



Rose & Westra
A Division of GZA

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION
MANAGEMENT

The Widdicomb Building
601 Fifth Street NW
Suite 102
Grand Rapids, MI 49504
T: 616.956.6123
F: 616.288.3327
www.rosewestra.com
www.gza.com



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Sent Via Email: hendershotta@michigan.gov

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

Re: Wolverine World Wide, Inc.
MDOT Parcel Investigation Summary Report

Dear Ms. Hendershott:

Rose & Westra, a Division of GZA GeoEnvironmental, Inc. (R&W/GZA) is presenting this MDOT Parcel Soil Investigation Report (Report) on behalf of Wolverine World Wide, Inc. (Wolverine). This Report pertains to the property located at 1758 House Street NE, Belmont, Michigan ("Site" or "MDOT Parcel").

Background Information

Based on historical files, it appears the MDOT Parcel was used for waste disposal in the 1950s and possibly 1960s. Historical aerials show disturbed areas of the parcel which are consistent with physical observations. Figure A presents a Site Plan which includes the overlay of the historical soil disturbances from the 1950 and 1960/61 aerials on a current aerial photograph.

These aerial photographs suggest disturbances on the MDOT Parcel ceased by 1965. The 1965 aerial photograph shows significant vegetative growth in the formerly disturbed areas.

Solid waste was previously removed from the MDOT Parcel. In June 2018, R&W/GZA collected soil verification samples from the excavation area as well as completed 10 soil borings in disturbed areas (indicated on the previously discussed aerial photographs). The June 2018 investigation is summarized in our August 31, 2018 letter entitled *Wolverine World Wide, Inc., MDOT Property 2018 Soil Investigation Report*.

The soil boring and surface soil sampling locations completed in June 2018 are shown on Figure B.

Based on the historical information identified and the findings of the previous investigations, Wolverine developed a scope of work to search for evidence of historical waste disposal in the formerly disturbed areas of the parcel, including various possible sources of waste. The work plan was submitted to the MDEQ on October 3, 2018 and completed on November 2, 2019. The findings of that investigation are summarized herein.



Soil Investigation

R&W/GZA utilized a triangular grid for the soil investigation. The grid points were located approximately 60 feet apart; see the scope of work for the proposed boring locations. The 60-ft grid interval was selected based on the EPA statistical model and reflects a 95% confidence level of finding a potential source if it is present.

At the request of the MDEQ, four additional borings were included in the ravine on the Site (MDOT-SB-33, -34, -39 and -41).

Borings were advanced using the direct-push method to approximately 20-feet below ground surface (bgs). This depth was selected based on our experience with the identified waste depths at the adjoining House Street site. Consistent with the House Street site work plan, the soil was logged, and field screened at 2-foot intervals using a photoionization detector (PID) and XRF. The verbally approved scope of work indicated if visible waste was encountered the screening interval was reduced to one foot. Visible waste was not encountered.

For borings where no visual, XRF, or PID screening indicated the likely presence of volatile organic compounds (VOCs) or elevated metals concentrations, two samples were collected for laboratory analysis. One sample was collected from a random depth within the top 10 feet and the second from a random interval within the lower 10 ft of the boring.

The approved scope of work indicated when visible waste was identified in the boring or if either PID or XRF screening suggested VOCs present or elevated metals concentrations may be present, soil samples were to be collected from within the identified interval and from approximately 2 ft below that interval. Because none of the screening triggers occurred, no such samples were necessary.

Soil boring logs are attached. Table A summarizes the borings completed, sample intervals, and XRF and PID data from those intervals.

The samples were analyzed for the following analytes in accordance with both the Quality Assurance Project Plan (QAPP) developed by R&W/GZA for the U.S. EPA and the PFAS QAPP developed for MDEQ:

- Volatile organic compounds (VOCs);
- Semi-volatile organic compounds (SVOCs);
- Metals Al, Sb, As, Ba, Be, B, Cd, Cr Total, Cr VI, Co, Cu, Fe, Pb, Mg, Hg, Mo, Ni, Se, Ag, Na, Ti, Tl, V, and Zn;
- Acetate;
- Formate;
- Total ammonia, nitrate, and nitrite;
- Chloride;
- Cyanide (total and available);
- Total phosphorus;
- Sulfate and sulfide; and



- Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by DOD QSM v1.1 (PFAS).

Excess soil was placed in 55-gallon open-top steel drums which were transported to the House Street Site prior to characterization and proper off-site disposal.

While not in the original scope of work, four additional surface soil samples were collected from the western side of the parcel, in a downstream surface flow area from the former solid waste excavation. These were added to determine if surface water flow to this area may have resulted in elevated metal concentrations in shallow soil. The samples were collected from 0-1 ft and screened with XRF only. Based on the results of the XRF screening, no samples were collected. These are MDOT-SB-1A to MDOT-SB-4A.

All borings for this investigation as well as the prior investigations are shown on Figure 1, overlain on the soil disturbance areas identified on historical aerial photographs.

Investigation Results

Tables 1 through 6 summarize the laboratory data from the June and November 2018 investigations compared to Michigan's Part 201 generic residential cleanup criteria, 2017 residential soil recommended interim action screening levels for volatilization to indoor air, as well as the U.S. EPA residential soil regional removal management levels.

