

Terraprobe

*Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing*

D-4 LANDFILL IMPACT ASSESSMENT 901 ESSA ROAD AND BROWN BEAR STREET BARRIE, ONTARIO

Prepared for:

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Attention: Mr. Mohammed Raja

File No. 02209230.000

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1.0 EXECUTIVE SUMMARY

Terraprobe was retained by Brown Bear Dev Ltd. to carry out a D-4 Landfill Assessment for the new mixed residential and commercial development located on the northwest corner of the intersection of Essa Road and Salem Road in the City of Barrie, Ontario, hereafter referred to as "*The Property*." The Property has a municipal address of 901 Essa Road, Barrie.

The eastern portion of the Property (901 Essa Road) currently consists of a two-storey residential building, a single-storey workshop/ garage, and gravel parking areas; and the western portion (Block 281) is a vacant land currently used as a construction staging area for the neighbouring subdivision. The total developable areas of the Property, following the re-design and reconfiguration of Essa Road, will be approximately 0.88 hectares (2.18 acres). The Property is surrounded by Essa Road to the east, Brown Bear Street to the west, Salem Road to the South, and residential development to the north.

The subject land is within a 500 m zone from a former Ministry of Transportation - MTO landfill site (known as Holly Site), number A252204.

The landfill hereafter referred to as "Landfill Site" or "Holly Site," was a Class A4 landfill that received roadside garbage and closed between 1992 and 2001. As such, the Property (Essa Road and Salem Road) under review falls within 500 meters of the waste disposal Site and is considered to be within a D-4 Assessment Area. According to the Ministry of the Environment, Conservation and Parks (MECP) D-4 Guideline Landfill Impact Assessment, the D-4 Assessment Area refers to the area considered to be potentially impacted by existing and previous waste disposal site operations. Terraprobe understands that the City of Barrie will require an assessment of the Property with respect to the MECP Guideline D-4 Impact Assessment to be completed for the proposed development in connection with the City's Conformity Review Process. The D-4 Assessment Area refers to the area considered to be potentially impacted by existing and previous waste disposal operations. The assessment is required to characterize the local and regional geologic and hydrogeological conditions around the proposed development Site and to determine the likelihood of any adverse effect, particularly with respect to leachate generation and/or methane gas generation impacting the proposed works.

Based on available background information on the landfill site, which was obtained by Terraprobe via the Freedom of Information Act, and on Site observation of the Property and the landfill Site, the following conclusion are summarized below:

Ground and surface water contamination by leachate and Surface Runoff

Based on the review of the topography of the Property and the landfill Site #A252204 obtained from the County of Simcoe web map, the landfill is located in a relatively flat area with an average elevation of 310 masl with localized low-lying areas of approximately 308 masl at the fill zone. The north portion of the

landfill site slopes to the northwest from an elevation high of 310 masl to a low of 306 masl towards Bear Creek/ Nottawasaga River valley.

The shallow groundwater and surface run-off from the landfill site will follow the topography and flow northwest from the non-operating closed waste disposal site toward Bear Creek, a tributary of Nottawasaga River and ultimately to Georgian Bay. The subject property is located upgradient of the landfill site. Since the non-operating waste disposal Site is downgradient with respect to the Property and the shallow groundwater travels northwest away from the Property and flows towards Bear Creek, there is barely any possibility of soil and water contamination to occur at the proposed development Site.

Groundwater monitoring on the landfill site and within the dense till below surficial sandy silt inferred perched condition with predominantly lateral flow above the transition zone between high-permeability sandy silt soils and low-permeability till. As such, the risk of the leachate impact is confined to the water-bearing sandy silts material close to the surface underneath the fill area and predominantly moving laterally to the north/ northwest downgradient the landfill site, away from the proposed development. Based on the groundwater quality monitoring since 1994, the concentrations of leachate-related parameters (iron, nitrate, DOC, TKN) in the monitoring wells within the landfill footprint were lower than the Reasonable Use Guideline (RUG) values at or near the downgradient property boundary. As such, no groundwater impacts were found at or near Holly landfill site boundaries with respect to the RUG at Holly sites (Trow, 1995). After the remediation, the walls and floors of the excavations were sampled and analyzed for metals, VOC's and PAH's. Water samples from 8 onsite monitoring wells were collected and analyzed. All results were found to be below Table A criteria. The MECP Memorandum of April 27, 2001, concurred with the conclusion of the MTO Holly Landfill Site Remediation Report prepared by AMEC (dated 30 March 2001) that all waste material has been removed from the site and that on the basis of samples taken from soils and groundwater and the geophysical survey conducted after the remediation, the site meets the Table A criteria for residential and parkland use.

Ground Settlement

The Property is not located on the landfill material and is therefore not prone to settlement issues associated with the degradation of loose and/or organic fills. Based on observation during the Site visit, no waste associated with a closed landfill was encountered at the Property during the site visit, and the potential for any future settlement is very low.

Visual Impact

The landfill site is currently covered with natural vegetation, and dense mature trees exist along the periphery of the landfill site. Based on site inspection of Holly landfill, the Property and the landfill site are separated by approximately 50 m distance occupied by Brown Bear Street and residential development between the



landfill and the Property. The landfill is surrounded by a vegetated strip of dense mature tree buffer and fencing around the perimeter between the landfill and neighbouring properties. Approximately 5 m tall 50 m along berm existed on the southwest corner, about two-meter-high wall borders the landfill from the east, a double hey bale fence from the west, less than a meter high black fence line from the north, and less than a meter high wire-fence line from the south along Salem Road. As such, the landfill site is not visible from the Property.

Soil Contamination and Hazardous Waste

No hazardous waste or soil contamination was observed at the Property and on the non-operation waste disposal site during the Site inspection. However, it stressed vegetation was observed on the property, and this indicates the possibility of soil contamination.

Landfill Generated Gases (Methane)

Methane is a by-product of decomposing organic matter. Methane moves readily through porous, granular soils. This landfill being closed for at least 30 years, with an estimated waste volume of approximately 50 tons per year placed at this Site during its operation from 1976 to 1992. However, the risk of methane gas from the non-operating waste disposal Site to the subject property depends on a number of factors, including the type and age of refuse, average depth and density of the waste as well as the annual average precipitation. Since the soils are granular in nature, methane gas probes were installed to monitor the methane generation rate or decay rate at the landfill Site. Gas vapour monitoring was carried out by Trow Consulting Engineers using an MSA Model 60 (methane) and an HNU Photo Ionization Detector (non-methane), as reported in their Environmental Study, dated May 24, 1995, no methane or non-methane vapour concentration was detected. Trow's "Operations and Closure Plan, Holly Site" has concluded that there is no potential impact on the surrounding areas.

Moreover, it is Terraprobe's opinion that the non-operating waste disposal site will not impact the proposed development since no landfill waste with contaminants that could migrate to the proposed remained in the landfill site.



2.0 INTRODUCTION

Terraprobe was retained by Brown Bear Dev Ltd. to carry out a D-4 Landfill Assessment for land under the City's review for the proposed residential and commercial use. The subject review Property is located on the northwest corner of the intersection of Essa Road and Salem Road in the City of Barrie, Ontario, hereafter referred to as "*The Property*." The Property has the municipal address 901 Essa Road, Barrie.

The Property is an irregularly shaped parcel of approximately 0.88 hectares (2.18 acres) and currently consists of a two-storey residential building, a single-storey workshop/ garage, and gravel parking areas on the eastern portion (901 Essa Road); and vacant land used as a construction staging area for the neighbouring subdivision on the western portion (Block 281). The Property is surrounded by Essa Road to the east, Brown Bear Street to the west, Salem Road to the South, and residential development to the north.

