



GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
GRAND RAPIDS DISTRICT OFFICE



LIESL EICHLER CLARK
DIRECTOR

June 15, 2021

VIA E-MAIL AND U.S. MAIL

Mr. Dave Latchana
Associate General Counsel
Wolverine World Wide, Inc.
9341 Courtland Drive, NE
Rockford, Michigan 49351

Dear Mr. Latchana:

SUBJECT: Disapproval of the House Street Property Feasibility Study Report as Required by the Wolverine World Wide, Inc. Consent Decree Court Case No. 1:18-cv-00039
Site ID No.: 41001161

The Michigan Department of Environment, Great Lakes, and Energy (EGLE), Remediation and Redevelopment Division, has reviewed the House Street Property Feasibility Study for the property located at 1855 House Street, NE, Belmont, Michigan submitted on February 19, 2021, by Rose & Westra, a Division of GZA GeoEnvironmental, Inc. (GZA) on the behalf of Wolverine World Wide, Inc. (Wolverine). The House Street Property Feasibility Study is a requirement of the Consent Decree (effective February 19, 2020) as described in Paragraph 7.8 of the Consent Decree.

As outlined in Section 15 of the Consent Decree, after receipt of any submission relating to Response Activities that is required to be submitted for approval, EGLE may notify the Defendant that the plan is disapproved if applicable. The House Street Property Feasibility Study (Feasibility Study) has been disapproved for the following reasons¹:

General comments which apply to entire report (may not be called out in specific report sections below):

1. The remedial objective as written and applied throughout the Feasibility Study does not meet the requirements of the Consent Decree specified in Paragraph 7.8(a)(ii).
2. The proposed remedy of a phytoremediation with a limited capped area does not meet the objectives laid out in Paragraph 7.8(a)(ii) of the Consent Decree.

¹ EGLE is not specifically rejecting Wolverine's chosen remedy, although, as set forth throughout this document, EGLE has significant concerns that even if the inadequacies in the Feasibility Study are addressed, that the remedial option selected by Wolverine would not meet the objectives of the Consent Decree.

3. The proposed phytoremediation remedy has not been demonstrated full-scale in the field to be an effective process for mass-transfer or treatment of per- and polyfluoroalkyl substances (PFAS).
4. The Feasibility Study did not specify the type of trees being used for the proposed phytoremediation option. Further, the Feasibility Study did not state the actual number of trees to be used (only an up to number) or how many existing trees were proposed to remain in place and where.
5. Details regarding how dead trees and tree detritus/leaves at the House Street Property would be collected and managed long-term were not included.
6. No supporting or backup information was provided to demonstrate how the costs included within the Feasibility Study were calculated for any of the remedy options.
7. The Feasibility Study failed to meet the substantive requirements of Part 115, Solid Waste Management, of the NREPA, Mich. Comp. Laws § 324.11501 et seq., and the Part 115 Administrative Rules (Part 115) related to remedy option 2 (“Cap Option”) and remedy option 3 (“Landfill Cell Option”).

Specific comments by report section:

1. Section 1.1, 1st paragraph:

The first sentence implies that if EGLE does not approve of the Feasibility Study the default option is automatically the 30-acre cap. However, the Consent Decree provides that, subject to dispute resolution, “if MDEQ does not approve of the **proposed remedy** in the Feasibility Study for the House Street Disposal Site, the final remedy shall be an approximately 30-acre cap without a bottom liner.” Although EGLE has serious concerns regarding Wolverine’s selected remedy, this disapproval rejects the entire Feasibility Study, because it fails to meet the requirements of the Consent Decree and none of the proposed remedy options can be adequately evaluated based on the information provided.

Wolverine is required by the Consent Decree to submit a Feasibility Study that meets the requirements of Paragraph 7.8. Wolverine's failure to submit a Feasibility Study that addresses the requirements of Paragraph 7.8 will result in the assessment of stipulated penalties.

2. Section 1.1, 1st paragraph and 5th paragraph:

These paragraphs reference that a cap does not prevent the horizontal movement of water through waste. Note that groundwater flow mechanics and Darcy’s law prevent the horizontal movement of water through the waste when the waste is situated above the water table like it is at the House Street property.

