



Rose & Westra
A Division of GZA

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ENVIRONMENTAL
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WATER
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MANAGEMENT

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August 31, 2018
File: 16.0062335.53

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

Re: Wolverine World Wide, Inc.
MDOT Property 2018 Soil Investigation Report

Dear Ms. Hendershott:

Rose & Westra, a Division of GZA GeoEnvironmental, Inc. (R&W/GZA) is presenting this 2018 Soil Investigation Report (Report) on behalf of Wolverine World Wide, Inc. (Wolverine). This Report documents investigation activities conducted at the property owned by MDOT located on the south side of House Street NE, commonly known as 1758 House Street ("Site"). Wolverine previously hired qualified contractors to remove debris including leather scrap, bottles, metal, rusted drums, and leather dust from the Site on October 11 to October 17, 2017. This Report summarizes the soil verification sampling for this Site and additional soil investigation tasks requested in May 2018 by MDEQ.

Soil Verification Sampling

As stated in the June 11, 2018 work plan, R&W/GZA collected 11 samples from the excavation; 2 from the floor and 9 from the sidewalls. We collected 2 sidewall samples from the west side of the excavation, which was approximately 345 ft² and 7 sidewall samples from the east sidewall which was approximately 3,620 ft². Consistent with MDEQ's 2002 guidance, the sample locations were biased based on visual observations and the shape of the excavation, as described in the work plan.

Based on the former tannery operations, on-Site observations during the debris removal and the analytical scheme for the on-going investigation at the adjoining House Street Property, the 11 soil verification samples were analyzed for the following analytes:

- Total ammonia, nitrate, nitrite, chloride, total and available cyanide, acetate, formate, total phosphorus, sulfate, and sulfide (general chemistry compounds);
- Metals (aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, total chromium, hexavalent chromium, cobalt, copper, iron, lead, magnesium, mercury, molybdenum, nickel, selenium, silver, sodium, titanium, thallium, vanadium, and zinc);
- Volatile Organic Compounds (VOCs);



- Semi-Volatile Organic Compounds (SVOCs); and
- Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids (PFAS compounds).

To estimate the background arsenic concentration, R&W/GZA also collected nine soil samples from the east side of the Site which appears to be an undisturbed portion of the Site. These samples were tested for arsenic only. Based on the Kent County Soil Survey, the soil in the background area is the same type (Chelsea loamy fine sand) as the soil in the area where the waste was removed.

Tables 1 through 5 summarize the laboratory analytical data. There were no VOCs, SVOCs, or general chemistry compounds detected at concentrations greater than Michigan's Part 201 generic residential criteria. Aluminum, boron, cobalt, iron, and magnesium concentrations in one sample (V-5) exceed the generic Part 201 criteria for the Drinking Water Protection (DWP) exposure pathway. Mercury concentrations at two locations (V-5 and V-6) exceed the generic Part 201 Groundwater Surface Water Interface Protection (GSIP) criteria. It is not clear if any of these metal concentrations are naturally occurring. Concentrations of PFOS in each of the verification samples were greater than the Part 201 GSIP.

Additional Soil Investigation

R&W/GZA conducted the following additional soil investigation tasks in accordance with the work plan.

We completed three direct-push soil borings in each of the "trenches" as described in the WP, except the furthest west "trench" (A). Two borings were completed in "trench" A. Ninth and tenth locations (SB-D1 and SB-E1) were selected and added in place of the third boring in "trench" A per DEQ request. The other locations were randomly selected along the length of each "trench", taking into consideration access and visual characteristics. Refer to Figure 1.

Each boring was completed to a depth of 20 ft below grade, well below the deepest known waste disposal depth on the adjoining House Street parcel.

Consistent with the EPA-approved Work Plan for the House Street parcel investigation, the soil was logged as well as screened at 2-foot intervals using a PID and XRF. During the first day of sampling, if no visual, XRF, or PID screening indicated the likely presence of waste, no aliquots were collected for laboratory analysis (locations SB-A1, SB-A2, SB-B1, SB-B2, SB-C1, SB-C3). No likely waste was identified during this sampling. At the request of the MDEQ, samples collected from SB-B3, SB-C2, SB-D1, and SB-E1 were analyzed for the same analyte list as the verification samples.

Tables 1 through 5 summarize the laboratory analytical data. VOCs, SVOCs, and general chemistry compounds were not measured at concentrations greater than Part 201 generic residential criteria.

Aluminum, boron, iron, and magnesium concentrations in samples SB-C2 (16-18) and SB-D1 (16-18) were greater than their generic Part 201 DWP criteria. Mercury concentrations in samples SB-B3 (2-4), SB-B3 (16-18), SB-C2(2-4), and SB-E1 (0-2) were greater than their Part 201 GSIP criteria. PFOS concentrations were greater than the GSIP at 6 locations [SB-B3 (16-18), SB-C-2 (3-4), SB-C2 (16-18), SB-D1 (16-18), SB-E1 (0-2), and SBE1 (16-18)].



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MDOT Property 2018 Soil Investigation Report

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Proposed Next Steps

R&W/GZA is assessing additional historical documentation and will submit a Work Plan with additional investigative steps for this Site by September 10, 2018.

Sincerely,

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

A handwritten signature in blue ink that reads "Loretta J. Powers".

Loretta J. Powers
Senior Project Manager

A handwritten signature in blue ink that reads "Leslie M. Nelson".

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

A handwritten signature in blue ink that appears to read "Mark A. Westra".

Mark A. Westra
Associate Principal

ljp/lmn/maw

c/enc: Mr. Dave Latchana – Wolverine World Wide, Inc. via email David.Latchana@wwwinc.com
Mr. John V. Byl – Warner Norcross & Judd LLP via email jbyl@wnj.com

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TABLE 3
 SUMMARY OF SOIL SAMPLE ANALYSIS - METALS
 1758 House Street NE
 Plainfield Township, Kent County, MI

