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Our Ref: 11224019-03
TBG Ref: 20697

18 January 2022

Michael Testaguzza
The Biglieri Group
2472 Kingston Road
Toronto, ON M1N 1V3

Re: Response to Comments – 787 & 825 Fallis Line, Millbrook ON
County File 15T-21007

Dear Mr. Testaguzza:

GHD Limited (GHD) is pleased to present the following responses to various agency comments received regarding the geotechnical and hydrogeologic investigation reports and environmental site assessment report completed for the above noted properties located on Fallis Line in Millbrook, Ontario. GHD responses follow the respective agency comments.

Stantec Memo Item – Geotechnical Section 1.0

1. *The introduction references the proposed scope of development as consisting of typical 1-storey and 2-storey homes, two (2) stormwater management ponds, asphalt paved roadways and servicing. The proposed design grades and service invert elevations were not available at the time of the Geotechnical report.*

   Comment: It may be of value to reference the possible presence of basements in this section, consistent with the reference provided in Section 6.4 The presence of basements may be of particular concern in the context of the potential "artesian" groundwater conditions referenced in Section 6.1

GHD Response

GHD has now reviewed the proposed grading plan. Potential flowing artesian groundwater conditions are not a concern for this development based upon our understanding of artesian conditions in the area, the subsurface conditions at the site and the proposed development plans. The ground surface elevations for the residential area ranges from about 250 to 260 masl. Based upon well records reviewed, there are six (6) flowing artesian wells documented in the area (i.e. within 500 m of the property). Each of these flowing wells are located just north of King Street West in the area of Turner Street and the former rail line in the Village of Millbrook. The ground elevation in this area is about 230 masl based upon Peterborough County GIS mapping. The well records indicate that groundwater was encountered within these flowing wells at depths of 5.5 to 26 m below ground surface or at approximate elevations of 224.5 to 204 masl. These elevations correspond to depths that are 25 to 45 m below the ground surface of the proposed development. In addition, no flowing groundwater conditions were encountered within the drilled boreholes on the site to depths of 6.7 m. The presence of artesian conditions and basements is not a concern.

Stantec Memo Item – Geotech Section 4

2. *The topography on the property was reported as rolling to hilly with overall relief in the order of 25 m.*

   Comment: Specific to the area of the planned development blocks, the topography shown on the draft plan of Subdivision indicates a moderate overall slope up from the east to the west with relief in the order of 17 m.

GHD Response

Comment only. No further action is warranted.

Stantec Memo Item – Geotech Section 6

3. *The presence of soft loose soils encountered in four (4) boreholes was reiterated. The report strongly recommended that raising the grade in the areas of these boreholes be avoided.*

   Recommendation 1: The general topography and relief referenced in Section 4 and commented on above may permit the development to proceed with only limited grading, thereby minimizing the placement of fill and associated potential settlements in this respect. However, if grading is required, areas of 'cut' may also pose a concern with respect to the underlying aquifer and potential artesian conditions outlined in Section 6.1 of the report. Additional commentary in this respect would be of value. The author's recommendation that the design grades, when available, be reviewed in detail in this respect, is substantiated.

GHD Response

As noted above, flowing artesian wells correspond to groundwater found under pressure at depths that are 25 to 45 m below the ground surface of the proposed development. These depths would be sufficiently deep below the development and flowing artesian conditions are not expected to be encountered by the construction or development activities. In addition, no flowing groundwater conditions were encountered within the drilled boreholes on the site to depths of 6.7 m.

Based on reviewed of the preliminary site servicing and grading plan prepared by Valdor, it is GHD's understanding that grade changes of more than one (1) m are not expected in the areas where soft/loose soils were encountered in the boreholes.

Stantec Memo Item – Geotech Section 6.1

4. *Paragraph 2 provides recommendations for excavation stability in the context of the presence of the water table.*

   Paragraph 2 also includes reference to potential zones of more significant groundwater infiltration; the report includes a recommendation for the use of filtered sumps, sheet piling, or other forms of groundwater control for this purpose.

   Paragraph 3 references potential artesian conditions associated with a confined aquifer underlying the properly.

   Comment for consideration: Section 5 of the report concluded that a static water table was not present within the depth of interest. It is suggested that minor clarification be provided in this section, perhaps referring to Section 5 for reference, in this context.

GHD Response

It is our opinion that there is no permanently saturated, shallow aquifer across the site. No further action is warranted.

Stantec Memo Item – Geotech Section 6.1

5. *Comment for Consideration: The use of filtered sumps and other forms of groundwater control (well points or similar) is considered reasonable and appropriate. The authors may wish to clarify the intended use of sheet piling for this purpose, within the context of the proposed scope of residential development.*

GHD Response

The use of sheet piling is not expected at this Site based on the proposed scope for residential development and groundwater conditions encountered. Groundwater seepage or surficial water inflow into proposed excavations is expected to be controlled by pumping from sumps to an acceptable outlet. Should

zones producing more significant groundwater infiltration be encountered, pumping from well points or equivalent would need to be considered.

Our experience from the adjacent development to the east was there was no water in the soils in the upper lands nearest to Fallis Line with some seepage encountered as the construction activities progressed to the south to lower elevations. Some pockets of sand material were also encountered; however, did not produce groundwater. Seepage into trenches and excavations was handled using sumps.

Stantec Memo Item – Geotech Section 6.1

6. *Recommendation 2 – Reference to or a discussion of the underlying aquifer and potential artesian conditions should be added to Section 5.1 or Section 5.7*

GHD Response

The underlying aquifer of potential artesian conditions has been addressed in previous responses.

Stantec Memo Item – Geotech Section 6.2

7. *Paragraph 1 advised of the underlying aquifer and potential for upward seepage through the "leaky"' aquitard. The last sentence in the paragraph recommends that the service bedding consist of HPB or HL-8 stone where there is a potential for leakage of the underlying aquifer.*

   Recommendation 3 - The potential for heave to occur at the bottom of the service trench excavations should be discussed in view of the presence and influence of the underlying "aquifer". A recommended procedure for evaluating and addressing any potential heave should be provided.

GHD Response

As noted in previous responses, flowing artesian conditions within the development area are not expected. However, should artesian conditions be encountered it is recommended that groundwater be lowered a minimum of one (1) m below the base of the excavation, using closely spaced well points or similar.

Stantec Memo Item – Geotech Section 6.2

8. *For Consideration - For clarification, is the recommended use of HPB or HL-8 stone intended for conditions where standing water is present at the base of the trench?*

GHD Response

Correct, the use of HPB or HL-8 is recommended should trenching encounter very wet (standing water) or loose subgrades.

Stantec Memo Item – Geotech Section 6.4

9. *The report references the potential presence of basements. The report reiterates the presence of soft/loose conditions encountered at specific depths in four (4) of the boreholes, providing limitations to the design and construction of foundations in these areas. The report provides bearing reactions and resistances for the design of conventional spread and strip footing foundations placed on the native soils or on engineered fill. The report includes recommendations for the placement of engineered fill.*

   Recommendation 4 - If basements are intended for homes in the areas of the four (4) boreholes in which loose/soft zones were encountered, recommendations for foundations should be provided in this respect.

GHD Response

Boreholes BH3-17 and BH5-21 are located within areas of residential homes with potential basements. Based on the proposed grading plan, it is expected that the excavation for basements will extend to or below the zones of loose/soft soils. Prior to forming, all foundation excavations must be inspected and approved by a geotechnical engineer. Any loose/soft soils should be subexcavated and replaced with engineered fill.

Stantec Memo Item – Geotech Section 6.4

10. *For Consideration - The authors include an option for the use of "Granular Fill" as engineered fill. It may be of benefit to clarify if the granular fill must meet a particular specification (such as OPSS Granular B) or similar.*

GHD Response

The granular fill materials should consist of Granular “B” conforming to the requirements of OPSS Form 1010 or equivalent.

Stantec Memo Item – Geotech Section 6.4

11. *Recommendation 5 - The text recommends a minimum thickness of engineered fill beneath the footings, if and as required, and refers to proportioning of the strip and spread footings based on the bearing values provided. Is there a maximum size/dimension of footing recommended relative to the thickness of engineered fill referenced?*

GHD Response

The bearing pressures provided are based on footings on the order of 1 m to 2 m wide.

Stantec Memo Item – Geotech Section 6.4

12. *For Consideration - The recommended lift thickness for the engineered fill is referenced as 300 mm. Section 6.5 refers to infilling or grade raise beneath the building basement floor slab and references a lift thickness of 200 mm for "granular fill". Should the engineered fill specifications in Section 6.4 be edited to include a recommendation for a 300 mm lift thickness for soil fill and a 200 mm lift thickness for granular fill?*

GHD Response

Correct. Earth borrow fill must be placed in maximum 300 mm lifts and granular fill must be placed in maximum 200 mm lifts.

Stantec Memo Item – Geotech Section 6.5

13. *The report recommends that under-slab drains be included where basements intersect the groundwater table.*

    Comment For Consideration - Section 5.7 states that there is not a permanently saturated shallow aquifer on the Site and that only minimal groundwater seepage should be expected to depths in the range of 0.9 m to 6.4 m. Can the authors clarify the requirement for under-slab drains in the context of the apparent absence of a permanent groundwater table to the depth indicated assuming any basement would not extend below the depth indicated?

