



March 28, 2022

City of Sevierville
Water Department
2295 McCroskey Island Road
Sevierville, Tennessee 37876

ATTENTION: Mr. Keith Malone

Reference: **ADDENDUM No. 1**
McCroskey Island Wastewater Treatment Plant Expansion
City of Sevierville
Sevierville, Tennessee
GEOservices Project No. 21-21717

Dear Mr. Malone:

We are submitting this addendum to our Report of Geotechnical Exploration for the subject project. This work was performed, as authorized by you, in accordance with our Proposal No. No. 11-21351R1, dated May 25, 2021. We previously issued the "Report of Geotechnical Exploration – McCroskey Island Wastewater Treatment Plant Expansion", dated November 1, 2021.

This addendum report provides addendum information and recommendations for the project. The information presented in this addendum should be considered as additional information and does not replace nor is intended to fully replicate the information presented in the aforementioned geotechnical report. The reader is encouraged to review the previous report.

PROJECT INFORMATION

Additional and revised information for the project has been provided in email correspondence with Jacobs personnel dating from January 27, 2022. We understand that it is desired to consider the use of on-site materials for the backfill of below grade walls for the project. This addendum reports provides our understanding of the proposed backfill materials requirements and equivalent fluid pressures for the materials.

We also understand that the bearing elevations for the proposed structures have been somewhat modified. Table 1 below shows the revised bearing elevations for the structures.

Table 1 – Proposed Expansion Structure Information

Structure	Anticipated Foundation Type	Estimated Foundation Loading	Anticipated Bearing Elevation (ft-MSL)	Depth Below 100 Yr Flood
Headworks/Grit & Grease Removal	Mat	1.5 ksf (slab) 2.0 ksf (effluent pump)	874.50 867.00	-3.5 -11
A/A Basin	Mat	2.3 ksf	865.10	-12.9
NRCY Pump Station	Mat	2.4 ksf	865.58	-12.4
Biological Reactor No. 2	Mat	1.7 ksf	870.00	-8.0
Clarifier Splitter Box	Mat	2.3 ksf	861.33	-16.7
Secondary Clarifiers 3 & 4	Mat	1.8 ksf	863.25	-14.8
RAS/WAS Pump Station	Mat	0.5 ksf	866.92	-11.1
Electrical Building 1 Biological Reactor	Shallow Spread	2.0 ksf	873.50	-4.5
Effluent Facility	Mat	2.4 ksf	862.83	-15.2
Electrical Building 2	Shallow Spread	2.0 ksf	874.50	-3.5
Plant Drain Pump Station Valve Vault	Mat	1.2 ksf	848.00 869.00	-30.0 -9.0
Scum Pump Station Valve Vault	Mat	2.0 ksf (Note 1)	863.50 873.00	-14.5 -5.0

Notes: (1) Assumed based on previous information. NA – Not applicable.

We note that the RAS/WAS Pump Station Canopy has been eliminated. Also, both the Plant Drain Pump Station and Scum Pump Station have adjacent valve vaults which bear at shallower elevations. A discussion of the modified bearing elevations and addendum recommendations for the Plant Drain Pump Station and Scum Pump Station and valve vaults are provided herein.

EQUIVALENT FLUID PRESSURES

Section 4.9 of the geotechnical report provided recommendations for lateral earth pressures, including a “Condition 3” which allowed for the use of fine-grained soil backfill. We understand that it is proposed to use on-site materials which may include the fine-grained soils as backfill at the site and that the material is to have a Liquid Limit (LL) of less than 50 percent and a Plasticity Index (PI) of less than 25 percent. Given the plasticity requirement, it is anticipated that the backfill of on-site soil may consist of materials having a USCS classification of SP, SW, SM, SC, ML and CL. Considering the proposed backfill materials, the equivalent fluid pressures for Condition 3 may be modified as follows:

Condition 3 - Walls which are backfilled with or constructed to retain the site soils which include fine-grained clays and silts having a LL of less than 50 percent and PI of less than 25 percent, are recommended to be designed considering the at-rest pressure whether restrained or not. The fine-grained materials will creep over time which will produce additional lateral pressures on the wall. We recommend an equivalent fluid pressure of 72 pounds per cubic foot (pcf) used for this condition. If saturated, the equivalent fluid pressure for Condition 3 would be 95 pcf.

