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MEMORANDUM

TO:	Christopher Ketchen, Town Manager, Lenox, MA
FROM:	Weston & Sampson
DATE:	May 20, 2024
SUBJECT:	Revised Final Pre-Design Investigation Summary Report for Upland Disposal Facility Area

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Weston and Sampson Engineers, Inc. (Weston & Sampson) has reviewed the relevant technical documents and reports pertaining to the pre-design investigation and conceptual design of the proposed Upland Disposal Facility (UDF) for the GE-Pittsfield/Housatonic Rest of River Project. In this memorandum we review responses made to comments on the site hydrogeology and environmental assessment, geotechnical, and landfill engineering aspects of the Project. The documents which were the primary focus of our review and comment efforts were as follows:

- *Revised Final Pre-Design Investigation Summary Report for Upland Disposal Facility Area*, GE-Pittsfield/Housatonic River Site; Arcadis, January 2024.
- *Memorandum, Review of Final Pre-Design Investigation Summary Report for Upland Disposal Facility*, Weston & Sampson, October 9, 2023.

To support this technical review, we also referred to the following documents for supporting information:

- *Upland Disposal Facility Final Design Plan*, Arcadis, February 2024.

The format for this memorandum generally presents a brief bulleted synopsis of responses made to comments on the Final Pre-Design Investigation (PDI) Summary Report in October 2023 and a determination if these comments were addressed in the revised report. The memorandum has three main sections focusing on Landfill Engineering, Site Hydrogeology and Environmental Assessment, and Geotechnical Engineering.

Landfill Engineering

Comment #1: Provide back-up calculations for UDF disposal capacity. Has the volume of the intercell berm and the general fill shown beneath the final cover on Figure 7 of the CDP been considered in the calculations of the maximum capacity?

- Extent of Response: These calculations were not provided.

Comment #2: The disposal facility design does not include a system for managing gases produced from the decomposition of consolidated waste. The presence of a small amount of carbon, sulfur, and other elements in sediments could result in the production of decomposition gases beneath the final

cover. This could threaten the integrity of the final cover. Has the possible production of decomposition gases been considered in the design of the UDF?

- Extent of Response: This comment was addressed as the UDF design includes a gas venting system.

Comment #3: Figure 7 depicts the geosynthetic layers of the baseliner and final cover terminating in separate anchor trenches. Has the approach of welding the geomembranes of the final cover system and primary baseliner been considered?

- Extent of Response: This comment was addressed. However, the termination details are complicated. Please see our corresponding comment of the Final Design Plan.

Comment #4: Section 4.2.4 discusses modelling of shear slope stability. Geosynthetic shear strength parameters are indicated as potentially the weakest interface shear strength in the UDF. It is noted that the baseliner was modelled as if it were a single layer. Are there intentions to further refine the shear strength modelling to determine if any particular interface within the baseliner or between the baseliners and an adjoining surface are weaker than is currently modelled? Are interface shear strength tests being considered as part of construction quality testing?

- Extent of Response: This comment was addressed as interface friction testing is included in the technical specifications.

Comment #5: Has the use of temporary stormwater berms within the cells been considered during early facility operations in order to reduce the size of the active cell and thus limit the amount of contact water generated during rain events?

- Extent of Response: No, the use of temporary stormwater berms within cells has not been considered. Contact stormwater will be treated as leachate.

Comment #6: There does not appear to be an access road from the perimeter to the top of the disposal facility on Figure 4. Will an access road be included in a future design and how might it affect stormwater management and consolidation capacity?

- Extent of Response: This comment was addressed, and an access road has been included in UDF design.

Comment #7: The movement of leachate through the consolidation material could be rather slow, which could result in a lengthy settlement period. Have means of increasing the rate of leachate movement been considered, such as the use of vertical drainage risers that extend from the primary leachate collection system up through the consolidation material?

- Extent of Response: No, other means of increasing the rate of leachate movement have not been considered.

Comment #8: There are indications that PFAS may present various concerns throughout the construction of the facility, such as the presence of PFAS in baseline groundwater monitoring. What considerations have been made about the potential presence of PFAS in various site materials, such as collected leachate? Given the evolving regulatory environment around PFAS, how will potential PFAS concerns be addressed if such compounds are detected during the project?

- Extent of Response: The potential presence of PFAS in site materials has not been addressed.

Comment #9: It is assumed that a financial assurance will be established for the UDF. Given the high interest of local communities in the amount and type of financial assurance, discussion of this in the next report is recommended.

- Extent of Response: Financial assurance was not discussed in the Final Design Plan or OMM Plan.

Hydrogeology and Environmental Site Assessment

Comment #1: Sampling network appears representative and includes worst-case sampling locations near grade and at groundwater interface.