Based on the proposed development plan provided (titled Brown Bear Apartment, Project No. 122001) prepared by Chamberlain Architect Services Limited (in the Presentation Set dated January 2022, provided in **Appendix H**), it is proposed to demolish the existing structures and construct a new 12-storey mixed residential and commercial use building supported over three (3) levels of underground parking. It is understood that the proposed development will be fully serviced with municipal water and sewage.

Based on the City of Barrie Conformity Review Required Reports Checklist (Official Plan Amendment, Zoning By-law Amendment, Draft Plan of Condominium, Site Plan Control), a Landfill D-4 Assessment Study is required due to the historical land use of an adjacent property located at 450 Salem Road. It was reported that a non-operating closed waste disposal site identified with certificate number A252204 was located approximately 50 m west of the proposed development boundary. The Landfill, hereafter referred to "Landfill Site" or "Holly Landfill Site" is classified as an A4 Potential Environmental Impact. As such, the Property under review falls within 500 meters of the waste disposal Site and is considered to be within a D-4 Assessment Area. According to the Ministry of the Environment, Conservation and Parks (MECP) D-4 Guideline Landfill Impact Assessment, the D-4 Assessment Area refers to the area considered to be potentially impacted by existing and previous waste disposal site operations. The D-4 Assessment is a direct application of Guideline D-1, "Land Use Compatibility", which specifies restrictions and controls on land use that the MECP outlines for land use in the vicinity of operating or non-operating landfills or dumps.

Based on the City's Conformity Review Reports Checklist, Terraprobe understands that the City of Barrie will require an assessment of the Property with respect to the MECP Guideline D-4 Assessment to be completed. The assessment is required to characterize the local and regional geologic and hydrogeological conditions around the proposed development site and to determine the likelihood of any adverse effect, particularly with respect to leachate generation and/or methane gas generation impacting the proposed works.



3.0 REVIEW OF THE BACKGROUND INFORMATION

The Property is located within the City of Barrie, in the County of Simcoe, Canada. The County of Simcoe requires that where development is proposed within 500 meters of a waste disposal site, a D-4 study be undertaken to evaluate the presence and impact of any adverse effects or risks to health and safety and any necessary remedial measures necessary for a proposed development in compliance with the Guideline D-4 including, but not limited to, ground and surface water (hydrogeology and hydrology), noise, odour, and dust, methane gas migration, traffic impact, land use compatibility, and other studies considered appropriate.

In reference to Section 4.1 of the D-4 Guideline entitled “Environmental Conditions,” the Holly landfill would be categorized as a “non-operating” Site. As such, the guideline suggests that it is important to consider impacts with respect to ground and surface water contamination by leachate, surface runoff, ground settlement, visual impact, soil contamination and hazardous waste and landfill-generated gases when assessing subject lands within 500m of non-operating Sites.

Waste Disposal Site Inventory produced by the MECP in June 1991 identifies the Holly landfill site with as class A4 Potential Environmental Impact. Holly landfill site was operated under Certificate of Approval Number A252204 issued by the Ontario Ministry of the Environment of Ontario (MOE – now known as MECP). MTO applied & received approval for a waste disposal site in 1972 to dispose of roadside garbage. The waste disposal site is 5 acres (2 hectare) of a 40 acres parcel. Based on the Operations and Closure Plan (May 1995), The entire Holly landfill site (including buffer) was 8.1 ha; 2.0 ha was used for waste disposal. The landfill was to operate 2 days per week and was used for waste disposal of roadside garbage (road wastes including street sweepings, concrete and culverts, catch basin cleanouts, sand, gravel, inert fill, asphalt, waste aggregate highway/picnic related refuse including wood, paper, glass and metal from Simcoe County). The estimated quantity of the waste was a total of 50 tonnes per year. The Holly site was formerly occupied by a portable HMA plant (hot-mix-asphalt), and an area in the western portion of the landfill site had been leased by the MTO for sand extraction. Based on a series of correspondence letters by the Ministry of Transportation and consultants (dated June 25, 2001; February 19, 1998; January 29, 1997, and November 1, 1996), Holly Site was acquired by the Ministry in August 1946, and the latest certificate of approval for a waste disposal Site received from the Ministry of Environment was on March 28, 1980. Based on AMEC’s letter of June 25, 2001, to the Ministry of Environment, most of the waste deposition occurred in the 1970s, and the last waste was deposited in 1992. The landfill site has been remediated, and all waste deposited has been removed. The waste material was removed by General Waste Inc. in 1997, and further remnant buried waste materials discovered by a detailed subsurface investigation of the site by AGRA in 1999 (approximately 6,000 tonnes) were removed in the fall of 2000. Subsequent sampling of groundwater and soils has confirmed that the site meets the Table A criteria for residential and parkland use



as outlined in the *Guideline for Use at Contaminated Sites in Ontario*, and the source of potential future impacts (the waste) has been removed. The letters are provided in **Appendix G**.

With the removal of the waste and contaminated soil from the site and based on the analytical results of the soil and groundwater samples and the post-remediation geophysical study, the MOE Barrie District Office agreed on its letter of April 30, 2001, with the consultants' conclusions that the site meets the Table A criteria for residential and parkland use, as outlined in the *Guideline for Use at Contaminated Sites in Ontario*. Barrie District Office recommended replacement and control of the site entrance gate, with "No Trespassing" / "No Dumping" signs posted at the entrance gate and at 30-meter intervals along the south site perimeter, fronting on Salem Road. The MOE Barrie District Office letter is provided in **Appendix G**.



4.0 REVIEW OF PREVIOUS REPORTS

Previously, the following Environmental Impact Study Reports were completed for the Property, as summarized below:

4.1 Hydrogeological Assessment Report (April 2022)

Report Title	Preliminary Hydrogeological Study, Proposed Mixed-Use Development 901 Essa Road and Brown Bear Street, Barrie, Ontario
Report Date	April 7, 2022,
File No.	3-22-0008-46
Prepared By	Terraprobe Inc.
Prepared For	Brown Bear Dev Ltd.

The study report presented the following results:

- The purpose of the report was to review the geological and hydrogeological setting of the Site, calculate the water balance for existing (pre-development) and post-development conditions, assess groundwater quality and evaluate potential construction dewatering needs for the Site
- The Site elevation varies from approximately $311.8 \pm \text{masl}$ to $312.6 \pm \text{masl}$ (meters above sea level) towards the west
- The Site physiographic region, known as the Peterborough Drumlin Field, which composed of sand, gravel, and boulder till and are separated by low-lying wetland areas composed of fine-grained soils. The surficial geology at the Site consists of ice-contact stratified deposits of sand and gravel, minor silt, clay and till. Depth to bedrock at the Site is approximately 194 m below ground surface, at an elevation of approximately 117 masl.
- The Site stratigraphy based on the borehole findings, as well as the geotechnical laboratory testing, included a surficial sand layer underlain by gravelly sand to sand followed by silty sand glacial till
- the hydraulic conductivity of the upper cohesionless gravelly sand to sand deposit is estimated in the order of 10^{-5} m/s. Moreover, the hydraulic conductivity of the lower silty sand glacial till is estimated in order ranging from 10^{-6} m/s to 10^{-7} m/s
- The Property is located within the Bear Creek Sub-watershed of the Middle Nottawasaga River Watershed. The regional groundwater flow paths correspond to the local surface drainage and flow towards the Nottawasaga River and its tributaries or to Georgian Bay.
- The study identified potential impacts to the nearby groundwater receptors, including water supply wells and natural heritage features pertaining, and provided a mitigation plan on the potential impacts to the groundwater receptors associated with the Site.