These materials should be placed according to and meet the other requirements presented in Section 4.9 of the geotechnical report. Regular Atterberg limits testing (ASTM D4318) of the backfill materials is recommended to confirm the on-site materials meet the plasticity requirements.

MODIFIED BEARING ELEVATIONS

The updated bearing elevations shown in Table 1 above are generally within a few feet of those on which the recommendations of the original geotechnical report were based, and addendum recommendations are not required for most structures. However, we note that the included “Table 9 - Summary Foundation Support Recommendations” provides maximum anticipated undercut depths which are based on target undercut bottom elevations. The reader should consider the recommended target undercut elevation (which will not change) when estimating the maximum required undercut depths as the depths provided in Table 9 will change somewhat based on the new foundation bearing elevations.

Addendum recommendations for the Plant Drain Pump Station and Scum Pump Station and valve vaults are provided in the following sections.

PLANT DRAIN PUMP STATION

The Plant Drain Pump Station is to have plan dimensions of approximately 30 by 15 feet and is to be supported by a mat foundation which exerts a pressure of about 1,200 psf on the bearing materials. The structure is to have a planned foundation bearing elevation of 848.0 feet MSL. The associated valve vault, which we have assumed will be supported using a shallow foundation which exerts an applied pressure of less than about 500 psf on the bearing materials, will bear at an elevation of 869.0 feet MSL.

Based on the provided top of ground boring elevations, the existing site grades in the area are at about 876 feet MSL. Excavations of approximately 28 feet will be required to reach the foundation bearing elevation. Based on the borings drilled in the area, shale bedrock will be exposed at the foundation bearing elevation for the Plant Drain Pump Station.

The Plant Drain foundation supported by bearing on shale bedrock may be designed considering a net allowable bearing pressure of 3,000 psf. We estimate maximum total and differential settlements for the foundation to be approximately less than one-quarter of an inch, considering an applied pressure of 1,200 psf bearing on the shale bedrock.

Considering a "beam on elastic subgrade" or Winkler approach in design of foundation reinforcing, a modulus of subgrade reaction value of 32 pounds per cubic inch (pci) may be considered for the computation of soil resistance to mat deflection. This value was estimated considering a mat foundation of 30 by 15 feet, an applied pressure of 1,200 psf and estimated settlement one-quarter of an inch.

The depth to weathered rock at the Plant Drain was about 15 feet which corresponds to an elevation of about 861 feet MSL. Auger refusal was encountered at a depth of about 23.5 feet (elevation 852.2 feet MSL). Given that weathered rock and auger refusal was encountered at an elevation greater than the proposed foundation bearing elevation, it should be anticipated that materials which will be difficult to excavate will be encountered.

The stabilized groundwater level in a boring drilled near the Plant Drain was measured at about 11.6 feet below the existing ground surface. Based on the provided top of ground boring elevations, the stabilized groundwater level in the area of the Plant Drain was at an elevation of about 865.4 feet MSL during the period when the borings were drilled, and water levels measured. Considering that the proposed foundation bearing elevation of 848.0 feet, dewatering for construction of the Plant Drain will be required. Additionally, the structure should be designed to resist the hydrostatic and buoyant forces which will develop.

Considering a bearing elevation of 869.0 feet MSL, very loose alluvial sand soils may be exposed at the valve vault foundation bearing elevation. We recommend that in order to reduce the potential for excessive differential settlements, the very loose alluvial materials be undercut to the underlying dense alluvium and the excavation brought back to grade using compacted dense graded aggregate. Based on the borings of this exploration, undercut depths to reach the dense alluvium may range up to about 3 feet (below the foundation bearing elevation). The undercutting should extend laterally beyond the foundation perimeter for a minimum distance of 5 feet.