- Extent of Response: General comment, no response required.

Comment #2: No conclusion offered about reuse. Appears adequate quality for reuse but should be confirmed.

- Extent of Response: General comment, no response required.

Comment #3: Geologic cross sections indicate thickness of overburden sediments range from 68 to 117 feet (east to west) and 47 to 105 feet (north to south). Depth-to groundwater ranges from 57 to 79 ft bg (east to west) and 21 to 80 ft bg (north to south). Variability east to west principally due to sloping bedrock surface, north to south due to topography.

- Extent of Response: EPA incorporated into their comments, a more detailed discussion of the bedrock surface and glacial till overburden to the east of the UDF and how it may impact groundwater levels is recommended but not required.

Comment #4: Geologic cross sections indicate phreatic water table, with no confining conditions or significant restrictive layers/stratification.

- Extent of Response: EPA incorporated into their comments, has been addressed in Revised UDF PDI.

Comment #5: Consider providing an extended section view from east to west, e.g., from the till boundary to other side of the Housatonic River valley.

- Extent of Response: EPA incorporated into their comments, a longer cross-section is recommended but not required.

Comment #6: Data suggests the till boundary is nearby to the east and affects groundwater levels and gradient.

- Extent of Response: No response required.

Comment #7: Table provided in comments document presents a summary of the water-level data relative to seasonal high groundwater levels.

- Extent of Response: No response required.

Comment #8: Appears to be significant variability of high groundwater levels between wells, which suggests variable hydrogeology relative to sediment composition, vertical permeability, and infiltration rates.

- Extent of Response: No response required.

Comment #9: It appears that the high groundwater level often occurs in months with below normal precipitation (see table provided in comments document with monthly precipitation amounts for 2000 through 2023, normalized mean values and relative wet/dry months for monitoring period). This should be explained.

- Extent of Response: EPA did not incorporate into their comments. GE used acceptable methodology and information to determine the seasonal high-water table. Weston & Sampson still recommends more detailed evaluation.

Comment #10: The fluctuation of groundwater levels is generally highest along the eastern perimeter, reflecting thinning of aquifer to east and effects of till boundary.

- Extent of Response: No response required.

Comment #11: For PZ-2022-3 located within the UDF footprint, the high groundwater elevation and Max Frimpter elevation is less than 15 feet below the proposed baseliner elevation of 975'.

- Extent of Response: EPA incorporated into their comments and GE provided additional information in the revised PDI report indicating that there should be compliance with the requirement that the baseliner be a minimum of 15 feet above the seasonal high groundwater table.

Comment #12: Water levels at MW-2022-1S/D well cluster, located east of the UDF, are significantly higher than 975'. Using the gradient from 1S/D to PZ-2022-5, groundwater beneath the eastern edge of the UDF may be higher than 975'.

- Extent of Response: EPA incorporated into their comments and GE provided additional information in the revised PDI report indicating that there should be compliance with the requirement that the baseliner be a minimum of 15 feet above the seasonal high groundwater table.

Comment #13: The monitoring network appears to be representative of hydrogeologic conditions. May need more monitoring wells along eastern edge of UDF and a longer period of record for comparison to the baseliner elevation.

- Extent of Response: Information provided in the Revised UDF PDI indicates that the existing monitoring well network appears to be adequate to demonstrate compliance with the 15-foot separation requirement.

Comment #14: Confirm the location of MW-2022-5. It appears to be shown at different locations on figures and cross section. This well is critical to the groundwater configuration beneath the central and western UDF areas.

- Extent of Response: Revised UDF PDI addresses this comment, no additional information is required.

Comment #15: The groundwater configuration appears relatively consistent throughout the monitoring period. The steep gradient beneath the east side of the UDF likely reflects the upland till/bedrock boundary. The hydraulic gradient shallows beneath the central and western portions of the UDF, with a centrally located east to west divide; flow north and south toward groundwater discharge areas at the northern pond and MW-2022-6. The divide is principally established by water levels in MW-2022-5, which appear to be several feet higher than would be expected. Water levels at MW-2022-5 and screen/aquifer connection should be confirmed. Redevelop well if needed.

- Extent of Response: Revised UDF PDI addresses this comment, no additional information is required.

Comment #16: Table 2 in the original comments document showed a water-level fluctuation of 3 to 6 feet beneath areas of the UDF, with the east area within 9 feet of the baseliner elevation, and 6 feet when seasonal high Frimpter elevations are considered.

- Extent of Response: Revised UDF PDI addresses this comment, no additional information is required.

Comment #17: The average fluctuation of groundwater levels in all wells, including the LML, was 6.16 feet; and for site wells only 5.80 feet. This conflicts with determination of 5 feet for comparison to OW. The significance of this deviation should be explained/evaluated or corrected.

