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CLIENT MEMORANDUM

20 December 2022
File No. 0204997-000

TO: New Hampshire Preservation Alliance
Jennifer Goodman

FROM: Haley & Aldrich, Inc.
Douglas C. Allen, P.G., Senior Associate | Hydrogeologist
William J. Haswell, P.E., Principal Consultant

SUBJECT: Gasholder Building Opinion of Probable Costs
Concord Former Manufactured Gas Plant (MGP) Site
NHDES Site #198904063
Concord, New Hampshire

Haley & Aldrich, Inc. (Haley & Aldrich) prepared this memorandum for the New Hampshire (NH) Preservation Alliance to provide a review and feedback on the estimated cost contribution to repair and preserve the Gasholder building located at the Concord Former Manufactured Gas Plant (MGP) Site in Concord, New Hampshire. We reviewed the draft *Calculation of Basis of Maximum Owner Contribution* dated 1 December 2022, prepared by GZA GeoEnvironmental, Inc. (GZA) on behalf of Liberty Utilities Corporation, the owner of the Concord Former MGP Site. The 1 December 2022 document by GZA provides an opinion of probable costs (OPC) to demolish the Gasholder building, investigate accessible soils beneath the demolished structure, remediate MGP-impacted soils beneath the structure, cap the Gasholder building area, and complete post-remediation monitoring. In accordance with the Emergency Stabilization License Agreement (Agreement) between the NH Preservation Alliance and Liberty Utilities, the probable costs to demolish and remediate the Gasholder building may be applied to the repair and preservation of the historical structure, should demolition be avoided.

BACKGROUND

As described in the approved *Remedial Action Plan* (GZA, April 2015) developed for the Site, the 1888 Gasholder building is currently serving as a cap to minimize the infiltration of precipitation to the subsurface, therefore reducing the likelihood of continued migration of MGP-related constituents. In the event the holder house is demolished, the New Hampshire Department of Environmental Services (NHDES) has indicated that a Supplemental Remedial Action Plan (RAP) will be required to address investigation and remediation of any contamination that is present beneath the structure (NHDES, September 2021).

Haley & Aldrich reviewed available investigation data and historical information to develop an estimate of soil volume beneath the Gasholder Building footprint that may need to be remediated should the structure be demolished. Based on our understanding of the geology, Gasholder building construction, and MGP-related impacts to soil observed in soil borings near the Gasholder building, the volume of soil identified for remediation assumed that a depth of approximately 5 feet, on average, would be excavated while maintaining a 1.5 to 1 slope within the perimeter of the foundation wall, which would be left in-place. The estimated soil volume identified for excavation and disposal was 788 cubic yards. This volume estimate was provided to GZA via email on 31 October 2022.

LIBERTY UTILITIES OPINION OF PROBABLE COST OVERVIEW

In the December 2022 *Calculation of Basis of Maximum Owner Contribution* report, GZA presented two cost scenarios for the demolition, investigation, and remediation of the Gasholder building. The GZA estimate limited remediation to within the footprint of the Gasholder building:

- The Gasholder building is demolished, subsurface investigations are completed, and investigations conclude that no further remediation is required. The total cost estimate is $1,128,750.
- The Gasholder building is demolished, subsurface investigations are completed, and soil remediation is required beneath the structure footprint, with soil volumes ranging from 275 cubic yards (GZA estimate) to 788 cubic yards (Haley & Aldrich estimate). The total cost estimate range is $1,691,606 (GZA volume estimate) to $2,379,492 (Haley & Aldrich volume estimate), depending on the volume of soil excavated.

GZA concluded that some degree of subsurface contamination beneath the Gasholder building is likely, but the extent is unknown. Therefore, a midpoint of the cost estimate range requiring remediation ($2,035,549) was proposed as the probable cost.

HALEY & ALDRICH OPINION OF PROBABLE COST

Based on our review of the data available for the Concord Former MGP Site and experience with other MGP sites, Haley & Aldrich recommends that excavation and disposal of the larger estimated soil volume (788 cubic yards) is the more likely scenario for remediation. Our opinion is based on the following observations:

- We acknowledge that the approved 2015 RAP assumes remediation of source material within other subsurface structures (tar tank, drip pots, etc.) and removal of the upper two feet of tar-impacted soils. However, the requirements for remediation for the Gasholder building are unknown. In their 3 September 2021 letter, NHDES indicated that "*investigation and remediation of any contamination beneath the Gasholder*" building would be required. Our understanding is that the NHDES expects that alternatives evaluated will not be limited to within the gasholder footprint. Since subsurface impacts are present to the east (downslope) of the Gasholder building, additional remediation outside the footprint of the structure may also be required. Our experience at other MGP sites is that gasholders are often a main source of

subsurface impacts. As noted above, the impacts to the east of the Gasholder building are an indication that tar is likely present beneath and beyond the footprint of the structure.

- The 788 cubic yards identified for potential remediation should not be considered an upper limit. To simplify construction and minimize costs, an open excavation was assumed with sloped sidewalls to preclude undermining/shoring of the building foundation, which leaves a "wedge" of soil around the perimeter of the building foundation. Using a slightly different technique known as "slot excavation" that has successfully been used at other MGP sites, this wedge of soil could be readily removed in a manner similar to what is currently being contemplated by GZA. A slot excavation approach would result in a total soil removal volume of 1,232 cubic yards at an estimated cost of approximately $3.05MM, following the unit pricing presented by GZA. To simplify the soil volume calculation, the estimated 788 cubic yards also assumed that the Gasholder building foundation floor was a flat surface. The foundation floor has a rounded "dumpling" feature, as documented by photographs. Additional soils will be present beneath this feature, which will also increase the soil volume that may need to be remediated and were not included in the 788 cubic yard estimate.
- The current RAP was approved by the NHDES on 29 May 2015. Based on our experience in New Hampshire, the NHDES has a fair amount of discretion in determining what remedial work is required on a project-by-project basis. Our experience is that NHDES's minimum cleanup expectations have increased with time, and given that the current RAP is eight years old, a Supplemental RAP would likely require additional remediation work that was not considered in 2015. If a Supplemental RAP is prepared, the certainty of the current remedy and cost outlined in the 2015 RAP would be subject to significant changes.
- Based on William Haswell's experience working at over 50 former MGP sites, gasholders are a common source of subsurface tar. If the structure is demolished and removed, NHDES may require remediation outside the footprint of the Gasholder building. Should the NHDES require remediation outside the footprint of the Gasholder building, significantly more tar-impacted soils could be removed. Without the complications of working within the building footprint, the work could be completed at a lower unit cost resulting in an overall modest increase in total cost and significantly greater mass removal. We would expect a remedy of this nature to be in the cost range of $4MM to $6MM.

Based on the uncertainties listed above, the estimate of 788 cubic yards of soil requiring remediation, excavated to a depth of approximately 5 feet (on average) below the Gasholder building footprint, is a reasonable and more likely scenario. Therefore, we conclude that Haley & Aldrich's volume estimate of 788 cubic yards of soil removal using the cost estimate prepared by GZA (i.e., the remediation cost of $2,379,492) should be considered the probable cost for demolition, investigation, and remediation of the Gasholder building. Due to the uncertainties mentioned and the potential accessibility of other soils described above, the cost for remediation could in actuality be higher than this estimate.

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