GHD Response

A permanent groundwater table is not expected to be intersected based on a review of the preliminary site grading plan and anticipated depth of basement excavations. If seepage zones are intersected, the intensity of groundwater seepage within basement excavations and the need for under slab drains should be assessed during construction.

Stantec Memo Item – Geotech Section 6.6

14. *The report recommends that hydrostatic forces be considered in the design of basement or retaining walls where the walls extend below the groundwater table.*

    For Consideration - Section 5.7 states that there is not a permanently saturated shallow aquifer on the site and that only minimal groundwater seepage should be expected to depths in the range of 0.9 m to 6.4 m. Can the authors clarify the recommendation to consider hydrostatic forces, assuming there is no permanent groundwater table assuming any basement would not extend below the depth indicated.

GHD Response

A permanent groundwater table is not expected to be intersected based on a review of the preliminary site grading plan and anticipated depth of basement excavations, in which case hydrostatic forces will not be an issue.

Stantec Memo Item – Geotech Section 6.7

15. *The report provides estimates of the hydraulic conductivity of the native soils in the range of $10E^{-4}$ cm/sec to $10E^{-7}$ cm/sec.*

    Recommendation 6: Municipalities and other regulatory authorities often adopt a hydraulic conductivity criteria of 10^{-6} cm/sec or less for 'wet' SWM Ponds. The applicable criteria/threshold should be confirmed and if necessary, the requirement for a localized liner in areas of coarser soil materials, as recommended by the authors, be extended to the entire pond

GHD Response

Based on the preliminary site grading plan the proposed base of the southern SWM Pond is expected to consist of dense to very dense sand soils, as such the liner recommendations provided in the geotechnical report must be extended over the entire pond. Groundwater seepage at lower elevations is likely based upon experience on the neighbouring site to the east, observations in our boreholes and groundwater seeps were observed in the forested area on the south slope of the development.

The base of the northern pond is expected to consist of clayey silt and the need for liner is not expected. The need for a localized liner in areas of coarser material (if encountered) should be verified during construction.

GHD is not aware of a Municipality-adopted hydraulic conductivity criteria for ‘wet” SWM ponds. We agree with the recommended *10^{-6} cm/sec or less criteria.*

Stantec Memo Item – Geotech Section 6.8

16. *The report includes a recommendation to undertake a test pit program at the time of the tendering phase.*

    Recommendation 6 - Stantec is in full agreement with the authors in this respect. Observations of seepage and groundwater with respect to dewatering | unwatering requirements and assessment of potential base heave in open excavations will be vital to confirming the Geotechnical and civil design and to providing information for the Contractors to assess their means and methods of construction.

GHD Response

We agree with the Stantec comment. No further response is required.

Stantec Memo Item – Geotech

17. *Recommendation 7 - Google Earth imagery indicates that there is a development under construction to the immediate east of the subject property. In consideration of the reference(s) to potential concerns of "artesian" conditions associated with the underlying "aquifer" on the subject property, it is suggested that information from the neighbouring development (both investigation and construction related information and documentation) may be of particular value in confirming the conditions likely to be encountered on the subject property.*

GHD Response

Agreed. We have discussed the conditions involved in various aspects of the development to the east and noted that information in this response. It is our understanding that the soils were dry in the higher elevations towards Fallis Line and some seepage was encountered as construction activities progressed to the lower elevations of the development. The seepage water was handled using pumps and sumps. There were no flowing artesian conditions encountered at the adjacent development.

Stantec Memo Item – Geotech

18. *Recommendation 8 - If there is no information available from the neighbouring property it would be of value to advance a limited number of boreholes on the subject property to a depth consistent with confirming the underlying aquifer does not pose a concern for the proposed scope of development.*

GHD Response

A total of 26 boreholes were advanced on the property and 11 monitoring wells were installed. Based on the work completed and our understanding of the area in relation to adjacent developments, sufficient work has been completed to provide the opinion that the underlying aquifer does not pose a concern for the proposed scope of development. There were no flowing artesian conditions encountered at the adjacent development

Stantec Memo Item – Phase One ESA

19. *O.Reg. 153/04 requires that a legal survey be provided in the final Phase One ESA if it is used in support of a Record of Site Condition (RSC). Since the property use was identified to be agricultural and residential, it would therefore not be changing to a more sensitive site use. Consequently, Stantec assumes that an RSC is not required and a legal survey is also not required to be included in the report.*

GHD Response

We concur. A Record of Site Condition is not required, hence a legal survey is not included in the ESA.

Stantec Memo Item – Phase One ESA

20. *A response to the freedom of information (FOI) request to the Ministry of Environment, Conservation and Parks (MECP) and Technical Standards and Safety Authority (TSSA) for environmental records related to the Site had not been received at the time of issuance of the Report. Under O.Reg. 153/04, a Phase One ESA report is not considered final until responses have been received from these search requests. Since over six months have elapsed since the FOI requests were submitted, GHD should be contacted to inquire if responses to the FOI requests have been received.*

GHD Response

As noted in the previous response, a Record of Site Condition is not required; however, the Regulation (O.Reg. 153/04) is used as a guide for this ESA. The Regulation indicates to “make all reasonable inquiries to obtain such of the following as are reasonably accessible and pertain, unless otherwise specified, to the phase one study area”.

GHD obtained the TSSA search requests in documents dated March 10, 2021 and December 15, 2021. There were no fuel safety-related documents for the property. The response letters from TSSA are provided in Attachment A.

GHD requested information from the MECP; however, no information was provided to GHD. A follow up request was conducted with the MECP. As noted in the email response to GHD, the MECP is still waiting for the program area within the Ministry to respond to our request. This is also provided in Attachment A.

It is our opinion that we have made a reasonable attempt to obtain the MECP search results. As the lands assessed are predominantly agriculturally based, the information expected to be provided by the MECP is not expected to be materially significant to the overall environmental conditions of the property. It is our opinion that the conclusions of the ESA report remain valid without the MECP document.

Stantec Memo Item – Phase One ESA

21. *The Site was reported to be snow covered at the time of the site reconnaissance. This is not an allowable limitation under O.Reg. 153/04. It is unclear how GHD concluded that there were no signs of deleterious fill materials at the Site. Furthermore, stained surficial materials or stressed vegetation, if present, would not be observable under snow covered conditions. GHD should conduct a site*

reconnaissance when snow cover is not present to confirm that there are no obvious deleterious fill materials, stained surficial materials, or stressed vegetation at the Site.

GHD Response

GHD has conducted various inspections and work programs on the lands on multiple occasions. The undersigned has walked the property as recently as July 2021 and December 2021 without snow cover. It remains our opinion that no signs of deleterious fill, stained surficial materials or stressed vegetation were observed. Photographs are provided in Attachment B illustrating the property conditions on these dates.

Stantec Memo Item – Phase One ESA

22. *Although Stantec generally agrees that the historical rail line PCA is not likely to contribute to an APEC at the Site, GHD should further assess and provide rationale on the likelihood that the subsurface beneath the former rail line does not contain fill of unknown quality.*

GHD Response

A follow up site reconnaissance was completed of the historical rail line corridor to confirm the absence of fill, rail line ties or ballast material. It is our understanding that the rail line was abandoned in 1920. On either side of the former rail line is forested. No discoloured soils or stressed vegetation was observed.

The portion of the rail line within the area to be residentially developed was historically excavated (likely to maintain a gradual grade from top to bottom of the slope) and is lower than the surrounding areas. No rail ties or rail ballast material was observed within the rail line right-of-way.

Where the rail bed was built up is within a heavily forested in this area. A number of areas of the rail bed area have been washed out and eroded over the years. The material observed was generally a brown silty sandy with gravel material. No deleterious fill, ballast or discoloured material was observed. Based upon our observations, the likelihood of significant impacts below the former rail line appears low.

It remains our opinion that the historical rail line does not contribute to an APEC at the Site.

Stantec Memo Item – Phase One ESA

23. *Stantec considers that the heating oil AST, the historical release of heating oil, and the temporary construction fuel AST all represent PCAs, but agrees that the reported small quantity of fuel released, and the nature of the heating oil and temporary fuel storage, suggest that these do not contribute to APECs at the Site.*

GHD Response

GHD agrees. No further response required.

Stantec Memo Item – Phase One ESA

24. *Stantec generally concurs with the report findings that no additional investigation is required and that the Report was in general compliance with O.Reg 153/04. Stantec recommends, however, that further justification be provided with respect to the surficial conditions at the Site and the potential presence of fill of unknown quality along the former railway line.*

GHD Response

Based upon our responses provided above, it is our opinion that no further assessment is required and the Phase One ESA report is valid.

Stantec Memo Item – Hydrogeological Assessment

25. *Stantec is of the opinion that the scope of the Hydrogeological assessment was suitable for the proposed scale of the development on municipal services.*

GHD Response

We concur. No further response is required.

Stantec Memo Item – Hydrogeological Assessment

26. *Stantec is of the opinion that a multi-layered approach should be considered for mitigating the infiltration deficit that includes a number of the following alternatives:*

    a. *Roof downspouts of the dwellings directed to pervious lawn areas and grassed swales, where feasible to promote infiltration.*

    b. *Where applicable, grassed swales should be constructed along side and rear lot lines*

    c. *Where possible, the grading of lots should be completed with increased topsoil depth (utilizing HSG A and B type soils to encourage infiltration and absorption.*

    d. *Construction of infiltration trenches to infiltrate a portion of the drainage area.*

GHD Response

GHD agrees. This approach or an approach that utilizes multi-layers can be implemented during the Function Servicing / Detailed Design stages.