Location Name	MDEQ STATE-WIDE DEFAULT BACKGROUND	MDEQ PART 201 SOIL CRITERIA PROTECTIVE OF GROUNDWATER USES - RESIDENTIAL	MDEQ PART 201 SOIL VOLATILIZATION TO INDOOR AIR	MDEQ PART 201 INFINITE SOURCE PARTICULATE SOIL INHALATION CRITERIA - RESIDENTIAL	MDEQ PART 201 VOLATILE SOIL INHALATION CRITERIA - RESIDENTIAL	MDEQ PART 201 DIRECT CONTACT CRITERIA - RESIDENTIAL	AS-1	AS-2	AS-3	AS-4	AS-5	AS-6	AS-7	AS-8	AS-9
							AS-1	AS-2	AS-3	AS-4	AS-5	AS-6	AS-7	AS-8	AS-9
Sample Name							AS-1	AS-2	AS-3	AS-4	AS-5	AS-6	AS-7	AS-8	AS-9
Lab Sample ID							AS-1	AS-2	AS-3	AS-4	AS-5	AS-6	AS-7	AS-8	AS-9
Depth Interval (feet)							TF26025-001	TF26025-002	TF26025-003	TF26025-004	TF26025-005	TF26025-006	TF26025-007	TF26025-008	TF26025-009
Sample Date							0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Parameter (ug/kg)							6/23/2018	6/23/2018	6/23/2018	6/23/2018	6/23/2018	6/23/2018	6/23/2018	6/23/2018	6/23/2018
Aluminum	6,900,000	1,000	NA	NA	NA	NA	50,000,000	NS	NS	NS	NS	NS	NS	NS	NS
Antimony	NA	4,300	94,000	NA	NA	NA	13,000,000	180,000	NS						
Arsenic	5,800	4,600	4,600	NA	NA	NA	720,000	7,600	870	1,100	770	900	840	1,500	1,100
Barium	75,000	1,300,000	NA	NA	NA	NA	330,000,000	37,000,000	NS						
Beryllium	NA	51,000	NA	NA	NA	NA	1,300,000	410,000	NS						
Boron	NA	10,000	140,000	NA	NA	NA	NA	48,000,000	NS						
Cadmium	1,200	6,000	NA	NA	NA	NA	1,700,000	550,000	NS						
Chromium, Total	NA	1,000,000,000	NA	NA	NA	NA	330,000,000	790,000,000	NS						
Chromium, Hexavalent	NA	30,000	3,300	NA	NA	NA	260,000	2,500,000	NS						
Cobalt	6,800	800	2,000	NA	NA	NA	13,000,000	2,600,000	NS						
Copper	32,000	5,800,000	NA	NA	NA	NA	130,000,000	20,000,000	NS						
Iron	12,000,000	6,000	NA	NA	NA	NA	NA	160,000,000	NS						
Lead	21,000	700,000	NA	NA	NA	NA	100,000,000	400,000	NS						
Magnesium	NA	8,000,000	NA	NA	NA	NA	6,700,000,000	1,000,000,000	NS						
Mercury	130	1,700	50	48,000	52,000	20,000,000	160,000	NS	NS	NS	NS	NS	NS	NS	NS
Molybdenum	NA	1,500	64,000	NA	NA	NA	NA	2,600,000	NS						
Nickel	20,000	100,000	NA	NA	NA	NA	13,000,000	40,000,000	NS						
Selenium	410	4,000	400	NA	NA	NA	130,000,000	2,600,000	NS						
Silver	1,000	4,500	100	NA	NA	NA	6,700,000	2,500,000	NS						
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NS						
Thallium	NA	2,300	4,200	NA	NA	NA	13,000,000	35,000	NS						
Vanadium	NA	72,000	430,000	NA	NA	NA	NA	750,000	NS						
Zinc	47,000	2,400,000	NA	NA	NA	NA	170,000,000	NS	NS	NS	NS	NS	NS	NS	NS
Titanium	NA	NA	NA	NA	NA	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS

TABLE 4
SUMMARY OF SOIL SAMPLE ANALYSIS - OTHER INORGANICS/GENERAL CHEMISTRY
 1758 House Street NE
 Plainfield Township, Kent County, MI

Location Name	MDEQ PART 201 SOIL CRITERIA PROTECTIVE OF DRINKING WATER USES - RESIDENTIAL	MDEQ PART 201 SOIL CRITERIA PROTECTIVE OF GROUNDWATER SURFACE WATER INTERFACE	MDEQ PART 201 SOIL VOLATILIZATION TO INDOOR AIR INHALATION CRITERIA - RESIDENTIAL	MDEQ PART 201 INFINITE SOURCE VOLATILE SOIL INHALATION CRITERIA - RESIDENTIAL	MDEQ PART 201 DIRECT CONTACT CRITERIA - RESIDENTIAL	SB-B3	SB-B3	SB-C2	SB-C2	SB-D1	SB-D1	SB-E1	SB-E1	SB-E1	V-1		
Sample Name						SB-B3 (2-4)	SB-B3 (16-18)	SB-C2 (2-4)	SB-C2 (16-18)	SB-D1 (12-14)	SB-D1 (16-18)	SB-E1 (0-2)	SB-E1 (0-2) DUP	SB-E1 (16-18)	V-1		
Lab Sample ID						TF26024-021/18061936-13A	TF26024-001/18061936-12A	TF26024-004/18061936-16A	TF26024-005/18061936-17A	TF26024-002/18061936-14A	TF26024-003/18061936-15A	TF26024-006/18061936-18A	TF26024-007/18061936-19A	TF26024-008/18061936-20A	TF26024-010/18061936-01A		
Depth Interval (feet)						2 - 4	16 - 18	2 - 4	16 - 18	12 - 14	16 - 18	0 - 2	0 - 2	16 - 18	0 - 0.5		
Sample Date						06/23/2018	06/23/2018	06/25/2018	06/25/2018	06/23/2018	06/23/2018	06/25/2018	06/25/2018	06/25/2018	06/16/2018		
Parameter (ug/kg)																	
Acetic Acid	84,000	NA	NA	NA	17,000,000,000	130,000,000	<19,000	<21,000	<21,000	<23,000	<20,000	<24,000	<23,000	<22,000	<23,000	<21,000	
Chloride (soluble)	5,000,000	NA	NA	NA	NA	500,000	<10,000	<11,000	<11,000	3,000 J	<10,000	2,700 J	<11,000	<11,000	28,000	<11,000	
Cyanide, Total	4,000	100	NA	NA	250,000	12,000	120	93 J	96 J	45 J	54 J	23 J	280	250	44 J	110 J	
Cyanide, Available	NA	NA	NA	NA	NA	NA	<41	<44	<43	<50	<42	<49	<48	<45	63	<43	
Formic Acid	200,000	NA	1,500,000	210,000	130,000,000	320,000,000	<19,000	<21,000	<21,000	<23,000	<20,000	<24,000	<23,000	<22,000	<23,000	<21,000	
Phosphorus	1,300,000	NA	NA	NA	NA	67,000,000	1,000,000,000	460,000	580,000	260,000	520,000	40,000	340,000	970,000	1,300,000	50,000	210,000
Sulfate (soluble)	5,000,000	NA	NA	NA	NA	NA	<10,000	<11,000	<11,000	<13,000	<10,000	<12,000	6,200 J	<11,000	970,000	<11,000	
Sulfide (acid soluble)	NA	NA	NA	NA	NA	NA	<100,000	<110,000	<110,000	<130,000	<100,000	<130,000	<120,000	<110,000	<120,000	<110,000	
Nitrogen, Ammonia - as N (gas diffusion)	NA	NA	NA	NA	NA	6,700,000,000	NA	<1,000	450 J	<1,100	<1,300	<1,000	<1,200	<1,100	<1,200	<1,100	
Nitrogen, Nitrite + Nitrate (soluble)	NA	NA	NA	NA	NA	NA	NA	100 J	100 J	160 J	170 J	67 J	120 J	680	170 J	330	66 J

