June 16, 2025
Project No. 2401284

GSS Engineering Consultants Ltd.
945 3rd Avenue East, Suite 230
Owen Sound, ON
N4K 2K8

Attention: W. Brad Benson

Re: Peer Review Comment Response
Maximum Predicted Water Table and Hydrogeological Assessment Report
Proposed Class 'A' Pit Above Water (JT Pit), JT Excavating Ltd,
Municipality of West Grey, Grey County

Dear Brad:

GEI Consultants Canada Inc (GEI) has been retained by JT Excavating Ltd (the Client) to provide a response to the Peer Review Comment response issued to the Municipality of West Grey by GSS Consultants Ltd, dated June 13, 2025.

The following responses are provided to your comments on the Maximum Predicted Water Table and Hydrogeological Assessment Report:

GSS Consultants Limited Comment

1. No further response is necessary.

GSS Consultants Limited Comment

2. No further response is necessary.

GSS Consultants Limited Comment

3. The report noted that based on field observations and groundwater elevation data collected, the occurrence of surface water on the site (ie. in the central saturated area) was expected to be consistent with the occurrence of the groundwater elevation. Surface water level monitoring data collected for the central ravine and wetland feature should be provided.

GEI Response

Surface water field observations made during site visits to conduct groundwater level monitoring noted that the surface water appears to be present in this area during relatively high groundwater conditions or

during surface run-off flooding events. Further, evidence of the surface water feature was not present during dry seasons.

The proposed on site pit operations are required to have a setback from the areas of the property designated as Hazard Lands as part of the Grey County Official Plan. It is our understanding that development within the area designated as an SVCA screening area is not prohibited as long as suitable consultation with the SVCA has been conducted. SVCA has provided their sign off on the proposed pit.

As noted during the field observations made during site visits, the surface water appears to be seasonal in nature and does not need specific monitoring.

GSS Consultants Limited Comment

The GEI response indicated that the surface water level measurements were not carried out in the on-site surface water feature. In our opinion, water level monitoring in that wetland should have been carried out for the purpose of identifying the high water table elevation on the site and to provide base-line data for the wetland. The report indicated that the seasonal ponding areas in the central portion of the Site were inferred to be associated with the shallow water table elevation. That could have been readily confirmed with installation and monitoring of a shallow piezometer. We disagree with the suggestion that surface water monitoring was not needed because the occurrence of surface water was seasonal. The intent of the study was to identify the seasonal high-water table on the site, which would coincide with the period when water was present in the wetland.

In this instance, it was not apparent that the absence of water level monitoring in the on site wetland materially diminished the findings of the hydrogeological study. Nevertheless, a suitable recommendation should be added to the site plans for a shallow piezometer to be installed in the on-site surface water feature within one year of issuance of the license for measurement of surface water and groundwater levels, coincident with groundwater levels in the existing monitoring wells. Water levels should be measured on at least three occasions, at least 2 weeks apart during the period of seasonal high water levels. The data should be reviewed by a qualified consultant for consistency with the conclusions presented in the report.

GEI Response

A note will be added to the site plans as noted above.

GSS Consultants Limited Comment

4. The report noted that since there are no proposed interactions with the water table or surface water features, the overall water budget, pre- to post-development, is expected to remain unchanged, and stated that equal infiltration to the subsurface will continue post-development. A water budget for the site was not presented. The main components of a water budget are precipitation, losses from evapotranspiration, run off and infiltration. The proposed limits of extraction were not shown on the cross sections in the report and we did not see the site plans. However, the information provided in the report suggested to us that there would be no surface

runoff from the pit created in the north half of the site and reduced or no runoff from the pit created in the south half of the site. A reduction in the existing run off would change the water budget and result in a corresponding increase in infiltration. GMBP should provide additional information to support the conclusion that the water budget for the site will not be changed by the proposed development. If there is a potential for a change in the water budget, then the associated implications should be evaluated.

GEI Response

The existing infiltration rates at the site are not expected to change due to the proposed aggregate extraction. The proposal is for an above water gravel pit which requires the bottom elevation to be 1.5 m above the maximum predicted groundwater table. Given the high permeability of the soil, which will remain after extraction, surface water will continue to infiltrate at a similar rate to pre-development.

Water budgets are designed for land development that includes changes to land use, especially the creation of impermeable surfaces. In our experience, water budgets are not typically applied to green field type works that result in temporary land use and localized changes to grading. Our comments regarding the water budget relate to the large-scale and long-term considerations which includes the maintenance of open fields and vegetated lands that will continue to slope towards the same features.

As noted on Drawing No. 3 Progressive Rehabilitation Plan, the surface flow direction (indicated by surface flow direction arrows on the drawing) will continue to be northeast pre and post development.

