at 68.3 feet to: Grayish brown, moderately sorted, fine to medium SAND, some Silt, trace Gravel, slightly cohesive, moist to wet.			
70	36	24/9	70-72	49-50/4"			70'		
71						Grayish brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, slightly plastic, cohesive, moist.	SILT & CLAY		
72	37	24/24	72-74	8-10 20-29		Dark grayish brown, poorly sorted, CLAY & SILT, little Sand, trace Gravel, plastic, cohesive, moist.	72' CLAY & SILT		
73									
74	38	24/24	74-76	13-24 35-45		Hard, brown, Clayey SILT, some medium Sand, trace Gravel (embedded in Clayey SILT), wet.	74' Clayey SILT		
75									
76									
77									
78									
79	39	24/24	79-81	6-13 27-41		Hard, brown, Clayey SILT, some medium Sand (embedded in Clayey Silt), wet.			
80									
81									
82									
83									
84	40	24/18	84-86	2-2 5-6		Medium stiff, brown, Clayey SILT, some medium Sand, wet.			

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV8D

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

Boring No.: MW-WV8D
Page: 6 **of** 8
File No.: 16.0062677.81
Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
							Clayey SILT		
86									
87									
88									
89	41	24/24	89-91	9-16 44-45		Hard, brown, Clayey SILT, some medium Sand, wet.			
90									
91									
92									
93									
94	42	24/24	94-96	8-16 30-55		Hard, brown, Clayey SILT, some medium Sand, wet.			
95									
96									
97									
98									
99	43	24/24	99-101	8-19 34-42		Hard, brown, Clayey SILT, some medium Sand, wet.			
100									
101									
102									

REMARKS

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV8D

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Wolverine World Wide
Wolven Avenue Area
Algoma Twp, Kent County, Michigan

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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
103							Clayey SILT		
104	44	24/24	104-106	6-14 20-20		Hard, brown, Clayey SILT, some medium to coarse Sand, wet. Changing at 105.0 feet to: Brown, fine to medium SAND, little Silt, wet.			
105							105' SAND		
106									
107									
108									
109	45	24/20	109-111	7-10 15-37		Medium dense, brown, fine to coarse SAND, little Silt, wet.			
110									
111									
112									
113									
114	46	22/22	114-115.8	3-5 24-50/4"		Medium dense, brown, fine to medium SAND, trace Silt, wet.			
115									
116									Filter Sand
117									
118									2-Inch PVC Well Screen
119	47	11/11	119-119.9	6-63/5"		Very dense, brown, fine to medium SAND, trace Silt, wet. Changing at 119.6 feet to: Very dense, gray, fine to medium SAND and			

REMARKS

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Boring No.: MW-WV8D

BORING_WELL 6267781 WWW.WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Wolven Avenue Area
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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
						Silt, wet.	SAND		
121	48	6/6	121-121.5	74		Very dense, gray, fine to medium SAND and Silt, wet.		2	
122									
123									
124	49	9/9	124-124.8	35-50/3"		Very dense, gray, fine to medium SAND and Silt.			
125									
126									
127									
128									
129	50	16/16	129-130.3	17-42-50/4"		Hard, gray, SILT & CLAY, some fine to medium Sand, wet.	129' SILT & CLAY		
130						Bottom of Borehole at 130.3 Feet	130.3'	3	
131									
132									
133									
134									
135									
136									
137									

REMARKS

2. Auger advancement slows at 120.0 fee below ground surface. Harder material. Collected in spoon.
3. Monitoring well was installed in borehole upon completion. Well screen set from 115.0 to 120.0 feet below ground surface.

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Check:

Contractor: Stearns Drilling Company
Foreman: Burt Graham
Logged by: Christopher Melby
Date Start/Finish: 5-9-18 / 5-10-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

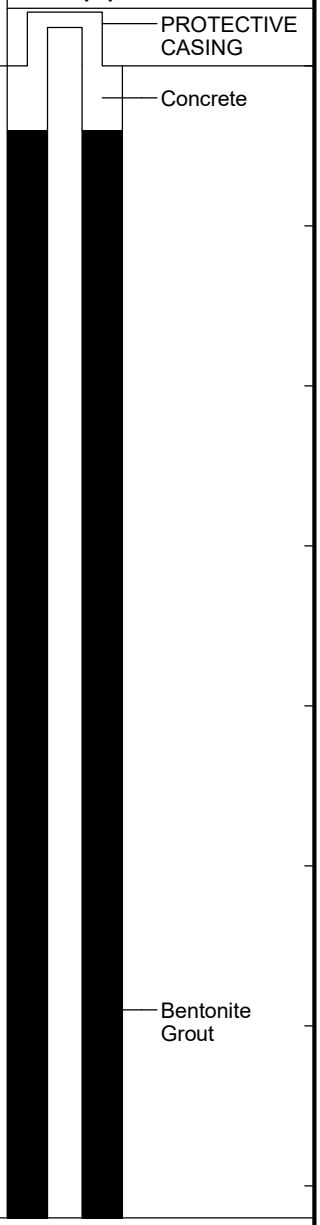
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1						See MW-WV8D boring log for soil descriptions from 0.0 to 63.0 feet.		
2–35								