TABLE 4
SUMMARY OF SOIL SAMPLE ANALYSIS - OTHER INORGANICS/GENERAL CHEMISTRY
1758 House Street NE
Plainfield Township, Kent County, MI

Location Name	MDEQ PART 201 SOIL CRITERIA PROTECTIVE OF DRINKING WATER USES - RESIDENTIAL	MDEQ PART 201 SOIL CRITERIA PROTECTIVE OF GROUNDWATER SURFACE WATER INTERFACE	MDEQ PART 201 SOIL VOLATILIZATION TO INDOOR AIR INHALATION CRITERIA - RESIDENTIAL	MDEQ PART 201 INFINITE SOURCE VOLATILE SOIL INHALATION CRITERIA - RESIDENTIAL	MDEQ PART 201 DIRECT CONTACT CRITERIA - RESIDENTIAL	V-2	V-3	V-4	V-5	V-6	V-7	V-8	V-9	V-10	V-11	
Sample Name						V-2	V-3	V-4	V-5	V-6	V-7	V-8	V-9	V-10	V-11	
Lab Sample ID						TF26024-011/ 18061936-02A	TF26024-012/ 18061936-03A	TF26024-013/ 18061936-04A	TF26024-014/ 18061936-05A	TF26024-015/ 18061936-06A	TF26024-016/ 18061936-07A	TF26024-017/ 18061936-08A	TF26024-018/ 18061936-09A	TF26024-019/ 18061936-10A	TF26024-020/ 18061936-11A	
Depth Interval (feet)						0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	
Sample Date						06/16/2018	06/16/2018	06/16/2018	06/16/2018	06/16/2018	06/16/2018	06/23/2018	06/23/2018	06/23/2018	06/23/2018	
Parameter (ug/kg)																
Acetic Acid	84,000	NA	NA	NA	17,000,000,000	130,000,000	<24,000	<23,000	<25,000	<24,000	<22,000	<25,000	<21,000	<20,000	<21,000	<20,000
Chloride (soluble)	5,000,000	NA	NA	NA	NA	500,000	<12,000	<11,000	<13,000	<13,000	<11,000	<12,000	<11,000	<11,000	<11,000	<11,000
Cyanide, Total	4,000	100	NA	NA	250,000	12,000	87 J	89 J	130 J	17 J	110 J	74 J	76 J	75 J	91 J	77 J
Cyanide, Available	NA	NA	NA	NA	NA	NA	<50	<47	<52	<53	<45	<51	<43	<42	<43	<44
Formic Acid	200,000	NA	1,500,000	210,000	130,000,000	320,000,000	<24,000	<23,000	<25,000	<24,000	<22,000	<25,000	<21,000	<20,000	<21,000	<20,000
Phosphorus	1,300,000	NA	NA	NA	NA	67,000,000	1,000,000,000	210,000	110,000	220,000	450,000	370,000	260,000	150,000	150,000	190,000
Sulfate (soluble)	5,000,000	NA	NA	NA	NA	NA	<12,000	<11,000	<13,000	<13,000	<11,000	<12,000	<11,000	<11,000	<11,000	<11,000
Sulfide (acid soluble)	NA	NA	NA	NA	NA	NA	<130,000	<120,000	<130,000	<130,000	<110,000	<130,000	<110,000	<100,000	<110,000	<110,000
Nitrogen, Ammonia - as N (gas diffusion)	NA	NA	NA	NA	NA	6,700,000,000	NA	<1,200	<1,100	<1,300	<1,300	<1,100	850 J	<1,100	<1,100	<1,100
Nitrogen, Nitrite + Nitrate (soluble)	NA	NA	NA	NA	NA	NA	NA	84 J	64 J	83 J	180 J	35 J	55 J	<220	<220	49 J

TABLE 5
SUMMARY OF SOIL SAMPLE ANALYSIS - PFAS
 1758 House Street NE
 Plainfield Township, Kent County, MI

Location Name		MDEQ PART 201 SOIL CRITERIA PROTECTIVE OF DRINKING WATER USES - RESIDENTIAL	SB-B3	SB-B3	SB-C2	SB-C2	SB-D1	SB-D1	SB-E1	SB-E1	SB-E1
			SB-B3 (2-4)	SB-B3 (16-18)	SB-C2 (2-4)	SB-C2 (16-18)	SB-D1 (12-14)	SB-D1 (16-18)	SB-E1 (0-2)	SB-E1 (0-2) DUP	SB-E1 (16-18)
Sample Name		TF26024-021	TF26024-001	TF26024-004	TF26024-005	TF26024-002	TF26024-003	TF26024-006	TF26024-007	TF26024-008	
Lab Sample ID			2 - 4	16 - 18	2 - 4	16 - 18	12 - 14	16 - 18	0 - 2	0 - 2	16 - 18
Depth Interval (feet)			06/23/2018	06/23/2018	06/25/2018	06/25/2018	06/23/2018	06/23/2018	06/25/2018	06/25/2018	06/25/2018
Sample Date											
Parameter (ug/kg)											
1H, 1H, 2H, 2H-perfluorooctane sulfonate (6:2 FTS)	NA	NA	<9.7	<10	<9.5	<12	<9.2	<11	<55	<10	<10
1H, 1H, 2H, 2H-perfluorodecane sulfonate (8:2 FTS)	NA	NA	<9.7	<10	<9.5	<12	<9.2	<11	<55	<10	<10
N-ethylperfluoro-1-octanesulfonamide (EtFOSA)	NA	NA	<1.9	4.2	<1.9	<2.3	<1.8	<2.2	<11	2.8	<2.1
N-methylperfluoro-1-octanesulfonamide (MeFOSA)	NA	NA	<1.9	<2	<1.9	<2.3	<1.8	<2.2	<11	<2.1	<2.1
Perfluorobutanoic Acid	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluorodecanoic acid (PFDA)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluorododecanoic acid (PFDoA)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluoroheptane Sulfonate (PFHPS)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	8.3	<28	<5.2	<5.2
Perfluoroheptanoic acid (PFHpA)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluorohexanoic acid (PFHxA)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluorononanoic acid (PFNA)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluoro-1-octanesulfonamide (PFOSA)	NA	NA	<4.8	350 E	24	<5.8	<4.6	<5.5	780 E	560 E	<5.2
Perfluorooctanesulfonic acid (PFOS)	NA	0.24	<4.8	1,200 E	95	8.5	<4.6	9.3	1,900 E	1,500 E	37
Perfluorooctanoic acid (PFOA)	NA	10,000	<4.8	14	15	7.7	22	<28	18	<5.2	
Perfluoropentanoic Acid (PPPeA)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluorotetradecanoic acid (PFTA)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluorotridecanoic Acid (PFTriA)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluoroundecanoic Acid (PFUnA)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluorohexane Sulfonate	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	9.3	<28	<5.2	<5.2
Perfluoro-1-nananesulfonate (PFNS)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	16	<5.2
Perfluoro-1-pentanesulfonate (PFPeS)	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluorobutane Sulfonate	NA	NA	<4.8	<5.1	<4.7	<5.8	<4.6	<5.5	<28	<5.2	<5.2
Perfluorodecane Sulfonate (PFDS)	NA	NA	<4.8	7.3	<4.7	<5.8	<4.6	<5.5	34	37	<5.2

