Rose & Westra
A Division of GZA

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

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File No. 16.0062677.81
December 13, 2017

Ms. Abigail Hendershott
Acting District Supervisor – Remediation and Redevelopment Division
Michigan Department of Environmental Quality
350 Ottawa Avenue NW #10
Grand Rapids, Michigan 49503

Re: Wolverine Worldwide, Inc. – Source Area Investigation Near Former Gravel Pit, Wolven Avenue Area, Algoma Township, Kent County, Michigan

Dear Ms. Hendershott:

On behalf of Wolverine Worldwide, Inc. (Wolverine), Rose & Westra, a Division of GZA GeoEnvironmental, Inc. (R&W/GZA), prepared this Source Area Investigation Work Plan related to the detection of per- and polyfluorinated alkyl substances (PFAS) in residential drinking water samples collected from the Wolven Avenue area in Algoma Township, Michigan. This Work Plan was prepared in response to certain requests included in Michigan Department of Environmental Quality's (MDEQ's) letter to Wolverine dated December 4, 2017.

BACKGROUND

In accordance with a November 6, 2017 request from MDEQ, Wolverine sampled residential drinking water wells in the Wolven Avenue area between November 15 and 21, 2017. Samples were analyzed for PFAS via EPA Method PFC/537M. Through December 6, 2017, the analytical results for approximately 83 samples had been received; combined concentrations of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) ranged from non-detect to 9,800 nanograms per liter (ng/l; parts per trillion).

According to the MDEQ, historical aerial photographs from 1965 show a gravel pit and interviews with a resident formerly from the area 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. Note that in response to MDEQ's December 4, 2017 request, Wolverine has expanded its residential well sampling program to include 189 houses located west of US 131 and east of the Rogue River. This work, known as Wolven West and Wolven West North (see Figure 1), commenced on December 4, 2017.

SCOPE OF WORK

The scope of work will include the following tasks.

TASK 1 – PREPARE REGIONAL GEOLOGICAL CROSS SECTIONS – PRELIMINARY CONCEPTUAL SITE MODEL

R&W/GZA will retain a licensed surveyor to establish reference point elevations for select residential wells located within the Wolven West and Wolven West North area. This data will be used in conjunction with the residential water well logs from the Kent County online parcel viewer to prepare geological cross sections. The cross sections, existing residential well analytical results, and historical aerial photographs will be used to develop a preliminary Conceptual Site Model (CSM) and will be used to evaluate soil boring/monitoring well locations and depths.

TASK 2 – SOIL BORING AND MONITORING WELL INSTALLATIONS

Based on information obtained in Task 1, and based on the results of the ongoing residential well sampling program in this area, R&W/GZA will implement a subsurface exploration program in the vicinity of, and downgradient of, the former gravel pit. The subsurface investigation will be focused on evaluating the vertical and lateral extents of PFAS-impacted groundwater, and evaluating hydraulic gradients. The number of monitoring wells and well screen depths will be based on the findings of Task 1. However, five preliminarily-proposed locations are shown on Figure 1. Field observations and access considerations may cause these locations to be modified. Based on our current understanding of local geological conditions, we anticipate installing well triplets or couplets at each location. Wells will likely be installed in the deep and shallow aquifers, at depths of approximately 150 feet below ground surface (bgs) and approximately 50 feet bgs, respectively; intermediate wells may also be installed depending on conditions observed during drilling (i.e., changes in lithology) or at elevations similar to those of nearby residential wells.

Soil borings will be advanced using standard hollow stem auger (HSA) methods. The deepest boring at each location will be advanced first; geologic information gathered during the installation of the deeper borings will be used to select well screen intervals for the shallower monitoring wells at those locations, and will be used to update the geological cross sections prepared in Task 1. Soil samples will be collected at 5-foot intervals using Standard Penetration Test methods. R&W/GZA field personnel will screen soil samples for total volatile organic compounds (VOCs) using a photoionization detector (PID). Based on PID screening and visual and olfactory observations, select soil samples may be analyzed for PFAS via EPA Method PFC/537M. Excess soil will be containerized in 55-gallon open-top steel drums and temporarily stored in a designated area. Containerized soil will be disposed of at an appropriate off-site, licensed disposal facility.