3. Section 1.1, 2nd paragraph:

States that the cleared and grubbed biomass will be buried and capped or removed from the site for disposal. If the cleared biomass contains PFAS or other hazardous substances, the biomass would need to be properly disposed,

and placing the biomass under a cap would not constitute proper disposal under Part 115.

4. Section 1.1, 4th paragraph:

EGLE is not aware of any location where full-scale phytoremediation has been demonstrated to be an effective process for mass-transfer or treatment of PFAS. The numerous studies that GZA refers to are almost entirely bench-scale or greenhouse studies, and the bulk of the studies focus not on phytoremediation, but risk assessment and toxicological studies (i.e. determination of risks associated with ingestion of PFAS-tainted food crops). A recently published paper, Sharifan, et al., 2020 (Fate and transport of per- and polyfluoroalkyl substances (PFASs) in the vadose zone) noted numerous challenges with phytoremediation of PFAS, including lack of knowledge on hyperaccumulation, cultivation times and PFAS phytotoxicity.

5. Section 1.1, 5th paragraph:

Clarification is warranted about media type and extraction of PFAS from beneath the surface. It is not clear if this paragraph is referring to groundwater, soil, or both.

6. Section 1.1, 5th paragraph:

No timeline is provided regarding how long it will take the newly planted trees to start to show a measurable reduction of PFAS concentrations migrating offsite. Additionally, GZA's statement about removing PFAS from the House Street Property over time implies an efficient process and does not consider fractional water usage, which varies due to several factors including species and environmental variables (wind, temperature, barometric pressure and so forth).

7. Section 1.1, 5th paragraph:

No information was included that identified where the PFAS containing tree material will be disposed, or what the protocol and procedure will be to collect and control the PFAS-containing leaves and other tree debris from being transported via wind or other mechanisms onto adjoining properties, or from animals moving them around on and offsite. There was also no information regarding if a tree harvesting schedule is proposed or is periodic harvesting only limited to those trees that die. There is a note on Figure 11 that suggests mature existing trees might be left in place. Section 4.3.6 also refers to leaving old stands in place, but the Feasibility Study contains no reference to how many trees or the locations of those stands.

8. Section 1.1, 5th paragraph

No information regarding the details of the long-term operation and maintenance of the phytoremediation cap option was included within the Feasibility Study.

9. Section 1.1, 5th paragraph:

It is not noted within the Feasibility Study what areas of the House Street Property plant roots will reach to the actual depths of where waste materials or soils with waste materials are located. Maximum identified depth to the bottom of known waste materials is 20 feet below ground surface but is generally 10 feet below ground surface plus or minus five feet. Since the specific types of trees were not identified in the Feasibility Study, it is unknown if the types of trees/plants would even be capable of growing a root system deep enough, or how long that would take to occur.

10. Section 1.1, 6th paragraph

This section states that as many as 4,000 trees may be planted, but no minimum number is provided, nor is it outlined how that number will be decided, or what areas of existing trees are proposed to be kept.

11. Section 1.1, 6th paragraph

Tree removal, transport, and delivery of up to 4,000 trees, and other work associated with the phytoremediation cap option will generate construction disturbances involving trucks and materials being transported. This activity is not accurately described in this section or in other applicable sections of the Feasibility Study.

12. Section 1.1, 7th paragraph

If fences are removed as referenced in this paragraph, there is no information or plan provided in the Feasibility Study as to how animals or humans will be prevented from encountering and potentially disturbing and/or transporting the PFAS-contaminated tree debris.

13. Section 2, 3rd paragraph

No information is provided within the Feasibility Study regarding the waste material characteristics or what they are comprised of.

14. Section 2, 3rd paragraph

The volume of waste materials and soil with waste materials is inaccurately referenced in this section as only 34,000 cubic yards total. Past reports produced by GZA have indicated that there is approximately 49,000 cubic yards of waste material, and 34,000 cubic yards of soil with waste materials, for a combined total of 83,000 cubic yards. Additionally, there is no reference to the volume of contaminated soils that are located between the waste and soils with waste materials in the upper 20 feet of the site.