Equipment Installed



REMARKS

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Boring No.: MW-WV8M

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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
37–77	S-1	24/24	63-65	15-23 36-51		Very dense, brown, fine to medium SAND, trace Silt, wet.	SAND		
65						Bottom of Borehole at 65.0 Feet	65'	1	

REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 60.0 to 65.0 feet below ground surface.

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Boring No.: MW-WV8S
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Check:

Contractor: Stearns Drilling Company
Foreman: Burt Graham
Logged by: Christopher Melby
Date Start/Finish: 5-9-18 / 5-9-18
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

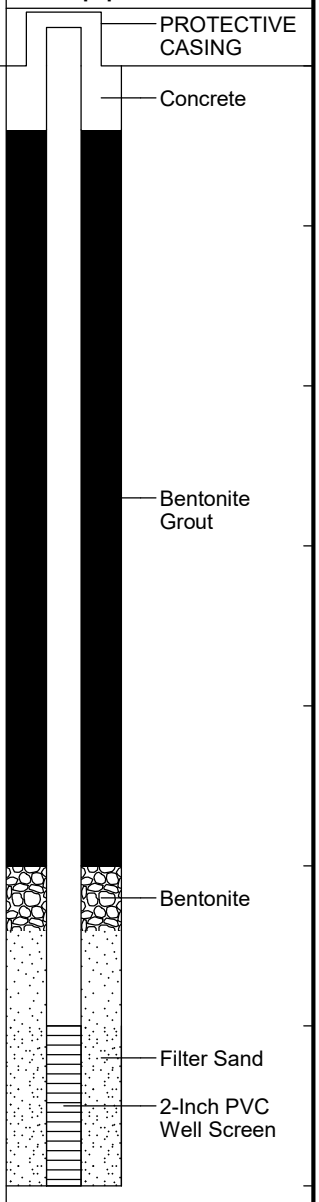
GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks
1–34						See MW-WV8D boring log for soil descriptions from 0.0 to 33.0 feet.		
33–34	S-1	24/12	33-35	2-3 4-6		Loose, brown and gray, fine to coarse SAND, trace Silt.	SAND	
35						Bottom of Borehole at 35.0 Feet	35'	1

Equipment Installed



REMARKS

1. Monitoring well was installed in borehole upon completion. Well screen set from 30.0 to 35.0 feet below ground surface.

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Boring No.: MW-WV8S

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Check:

Contractor: Stearns Drilling Company
Foreman: Jerry Zach/Travis
Logged by: John Morehouse
Date Start/Finish:
Boring Location:
GS Elev.: **Datum:**

	Auger/ Casing	Sampler
Type:	Hollow Stem Auger	Split Spoon
O.D. / I.D.:	12.25" / 4.25"	2.0" / 1 3/8"
Hammer Wt.:	NA	140lbs
Hammer Fall:	NA	30.0"
TOC Elev.:	NA	NA

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab

Surveyed By: NA **Survey Date:**

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
1	1	24/21	0-2	2-2 2-3		Very dark grayish brown, moderately well sorted, SILT, some fine to medium grained Sand, trace Gravel, moist.	SILT		PROTECTIVE CASING
2	2	24/19	2-4	2-1 1-1		Dark yellowish brown, poorly sorted, fine grained SAND, some Silt, trace Clay, slightly plastic, moderately cohesive, moist.	2' SAND		Sand
4	3	24/20	4-6	3-2 2-3		Yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist.			Hole Plug
6	4	24/17	6-8	2-2 2-3		Yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist.			
8	5	24/18	8-10	2-3 2-2		Yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist.			
10	6	24/23	10-12	2-2 3-3		Yellowish brown, well sorted, fine to medium grained SAND, trace Silt, moist.			