VOCs and SVOCs Results

VOCs and SVOCs were not measured at concentrations greater than Michigan's Part 201 generic residential criteria or the U.S. EPA residential soil regional removal management levels.

Three VOCs (benzene [SB-34, 15-16 ft], 1,4-dichlorobenzene [SB-E1, 0-2 ft], and ethylbenzene [SB-34, 15-16 ft]) were identified in one sample each above their residential soil recommended interim action screening levels for volatilization to indoor air. However, the 1,4-dichlorobenzene and ethylbenzene concentrations do not exceed their non-residential screening levels.

While benzene does exceed its non-residential screening level in sample SB-34 collected at a depth 15-16 ft, the Site is not zoned for future development and no structures are present. Additionally, the detection of benzene was limited to one sample and does not appear to be wide-spread. The detection is at least 120 ft from the nearest property boundary and sampling between the detection and the property boundary did not identify this VOC.

Metals Results

There were no metals detected at concentrations greater than the MDEQ direct contact criteria, particulate soil inhalation criteria, or U.S. EPA residential soil regional removal management levels.

The following table summarizes the metals concentrations greater than the Michigan's generic residential drinking water protection criteria (DWPC) and/or Michigan's generic groundwater/surface water interface protection criteria (GSIPC). These were identified in samples collected throughout the 20 ft borings. It does not appear there is a consistency in the sampled intervals (especially in light of the significant topographic



relief on the site) and these concentrations; therefore, isoconcentration or other contour mapping was not performed because they would likely be misleading.

Metal	Number of Samples with Concentrations Detected > DWPC and/or GSIPC	Maximum Concentration (µg/kg-ppb)
Aluminum	18	35,000,000
Arsenic	5	6,800
Boron	13	40,000
Cobalt	17	15,000
Hexavalent Chromium	1	4,600
Iron	19	36,000,000
Magnesium	17	40,000,000
Mercury	5	2,000
Selenium	4	590
Silver	1	2,500

Additionally, while mercury concentrations in six samples are greater than MDEQ residential soil recommended interim action screening levels for volatilization to indoor air, the Site use is not residential, and no structures are present. Not all mercury compounds are volatile; the analysis and screening number are based on total mercury concentrations and do not consider this. Also, the screening levels are lower than the Michigan Default Background Concentration for mercury.

Several soil samples exceeded the Part 201 Statewide Default Background concentration for total chromium. However, no detections of Chromium III exceeded Part 201 generic criteria. As indicated above, one hexavalent chromium concentration was greater than the GSIPC.

Samples containing total metal concentrations exceeding 20 times their Toxicity Characteristic Leaching Procedure (TCLP) concentration were also analyzed for TCLP metals (see Table 6). Only three samples, including one duplicate, met this requirement and were analyzed. In all three samples, chromium was above the TCLP analysis threshold, but the TCLP analysis did not exceed the RCRA threshold concentration of 5,000 µg/L in any of the samples.



General Chemistry Results

Phosphorus (all samples) and unionized ammonia (SB-25, collected 10-11 ft) were the only general chemistry compounds detected greater than the GSIPC. Additionally, the concentration of nitrate-nitrite in sample SB-25 collected 10-11 ft below grade is greater than the DWPC. While Michigan does not have default background concentrations for phosphorus and nitrate-nitrite, in R&W/GZA's experience, these constituents are often found at concentrations ranging in several hundred mg/kg in and near active and former farm fields.

PFAS Results

Forty-seven soil samples contained PFOS concentrations greater than GSIPC, ranging from 5 to 2,000 µg/kg from surface samples to 19 ft below grade. Of the 47 samples with PFOS concentrations above GSIP, 21 were collected within the top 2 ft of soil. The remaining 26 were from between 2 – 19 ft. The concentrations do not appear to coincide with depth, again specifically considering the significant topographic gradients on the site.

Summary

A permanent monitoring well (MW-8) is located on the MDOT Parcel. Groundwater samples from this well have not contained any of the metals measured in soil above their Part 201 groundwater generic cleanup criteria, except for aluminum and iron above aesthetic drinking water values only. PFOS/PFOA are present in the groundwater above their respective Part 201 drinking water criteria. No other contaminants were present in the groundwater samples collected from MW-8 in July and October 2018 above generic cleanup criteria.

The June and October/November 2018 investigations did not identify contaminant concentrations in soil greater than direct contact or soil inhalation criteria. Drinking water exposure (PFOS+PFOA only) is the primary potential concern. As you know, residents immediately adjacent to and directly downgradient from the MDOT Parcel, have all been offered bottled water and either a whole house filter or a point of use filter for their home.

Based on the information gathered during the MDOT Parcel investigations, it does not appear that waste materials similar to those identified on the House Street Disposal Facility are present on the MDOT Parcel. Additionally, it does not appear that additional investigation, delineation, or remediation is warranted.

Sincerely,

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


Loretta J. Powers

Senior Project Manager



Mark Westra
Associate Principal

Attachments: Figures and Tables
Soil Boring Logs

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*