15. Section 2.0, reference to Figures 5 and 5A-5D

No geologic data is presented on the cross-sections. It is important at some phase (pre-design or earlier) to assess and map site stratigraphy because soil density, texture, and fabric affect tree rooting and depth of penetration. Additionally, there was no indication of water table depth. The separation

distance between the bottom of the waste materials and water table was not identified.

16. Section 4.1.1

Based on Paragraph 7.8(a)(ii) of the Consent Decree, the following objectives MUST be met:

“The Feasibility Study shall evaluate the following remedy options to (1) manage solid wastes at the House Street Disposal Site and (2) reduce and control potential migration of PFAS Compounds from soils and sludges into the groundwater from the House Street disposal Site.”

GZA/Wolverine cannot solely rely on requirements of Part 201 and ignore the remedial objectives stated in the Consent Decree. When conducting a Feasibility Study of the alternatives for the House Street Disposal Site, the provisions of Paragraph 7.8(a)(ii)(A)-(C) dictate that the evaluation of the potential remedy options must comply with Part 201 and are expressly required to meet the substantive requirements of Michigan’s Part 115. Any less restrictive objectives or procedures outlined in Part 201 do not supersede or cancel out requirements included within the Consent Decree. The Feasibility Study is bound to the requirements of Consent Decree which are clearly defined.

17. Section 4.1.2

The pathway analysis does not change the objectives laid out in the Consent Decree. The Feasibility Study should evaluate the remedy options to: *(1) manage solid wastes at the House Street Disposal Site and (2) reduce and control potential migration of PFAS Compounds from soils and sludges into the groundwater from the House Street disposal Site.*

18. Section 4.2

Refer to Table 1 comments below.

19. Section 4.3

The objectives of the Feasibility Study as required by the Consent Decree are not being appropriately referenced in the second to last and last paragraph of this section. The fact that Wolverine installed municipal water does not change the objectives the Consent Decree lays out in Paragraph 7.8 of the Consent Decree. The analysis of identified remedy options (all of Section 4.3) needs to be completed under the correct objectives as identified in the Consent Decree.

20. Section 4.3.1.4

Continued environmental impacts are not discussed in this section.

21. Section 4.3.2

The various capping options included within this Feasibility Study affect overland flow as reflected in GZA’s inclusion of storm water retention basin. No information was provided regarding how storm water will be managed post-basin

and how that might impact nearby stormwater conveyances ultimately discharging to the Rogue River. It is unclear if the proposed infiltration of stormwater, particularly water discharged from the basin, would create a recharge area that could result in a change in groundwater flow rate or direction.

22. Section 4.3.2, 1st paragraph on pg. 8:

This paragraph mentions that the cap could be comprised of synthetic polyethylene materials (HDPE or LLDPE) commonly referred to as a flexible membrane liner (FML) or geocomposite materials. A geocomposite material cap without an overlying FML would not be an acceptable cap pursuant to Rule 304 of Part 115.

23. Section 4.3.2, 1st paragraph on pg. 8:

This paragraph states '*Localized and select areas of near-surface waste materials will be excavated and moved to within the capping footprints. The aggregate footprint to encompass the waste materials of the three caps would approach 27 acres.*' Based on a review of Figures 5, 6, and 7 it appears that a number of areas outside of the proposed cap boundaries contain tannery sludges and contaminated soils. It is unclear why these areas would not be capped. Figure 6 shows the cap extent and the waste material floor estimated extent. The floor of the waste is not the same as the extent of the waste, and it is not clear how much waste or soils with waste materials are not being included within the capped area. There is no discussion of where waste or soils with waste materials could be consolidated to underneath the proposed cap.

24. Sections 4.3.2.1 and 4.3.2.2

Both sections incorrectly state that the performance of the landfill cap option will have similar performance to the no further action option. By eliminating or at least greatly reducing the infiltration of stormwater into the waste and contaminated soils (identified as the primary contaminant source in Section 2.0) the performance of this option will greatly exceed the no further action option. As for reliability, properly designed, constructed, and maintained landfill caps have a long history of performance and under local conditions would not be expected to degrade for hundreds of years. Modern FML utilize antioxidant additives (Hindered Phenols, Thiosynergists, Hindered Amines, etc.) to the resin during the liner manufacturing process and have service lives expected to be in the range of 200 – 500 years at 20° C with thicker liners and cooler temperatures increasing the service life (note the average temperature in Grand Rapids is much lower than 20° C.). Please see GRI White Paper #6 (Geomembrane Lifetime Prediction: Unexposed and Exposed Conditions, Robert M. Koerner, Y. Grace Hsuan and George R. Koerner, Geosynthetic Institute, February 11, 2011) for additional details on lifetime predictions of geomembrane FMLs.