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	7	24/17	12-14	3-4 5-4		Pale brown, well sorted, fine to medium grained SAND, bedded, moist.	SAND		
13									
14	8	24/19	14-16	3-4 5-5		Pale brown, well sorted, fine to medium grained SAND, bedded, moist.			
15									
16	9	24/23	16-18	3-7 7-7		Pale brown, well sorted, fine to medium grained SAND, bedded, moist.			
17									
18	10	24/17	18-20	3-4 6-7		Pale brown, well sorted, fine to medium grained SAND, bedded, moist.			
19									
20	11	24/23	20-22	3-5 5-7		Pale brown, well sorted, fine to medium grained SAND, bedded, moist. Changing at 21.2 feet to: Yellowish brown, very well sorted, SILT & CLAY, moderately plastic, moderately cohesive, moist. Changing at 21.3 feet to: Pale brown grading to very pale brown, well sorted, fine to medium grained SAND, bedded, moist.	21.2' 21.3' SILT & CLAY SAND		
21									
22	12	24/17	22-24	8-13 17-22		Pale brown grading to very pale brown, well sorted, fine to medium grained SAND, bedded, moist.			
23									
24	13	24/23	24-26	15-20 18-21		Pale brown grading to very pale brown, well sorted, fine to medium grained SAND, bedded, moist. Changing at 25.1 feet to: Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
25									

REMARKS

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
27	14	24/23	26-28	6-11 14-17		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.	SAND		
28	15	24/22	28-30	10-18 17-18		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
30	16	24/18	30-32	11-16 19-22		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
32	17	24/23	32-34	11-14 15-16		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist. Changing at 32.6 feet to: Yellowish brown to brown, very well sorted, fine grained SAND, trace Silt, moist to wet. Changing at 33.2 feet to: Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
34	18	24/24	34-36	13-17 21-25		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
36	19	24/24	36-38	8-12 22-24		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
38	20	24/23	38-40	17-18 23-25		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.	38' CLAY & SILT		

REMARKS

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Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
41	21	24/19	40-42	6-13 21-28		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.	CLAY & SILT		
42	22	24/19	42-44	5-11 17-20		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
44	23	24/22	44-46	7-15 20-23		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist.			
46	24	24/20	46-48	5-6 9-13		Yellowish brown, moderately sorted, fine to coarse grained SAND, some Silt, trace Clay, trace Gravel, slightly to moderately plastic, cohesive, moist. Changing at 46.3 feet to: Brown, well sorted, fine to medium grained SAND, trace Silt, moist to wet. Changing at 46.9 feet to: Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist.	46.3' SAND 46.9' CLAY & SILT		Bentonite Grout
48	25	24/24	48-50	8-16 24-30		Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist.			
50	26	24/11	50-52	5-11 19-25		Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist.			
52	27	24/24	52-54	7-17 23-32		Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist.			

REMARKS

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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
55	28	24/24	54-56	7-16 25-26		Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist. Changing at 55.5 feet to: Brown, poorly sorted, fine to coarse grained SAND, little Gravel, little Silt, moist to wet. Changing at 55.6 feet to: Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist.	CLAY & SILT 55.5' 55.6' SAND CLAY & SILT		
56	29	24/24	56-58	5-13 19-25					
57						Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist.			
58	30	24/24	58-60	9-15 31-43		Dark grayish brown, moderately sorted, CLAY & SILT, some Sand, trace Gravel, slightly to moderately plastic, cohesive, moist. Changing at 59.5 feet to: Dark yellowish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 59.7 feet to: Yellowish brown, well sorted, SILT, trace Sand, non plastic, moderately cohesive, moist.	59.7' 60' SILT CLAY & SILT		
59									
60	31	24/24	60-62	11-15-50/5"		Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 60.6 feet to: Brown, poorly sorted, fine to medium grained SAND, little Silt, trace Clay, soft, moist to wet. Changing at 60.7 feet to: Dark yellowish brown grading to dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist.	60.6' 60.7' SAND CLAY & SILT		
61									
62	32	24/24	62-64	5-13 23-22					
63						Dark yellowish brown grading to dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 62.4 feet to: Dark yellowish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 62.7 feet to: Brown, poorly sorted, fine to medium grained, SAND, little Silt, trace Clay, slightly plastic, moist to wet. Changing at 62.8 feet to: Dark yellowish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, moist. Changing at 63.5 feet to: Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist.	62.7' 62.8' SAND CLAY & SILT		
64	33	24/24	64-66	8-16 30-45					
65									
66	34	24/24	66-68	13-23 32-35					
67						Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist. Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist.			