4.2 Phase One Environmental Site Assessment (March 2022)

Report Title	Phase One Environmental Site Assessment, 901 Essa Road and Brown Bear Street, Barrie, ON
Report Date	March 21, 2022
File No.	3-22-0008-41
Prepared By	Terraprobe Inc.
Prepared For	Mr. Samuel Oyedokun, P.Eng., PMP, QP _{ESA}

- The purpose of the study was to satisfy the intent of the requirements, methodology, and practices for a Phase One ESA as described in Ontario Regulation 153/04 (as amended).
- The result of investigation indicated that there are no areas of potential environmental concern (APEC) were determined for the Property.

4.3 Preliminary Geotechnical Investigation and Engineering Report

Report Title	Proposed Mixed-Use Development, 901 Essa Road and Brown Bear Street, Barrie, Ontario
Report Date	March 2022
File No.	3-22-0008-01
Prepared By	Terraprobe Inc.
Prepared For	Brown Bear Dev Ltd.

- The objective of a geotechnical investigation conducted for the property was to assess its geotechnical suitability for the intended re-development.
- The field investigation consisted of advancing a total of five (5) exploratory boreholes across the site.
- The geotechnical investigation determined the prevailing subsurface soil and groundwater conditions and provided geotechnical engineering recommendations for the design of proposed building foundations, basement floor-slab, earthquake and earth pressure design parameters, basement drainage, shoring design parameters, pipe bedding and installation of underground utilities. In addition, comments are also included on the pertinent project construction aspects, including excavation, backfill and groundwater control.

4.4 MOE Memorandum (April 2001)

Report Title	MOE Memorandum
Report Date	April 27, 2001
File No.	N/A
Prepared By	Ministry of Environment (now known as MECP)
Prepared For	Addressed to Barrie District Office, Ministry of Environment



- The MECP Memorandum confirmed a review of the Remediation Action Report, which shows that all waste deposited at this site over the years of operation has been removed and the site cleaned up to Table A criteria.
- Summarized remediation actions conducted on the basis of a geophysical survey, including excavation of 15 sites and removal of all waste and contaminated soils. After the remediation, the walls and floors of the excavations were sampled and analysed for metals, VOC's and PAH's. Water samples from eight (8) onsite monitoring wells were collected and analysed. All results were found to be below Table A criteria.
- Confirmed that a post-remedial geophysical survey was conducted. Some four (4) spots were identified as having anomalies. Test pits were dug at those four spots, but no further waste was found.
- Acknowledged the remediation report conclusion that all waste material has been removed from the site and that on the basis of samples taken from soils and groundwater and the geophysical survey conducted after the remediation, the site meets the Table A criteria for residential and parkland use.
- The Ministry of Environment concurred with the conclusion of the Remediation report and confirmed that it would have no objection to granting a revocation of the C of A for the MTO Holly landfill site

4.5 Remediation Action Plan Report (March 2001)

Report Title	Remediation Action Plan
Report Date	March 30, 2001
File No.	N/A
Prepared By	AMEC Earth & Environment Ltd.
Prepared For	Ontario Ministry of Transportation

- The AMEC Earth & Environment Ltd. described a Remediation Action Plan completed on March 30, 2001, and submitted to the Ministry of Environment for review and comment prior to an application by the Ministry of Transportation MTO to revoke the Certificate of Approval (C of A) for the landfill site
- Indicated that Seven (7) monitoring wells (OW-1 A/B to OW-6) existed as of July 2000 on the site, including a replacement well installed by AGRA in May 1998 (observation wells location (Figure 3) is provided in **Appendix F**.



- Groundwater elevations in July 2000 were similar to the previous data (AGRA, 1999; Gartner Lee, 1997). The groundwater flow gradient is relatively flat beneath the former landfill footprint, with flow estimated to be to the northwest.
- The report indicated that no putrescible waste was deposited below the water table, and the remanent buried waste materials (approximately 6,000 tonnes) were removed in fall 2000 as part of the remedial action plan.
- The report concluded that the groundwater level and chemistry data from the sampling events within the fill footprint, upgradient and downgradient areas were generally consistent. No groundwater impacts were found at or near any of the property boundaries with respect to the Reasonable Use Guideline (RUG) at the Holly sites (Trow, 1995a,b) or the ODWO and/or PWQO for the Forest Home Site
- AMEC requested that the provisional certificate of approval be revoked since the site is no longer a landfill; and recommended that no further monitoring be conducted on the landfill site, since the soil and groundwater quality meet the Table A (Potable) criteria from the MOE Guideline for Use at Contaminated Sites in Ontario, and the source of potential future impacts (the waste) has been removed
- The Remediation report recommended that MTO apply to MOE for revocation of the C of A for this landfill site.

4.6 Groundwater monitoring program between 1994 and 2000 (Various Consultants)

Report Title	Monitoring Report for the Spring and Fall Sampling and Monitoring Program
Report Date	November 1996, December 1997, October 1998, 1999, March 2001
File No.	
Prepared By	• AMEC Earth & Environment Ltd. (March 2001), • AGRA Earth and Environment Limited, October 1998 (Spring Monitoring, 1998) • Gartner Lee Limited, December 1997 (Spring and Fall Sampling and Monitoring 1997) • Dames and Moore, Canada, November 1996, (Fall Monitoring Event, 1996)
Prepared For	Ontario Ministry of Transportation

- Some of the monitoring reports were not available for review during the writing of the above report. However, the report stated that a letter dated February 1998 from the Ministry of Transportation to the Waste Approval Branch of the Ministry of Environment was reviewed. The letter stated that the results from the monitoring program showed only minimal salt contamination from the local service road.



- The Groundwater quality in the Holly landfill was monitored between 1994 and 2001. The monitoring program was originally comprised of six (6) observation wells installed in 1994, including OW1A/94, OW1B/94, OW2/94, OW3/94, OW4/94, OW5/94, and six (6) gas monitoring probes installed alongside the groundwater monitoring wells to characterize landfill leachate quality. Additional deep observation well OW6/96 (16.2 mbgs) was installed in 1996 to investigate the stratigraphy and groundwater quality in deeper formations underneath the site; and interpret vertical migration of groundwater. The map of monitoring locations at the closed landfill site prepared by AMEC (2001) is included in Appendix G.
- The monitoring program reports concluded that no significant impacts had been noted over these years. Based on the groundwater quality monitoring since 1994, no cece of groundwater impacts was found at or near Holly landfill site boundaries with respect to the Reasonable Use Guideline (RUG). The concentrations of leachate-related parameters (iron, nitrate, DOC, TKN) in the monitoring wells within the landfill footprint indicated a minor localized impact on water quality as a result of landfilling operations (Trow, 1995a,b).
- It was reported that the soil and groundwater quality meet the Table A (Potable) criteria from the MOE Guideline for Use at Contaminated Sites in Ontario, and the source of potential future impacts (the waste) has been removed.
- Gartner Lee Limited, December 15, 1997, reported that groundwater quality remained similar to that observed in 1996 at the Holly site. Monitoring locations exhibited slightly elevated results in and below the former landfill footprint, as well as down-gradient. However, elevated nitrate concentrations observed at the Holly site may not be related to the landfill, as it was demonstrated in upgradient monitoring wells in 1996. It was therefore attributed to agricultural uses in the area and/or to naturally elevated nitrate.
- The increase in chloride appears to be directly related to road salt effects, which was illustrated in 1996 at the up-gradient monitoring location (OW4) close to the road. As such, chloride concentrations were not considered landfill related. As there is no longer any waste to generate leachate, increased chloride could not be landfill related.
- Considering low levels of leachate-related parameters (iron, nitrate, DOC, TKN and manganese) and the fact that high levels of chloride are attributed to road salt effects, the landfill was considered to be not contributing to any adverse effects on the surrounding groundwater regime. This was also demonstrated by the down-gradient monitoring location (OW5) and by the Reasonable Use Guideline concentrations calculated in Environmental Investigation – MTO Holly Pit Waste Disposal Site prepared by Trow Consulting Engineers Ltd. In May 1995.