Stantec Memo Item – Hydrogeological Assessment

27. *During the detailed design stage of the project, Stantec recommends that additional calculations / analysis should be performed to demonstrate that proposed post-development infiltration augmentation measures will be capable at meeting the infiltration deficits projected for the Site (i.e., what annual volume of infiltration can be expected from each measure to maintain pre- to post-development values)*

GHD Response

We concur. No further action at this time.

Stantec Memo Item – Hydrogeological Assessment

28. *As per the recommendation provided in the Geotechnical Peer Review, the reference to potential concerns of "artesian" conditions (Section 4.2.3) associated with the underlying "aquifer" on the subject property has not been investigated as part of this study. Stantec recommends that information from the neighbouring development (both investigation and construction related information and documentation) be reviewed as this may be of value in confirming the conditions likely to be encountered on the Site.*

GHD Response

As noted in previous responses, additional information was gathered from the development to the east and for the potential of flowing artesian wells. Artesian conditions were not encountered during construction activities to the east of this development. As noted, artesian conditions appear to correspond to groundwater found under pressure at depths that are 25 to 45 m below the ground surface of the proposed development. These depths would be sufficiently deep below the development that flowing artesian conditions are not expected to be encountered by the construction or development activities. It is our opinion that sufficient investigation was completed to address if there would be anticipated artesian conditions on this site as no flowing groundwater conditions were encountered within the drilled boreholes on the site to depths of 6.7 m.

Stantec Memo Item – Hydrogeological Assessment

29. *Stantec recommends that a multi-layered approach be used for mitigating the infiltration deficit as opposed to just rooftop water being directed to grassed surfaces. Additional measures that could be employed include the construction of grassed swales along side and rear lot lines, grading with increased topsoil depth, and construction of infiltration trenches. Although increased topsoil depth is recommended by GHD, this approach is most effective at enhancing infiltration potential when HSG A and B soils are utilized. In addition, ongoing data collection at the Site should be used to refine the recommendations in this report during detailed design, as appropriate.*

GHD Response

Comment only – no further response at this time. Refining of the recommendations to be completed at the detailed design stage.

ORCA Memo Item – Planning

1. *Hydrologic features with associated floodplain, and steep slopes were found on the subject site. Section 3.1 of the PPS directs development outside of hazardous lands and prohibits development within a floodway. A combined slope stability/ erosion hazard study is required to confirm the Southern stormwater management (SWM) block is not located within an erosion hazard*.

GHD Response

Refer to the report completed by GHD, entitled “Erosion Hazard Limit and Slope Stability Assessment, Proposed Subdivision Development, 787 and 825 Fallis Line, Millbrook, Ontario”, dated December 15, 2021. Refer to Attachment C.

ORCA Memo Item – Engineering

1. *The south pond and the proposed wastewater treatment plant is located on steep slopes associated with Baxter Creek. Please provide a combined slop stability study and erosion hazard limit for the south pond and wastewater treatment plant including, but not limited to cross-sections of the existing slope, all proposed slope modifications including fill placement, weight loading for the swm pond (full) and all proposed wastewater treatment plant structures (full built-out condition full of water), etc.*

GHD Response

Refer to the report completed by GHD, entitled “Erosion Hazard Limit and Slope Stability Assessment, Proposed Subdivision Development, 787 and 825 Fallis Line, Millbrook, Ontario”, dated December 15, 2021. Refer to Attachment C.

ORCA Memo Item – Engineering

2. *North Pond*

    a. *Since drilling was done in March, does the groundwater elevation accurately define the maximum elevation?*

    b. *Does the pond require a liner to separate stormwater from groundwater?*

    c. *Please confirm the seasonally high groundwater elevation for the proposed north pond.*

GHD Response

a. A water level was collected on March 17, 2021 as well as additional water levels in July 2021. The March water level is the highest recorded from our measurements and reasonably represents a high water level. However, this water level is, in our opinion, a function of the drainage occurring in this north pond area. The north pond is in an area of lower elevation with overland flow draining to this area. There did not appear to be an outlet for water to drain from this area resulting in a poorly drained, saturated area. The soils observed during drilling at BH1S-21 to a depth of 2.4 mbgs was topsoil underlain be clayey silt till. No groundwater seepage from the shallow till was noted. The deeper borehole drilled in the north pond encountered groundwater seepage at about 4.6 mbgs.

Improved surface drainage in this area would result in a reduction of standing surface water that infiltrates the shallow till soils in this area and over time, the low permeability soils of this area would be expected to deplete of water.

b. It is GHD's opinion that there is no permanently saturated, shallow aquifer within this proposed SWM pond location. Based upon our boreholes in the proposed pond area, groundwater seepage should not be encountered provided the pond stays above approximately 4.6 mbgs. The base of the northern pond is expected to consist of clayey silt and the need for liner is not expected. The need for a localized liner in areas of coarser material (if encountered) should be verified during construction.

c. Refer to response a).

ORCA Memo Item – Engineering

3. *South Pond*

   a. *Table 5.2 indicates the water level observed at 2.0 mbgs on March 17, 2021. However, it does not reflect the borehole log in BH11-17. Please review and correct it.*

   b. *The bottom of the SWM pond elevation is designed at 243.0 m. When the water level is approximately at 244.5 m, it is likely that the pond bottom will become submerged. Please identify any impact on the groundwater level based on the construction of the pond.*

   c. *Please confirm the seasonally high groundwater elevation for the proposed south pond.*

GHD Response

a. The corrected borehole log is provided in Attachment D of this response letter.

b. It is GHD's opinion that the hydraulic conditions are discontinuous across the site. In the area of the south pond, seepage was noted at approximately 2.3 m (248.4 masl) at BH10-17; approximately 4.6 m (241.9 masl) at BH11-17, and approximately 5.2 m (240.9 masl) at BH12-17. It is our opinion that there is no permanently saturated, shallow aquifer across the site, within this proposed SWM pond location; however, thin sand seams with water may be encountered based upon our borehole observations and groundwater seeps were observed in the forested area on the south slope of the development. Groundwater within these thin sand seams may deplete over time. The proposed base of the southern SWM Pond is expected to consist of dense to very dense sand soils, as such the liner recommendations provided in the geotechnical report must be extended over the entire pond. A properly lined SWM pond will mitigate any impact to the groundwater conditions at the Site. Additionally, the bottom of the south pond is about 15 to 40 m above the depths where flowing groundwater was encountered within artesian wells in the Village of Millbrook south of the site.

c. Groundwater levels from BH11-17 from March 17, 2021 were observed to be at approximately 244.50 masl. On July 10, 2021 the water level was 243.2 masl. The groundwater elevation is interpolated from a ground surface elevation from ODTM Lidar derived data.

ORCA Memo Item – Engineering

4. *Water balance. Downspout disconnection, top soil depth and reducing grades are standard design practices. All low impact development practices to meet water balance criteria will be directing surface water into the infiltration (e.g., soakway pits, infiltration trenches, etc). We do not accept the downspout disconnection, top soil depth and reducing grades. Please adjust the design accordingly.*

GHD Response

Design of low impact development alternative to be completed by Valdor.

ORCA Memo Item – Engineering

5. *A borehole location plan is missing in Appendix H. Please include in the report.*

GHD Response

An Appendix H is not included in GHD's Geotechnical and Hydrogeological Repots. A borehole location plan is provided as Figure 2 of the Geotechnical Investigation Report and Figure 3 of the Hydrogeological assessment Report.

ORCA Memo Item – Engineering

6. *As recommended in the geotechnical report, SWM berm's stability analyses will be demonstrated at the detail design or when grading plans are finalized.*

GHD Response

Refer to the report completed by GHD, entitled "Erosion Hazard Limit and Slope Stability Assessment, Proposed Subdivision Development, 787 and 825 Fallis Line, Millbrook, Ontario", dated December 15, 2021. The report is provided in Attachment C.

Township of Cavan-Monaghan - Planning

1. A Record of Site Condition will be needed for the former rail trail lands.

GHD Response

It is GHD's position that a Record of Site Condition (RSC) is not required for the former railway line. The historical rail line has been used as a parkland property use for about 100 years as a private trail for recreational activities. Once developed, the majority of the trail will remain parkland with a short section to be developed for residential purposes. Based upon this current property use and the future use after development, it is our opinion that a RSC is not required.

Within Ontario Regulation 153/04: Records of Site Condition – Part XV.1 of the Act (under the Environmental Protection Act, Section 168), there are exemptions to the changes of use that require an RSC. As defined within Section 168.3.1 of the Act, a change in use from industrial or commercial to residential or parkland cannot occur without an RSC. However, based on the exemption under s.168.3.1 (1) (a) of the Act, the property can be changed from a railway line to a trail used for recreational activities without an RSC. Regardless of this exemption, it is our professional opinion that an RSC does not apply since the development is changing property use from agricultural and / or parkland to residential use. An RSC is not required for this property use change.

