



D-4 Guideline Study 295 Mountain Road February 2020

Collingwood, Ontario

Todco Investments Inc. and Ted North
(295 Mountain Road) Ltd.

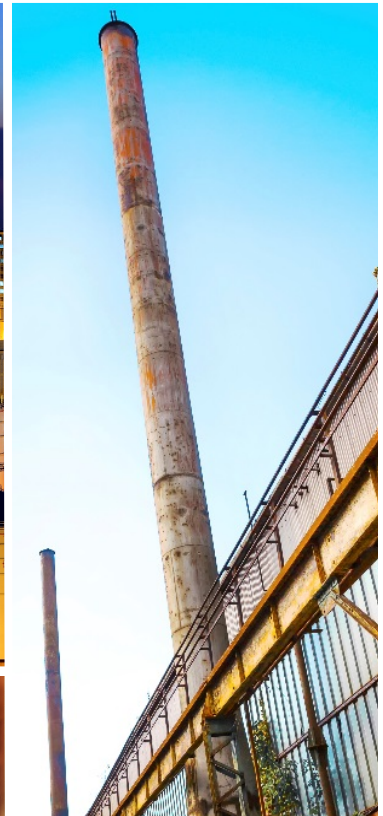




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1. Introduction

1.1 Proposed Development Overview

Todco Investments Inc. owns the property at 295 Mountain Road and in association with Ted North (295 Mountain Road) Ltd. is applying to develop the lands. The property at 295 Mountain Road is 20.12 hectares (ha) in area and is zoned for residential use with several different residential zoning designations. Currently the property is vacant with no residential buildings. Within this report, the 295 Mountain Road property is referenced as either Site or Panorama North (proposed development name).

The proposed Panorama North development prepared by GSP Group is provided in Figure 1.1. The development consists of a mixture of residential units (126 single detached, 166 townhouses, 208 stacked townhouses, 50 apartments), an elementary school (or 50 residential units), a park, stormwater management pond, and hydro substation. The Panorama North development is currently in the planning stages and as such, the information presented with regard to the proposed development may change based on comments received during the planning and development process.

The following provides an overview of key information with regard to the Panorama North development:

- Current Site zoning is:
 - Holding One Residential Second Density (H1) R2
 - Holding One Residential Third Density (H1) R3
 - Holding One Recreation (H1) REC
 - Holding One Local Convenience Commercial (H1) C6
 - Holding One Deferred Residential (H1) DR
- The current site topography slopes from the south-west corner (204 metres above mean sea level [mAMSL]) to the north-east corner (190.5 mAMSL). In the central part of the Site, a ridge exists that has about a 4 metre elevation drop. As part of the development, the Site grading will be adjusted to reflect the development needs.
- Water and sanitary for the proposed development will be connected to the Town of Collingwood municipal services. The Site will have services that are compliant with the Town of Collingwood requirements.

The Site is located within 500 metres (m) of the Collingwood Landfill/ waste disposal property boundary that is owned by the County of Simcoe. Based on the Simcoe County Official Plan, lands within 500 m of a waste disposal property boundary proposed for development require a D-4 Guideline for Landfill Impact Assessment to be completed as part of the planning documentation. The Ministry of the Environment, Conservation, and Parks (MECP) Guideline D-4 – Land Use On or Near Landfills and Dumps requires considerations of developments within 500 m of the waste disposal limit (fill area). The County has developed a best management practices guideline titled



"D-4 Guideline for Landfill Impact Assessment, Solid Waste" to assist and streamline the documentation provided. The County guideline has been used by GHD with regard to report structure and section discussions, along with the MECP guideline.

Figure 1.2 provides the location of the Panorama North development and the Collingwood Landfill. The figure provides a reference line that is 500 m from the southern property limit of the Collingwood landfill and the waste transfer station. A second 500 m line is provided that represents the approximate extent of the 500 m limit once the waste disposal component of the landfill has been closed and represents the 500 m line from the extension of the eastern waste disposal limit to the south property line which is an estimate of the waste transfer station active use zone. The Ministry of the Environment, Conservation and Parks Guideline D-4 indicates "within 500 metres of the perimeter of a fill area" where the perimeter of the fill area relates to the waste disposal footprint.

1.2 Collingwood Landfill Simcoe Site 2

The County of Simcoe provided GHD a copy of the Collingwood Landfill, County Waste Disposal Site #2, 2017 Annual Report prepared by Golder Associates Ltd. and dated March 21, 2018 (2017 Annual Report) and the 2018 Annual Report prepared by Golder Associates Ltd. and dated March 29, 2019 (2018 Annual Report). The reports provide the most current information with regard to landfill operation, site life, and environmental monitoring and has been used by GHD to assess current and potential issues that might arise at the Site with regard to the landfill operation.

The Collingwood Landfill Site is located at 470 10th Line, north of Mountain Road on Lots 46 and 47, Concession XI, Town of Collingwood. Access to the landfill is from 10th Line. The landfill operates under Environmental Compliance Approval (ECA) A250402 which allows for disposal of solid non-hazardous municipal waste. Stormwater management for the landfill is approved and operated in accordance with ECA 2854-6B7QUS issued July 4, 2005.

The landfill property is approximately 43.7 hectares (ha) and 14.4 ha are approved for waste disposal. The landfill commenced operations in 1973 and the County assumed ownership in 1990. Waste is landfilled over the native thin soils located above limestone bedrock. Waste is placed on the existing ground surface and extends approximately 10 m above the native ground surface. A leachate toe drain has been installed along the north and northeastern perimeter of the landfill. A series of contaminant attenuation zones (CAZ) are located north of the landfill (Figure 1, 2017 Annual Report). Approximately 70 percent of the waste disposal footprint has received final cover. The eastern section of the Site is currently the active landfill area.

The landfill operates Monday to Friday from 8:30 am to 4:30pm and Saturday from 8:00 am to 4:00 pm. All waste is received through the landfill scale and waste drop-off/transfer station. All waste traffic uses Tenth Line to access the landfill. In 2017, 16,501 tonnes of waste was disposed at the landfill. The waste received is shredded prior to placement. The shredding operation occurs in a compound that is constructed on the north-eastern corner of the waste disposal area. Waste is placed and compacted by landfill vehicles that include a compactor, front-end loader, and rock trucks.

Figure 2.1 provides a copy of the current site existing conditions plan from the 2017 Annual Report. The 2017 Annual Report indicated that the south-central area was capped in 2017 and the active



area was consolidated to the eastern section of the approved landfill area. Appendix A provides copies of selected pages and figures of the 2017 Annual Report.

The waste transfer station received approximately 7,371 tonnes of waste during 2017 that was sent off-site for recycling. The top five waste diversion waste streams in 2017 were as follows:

1. Wood chips (1,773 tonnes)
2. Leaf and yard waste (1,493 tonnes)
3. Shingles (1,126 tonnes)
4. Brush chips (815 tonnes)
5. Cardboard and paper (390 tonnes)

The 2017 Annual Report indicated that as of the end of 2017, the estimated site life remaining was 7.5-years. The 2018 Annual Report indicated at the end of 2018, the estimated site life remaining was 6.1-years. The remaining capacity as of December 31, 2018 is estimated at 156,623 m³, and the annual capacity consumption rate is estimated at 25,480 m³ (5 year average).

It is understood that the eastern section of the landfill will be completed in two stages. The first stage (south-east corner) will be filled from the north to the south in successive lifts. The final stage will be the north-east corner and will be filled once the landfill shredder is relocated or removed. The County does not indicate the time periods that each section will be active or completed. Comparison between the 2017 and 2018 Annual Report figures indicates that the County filled the east-central section in 2018. The Collingwood Landfill does not have an approved closure plan at this time. A landfill closure plan is required to be prepared and submitted the earlier of: a) prior to 90 percent of the approved capacity is consumed, or b) 2 years prior to estimated closure. Based on the current estimate of closure noted in the 2018 Annual Report, the closure plan would be required to be submitted about December of 2022.

As stated in the Annual Report, the surface water, leachate, landfill gas, and groundwater monitoring programs indicated that the site was in compliance.

1.3 Development/ Landfill Closure Timeline

The remaining estimated site life provided in the 2018 Annual Report is 6.1 years (as of December 31, 2018). This estimate is dependent on the amount of waste landfilled and the waste compaction density. For general timeline purposes, the waste disposal phase should be considered as 8 years (6 years for waste disposal, 1 year for final cover placement, 1 year for contingency). This may vary based on several factors including how the County of Simcoe manages their waste disposal operations. The eight-year period would be from the start of 2019 to the end of 2027. Based on general assumptions, the south-east corner of the landfill should achieve the approved waste disposal capacity within 5-years or about the end of 2023. Based on the estimates presented in the 2018 Annual Report, the landfill would achieve final grade in 2024/2025 and final cover would be applied in 2025/2026. The timing presented are estimates and the actual landfill closure will occur once the final cover is completed for all of the waste disposal area.

The Panorama North development is currently proceeding through the planning process with Draft Plan approval anticipated to be in 2020. The proposed Draft Plan will be separated into five phases



for development. Phase 1 is anticipated to be registered in 2021 with construction of the units in 2022. Phase 2 and 3 would commencement would be based on market and other conditions. It is anticipated that each development phase will require 1 to 2 years to complete. Phases 4 and 5 will be delayed until the landfill has ceased accepting waste and has been covered (estimated to be in 2027 or sooner) or long-term mitigation measures have been installed. During the development of Phases 1, 2, and 3, temporary mitigation measures will be placed on land in Phases 4 and 5 to minimize any potential impacts associated with the phase or phases under active construction of residential units. Section 3 provides information with regard to the development phasing, timelines, and short-term and long-term mitigation measures. The phases are shown on Figure 1.3.

The Panorama North development has been designed and staged to reflect:

1. The D-4 Guideline policy of the County of Simcoe;
2. The most recent landfill waste disposal site life projection and anticipated closure;
3. Development of temporary mitigation measures to be employed to control minor impacts during the potential short-term overlap of the residential use and waste disposal period; and
4. Long-term / contingency mitigation measures to allow development of Phases 4 and 5 to proceed if the landfill is still open or potential impacts from the waste transfer station.

Throughout this D-4 Guideline Study, the assessment of potential impacts relate to the impacts considered to be long-term that are similar if the landfill is open or closed, and impacts that are short-term and related to active landfilling. The long-term waste transfer station impacts are dealt with as part of the assessments where applicable.

2. Operating Landfill/Waste Transfer Impacts

2.1 Groundwater Contamination by Leachate

The 2018 Annual Report provides the most recent groundwater and leachate data and assessment. The 2018 Annual Report indicates the following:

1. Leachate is collected by a toe drain that is located at the perimeter of the waste disposal area. The location is noted on Figure 2 of the 2017 Annual Report (Figure 2.1) and covers all of the northern side and portions of the west and east sides of landfill.
2. Figures 4 and 5 of the 2018 Annual Report provide the overburden and bedrock groundwater levels and flow direction based on the 2018 groundwater monitoring data. The groundwater flow for both the overburden and the bedrock aquifers is toward the north-east. The bedrock groundwater on the western portion of the site has a slight deflection in groundwater flow direction to a more northerly direction.
3. The leachate levels within the landfill are similar to the groundwater data for the overburden.

The Panorama North development is located south of the landfill and waste transfer station. From a groundwater perspective, the Panorama North development is located upgradient from the landfill and waste transfer station, and as such from a groundwater perspective, the landfill and waste transfer station will not impact the Panorama North development.



Panorama North development will be supplied by potable water from the Town of Collingwood's municipal system. The proposed type of development will not require the installation of groundwater pumping wells. The development will consist mainly of residential dwellings and as such standard basement excavations will occur. Extensive dewatering will not be required for the proposed development.

It is GHD's opinion that the groundwater from the landfill and waste transfer station does and will not impact the Panorama North development for the reasons outlined above.

2.2 Surface Water Contamination by Leachate and Surface Water Runoff

2.2.1 Groundwater Contamination

The Panorama North development is located upgradient to the landfill and waste transfer station and at a higher elevation than the associated buffer lands. The groundwater and surface water from the landfill and waste transfer station flow toward to Nottawasaga Bay (Georgian Bay) in a north to north-east direction.

It is GHD's opinion that groundwater contamination from the landfill that may enter the surface water system will not impact the Panorama North development.

2.2.2 Surface Water Runoff

Surface water at the landfill drains in a northeastern direction toward to Nottawasaga Bay. The landfill and waste transfer station surface water drains into the vegetated area north of the disposal area and discharges through four culverts that pass beneath the former rail line (2018 Annual Report). On the southern perimeter, a ditch has been constructed to receive surface water from properties south of the landfill and the waste transfer station and divert this water to the east so that it will not impact the landfill and waste transfer station.

The Panorama North development will have a surface water management system that will be approved by the various authorities. The surface water from the Panorama North development will flow from west to east and pass through the on-site surface water pond that is located in the north-east corner of the development. The surface water runoff ponds will discharge on the east side of the Site and that the surface water discharged will bypass the landfill and waste transfer station area and flow east for eventual discharge to Nottawasaga Bay.

Based on that the surface water from the landfill and waste transfer station flows away from the development, it is GHD's opinion that surface water runoff from the landfill and waste transfer will not impact the Panorama North development, nor will the development surface water impact the landfill and waste transfer station.

2.3 Landfill Generated Gases

According to the 2017 Annual Report (page 36),

"Waste is not landfilled below the ground surface at the Collingwood Landfill and the water table is relatively close to the ground surface (above the surface in the centre of the leachate mound)."



This limits the potential for migration of methane in the subsurface, as evidenced by the absence of methane at wells outside the landfill footprint."

Combustible gas is measured at three leachate wells within the landfill and 3 gas probes (GP1, GP3, GP4) located around the perimeter of the waste disposal area. Combustible gas testing indicated that the landfill mound has combustible gas in the range of 30 to 65 percent (measured as methane in air). Of the four gas probes, only GP3 indicated a presence of combustible gas and it ranged between 0.9 and 14.7 percent. GP3 is located immediately east of the active refuse disposal area and within 30 m of the waste disposal limit.

Based on the cross-sections contained in the 2018 Annual Report (Figure 3) and the groundwater contours (Figure 4), the water table is about 1 m below the ground surface (mbgs), or less where a ditch is located on the southern landfill property boundary. Combustible gas (methane), the main landfill gas of concern, is lighter than air and water provides a barrier to gas movement.

Given the shallow thickness of the unsaturated overburden along the south limit of the landfill, that at least 300 m of undeveloped land is located between the landfill property boundary and the Panorama North development, and the lack of or limited landfill gas migration at the landfill site, it is GHD's opinion that landfill gas migration from the landfill will not impact the Panorama North development.

Since the Panorama North development is a former agricultural property, the potential exists for agricultural tile drains to be present. If agricultural tile drains are encountered during the development of the property, the agricultural drains should be removed from the location point to the northern property limit to minimize the potential for a potential pathway for the migration of landfill gas. This is considered a very slight potential, but is considered by GHD to be a proactive contingency measure. This recommendation is moved forward to Section 3

2.4 Ground Settlement

The Panorama North development is located on lands that were not used for waste disposal. As such, it is GHD's opinion that ground settlement at the Panorama North development as a result of the County of Simcoe landfill operations is not a concern or issue.

2.5 Soil Contamination and Hazardous Waste

The Panorama North development is located on lands that were not used for waste disposal. The landfill is approved to accept non-hazardous solid industrial and municipal wastes.

As such, it is GHD's opinion that soil contamination and/or hazardous waste disposal that occurs or may have occurred at the landfill will not impact the Panorama North development.

2.6 Visual Impact

The landfill is estimated to have 6.1 years (as of December 2018) of active site life remaining. The landfill has a maximum finished surface elevation of 206 m AMSL and this is located in the south-west section of the waste disposal area. As presented previously, an 8 year planning period should be considered for landfill closure. The southern landfill boundary has an elevation of 195 to



190 m AMSL along the landfill portion and 188 to 185 m AMSL in the site entrance/ public drop-off area. The finished landfill surface is proposed to be about 10 metres above the original land surface.

The Panorama North development lands currently vary from 190.5 m AMSL on the north-east corner, 198 m AMSL on the north-west corner, and peaks at 204 m AMSL in the south-west corner. The site will be graded as part of the overall development and the actual elevations along the northern development limit will be altered, but in general terms will be similar to the elevations noted. The property along the northern portion of the development is scheduled to be either single detached homes or an elementary school as noted in Figure 1.1.

After landfill closure and based on the proposed grades for Panorama North and the landfill, the landfill will be observed as a vegetated hill to the residents of Panorama North that are able to look north either from their yards or from windows. Between the Panorama North development and the landfill two properties are located that in the Official Plan are designated Residential and both have residential dwellings. As well, the land is currently treed along the northern limit and the eastern portion. GHD is not aware of any proposed changes to the current land use between Panorama North and the landfill, nor have any tree cutting been proposed for the lands in accordance with the Town of Collingwood's bylaw.

