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1000-343 Preston Street
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Attention: Evan Way, P.Eng.

**Re: Response to Comments - Wren Subdivision Phase 3 and 4**
**Wren Drive**
**Cobden, Ontario**

This letter presents GEMTEC's response to comments raised by Jp2g relating to potential for groundwater impacts on the proposed buildings to be constructed in Phase 3 and 4 of the Wren Subdivision in Cobden, Ontario.

## BACKGROUND

GEMTEC carried out a geotechnical investigation for the above noted subdivision in 2014. The findings of that investigation and geotechnical guidelines for the current phases of the subdivision were presented in a geotechnical investigation report titled "Geotechnical Investigation, Proposed Wren Subdivision – Phase 3, Wren Drive, Cobden, Ontario". The report was prepared for Bonnechere Excavating Inc. and is dated December 2022. This report is referred to further herein as GEMTEC (2022).

Jp2g, acting on behalf of the Township has provided commentary on GEMTEC (2022), which is the subject of this letter.

## SUMMARY OF EXISTING INFORMATION AND CONDITIONS

### Summary of GEMTEC (2022)

GEMTEC (2022) refers to 13 test pits which were advanced at the site in 2014 for an initial phase of the subsurface investigation. Four of these test pits are located in the Phase 3 area and a further 6 are located within 50 metres of the Phase 3 area and so are considered relevant. 2 test pits were located within the Phase 4 area. The test pits encountered topsoil underlain by deposits of weathered silty clay, over glacial till, over bedrock. The depth of the test pits ranged from about 0.3 to about 4.8 metres. A summary of the groundwater observations / measurements from each of the test pits is provided in Table 1, along with basic information on the subsurface conditions. The information on groundwater levels were obtained in August 2014. Shallow refusal (i.e. within

about 1.8 metres of depth of excavation) was encountered in test pits TP14-5, TP14-6, TP-9. TP-10 and TP-12, as indicated on the table by the letter (R).

**Table 1 – Summary of Subsurface Conditions**

| Test Pit ID / Final Depth | Surface Elevation | Location | Groundwater Level | |
|---|---|---|---|---|
| | | | Observed | Measured |
| TP14-2 / 3.7 m | 147.1 m | < 50 m from Ph. 3 | Inflow at 3.3 m from Glacial Till (elev. 143.3 m) | ~ |
| TP14-3 / 4.7 m | 147.3 m | Within Ph. 3 | Inflow at 3.2 m from Glacial Till (elev. 144.1 m) | ~ |
| TP14-4 / 3.7 m | 147.2 m | Within Ph. 3 | Inflow at 2.7 m from Glacial Till (elev. 144.5) | ~ |
| TP14-5 / 0.3 m (R) | 147.4 m | Within Ph. 4 | Dry / No observed inflow. | ~ |
| TP14-6 / 1.6 m (R) | 146.2 m | Within Ph. 4 | Dry / No observed inflow. | ~ |
| TP14-7 / 3.7 m (R) | 144.6 m | Within Ph. 3 | Inflow at 2.5 m from Silty Clay / Glacial Till (elev. 142.1) | ~ |
| TP14-8 / 4.8 m | 144.1 m | < 50 m from Ph. 3 | Inflow at 4.6 m from Silty Clay (elev. 139.5 m) | 1.6 m (elev. 142.5 m) |
| TP14-9 / 0.8 m (R) | 145.4 m | < 50 m from Ph. 3 | Dry / No observed inflow. | ~ |
| TP14-10 / 1.7 m (R) | 148.2 m | Within Ph. 3 | Dry / No observed inflow. | ~ |
| TP14-11 / 3.8 m | 145.4 m | < 50 m from Ph. 3 | Inflow at 3.3 m from Glacial Till (elev. 142.1 m) | 2.1 m (elev. 143.3 m) |
| TP14-12 / 1.3 m (R) | 149.1 m | < 50 m from Ph. 3 | Dry / No observed inflow. | ~ |
| TP14-13 / 3.9 m (R) | 144.1 m | < 50 m from Ph. 3 | Inflow at 3.3 m from Glacial Till (elev. 140.8) | 2.2 m (elev. 141.9 m) |

### Overview of Site and Surrounding Conditions

JL Richards has prepared a series of grading and drainage plans for Phases 3 and 4 of the subdivision. J.L. Richards has also prepared a sketch with a possible interpretation of the bedrock level (based on the refusal levels encountered in the test pits). The following is noted from these drawings and sketches, in combination with publicly available information on ground levels in the area;

- The overall land topography in the area in which the Wren Subdivision is located is sloping from west to east dropping down to the Muskat River. The water level in the Muskat, located to the east of the Subdivision, is significantly below the ground level in the subdivision (by 20 metres or greater);
- A stormwater management pond has been constructed on the northwest side of the subdivision. The top of the pond wall near the western inlet is at about 144.2 m elevation. The base of the low water drainage channel in the pond at this location is at about 143.7 metres elevation. The pond drains to the north and out of the subdivision. The northern end of the pond is a dry pond. Its base level is at about 143.7 to 143.3 metres elevation. The pond outlet level is at about 143.1 metres elevation;
- Within Phase 3 USF levels are proposed from between about 144.3 to 146.6 metres elevation. Lower USF are planned on lots closer to the pond boundary in general but above the level of the base of the pond;
- Within Phase 4 USF levels are proposed from 144.2 to 145.2 metres elevation. Lower USF are planned on lots closer to the pond boundary in general but above the level of the base of the pond;
- Houses along Bamagillia Street in the adjacent phase of the development have been constructed with USF elevations of 144.5 to 146.0;
- The sketch of bedrock levels identifies a potential for bedrock excavation for many of the lots located within the central portion of Phase 3. The map points towards a general trend of higher / shallower bedrock within this area of the site, and no consistent bedrock level throughout. However, it is important to note the quantum of data available to develop the map and the bias that contour plots can show to clusters of data, and therefore it should be used with caution.