After development, the majority of the private trail will continue to remain as parkland and trails. There are lots that will be developed within the former rail line (Lots 51 to 59 on Street B), however, there was no evidence observed of any former rail line materials (ballast, rail ties, rails etc.) in any of the areas reviewed on this Site. Within proposed Lots 51 to 59, this area has been previously excavated and is lower than the surrounding terrain. Further north along the historical rail alignment, a gravel driveway has replaced the rail line to access the residential home.

It remains our opinion that the former rail line presents a very low level of concern from an environmental site assessment perspective and is suitable for development without an RSC. We are in agreement with the Stantec comment #22 that the historical rail line PCA is not likely to contribute to an APEC, negating the rationale for an RSC.

We trust that this response letter meets with your immediate requirements. Should you have any additional questions, please contact our office.

Sincerely,

GHD

Robert Neck, P.Geo.(Limited)
Associate, Project Director

Leandro Ramos, P.Eng.
Project Manager

Attachments

Attachment 1

Site Photographs

Photo 1 - View of the former rail line looking north.

Photo 2 - View across agricultural field looking south.

Site Photographs

Photo 3 - View of former rail line looking south.

Photo 4 - Area of erosion of former rail line (south of residential area). Light brown silty sand observed. No rail ballast or discoloured soils noted.

Site Photographs

Photo 5 - View of western agricultural field looking west.

Photo 6 - View of agricultural field looking southeast toward Village of Millbrook.

Site Photographs

Photo 7 - View of agricultural field looking north toward Fallis Line.

Photo 8 - View of BH11-21 monitoring well nested location looking south.

Site Photographs

Attachment 2

TSSA and MECP Documentation

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www.tssa.org

10 March 2021

Eric Wierdsma
GHD
29-347 Pido Road
Peterborough ON K9J 6X7

Subject: 787 Fallis Line, Millbrook
Your File No.: 11224019-01
SR No.: 3017186

Dear Madam/Sir:

We are in receipt of your correspondence wherein you requested information regarding the above noted subject.

A search of our records did not produce the requested Fuels Safety documents.

TSSA does not make any representations or warranties with respect to the accuracy or completeness of any records released. The requestor assumes all risk in using or relying on the information provided.

Should you have any questions, please contact Public Information at publicinformationservices@tssa.org.

Yours truly,

Gaya Nair

Gaya Nair
Public Information Services

345 Carlingview Drive
Toronto, Ontario M9W 6N9
Tel.: 416.734.3300
Fax: 416.231.1626
Toll Free: 1.877.682.8772

www.tssa.org

15 December 2021

Eric Wierdsma
GHD
29 – 347 Pido Road
Peterborough, ON K9J 6X7

Subject: **825 Fallis Line, Millbrook, Ontario**
Your File No.: **11224019-01**
SR No.: **3150428**

Dear Madam/Sir:

We are in receipt of your correspondence wherein you requested the release of information regarding the above noted subject.

A search of TSSA public records **did not** identify/reveal/locate any documents relating to the following Program(s):

Program	No Record
Fuels Safety	☒
Boiler/Pressure Vessel	☐
Elevating & Amusement Devices	☐

Requested records relating to the following Program(s) were located:

Program	Record	Documents Attached
Fuels Safety	☐	☐
Boiler/Pressure Vessel**	☐	☐
Elevating & Amusement Devices	☐	☐
Other	☐	☐

**For BPV, if it has been indicated that records have been located but are not attached, it is likely that TSSA may not be the keeper of the records you are looking for, see note below.

TSSA does not make any representations or warranties with respect to the accuracy or completeness of any records released. The requestor assumes all risk in using or relying on the information provided.

Should you have any questions, please contact Public Information at publicinformationservices@tssa.org.

Yours truly,

C. Hill

Connie Hill
Public Information Services

Limitations and Notices:

TSSA Fuels Safety:

If you have environmental concerns regarding this property, you should consider hiring an environmental consultant to conduct an environmental assessment of the property in question.

- Sites that have not been licensed since 1987 may not be in TSSA records.

- Be advised, TSSA Fuels Safety Division did not register:
  - private fuel underground/ aboveground storage tanks prior to January of 1990; and
  - furnace oil tanks prior to May 1, 2002.

- Fuels Safety Division does not register
  - private waste oil tanks in apartments, office buildings, residences etc.; and
  - aboveground gas or diesel tanks.

- The *Technical Standards and Safety Act* and associated regulations do not require the registration of private fuel outlets, nor does it require that any documentation on these facilities be submitted to or reviewed or approved by TSSA. As a result, TSSA has limited information on these facilities. TSSA cautions that any information provided may be inaccurate, incomplete or out of date.

TSSA Elevating & Amusement Devices Program Notice:

- All orders and/or directions issued by the TSSA Inspector have a compliance date and the owner or designated contractor are required to comply within the specified time limit.

- All written declarations of compliance (where eligible) should be sent to TSSA. Once a declaration of compliance has been received, the outstanding order will be resolved.

- Each report shows the details and date of the inspection conducted by TSSA at the requested location.

- The Ontario Amusement Devices Regulation (O. Reg. 221/01) was adopted in 2001. Since that time, TSSA retains copies of technical dossiers of new amusement devices in Ontario (as per TSSA's retention policy). However, for rides that existed prior to the adoption of the Regulation, which were subject to a "grandfathering-in" clause, technical dossiers were not required to be filed with the TSSA. However, if the amusement ride remains in operation, as per ASTM requirements, the owner/licensee must possess an operations document for the device in question.

TSSA Boilers and Pressure Vessels (BPVs) Program Notice:

- Be advised, TSSA does not typically inspect BPVs. These inspections are usually performed by insurance companies.

- **Inspection reports are not always submitted to TSSA by insurance companies; therefore, while TSSA may have some evidence of a BPV at a location on file, there may be no inspection records pertaining to BPVs located at the address provided.

- As of July 1, 2018, BPVs in Ontario may not be operated unless the Director has issued a current certificate of inspection (COI) to the owner or operator. A COI will be issued to the owner or operator of the BPV by TSSA after TSSA has received a Record of Inspection (ROI) from the insurer/third-party inspector, the associated fees have been paid and the BPV has passed a periodic inspection.

- Please note that if the BPV in question is insured, the insurance company may have additional inspection records. Please contact the insurer directly should you wish to obtain further information.

From:	Briollais, Dany (MECP)
To:	Eric Wierdsma
Subject:	RE: Follow up on 2 FOI Searches from February 2021
Date:	Monday, December 06, 2021 4:22:28 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png

---

Good afternoon Eric,

We are still waiting to hear back from the program area (an email has been sent)for this request.

825 Fallis Line, Millbrook Request 21-00866
787 Fallis Line, Millbrook Request 21-00865.

Thanks,
Dany.

From: Eric Wierdsma <Eric.Wierdsma@ghd.com>
Sent: Monday, December 6, 2021 2:02 PM
To: Briollais, Dany (MECP) <Dany.Briollais@ontario.ca>
Subject: Follow up on 2 FOI Searches from February 2021

Good afternoon Dany,

I am emailing to follow up on 2 searches I requested back in February. Is there any way you can check on the status of these searches on your end? They are attached.

Thanks so much in advance,

Eric Wierdsma
B.A.Sc. (Eng)
Environmental Technician

GHD
Proudly employee-owned | ghd.com
347 Pido Road Unit 29 Peterborough Ontario K9J 6X7 Canada
D +1 705 749 3317 **M** +1 705 761 4485 **E** eric.wierdsma@ghd.com

Attachment 3

Erosion Hazard Limit and Slope Stability Assessment

347 Pido Road
Peterborough, Ontario K9J 6X7
Canada
www.ghd.com

Our ref: 11224019

15 December 2021

Attn: Michael Testaguzza
The Bromont Group
c/o The Biglieri Group
2472 Kingston Road
Toronto, Ontario M1N 1V3

Re: Erosion Hazard Limit and Slope Stability Assessment
Proposed Subdivision Development
787 and 825 Fallis Line, Millbrook, Ontario

Dear Mr. Testaguzza

1. Introduction

This letter report presents the results of an Erosion Hazard Limit (EHL) and Slope Stability Assessment performed for as part of the above-captioned subdivision development. This investigation has been performed to assess the location of potential developmental setbacks based on any erosion and instability hazards associated with the existing slope located along the southern limits of the Site and to evaluate the stability of slope based on proposed site grades including construction of the south stormwater management pond (SWM Pond) and Waste Water Treatment Plan (WWTP). GHD was retained by the Bromont Group (the Client) to complete this assessment.

GHD has previously prepared the following reports for this development

- Hydrogeologic Assessment Report, Proposed Subdivision Development, 787 and 825 Fallis Line, Millbrook, Ontario, Project No. 11224019, dated March 28, 2021.
- Geotechnical Investigation Report, Proposed Subdivision Development, 787 and 825 Fallis Line, Millbrook, Ontario, Project No. 11224019, dated March 23, 2021

The subsurface conditions encountered during our previous investigations, were the basis for our modelling and stability analysis described herein.

The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. This report should be read in conjunction with the Statement of Limitations appended to this report. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

2. Project Background

A site plan was provided to GHD by Valdor Engineering (Valdor), illustrating the proposed development layout. It is GHD's expectations that this project shall include design and construction of a new residential development containing typical 1- and 2-storey homes, with associated SWM Ponds, asphalt-paved roadways, and servicing. A preliminary site servicing and grading plan prepared by Valdor, drawing No. PSG-1, dated May 18. 2021 was provided to GHD for review.