GSS Consultants Limited Comment

The rate of post-development infiltration may be similar to the pre-development rate based on the consistency of soil type, but the volume of infiltration on an annual basis will change. The site plans indicated that two enclosed pits will be created in the north and south halves of the site. Notes on both the Operations Plan and the Progressive Rehabilitation Plan indicated that surface water drainage from those pits will be by percolation or evaporation, meaning there will be no runoff from those areas. The existing ground profiles shown on Section B-B, C-C, D-D on Drawing No. 4 indicated there would be no surface runoff to the west at the section locations under existing conditions. The proposed rehabilitation ground profiles shown on the same sections indicated that there would be surface runoff to the west at the section locations under existing conditions. The proposed rehabilitation ground profiles shown on the same sections indicated that there would be no runoff beyond the western limit of the completed pits. Presumably, most of the volume of the current run-ff from the 17.4 ha extraction area will become infiltration, with some potential for increased evapotranspiration. It is not conceivable to us that equal infiltration to the subsurface will continue post-development. We would consider the creation of a gravel pit on the site to be a change in land use and the alterations to the drainage conditions on the site to be permanent.

We assumed that the GEI comment that the surface flow direction indicated by the arrows on Drawing No. 3 Progressive Rehabilitation Plan will continue to be northeast was intended to mean west southwest. The direction of surface water runoff within the completed pit may be consistent with the pre-

development direction, but the site plans indicated that there will be no runoff at the western limit of the pits, as there is under existing conditions, unless the runoff ponds to a sufficient depth in the pit to flow over the top of the completed slopes.

Consistent with our original comment, we cannot agree with the conclusion that the water budget for the site will not be changed by the proposed development, and we recommend that the potential changes to the water budget on the site be identified and evaluated for potential effects on nearby surface water features. This is not to suggest that the implications will necessarily be negative. Increased infiltration and reduced runoff on the site could potentially be considered favourable with respect to local surface water features.

GEI Response

The direction of surface water run off as indicated on Drawing No. 3 Progressive Rehabilitation Plan is south southeast, which is consistent with the direction of surface water run off indicated on Drawing No. 2.

A water balance is an accounting of the water resources within a given area. The water balance equates the precipitation (P) over a given area to the summation of the change in groundwater storage (S), evapotranspiration/evaporation (ET), surface water runoff (R) and infiltration (I) using the following equation:

$$\mathrm{P} = S + I + ET + R$$

The components of the water balance vary in space and time and depend on climatic conditions as well as the soil and land cover conditions (i.e., rainfall intensity, land slope, soil hydraulic conductivity and vegetation). For example, runoff occurs at a higher percentage during periods of snowmelt when the ground is frozen or during intense rainfall events.

Precise measurement of the water balance components is difficult, and as such, approximations and simplifications are made to characterize the water balance of a property. Field observations of the drainage conditions, land cover and soil types, groundwater levels and local climatic records are important inputs to the water balance calculations.

- Precipitation (P): For the purposes of approximating the annual precipitation at this site, the monthly rainfall between 1981 and 2010 was used based on Environment Canada historical weather data for the “Hanover” weather station.
- Storage (S): Although there are groundwater storage gains and losses on a short-term basis, the net change in groundwater storage on a long-term basis is assumed to be zero.
- Evapotranspiration/Evaporation (PET): The evapotranspiration and evaporation components vary based on the characteristics of the land surface cover (i.e., type of vegetation, soil moisture conditions, perviousness of surfaces, etc.). Potential evapotranspiration refers to the water loss from a vegetated surface to the atmosphere under conditions of an unlimited water supply. Evaporation occurs from a hard surface (such as flat rooftops, asphalt, gravel parking areas, etc.).

- Water Surplus (R + I): The difference between the mean precipitation and evapotranspiration is referred to as the water surplus. The water surplus is divided into two parts: as surface or overland runoff (R) and the infiltration into the surficial soil (I). The infiltration is comprised of two end member components: one component that moves vertically downward to underlying aquifers (referred to as percolation, deep infiltration or net recharge) and a second component that moves laterally through the near surface soil profile or shallow soils as interflow that re-emerges locally to surface (i.e., as runoff) at some short distance and time following precipitation.

The analytical approach to calculate the water balance involves monthly soil-moisture balance calculations to determine the pre-development infiltration volumes. The detailed water balance calculation is provided as an enclosure, which is summarized in this and subsequent sections of the report. The following assumptions were used as part of the soil-moisture balance calculations:

- A soil moisture balance approach assumes that soils do not release water as potential recharge while a soil moisture deficit exists.
- During wetter periods, any excess of precipitation over evapotranspiration first goes to restore soil moisture. Considering the nature of the current near surface soils, a soil moisture storage capacity of 75 mm was assumed for pre-development scenarios.
- Once the soil moisture deficit is overcome, any further excess water can then pass through the soil as infiltration and either become interflow (indirect runoff) or recharge (deep infiltration).