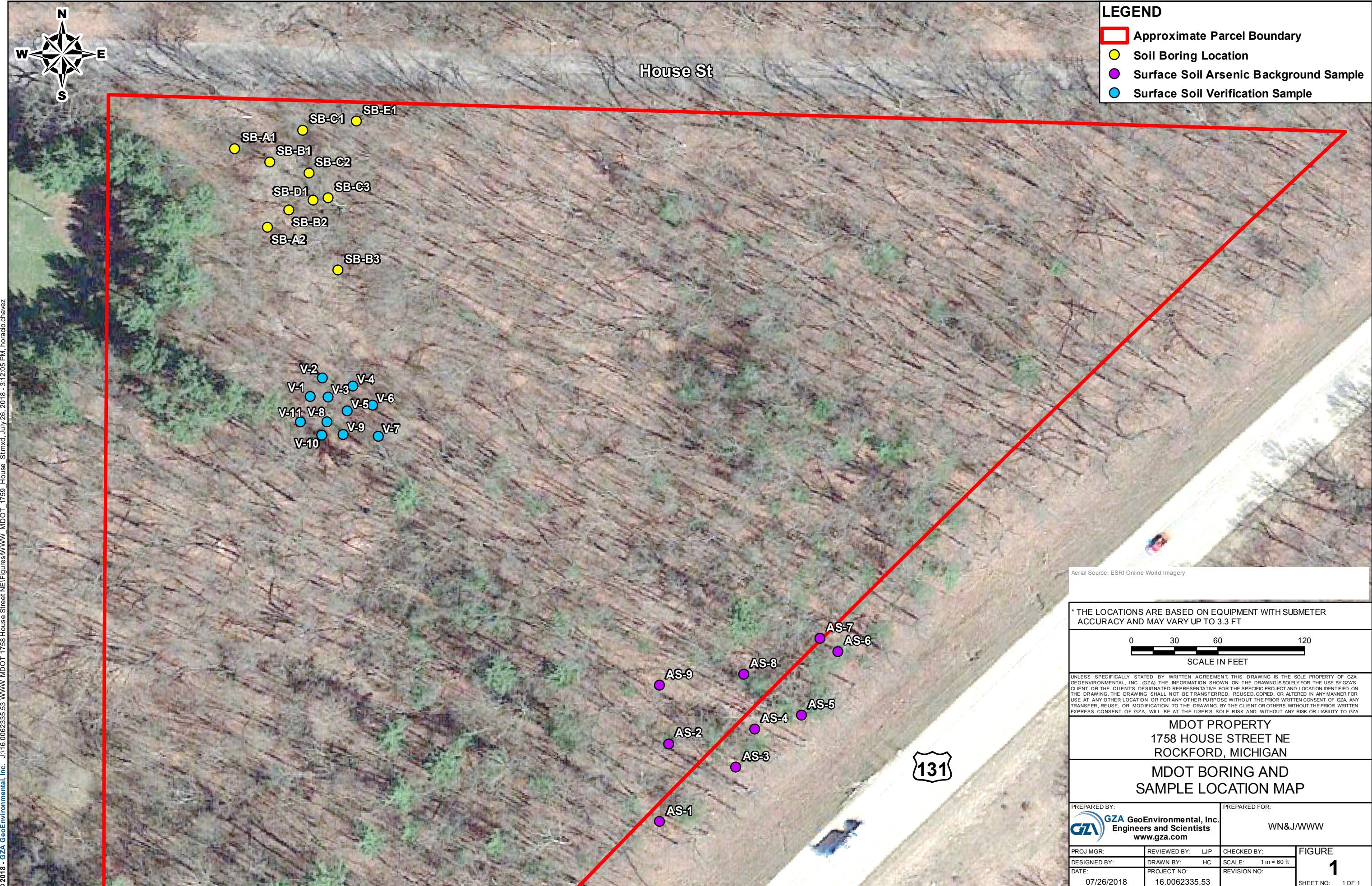
TABLE 5
SUMMARY OF SOIL SAMPLE ANALYSIS - PFAS
 1758 House Street NE
 Plainfield Township, Kent County, MI

Location Name		MDEQ PART 201 SOIL CRITERIA PROTECTIVE OF DRINKING WATER USES - RESIDENTIAL	V-1	V-2	V-3	V-4	V-5	V-6	V-7	V-8	V-9	V-10	V-11
			V-1	V-2	V-3	V-4	V-5	V-6	V-7	V-8	V-9	V-10	V-11
Sample Name			TF26024-010	TF26024-011	TF26024-012	TF26024-013	TF26024-014	TF26024-015	TF26024-016	TF26024-017	TF26024-018	TF26024-019	TF26024-020
Lab Sample ID			0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Depth Interval (feet)			06/16/2018	06/16/2018	06/16/2018	06/16/2018	06/16/2018	06/16/2018	06/16/2018	06/23/2018	06/23/2018	06/23/2018	06/23/2018
Sample Date													
Parameter (ug/kg)													
1H, 1H, 2H, 2H-perfluorooctane sulfonate (6:2 FTS)	NA	NA	<11	<11	<10	<12	<12	<9.9	<12	<10	<10	<9.8	<11
1H, 1H, 2H, 2H-perfluorodecane sulfonate (8:2 FTS)	NA	NA	<11	<11	<10	<12	<12	<9.9	<12	<10	<10	<9.8	<11
N-ethylperfluoro-1-octanesulfonamide (EtFOSA)	NA	NA	<2.2	<2.3	<2.1	<2.3	<2.4	<2	<2.4	<2	<2	<2	<2.1
N-methylperfluoro-1-octanesulfonamide (MeFOSA)	NA	NA	<2.2	<2.3	<2.1	<2.3	<2.4	<2	<2.4	<2	<2	<2	<2.1
Perfluorobutanoic Acid	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluorodecanoic acid (PFDA)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluorododecanoic acid (PFDoA)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluoroheptane Sulfonate (PFHPS)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluoroheptanoic acid (PFHpA)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluorohexanoic acid (PFHxA)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluorononanoic acid (PFNA)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluoro-1-octanesulfonamide (PFOSA)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	23	<6.1	<5.1	<5	<4.9	<5.3
Perfluoroctanesulfonic acid (PFOS)	NA	0.24	9.8	17	31	72	6	110	17	16	14	9.7	7.4
Perfluorooctanoic acid (PFOA)	NA	10,000	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluoropentanoic Acid (PFPeA)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluorotetradecanoic acid (PFTA)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluorotridecanoic Acid (PFTriA)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluoroundecanoic Acid (PFUnA)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluorohexane Sulfonate	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluoro-1-nonanesulfonate (PFNS)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluoro-1-pentanesulfonate (PPeS)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluorobutane Sulfonate	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3
Perfluorodecane Sulfonate (PFDS)	NA	NA	<5.5	<5.6	<5.1	<5.8	<5.9	<4.9	<6.1	<5.1	<5	<4.9	<5.3