This study is required to assess the potential for slope instability and loss of land due to erosion at a Site, where a development is proposed. The purpose of this study was to determine the appropriate setback limits for future development on the Site that will protect the development from slope instability and erosion hazard along its boundary in proximity to the slope. An erosion setback is a sum of the results of the following three components:

a) Toe erosion allowance setback

b) Stable top of slope setback

c) Access allowance Setback

The opinions described herein are based on an assessment performed in accordance with the Ontario Ministry of Natural Resources (MNR's) "Technical Guide - River & Stream Systems: Erosion Hazard Limit", 2002 (hereafter referred to as the Guideline).

Additionally, GHD evaluated the stability of proposed grades along the southern stormwater management block based on the preliminary site servicing and grading plan prepared by Valdor.

3. Slope Inspection Evaluation

A GHD geotechnical engineer visited the Site and visually inspected the slope conditions on December 8, 2021. No watercourse or waterbody was observed within less than 15m distance of the slope toe. The slope crest and face are typically composed of well vegetated surface with heavy shrubs and mature trees present. No signs of mass slope instability were observed during the site visit, such as slope bulging, mass sloughing or tension cracks within or above the slope.

The slope inclinations and height were visually assessed during the slope inspections, and verified using the topographic information provided by the Valdor. The slope inclination was assessed to be approximately 9 degrees (6H:1V) along cross-section A-A' and 6 degres (9H:1V) along cross-section B-B' illustrated on Figure 1.

Detailed description of the soil and groundwater conditions encountered are included in Geotechnical and Hydrogeological reports previously completed by GHD for this Site. The borehole within the southern SWM Pond block generally encountered a layer of compact silty sand till, underlain by a dense to very dense sand.

Based on the results of the site inspection, and subsurface investigation completed, GHD conducted a Slope Stability Rating of the overall slope condition along cross-sections A-A' and B-B'. The slope stability rating was conducted in accordance with the requirements of the Ontario Ministry of Natural Resources and Forestry (MNRF) Guideline. The rating chart for the overall slope condition is attached in Attachment A. A rating value of 15 was obtained for the slope stability rating performed for both cross-sections. According to the MNRF Guidelines, the instability for a slope with a rating smaller then 24 is considered 'Low Potential'.

4. Erosion Hazard Limit Evaluation

4.1 Toe Erosion Allowance

According to the MNRF guidelines for Toe Erosion Allowance, if the distance between the edge of the watercourse or waterbody (toe of bank) and toe (bottom) of slope is more than 15m then a toe erosion allowance is not required. Based on the Site inspection conducted on December 8, 2021, no watercourse or waterbody was observed within less than 15m distance to the toe of slope, therefore a Toe Erosion Allowance is not required on this Site.

4.2 Slope Stability Modeling and Evaluation

In order to determine the global stability of the slope along the representative cross-sections A-A' and B-B', illustrated in Figure 1, a global stability analysis was carried out for the existing and proposed Site conditions. Global stability refers to the potential of a slope to undergo a relatively deep seated circular failure. The subsurface stratigraphy was selected using the GHD borehole logs.

The static slope stability analysis was performed using the Morgenstern & Price Method using the module Slope/W of the computer software Geo-Studio, developed and distributed by Geo Slope International Ltd.

The soil properties required for the slope stability analysis are the bulk densities and shear strength parameters of the materials identified at the Site. The borehole within the southern SWM Pond block generally encountered a layer of compact silty sand till, underlain by a dense to very dense sand.

The material parameters assigned to each soil layer in the slope stability analyses are provided on the slope stability analysis Figure 2 through Figure 7. The selected parameters are considered conservative while realistic based on the field and laboratory testing performed on representative samples of the soils, as well as published technical literature and our experience with similar materials.

Piezometric surfaces can affect the results of the slope stability analyses if they pass through the soil mass above the critical slip circle/plane. Groundwater levels were reported at depths ranging from 4.7 to 5.2 mbgs (241.8 to 240.9 m) in the open borehole and monitoring well (BH11-17) installed within the southern SWM Pond block. Using the groundwater observations obtained the groundwater was conservatively assumed to follow a straight line path from the depth at which it was measure in the boreholes to the bottom of the slope.

A factor of safety (FoS) in slope stability analysis can be defined as the ratio of the available shear strength to that of the applied stresses along a potential failure plane. A factor of safety of 1.0 or greater indicates stable conditions and a value of less than 1.0 represents unstable conditions. Typically, a target factor of safety between 1.3 and 1.5 is considered reasonable for natural slopes, under static conditions where the consequences of failure is property loss. For the purposes of this study a minimum FoS of 1.5 was targeted.

The graphical output of the slope stability analyses for the existing and proposed conditions along cross-section A-A' and B-B' are provided on Figure 2 through Figure 5. The modeled cross-sections A-A' and B-B' obtained factors of safety ranging from 2.5 and 5.9, for existing and proposed conditions.

Based on the results of the analysed cross sections and as illustrated in Figure 2 through Figure 5, it is concluded that the existing and proposed grades for the Site obtained the targeted minimum 1.5 FoS and can be considered stable.

GHD also evaluated the stability of the east and west embankment of the proposed southern SWM Pond along cross-section A-A'. The SWM Pond was analysed under full weight condition (100 year storm event) and yeilded a FoS of 3.4 for the east embankment (Figure 6) and 3.0 for the west embankment (Figure 7). The stabiliyt analyses performed therefore suggest the pond's design is globally stable.

4.3 Access Allowance

In accordance with the Guide, an erosion access allowance of 6 m could be applied in addition to the toe erosion and the stable top of slope allowances and in accordance with the local conservation authority. It is GHD's opnion that this allowance should be waived as the slope isn't steep enough to impede access and if required, emergency access to the slope can be achived through the proposed development and existing trails along the bottom of the slope.

5. Discussion and Recommendations

The following summarizes our overall conclusions and recommendations for this project:

1. No slope degradation or stability issues were identified in the visual inspection of the existing slope along the southern Property boundary.
2. A toe erosion allowance and access allowance is not required for this Site.
3. The existing and proposed site grades are considered globally stable based on the completed modeling and stability evaluation (Figure 2 through Figure 5).
4. An Erosion Hazard Limit (EHL) within the project development limits is not required.
5. Based on the pond berm global stability analyses, it is GHD's professional opinion that the proposed grading for the SWM pond is expected to be globally stable from a geotechnical perspective (Figures 6 and Figure 7).

It is further recommended that any future development consider the following:

- The existing vegetative cover must be kept in place for a continuation of the existing stable conditions.
- Storm water from swales or concentrated flow should not be directed to flow over the crest of the slope.
- Should disturbances occur on the slope, the area must be inspected at regular intervals for signs of erosion/instability and any remedial measures should be performed in consultation with a geotechnical engineer.
- The geotechnical engineer should be consulted when the development plans have been finalized to ensure that the proposed development does not affect the stability of the slope.
- This stability analysis does not assess any instabilities resulting from the effects of surficial erosion, or piping through the berm. It is GHD's understanding that various outlet pipes will be located within the berms of the pond – it is recommended that installation of these pipes within the berm take precautionary measures to reduce or eliminate the potential for water to be conducted through the sewer bedding and backfill materials, as this can be a cause of progressive erosion and piping if allowed to occur. Such measures can include (but are not necessarily limited to) use of an approved impermeable material to form trench plugs at appropriate locations within the utility trenching formed in the berm. At least two (2) such plugs should be constructed; one close to the up-gradient end of the berm trench, and one close to the down-gradient end of the berm trench. Slopes and berms of the SWM Pond should be constructed so as to reduce or eliminate the effects of surficial erosion. Features to do so may include slope vegetation, installation of erosion or gabion mats, rip rap, and/or other acceptable stabilizing features.
- It is recommended that GHD staff be onsite to observe the pond construction including excavations, inspect subgrades as they are exposed and test berm construction material including gradation analysis, moisture contents, and compaction of each lift, and installation of the proposed utility pipe. The soils being considered for construction of the berm must be inspected and approved by GHD at the time of construction, prior to being used.

- A regular maintenance program for the SWM Pond include monitoring of it for any potential slope erosion, degradation, piping, or otherwise undesirable structural conditions is recommended. Should such conditions become evident, immediate mitigative actions must be performed.

6. Limitation of the Investigation

This report is intended solely for the Bromont Group and their designers and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevation and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of geotechnical engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

All details of design and construction are rarely known at the time of completion of a geotechnical study. The recommendations and comments made in the study report are based on our subsurface investigation and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, GHD will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design.

By issuing this report, GHD is the geotechnical engineer of record. It is recommended that GHD be retained during construction of all foundations and during earthwork operations to confirm the conditions of the subsoil are actually similar to those observed during our study. The intent of this requirement is to verify that conditions encountered during construction are consistent with the findings in the report and that inherent knowledge developed as part of our study is correctly carried forward to the construction phases.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments included in this report are based on the results obtained at the test locations only. The subsurface conditions confirmed at the test locations may vary at other locations. The subsurface conditions can also be significantly modified by the construction activities on site (e.g., excavation, dewatering and drainage, blasting, pile driving, etc.). These conditions can also be modified by exposure of soils or bedrock to humidity, dry periods or frost. Soil and groundwater conditions between and beyond the test locations may differ both horizontally and vertically from those encountered at the test locations and conditions may become apparent during construction which could not be detected or anticipated at the time of our investigation.

Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations. If changed conditions are identified during construction, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by GHD is completed.

All of Which is Respectfully Submitted,

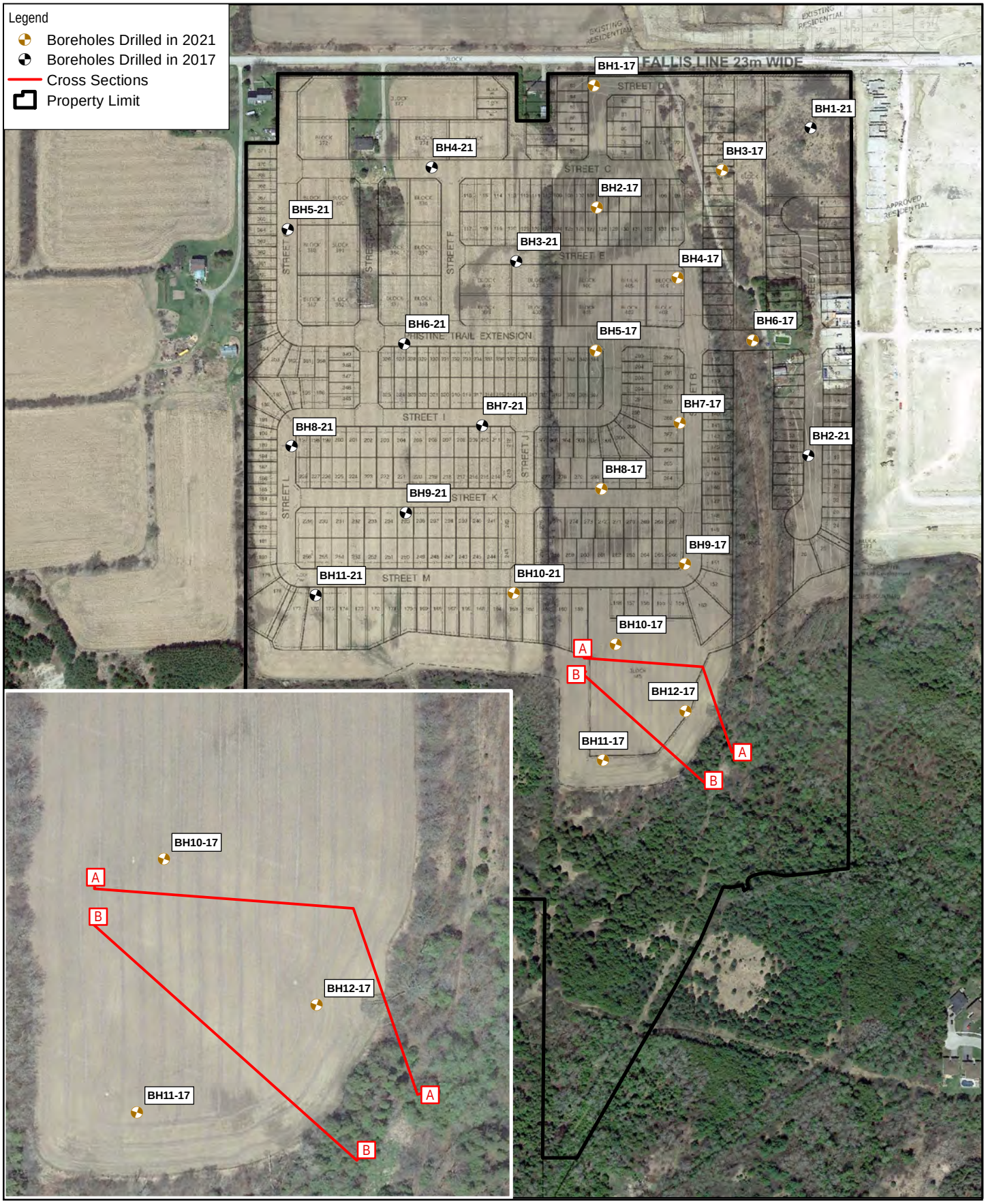
GHD

Leandro Ramos, P.Eng.

Andy Fawcett, P. Eng.

lr/af/1

Figures



Paper Size ANSI A

0 30 60 90 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

The Bromont Group
787 & 825 Fallis Line, Millbrook, ON
Township of Cavan-Monaghan
County of Peterborough

Erosion Hazard Limit and Slope Stability Assessment

Cross Section Location Plan

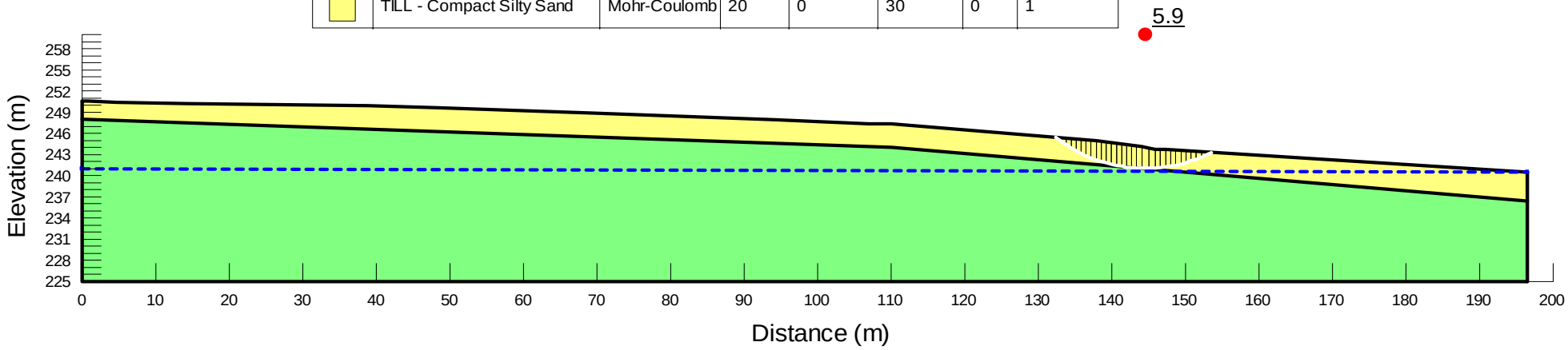
Project No. 11224019
Revision No.
Date Jan 19, 2022

Figure 1

Q:\GIS\PROJECTS\11224000s\11224019\202112_RPT001\11224019_202112_RPT001_GIS001 - Cross Section Location Plan.mxd
Print date: 19 Jan 2022 - 12:46

Data source: © Google (Imagery date unverified).

Color	Name	Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line
	SAND - Dense to Very Dense	Mohr-Coulomb	21	0	34	0	1
	TILL - Compact Silty Sand	Mohr-Coulomb	20	0	30	0	1



Scale:
As Shown Above

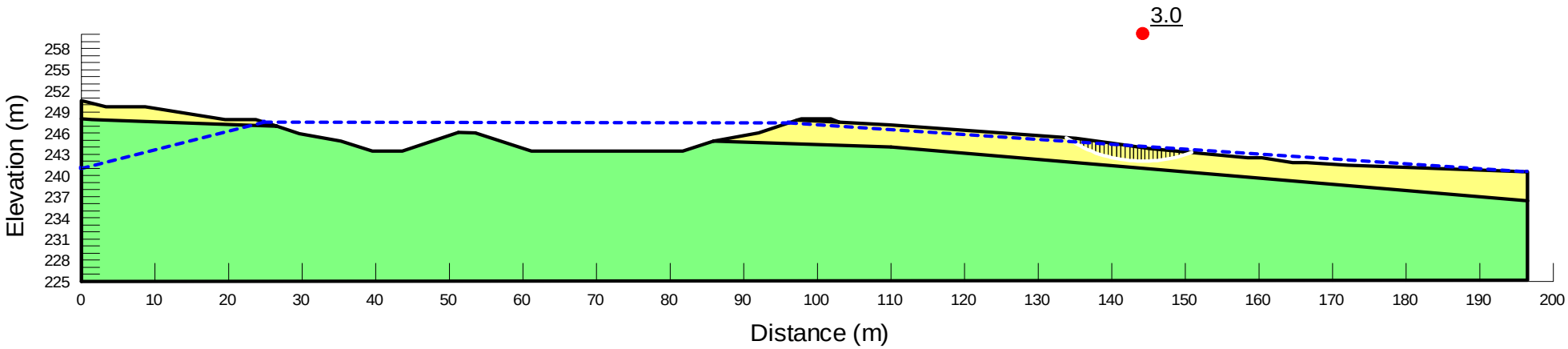
The Bromont Group
787 and 825 Fallis Line
Slope Stability Assessment

SLOPE STABILITY MODEL - CROSS SECTION A-A' - EXISTING CONDITION

11230272
Nov. 2021

FIGURE 2

Color	Name	Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line
	ENGINEERED FILL - Compact Silty Sand	Mohr-Coulomb	20	0	29	0	1
	SAND - Dense to Very Dense	Mohr-Coulomb	21	0	34	0	1
	TILL - Compact Silty Sand	Mohr-Coulomb	20	0	30	0	1