Monthly potential evapotranspiration calculations accounting for latitude, climate and the actual evapotranspiration and water surplus components of the water balance based on the monthly precipitation and soil moisture conditions were calculated. The MECP SWM Planning and Design Manual (2003) methodology for calculating total infiltration based on topography, soil type and land cover was used, and a corresponding infiltration factor was calculated for pre- and post-development conditions. The water surplus was multiplied by the infiltration factor to determine both the pre-existing and post-condition annual volumes for run-off and infiltration for the property.

The pre-development scenario was estimated from the site drawings and aerial images. As the site is predominantly covered by agricultural fields and tree cover, with a building and small driveway, the condition of the site pre-development is considered to be 99.7% permeable and 0.3% impermeable. The post-development water balance scenario was estimated based on Drawing No. 3 Progressive Rehabilitation Plan. The post-development scenario assumes 100% of the site remains permeable land.

It is noted that the infiltration and runoff values presented in the enclosure are estimates only. Single values are used for the water balance calculations, but it is important to understand that infiltration rates are dependent upon the hydraulic conductivity of the surficial soils which may vary over several orders of magnitude. As such, the margins of error for the calculated infiltration and runoff component values are potentially quite large. These margins of error are recognized, but for the purposes of this assessment, the numbers used in the water balance calculations are considered reasonable estimates based on the site-specific conditions and useful for comparison of pre- to post-development conditions.

Detailed water balance calculations are included in the enclosure. The pre-development calculations summarized in this section are preliminary only and must be updated once site plans are finalized.

The table below summarizes the pre-construction water balance as per the proposed site development plans.

	SUMMARY			
	Infiltration		Runoff	
	m^3/year	%	m^3/year	%
Pre-to-Post Change Without Mitigation	356	0	-886	0
Required to Meet Pre-Development Conditions	0	-	886	-

These calculations suggest that there is a slight decrease in runoff and increase in infiltration. Based on the water balance calculations, the impact to the surface water features is that surface run off to the surface water bodies will not increase.

GSS Consultants Limited Comment

5. No further response is necessary.

If you have any questions, please feel free to contact me via email at kpickett@geiconsultants.com.

Sincerely,

GEI Consultants Canada Ltd.

Kim Pickett, M. Ed, C.E.T, LET, QP_{ESA}
Project Geoscientist

Matthew Nelson, P. Eng., P. Geo
Senior Project Manager, ENV Practice Lead

Enclosure: Water Balance Calculation

Pre-to-Post Development Water Balance

PRE- AND POST-DEVELOPMENT WATER BALANCE (WITH MITIGATION)									
		Total Land Area (m^2)	Impervious Factor	Pervious Area (m^2)	Impervious Area (m^2)	Infiltration Factor	Runoff Factor	Infiltration (m^3/year)	Runoff (m^3/year)
Existing Land Use (Pre-Development)	Agriculture fields	312483	0.00%	312483	0	0.55	0.45	87260	71395
	Naturalized treed and vegetated areas	92551	0.00%	92551	0	0.65	0.35	30544	16447
	Farm house	1990	64.00%	717	1274	0.55	0.45	200	1341
	Low-lying vegetated area with seasonal saturation/ponding	4976	0.00%	4976	0	0.60	0.40	1516	1011
	TOTAL	**412,000**	**0.31%**	**410,726**	**1,274**	**0.57**	**0.43**	**119,520**	**90,193**
Proposed Land Use (Post-Development No Mitigation)	Lawn	314473	0.00%	314473	0	0.55	0.45	87816	71850
	Naturalized treed and vegetated areas	92551	0.00%	92551	0	0.65	0.35	30544	16447
	Low-lying vegetated area with seasonal saturation/ponding	4976	0.00%	4976	0	0.60	0.40	1516	1011
	TOTAL	**412,000**	**0.00%**	**412,000**	**0**	**0.57**	**0.43**	**119,876**	**89,307**

	SUMMARY			
	Infiltration		**Runoff**	
	m^3/year	%	m^3/year	%
Pre-to-Post Change Without Mitigation	356	0	-886	0
Required to Meet Pre-Development Conditions	0	-	886	-

Notes

1. Both potential infiltration and surface water runoff are independent of temperature
2. Assumption is in January maximum soil moisture storage value is present (75mm)
3. Water Holding Capacity & Infiltration Factors taken from Table 3.1 of MOE SWMPDM, 2003
4. Average Temp. and Precip. taken from Environment Canada station Hanover (6113329)
5. Adjusting Factor for U based on Lorente, 1961