NOTES FOR TABLES 1 THROUGH 5
SUMMARY OF SOIL SAMPLE ANALYSIS - PFAS
1758 House Street NE
Plainfield Township, Kent County, MI

NOTES:

1. Concentration and criteria units are micro-grams per kilogram or parts per billion; "< RL" or "<PQL" indicates the compound was analyzed for but not detected above the method detection limit; "B" indicates the compound was detected in the sample and in the associated laboratory method blank above the reporting limit; "J" indicates the result is less than the laboratory reporting limit but greater than or equal to the laboratory method detection limit and the concentration is an estimated value; "E" denotes the quantitation of the compound exceeded the calibration range; "DUP" indicates a duplicate sample; RL = Reporting Limit; PQL=Practical Quantitation Limit; MDL=Method Detection Limit.
2. **BOLD** number indicates that the compound was detected at concentrations greater than the MDL.
3. **BOLD, Italic** number with a thick border and shading indicates that the compound was detected greater than one of the listed cleanup criteria. For metals, **BOLD, Italic** number with a thick border and shading indicates that the compound was detected at a concentration greater than both the statewide background, if available, and the most restrictive Part 201 cleanup criteria.
4. Michigan Part 201 soil cleanup criteria were based on MDEQ's Table 2, Soil: Residential, Part 201 Generic Cleanup Criteria and Screening Levels, June 2018.
5. Part 201 Criteria for total chromium is not available, and the criteria for chromium (III) are used in the table.



GEOPROBE LOG												
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-A1 SHEET: 1 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:			
Logged By: Brian Luhrs Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/16/2018 Finish Date: 6/16/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83						
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.): 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:						
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed	
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab							PID (ppm)
1	C-1	0-5	60	36		0.8	C-1: S-1: 0-14": Dark brown, TOPSOIL, some Silt, trace Organics (Roots). 14-24": Brown, fine to medium SAND, trace Silt.	1	TOPSOIL	1.2	No Equipment Installed	
2	S-1	0-2				5.7			SAND	2.3		
3	S-2	2-4				0.8	S-2: 0-4": Brown, fine to medium SAND, trace Silt. 4-10": Brown, SAND and Silty CLAY. 10-12": Brown, Silty CLAY, little Sand. 12-24": No Recovery.		SAND AND SILTY	2.8		
4	S-3	4-5				NA	S-3: No Recovery.		CLAY	7		
5	C-2	5-10	60	48		0.4	C-2: S-4: No Recovery.		SILTY CLAY			
6	S-4	5-6				NA						
7	S-5	6-8				0.9	S-5: 0-12": Brown, Silty CLAY, little Sand. 12-24": Brown, fine to medium SAND, trace Silt (1" CLAY lens at 14").		CLAY	6		
8	S-6	8-10				0.5	S-6: Brown, fine to medium SAND, trace Silt.			7		
9	C-4	10-15	60	45		ND	C-4: S-7: 0-15": No Recovery.		SAND			
10	S-7	10-12				1.0	15-24": Brown fine to medium SAND, trace Silt.					
11	S-8	12-14				0.9	S-8: Brown fine to medium SAND, trace Silt.					
12												
13												
14												
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense					<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard	<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None 1/4" 1/8" 1/16" 1/32" 1/64"					MISSDIG Ticket Number:	
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 represents <0.1 ppmv. Background was ND.											Logger Initials: Brian Luhrs	
REMARKS												Boring No.: SB-A1

GEOPROBE LOG												
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-A1 SHEET: 2 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:			
Logged By: Brian Luhrs Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/16/2018 Finish Date: 6/16/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83						
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.): 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:						
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)		
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab						PID (ppm)	
14	S-9	14-15				1.2	S-9: Brown fine to medium SAND, trace Silt.		SAND			
15	C-5	15-20	60	56		ND	C-5: S-10: 0-4": No Recovery.			15		
16	S-10	15-16				0.9	4-12": Brown, Silty CLAY.					
17	S-11	16-18				0.8	S-11: Brown, Silty CLAY.		SILTY CLAY			
18	S-12	18-20				0.7	S-12: 0-4": Brown, Silty CLAY. 4-24": Brown, fine to medium SAND, trace Silt.			18.3		
19									SAND			
20								2		20		
21							End of exploration at 20 feet.					
22												
23												
24												
25												
26												
27												
28												
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense					<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard			<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None SILT 1/4" Clayey SILT 1/8" SILT & CLAY 1/16" CLAY & SILT 1/32" Silty CLAY 1/64" CLAY			MISSDIG Ticket Number:	
2. Groundwater was not encountered during drilling or upon completion.											Logger Initials: Brian Luhrs	
											Boring No.: SB-A1	
REMARKS												