Soil borings will be completed with monitoring well installations. Monitoring wells will consist of 2-inch-diameter PVC solid riser pipe attached to slotted well screen, and will be completed with flush-mounted road boxes or a locked protective standpipe. Monitoring wells will be developed following installation using an inertia pump and surge block methods. Water generated during the well development activities will be placed in containers for off-site disposal. Monitoring well locations and reference point elevations (ground surface and top of casing) will be established by a licensed surveyor. R&W/GZA personnel will measure depths to water in the newly installed monitoring wells and select residential wells in the Wolven West and Wolven West North area to assess groundwater flow direction.

TASK 3 – GROUNDWATER SAMPLING

After a minimum two-week rest period, R&W/GZA will sample the newly installed monitoring wells via low-flow sampling techniques. In the process of low-flow purging activities, groundwater will be monitored for pH, specific conductivity, temperature, oxidation-reduction potential (ORP), and dissolved oxygen (DO) using a YSI multimeter in conjunction with a flow-through cell. Groundwater samples will be collected upon parameter stabilization. Samples will be collected in laboratory-provided, PFAS-free, polyethylene bottles, placed in an ice-packed cooler, and transported to ALS Environmental in Kelso, Washington or Eurofins Lancaster in Lancaster, Pennsylvania for analysis of PFAS via EPA Method PFC/537M. Groundwater samples will also be collected for analysis of VOCs, MI-18 metals, and general chemistry (nitrate/nitrite,

ammonia, sodium, potassium, calcium, magnesium, chloride, sulfate, and alkalinity). The groundwater samples will be placed in an ice-packed cooler and transported to the appropriate laboratories in accordance with chain-of-custody protocols for laboratory analysis according to MDEQ Remediation and Redevelopment Division Operational Memorandum No. 2, Attachment 5 (2004). We will collect one field blank to assess potential cross-contamination from sources of PFAS routinely found in the environment, one VOC trip blank, and one blind duplicate per day.

TASK 4 – DATA EVALUATION AND INTERPRETATION

The information and data collected in Tasks 1 through 3, and the analytical results of the ongoing residential well sampling program will be evaluated by R&W/GZA relative to the project objectives. We will provide MDEQ with the following information upon completion of the subsurface investigation:

- Soil boring logs for the explorations containing soil descriptions, VOC field-screening results, and monitoring well installation details.
- A Site Plan showing monitoring well and residential well sampling locations, potential former disposal areas, if applicable, and concentrations of PFOS and PFOA.
- A contour interpretation of the water table surface and groundwater flow direction.
- Revised geological cross sections based on the information obtained during the investigation.
- Data summary tables for soil and groundwater analytical results. The analytical results will be compared to existing Michigan Part 201 cleanup criteria or, for PFAS, the EPA's lifetime drinking water advisory concentrations, if applicable.
- A summary report with conclusions and recommendations.

SCHEDULE

R&W/GZA is currently gathering information necessary to prepare the initial geological cross sections, and the residential well sampling in the Wolven West and Wolven West North area is ongoing. As noted above, we will use analytical results obtained during the residential well sampling program to guide our subsurface investigation locations. However, we anticipate initiating the monitoring well installation program for the five proposed locations shown on Figure 1 during the week of January 15, 2018. Based on our current understanding of conditions, we anticipate the investigation and report will take approximately 90 days to complete.