REMARKS

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Boring No.: MW-WV9D

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Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	35	24/24	68-70	11-18 24-32		Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist.	CLAY & SILT		
69									
70	36	24/24	70-72	12-10 11-18		Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist.			
71									
72	37	24/24	72-74	12-14 17-20		Dark grayish brown, poorly sorted, CLAY & SILT, trace Sand, trace Gravel, plastic, cohesive, grades softer, moist.			
73									
74	38	24/11	74-76	0-2 3-5		Yellowish brown, moderately sorted, fine to coarse grained SAND, little Silt trace Gravel, moist to wet.	74' SAND		
75									
76	39	24/15	76-78	8-15 23-26		Yellowish brown, moderately sorted, fine to coarse grained SAND, little Silt trace Gravel, moist to wet. Changing at 76.9 feet to: Yellowish brown, moderately well sorted, fine to medium grained SAND, little Silt, moderately cohesisve, moist to wet.			
77								1	
78	40	24/15	78-80	8-20 29-37		Yellowish brown, moderately well sorted, fine to medium grained SAND, little Silt, moderately cohesisve, moist to wet.			
79									
80	41	24/9	80-82	14-33-50/3"		Yellowish brown, moderately well sorted, fine to medium grained SAND, little Silt, moderately cohesisve, moist to wet.			
81									

REMARKS

1. Groundwater was encountered at approximately 76.9 feet below ground surface.

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Boring No.: MW-WV9D

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18

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Check:

Depth	Sample Information					Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data				
	42	24/3	82-84	21-44-50/3"		Yellowish brown, moderately well sorted, fine to medium grained SAND, little Silt, moderately cohesisve, moist to wet.	SAND		
83									
84	43	24/8	84-86	50/5"		Yellowish brown, poorly sorted, fine to medium grained SAND, little Silt, trace Gravel, trace Clay, non to slighty plastic, slightly cohesive, moist to wet.			
85									
86	44	24/7	86-88	12-35-50/6"		Yellowish brown, poorly sorted, fine to medium grained SAND, little Silt, trace Gravel, trace Clay, non to slighty plastic, slightly cohesive, moist to wet.			
87									
88	47	24/7	88-90	21-50/3"		Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, wet.			
89									
90	48	24/2	90-92	13-34-50/3"		Yellowish brown, poorly sorted, fine to medium grained SAND, little Silt, trace Gravel, trace Clay, non to slighty plastic, slightly cohesive, moist to wet.			
91									
92	49	24/17	92-94	5-14 30-50/3"		Yellowish brown, poorly sorted, fine to medium grained SAND, little Silt, trace Gravel, trace Clay, non to slighty plastic, slightly cohesive, moist to wet.			
93									Filter Sand
94	50	24/13	94-96	35-34 32-30		Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, occasional very thin Silt seams, wet.			
95									2-Inch PVC Well Screen

REMARKS

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Check:

Depth	Sample Information: No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remarks	Equipment Installed
97	51	24/24	96-98	7-12 9-11		Light yellowish brown to pale brown, very well sorted, fine to medium grained SAND, trace Silt, occasional very thin Silt seams, wet. Changing at 96.6 feet to: Dark grayish brown, poorly sorted, SILT & CLAY, little Sand, trace Gravel, slightly plastic, moderately cohesive, moist. Changing at 96.8 feet to: Light yellowish brown to pale brown, very well sorted, fine to medium grained SANd, trace Silt, wet. Changing at 97.3 feet to: Dark grayish brown, poorly sorted, medium to coarse grained SAND, trace Gravel, trace Silt, wet. Changing at 97.8 feet to: Dark grayish brown, poorly sorted, medium to coarse grained SAND, trace Gravel, moderately plastic, cohesive, hard, moist.	SAND 96.6' 96.8' SILT & CLAY SAND 97.8' SILT & CLAY		
98	52	24/15	98-100	8-16 21-28					
99									
100							100'	2	
101						Dark grayish brown, poorly sorted, medium to coarse grained SAND, trace Gravel, moderately plastic, cohesive, hard, moist. Bottom of Borehole at 100.0 Feet			
102									
103									
104									
105									
106									
107									
108									
109									

REMARKS

2. Monitoring well was installed in borehole upon completion. Well screen set from 92.3 to 97.3 feet below ground surface.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: MW-WV9D

BORING_WELL 6267781 WWW WOLVEN AVENUE.GPJ GZA_CORP.GDT 8/1/18