4.7 Geophysical Survey Report (June 1999)

Report Title	Post remediation Geophysical Survey Report
Report Date	June 21, 1999
File No.	N/A
Prepared By	Hyd-Eng. Inc.
Prepared For	Ontario Ministry of Transportation

- The Geophysical survey report was not available for review during the writing of this report. However, findings were summarised in the various letters exchanged between the Ministry of Transportation, MECP and a previous D4 assessment by Terraprobe in 2010.

4.8 Installation of Observation Well No. 6 Holly Site (October 1996)

Report Title	Installation of Observation Well No. 6 Holly Pit
Report Date	October 1996
File No.	9630-7411-3049/ 24811-005
Prepared By	Dames & Moore, Canada (DMC)
Prepared For	The Ministry of Transportation (MTO)

- Excerpts of the Installation of Observation Well No. 6 report were available for review during the writing of this report; as well as a summary report letter addressed to the Ministry of Transportation (dated October 30, 1996) by Dames & Moore, Canada (DMC) was reviewed.
- The purpose of the deeper well installation was to investigate whether the highly permeable near-surface soils persisted to an extent where high vertical groundwater velocities may be carrying leachate down beyond the depth of the shallower monitors
- This investigation was required in order to assess the stratigraphy and groundwater quality in deeper formations underneath the site, and explore if similar sand soils persisted at depth, and if there was potential for a high degree of vertical groundwater flow, which the shallow 1994 observation wells downgradient of the fill area (OW-2/94, OW-5/94) may not intercept.
- The report investigated Tow's 1994 interpreted potential for vertical migration of groundwater before it moves laterally off the site. The Ministry resolved to accept Trow's recommendation to drill a borehole and install an observation well in a deeper soil formation to investigate the concerns raised by Trow in their 1994 report (Operational and Site Closure Plan).
- The terms of reference for Project No. 9630-7411-3049 included the installation of a deep monitor near the northern (downgradient) property boundary of the site
- The letter presented the results of the borehole drilling and subsequent installation of Observation Well 6/96 (OW-6/96) at MTO's former waste disposal site.



- The borehole drilling and well installation revealed the presence of dense tills at a depth just below where the shallow monitors were installed in 1994. As such, the borehole stratigraphy indicates that this is highly unlikely.
- The report showed that the bottom of the OW-5/94 monitor was likely at the transition from the high-permeable surficial soils to the underlying dense silty sand till. The hydraulic conductivity (K) of this till will be low and may vary from 10^{-7} to 10^{-5} cm/s based on density and clay content. This is in marked contrast to the measured hydraulic conductivity ($\sim .25 \times 10^{-2}$ cm/s) in the "sandy silt" within which the shallow monitors were installed. It is expected that groundwater descending through the granular surficial units will be greatly impeded upon reaching the low-K soils and will be largely migrating laterally along the "contact" zone between the high-K and low-K soils. The water-bearing "sandy silts" close to the surface at the landfill site may be considered to be under a "perched" condition locally and possibly seasonally.
- Leachate and shallow groundwater beneath the pit will be predominantly moving laterally to the north above the transition zone between the high-K and low-K soils. Dilution of any leachate will be relatively high due to the marked contrast (3 to 5 orders of magnitude) in hydraulic conductivity between the surficial sands and underlying till which will promote the accumulation of infiltrating water at the tile transition zone and lateral movement in the upper water-bearing sands. DMC does not consider it necessary to drill a well in a search for groundwater quality in deeper formations but to monitor OW-6/96 in the spring when groundwater levels recover and, if possible, obtain a sample at this time.

4.9 Operational and Site Closure Plan for the Holly Pit Waste Disposal Site (May 1995)

Report Title	Operational and Site Closure Plan for the Holly Pit Waste Disposal Site (Holly Site)
Report Date	May 24, 1995
File No.	BR-DB133-A/EA
Prepared By	Trow Consulting Engineers Ltd. (Trow)
Prepared For	The Ministry of Transportation (MTO)

- The purpose of the document is to detail an Operational and Closure Plan, which includes an evaluation of the possible use of catch basin material and road sweepings from Simcoe County as cover material. The measures described in the Closure Plan were implemented, and subsequent acceptance of the Plan by the MOEE.
- In conjunction with the Operational and Closure Plan, Trow conducted an Environmental Investigation of the Holly Site to identify existing and/or potential impacts as a result of previous



landfilling operations. The findings indicated that there is no potential impact on the surrounding areas (agricultural and light industrial land use).

- Trow's investigation indicated that the shallow water-bearing soils beneath the surficial sand and gravel possessed a relatively high hydraulic conductivity ($\sim 2\text{-}3 \times 10^{-2}$ emfs); the vertical extent of these soils was not known.
- The results of the environmental investigation of the Holly site indicate that a minor localized impact on water quality is occurring as a result of landfilling operations. There is no evidence to suggest that groundwater migrating offsite exceeds any criteria under MECP Policy 15-08 ("Reasonable Use").
- Soil gases monitored by Trow (1994) within the landfill site in installed monitoring wells/gas probes indicated that measured gas vapour readings were nondetectable.
- Environmental Investigation of the Holly Site reviewed the site topographic survey completed May 4 & 5, 1994, and indicated that there is no surface drainage within the Holly site, all surplus moisture infiltrates to the shallow water table aquifer. Minor posing was observed in localized low-lying areas after significant rainfall events.
- There were various temporary on-site roads within the floor of the Holly site; and temporary roads for heavy vehicular traffic were constructed for land-filling operations.



5.0 ENVIRONMENTAL SETTINGS

5.1 Physiography, Surficial Geology and Bedrock

Geological mapping indicates that the subject property and the landfill are generally located within the area known as the Peterborough Drumlin Field. The bedrock on the Site is the Lindsay formation (fine- to coarse-grained, fossiliferous, commonly nodular, argillaceous limestone; the upper member (Collingwood) is black, organic-rich, fissile, very fine-grained limestone). The overburden consists of Till: Ice-contact stratified deposits of sand and gravel, minor silt and clay till. The geological maps are provided in **Appendix E**.

5.2 Topography

Based on the topographic information from the County of Simcoe web map, the Property ground surface elevation is approximately 311 to 312 meters above mean sea level. The ground surface elevation of the landfill ranges from approximately 306 to 310 meters above mean sea level. The landfill is located on a relatively flat area with an average elevation of 310 masl and localized low-lying areas of approximately 308 masl at the fill zone. The north portion of the landfill site slopes to the northwest from an elevation high of 310 masl to a low of 306 masl towards Bear Creek/ Nottawasaga River valley. The subject property is located upgradient of the landfill site. The topographical map is provided in **Appendix E**.

5.3 Soil Stratigraphy and Hydrogeology

The MECP well record database was reviewed for properties within 500m of the Property. A total of 38 wells were located within the 500 m radius with depths ranging from 6.0 mbgs to 50.9 mbgs. The well records obtained is attached in **Appendix C**.

Stratigraphy (Property/ Study Area)	• 0 to 0.6 m – Topsoil • 0.6 to 7.6 m – Sand, sandy silt and sand and gravel • 7.6 to 48 m – Clayey silt glacial till
Depth to Water Table	• Approximately 1.2 to 38.4 m, with seasonal fluctuations
Depth to Bedrock	• Bedrock was not encountered in the MECP well record
Inferred Groundwater Flow Direction	• The non-operating closed waste disposal Site # A252204 is located approximately 50 m west of the Property boundary. Shallow groundwater and surface water are expected to follow the topography and flow to the west/ northwest toward a stream along Bear Creek and ultimately to Nottawasaga River.