Scale:
As Shown Above

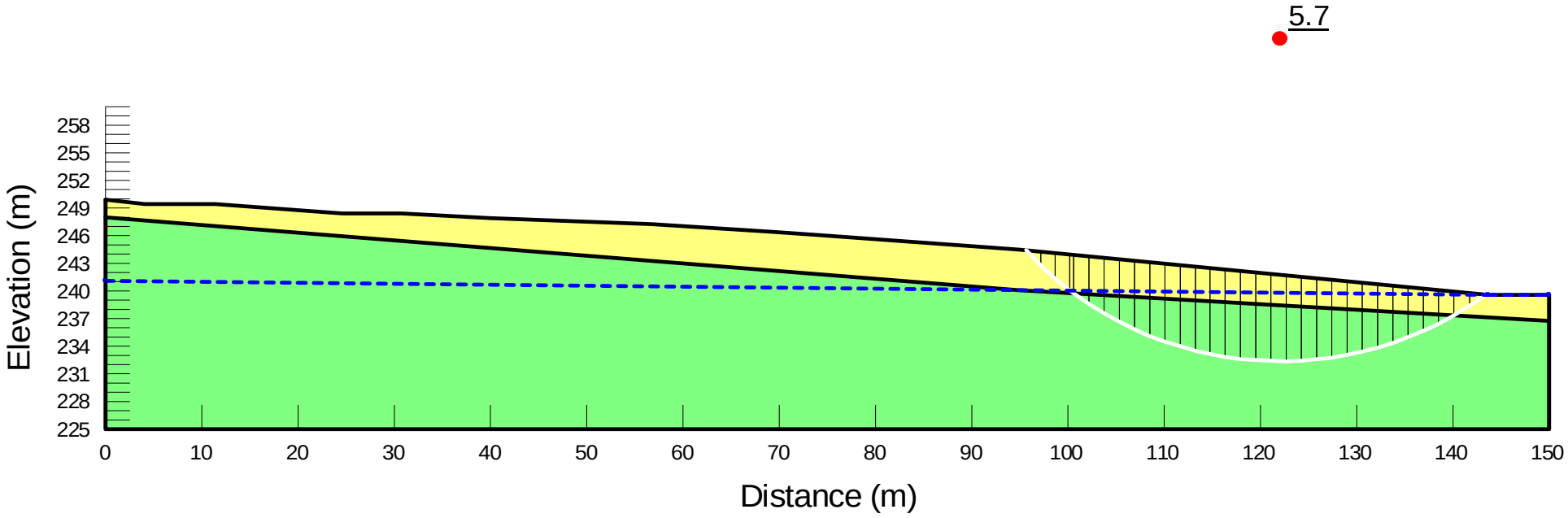
The Bromont Group
787 and 825 Fallis Line
Slope Stability Assessment

11230272
Nov. 2021

SLOPE STABILITY MODEL - CROSS SECTION A-A' - EXISTING CONDITION (100 YEARS)

FIGURE 3

Color	Name	Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line
	SAND - Dense to Very Dense	Mohr-Coulomb	21	0	34	0	1
	TILL - Compact Silty Sand	Mohr-Coulomb	20	0	30	0	1



Scale:
As Shown Above

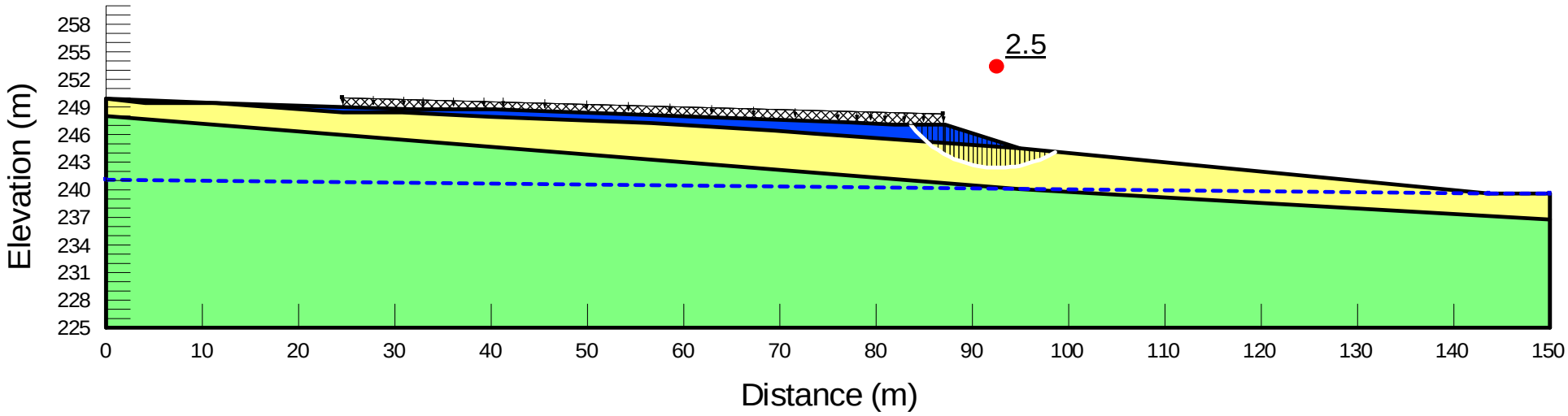
The Bromont Group
787 and 825 Fallis Line
Slope Stability Assessment

SLOPE STABILITY MODEL - CROSS SECTION B-B' - EXISTING CONDITION

11230272
Nov. 2021

FIGURE 4

Color	Name	Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line
	ENGINEERED FILL - Compact Silty Sand	Mohr-Coulomb	20	0	29	0	1
	SAND - Dense to Very Dense	Mohr-Coulomb	21	0	34	0	1
	TILL - Compact Silty Sand	Mohr-Coulomb	20	0	30	0	1



Scale:
As Shown Above

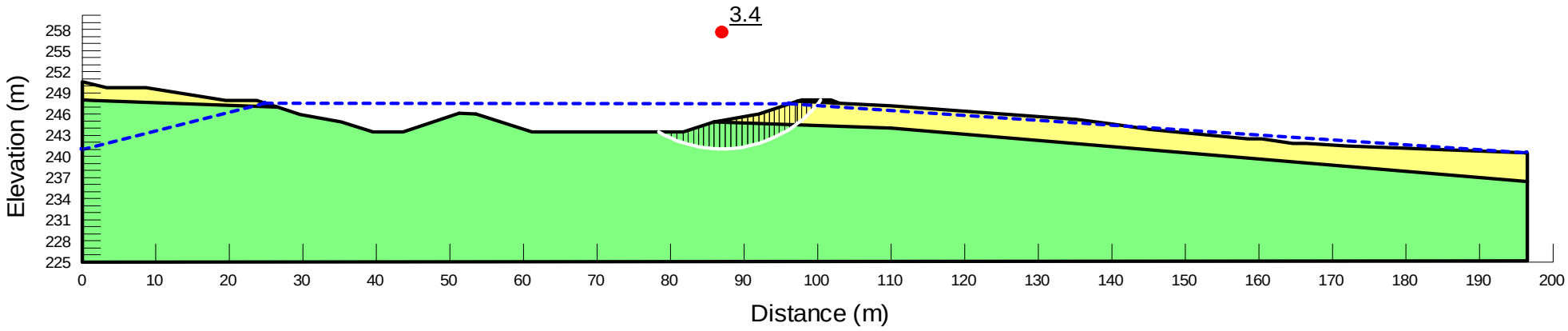
The Bromont Group
787 and 825 Fallis Line
Slope Stability Assessment

SLOPE STABILITY MODEL - CROSS SECTION B-B' - PROPOSED CONDITION

11230272
Nov. 2021

FIGURE 5

Color	Name	Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line
	ENGINEERED FILL - Compact Silty Sand	Mohr-Coulomb	20	0	29	0	1
	SAND - Dense to Very Dense	Mohr-Coulomb	21	0	34	0	1
	TILL - Compact Silty Sand	Mohr-Coulomb	20	0	30	0	1



Scale:
As Shown Above

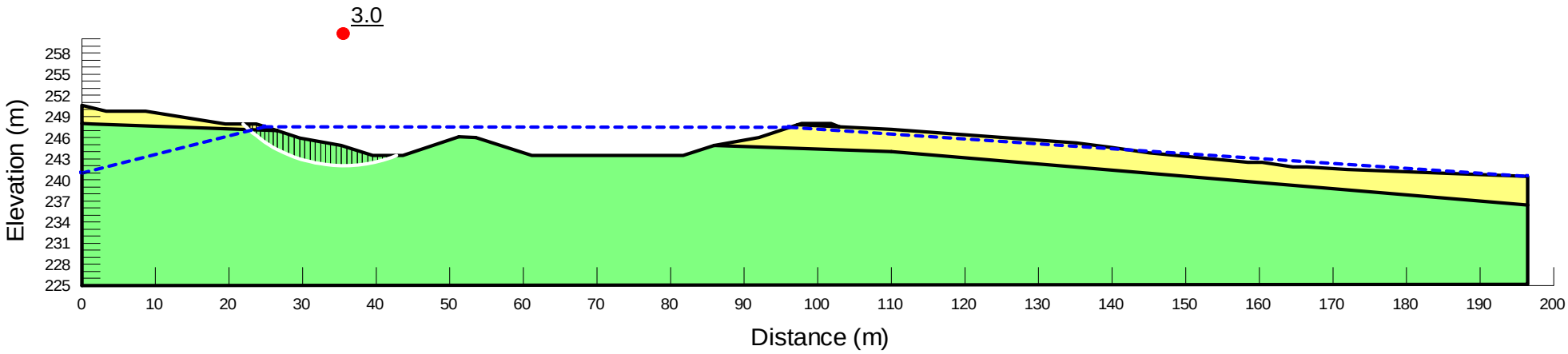
The Bromont Group
787 and 825 Fallis Line
Slope Stability Assessment