- Extent of Response: Revised UDF PDI addresses this comment, no additional information is required.

Comment #18: Weston & Sampson reviewed stream-gauge and precipitation records to evaluate the climatic conditions for the monitoring period. The stream gauge in the Housatonic River at Lenox dale, MA-01197145 (at Site) only has a period of record beginning September 2022. The gauge near Great Barrington, MA-01197500, is the closest downstream station to the parcel with a long period of record. This gauge shows variable flow conditions over the monitoring period but generally representative of historical flow variability, with the possible exception of highest flow period 2021.

- Extent of Response: No response required.

Comment #19: During the monitoring period the precipitation total was 63.16 inches, compared to the normalized mean precipitation total for this period of 56.76. So, monitoring was conducted during a statistically wet period.

- Extent of Response: No response required.

Comment #20: In 2022, total precipitation was 50.19 inches, compared to the normal annual precipitation amount of 47.57 inches, so relatively wet.

- Extent of Response: No response required.

Comment #21: Since 2000, the highest annual precipitation was 66.53 inches recorded in 2021 prior to the monitoring period. This corresponds to a high stream gauge reading as noted above. The monitoring period was statistically wet, as noted above under #19, but not the wettest period according to recent records. The measured water levels during the monitoring period should reflect relatively high conditions, but not the highest.

- Extent of Response: No response required.

Comment #22: The analyte list appears to be adequate for assessment of background conditions. Confirm that the list includes all analytes used for assessment of remedial dredge samples to confirm the background water-quality results are useful for monitoring of potential releases from UDF.

- Extent of Response: Revised UDF PDI addresses this comment, no additional information is required.

Comment #23: Sample results from seasonal events appear to be reasonably consistent, validating use for background conditions.

- Extent of Response: No response required.

Comment #24: Absence of PCBs good for operational and post-closure monitoring.

- Extent of Response: No response required.

Comment #25: To understand the significance and distribution of results, the relevance and use of in-situ “K values for parcel soils” should be explained. The report only references it as being required by EPA.

- Extent of Response: Revised UDF PDI addresses this comment, no additional information is required.

Comment #26: The results are not relevant to reuse due to depth of saturated soils. They may be useful for development of a groundwater flow model, which is recommended to understand pre- and post UDF conditions.

- Extent of Response: Revised UDF PDI addresses this comment, no additional information is required.

Comment #27: K values reflect the heterogeneous nature of glacial deposits.

- Extent of Response: No response required.

Comment #28: No slug tests were conducted within the proposed stormwater basin area for mounding analysis purposes. The closest test was conducted at MW-2022-2; K = 30 ft/d; 224 gpd/ft2. This K value is characteristic of fine to coarse sand and glacial till (Groundwater and Wells, 1989). K values beneath the proposed stormwater basin would facilitate a mounding analysis for the design use of infiltration, and to assess the effects of infiltration on groundwater elevation and flow in the northern UDF area.

- Extent of Response: EPA did not incorporate into their comments, and this is not addressed in the Revised UDF PDI. Weston & Sampson still recommends that a mounding analysis be performed in the area of the stormwater basin to evaluate compliance with the 15-foot separation requirement.

Comment #29: A mounding analysis should be conducted to confirm groundwater separation from baseliner in northern portion of UDF. Of note, the Frimpter estimate at PZ-1 is about 18.5 feet below the baseliner elevation 975'. Would mounding raise groundwater in this area 3.5 feet?

- Extent of Response: Clarifications in the Revised UDF PDI mitigate the need to perform a mounding analysis in the location of the stormwater basin. Weston & Sampson still recommends that this be performed.

Comment #30: Is 500-foot radius adequate for this assessment? This radius should consider well yields and radius of influence, which could be greater than 500 feet if used for more than residential supply.

- Extent of Response: EPA did not incorporate into their comments, and nothing was provided in the Revised UDF PDI indicating that the 500-foot radius would be extended. Weston & Sampson recommends that an assessment be performed to determine if there are wells outside of this radius to determine if wells are present that may affect groundwater movement.

Comment #31: Will construction of the UDF include a restriction from development of groundwater supplies within a certain radius of the UDF consolidation area?

- Extent of Response: EPA did not incorporate into their comments, and nothing was provided in the Revised UDF PDI addressing this comment. Weston & Sampson requests clarification about any land use restrictions that may be placed for development of the UDF.

Comment #32: The bedrock surface was confirmed at 3 borings. The highest bedrock-surface elevation was 957.5 feet, at MW-2022-1. This is approximately 17.5 feet below the baseliner elevation of 975'. Perform additional borings to provide additional information.

- Extent of Response: Revised UDF PDI addresses this comment, no additional information is required.