GEOPROBE LOG														
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-A2 SHEET: 1 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:					
Logged By: Allie Hazard Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/16/2018 Finish Date: 6/16/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83								
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.): 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:								
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed			
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab							PID (ppm)		
1	C-1	0-5	60	43		0.1	C-1: S-1: 0-6": Dark brown, TOPSOIL. 6-11": Brown, fine to medium SAND, some Silty Clay. 11-23": Brown, fine to medium SAND, trace Silt. 23-24": Brown, Clayey SILT, trace fine to medium Sand.		TOPSOIL	0.5				
2	S-1	0-2				1.0		1	SAND	1.9	No Equipment Installed			
3	S-2	2-4				0.7	S-2: 0-2": Brown, Clayey SILT, trace fine to medium Sand. 2-15": Brown, fine to medium SAND, trace Silt. (2" Dark brown, Organic, rich, fine to medium SAND, trace Organics (Roots) lens at 5" and 0.5" lens at 10") 15-19": Brown, Clayey SILT, trace fine to medium Sand. 19-24": No Recovery.		CLAYEY SILT	2.2				
4	S-3	4-5				NA	S-3: No Recovery.		SAND	3.3				
5	C-2	5-10	60	49		ND	C-2: S-4: 0-11": No Recovery.		CLAYEY SILT					
6	S-4	5-6				0.8	11-12": Brown, Clayey SILT, trace fine to medium Sand.							
7	S-5	6-8				0.8	S-5: 0-11": Brown, Clayey SILT, trace fine to medium Sand. 11-24": Brown to light brown, fine to medium SAND, trace Silt.			6.9				
8	S-6	8-10				0.9	S-6: Brown to light brown, fine to medium SAND, trace Silt.							
9	C-3	10-15	60	54		ND	C-3: S-7: 0-6": No Recovery.							
10	S-7	10-12				1.0	6-24": Brown to light brown, fine to medium SAND, trace Silt.		SAND					
11	S-8	12-14				0.9	S-8: Brown to light brown, fine to medium SAND, trace Silt.							
12														
13														
14														
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense					<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard			<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None SILT 1/4" Clayey SILT 1/8" SILT & CLAY 1/16" CLAY & SILT 1/32" Silty CLAY 1/64" CLAY			MISSDIG Ticket Number:			
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 represents <0.1 ppmv. Background was ND.												Logger Initials: Allie Hazard		
												Boring No.: SB-A2		
REMARKS														

GEOPROBE LOG											
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-A2 SHEET: 2 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:		
Logged By: Allie Hazard Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/16/2018 Finish Date: 6/16/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83					
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.): 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:					
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab						PID (ppm)
15	S-9	14-15				1.1	S-9: Light brown, fine to medium SAND, trace Silt.				
16	C-4	15-20	60	60		ND	C-4: S-10: Brown to light brown, fine to medium SAND, trace Silt. (1" Dark brown, Organic Rich, fine to medium Sand lens at 8") S-11: 0-9": Brown, fine to medium SAND, trace Silt. 9-24": Brown, CLAY & SILT, trace fine Sand.		SAND		
17	S-10	15-16				0.6					
18	S-11	16-18				0.5					
19	S-12	18-20				0.4	S-12: Brown, CLAY & SILT, trace fine Sand.		CLAY AND SILT		
20								2		20	
21							End of exploration at 20 feet.				
22											
23											
24											
25											
26											
27											
28											
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense					<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard			<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None SILT 1/4" Clayey SILT 1/8" SILT & CLAY 1/16" CLAY & SILT 1/32" Silty CLAY 1/64" CLAY			MISSDIG Ticket Number:
2. Groundwater was not encountered during drilling or upon completion.											Logger Initials: Allie Hazard
											Boring No.: SB-A2
REMARKS											

GEOPROBE LOG												
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-B1 SHEET: 1 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:			
Logged By: Allie Hazard Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/16/2018 Finish Date: 6/16/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83						
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.) : 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:						
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed	
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab							PID (ppm)
1	C-1	0-5	60	36	ND	C-1: S-1: 0-8": Dark brown, TOPSOIL, trace Organics (Roots). 8-16": Brown, fine to medium SAND, trace Organics (Roots), trace Silt. 16-24": Dark brown, fine to medium SAND, trace Organics (Roots), some Silt.	1	TOPSOIL	0.7	No Equipment Installed		
2	S-1	0-2			0.8	S-2: 0-4": Dark brown, fine to medium SAND, trace Organics (Roots), some Silt. 4-13": Brown to dark brown, fine to coarse SAND, some Silt, trace Organics (Roots). 13-24": No Recovery.		SAND	1.3			
3	S-2	2-4			0.7	S-3: No Recovery.		SILTY SAND				
4	S-3	4-5			NA							
5	C-2	5-10	60	42	ND	C-2: S-4: No Recovery.						
6	S-4	5-6			NA							
7	S-5	6-8			1.1	S-5: 0-6": No Recovery. 6-12": Dark brown, fine to medium SAND, some Silt, trace Organics (Roots). 12-24": Brown to light brown, fine to medium SAND, trace Silt.			7			
8	S-6	8-10			1.2	S-6: Brown to light brown, fine to medium SAND, trace Silt.						
9	C-3	10-15	60	43	ND	C-3: S-7: 0-17": No Recovery.						
10	S-7	10-12			1.0	17-24": Brown to light brown, fine to medium SAND, trace Silt.		SAND				
11	S-8	12-14			0.6	S-8: Brown to light brown, fine to medium SAND, trace Silt.						
12												
13												
14												
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense					<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard	<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None 1/4" 1/8" 1/16" 1/32" 1/64"					MISSDIG Ticket Number:	
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 represents <0.1 ppmv. Background was ND.											Logger Initials: Allie Hazard	
											Boring No.: SB-B1	
REMARKS												

GEOPROBE LOG												
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-B1 SHEET: 2 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:			
Logged By: Allie Hazard Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/16/2018 Finish Date: 6/16/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83						
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.): 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:						
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)		
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab						PID (ppm)	
15	S-9	14-15				0.9	S-9: 0-8": Brown to light brown, fine to medium SAND, trace Silt. 8-12": Brown, Silty CLAY, trace fine Sand. C-4:		SAND			
16	C-4	15-20	60	55		ND	S-10: 0- 5": No Recovery. 5-12": Brown, Silty CLAY, trace fine Sand.			15.7		
17	S-10	15-16				0.8	S-11: Brown, Silty CLAY, trace fine Sand.					
18	S-11	16-18				0.9			SILTY CLAY			
19	S-12	18-20				0.6	S-12: 0-16": Brown, Silty CLAY, trace fine Sand. 16-24": Light brown, fine to medium SAND, trace Silt.			19.3		
20							End of exploration at 20 feet.	2	SAND	20		
21												
22												
23												
24												
25												
26												
27												
28												
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense					<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard			<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None SILT 1/4" Clayey SILT 1/8" SILT & CLAY 1/16" CLAY & SILT 1/32" Silty CLAY 1/64" CLAY			MISSDIG Ticket Number:	
2. Groundwater was not encountered during drilling or upon completion.											Logger Initials: Allie Hazard	
											Boring No.: SB-B1	
REMARKS												