SLOPE STABILITY MODEL - CROSS SECTION A-A' - SWP EAST EMBANKMENT (100 YEARS)

11230272
Nov. 2021

FIGURE 6

Color	Name	Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-B (°)	Piezometric Line
	ENGINEERED FILL - Compact Silty Sand	Mohr-Coulomb	20	0	29	0	1
	SAND - Dense to Very Dense	Mohr-Coulomb	21	0	34	0	1
	TILL - Compact Silty Sand	Mohr-Coulomb	20	0	30	0	1



Scale:
As Shown Above

The Bromont Group
787 and 825 Fallis Line
Slope Stability Assessment

SLOPE STABILITY MODEL - CROSS SECTION A-A' - SWP WEST EMBANKMENT (100 YEARS)

11230272
Nov. 2021

FIGURE 7

Appendices

Appendix A

Slope Inspection Rating Chart

SLOPE STABILITY RATING CHART

Site Location:	787 and 825 Fallis Line, Millbrook (Section A-A)	File No.	11224019
Property Owner:	The Bromont Group	Inspection Date:	8-Dec-21
Inspected By:	L. Ramos	Weather:	Overcast ~ -4˚C

Inspection Task		Rating Options	Assigned Rating
1. SLOPE INCLINATION			
Degrees	**Horizontal:Vertical**		
a) 18 or less	3:1 or flatter	0	**0**
b) 18 to 26	2:1 to more than 3:1	6	
c) more than 26	Steeper than 2:1	16	
2. SOIL STRATIGRAPHY			
a) Shale, Limestone, Granite (Bedrock)		0	
b) Sand, Gravel		6	
c) Glacial Till		9	**9**
d) Clay, Silt		12	
e) Fill		16	
f) Leda Clay		24	
3. SEEPAGE FROM SLOPE FACE			
a) None or near bottom only		0	**0**
b) Near mid-slope only		6	
c) Near crest only or from several levels		12	
4. SLOPE HEIGHT			
a) 2 m or less		0	
b) 2.1 to 5 m		2	**4**
c) 5.1 to 10 m		4	
d) more than 10 m		8	
5. VEGETATION COVER ON SLOPE FACE			
a) Well vegetated, heavy shrubs or forested with mature trees		0	**0**
b) Light Vegetation; Mostly grass, weeds, occasional trees, shrubs		4	
c) No vegetaion, bare		8	
6. TABLE LAND DRAINAGE			
a) Table land flat, no apparent drainage over slope		0	**2**
b) Minor drainage over slope, no active erosion		2	
c) Drainage over slope, active erosion, gullies		4	
7. PROXIMITY OF WATERCOURSE TO SLOPE TOE			
a) 15 m or more from slope toe		0	**0**
b) Less than 15 m from slope toe		6	
8. PREVIOUS LANDSLIDE ACTIVITY			
a) No		0	**0**
b) Yes		6	
		RATING VALUES TOTAL	**15**

SLOPE INSTABILITY RATING		INVESTIGATION REQUIREMENTS
1. Low Potential	<24	Site inspection only, confirmation, report letter
2. Slight Potential	25 - 35	Site inspection and surveying, preliminary study, detailed report
3. Moderate Potential	>35	Boreholes, piezometers, lab tests, surveying detailed report

Notes:

a) Choose only one rating value from each category; compare total rating value with above requirements

b) If there is a waterbody (stream, creek, river, pond, bay, lake) at the slope toe, the potential for toe ersoion and undercutting should be evaluated in detail and protection provided if required.

c) For leda clay and rock slopes, additional evaluation must be carried out

Source: Table 4.2 Slope Stability Rating Chart (Technical Guide - River and Stream Systems - Erosion Hazard Limit - 2002, Ontario Ministry of Natural Resources)

SLOPE STABILITY RATING CHART

Site Location:	787 and 825 Fallis Line, Millbrook (Section B-B)	File No.	11224019
Property Owner:	The Bromont Group	Inspection Date:	8-Dec-21
Inspected By:	L. Ramos	Weather:	Overcast ~ -4˚C

Inspection Task		Rating Options	Assigned Rating
1. SLOPE INCLINATION			
Degrees	**Horizontal:Vertical**		
a) 18 or less	3:1 or flatter	0	**0**
b) 18 to 26	2:1 to more than 3:1	6	
c) more than 26	Steeper than 2:1	16	
2. SOIL STRATIGRAPHY			
a) Shale, Limestone, Granite (Bedrock)		0	
b) Sand, Gravel		6	
c) Glacial Till		9	**9**
d) Clay, Silt		12	
e) Fill		16	
f) Leda Clay		24	
3. SEEPAGE FROM SLOPE FACE			
a) None or near bottom only		0	**0**
b) Near mid-slope only		6	
c) Near crest only or from several levels		12	
4. SLOPE HEIGHT			
a) 2 m or less		0	
b) 2.1 to 5 m		2	**4**
c) 5.1 to 10 m		4	
d) more than 10 m		8	
5. VEGETATION COVER ON SLOPE FACE			
a) Well vegetated, heavy shrubs or forested with mature trees		0	**0**
b) Light Vegetation; Mostly grass, weeds, occasional trees, shrubs		4	
c) No vegetaion, bare		8	
6. TABLE LAND DRAINAGE			
a) Table land flat, no apparent drainage over slope		0	**2**
b) Minor drainage over slope, no active erosion		2	
c) Drainage over slope, active erosion, gullies		4	
7. PROXIMITY OF WATERCOURSE TO SLOPE TOE			
a) 15 m or more from slope toe		0	**0**
b) Less than 15 m from slope toe		6	
8. PREVIOUS LANDSLIDE ACTIVITY			
a) No		0	**0**
b) Yes		6	
		RATING VALUES TOTAL	**15**

SLOPE INSTABILITY RATING		INVESTIGATION REQUIREMENTS
1. Low Potential	<24	Site inspection only, confirmation, report letter
2. Slight Potential	25 - 35	Site inspection and surveying, preliminary study, detailed report
3. Moderate Potential	>35	Boreholes, piezometers, lab tests, surveying detailed report

Notes:

a) Choose only one rating value from each category; compare total rating value with above requirements

b) If there is a waterbody (stream, creek, river, pond, bay, lake) at the slope toe, the potential for toe ersoion and undercutting should be evaluated in detail and protection provided if required.

c) For leda clay and rock slopes, additional evaluation must be carried out

Source: Table 4.2 Slope Stability Rating Chart (Technical Guide - River and Stream Systems - Erosion Hazard Limit - 2002, Ontario Ministry of Natural Resources)

Attachment 4

Revised Borehole Log BH11-17

REFERENCE No.: 11224019-01 ENCLOSURE No.: A-11

BOREHOLE No.: BH11-17
ELEVATION: 246.5 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Bromont Group c/o Valdor Engineering

PROJECT: Proposed Residential Development - Fallis Line, Millbrook, Ontario

LOGGED BY: S. Shepherd DATE: 23 August 2017

DRILLING COMPANY: Landshark Drilling METHOD: Solid Stem Augers and Split Spoons

NOTES: Ground surface elevation interpolated from concept plan provided by Valdor Engineering with electronic title "16119_Fallis Line Subdivision_Preliminary Concept.pdf" by email dated July 11, 2017.

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- ▼ - WATER LEVEL

UTM: +/- 17T 703134E 4892182N

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery %	Moisture Content %	Blows per 6 in. / 15 cm	Penetration Index N	COMMENTS
		0.0		GROUND SURFACE						
				TOPSOIL (300 mm)						
		0.3		**TILL** - Brown Silty Sand, Some Clay, Trace Gravel, Moist, Compact - Occasional Organics to 0.8m	SS-1	83	22	0 2 3 7	5	Borehole open upon completion of drilling
	1.0				SS-2	78	9	11 6 7	13	
					SS-3	100	14	7 6 7	13	WL - 2.0 m 3/17/2021
	2.0				SS-4	100	12	9 10 9	19	
	3.0	3.0		Dense	SS-5	72	10	14 17 18	35	Slight groundwater seepage encountered at 4.6 m during drilling WL - 4.8 m 10/17/2017
		4.6		Wet, Compact	SS-6	100	10	6 8 7	15	WL - 4.7 m 9/7/2017
	5.0									SS-7: 21% Gravel 48% Sand 31% Silt and Clay 20% between 5-75 µm
	6.0	6.1		Dense, With Gravel	SS-7	100	6	9 20 27	47	51 mm inside diameter monitoring well installed to 6.1 m
		6.6		END OF BOREHOLE						
	7.0									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_P W_l Atterberg limits (%)
× "N" Value (blows / 0.3 m)
◆ RQD
◎ CONE

10 20 30 40 50 60 70 80 90

m
0.91 m

BOREHOLE LOG GEOTECH 11148475-01, 17-08-22, BOREHOLE LOG, LR.GPJ GEOLOGIC.GDT 24/10/17

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