5.4 Access Environment

MECP's Access Environment was reviewed within a 500 m radius of the Property and a non-operating closed waste disposal Site (A252204). Record of Site Condition (RSC), Environmental Compliance Approval (ECA), Environmental Activity and Sector Registrations (EASR), and Permit to Take Water (PTTW) were searched using the database. The results indicated records with respect to RSCs, ECAs, EASRs, and PTTWs found on the Study Area. There were no records on the Property. The map showing the location of the applicable environmental approvals and registrations is provided in **Appendix A**.

5.5 Source Protection Atlas, Official Plan, and MNRF

Terraprobe also reviewed the Municipal Official Plan, the Ontario Ministry of Natural Resources and Forestry (MNRF) Natural Heritage Information Centre for information specific to natural areas, such as locations of environmentally sensitive areas. The non-operating waste disposal Site and the Property were assessed as shown below.

- No Area of Natural and Scientific Interest (ANSI) were identified at the Property and the non-operating waste disposal Site.
- No Provincially significant wetlands were identified at the Property and the non-operating waste disposal Site.
- Non-operating closed waste disposal Site A252204 is located approximately 50 m west of the Property boundary, approximately 200 m east of Bear Creek.



6.0 AERIAL PHOTOGRAPHS

Aerial and satellite photographs dating 1951, 1971, 1989, 2004, 2009, 2012, 2018, and 2021 were reviewed. Satellite photos do not indicate any signs of developments or landfill operations in the subject property or the landfill sites. Upon the review of aerial and satellite photos, the east limit of the fill footprint within the non-operating closed waste disposal Site A252204 is located at 450 Salem Road, which is approximately 80 m west of the Property boundary. The satellite photographs are provided in Appendix D.

7.0 ZONING BY-LAWS

According to the by-law no. 054-04 currently in place for the Corporation of the Town of Innisfil, the eastern portion of the Property (901 Essa) is zoned as Residential Rural; and Block 281 (the western portion of the Property) as Neighbourhood Mixed Use. Copies of the Town of Innisfil zoning maps are provided in Appendix A.

8.0 SITE VISIT

Terraprobe visited the site on October 12, 2022 to perform a D-4 assessment. Access to the Property is from Brown Bear Street and Salem Road. The surrounding properties are a mix of residential, industrial, institutional, and agricultural land use. During the visit, the subject property appeared to be a relatively flat residential property comprised of two structures, one residential building that was not occupied at the time of the site inspection and one garage used for storage. The remainder of the Property is occupied by an in-ground swimming pool, a gravel parking area, landscaped areas used for recreation and natural vegetation, including some mature trees. There was also a small wooden shed northwest of the garage, a motorhome south of the shed, and a dug well existed on the northwest corner of the east portion of the Property. The western portion (Block 281) was a gravel area that seemed to be used as a construction staging area for the neighbouring subdivision. Two drainage ditches existed along the northern side of the property on the fence line; and at the east boundary at the Salem Road/ Essa Road intersection. No waste was encountered at the Property and the landfill Site during the inspection. The visual inspection of the Property indicated that the landfill Site was at a lower elevation and sloped towards the northwest. No stains or evidence of impact was noted on the driveways; no stained soil or stressed vegetation was noted at the Property. Site inspection photographs are provided in **Appendix F**.

The landfill site is located west of the subject property and separated by Brown Bear Street and residential development. The landfill site is vegetated with long grass, bushes and trees scattered in the middle of the site; and was heavily treed on the perimeter. The site is fenced around the perimeter with a large, approximately 4.5 to 6 feet tall berm on the southwest corner for approximately 50 m. Three (3) monitoring wells/ gas probes were observed at the south end of the landfill, four (4) monitoring wells/ gas probes in



the middle and four (4) on the north end of the landfill site. The landfill site is observed to be topographically downgradient from the subject property. The wind direction is observed to be from the south to the north. Site inspection photographs are provided in **Appendix F**.



9.0 DISCUSSION WITH RESPECT TO MECP D4 GUIDELINE (LAND USE ON OR NEAR LANDFILLS AND DUMPS)

In reference to Section 4, “Environmental Conditions” of MECP D-4 guideline, the landfill Site would be categorized as indicated in 4.2 as a “non-operating” Site. The guidelines suggest that the following factors should be considered for the D-4 Assessment:

Ground water contamination by leachate

Based on the review of the topography ([Interactive Map - County of Simcoe \(GIS\)](#)) of the Property and the landfill Site #A252204, the landfill is located on a relatively flat area with an average elevation of 310 masl. Localized low-lying areas of approximately 308 masl exist at the fill footprint. The north portion of the landfill site slopes to the northwest from an elevation high of 310 masl to a low of 306 masl towards Bear Creek valley, a tributary of Nottawasaga River valley.

Based on the topography ([Interactive Map - County of Simcoe \(GIS\)](#)) of the Property and the waste disposal Site, the landfill slopes down northwest towards Bear Creek valley. It is expected that shallow groundwater and surface run-off from the landfill site will follow the topography and flow northwest from the non-operating closed waste disposal Site toward Bear Creek and ultimately to Georgian Bay. Based on information obtained from AMEC 2001 study (conducted to assess potential impacts on the Holly site and complete a remedial action program), groundwater elevations monitoring between 1999 to 2000 indicated that groundwater flow gradient is relatively flat beneath the former landfill footprint, with flow estimated to be to the northwest.

As such, the risk of the leachate impact is confined to the water-bearing sandy silts material close to the surface underneath the fill area and predominantly moving laterally to the north/ northwest drainage valley downgradient the landfill site, away from the proposed development.

Based on DMC (1996), the borehole stratigraphy indicated the transition from the high-permeable surficial sandy silt soils to the underlying dense silty sand till. Groundwater monitoring on the limits of the landfill site and within the dense till below surficial sandy silt with gravel inferred perched condition with predominantly lateral flow above the transition zone between high-permeability sandy silt soils and low-permeability till. As such vertical migration of groundwater is unlikely.

An MECP Memorandum (MECP, 2001) stated that after the remediation, the walls and floors of the landfill excavations were sampled and analyzed for Metals, VOC's and PAH's. Water samples from eight (8) onsite monitoring wells were collected and analyzed. All results were found to be below Table A criteria.

Based on the groundwater quality monitoring since 1994, the concentrations of leachate-related parameters (iron, nitrate, DOC, TKN) in the monitoring wells within the landfill footprint are lower than the Reasonable Use Guideline (RUG) values at or near the landfill site downgradient boundary. As such, no groundwater



impacts were found at or near Holly landfill site boundaries with respect to the RUG at Holly sites (Trow, 1995). Since the non-operating waste disposal Site is downgradient with respect to the Property and the shallow groundwater travels northwest away from the Property and flows towards Bear Creek, there is barely any possibility of soil and water contamination to occur at the Property.

Surface Water Contamination By Leachate / Surface Run-off

The nearest surface water is Bear Creek, approximately 200 m west of the Property, which flows from south to north/ northwest. All of the landfill sites are located west of the Property, with grades falling towards Bear Creek valley. Based on the 1995 operation and closure plan by Trow, there is no surface drainage within the Holly landfill, all surplus moisture infiltrates to the shallow water table aquifer. Minor ponding is observed in localized low-lying areas after significant rainfall events. As such, no potential impacts are expected from the surface runoff from the landfill site.

Ground Settlement

The subject property is not located on the landfill material, and a buffer distance exists between the Property and the landfills site. Therefore, the proposed development is not prone to settlement issues associated with degradation of loose and/or organic fills. No waste was encountered at the Property during the site visit, and the potential for any future settlement is very low.