GEOPROBE LOG															
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-B2 SHEET: 1 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:						
Logged By: Allie Hazard Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/16/2018 Finish Date: 6/16/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83									
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.) : 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:									
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister			Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed		
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab									PID (ppm)	
1	C-1	0-5	60	40	ND	C-1: S-1: 0-8": Dark brown, TOPSOIL. 8-23": Brown, fine to medium SAND, some Clay & Silt. (1" Silt & Clay lens at 17") 23-24": Dark brown, fine to medium SAND, trace Silt, trace Organics (Roots).			1	TOPSOIL	0.7		No Equipment Installed		
2	S-1	0-2			0.4	S-1: 0-8": Dark brown, TOPSOIL. 8-23": Brown, fine to medium SAND, some Clay & Silt. (1" Silt & Clay lens at 17") 23-24": Dark brown, fine to medium SAND, trace Silt, trace Organics (Roots).									
3	S-2	2-4			0.6	S-2: 0-16": Dark brown, fine to medium SAND, trace Silt, trace Organics (Roots). 16-24": No Recovery.									
4	S-3	4-5			NA	S-3: No Recovery.									
5	C-2	5-10	60	50	ND	C-2: S-4: 0-10": No Recovery.									
6	S-4	5-6			0.6	10-12": Dark brown, fine to medium SAND, tract Silt, trace Organics (Roots).									
7	S-5	6-8			0.7	S-5: 0-8": Dark brown, fine to medium SAND, tract Silt, trace Organics (Roots). 8-24": Brown to light brown, fine to medium SAND, trace Silt.									
8	S-6	8-10			0.7	S-6: Brown to light brown, fine to medium SAND, trace Silt.									
9	C-3	10-15	60	54	ND	C-3: S-7: 0-6": No Recovery.									
10	S-7	10-12			0.6	6-13": Brown to light brown, fine to medium SAND, trace Silt. 13-20": Dark brown, fine to medium SAND, trace Silt, trace Organics (Roots).									
11	S-8	12-14			0.7	(1" light brown, fine to medium Sand lens at 17") 20-24": Brown to light brown, fine to medium SAND, trace Silt. S-8: Brown-light brown, fine to medium SAND, trace Silt.									
12															
13															
14															
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense					<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard			<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None SILT 1/4" Clayey SILT 1/8" SILT & CLAY 1/16" CLAY & SILT 1/32" Silty CLAY 1/64" CLAY			MISSDIG Ticket Number:				
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 represents <0.1 ppmv. Background was ND.												Logger Initials: Allie Hazard			
												Boring No.: SB-B2			
REMARKS															

GEOPROBE LOG													
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-B2 SHEET: 2 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:				
Logged By: Allie Hazard Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/16/2018 Finish Date: 6/16/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83							
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.): 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:							
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)			
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab						PID (ppm)		
14	S-9	14-15				0.5	S-9: 0-11": Brown to light brown, fine to medium SAND, trace Silt. 11-12": Brown, CLAY & SILT, trace fine Sand. C-4:		SAND				
15	C-4	15-20	60	54		ND	S-10: 0-6": No Recovery. 6-11": Brown, CLAY & SILT, trace fine Sand. S-11: Brown, CLAY & SILT, trace fine sand.			14.9			
16	S-10	15-16				0.3							
17	S-11	16-18				0.2							
18	S-12	18-20				0.4	S-12: 0-9": Brown, CLAY & SILT, trace fine Sand. 9-24": Light brown, fine to medium SAND, trace Silt.		CLAY AND SILT				
19										19.3			
20								2	SAND	20			
21							End of exploration at 20 feet.						
22													
23													
24													
25													
26													
27													
28													
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense					<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard			<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None SILT 1/4" Clayey SILT 1/8" SILT & CLAY 1/16" CLAY & SILT 1/32" Silty CLAY 1/64" CLAY			MISSDIG Ticket Number:		
2. Groundwater was not encountered during drilling or upon completion.													
REMARKS													
Logger Initials: Allie Hazard													
Boring No.: SB-B2													

GEOPROBE LOG												
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-B3 SHEET: 1 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:			
Logged By: Chris Melby Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/23/2018 Finish Date: 6/23/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83						
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.): 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:						
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed	
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab							PID (ppm)
1	C-1	0-5	60	37		ND	C-1: S-1: Dark brown, fine to medium SAND, little Organics (Roots), trace Silt.			TOPSOIL	No Equipment Installed	
2	S-1	0-2				0.2						
3	S-2	2-4				0.8	S-2: 0-13": Dark brown, fine to medium SAND, trace Silt, trace Organics (Roots). 13-24": No Recovery.					
4	S-3	4-5				0.3	S-3: No Recovery.					
5	C-2	5-10	60	54			C-2: S-4: 0-6": No Recovery.					
6	S-4	5-6				0.4	6-24": Brown, fine to medium SAND, trace Silt.					
7	S-5	6-8				0.3	S-5: Light brown, fine to medium SAND, trace Silt.			SAND		
8	S-6	8-10				0.2	S-6: Light brown, fine to medium SAND, trace Silt.					
9												
10	C-3	10-15	60	60		ND	C-3: S-7: 0-7": Light brown, fine to medium SAND, trace Silt.					
11	S-7	10-12				0.2	7-24": Brown, CLAY & SILT.				10.6	
12	S-8	12-14				0.4	S-8: Brown, CLAY & SILT.			CLAY AND SILT		
13												
14											14	
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense			<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard			<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None SILT 1/4" Clayey SILT 1/8" SILT & CLAY 1/16" CLAY & SILT 1/32" Silty CLAY 1/64" CLAY			MISSDIG Ticket Number:			
REMARKS											Logger Initials: Chris Melby	
											Boring No.: SB-B3	

GEOPROBE LOG														
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-B3 SHEET: 2 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:					
Logged By: Chris Melby Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/23/2018 Finish Date: 6/23/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83								
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.): 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:								
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister			Remark	Elev. (ft.)	Stratum Description	Depth (ft.)		
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab								PID (ppm)	
14	S-9	14-15				0.3	S-9: Light brown, fine to medium SAND, trace Silt.							
15	C-4	15-20	60	60		ND	C-4: S-10: 0-11": Light brown, fine to medium SAND, trace Silt.				SAND			
16	S-10	15-16				0.2	S-11: 0-4": Brown, CLAY & SILT.							
17	S-11	16-18				0.4	11-12": Brown, CLAY & SILT. S-11: 0-4": Brown, CLAY & SILT.							
18							4-12": Dark brown, fine to medium SAND, little Organics (Roots), trace Silt.							
19	S-12	18-20				0.4	12-24": Light brown, fine to medium SAND, trace Silt. S-12: Light brown, fine to medium SAND, trace Silt.				SAND			
20							End of exploration at 20 feet.						20	
21														
22														
23														
24														
25														
26														
27														
28														
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense					<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard			<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None SILT 1/4" Clayey SILT 1/8" SILT & CLAY 1/16" CLAY & SILT 1/32" Silty CLAY 1/64" CLAY			MISSDIG Ticket Number:			
REMARKS														
Logger Initials: Chris Melby														
Boring No.: SB-B3														