A closed landfill, (i.e. waste disposal landform), is not considered to be a negative from a visual aspect. The closed landfill will be a green space. Depending on location, landfills may be able to be used for active recreation (e.g. golf course), but many are used as a natural habitat area or for passive uses such as walking trails. These uses are not considered to be negative from a long term visual aspect. With the landfill partially capped and vegetated (about 70 %), the majority of the long-term landform is present.

Panorama North is proposing to temporary screen the view of the active landfill through the use of interim measures installed on land in Phases 4 and 5 (Figure 1.3). The installation/development of the temporary visual mitigation measures will be sequenced with the development of Phases 1 to 3 and the landfill closure status. The proposed temporary visual mitigation measures are presented in Section 3.

The transfer station is a long-term operation at the facility and is located on the eastern portion of the waste disposal property. The waste transfer station is an established facility and is mainly a ground level operation with an elevated platform for ease of drop-off by users. The visual impact of the transfer station is considered to be minor due to distance from the development and the current conditions (undeveloped and treed) of the lands between Panorama North and the landfill. As such, the long-term visual impact can be dealt with through typical methods for residential developments such as wood privacy fences and tree plantings, and building orientation to lessen the visual impact for buildings higher than 2 floors. The proposed long-term visual mitigation measures are presented in Section 3.

It is GHD's opinion the closed landfill does not create a long-term visual concern to the Panorama North development, and that temporary visual mitigation measures can be used to develop Phases 1, 2, and 3, and that typical residential measures with some enhancements can be used to manage the minor long-term visual impacts associated with the waste transfer station or replace the temporary visual mitigation measures (required for landfill) for the Phase 4 and 5 lands. With regard



to park and stormwater management ponds, these items are not restricted from development. The short and long-term mitigation measures are presented in Section 3.

2.7 Litter

Litter control at the landfill includes the use of litter fences as appropriate and the placement of daily cover soil at the end of each working day. The landfill site is well organized and is neat in general appearance with the use of bunkers for the receipt of recyclable materials and general wastes at the waste transfer station. Since the wastes received at the landfill are shredded, the shredder area has been set-up to minimize litter generation and appropriate litter controls. The waste disposal area is thus controlled to landfill vehicles and enhances the placement, compaction, and covering of wastes at the landfill. In 2017 and 2018, the annual reports do not reference any landfill related complaints with regard to litter.

The long-term operation is for the public drop-off and waste transfer station to continue to operate after landfill closure. The current operation does not have litter issues, and if litter issues are noted, the County responds accordingly to mitigate the issue.

The prevailing winds for the Collingwood area are from the northwest – southwest quadrant. The Collingwood wind rose is provided in Appendix B. The active landfill operations and the waste transfer station are located on the eastern portion of the landfill site property. Based on wind rose, the critical winds direction that would blow litter in the direction of the Panorama North development are from the north-west to north-east quadrant. Based on the wind rose data, the winds from this quadrant are the lowest for the Collingwood area.

Litter is managed by the County at the landfill and transfer station and the County has taken proactive steps to reduce the potential for litter generation. Based on the following, litter is not considered by GHD to be an issue that would create an impact that would impact the Panorama North development:

1. The active disposal operation and phased Panorama North development will only overlap for a few years and that during those years, the development would be an active construction site and require on-site controls for litter and refuse.
2. The wind directions that would have the potential to blow litter in the direction of the development is the lowest of any quadrant.
3. The Collingwood Landfill currently has an active litter control measures in place in the vicinity of the active landfill areas and the waste transfer station area.
4. In addition, currently between the active disposal area and Panorama North, a wooded area exists and majority of landfill related blowing litter occurs along the ground surface and if the litter escaped from the landfill property would be trapped/collected prior to reaching the Panorama North development by the perimeter fencing and the wooded area. The wooded area noted is shown on Figure 1.2.
5. Potential impacts related to blowing litter at the transfer station or through traffic to the landfill/transfer station should be dealt with through local measures or regular maintenance by the County. Litter management and the control of litter is a normal requirement for waste disposal sites and waste transfer stations.



2.8 Odour

Odour at landfills either relate to waste that enters the landfill or to gases generated as part of the waste degradation process. Odourous gases make up less than one percent of the gas generated by decomposition of waste. Landfill gas generation will normally peak around the landfill closure period. The application of final cover will normally reduce the potential or strength of odourous gases. Soil final cover systems have been shown to provide a matrix for natural bacteria that will attenuate and destroy odourous gases associated with landfill gas emissions.

The landfill currently has residential properties and an active golf course that are located within the 500 m zone. At least two residential properties are located between the landfill and the Panorama North development. The Annual Report does not indicate that odours are an issue at the landfill, nor have odour complaints been reported from the sensitive receptors in the area.

As per the discussion of the wind direction in Section 2.7, the potential for odour is low at this landfill due to the current data and the wind direction that would blow the odour in the direction of the Panorama North development is small since the principle wind direction is from the west and toward existing developed lands (golf course and club house). It is GHD's opinion that odour from the gases generated from the decomposition of waste or from the active waste disposal operations will not impact the Panorama North development for the items noted in this section.

2.9 Dust

Dust is generated at landfills through landfill operations and through un-vegetated portions of the landfill during wind storms/ events. Landfills are required to control dust from normal landfill operations through various controls which include ceasing the operation or applying water to the dust generation area and these actions normally will control the dust to the landfill property.

It is GHD's opinion that dust from the landfill will not impact the Panorama North development for the following reasons;

1. The active disposal operation and phased Panorama North development will only overlap for a few years and that during those years, the development would be an active construction site that will be creating dust that will be required to be dealt with and controlled.
2. The wind directions that would have the potential to blow dust in the direction of the development is the lowest of any quadrant.
3. Between the active disposal area and the development, a wooded area exists and will act as a buffer to any surface dust that may leave the landfill in the direction of the Panorama North development.
4. Once the landfill is closed, the main dust generation source, the active disposal area, will be vegetated and the source area eliminated.
5. Potential for dust generation through grinding operations are required to be controlled at the source and these operations are short in duration.



2.10 Noise

As part of the overall development approval, noise is required to be assessed with regard to existing developments and with regard to current and future road traffic volumes. The landfill was included within that study in accordance with approval requirements. As such, noise associated with landfill or waste transfer station traffic has been accounted for and is not discussed in the D-4 Guideline. The noise related to the landfill and transfer station operations are discussed in this section.

Noise at the landfill will occur during landfill operating hours and relates to receipt, shredding, placement of waste, and application of interim and final cover. A noise assessment of these activities was conducted and assessed in relation to the requirements of O.Reg. 292/98. Figure 2.2 provides the results of the landfill related noise assessment. Appendix C contains the noise assessment with regard to the landfill operations.

Landfill noise is required to be less than 55 dBA at a receptor during the 7 AM and 7 PM or similar to the ambient background noise at a location if the background noise is higher. The landfill operating hours are within the time period and as such 55 dBA criteria is applicable. The noise assessment indicates that the landfill operations do not create a noise impact at the Panorama North development during the 7 AM to 7 PM period. As such, no temporary noise mitigation measures are required with regard to the landfill operations.

The waste transfer station operations were assessed with regard to noise levels. The normal day-to-day operations do not cause noise levels of concern. However, the chipper that is used to chip wood has short-term noise impacts at the Panorama North development. The wood chipper is a mobile unit that has a mobile certificate that governs the noise levels required to be met at sensitive land uses (residential) and the chipper will have a limited time of use. The noise assessment indicates that the wood chipper noise levels in Phase 5 will exceed the 50 dBA requirement for a sensitive land use, as well as a small section of Phase 3 and Phase 4.

With regard to the waste transfer station, several additional factors need to be considered. Phase 5 is currently proposed to be an elementary school that according to school board staff is proposed to be three stories in height. This will require sealed windows (non-opening). As such, the projected noise levels in Phase 5 would not be considered a noise impact for the school due to noise assessment criteria in NPC-300. However, if the school property is developed as residential units, than noise impacts will occur for short time periods when the wood chipper is operated. These noise impacts could be managed either through installation of noise mitigation at the source area (by the wood chipper) or through installation of air conditioning units on the subject property. These items are discussed in Section 3.

The assessment of noise from the landfill and the waste transfer station operations consider only the development and does not consider the two existing residential properties located between the landfill/ waste transfer station and the development. Any noise assessments required for changes in landfill operations or the use of mobile shredders need to consider these two existing sensitive land uses.

It is GHD's opinion that noise from the active landfill disposal operations do not create a noise issue with regard to the Panorama North development as proposed. For the waste transfer operation, potential noise impacts related to the short-term chipping of wood wastes will occur in Phase 4 and



for a small portion of Phase 3 and 4. At this time, the noise chipper operation is required to be in compliance with noise levels at two existing residential structures between the landfill and the Panorama North development. If the land use changes between the landfill and Panorama North development, contingency noise mitigation measures can be used to reduce the noise levels to acceptable levels. The best approach is to deal with the noise at the source. This is discussed in Section 3.

2.11 Contaminated Discharge from Vehicle Traffic

Potential for litter from the waste trucks and public vehicles may occur along the access road such as 10th line. It is GHD's understanding that the County has a regular maintenance program that removes litter that may have been released from vehicles using the landfill/ waste transfer station. This is assumed that it will continue as long as the waste transfer station is in operation.

Along 10th Line Road, the proposed use is a stormwater pond and multi-use residential. Depending on the land use, fences and noise barriers will be installed that will restrict the movement of litter from the road and control litter that is discharged from waste vehicle traffic.

2.12 Fires

The landfill is not permitted to burn waste materials at the Site. The potential for a fire at the landfill exists through the normal operations and/or an accident. The County has not reported the occurrence of a fire at the Site either at the transfer station component of the operation or the disposal operation. The most likely potential for a fire would be during a grinding or shredding operation where sparks may be generated or heat generated during the operation.

The method of waste storage at the facility minimizes the potential for a large or significant fire to occur. With regard to waste disposal operations, the active placement of waste normally can manage any small fire that may occur with equipment on Site through the smothering of the fire with soil. Alternatively, if the fire is contained, normal fire measures can be employed.

In GHD's opinion, the lack of fires at the Site reflects the typical operation and the low risk of a potential fire. The short overlap of active landfilling and the initial development phase, as well as that wind is normally directing any air borne emissions away or cross-gradient to the Site reduces the potential for an impact from a fire at the landfill should it occur.

2.13 Vectors and Vermin

The 2017 Annual Landfill Report identified only one complaint that is related to landfill operations. The complaint was not related to vector and vermin. The ECA requires daily site inspections to be conducted by County staff.

Landfills are required to control vector and vermin through landfill operations and if required through other means. Vector and vermin issues at landfill relate to food sources and as such relate to the active disposal area. Control of the active disposal area through placement of daily cover is the normal method to control vector and vermin. As has been presented in Section 1.3, the landfill has a remaining site life of 6.1-years. Based on various assumptions presented in Section 1.3, the active



landfill operation is projected to have a limited overlap with the Panorama North development and that during the overlap construction will be occurring.

The County does not indicate a current vector and vermin problem with the landfill or the waste transfer station operations. It is GHD's opinion that vectors and vermin are not a concern for the current and proposed operations.

3. Proposed Management Controls

Based on the D-4 Guideline assessment the proposed management controls at the Panorama North development that are associated with the Collingwood Landfill and the associated waste transfer station are as follows:

1. If agricultural tile drains are encountered during the development of the property, the agricultural drains should be removed from the location point to the northern property limit to minimize the potential for a pathway for the migration of landfill gas. This management control is a proactive measure.
2. The development is partially located within the D-4 Guideline boundaries and the landfill is estimated to be closed within seven years based on current waste receipt projections and the waste transfer station is scheduled to continue to operate for the long term. Panorama North development has been divided into five phases that would allow temporary mitigation measures to be installed on lands in Phases 4 and 5 to allow Phases 1, 2, and 3 to be developed prior to landfill closure. Phases 4 and 5 would be developed after landfill closure or would require the proposed long-term visual mitigation measures to be installed prior to development of the residential structures if the landfill is still active/ open (not closed).
3. Temporary Visual Mitigation Measures – Temporary visual mitigation measures to be installed include the placement of site topsoil and excess material berms along the northern property boundary. The temporary berms will be a minimum of 2 m high and vegetated with a tall grass mix. The width and side slopes of the berm will vary depending on location and material available. The minimum width will be 1 m on top with side slopes at a minimum of 2 to 1. The berms would be installed prior to release of the related phase noted on the Figure 3.1 for occupancy. Figure 3.1 provides the proposed location and the temporary berm development installation based on development phases. Existing trees along the north boundary will be maintained as long as possible. The trees will be assessed to determine trees that are suitable to maintain for the long-term mitigation measures.
4. Long-Term Visual Mitigation Measures – A standard board privacy fence, 1.8 m in height will be installed along the north property line of the Panorama North development for residential units/ elementary school proposed for Phase 4 and 5. Deciduous trees (4 m in height) native to the area will be planted at 6 m spacings along the south side of the fence (approximately 1 m or less from the fence). If existing trees along the northern boundary are suitable and can be maintained, such as not impacted by grading requirements, the existing trees will be maintained as part of the long-term visual mitigation measures. Within the proposed park, additional tree plantings will be installed to replace the fence requirement. For the elementary school, levels above the second storey where a line perpendicular to the window intersects



the waste transfer station lands shall be required to have light filtering roller shades/blinds or similar visual restrictions consistent with school board requirements.

5. Additional Visual Mitigation Measures – Residential structures greater than 2 stories – Within the D-4 Guideline zone, these units will be situated in a manner so that they do not directly face the landfill (See Figure 3.1 – apartment and stacked townhouses). Windows above the second storey, where a line perpendicular to the window intersects the waste transfer station lands shall be required to have at a minimum light filtering roller shades/blinds.
6. Contingency Long-Term Noise Mitigation Measures – Assessment indicates that the wood chipper that is occasionally used at waste transfer station requires noise mitigation measures if the school site is used for residential units and for a small section of Phase 3 and 4. Currently the County is required to meet noise limits at the residential locations located between Panorama North and waste transfer station. If these locations are no longer residential locations, contingency noise mitigation measures would be required. The contingency noise mitigation measure is proposed to be the installation of noise mitigation fence at the source area or identified long-term wood chipping area that addresses noise directed toward the Panorama North development and that would reduce the noise at the Panorama North sensitive land uses to less than 50 dBA. The noise barrier would need to be 20 long and 4 meters and could be either a noise barrier system or shipping containers that could be moved or used for storage.

The proposed mitigation measures should be incorporated into the various agreements related to the development.

4. References

County of Simcoe, D-4 Guideline, Landfill Impact Assessments, Solid Waste Management

Golder Associates Ltd., 2018, Collingwood Landfill, County Waste Disposal Site #2, 2017 Annual Report, Prepared for the County of Simcoe. Dated March 21, 2018.

Golder Associates Ltd., 2019, Collingwood Landfill, County Waste Disposal Site #2, 2018 Annual Report, Prepared for the County of Simcoe. Dated March 29, 2018.

Ministry of Environment, Conservation, and Parks, Guideline D-4 – Land Use on or Near Landfills and Dumps, April 1994.



All of Which is Respectfully Submitted,

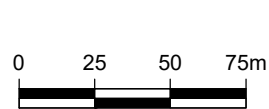
GHD

A handwritten signature in blue ink, reading "James R. Yardley". The signature is stylized with a large, looping "J" and "Y".

James R. Yardley, P.Eng.



Source: GSP GROUP, PANORAMA NORTH, CONCEPT PLAN, TODCO INVESTMENTS INC., FEBRUARY 10, 2020.