25. Sections 4.3.2.3 and 4.3.2.4

Sections 4.3.2.3 and 4.3.2.4 allude to exposing a large area of waste materials and the potential for worker and area resident exposure. It is unclear why and

what large areas of odiferous waste will be uncovered. A synthetic cap would require clearing and grubbing the land, placement, grading and surface compacting of a suitable foundation/subbase layer to place the FML on and then placing 24 inches of erosion layer followed by a minimum of 6 inches of topsoil (See Rule 304).

26. Section 4.3.2.6

The 30-month schedule in section 4.3.2.6 is longer than practical by industry standards. Single synthetic landfill caps exceeding greater than 30 acres are routinely constructed all over the United States in the 12 – 18-month range. Clearing and grubbing can be performed during winter months and the light amount of grading and earthwork needed to grade and prepare for FML installation can be performed quickly and in coordination with liner installation in other portions of the site.

27. Section 4.3.2.7

This section references cost estimates which contain no support for the numbers listed. It is common to estimate costs utilizing either area specific costs, standardized costs, or a combination of these methods. No such methodology was provided for the numbers listed.

28. Section 4.3.2.7

The estimated costs associated with this remedial option appear to be inflated. As an example, Part 115 requires type II landfills to provide sufficient financial assurance for a third party to perform closure and post-closure maintenance and monitoring if the owner fails to perform their legal duties. For a 30-acre landfill cap which does not include leachate collection and treatment, the required financial assurance for closure and post closure would be approximately \$2.8 million for a thirty-year post closure period. This would include \$2.44 million for construction costs and about \$360,000 for maintenance and monitoring of the cap (\$12,000 per year). While Part 115 financial assurance requirements may be slightly lower than actual costs, they are most certainly not 7 to 10 times lower than expected. This would equate to 10% - 15% of GZA estimated costs to perform the work.

29. Section 4.3.3

It is unclear what materials are being discussed in this section. As an example, Section 4.3.3 discusses overburden, waste and impacted soil being excavated, staged and then placed in a new landfill cell. However, 4.3.3.1 states that 'secondary source material' would remain outside of the cell area resulting in equal or increased infiltration which does not make logical sense. Section 2.0 clearly states that the waste materials and waste materials mixed with soil (contaminated soils) are the primary contaminant source at the House Street Property. The materials would need to be treated as solid waste and either disposed of offsite at a properly licensed facility or if left onsite, they must be addressed through an appropriate response activity plan under Part 201.

30. Section 4.3.3

This section does not appear to consider the liner, leachate collection and removal, and capping requirements for the Landfill Cell Option. For example, this site would be defined as a unit for which it is not possible to determine the unit's impact on groundwater using groundwater monitoring. Since the site has already leaked it would be impossible, using detection monitoring, to determine whether the new landfill cell was leaking. This would be an 'Unmonitorable Unit' and a double liner with leak detection would be required. The primary liner would need to be a composite liner containing both a FML and a clay component as required by Rule 304. The leak detection system would need to be designed to detect, collect, and remove leaks of hazardous substances at the earliest practicable time and in all areas of the top liner during the active life and post closure period.

31. Section 4.3.3

The leachate collection and removal system design requirements need to follow Rule 308 and the design requirements of Rule 423. This would include limiting head to no more than 1 foot. This would further include removing leachate as needed to prevent head build up. The leachate would then need to be conveyed to a wastewater treatment system. All liquid removed from the leak detection system would need to be handled the same as leachate unless it could be proven that it does not contain hazardous substance which may cause contamination. The design of the system would need to include a series of pipes located no more than 50 feet from each high point in the drainage layer. The pipe would need to drain to a collection sump(s). In figure 7, the distance between the high points (cell edges) to the central collection point is shown as 465 – 470 feet, which greatly exceeds the required spacing and would likely not function as required by Part 115.