## SUMMARY OF COMMENTARY BY JP2G ON GEMTEC (2022) AND GEMTEC RESPONSE

### Jp2g Commentary

The comment from Jp2g is reproduced below for reference (with some minor rewording and numbering for clarity / context).

*The township and Jp2g are concerned over the issue of groundwater and its impact on the buildings both during construction and long term. None of the test pits located within the lots for*

*Phase 3/4 had well screens installed in them so there is no information on groundwater levels for the lots in these phases. A significant number of houses will have basements within the bedrock, if full depth basements are used. Sumps with a drainage outlet to a ditch could be prone to freezing in the winter months and individuals may connect the sump drains to the sanitary lines. Jp2g recommends that alternative house styles be considered for specific lots with either slab on grade or shallow basements being adopted (to avoid the possibility of foundations being installed below the groundwater level).*

**GEMTEC Response**

For clarity, and to comprehensively respond to Jp2g / the township, GEMTEC has addressed each component of the comment individually below.

1. *The township and Jp2g are concerned over the issue of groundwater and its impact on the buildings both during construction and long term.*

GEMTEC notes the concern raised on this matter. GEMTEC agrees that groundwater management will be required by the contractor during construction, however this should be manageable. Houses within previous phases of the development have been constructed with USF at similar levels to those proposed in Phase 3 and 4 and below the groundwater level. Test pit TP12 encountered a relatively shallow refusal level (147.8 m elevation) and the foundation USF of the adjacent Lots 23 and 15 from Phase 2 was at about 146.2 m elevation. Available aerial imagery of open excavations along Bamagillia Street show groundwater within the excavations.

As noted in GEMTEC (2022) – based on observations during the construction of Phase 1 and 2 groundwater inflow to excavations should be expected. GEMTEC does not expect short term pumping during excavation to have any significant effect on nearby structures and services. Notwithstanding, during construction groundwater management is the responsibility of the contractor.

Observed and measured groundwater levels from GEMTEC (2022) were above the outlet level of the drainage ponds. However, in the longer term, groundwater level lowering should it occur, is not anticipated to have a significant impact on the subsurface units at this site, given the already weathered condition of the silty clay soils, and as glacial till and bedrock are not prone to significant volume change as a result of reduction in moisture content.

2. *None of the test pits located within the lots for Phase 3/4 had well screens installed in them so there is no information on groundwater levels for the lots in these phases.*

Two of the standpipe piezometers are within adequate distance of the Phases 3 and 4 to be of relevance. Also, observations of groundwater conditions were made in each of the test pits. Notwithstanding, this information can be supplemented with observations from construction of

previous phases for the houses and the stormwater management pond (which if unlined will provide a clear indication of the groundwater level in the vicinity of the pond).

In GEMTEC's opinion there is a low risk of the relatively isolated shallow bedrock in the central portion of Phase 3 having connectivity to a significant body of water. Groundwater therein would likely drain to the lower surrounding areas and the groundwater level in the shallow rock is likely consistent with the groundwater level in the surrounding soils. There may be a potential for groundwater to accumulate in zones of lower transmissivity and in bowls or poorly drained areas but dewatering during construction will result in drainage and and ongoing recharge of this rock would be reduced by the development of the subdivision.

3. *A significant number of houses will have basements within the bedrock, if full depth basements are used. Sumps with a drainage outlet to a ditch could be prone to freezing in the winter months and individuals may connect the sump drains to the sanitary lines.*

GEMTEC agrees that houses with basements constructed partially below the bedrock level are likely, particularly in the central portion of Phase 3, and also that poorly constructed or inadequately protected sump drainage lines may not perform as intended. However, the drainage lines can be designed to mitigate these risks.

4. *Jp2g recommends that alternative house styles be considered for specific lots with either slab on grade or shallow basements being adopted (to avoid the possibility of foundations being installed below the groundwater level).*

Based on the water level observations available from GEMTEC (2022) the USF levels are above the measured water level at least for a portion of the year within parts of the site. The selection of the style of house to be constructed is not a geotechnical consideration but it is GEMTEC's opinion that construction of the proposed style of house, i.e. with a full depth basement level with foundations below the seasonal high water level, is feasible for the site conditions. Homes are routinely constructed, when designed with adequate surface and foundation drainage and sump pumps, in these types of conditions.

## CLOSURE

We trust that this letter is sufficient for your purposes. If you have any questions or require additional information, please call.


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Hydrogeologist

William (Bill) Cavers, P.Eng.
Principal Geotechnical Engineer

DC/WC/AP

Enclosures
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## ATTACHMENTS

None