TED NORTH (295 MOUNTAIN ROAD) LTD.
295 MOUNTAIN ROAD, COLLINGWOOD, ON

PANORAMA NORTH DRAFT PLAN

11148856-00
Feb 24, 2020

FIGURE 1.1

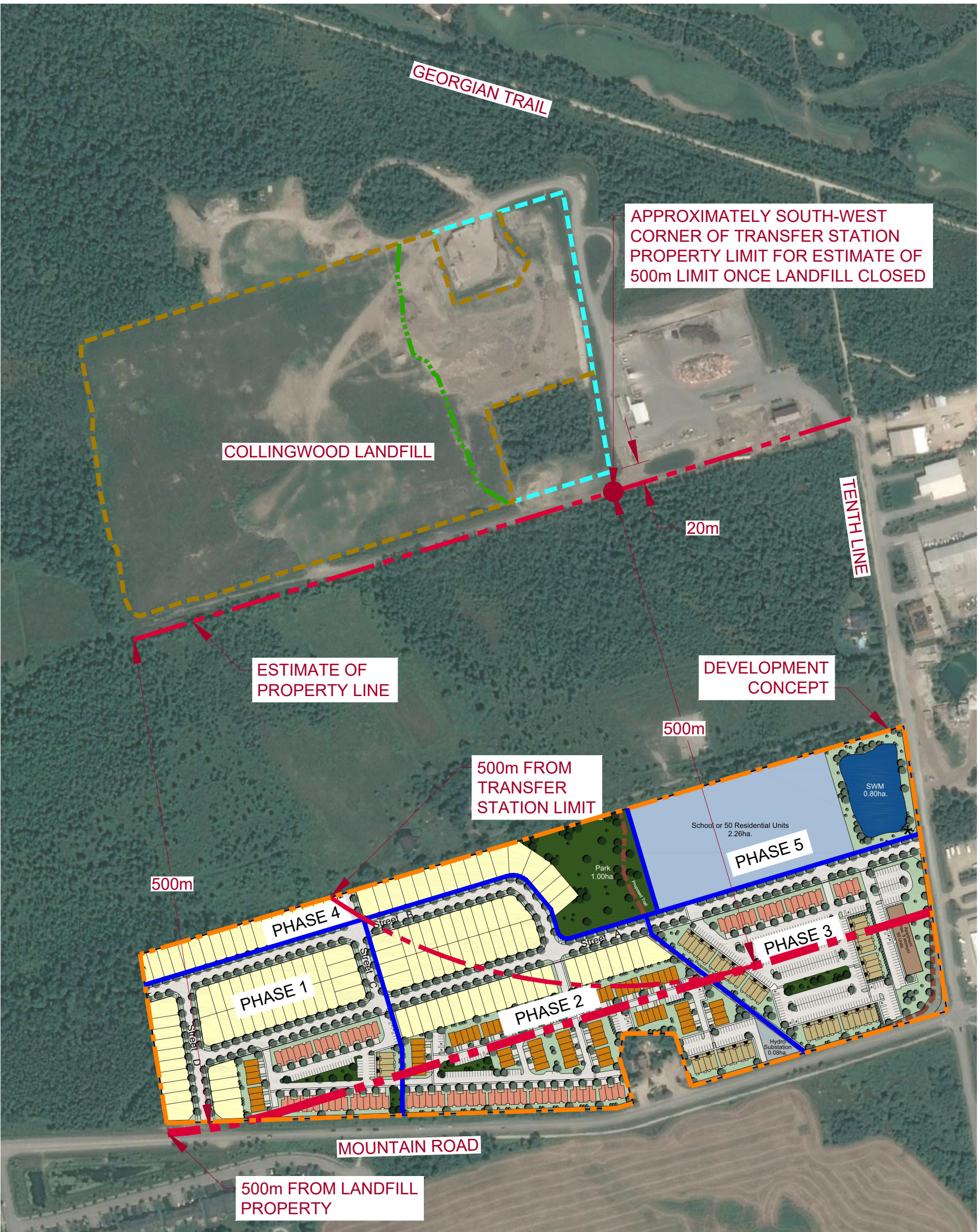


LEGEND

- PROPERTY BOUNDARY
- EXISTING WASTE LIMIT
- APPROVED LIMIT OF LICENSED LANDFILL
- APPROXIMATE LIMIT OF FINAL COVER

500m PROJECTION LINE

SOURCE:
MICROSOFT PRODUCT SCREEN SHOT REPRINTED WITH PERMISSION FROM MICROSOFT CORPORATION, 2020, ACCESSED FEBRUARY 2020
TED NORTH (295 MOUNTAIN ROAD) LTD. DEVELOPMENT CONCEPT TODCO & SLY PROPERTIES, COLLINGWOOD BY GSP GROUP, DATED 2017-11-14
SITE 2 COLLINGWOOD LANDFILL 2017 ANNUAL WATER MONITORING REPORT BY GOLDER ASSOCIATES DATED 2017-12-02
GSP GROUP, PANORAMA NORTH, CONCEPT PLAN, TODCO INVESTMENTS INC., FEBRUARY 10, 2020.



LEGEND

PROPERTY BOUNDARY

EXISTING WASTE LIMIT

APPROVED LIMIT OF LICENSED LANDFILL

APPROXIMATE LIMIT OF FINAL COVER

500m PROJECTION LINE

PHASE BOUNDARY

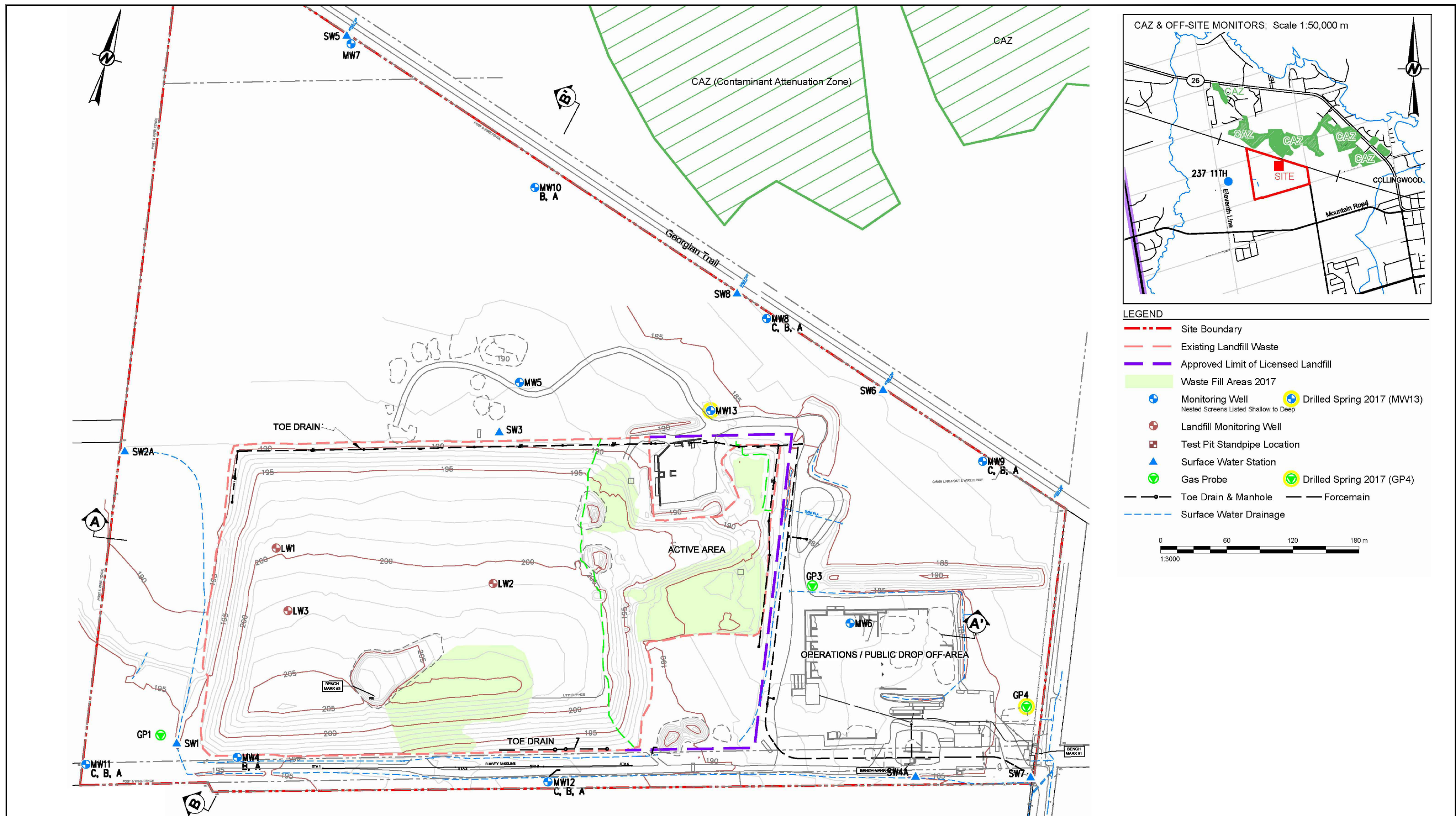
SOURCE:

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SITE 2 COLLINGWOOD LANDFILL 2017 ANNUAL WATER MONITORING REPORT BY GOLDER ASSOCIATES DATED 2017-12-02

GSP GROUP, PANORAMA NORTH, CONCEPT PLAN, TODCO INVESTMENTS INC., FEBRUARY 10, 2020.



Source: COLLINGWOOD LANDFILL COUNTY WASTE DISPOSAL SITE #2, 2017 ANNUAL REPORT, PREPARED BY GOLDER ASSOCIATES LTD., MARCH 2018



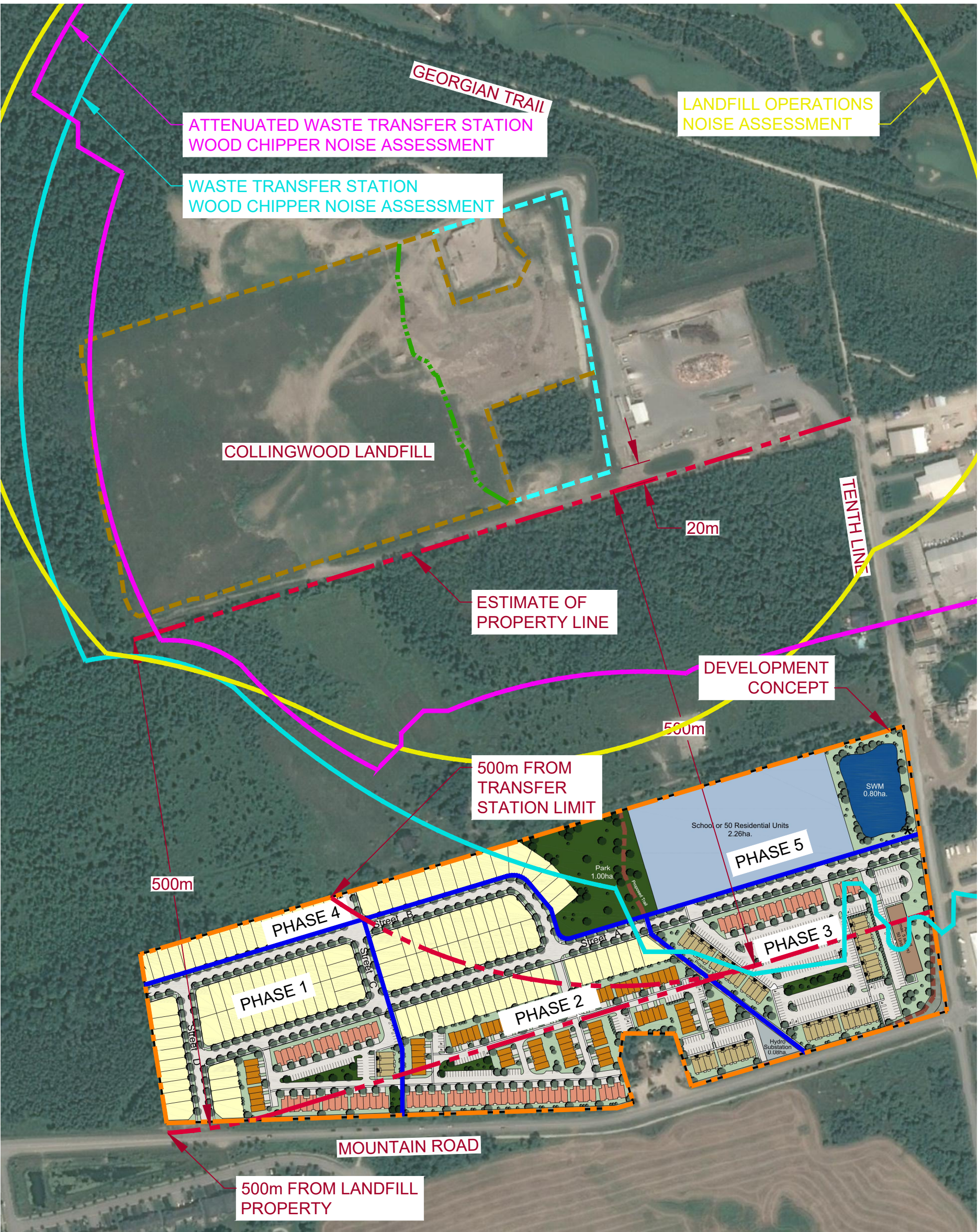
TED NORTH (295 MOUNTAIN ROAD) LTD.
295 MOUNTAIN ROAD, COLLINGWOOD, ON

11148856-00

Feb 25, 2020

COLLINGWOOD LANDFILL SITE PLAN

FIGURE 2.1



LEGEND

- PROPERTY BOUNDARY
- EXISTING WASTE LIMIT
- APPROVED LIMIT OF LICENSED LANDFILL
- APPROXIMATE LIMIT OF FINAL COVER

- 500m PROJECTION LINE
- PHASE BOUNDARY

SOURCE:

MICROSOFT PRODUCT SCREEN SHOT REPRINTED WITH PERMISSION FROM MICROSOFT CORPORATION, 2020, ACCESSED FEBRUARY 2020

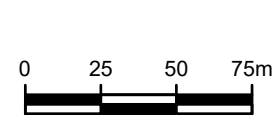
TED NORTH (295 MOUNTAIN ROAD) LTD. DEVELOPMENT CONCEPT TODCO &SLY PROPERTIES, COLLINGWOOD BY GSP GROUP, DATED 2017-11-14

SITE 2 COLLINGWOOD LANDFILL 2017 ANNUAL WATER MONITORING REPORT BY GOLDER ASSOCIATES DATED 2017-12-02

GSP GROUP, PANORAMA NORTH, CONCEPT PLAN, TODCO INVESTMENTS INC., FEBRUARY 10, 2020.



Source: GSP GROUP, PANORAMA NORTH, CONCEPT PLAN, TODCO INVESTMENTS INC., FEBRUARY 10, 2020.



TED NORTH (295 MOUNTAIN ROAD) LTD.
295 MOUNTAIN ROAD, COLLINGWOOD, ON

MITIGATION MEASURES

11148856-00
Mar 4, 2020

FIGURE 3.1

Appendices

Appendix A
Selected Pages – 2017 Annual Report
Collingwood Landfill



March 2018

COLLINGWOOD LANDFILL COUNTY WASTE DISPOSAL SITE #2 2017 ANNUAL REPORT

The Corporation of the County of Simcoe

Submitted to:

The Corporation of the County of Simcoe
Solid Waste Management
1110 Highway 26
Midhurst, Ontario
L9X 1N6

Report Number: 1418312 (1702)

Distribution:

1 Copy - The Corporation of the County of Simcoe
2 Copies - Ontario Ministry of the Environment and
Climate Change
1 e-Copy - Golder Associates Ltd.





COLLINGWOOD LANDFILL SITE #2 2017 ANNUAL REPORT

March 21, 2018

Project No. 1418312 (1702)

Ms. Elizabeth Verghis, P.Eng., Technical Compliance Supervisor
The Corporation of the County of Simcoe
1110 Highway 26
Midhurst, Ontario
L9X 1N6

COLLINGWOOD LANDFILL - SIMCOE COUNTY WASTE DISPOSAL SITE #2 2017 ANNUAL REPORT

Dear Ms. Verghis,

We are pleased to provide you with this report documenting the results of the 2017 annual landfill site compliance monitoring program and Site operations at the Collingwood Landfill (County of Simcoe Site #2), located in the Township of Collingwood.

The Site monitoring and reporting was completed to address the requirements under the Provisional Certificate of Approval (C of A) No. A250402, dated September 13, 2010 and most recently amended in February, 2014 as well as items related to the stormwater C of A No. 2854-6B7QUS, issued July 4, 2005.

Golder has forwarded the required copies of the report to the Ministry of the Environment and Climate Change, Barrie District office on behalf of the County of Simcoe.

Should you have any questions please contact the undersigned. We can be contacted at the address and numbers noted below.

Sincerely,

GOLDER ASSOCIATES LTD.

Paul Dewaele, M.Sc., P.Eng.
Principal

Attachment: Collingwood Landfill, County of Simcoe Waste Disposal Site #2, 2017 Annual Report

Golder Associates Ltd.

121 Commerce Park Drive, Unit L, Barrie, Ontario, Canada L4N 8X1
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Executive Summary

The Collingwood Landfill Site (County Waste Disposal Site #2) is located in the Township of Collingwood approximately 3 kilometres west of the centre of the Town of Collingwood and 1.4 km southwest of Nottawasaga Bay. The Site consists of an overall area of 43.7 ha, of which 14.4 ha is the licenced waste fill area and is used for disposal of solid non-hazardous waste. The Site is monitored in compliance with the Provisional Certificate of Approval (C of A) No. A250402, issued September 13, 2010 and most recently amended in February, 2014. The stormwater controls are operated under C of A No. 2854-6B7QUS for Municipal and Private Sewage Works, under the Ontario Water Resources Act (OWRA), issued July 4, 2005. A Contaminant Attenuation Zone (CAZ) has been defined beyond the Georgian Trail, immediately north of the Site.

The landfill consists of a single cell located in the south end of the Site and is situated directly over thin overburden overlying bedrock. The south-western portion of the fill area was completed and capped following removal of an access road. A new fill area was commenced in 2017 in the eastern part of the landfill. In 2017, this Site was in compliance with the monitoring, reporting and inspection requirements outlined in the C of A.

The nearest surface water body is the un-named creek sampled to the west of the landfill at SW1. Wetlands are present to the north and northwest of the Site, as are ponds associated with the wetlands and the adjacent Cranberry Resort golf course. These water bodies all drain northerly to Nottawasaga Bay of Georgian Bay.