Visual Impact

The non-operating waste disposal Site is located west of the Property. Brown Bear Street and a residential subdivision existed between the landfill and the Property, which excluded any visual impact on the proposed development from the landfill because there was no line of sight to the landfill from the Property. Based on site inspection, currently, the landfill site periphery is fenced with dense and mature trees. Evidence of the non-operating waste disposal Site, such as wastes, fences, and access roads, were not observed during the site visit. In addition, no visible stressed vegetation was identified on the Property during the site visit or from a review of the aerial photos.

Soil Contamination and Hazardous Waste

No hazardous waste or soil contamination was observed at the Property during the site visit. Based on the anticipated direction of groundwater flow and the upgradient location of the subject property, there is no potential for hazardous waste or soil contamination at the landfill site to impact the groundwater, which would migrate toward the subject property.

Landfill Generated Gases (Methane)

Methane is a by-product of decomposing organic matter. Methane moves readily through porous, granular

soils. This landfill being closed for at least 30 years, with an estimated waste volume of approximately 50 tons per year placed at this Site during its operation from 1976 to 1992. However, the risk of methane gas from the non-operating waste disposal Site to the subject property depends on a number of factors, including the type and age of refuse, average depth and density of the waste as well as the annual average precipitation.

Based on the landfill Site Closure Plan by Trow (1994), it is estimated that approximately 11,500 m³ of refuse and waste materials have been disposed at the site during its operation from May 1972 to January 1980. Sandy soil cover is variably present overlying the waste. Since the soils are granular in nature, methane gas probes were installed to monitor the methane generation rate or decay rate at the landfill Site. Gas vapour monitoring was carried out by Trow using an MSA Model 60 (methane) and an HNU Photo Ionization Detector (non-methane), as reported in the Environmental Study, dated May 24, 1995.

Field methane and non-methane gas testing were carried out during the initial subsurface investigation work (test pits and boreholes) and in the gas monitoring probes (installed by Trow (1994) alongside the groundwater monitoring wells). No methane or non-methane vapour concentration was detected. Trow's "Operations and Closure Plan, Holly Site" has concluded that there is no potential impact on the surrounding areas. The results of Trow's gas testing are provided in Appendix F.

Moreover, based on the MECP Memorandum (2001), all waste deposited at the landfill site over the years of operation have been removed, and the site cleaned up. On the basis of a geophysical survey, 15 sited were excavated, and all waste and contaminated soils were removed. As such, it is Terraprobe's opinion that a non-operating waste disposal Site will not impact the proposed development.

Odour, Noise, Air Emission, Vehicle Traffic, Fires, or Vectors and Vermin

odour, noise, air emission, vehicle traffic, fires, or vectors and vermin are potential concerns related to operating and/or recently closed landfills. However, there would be no concern to the proposed development from these elements since the downgradient landfill closed over 30 years ago. Site inspection within the scope of this study did not encounter unpleasant odour, noise, traffic or Vectors and Vermin related to a landfill operation. Therefore, these elements of the assessment is not a concern.



10.0 CONCLUSIONS AND RECOMMENDATIONS

In summary, it is Terraprobe's opinion that the risk of landfill leachate and landfill-generated gases to impact the subject property is low. This is based on the physical setting and hydrogeological conditions of the property, nature (roadside garbage), the age of waste buried at the landfill site being closed for at least 30 years, and well as the remediation cleanup and post-remediation geophysical results.

We trust that this report adequately summarizes our recent assessment of the potential impact of the landfill Site on the subject property. If you should have any questions or need further assistance, please do not hesitate to contact the undersigned.

Sincerely,

Terraprobe Inc.



Muna Mirghani, P.Eng.
Project Manager



Samuel Oyedokun, P.Eng., PMP, QP_{ESA}
Associate, Environmental Engineering



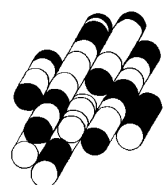
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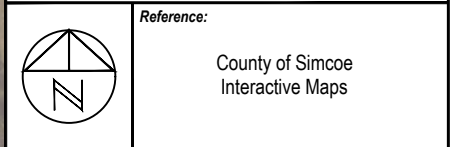
1. MECP, 1991, *Waste Disposal Site Inventory* produced by the MECP on June 1991
2. [Ontario Landfills.xlsx \(live.com\)](#)
3. [Zoning - Town of Innisfil](#)
4. Oak Ridges Moraine Groundwater Program (ORMGP) mapping
5. [Interactive Map - County of Simcoe \(GIS\)](#)
6. MECP, 2001, Memorandum, April 27, 2001 by the Southwestern Region Office, the Ontario Ministry of the Environment
7. Terraprobe Inc. (2010), “Landfill Impact Assessment Proposed Residential Development Lot 1, Concession 11, Innisfil, (Northeast Corner Hwy 27 and Salem Road) Barrie Annex Land, Ontario” File No. 3-10-6080, dated October 12, 2010
8. Terraprobe Inc. 2022, Preliminary Hydrogeological Study Proposed Mixed-Use Development, 901 Essa Road and Brown Bear Street, Barrie, ON, Ontario, File No. 3-22-0008-41, April 7, 2022.
9. Terraprobe Inc. 2022, Phase One Phase One Environmental Site Assessment 901 Essa Road and Brown Bear Street, Barrie, ON, Ontario, File No. 3-22-0008-41, March 21, 2022
10. The Corporation of the Town of Elliot Lake, 1980, Elliot Lake Landfill Site Closure Plan, December, 1980
11. Trow Consulting Engineers, dated May 24, 1995, Environmental Investigation:
12. Trow Consulting Engineers, dated May 24, 1995, Operations and Closure Plan:
13. Dames & Moore Canada (DMC), dated October 30, 1996, Installation of Observation Well No. 6
14. Hyd-Eng. Inc. Geophysical Survey Report, dated June 21, 1999
15. Electromagnetic Survey: Geomar Geophysics Ltd., dated April 1994



FIGURES

TERRAPROBE INC.





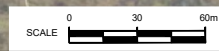
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	Property Boundary
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Site Location:

901 Essa Road & Brown Bear Street
Barrie, Ontario

Designed By: MM	File No.: 02209230.0101
Drawn By: AA	
Reviewed By: MS	Scale: As Shown
Date: October 2022	Figure No.: 1







Terraprobe Inc.
Consulting Geotechnical & Environmental Engineering
Construction Materials, Inspection & Testing
11 Indell Lane - Brampton Ontario L6T 3Y3 (905) 796-2650



Reference:

County of Simcoe
Interactive Maps

Notes:

Legend:

Property Boundary

Landfill

500m Radius from Landfill

Project Title:

D4 Landfill Impact Assessment

Site Location:

901 Essa Road & Brown Bear Street
Barrie, Ontario

Figure Title:

Landfill Location Plan

Designed By:
MM

Drawn By:
AA

Reviewed By:
MS

Date:
October 2022

File No.:
02209230.0101

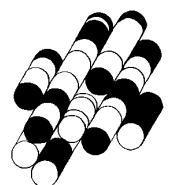
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APPENDIX A

TERRAPROBE INC.