32. Section 4.3.3

Figure 7 which is referenced in this section estimates the landfill cell to have a volume of 430,000 cubic yards. The Feasibility Study report states that the total waste volume is 34,000 yards which conflicts with Figure 8F of the *HSDS Implementation of the 2018 Work Plan Summary Report* submitted to the United States Environmental Protection Agency (USEPA) on May 21, 2019, which estimates waste and contaminated soils to be 83,000 cubic yards total. It appears that the estimated 49,000 cubic yards of waste is not accounted for in the Feasibility Study volume summary. Additionally, it also appears that the contaminated soils located in between the waste materials and soils with waste materials is not being accounted for. Even accounting for this error, the proposed landfill cell is still greater than 5 times larger in capacity than the volume estimate for waste disposal onsite.

33. Section 4.3.3

The design of the landfill would need much more work if it is selected due to the proposed size, bottom slopes, and the design of the perimeter berm. The top of

the perimeter berm drops 16 feet in elevation from north to south which would allow for any surface water to spill out at the lowest point of the tilted rim.

34. Section 4.3.3.1

This section discusses 'secondary source material' being left outside of the cell area. However, this report states that the primary contaminant source at House Street Property is the waste materials and contaminated soils. This should be clarified.

35. Section 4.3.3.1

This section erroneously states that the Landfill Cell Option would not have a performance benefit within a lifetime similar to the No Further Action Option. No explanation is given to support that claim or how this option would not meet the performance requirements of the Consent Decree.

36. Section 4.3.3.2

This section erroneously states that the Landfill Cell Option is no more reliable than the No Further Action Option. Placing waste and contaminated soils within a double lined and capped waste cell with leachate extraction and proper disposal is clearly an option with greater reliability than options which do not prevent infiltration of rainwater into existing waste and do not collect contaminated waste leachate.

37. Section 4.3.3.6

Due to the overdesign of the landfill cell area as discussed in number 32 of this letter, the time being proposed for this option is most likely excessive.

38. Section 4.3.3.7

Because of the huge size discrepancy discussed in number 32 of this letter, the costs estimated in Section 4.3.3.7 are greatly exaggerated. If it is assumed that similar over projections as were noted for the Cap Option are incorporated in this cost estimate, these estimates likely grossly overstate the actual cost to implement this option.

39. Section 4.3.4

No estimated volume of materials that would be excavated and disposed of was provided in this section.

40. Section 4.3.4.1

This section erroneously states that the Offsite Disposal Option would not have a performance benefit within a lifetime similar to the No Further Action Option. No explanation is given to support that claim or how this option would not meet the performance requirements of the Consent Decree.

41. Section 4.3.6.1

No calculations or models were provided of how contaminant reduction and reduction in offsite migration would be achieved. It is unknown if models were done to try and calculate this, or if they were done for both the growing and non-growing seasons. Additionally, no calculations, supporting information, or timeline were included as to how the trees would reduce surface water infiltration.

42. Section 4.3.6.1

Tree species that would be used as part of this plan are not identified.

43. Section 4.3.6.2

No references or backup information was provided to support the claim that concentrations of chemicals known to be in the site waste, soil, and perched water are well below concentrations that inhibit plant growth. A recently published paper, Sharifan, et al., 2020 (Fate and transport of per- and polyfluoroalkyl substances (PFASs) in the vadose zone) noted numerous challenges with phytoremediation of PFAS, including lack of knowledge on hyperaccumulation, cultivation times and PFAS phytotoxicity.

44. Section 4.3.6.4

There is no reference to truck traffic, excavation equipment, and soil relocation activities that will be needed since not all of the soil/waste materials that are dug up will fit back in the hole that is dug for the tree. There is no mention of how that soil/waste will be handled and no discussion of how odors will be controlled.