GEOPROBE LOG														
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-C1 SHEET: 1 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:					
Logged By: Allie Hazard Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/16/2018 Finish Date: 6/16/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83								
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.): 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:								
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed			
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab							PID (ppm)		
1	C-1	0-5	60	37		ND	C-1: S-1: 0-6": Dark brown, TOPSOIL. 6-12": Brown, fine to medium SAND, some Silt, trace Organics (Roots). 12-20": Dark brown, SILT, little Organics (Roots), little fine to medium Sand. 20-24": Brown to dark brown, fine to medium SAND, trace Clayey Silt, trace Organics (Roots). S-2: 0-6": Brown, Clayey SILT, trace fine to medium Sand, trace Organics (Roots). 6-19": Brown to light brown, fine to medium SAND, trace Silt. (1" Clayey Silt lens at 8") 19-24": No Recovery.							
2	S-1	0-2				0.6								
3	S-2	2-4				0.7								
4	S-3	4-5				NA								
5	C-2	5-10	60	42		ND	S-3: No Recovery.							
6	S-4	5-6				NA	C-2: S-4: No Recovery.							
7	S-5	6-8				0.2	S-5: 0-6": No Recovery. 6-24": Brown to light brown, fine to medium SAND, trace Silt.							
8	S-6	8-10				0.2	S-6: Brown to light brown, fine to medium SAND, trace Silt.							
9	C-3	10-15	60	56		ND	C-3: S-7: 0-4": No Recovery.							
10	S-7	10-12				0.5	4-20": Brown, SILT & CLAY, trace fine to medium Sand.							
11	S-8	12-14				0.6	S-8: Brown, SILT & CLAY, trace fine to medium Sand.							
12														
13														
14														
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense					<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard			<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None 1/4" 1/8" 1/16" 1/32" 1/64"			MISSDIG Ticket Number:			
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 represents <0.1 ppmv. Background was ND.												Logger Initials: Allie Hazard		
												Boring No.: SB-C1		
REMARKS														

GEOPROBE LOG											
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-C1 SHEET: 2 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:		
Logged By: Allie Hazard Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/16/2018 Finish Date: 6/16/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83					
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.): 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:					
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab						PID (ppm)
14	S-9	14-15				0.9	S-9: 0-9": Brown, SILT & CLAY, trace fine to medium Sand. 9-12": Brown, fine to medium SAND, trace Silt. C-4: S-10: No Recovery.		SILT AND CLAY	14.8	
15	C-4	15-20	60	48		ND					
16	S-10	15-16				NA					
17	S-11	16-18				1.0	S-11: Brown to light brown, fine to medium SAND, trace Silt.		SAND		
18	S-12	18-20				0.8	S-12: 0-21": Light brown to brown, fine to medium SAND, trace Silt. 21-24": Brown, SILT & CLAY, trace fine to medium Sand.				
19											
20							End of exploration at 20 feet.		SILT AND CLAY	19.8	
21										20	
22											
23											
24											
25											
26											
27											
28											
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense			<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard			<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None SILT 1/4" Clayey SILT 1/8" SILT & CLAY 1/16" CLAY & SILT 1/32" Silty CLAY 1/64" CLAY			MISSDIG Ticket Number:		
									Logger Initials: Allie Hazard		
									Boring No.: SB-C1		
REMARKS											

GEOPROBE LOG														
 GZA GeoEnvironmental, Inc. Engineers and Scientists					Michigan DEQ 1758 House Street Rockford, Michigan				EXPLORATION NO.: SB-C2 SHEET: 1 of 2 PROJECT NO: 16.0062335.53 REVIEWED BY:					
Logged By: Joe Workman Drilling Co.: Stearns Drilling Foreman: Roger Christensen					Start Date: 6/23/2018 Finish Date: 6/25/2018 Final Depth (ft.): 20	BORING COORDINATES (International Feet): N E H. Datum: MI State Plane S Zone NAD83								
Type of Rig: Geoprobe Rig Model: 7822DT Drilling Method: Direct Push					Sampler Type: Macro Core Sampler O.D. (in.): 2.25" O.D. Sampler Length (in.) : 5.0'	Offset of Boring From Original Location: Ground Elevation: V. Datum:								
Depth (ft)	Sample					Sample Description & Configuration Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed			
	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Submitted To Lab							PID (ppm)		
1	C-1	0-5	60	34	ND	C-1: S-1: 0-6": Brown, fine to medium SAND, trace Silt, trace Organics (Roots). 6-22": Brown, fine to medium SAND, trace Silt. 22-24": Brown, CLAY & SILT, some fine to medium Sand, trace Organics (Roots).	1	TOPSOIL	0.5					
2	S-1	0-2			0.4	S-2: 0-4": Brown, CLAY & SILT, some fine to medium Sand, trace Organics (Roots). 4-8": Gray, fine to medium SAND, trace Silt. trace Organics (Roots). 8-10": Red-brown, fine to medium SAND, trace Silt, trace Organics (Roots). 10-24": No Recovery.		SAND	1.8		No Equipment Installed			
3	S-2	2-4			0.4	S-3: No Recovery.		CLAY AND SILT	2.3					
4	S-3	4-5			ND	C-2: S-4: 0-7": No Recovery. 7-12": Brown, fine to medium SAND, trace Silt. trace Organics (Roots). S-5: 0-8" Brown, fine to medium SAND, trace Silt. trace Organics (Roots). 8-24": Brown, fine to medium SAND, trace Silt.								
5	C-2	5-10	60	53	0.6	S-6: Brown, fine to medium SAND, trace Silt.		SAND						
6	S-4	5-6			0.5									
7	S-5	6-8			0.4									
8	S-6	8-10			0.3									
9	C-3	10-15	60	54	0.1	C-3: S-7: 0-6": No Recovery. 6-9": Brown, fine to medium SAND, trace Silt. 9-13": Brown, fine to medium SAND, trace Silt, trace Organics (Roots)								
10	S-7	10-12			0.5	13-16": Brown, fine to medium SAND, trace Silt. 16-20": Brown, fine to medium SAND, some Silt & Clay, trace Organics (Roots).								
11	S-8	12-14			0.4	20-24": Brown, fine to medium SAND, trace Silt. S-8: Brown, fine to medium SAND, trace Silt.								
12														
13														
14														
<u>Granular Soils</u> <u>Blows/FT Density</u> 0-4 -- Very Loose 4-10 -- Loose 10-30 -- Medium Dense 30-50 -- Dense >50 -- Very Dense					<u>Cohesive Soils</u> <u>Blows/FT Consistency</u> <2 -- Very Soft 2-4 -- Soft 4-8 -- M. Stiff 8-15 -- Stiff 15-30 -- V. Stiff >30 -- Hard			<u>Plasticity</u> <u>SM Thread Diameter Rolled</u> None 1/4" 1/8" 1/16" 1/32" 1/64"			MISSDIG Ticket Number:			
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 represents <0.1 ppmv. Background was measured at 0.0 ppmv. 2. Soil saturated at approximately 14 feet below ground surface.												Logger Initials: Joe Workman		
												Boring No.: SB-C2		
REMARKS														