Zoning By-Law



Brent Harlow
The City of Barrie

[View Full Details](#)[Download](#)

Details



Dataset
Feature Layer



May 16, 2022
Info Updated



May 16, 2022
Data Updated



May 24, 2017
Published Date



4,072 Records
[View data table](#)



Public
Anyone can see this content



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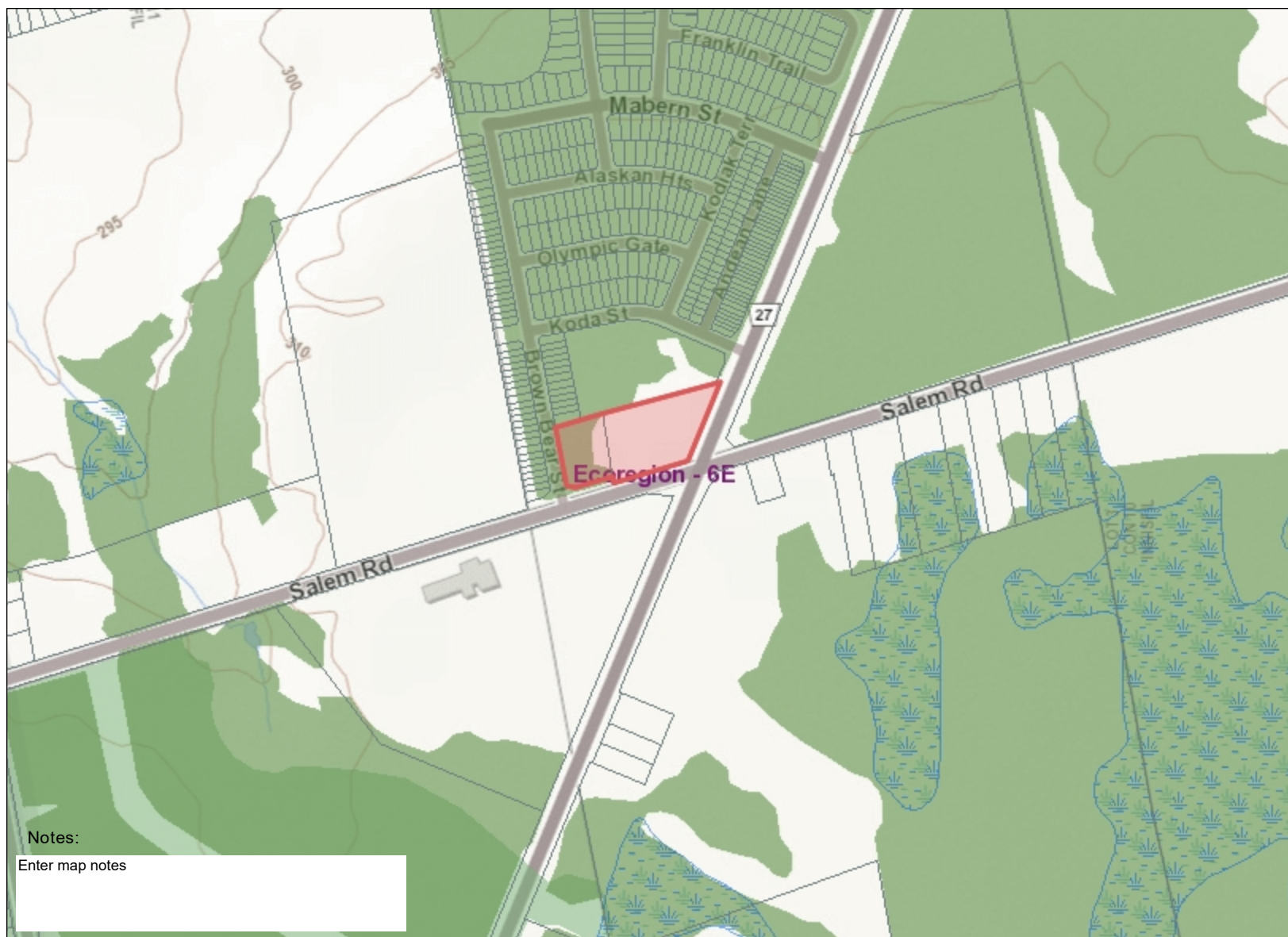
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In Force Zoning By-Law

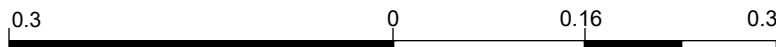
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SPECIAL	
HOLD	
BYLAWNO	054-04 Innisfil
DESCRIPT	Refer to Zoning By-law 054-04 Innisfil
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SHAPE_Length	21,792.347
SHAPE_Area	12,567,478.095
LASTUPDATE	October 12, 2022

Zoom to



Notes:

Enter map notes



This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Natural Resources and Forestry(OMNRF) shall not be liable in any way for the use of, or reliance upon, this map or any information on this map.

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Legend

- Assessment Parcel
- Ecoregion
- ORM Boundary
- NEP Parks and Open Space System
- NEP Minor Urban Centres
- ANSI
- Earth Science Provincially Significant/sciences de la terre d'importance provinciale
- Earth Science Regionally Significant/sciences de la terre d'importance régionale
- Life Science Provincially Significant/sciences de la vie d'importance provinciale
- Life Science Regionally Significant/sciences de la vie d'importance régionale
- Evaluated Wetland
- Provincially Significant/considérée d'importance provinciale
- Non-Provincially Significant/non considérée d'importance provinciale
- Unevaluated Wetland
- Woodland
- Natural Heritage System



Layers

Filter Layers...

Filter

☒ Environmental Site Registry

☒  Record of Site Condition

☒ Other Permissions

☒  Environmental Compliance Approvals

☒  Renewable Energy Approval

☒  Environmental Activity and Sector Registrations

☒  Pesticide Licences

☒  Permit to Take Water

☒ Base Maps

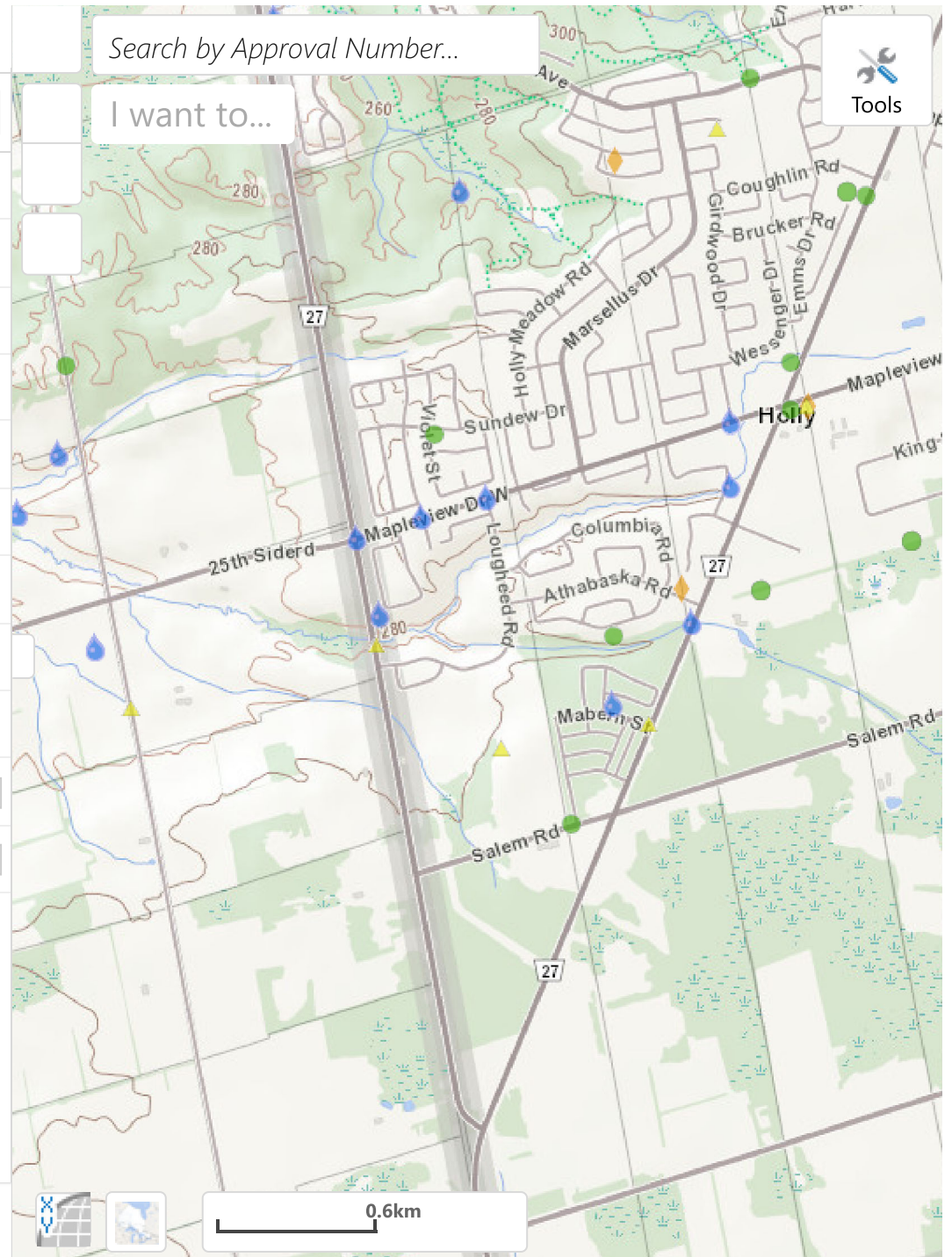
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☐  Imagery