The local hydrogeologic setting for the landfill site consists of three main units; (i) an upper silty sand and gravel aquifer, (ii) a clayey gravelly silt till or silty clay confining unit and (iii) a limestone bedrock aquifer. Groundwater flow underneath the landfill is to the northeast towards Nottawasaga Bay. The bedrock in the northern portion of the property consists of limestone of the Lindsay Formation; under the southern portion it consists of limestone from the Whitby Formation, known to contain naturally elevated chloride, sodium, metals and petroleum hydrocarbon constituents.

One or more potential leachate indicators chloride, sodium, DOC, iron and manganese exceeded their respective Reasonable Use Criteria (RUC) limits in the groundwater at the northern site boundary. These elevated parameters are not considered to reflect landfill impact and actions to address these exceedances are not considered necessary. There were no exceedances of the surface water trigger criteria reported for unionized ammonia and chloride at downstream monitoring stations SW5, SW6, SW7 and SW8. An exceedance of the surface water trigger criteria for phosphorus at SW7 during the October 2017 monitoring round, is not considered to be related to landfill impacts. Based on the results of the 2017 monitoring program, the existing CAZ is considered to be adequate.

The following recommendations are provided based on the 2017 monitoring results: (i) the February 2017 monitoring program reduction letter should be amended to request removal of bedrock monitoring wells 4A, 6, 7, 10A, 11A, 12A and 12B from the water quality sampling program, (ii) the samples from MW13 should be analyzed for a full suite of VOC in 2018, (iii) C of A No. 2854-6B7QUS should be amended to remove SW3 from the surface water monitoring program and (iv) following the completion of grading changes on the southern portion of the Site, records of the stormwater controls under C of A No. 2854-6B7QUS should be updated.



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Capacity Assessment

APPENDIX C

Landfill Inspection Logs



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MOECC Checklist

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Laboratory Certificates of Analysis (On CD)

APPENDIX G

Record of Borehole Sheets (On CD)



1.0 INTRODUCTION

The Corporation of the County of Simcoe (County) owns and operates the Collingwood Landfill Site (County Waste Disposal Site #2, the Site), located at 470 10th Line, north of Mountain Road on Lots 46 and 47, Concession XI, Town of Collingwood (Figure 1). It is accessed off Tenth Line, located to the southeast corner of the Site. It is located approximately 3 kilometres (km) west of the centre of the Town of Collingwood and 1.4 km southwest of Nottawasaga Bay.

The Site is operated under Amended Provisional Certificate of Approval (C of A) A250402 issued September 13, 2010 (amended August 19, 2011 and February 25, 2014), which allows for disposal of solid non-hazardous waste. A copy of the C of A and correspondence between the County of Simcoe and the Ministry of the Environment and Climate Change (Ministry, or MOECC) are provided in Appendix E. A Site Plan showing the licenced area of waste fill and Site Boundaries is provided in Figure 2, attached. The stormwater controls are operated under C of A No. 2854-6B7QUS for Municipal and Private Sewage Works, under the Ontario Water Resources Act (OWRA), issued July 4, 2005.

Golder Associates Ltd. (Golder) has been retained by the County to complete the 2017 environmental monitoring program and report. The 2017 annual monitoring report provides an assessment of the groundwater and surface water monitoring data collected in April, August and October 2017 and the combustible (i.e., landfill, methane) gas monitoring data collected in April, August and October 2017.

1.1 Site Design

The Site covers an area of approximately 43.7 ha in area; the approved waste fill area is 14.4 ha and is located in the southern portion of the Site. The Site was opened in 1973 and was operated by the Town of Collingwood until 1990, following which the County assumed ownership.

Waste is landfilled over the native thin soils over bedrock; the waste thickness over most of the final capped portions of landfill is approximately 10 m. The landfill has no engineered liner or underlying leachate collection system and is situated directly on overburden, and therefore relies on natural attenuation to meet environmental compliance criteria. In 2015, the County completed the installation of a toe drain located at the northern and northeastern landfill perimeter, as shown on Figure 2. This toe drain runs from manhole MH1 on the western side of the landfill to PS1, located at the northeastern corner of the landfill. A second section of the toe drain runs along the eastern toe of the landfill from MH11 (south) to PS1. In 2017, the toe drain was extended from MH10 to MH11 as waste filling operations were extended towards the south. Leachate from this system is discharged by force main to the Collingwood Waste Water Treatment Plant.

A Contaminant Attenuation Zone (CAZ) has been defined on lands beyond the Georgian Trail, for properties where an agreement between the County, the Ministry and property owner (Tanglewood Homes) have agreed to environmental (e.g., noise, groundwater) buffers, as outlined on Figure 1. The Property Identification Numbers for the buffer zones are identified in Schedule A of the C of A.

1.2 Surrounding Land Use

The Site is located north of a predominantly forested area; the area to the west is an open field. The Georgian Trail, formerly a Canadian National Railway line, runs along the northern property boundary and the Cranberry Resort golf course is located immediately north of the Georgian Trail (Figure 2). Industrial buildings are located to the southeast, east of the Tenth Line.



1.3 Landfill Site Operations

The County reported that approximately 16,501 tonnes of waste were disposed at the Site in 2017. Table 1 includes waste tonnages that have been reported in previous years:

Table 1: Previous Waste Tonnages - Collingwood Landfill

Year	Tonnage	Year	Tonnage
1995	4,059	2007	7,109
1996	4,605	2008	4,446
1997	6,323	2009	7,767
1998	7,019	2010	7,459
1999	8,025	2011	13,800
2000	9,881	2012	18,312
2001	7,257	2013	18,072
2002	7,036	2014	16,251
2003	7,325	2015	15,755
2004	7,592	2016	14,750
2005	8,174	2017	16,501
2006	7,127		

Notes:

Information for 1995 to 2014 obtained from 2014 Annual Monitoring Report (WSP, 2015)

Landfilling activities occurred in four active areas in 2017, as noted on Figure 2. The south-central portion of the fill area was completed and capped following removal of an access road. It is reported by the County that final cover was placed in a thickness of at least 0.9 m, and covered with 150 mm of topsoil. A new fill area was commenced in 2017 in the eastern part of the landfill. The approximate extent of the final covered area and areas with interim or daily cover in 2017 is shown on Figure 2.

In 2017, a landfill compactor and front-end loader were used for waste compaction and spreading of cover material. This equipment was serviced by mechanics from Equipment Solutions. It is reported by the County that all waste is covered at the end of each working day by placement of steel framed tarps and/or a minimum of 0.15 m of daily cover, to achieve an estimated refuse to soil ratio of 6:1 by volume. Windblown litter was controlled by the placement of daily cover above the waste at the end of each working day. Litter cleanup was completed regularly by County staff and an outside contractor.

The County operates a waste shredder, which is used to shred incoming waste prior to landfilling and results in a material which can typically be compacted to a greater density than is possible for typical municipal solid waste (MSW).

The Collingwood Landfill is the County's designated site for asbestos disposal. This material is disposed of using special procedures in accordance with Ontario Regulation 347. In 2017, 232 tonnes of asbestos were reported to have been placed at the Collingwood Landfill.

1.3.1 Operating Hours and Weigh Scale

In 2017, landfill operating hours were from 8:30 am to 4:30 pm Monday to Friday and Saturday from 8:00 am to 4:00 pm. The weigh scale was inspected in 2017 by Mettler Toledo.



1.3.2 Inspections and Complaints

Daily inspections of the Site were completed by County staff in 2017, as required by Condition 25 of the C of A. Golder also completed field inspections during monitoring events; field inspection forms are included in Appendix C. No issues or deficiencies were noted during the inspections.

There were seven complaints received within the 2017 monitoring period, six of which were unrelated to site operations, the maintenance of landfill or to the monitoring program. These complaints were primarily related to customer service operations at the Site, which were addressed by the County. Additional information can be provided by the County, if required. There was a single odour complaint received by the County from an adjacent property owner, attributed to windy conditions. The County addressed the complaint by adding additional cover on the active waste area.

There were no comments received from the Ministry on the 2016 annual report. Correspondence from the Ministry, if received, is included in Appendix A.

On February 21, 2017 a leak was identified by the County in the leachate forcemain that runs from the Collingwood Landfill to the Collingwood Wastewater Treatment Centre (WWTC). This was repaired and is further discussed in Section 1.4.2.

In 2017, this Site was in compliance with the monitoring, reporting and inspection requirements outlined in the C of A.

1.3.3 Waste Diversion and Recycling

According to scale data provided by the County, 7,371 tonnes of waste was diverted during 2017, as summarized in Table 2. The layout of the segregation pad is shown on Figure 2B. The County keeps track of the detailed daily waste volumes received at Site in an electronic system; this data has not been appended to this report due to its size but is available upon request.

Table 2: Summary of Waste Diverted, 2017

Waste Type	Tonnes
Brush - Logs	1.3
Brush Chips	815
Leaf & Yard Waste	1,493
Brush-Facilities drop off	5.6
Bulky Rigid Plastic	34
Cardboard and Paper	390
CFC bearing appliances (number of units)	511
Comingled Recyclables	75
Drywall	366
Electronics	67
Household Hazardous Waste	2.9
Mattresses	74
Organics	27
Scrap Metal	370



COLLINGWOOD LANDFILL SITE #2 2017 ANNUAL REPORT

Waste Type	Tonnes
Shingles	1,126
Textiles	7.1
Tires	14
Window Pane Glass	85
Wood Chips	1,773
Wood Pressure Treated	21
Total	6,744

1.3.3.1 WHITE GOODS AND SCRAP METAL

White goods and scrap metal were deposited in the drop-off bunker near the Household Hazardous Waste Depot. All Ontario Recycling Inc. of Bracebridge was responsible for removal and recycling of metal products. CFC (chlorofluorocarbons) bearing appliances were stored separately from the scrap metal. According to scale records, 370 tonnes of scrap metal were diverted from the landfill in 2017 and 511 CFC bearing appliances were shipped from the Site. All appliances were properly segregated and tagged, and CFC were removed by a qualified technician.

1.3.3.2 TIRES

Tires were accepted and stored adjacent to the drywall and shingles bunker. Tire recycling is carried out under the Ontario Tire Stewardship Program. Tires are shipped to the Nottawasaga Landfill (County Waste Disposal Site #10) and are subsequently taken to government-licensed tire processing depot(s). According to the Site records, 14 tonnes of tires were diverted in 2017.

1.3.3.3 RECYCLABLES

Recyclables were collected in covered bins located near the Site entrance, north of the scale house. According to scale records, 465 tonnes of comingled recyclables (i.e., comingled recyclables and cardboard and paper in Table 2) were diverted in 2017. Recyclables were shipped for to Progressive Waste Services in Barrie for transfer to an approved market. Drywall and shingles were stored in a dedicated bunker within the segregation/recycling area. According to the Site records, 366 tonnes of drywall and 1,126 tonnes of shingles were diverted in 2017. Drywall was shipped to New West Gypsum in Oakville. Shingles were shipped to the Nottawasaga Landfill (County Waste Disposal Site #10) for processing.

E-waste is recycled under the Ontario Electronics Stewardship Program and stored in a dedicated shelter. According to Site records, approximately 67 tonnes of e-waste were received at the Site.

There were approximately 7.1 tonnes of textiles and 74 tonnes of mattresses diverted from the Site during 2017. Textiles are temporarily stored near the scale house, and mattresses are stored under a roofed structure along the north boundary.

1.3.3.4 COMPOSTING AND WOOD WASTE

Leaves, grass clippings, yard waste and brush are not composted at the Collingwood Landfill. Yard waste is separated and hauled to the Nottawasaga Landfill (County Waste Disposal Site #10) to be processed. According to County records, 1,493 tonnes of leaf/yard waste and 822 tonnes of brush were diverted in 2017.



Wood waste was separated and stored on a gravel/asphalt pad near the Site entrance. The wood waste was grinded using the grinder from the County equipment fleet and the woodchips were shipped to an approved market. According to Site records, 1,794 tonnes of wood waste were diverted in 2017.

1.3.4 Site Life

The volume of landfill space used during 2017 was calculated based on the volumetric change between the surveys conducted on December 21, 2016 and on November 28, 2017. The volumetric change over this period was approximately 20,988 m³ and includes waste and daily/interim cover material. Details regarding calculations of the volume of waste are included in the Site Capacity assessment memo completed in February (Appendix B).

The volume of 20,988 m³ in from December 21, 2016 to November 28, 2017 covers a filling period of approximately 11 months. The tonnage reported to be disposed of between the two surveys was 15,599 tonnes. The apparent waste density for waste material placed in this period is calculated to be 743 kg/m³. This is higher than the 622 kg/m³ calculated for 2016, which may reflect additional removal of fill in the area of the access road within Cell 1. Recent waste density values are reported to be approximately 35% higher than those reported before waste shredding was introduced at the Site in 2013.

Based on the elevation survey completed in November 2017, the estimated landfill capacity remaining for waste and daily cover is 180,304 m³. Assuming the future annual capacity consumption rate will be similar to the average rate between 2011 and 2017 (24,908 m³) and utilizing the remaining capacity estimate of 188,436 m³, the remaining site life is estimated to be approximately 7.5 years from the start of 2018.

1.4 Stormwater and Leachate Controls

1.4.1 Stormwater Controls

The stormwater controls are operated under C of A No. 2854-6B7QUS for Municipal and Private Sewage Works, under the Ontario Water Resources Act (OWRA), issued July 4, 2005. Condition 6 (Reporting) of C of A No. 2854-6B7QUS is satisfied through the information in this report. A copy of the C of A is provided in Appendix E.

The surface water drainage at the landfill site occurs as defined in the "Design Brief/Stormwater Management Plan" (Henderson Paddon & Associates Limited (HPA), 2005). A drainage ditch south of the main access road intercepts runoff from upslope properties located south of the landfill. This drainage ditch diverts stormwater towards the east through two culverts that pass beneath Victoria Street and around the landfill property. Stormwater drainage improvements were completed in 2015, notably to the drainage ditch that runs along the east side of the landfill. Following the completion of planned grading changes on the southern portion of the Site, the County should formalize the design of the stormwater controls and update the stormwater C of A as required.

Stormwater at the Site drains in a northeast direction toward Nottawasaga Bay; stormwater from the landfill area drains into a low, heavily vegetated area located north of the landfill. During the spring freshet, this area is quite wet, and pools of ponded water are present; the area is generally dry in the summer and early fall. Stormwater discharges from the Site through a series of four culverts that pass beneath the former CN rail bed embankment located immediately to the north. The heavily vegetated area located north and downslope of the landfill is expected to act as a filter for surface water before it leaves the Site.

The storm water management system is inspected and maintained by County Staff on a regular basis. The County of Simcoe maintains a log book, where system inspections and required maintenance are recorded.



Surface water monitoring was carried out at the Site in 2017 in accordance with Condition 4.1 of C of A No. 2854-6B7QUS. In 2017, seven of the eight surface water stations were monitored in April; only SW2B was monitored in August as the remaining surface water stations were dry and only SW2A and SW7 were monitored in October as the remaining surface water stations were dry. The collected samples were analyzed for the parameters identified in Table 1 of C of A No. 2854-6B7QUS. The surface water quality is compared to the Provincial Water Quality Objectives (PWQO); analysis of the surface water analytical data is provided in Section 4.4. In addition, the C of A establishes surface water trigger criteria at the downstream surface water stations (SW5, SW6, SW7 and SW8), which are compared to the trigger concentrations identified in Table 2 of the C of A.

Based on (i) conditions reported to be observed at the Site by County Staff, (ii) inspection during the monitoring completed by Golder in 2017 and (iii) the results of the surface water monitoring, the storm water management controls implemented at the Collingwood Landfill appear to be operating adequately.

1.4.2 Leachate Control

Leachate is collected from the leachate toe drain and pumped via the leachate forcemain that runs from the Collingwood Landfill to the Collingwood Wastewater Treatment Centre.

On February 21, 2017, the County identified a leak in the leachate forcemain that runs from the Collingwood Landfill to the Collingwood WWTC and notified the Ministry. The leak was located on the west side of 10th Line, approximately 450 m south of the landfill entrance. Leachate impacted soil was removed using a vacuum truck operated by Region of Huronia Environmental Services Ltd. Verification soil samples for chemical laboratory analysis were collected by Golder from the walls and floor of the limits of the completed soil removal area. The analytical results of verification soil samples collected for this work program were compared to the full depth potable groundwater condition standards for industrial/commercial/community land use, coarse textured soil presented in Table 2 of the Ministry "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*", dated April 15, 2011. The quality of soil samples were below (in compliance with the applicable Ministry Table 2 Standards for the analyzed parameters).

Based on inspections completed by Golder and the County, no surface leachate seeps were observed on the landfill sideslopes in 2017.



3.0 TOPOGRAPHY, PHYSIOGRAPHY, GEOLOGY, AND DRAINAGE

The regional area slopes to the northeast, towards Nottawasaga Bay. Local elevations at the Site range from a high of 205 metres above sea level (masl) in the southern part of the waste fill area, to approximately 190 masl at the northern toe of the landfill. Local elevations further decrease to the north of landfill, to a low of approximately 182.2 masl at MW9.