45. Table 1 Comments:

- a. Sorption technologies are not listed. There are other destructive technologies besides thermal, including sonication, electrochemical oxidative, plasma oxidative, and probably other emerging technologies. Please provide rationale for not including sorption technologies or oxidative methods.
- b. It is not documented why certain treatment options like in-situ waste stabilization would require pilot testing, but phytoremediation would not.
- c. It was stated that phytoremediation of waste sludges is not considered experimental, but previous statements indicate that in-situ waste stabilization is considered experimental. Further clarification is needed on why certain treatment options are considered 'experimental' and others are not. To EGLE's knowledge, no large-scale phytoremediation studies on waste sites have been completed.
- d. Define the factors used to identify the implementability as poor, moderate, exceptionally difficult, etc.
- e. Under the "Screening Comment" column, provide backup resources and references used or associated with options dismissed. Share the information reviewed that supports time and resource issues, pilot testing needs, etc.

- f. Under the “Relative Cost Range” column, define what minimal, significant, significant+, and significant++ capital means and what price ranges qualify as each. No backup material was provided to demonstrate how the costs were calculated.

46. Table 2 Comments:

- a. No backup documentation was provided for the “estimated cost for implementation” column.
- b. No backup documentation was provided for how the “time required” column was calculated.
- c. Any remedial option implemented by Wolverine is expected to be long-term based on the properties of PFAS compounds and will require long-term operations, maintenance, and monitoring (OM&M).
- d. Reliability under Option 4: Hazardous landfills have accepted PFAS wastes, such as the ones that accepted waste from the Tannery property. There are landfills available that are equipped to deal with PFAS and other hazardous substances.
- e. Based on GZA’s definition of secondary source being the soils located between the bottom of the waste materials and the top of water table, the secondary source would remain for all options proposed; however, the secondary source soils are only listed on select options.
- f. Option 6: No calculations or backup materials were provided that identify how the phytoremediation option will prevent continued infiltration and migration of stormwater/rainwater into the waste materials and eventual aquifer. It does not appear that this option would meet the minimum requirements identified in the Consent Decree. No timeline is included for how long it would take to reduce any infiltration of stormwater/rainwater.
- g. Option 6: No discussion of how infiltration would be affected during the non-growing season was provided.
- h. Option 6: Table 2 references numerous areas of impermeable capping; however, Figure 10 only identifies one new small-capped area, in addition to the limited existing capped areas previously installed under the USEPA work. Nowhere in the report is the size of the capped area specified or discussed in detail.
- i. Option 6: Long term OM&M should also be listed since yearly inspections, and debris control, removal, and proper disposal, at a minimum, would be required.
- j. Option 6: No discussion was included pertaining to tree/plant biodiversity or potential disease issues.
- k. Option 6: Reduction of waste constituents of concern through phytoextraction and phytoaccumulation would only occur through periodic harvesting of plant tissues.

47. Figure 6:

The full extent of waste materials should be depicted on this figure, not just the waste material floor extent. It is unclear if the waste materials identified on Figure 5 are all being addressed by the cap.

48. Figure 11:

4,000 trees are not depicted on this figure as referenced in the text, nor is it shown where existing trees are planned to be kept.

As provided for in Paragraph 15.8 of the Consent Decree, upon receipt of a notice of disapproval Paragraph 15.7(3), Wolverine shall correct the deficiencies and provide the revised Submission to EGLE for review and approval within thirty (30) days. However, EGLE is willing to meet with Wolverine to discuss this disapproval within the next fourteen (14) days and toll the start date for the thirty (30) days to submit the revised submission for those fourteen (14) days.

The deficiencies identified in this letter are based on representations and information contained in the submittal. Therefore, additional supplementary information may be necessary to address the deficiencies identified above.

If you should have further questions or concerns, please contact the Project Manager, Karen Vorce, at the Grand Rapids District Office at 616-439-8008, or at VorceK@michigan.gov.

Sincerely,



David Bandlow
Acting District Supervisor
Grand Rapids District Office
Remediation and Redevelopment Division
616-745-5337
BandlowD@michigan.gov

cc: Mr. John Byl, Warner Norcross & Judd LLP
Ms. Polly Synk, Department of Attorney General
Ms. Danielle Allison-Yokom, Department of Attorney General
Ms. Abigail Hendershott, Michigan PFAS Action Response Team
Mr. Dan Yordanich, EGLE
Ms. Nancy Johnson, EGLE
Ms. Karen Vorce, EGLE