Comment #33: Design drawings and sections show lowest bottom elevation of baseliner at 975'. Drawing of bottom elevation contours compared to seasonal high groundwater elevation contour should be provided.

- Extent of Response: Revised UDF PDI addresses this comment, no additional information is required.

Geotechnical Engineering

Comment #1: MW-2022-4S/D: profile on Figure 7 indicated that this boring extended into rock, but log indicates it terminated in sand.

- Extent of Response: Comment not addressed.

Comment #2: A total of 22 borings for the site seems low. Provide justification that the number of borings adequately assesses site subsurface conditions.

- Extent of Response: Comment not addressed.

Comment #3: Of the 22 borings completed, 5 encountered very loose to loose material. Based on the "upland disposal facility limits of Consolidated material" on Figure 6, these borings are outside the UDF. Please confirm.

- Extent of Response: Comment not addressed.

Comment #4: Of the 22 borings completed, only 9 are located within the "Upland Disposal Facility Limits of Consolidated Material" on Figure 6. Rock cores were retrieved from 3 of the 22 borings, none of which are located within the UDF limits. Recommend additional borings within the UDF limits extending into rock to further define the soil conditions, soil thickness and rock elevation, and rock characteristics in particular degree of fracturing and corresponding permeability.

- Extent of Response:

Comment #5: Additional borings may be necessary to assess slope stability depending on the proposed grading.

- Extent of Response: Comment not addressed.

Comment #6: Section 4.2.1 presents the final cover system components. Confirm that veneer stability has been assessed.

- Extent of Response: Comment partially resolved. Calculation in Appendix D.4 states "Acceptability of the proposed cover system materials will be determined by laboratory testing of each soil-to-geosynthetic and geosynthetic-to-geosynthetic interface (ASTM D5321 or ASTM D6243, as appropriate for interface) and by direct shear testing (internal friction angle) of fill materials (ASTM D3080)." However, this testing is not required in the specifications included in Appendix C.

Comment #7: What will be the condition and degree of saturation of the dredged material at the time it is placed in the UDF cells? If sediment is to be dewatered on site how will this be achieved and how will effluent be managed? Is there sufficient space on site for a sediment dewatering operation?

- Extent of Response: Comment partially resolved. Technical specifications are included in Appendix C, but they do not address handling and conditioning of the Consolidated Materials.

Comment #8: Section 4.2.3 notes that settlement will be evaluated as part of the final design, and it will include settlement of the proposed fill. Fill placement and compaction criteria for the dredged/waste

materials has not been provided. Confirm that this will be included in the final report along with corresponding geotechnical strength parameters.

- Extent of Response: Comment partially resolved. Settlement calculations are provided in Appendix D-2.
  1. The calculation does not discuss if long term settlement of the Consolidated Materials is anticipated as this material drains.
  2. Settlement of the subgrade floor is estimated to be up to 1.2 feet. Provide calculations demonstrating that this magnitude of settlement will not negatively impact connections of the piping within the drainage system; corresponding strain within the HDPE geomembrane sheets and at the seams; and the anticipated change in the pipe slope.
  3. Subgrade settlement figures in Attachment C assumes uniform settlement which is not consistent with the Settle3D output.

Comment #9: Section 4.2.4 indicates that slope stability analyses have been performed. However, the report does not provide the soil parameters or cross sections used in the analysis which are critical input in the analysis. Without that information, we cannot comment on the slope stability analysis.

- Extent of Response: Comment partially addressed. Appendix D-1 includes a summary of the slope stability computations but does not include figures showing the cross sections used in the analysis. Additional Comments are provided:
  1. Attachments A, B, and C to the calculation are referenced but not included.
  2. Provide a bases for the geotechnical material parameters selected for the Consolidated Materials. Information has not been provided on the composition/gradation of the dredged materials; material conditioning prior to placement; acceptable water content of compacted materials; or discussion that the material placement described in Specification 31 22 00 is consistent with the assumed geotechnical parameters.
  3. It is unclear from the discussion what was assumed for the water level within the proposed fill.

Comment #10: Section 4.4.3 discusses culvert design with respect to flow conditions. Will the design also consider structural and geotechnical engineering?

- Extent of Response: Comment not addressed.

Comment #11: Section 5.2 indicates that transport of the dredged or excavated material has not been determined but “trucking or conveyance via slurry within a temporary pipe to the UDF” are under consideration. These methods have very different impacts on the material handling, dewatering, and placement. It is unclear how geotechnical engineering parameters could have been assigned to perform a slope stability analysis without this having been determined.

- Extent of Response: Report indicates that is will be addressed in a revised Transportation and Disposal Plan. This plan had not been submitted to EPA at this time.