The nearest surface water body in the vicinity is the un-named creek sampled to the west of the landfill at SW1. Wetlands are present to the north and northwest, as are ponds associated with the wetlands and the adjacent golf course. These water bodies all drain to Nottawasaga Bay, located approximately 1,400 m to the northeast.

Geology in the immediate vicinity of the Site is shown in cross-sections in Figure 3. The locations of the cross-sections are shown on Figure 2. The local hydrogeologic setting for consists of three main units; (i) an upper silty sand and gravel, (ii) a clayey gravelly silt till or silty clay confining unit and (iii) a limestone bedrock. The upper unit is identified as a thin silty sand and gravel with a depth of approximately 1 m in the southwest corner of the waste fill area (i.e., MW4) to a maximum depth of approximately 2.2 m in the northern portion of the waste fill area (i.e., MW2). In the southern portion of the Site (MW4, MW11 and MW12), the thin sand unit is underlain by a clayey gravelly silt till. This unit is not laterally continuous across the Site and in northern portion; the overburden soils are underlain by a silty clay. The silty clay unit varies in thickness, and exhibits a maximum thickness of 5.5 m at MW3. This silty clay layer is interpreted to form a confining unit above the bedrock.

Bedrock is reported to have been encountered at elevations between approximately 180 and 186 masl. The depth to bedrock is shallowest toward the northwest and west of the Site. Paleozoic geology mapping (Telford, 1976) indicate the bedrock formation underlying the landfill outcrops in the Collingwood area. The bedrock in the north portion of the Site consists of limestone of the Lindsay Formation, whereas that under the southern portion of the Site consists of limestone from the Whitby Formation (also known as the Collingwood Member of the Lindsay Formation). The Whitby Formation unit is described as black, fissile, petroliferous and calcareous shale with abundant fossils (Telford, 1976). The Whitby Formation is divided into three members; the lower member of the formation is present in the area under the landfill. Grey to black fossilized limestone, thickly bedded, was penetrated in MW4, MW5, MW6 and MW7 at the Site, according to historical borehole logs. The Whitby Formation is known to contain naturally elevated chloride, sodium, metals and petroleum hydrocarbon constituents, including benzene, toluene, ethyl benzene and xylene (BTEX). The Lindsay Formation unit is described as grey, thin to medium bedded, finely crystalline, very fossiliferous and argillaceous limestone having shale partings (Telford, 1976). This bedrock formation is observed in the borehole logs from the wells installed along the northern property boundary (MW8 to MW10).

A review of the Ministry water well records and a domestic well survey were completed as part of the Hydrogeological Assessment completed in 2000 and summarized in the 2014 Annual Monitoring Report (WSP, 2015). The results of the domestic well survey indicated that all of the wells surrounding the landfill, with the exception of MOE #13718, were drilled into bedrock; the depths of these bedrock wells are between 7.6 m and 29.6 m. Consistent with water quality expected in the Whitby and Lindsay Formations, the water quality was reported to contain significantly elevated concentrations of a number of parameters. Water softeners are typically required and either bottled water or Town of Collingwood water is reported to be typically used for drinking and cooking purposes. Newer residential developments in the area are now serviced by the municipal water supply.



COLLINGWOOD LANDFILL SITE #2 2017 ANNUAL REPORT

The Collingwood Landfill is located within Nottawasaga Bay watershed, and Nottawasaga Bay is located approximately 1.4 km northeast of the Site. Two distinct drainage areas were identified near the landfill property. The first drainage area is located immediately south of the landfill and grades overland in a northeast direction until intercepted by the roadside ditch located on the south side of the landfill. The water in the roadside ditch flows eastward towards the landfill entrance, crossing 10th Line through a culvert and ultimately flows northward into a wooded, swampy area located east of the landfill property. The second drainage area is also located south of the landfill property and includes land south of Mountain Road. There is a defined, natural, intermittent channel between Mountain Road and the southwest corner of the landfill property. Water in this drainage area flows northward, west of the waste fill area, where the flow path becomes poorly defined. The second drainage area is relatively flat and mostly tree covered with the exception of the waste fill area. Runoff from the upper part of the drainage area is reported to spread over the swampy, vegetated land surface in the north part of the landfill property. This vegetation acts as a natural recharge area as well as a wide, vegetated filter strip. These conditions can help with the attenuation of peak spring runoff flows through the Site as well as the improvement of the surface water quality before it flows from the landfill site through any of the culverts located under the Georgian Trail.

3.1 Water Levels and Flow

3.1.1 Groundwater

Groundwater levels were measured in all the groundwater monitoring wells on April 4 and 5; August 1 and October 5, 2017. Water levels recorded in 2017, along with historical water level data, are summarized on hydrographs included in Appendix A.

Water Levels in the shallow overburden soils, upper bedrock and lower bedrock are monitored at the monitoring wells shown in Table 6.

Table 6: Water Level Monitoring Locations

Overburden	Upper Bedrock	Lower Bedrock
MW4B, MW8C, MW9C, MW11C and MW12C	MW3, MW8B, MW9B, MW10B, MW11B and MW12B	MW4A, MW5, MW6, MW7, MW8A, MW9A, MW10A, MW11A and MW12A

Water levels in 2017 were within the historical range, with the exception of MW11C where water levels decreased throughout 2017 (0.7m decline from October 2016 to October 2017). Higher water levels are noted in the spring than in the fall, consistent with the spring freshet. The water table is interpreted to be located near the base of the waste fill. It is noted that a slight declining trend (approximately 1 m) was noted in the overburden soils at MW4B since 2013, however water levels increased by 0.3 m from October 2016 to October 2017. A similar declining trend was noted in the bedrock at MW6 and MW12A, but water levels increased slightly in 2017.

Figure 4 illustrates the groundwater regime for the overburden soils in October 2017; Figure 5 illustrates the groundwater regime for the bedrock. Groundwater flow in the overburden is to the northeast; groundwater flow in the bedrock diverges to the northeast and north. The horizontal hydraulic gradient in the overburden soils at the Site is estimated at 0.02 m/m between MW4 and MW8.



Similar to previous years, downward vertical gradients are observed between the overburden and bedrock, including at MW8, MW9 and MW10; a slight upward gradient was noted between MW11C and MW11B in October 2017. The vertical gradient in 2017 ranged from -0.07m/m at MW11, to 0.6 m/m at MW8. The upward gradients observed at MW1- suggest the water in these wells is mixing with that of the deeper bedrock water; a similar slight upward gradient was observed at MW12 in previous years. It is noted that the upper bedrock was dry at MW9 (i.e., MW9B), whereas the higher screen in the overburden contained water. This indicates that perched conditions are present in some areas.

The horizontal hydraulic gradient in the bedrock at the Site is estimated at 0.01 m/m between MW4 and MW8. A downward vertical gradient is also noted within the bedrock. The vertical gradient within the bedrock is downward and ranges from 0.2 m/m at MW8, to 1.0 m/m at MW11.

3.1.2 Leachate

The leachate levels recorded in 2017, along with historical data, are summarized on hydrographs included in Appendix A. Historically, the leachate levels at LW1, LW2 and LW3 have remained relatively steady. LW1 was dry in 2017, after a slight increase in leachate levels was noted in 2015 and 2016 that provided evidence of some localized mounding or perched leachate conditions. The leachate levels at LW2 and LW3 indicate the leachate in these wells are at a similar elevation to the water table, which is interpreted to be located near the base of the waste.



6.0 COMBUSTIBLE GAS

6.1 2017 Combustible Gas Results

Table 18 summarizes the annual combustible gas (methane) readings in 2017. Combustible gas was not detected at any wells outside of the waste footprint (i.e., GP1, GP2, GP4) in 2017.

The highest concentrations of combustible gas were present within the waste, at LW2, ranging from 59.8% v/v to 65.7% v/v. Elevated combustible gas concentrations were also present at LW1 at concentrations ranging from 30.1% v/v to 48.5% v/v. Lower concentrations were detected at GP3 (0.0% v/v to 14.7% v/v). Methane concentrations in at LW2 in 2017 were consistent with those in previous years, whereas those at LW1 and GP3 were slightly greater.

Waste is not landfilled below the ground surface at the Collingwood Landfill and the water table is relatively close to the ground surface (above the surface in the centre of the leachate mound). This limits the potential for migration of methane in the subsurface, as evidenced by the absence of methane at wells outside of the landfill footprint.

Table 18: 2017 Combustible Gas Readings (% volume CH₄ in air)

Date	LW1	LW2	LW3	GP1	GP2	GP3	GP4
03-Apr-17	30.1	59.8	0.0	0.0	0.0	0.9	-
29-Aug-17	48.3	65.1	0.0	0.0	-	14.7	0.0
16-Oct-17	34.5	65.7	0.0	0.0	-	0.0	0.0



7.0 CONCLUSIONS

- 1) The Collingwood landfill is underlain by a largely unconfined thin overburden aquifer over limestone bedrock. Groundwater flow in these units is to the northeast towards Nottawasaga Bay, located approximately 1,400 m to the northeast. A downward vertical gradient is observed between the overburden and bedrock at most locations. A downward vertical gradient is also noted in the nested wells within the bedrock.
- 2) Based on a comparison of the data from LW2, LW3, the toe drain and background water quality, the best indicators of landfill impacts are considered to be alkalinity, ammonia, TKN, DOC, boron, iron and manganese, and non BTEX volatile organic compounds.
- 3) Lower concentrations of indicator parameters are observed in the background wells screened in the overburden (MW11C) and the upper bedrock (MW11B). Elevated concentrations of many indicator parameters are observed in the background well screened in the lower bedrock (MW11A), including sodium and chloride, metals and BTEX. The elevated concentrations of these indicator parameters observed at MW11A are reflective of the naturally occurring concentrations in the bedrock Whitby Formation.
- 4) A Durov analysis indicated the wells are split into two clear groups consisting of bedrock wells with a high proportion of chloride and sodium and the remainder of the wells, consisting of a mixture of bedrock and overburden. The quality of the water at MW7 and MW10A is strongly indicative of elevated brine concentrations, which precludes their use as landfill compliance monitoring locations.
- 5) Whereas monitoring results at Site boundary wells MW7, MW8, MW9 and MW10 indicate there were exceedances of the RUC for chloride, sodium, DOC, iron and manganese, the results are not considered to indicate landfill impact and actions to address these exceedances are not considered necessary.
- 6) Benzene, ethylbenzene, m,p-xylenes, o-xylenes and toluene were detected at the northern property boundary. These concentrations are within the range of the background concentrations observed at MW11A. This, combined with the observed natural concentrations observed in the lower bedrock upgradient at MW11A, indicate that the BTEX is not related to landfill impacts.
- 7) There were no exceedances of the surface water trigger criteria reported for the trigger parameters unionized ammonia and chloride at downstream monitoring stations SW5, SW6, SW7 and SW8. An exceedance of the trigger criteria for phosphate was identified at SW7 in October, however potential sediment entrainment and low ammonia concentrations indicate that the landfill is not impacting this location.
- 8) Based on the groundwater quality and surface water quality observed at site boundary locations in 2017, the existing CAZ is adequate and there is not a current need to expand or reconfigure the CAZ.
- 9) The naturally mineralized quality of the groundwater reported for MWs 4A, 6, 7, 10A, 11A, 12A and 12B precludes use of this data for compliance purposes. Similarly, the presence of naturally derived BTEX in these wells precludes the use of these parameters to assess landfill impact.
- 10) Combustible gas (methane) monitoring results indicate that methane is not migrating outside of the waste footprint.
- 11) In 2017, this Site was in compliance with the monitoring, reporting and inspection requirements outlined in the C of A.



COLLINGWOOD LANDFILL SITE #2 2017 ANNUAL REPORT

8.0 RECOMMENDATIONS

The following recommendations are provided relative to the results of the 2017 environmental compliance monitoring program at the Collingwood Landfill:

- 1) The February 2017 monitoring program reduction letter should be amended to request removal of bedrock MWs 4A, 6, 7, 10A, 11A, 12A and 12B from the water quality sampling program as the naturally highly mineralized nature of the bedrock water and the natural presence of BTEX preclude their use as compliance monitoring and background locations.
- 2) The samples from and MW13 should be analyzed for a full suite of VOC in 2018.
- 3) C of A No. 2854-6B7QUS should be amended to remove SW3 from the surface water monitoring program.
- 4) Following the completion of grading changes on the southern portion of the Site, records of the stormwater controls under C of A No. 2854-6B7QUS should be updated.
- 5) Groundwater and surface water monitoring in 2018 should be undertaken as per the C of A and recommendations made in this report.

GOLDER ASSOCIATES LTD.

Jamie Bonany
Project Scientist

JEB/PJD/plc/js

Paul Dewaele, M.Sc., P.Eng
Principal



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\\golder.gds\gal\barrie\active\2014\141-8312 simcoe county landfill monitor various\08. report\02 collingwood lf\09. 2017 amr\1418312 (1702) rep 2018\03\21 site 2 collingwood 2017 amr (final).docx



LIMITATIONS AND USE OF THIS REPORT

This report was prepared by Golder Associates Ltd. (Golder) for the exclusive use of The Corporation of the County of Simcoe (County) in accordance with the scope and conditions agreed upon between these parties, acknowledging that this report is intended for submission to applicable regulatory agencies for their review.

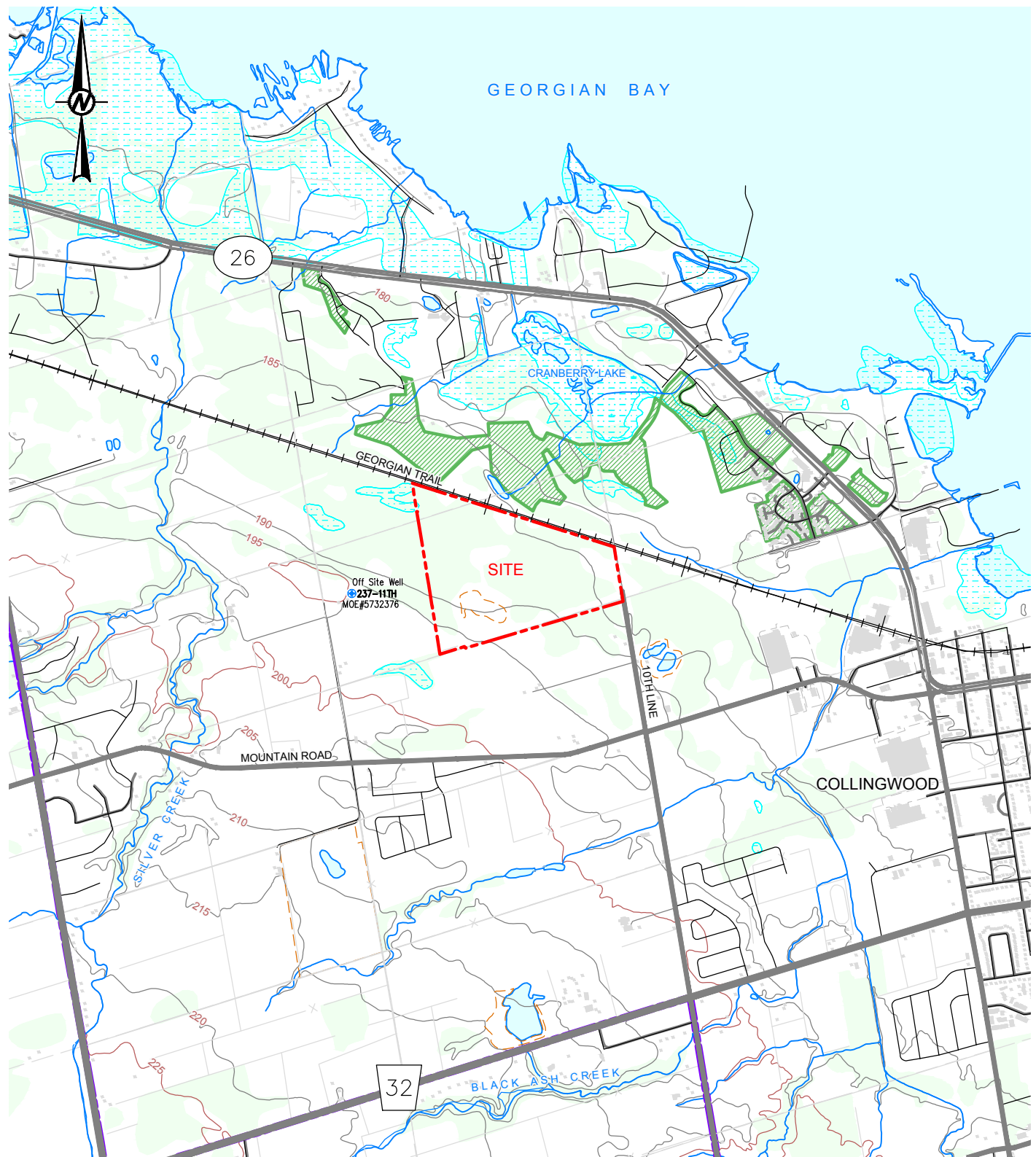
The report is based on data and information collected in the current monitoring year referred to in the report, as well as historical information and data obtained by Golder and that provided to Golder by the County. Golder has relied in good faith on all information provided by others and does not accept responsibility for any deficiency, misstatements, or inaccuracies contained in these reports as a result of omissions, misinterpretation, or fraudulent acts of the persons contacted or errors or omissions in the reviewed documentation.