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

Susan J. Bator
Senior Project Manager

Mark A. Westra
Associate Principal

cc: 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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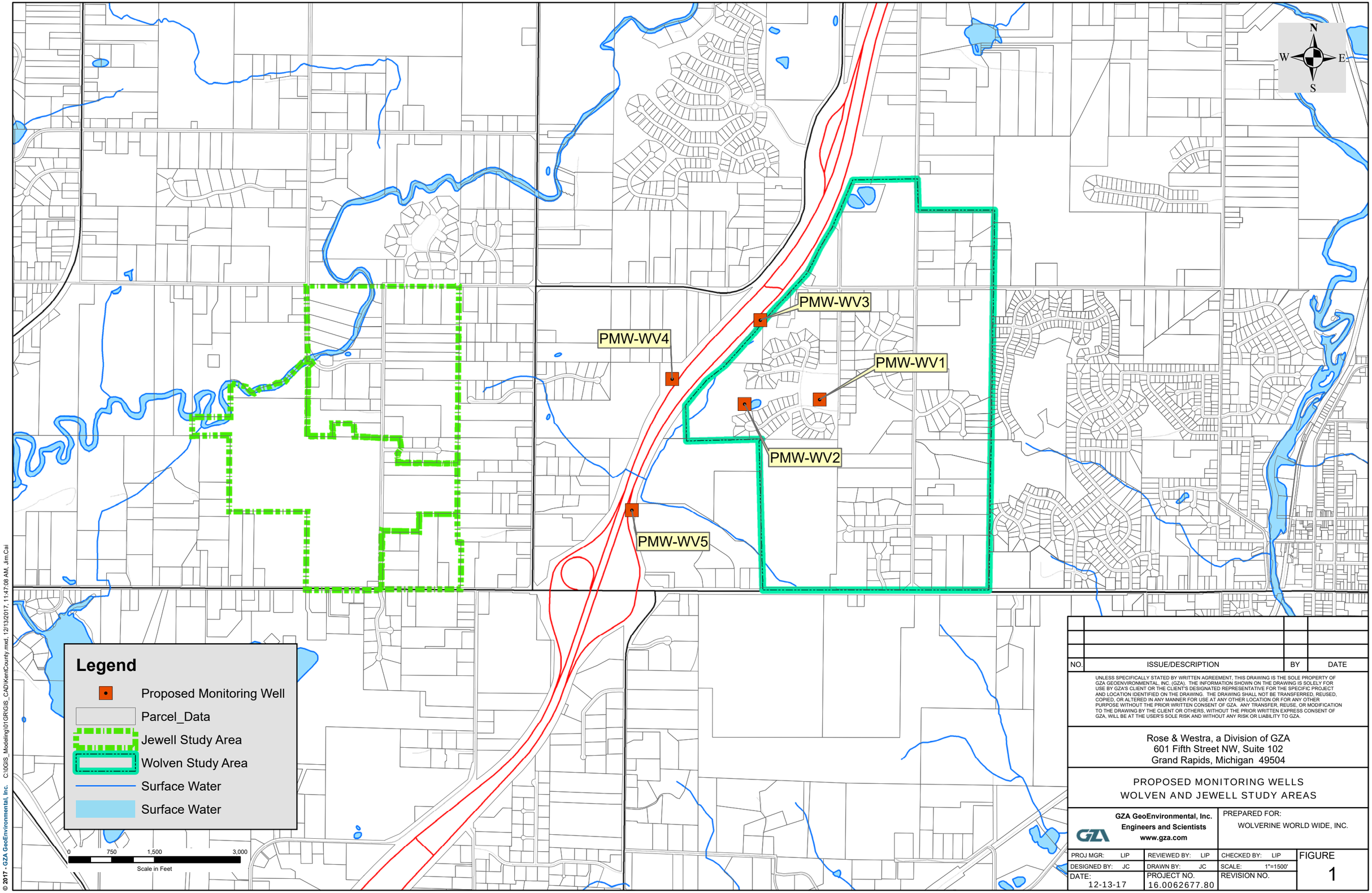

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NO.	ISSUE/DESCRIPTION	BY	DATE

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PROPOSED MONITORING WELLS
WOLVEN AND JEWELL STUDY AREAS

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

PREPARED FOR:
WOLVERINE WORLD WIDE, INC.

PROJ MGR: LIP	REVIEWED BY: LIP	CHECKED BY: LIP	FIGURE
DESIGNED BY: JC	DRAWN BY: JC	SCALE: 1"=1500'	1
DATE: 12-13-17	PROJECT NO. 16.0062677.80	REVISION NO.	