SCUM PUMP STATION

The Scum Pump Station is to have plan dimensions of less than about 20 by 20 feet and is to be supported by a shallow mat foundation which exerts an assumed pressure of about 2,000 psf on the bearing materials. The structure is to have a planned foundation bearing elevation of about 863.5 feet MSL. The associated valve vault, which we have assumed will be supported using a shallow foundation which exerts an applied pressure of less than about 500 psf on the bearing materials, will bear at an elevation of 873.0 feet MSL.

Based on the provided top of ground boring elevations, the existing site grades in the area range from about 872 to 874 feet MSL. Excavations of up to 10 feet will be required to reach the foundation bearing elevation. Based on the borings drilled in the area, alluvial materials consisting of medium dense sand and very dense gravel and cobbles will be exposed at the foundation bearing elevation of the Scum Pump Station. The Scum Pump Station foundation supported by bearing on the medium dense alluvium may be designed considering a net allowable bearing pressure of 2,000 psf. We estimate maximum total and

differential settlements for the foundation to be less than one inch and one-half of an inch, respectively, considering an applied pressure of 2,000 psf bearing on the medium dense alluvium.

Where loose alluvial soils are exposed at the Scum Pump Station foundation bearing elevation, they should be undercut to the underlying medium dense alluvium and replaced using compacted dense graded aggregate. Where required, undercut depths to reach the underlying medium dense alluvium may range up to about 2 feet (below the foundation bearing elevation). If required, undercutting should extend laterally beyond the foundation perimeter for a minimum distance of 5 feet.

Considering a "beam on elastic subgrade" or Winkler approach in design of foundation reinforcing, a modulus of subgrade reaction value of 14 pounds per cubic inch (pci) may be considered for the computation of soil resistance to mat deflection. This value was estimated considering a mat foundation of 20 x 20 feet, an applied pressure of 2,000 psf and estimated settlement of one inch.

The depth to weathered rock ranged from 10 to 20 feet in the borings drilled in the area of the proposed Scum Pump Station. These depths correspond to elevations of 853.5 to 862.0 feet MSL. Where confirmed to be the result of less weathered shale, the depth to auger refusal ranged from 18.3 to 24.6 feet (elevation 848.9 to 853.7 feet MSL). We do not expect that excavation difficulty will present a significant challenge for excavations to reach the foundation bearing elevation of the Scum Pump Station.

The stabilized groundwater level in the borings drilled in the area of the Scum Pump Station ranged from about 9.9 to 11.6 feet below the existing ground surface. Based on the provided top of ground boring elevations, the stabilized groundwater level in the area was at an elevation of about 862.1 feet MSL during the period when the borings were drilled, and water levels measured. Considering that the proposed foundation bearing elevation of 863.5 feet, some dewatering for construction of the Scum Pump Station may be required. Additionally, the structure should be designed to resist the hydrostatic and buoyant forces which will develop.

Considering a bearing elevation of 873.0 feet MSL, cultivated soils and very loose to loose alluvial sands may be exposed at the valve vault foundation bearing elevation. We recommend that in order to reduce the potential for excessive differential settlements, the cultivated and very loose alluvial materials be undercut to at least 5 feet below the foundation bearing elevation and the excavation brought back to

grade using compacted dense graded aggregate. The undercutting should extend laterally beyond the foundation perimeter for a minimum distance of 5 feet. We note that loose alluvium may be present at the bottom of the undercut elevation, which may require some improvement by in-place densification or by tracking surge stone (Section 4.2.4) into the exposed subgrade, prior to backfilling the excavation.

CLOSING

This addendum report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. This report is for our geotechnical work only, and no environmental assessment efforts have been performed. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

The information presented in this addendum should be considered as additional information and does not replace nor is intended to fully replicate the information presented in the aforementioned geotechnical report. The reader is encouraged to review the previous report in its entirety.

We appreciate the opportunity to have been of service to you on this project. Please contact us with any questions you may have regarding this transmittal.

Sincerely,
GEOServices, LLC



Matthew B. Haston, P.E.
Senior Geotechnical Engineer
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