The Site conditions between sampling locations have been inferred based on conditions observed at borehole locations or other spatially separated sampling locations. Subsurface conditions may vary from these sampled locations.

The services performed as described in this report were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

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- - - - - Landfill Property Line
- / / / / / Contaminant Attenuation Zone Parcels



CLIENT
COUNTY OF SIMCOE

PROJECT
SITE 2 COLLINGWOOD LANDFILL
2017 ANNUAL WATER MONITORING REPORT

CONSULTANT	YYYY-MM-DD	2018-01-04
	PREPARED	JPR
	DESIGN	
	REVIEW	JEB
	APPROVED	PJD



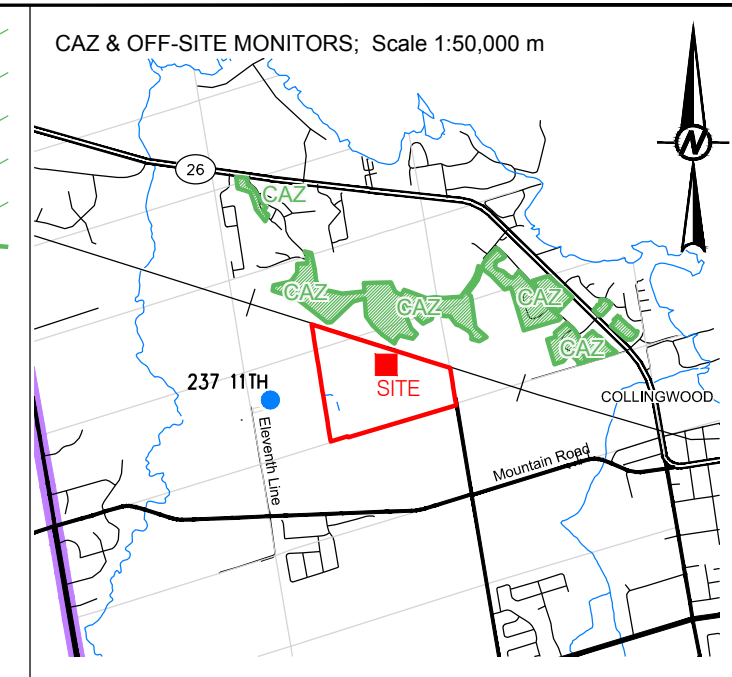
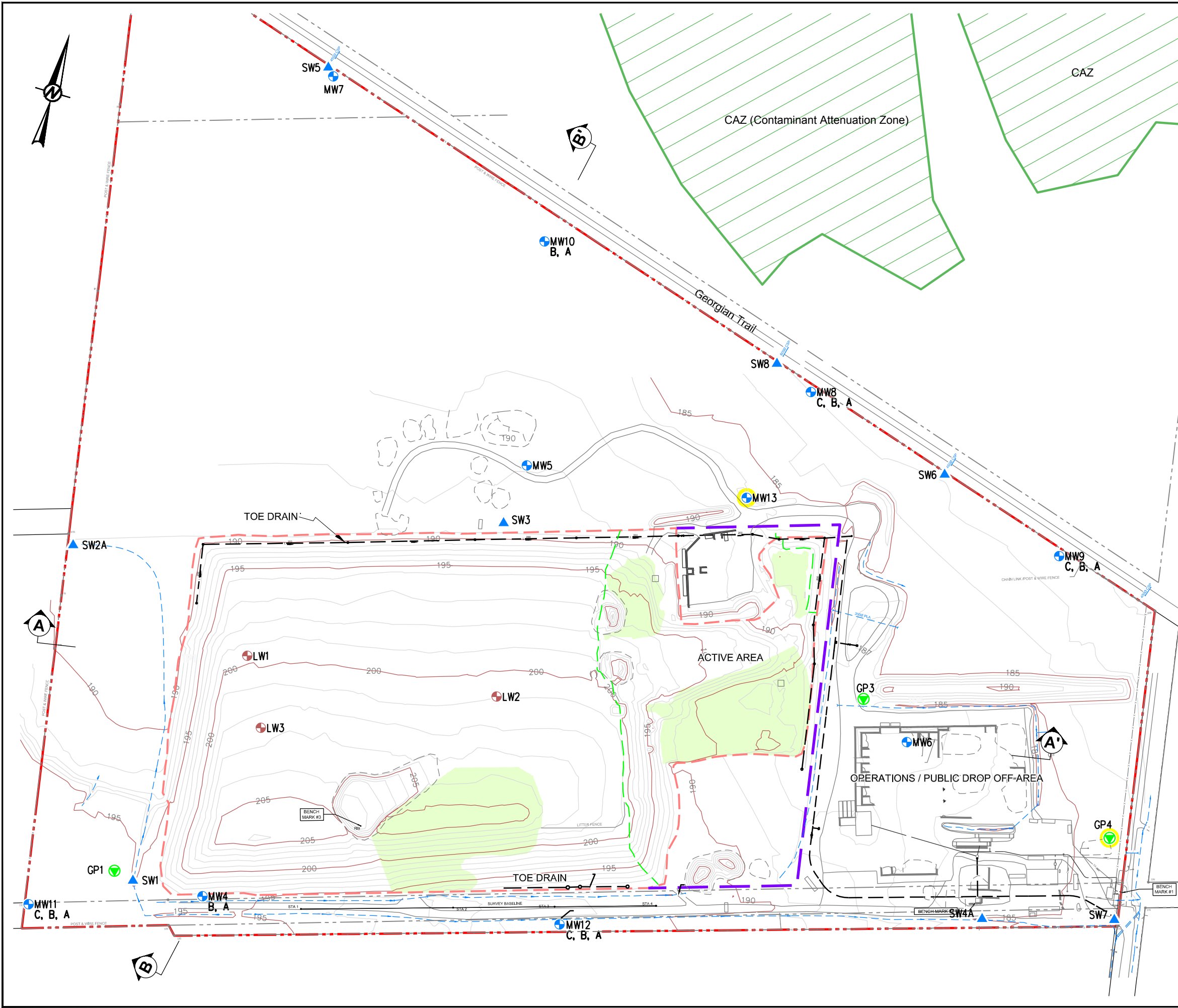
TITLE
REGIONAL KEY PLAN

PROJECT No. 141-8312	Phase -	Rev. 1702B	Figure 1
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

Path: \\golder\gis\golder\CAD\Projects\2014\141-1312 (Simcoe Landfills Monitoring)\17-02B-AMWR\1 - File Name: 1418312-1702B-SITE.dwg



LEGEND

- Site Boundary
- Existing Landfill Waste
- Approved Limit of Licensed Landfill
- Waste Fill Areas 2017
- Monitoring Well
Nested Screens Listed Shallow to Deep
- Drilled Spring 2017 (MW13)
- Landfill Monitoring Well
- Test Pit Standpipe Location
- Surface Water Station
- Gas Probe
- Drilled Spring 2017 (GP4)
- Toe Drain & Manhole
- Forcemain
- Surface Water Drainage

0 60 120 180 m
1:3000

NOTES

Datum is UTM NAD 83 Zone 17
Fill Areas, Golder Associates 2017 Capacity Assessment

REFERENCE

2007 County of Simcoe Assessment and County Mapping.
Topographic Survey November 2017 by SMC Geomatics
CAD Base adapted and aligned to Datum.

CLIENT
COUNTY OF SIMCOE

PROJECT
SITE 2 COLLINGWOOD LANDFILL
2017 ANNUAL WATER MONITORING REPORT

TITLE
SITE PLAN

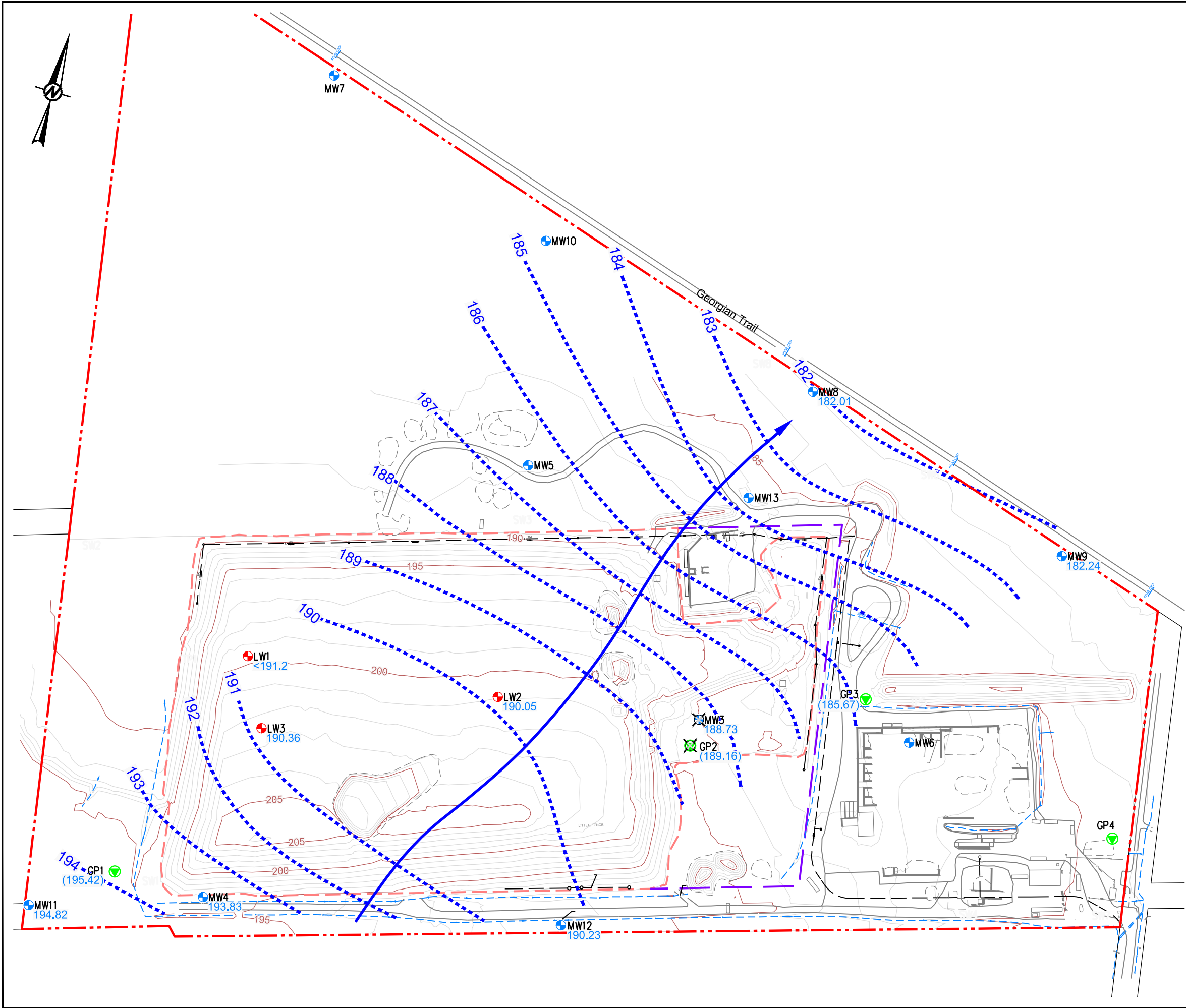
CONSULTANT	YYYY-MM-DD	2017-12-02
	PREPARED	JPR
	DESIGN	
	REVIEW	JEB
	APPROVED	PJD

PROJECT No. 141-8312 Phase - Rev. 1702C Figure 2



IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3/B

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LEGEND

- Site Boundary
- Existing Landfill Waste
- Approved Limit of Landfill
- Goundwater Observation Well
- Landfill Refuse Monitor Well
- Gas Probe
- 178.70 Overburden Static Water Level (Fall 2017)
- Interpolated Equipotential (masl)
- Inferred Direction of Groundwater Flow



NOTES

Datum is UTM NAD 83 Zone 17
Groundwater potentials monitored at screens in the Refuse may reflect Perched or Mounded Conditions.
Groundwater Levels included from Gas Wells, Fall Monitoring.

REFERENCE

2007 County of Simcoe Assessment and SMC Geomatics provided Mapping.
Topographic contours SMC Geomatic topographic survey November 2017.

CLIENT
COUNTY OF SIMCOE

PROJECT
SITE 2 COLLINGWOOD LANDFILL
2017 ANNUAL WATER MONITORING REPORT

TITLE
OVERBURDEN GROUNDWATER FLOW

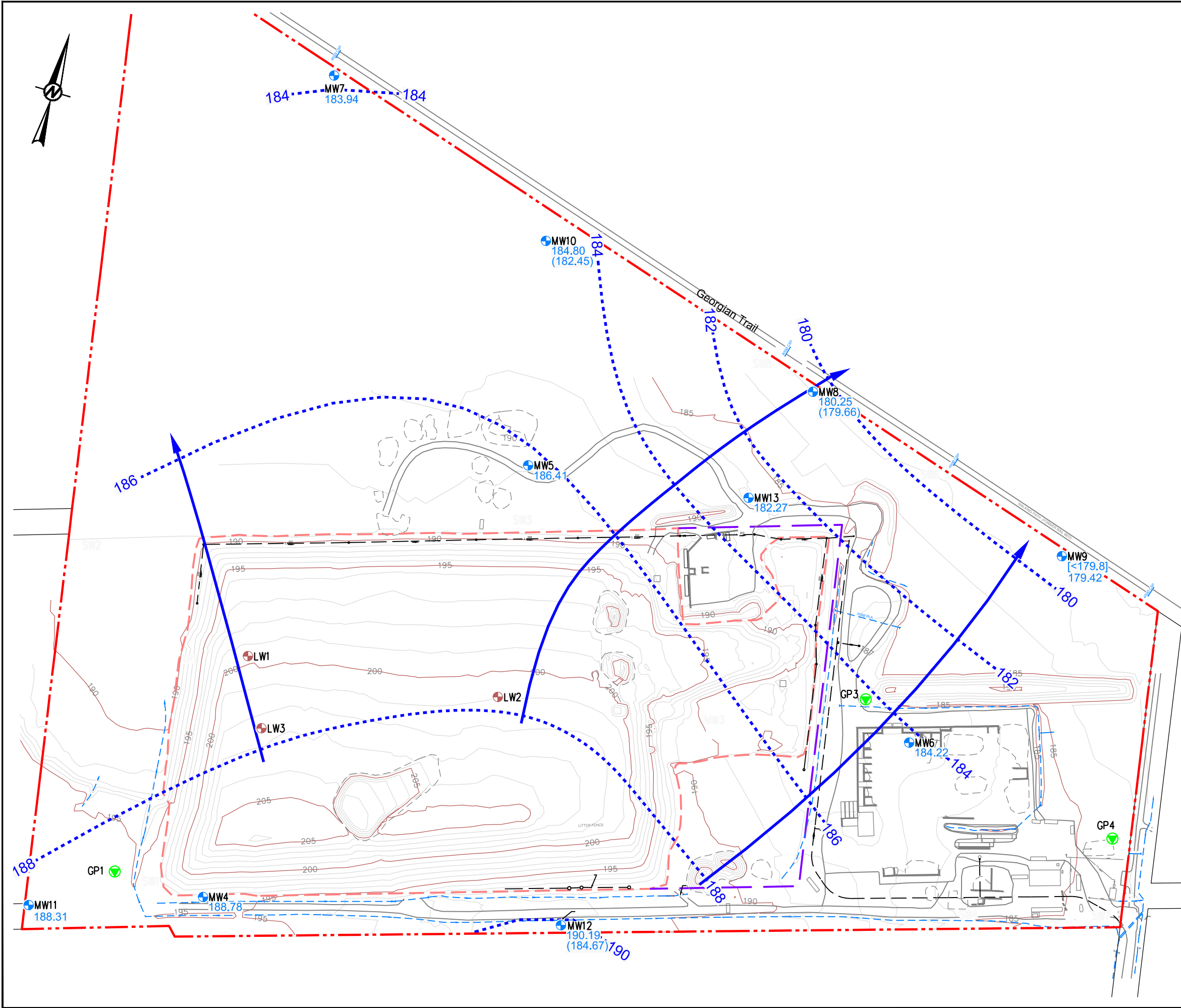
CONSULTANT	YYYY-MM-DD	2017-12-02
	PREPARED	JPR
	DESIGN	
	REVIEW	JEB
	APPROVED	PJD



PROJECT No.	Phase	Rev.	Figure
141-8312	-	1702C	4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3S B

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LEGEND

- Site Boundary
- Existing Landfill Waste
- Approved Limit of Landfill
- Goundwater Monitoring Well
- Landfill Monitoring Well
- Gas Probe
- 178.70 Bedrock Static Water Level (Fall 2017)
- Interpolated Equipotential (masl)
- Inferred Direction of Groundwater Flow

NOTES

Datum is UTM NAD 83 Zone 17
Groundwater potentials in brackets () monitored at lower screens in the Bedrock.
Levels moniotred October 2017

REFERENCE

2007 County of Simcoe Assessment and SMC Geomatics Provided Mapping.
Topographic contours SMC topographic survey December 2015.

