TECHNICAL MEMORANDUM

DATE March 10, 2023 **Project No.** 21493887

TO Marc Rivet, MPP, RCIP
J.L. Richards and Associates Limited

FROM Chris Hendry, P.Eng. **EMAIL** chris.hendry@wsp.com

RESPONSE TO CITY COMMENTS DATED FEB. 14, 2023
D07-12-22-0057 - 3440 FRANK KENNY ROAD – HYDRO ONE OPERATIONS CENTRE PHASE 2

Golder Associates Ltd. (Golder; now WSP Canada Inc.) has reviewed additional comments related to the geotechnical investigation for the above-noted site and provides the following additional discussion related to the geotechnical comments.

Comment 1

1. In the section of the report 4.3 Silty Clay, the report shall provide remolded shear strength of the silty clay, in addition to, already provided, undrained shear strength and offer discussion of this parameter and clear conclusion and recommendation – the original comment was not addressed. Sensitivity results are required and the implication of sensitivity in calculations, or not, requires exhaustive discussion.

The remoulded strength of the clay (where measured) and the resulting sensitivity values are shown in the table below.

	Depth (m)	Su (kPa)	Su remoulded(kPa)	Sensitivity
BH11-1	4	30	5	6.00
	4.3	35	6	5.83
	5.5	28	2	14.00
	5.8	45	6	7.50
BH11-3	3.8	25	4	6.25
BH11-4	1.7	44	10	4.40
	2	68	11	6.18
	2.3	70	15	4.67

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This information is not used in any of the analyses completed for site and does not impact the discussion or recommendations presented in the report. It is not possible to provide an “exhaustive discussion” of potential concerns or implications in the calculations as these sensitivity values are not used in any of the calculations performed for the site, or in developing any of the recommendations for the project.

Comment 2

2. The section of the report 4.3, Silty Clay, informs that the clay is of high plasticity and very high-water content (83 % and 88%). The report shall state the implications of this discovery and provide clear discussion of potential concerns and recommendations, especially that this soil appears to dominate on site. As it relates

to these findings, the report needs to discuss the effects of the GWT seasonal fluctuations and potential concerns. The report needs to provide clear recommendations.

Two samples of the lower silty clay were tested and were confirmed to be of high plasticity with water contents at approximately the liquid limit as noted in the comment. Both the plasticity and the water content are common in this type of clay and are present all over the Ottawa region.

There are no unusual implications of this discovery and there are no potential concerns or specific recommendations related to the plasticity of the clay.

During the geotechnical investigation the groundwater levels were found to be at 1.0 to 1.3 m depth. It is understood that based on investigations by others there is a possibility that the groundwater level could be shallower seasonally (for example near the ground surface, or approximately 1 m higher than measured). There are no geotechnical concerns related to seasonal fluctuations of the groundwater table. Changes to the groundwater level of the magnitude being discussed would not have any meaningful impact on the recommendations and parameters contained in the report, and the potentially higher groundwater levels have already been accounted for.

Comment 3

3. The report corelates the differential settlement of 25 (SLS) and 15 mm (ULS), due to consolidation, with empirical relationship between undrained shear strength and pre-consolidation pressure and experience with similar soils. The report does not specify what the pre-consolidation pressure was determined to be and what similar soils were considered (what are they, where are they and what the numerical shear strength results of those soils were?). The report needs to provide more detailed discussion, supported by numerical data, especially that it appears that the silty clay dominates on site, and it was found to be of very high plasticity and high-water content.

The 25 mm and 15 mm values are almost universally adopted as allowable settlement for typical building structures.

The pre-consolidation pressure of the silty clay was determined to range from 90 kPa to 260 kPa based on the shear strengths measured during the investigation (see table above). The correlation to similar soils referenced is not a correlation to a particular location or project, but correlation to the same silty clay deposits present all over the City of Ottawa and eastern Ontario.

These correlations and methodologies have been used by Golder for thousands of projects since 1960 and are used by all geotechnical consultants on similar types of projects. Furthermore, the theoretical background to these correlations has been well documented in the geotechnical industry the world over for decades, and is extensively written about in textbooks, papers, etc.

Where the shear strengths were not measured (because the soil is too stiff for vane testing) the pre-consolidation pressures would be higher (in the case of clay) or do not apply at all (in the case of glacial till) and so adopting these values is a conservative assumption for areas where there are no shear strength measurements.

These values as well as the site stratigraphy were used to determine SLS bearing resistance values which would limit stresses to values which are below soil's pre-consolidation pressure.

Closure

We trust that this memorandum is sufficient for your present requirements. If you have any questions concerning this memo, please feel free to contact the undersigned.

WSP Canada Inc.

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