CLIENT
COUNTY OF SIMCOE

PROJECT
SITE 2 COLLINGWOOD LANDFILL
2017 ANNUAL WATER MONITORING REPORT

TITLE
BEDROCK GROUNDWATER FLOW

CONSULTANT	YYYY-MM-DD	2017-03-20
	PREPARED	JPR
	DESIGN	
	REVIEW	JEB
	APPROVED	PJD

PROJECT No. 141-8312 **Phase** - **Rev.** 1702C **Figure** 5

Golder Associates

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3S B 28 mm



APPENDIX B

Capacity Assessment

March 7, 2018

Project No. 1418312 (1741-01)

Elizabeth Verghis, P.Eng.
Technical Compliance Supervisor
County of Simcoe, Solid Waste Management
1110 Highway 26
Midhurst, ON L9X 1N6

**COUNTY OF SIMCOE SITE 02 – COLLINGWOOD
ESTIMATE OF AIRSPACE USE IN 2017 AND REMAINING CAPACITY**

Dear Ms. Verghis,

Golder has been retained by the County of Simcoe (County) to complete an annual assessment of landfill capacity of the Collingwood Landfill Site 02 (Site). This letter outlines the estimate of the landfill airspace used in 2017 and the remaining airspace available for placement of waste.

Landfill Survey

The most recent survey of the landfill was carried out by SMC Geomatics, completed on November 28, 2017 (SMC Geomatics, 2017). Figure 1 illustrates the Site contours based on the November 2017 topographic survey, as well as a comparison of the 2016 and 2017 topographic elevations in the area of active waste filling in 2017. Figure 2 outlines the future filling area based on final design grades provided by the County. Figure 3 provides cross-sections reflecting the annual elevation changes between the 2016 and 2017 topographic surveys.

2017 Waste Tonnages

The County weighs all waste received and placed at the Site through the use of the on-site weigh scale. The volume of daily cover material used at the landfill is recorded through bucket counts and converted to total m³.

From January to December 2017, a total of 16,501 tonnes of new incoming waste was reported to have been disposed of in the landfill. This total is approximately 11% higher than what was reported in 2016 (14,750 tonnes). Table 1 below provides a summary of the annual incoming waste tonnage recorded at the Site since 2011.

Table 1: Annual Waste Tonnage Summary

Description	Total Tonnes
2011	13,800
2012	18,312
2013	18,072
2014	16,251
2015	15,755
2016	14,750
2017	16,501
Average	16,206

Source: (2011 – 2014) WSP, 2015.

Landfill Capacity Used in 2017

The 16,501 tonnes of waste landfilled at the Site excluded daily cover material. It is reported by the County that at the end of each day, the County covers the top of the working face with steel framed tarps and places daily soil cover on the sides, as needed.

The volume of landfill space used during 2017 was calculated based on the volumetric change between the surveys conducted on December 21, 2016 and on November 28, 2017; the volumetric change between the two surveys is 20,988 m³. This volume was filled over four active areas as noted on Figure 1. Area 1 was filled following removal of the access road in this area, and was covered with 900 mm of final cover. Area 2 was filled following stripping of 200 mm of topsoil from the native grade. This area, as well as Areas 3 and 4, remain active and are completed with daily cover.

In 2017, approximately 3,150 m³ of daily soil cover was used. Comparison of this volume to the total airspace use indicates an estimated refuse to soil ratio of slightly more than 6:1 by volume.

Apparent Waste Density

Apparent Waste Density is a measure commonly used to represent the amount of landfill airspace that is used up over a specified period (usually annually), and includes both the waste and the daily/interim cover material. The apparent waste density can be calculated based on the change in volume of the available airspace (determined from the topographic survey) and the mass of incoming waste measured, using the following formula:

$$\gamma_{waste} = \frac{M_{waste}}{V_{waste}}$$

where: γ_{waste} is the apparent waste density (tonnes/m³),

M_{waste} is the mass of waste added to the Landfill (tonnes), and,

V_{waste} is the volume of the waste added to the Landfill (m³).

The volume of 20,988 m³ from December 21, 2016 to November 28, 2017 covers a filling period of approximately 11 months. The tonnage reported to be disposed of between the two surveys was 15,599 tonnes. The apparent waste density for waste material placed in this period is calculated to be 743 kg/m³. This is higher than the 622 kg/m³ calculated for 2016, which may reflect additional removal of fill in the area of the access road within Cell 1.

The following table provides a summary of the apparent waste density calculated at the Site since 2014.

Table 2: Apparent Waste Density

Year	Waste Placed (tonnes)	Airspace Used (m ³)	Apparent Waste Density (kg/m ³)
2014	16,251	28,580	569
2015	15,755	25,155	626
2016	14,750	23,723	622
2017	15,599*	20,988	743
Average		24,908	646

Note: * represents the reported tonnage in the 11-month period between surveys, as discussed in the text above.

Total Remaining Capacity and Site Life

The remaining landfill capacity of the Site at the end of 2014 (WSP, 2015) was reported to be 250,170 m³. This volume was subsequently reduced by the fill volumes for each of 2015 and 2016, to 201,292 m³. This is further reduced to 180,304 m³ at the end of 2017, based on subtracting the 2017 airspace use.

To confirm the available remaining capacity, Golder obtained the proposed final waste grades (Genivar, 2013) and completed a volumetric assessment over the part of the landfill where final cover has not been placed. The remaining capacity was calculated based on the volumetric difference between the proposed landfill final contours and the most recent survey completed on November 28, 2017, adjusted to remove temporary storage piles of soil and other materials. The estimated total available capacity as of November 28, 2017 is 188,436 m³. This is approximately 8,100 m³ (or about 5%) more than estimated in recent years through subtraction, which is considered reasonable. This value of 188,436 m³ should be used for the 2018 site life and closure calculations.

Assuming the future annual capacity consumption rate will be similar to the average rate between 2011 and 2017 (24,908 m³) and utilizing the remaining capacity estimate of 188,436 m³, the remaining site life is estimated to be approximately 7.5 years from the start of 2018.

We trust the above meets with your approval. Please do not hesitate to contact us if you have any questions.

Yours truly,

GOLDER ASSOCIATES LTD.



Tian Gou, P.Eng.
Environmental Engineer

TG/PJD/js/plc



Paul Dewaele, P.Eng.
Principal

References: SMC Geomatics, 2017. County of Simcoe Landfill Site #2 (Collingwood) December 2017 Existing Conditions. Site survey completed on November 28, 2017.
Genivar, 2013. Drawing No. 9271913-2012FC, February 2013, Genivar Inc. (now part of WSP Canada Inc.)
WSP, 2015. County of Simcoe, Site 02 Collingwood Landfill Annual Report. WSP Canada Inc., 2015.

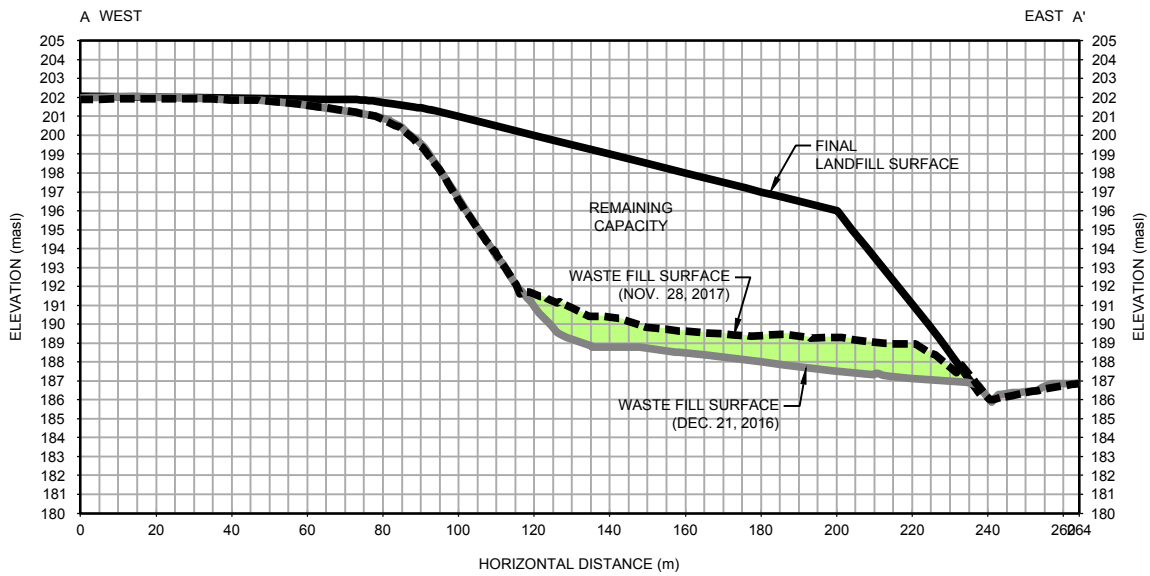
Attachments: Figure 1 – Existing Conditions (November 28, 2017)

Figure 2 – Remaining Capacity

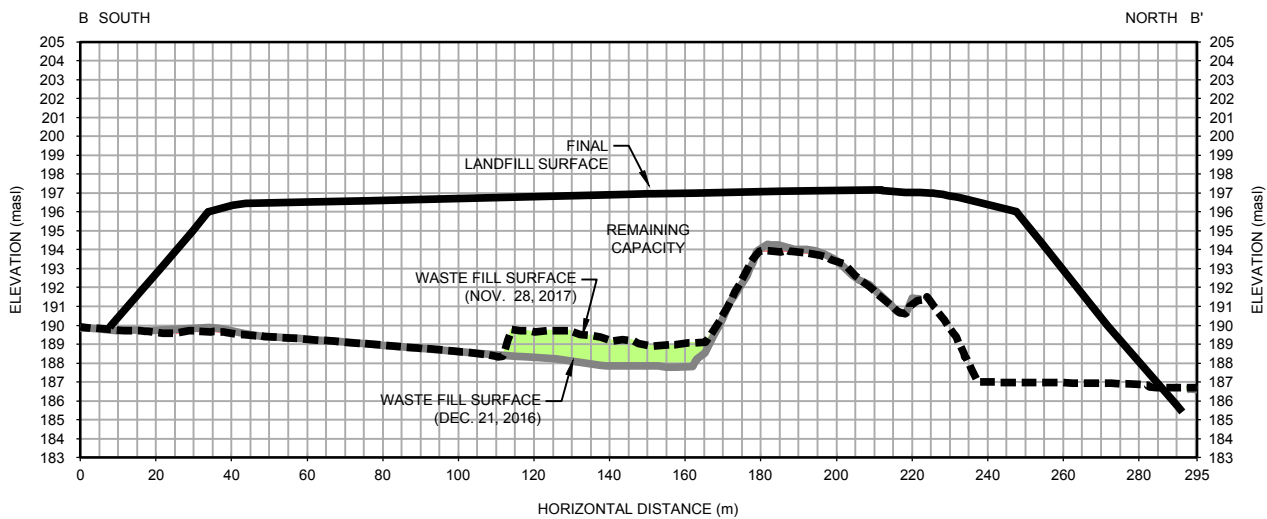
Figure 3 – Cross-Sections A-A' and B-B'

\\golder.gds\gal\barrie\active\2014\141-8312 simcoe county landfill monitor various\09. survey and capacity assessments\collingwood\2017 capacity assessment\1418312 (1741-01) let 2018'03'07 capacity assessment - site 02 collingwood (final-revised).docx

Path: \\golder-gas\gis\workspace\clients\County of Simcoe\Landfill_Site_02_Collingwood\09_PROD\0004_2017_Capacity_Assessment\1 File Name: 1418312-0004-CIV-0003.DWG



A CROSS-SECTION A-A'
V.E. = 5X



B CROSS-SECTION B-B'
V.E. = 5X

LEGEND

- WASTE FILL AREAS OF CUT
- WASTE FILL AREAS OF FILL

NOTES

1.

REFERENCE

- BASE PLAN IS BASED ON TOPOGRAPHIC SITE SURVEY DATED NOVEMBER 28, 2017 BY SMC GEOMATICS.
- FINAL COVER CONTOURS ARE BASED ON DRAWING NO. 9271913-2012FC DATED FEBRUARY 2013 BY GENIVAR.

CLIENT
COUNTY OF SIMCOE

CONSULTANT



YYYY-MM-DD 2018-01-25

PREPARED FC

DESIGN -

REVIEW XXX

APPROVED XXX

PROJECT
LANDFILL CAPACITY ASSESSMENT
LANDFILL SITE #2 (COLLINGWOOD)
COUNTY OF SIMCOE, ONTARIO

TITLE
CROSS-SECTIONS A-A' AND B-B'

PROJECT No.
1418312

CONTROL
0004

Rev.
A

FIGURE
3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D 25 mm

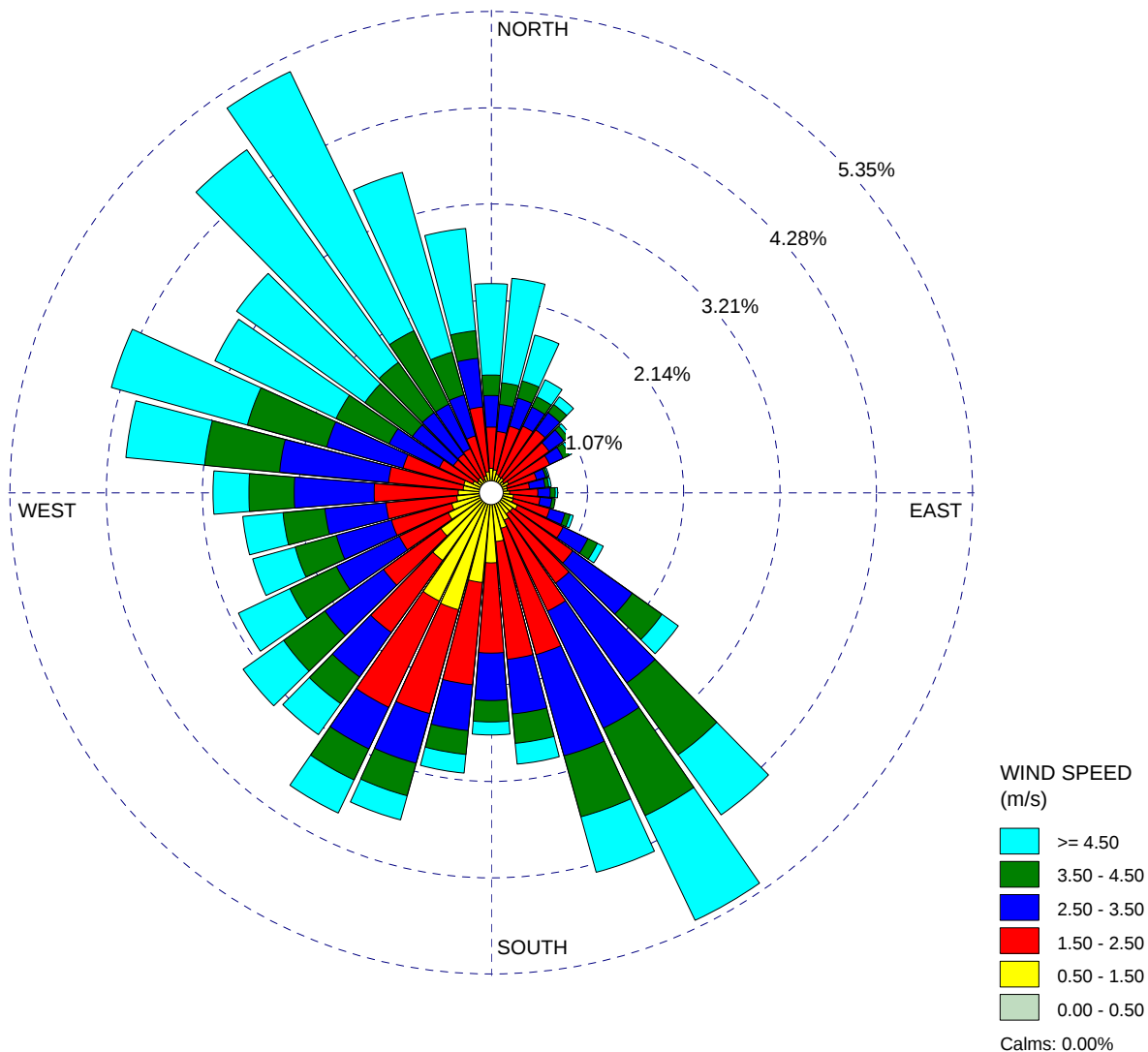
Appendix B

Wind Rose

WIND ROSE PLOT:

Collingwood Wind Rose
2010-2014 (MOE Processed)

DISPLAY:

Wind Speed
Direction (blowing from)


COMMENTS:

DATA PERIOD:

Start Date: 1/1/2010 - 00:00
End Date: 12/31/2014 - 23:59

COMPANY NAME:

MODELER:

GHD

CALM WINDS:

0.00%

TOTAL COUNT:

43690 hrs.

AVG. WIND SPEED:

3.32 m/s

DATE:

9/28/2018

PROJECT NO.:



Appendix C

Landfill and Waste Transfer Station Noise Assessment



Memorandum

May 7, 2020

To: Shelley Wells, Plan Wells Associates Ref. No.: 11148856
N. N.
From: Naveen Nirmalaraj, GHD/cb/2 Tel: 519-340-4414
cc: Mike Masschaele, GHD
Subject: Predicted Noise Impact of Simcoe County No. 2 Landfill

GHD has estimated the worst case noise impacts of the Simcoe County No. 2 Landfill (Landfill) on the proposed residential development south of the landfill and located at 295 Mountain Road in Collingwood, Ontario (Development). This Memo has been produced in order to support GHD's D-4 Guideline Study (2020).

The predicted noise impacts of the Landfill were evaluated using CadnaA acoustical modelling software (CadnaA), version 2020 MR1. CadnaA is the industry standard for noise modelling for industrial and commercial facilities, and is based on ISO Standard 9613-2 "Acoustics – Attenuation of Sound during Propagation Outdoors".

GHD notes that the Landfill is in possession of an Environmental Compliance Approval (ECA) issued by the Ministry of the Environment, Conservation, and Parks (MECP). The ECA #1949-9Z5R2Q states that Landfill operations must be limited to daytime hours only (07:00 to 19:00).

For noise assessments the MECP differentiates between landfilling operations (Noise Guidelines for Landfill Sites, 1998) and Ancillary Facilities/Operations (NPC-300, 2013). Accordingly, GHD has split the assessment of the Landfill's noise impact into two scenarios:

- Landfill Operations
- Ancillary Facilities (Transfer Station Operations)

Scenario 01: Landfill Operation

GHD anticipates that the worst case landfilling operations would occur to the west of the Transfer Station as indicated on Figure 1, with trucks being unloaded near the south property line. GHD included the following noise sources in the assessment of landfilling operations:

- 1 Landfill Shredder (Sound Power Level of 117 dBA)
- 1 Truck Route (10 trucks/hr during daytime, Sound Power Level of 110 dBA)
- 1 Tracked Excavator Loading Trucks (Sound Power Level of 118 dBA)
- 1 Dump Truck Dumping Load (Sound Power Level of 107 dBA)



- 1 Landfill Compactor (Sound Power Level of 111 dBA)

GHD evaluated the noise impact of the typical landfill operations in accordance with the Ministry's Noise Guideline for landfill sites which states that "The limits for sound levels due to the landfill site operation at a point of reception are 55 dBA in any hour of the day, 7:00 a.m. - 19:00 p.m. These levels are expressed in terms of the One Hour Equivalent Sound Level (Leq)".

Figure 1 depicts the predicted noise impacts of the landfill operations and the 55 dBA noise contour line. As shown, the landfilling operations are expected to be in compliance at the Development, as well as the existing residences.

Scenario 02: Ancillary Facilities (Transfer Station Operations)

GHD included the following noise sources in the assessment of the Transfer Station operations:

- 1 Landfill Shredder (Sound Power Level of 117 dBA)

GHD evaluated the noise impact of the transfer station operations in accordance with the MECP's guideline document NPC-300. The guideline document states that the noise impacts from industrial or commercial facilities in a Class 2 Acoustic Area (Semi-Urban) must not exceed 50 dBA during the day at noise-sensitive receivers.

Further, as stated in the Landfill's ECA, "The Company shall, at all times, ensure that the noise emissions from the Facility comply with the limits set out in Ministry Publication NPC-300".

It should be noted that there are existing residences between the Landfill and the Development and that the Landfill is legally required to meet the noise limits at these residences.

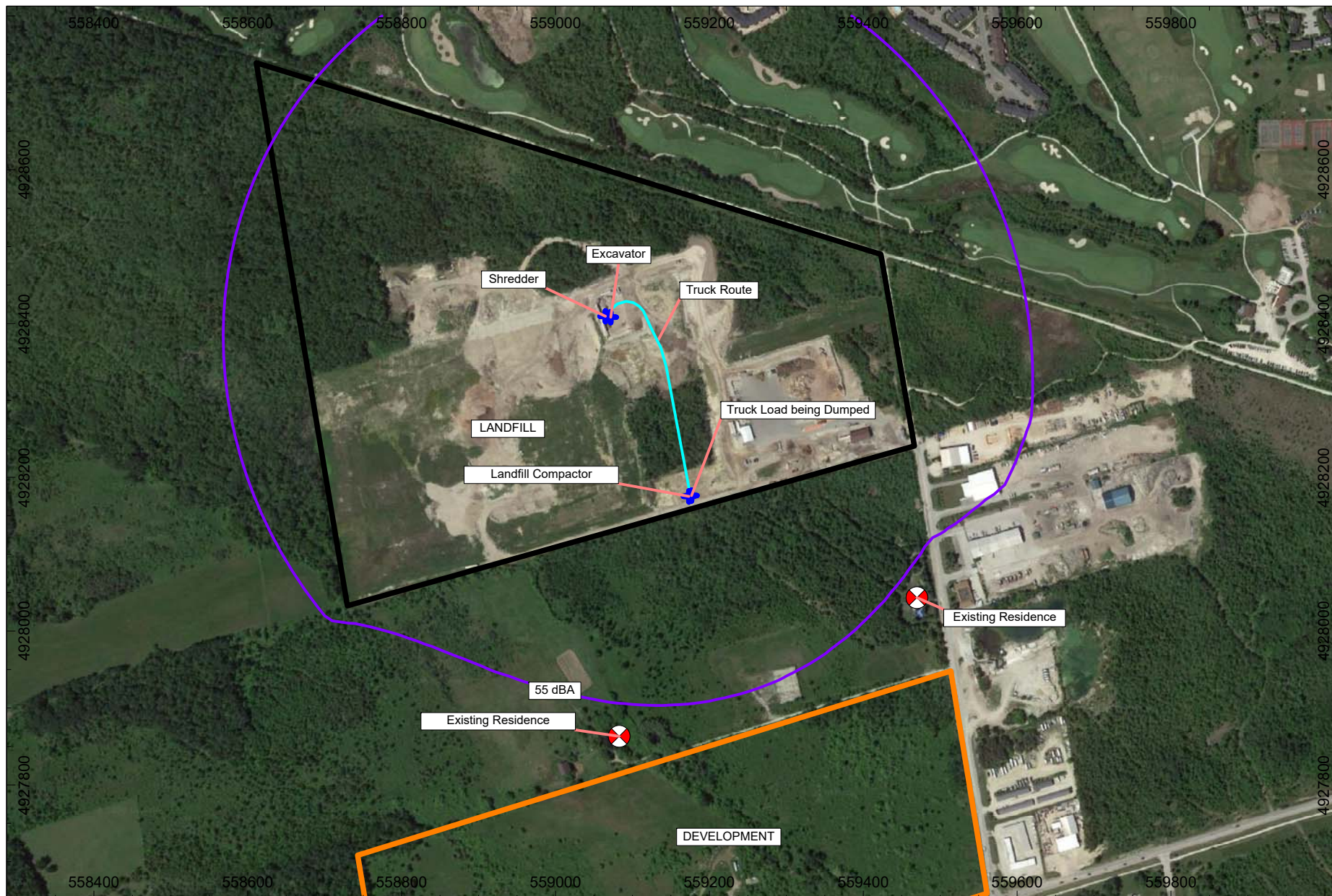
However, GHD has prepared this analysis assuming the existing residences are removed and no longer compliance locations. In that scenario, and assuming highly conservative noise emissions and modelling parameters, the Landfill Shredder could be out of compliance with the Development as shown on Figure 2.

To mitigate this potential noise, GHD would recommend a barrier approximately 20 metres long and 4 metres tall with a maximum separation distance of 6 metres from the Landfill Shredder as indicated on Figure 3 or the acoustic equivalent (berm or locating the equipment below grade). The barrier would need to be constructed of material having a minimum surface density of 20 kg/m² and be constructed without gaps. Due to the mobile nature of the shredder the barrier would also need to be movable and/or mobile. Figure 3 show the potential mitigated noise impacts and the corresponding 50 dBA noise contour line.

Conclusion

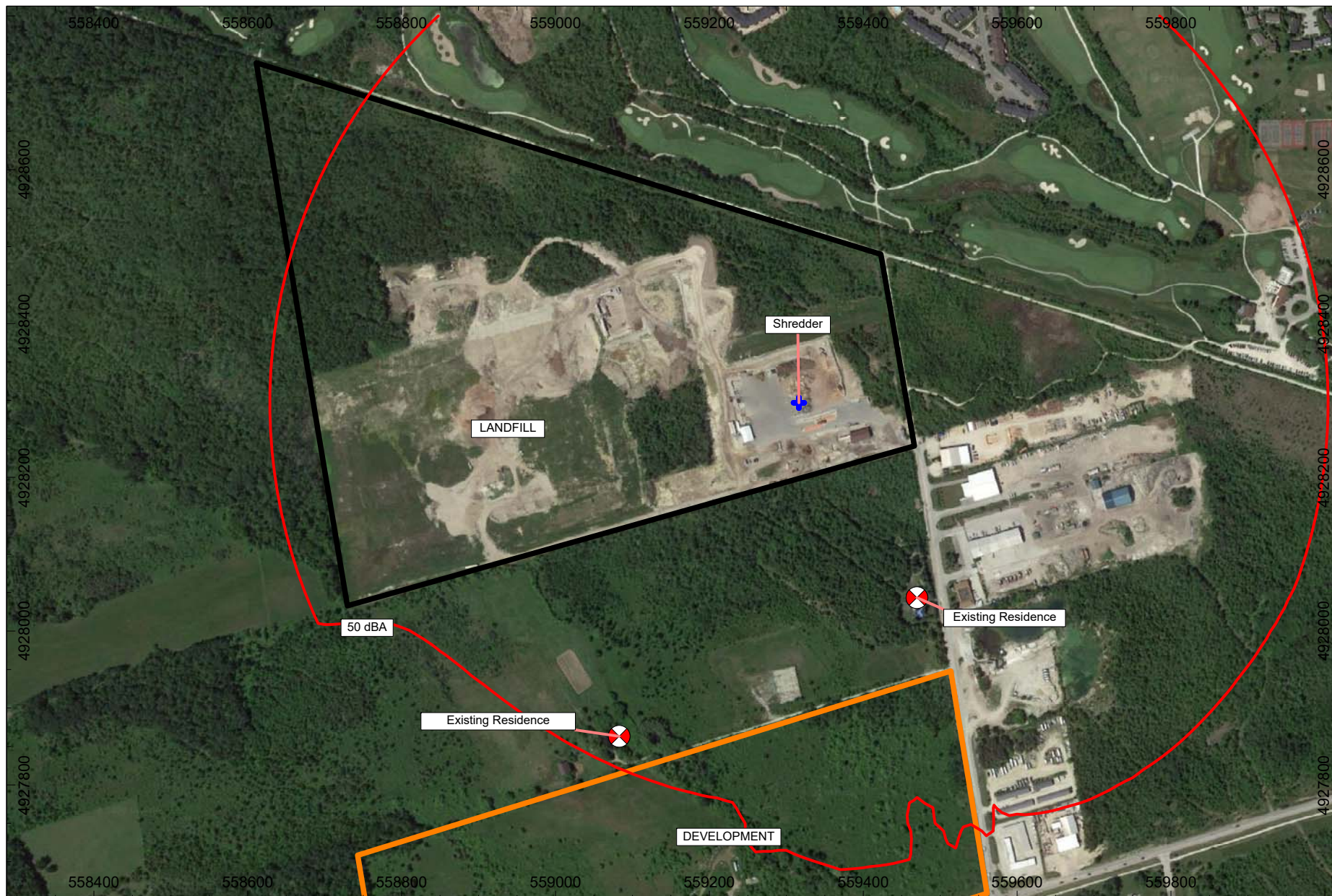
In a future scenario where the existing residences have been removed, and assuming highly conservative noise emissions and modelling parameters, GHD has determined noise mitigation that could be implemented to ensure the Landfill's operations remain in compliance at the Development. The relative location, extent, and height of an appropriate noise barrier are shown on Figure 3.

Should you have any questions or comments regarding the above, please do not hesitate to contact us.



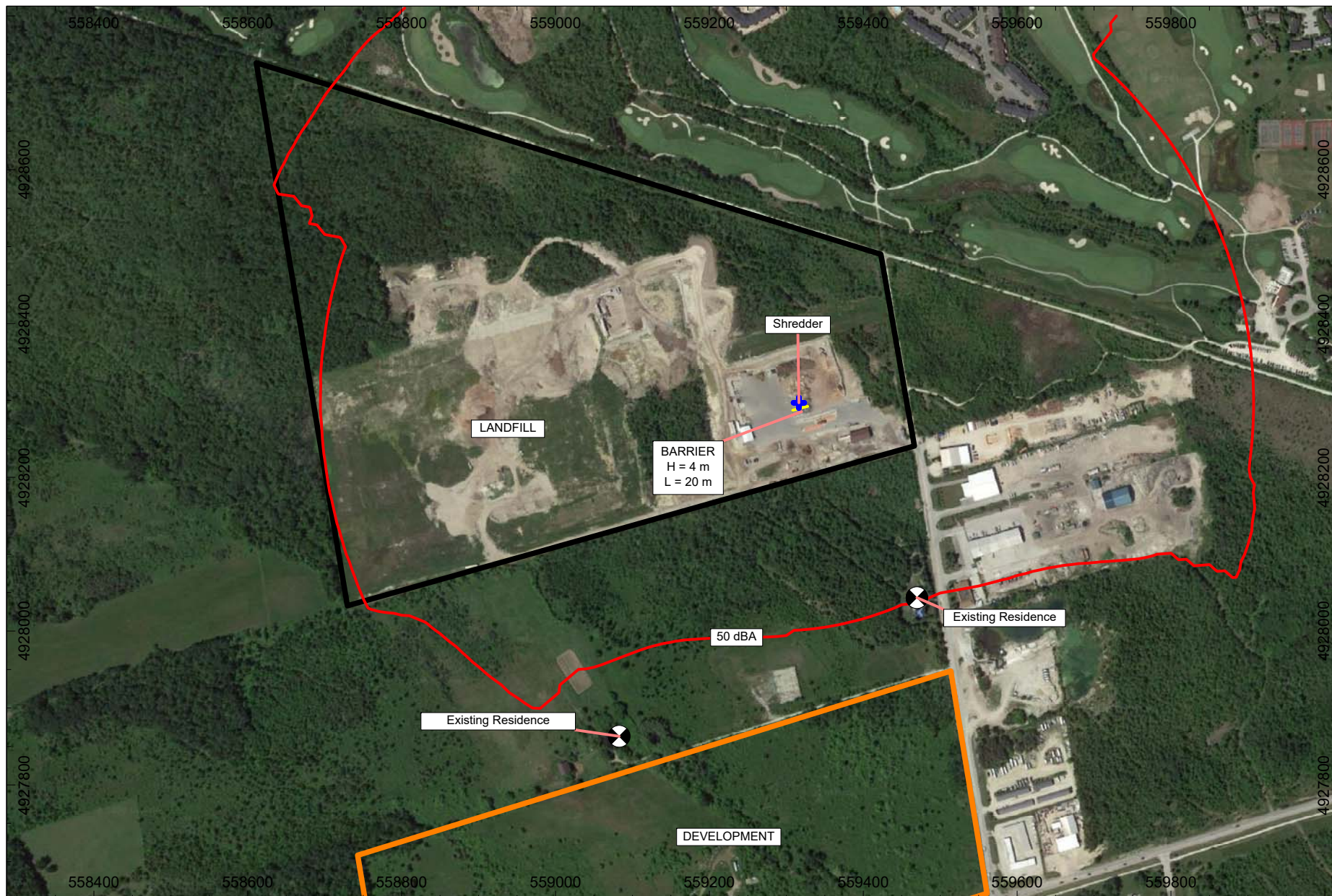
PREDICTED NOISE IMPACT OF SIMCOE COUNTY NO. 2 LANDFILL IN RELATION TO PANORAMA NORTH
295 MOUNTAIN ROAD, COLLINGWOOD, ONTARIO

FIGURE 1
SCENARIO 01 - NOISE IMPACT CONTOUR PLOT - 4.5 M A.G. - DAYTIME



PREDICTED NOISE IMPACT OF SIMCOE COUNTY NO. 2 LANDFILL IN RELATION TO PANORAMA NORTH
295 MOUNTAIN ROAD, COLLINGWOOD, ONTARIO

FIGURE 2
SCENARIO 02 - NOISE IMPACT CONTOUR PLOT - 4.5 M A.G. - DAYTIME



PREDICTED NOISE IMPACT OF SIMCOE COUNTY NO. 2 LANDFILL IN RELATION TO PANORAMA NORTH
295 MOUNTAIN ROAD, COLLINGWOOD, ONTARIO

FIGURE 3
SCENARIO 02 - NOISE IMPACT CONTOUR PLOT - 4.5 M A.G. - DAYTIME - WITH MITIGATION



about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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