Search by Approval Number...

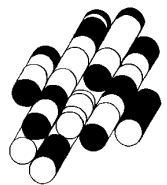
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Tools



APPENDIX B

TERRAPROBE INC.



D-4 Land Use On or Near Landfills and Dumps

A guide for land use planning authorities on how to decide what types of land uses are appropriate near landfilled waste.

Legislative Authority:

Environmental Protection Act, RSO 1990, Part V, Sections 27 and 46

O. Reg. 347, General -- Waste Management

Planning Act, RSO 1990, Sections 2(a)(b)(c)(f)(g)(h), 17(9), 22(3), 41(4) and 51(3)

Condominium Act, RSO 1990, Section 50(3)

Environmental Assessment Act, RSO 1990, Section 5(3)

Responsible Director:

Director, Environmental Planning Branch

Last Revision Date:

April, 1994

Synopsis

This guideline specifies restrictions and controls on land use that the Ministry wishes to see implemented in the vicinity of landfills and dumps, in order to protect the health, safety, convenience and welfare of residents near such facilities. It complements existing ministry abatement programs for landfills and dumps, and is a direct application of Guideline D-1: "Land Use Compatibility."

Application of the guideline extends to all proposals for land use on, or near, operating and non-operating landfills, (as defined in O. Reg. 347) and dumps which contain municipal solid waste, industrial solid waste and/or sewage sludges. The guideline applies to all such facilities regardless of ownership. It does not apply to lands certified as organic soil conditioning sites under O. Reg. 347.

Ministry staff shall use the guideline when they are reviewing land use proposals, including official plans and amendments, and plans of subdivision/condominium:

at the request of the responsible Ministry or the delegated approving authority, under the Planning Act or the Condominium Act;

for land use requests subject to Section 46 of the Environmental Protection Act; and

for undertakings subject to the Environmental Assessment Act.

Introduction

This guideline protects the health, safety, convenience and welfare of residents from the potential adverse effects of landfills and dumps, by restricting or controlling land use in their vicinity. It complements the Ministry's existing abatement programs, and Ministry staff shall refer to it when they review land use proposals.

The principles of Guideline D-4 shall also be considered when looking for locations to establish a landfill in Ontario.

Procedure D-1-1: "Land Use Compatibility: Procedure for Implementation" discusses various implementation approaches and tools. Procedure D-1-3: "Land Use Compatibility: Definitions" provides definitions of terms, in addition to those included in Section 2.0 of this guideline.

Definitions

Note: Additional definitions are provided in Procedure D-1-3: "Land Use Compatibility: Definitions".

Fill Area

The area of a waste disposal site set aside for landfilling or dumping (see Conceptual Diagram No. 1. below).

Land Use

Any existing or proposed activity, structure, service, facility, or natural feature, either at, above, or below grade, which conforms to an approved municipal plan.

Land Used for Waste Disposal Purposes

The land comprising the fill area, where landfilling or dumping has occurred, and the land which is being used or is to be used for the leachate buffer area and/or the gas buffer area; the land may be on- or off-site, (see Conceptual Diagram No. 1 below).

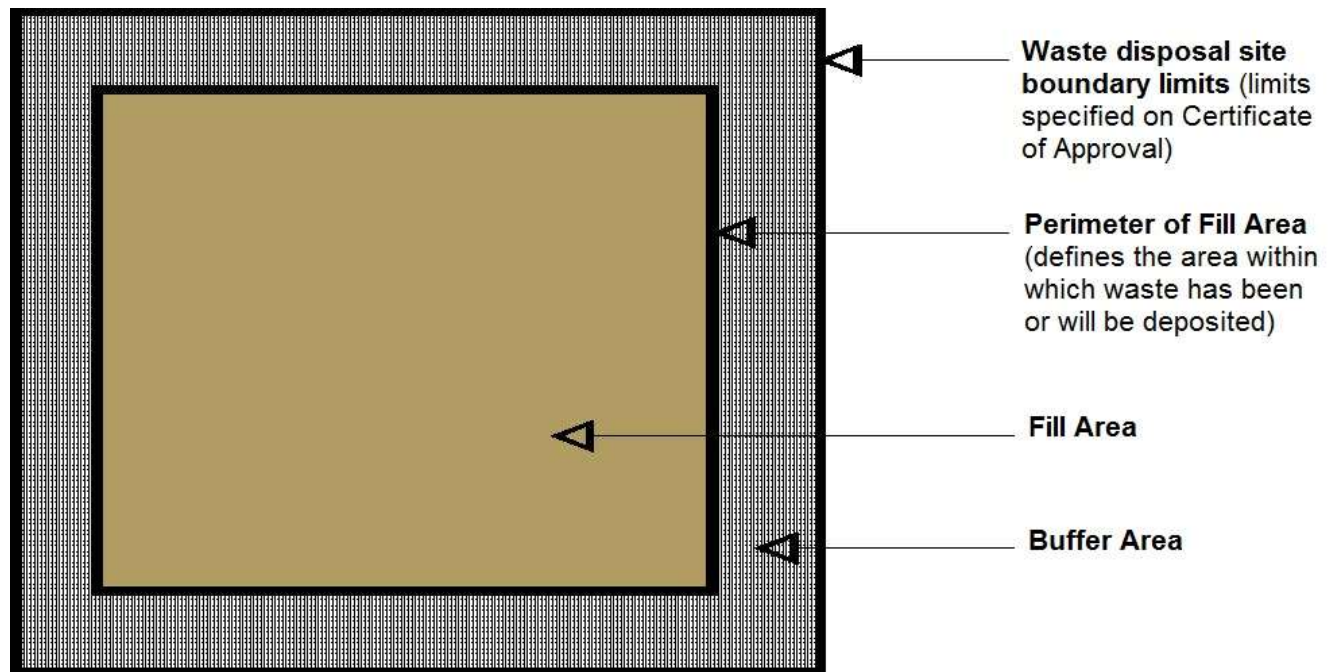
Peripheral Area

The area controlled by the site owner/operator between the boundary of the waste disposal site and the fill area; together, the peripheral area and the fill area make up the waste disposal site; the peripheral area will contain the buffer areas required to be on-site (see Conceptual Diagram No. 1 below).

Vectors and Vermin

Disease-carrying organisms, insects, rodents, birds (especially gulls) and other harmful creatures (e.g., bears).

Conceptual diagram no. 1 (plan view)



Application

3.1 General

This guideline applies to all proposals for land use on or near any landfill or dump which contains municipal solid waste, industrial solid waste and/or sewage sludges. It does not apply to lands certified as organic soil conditioning sites under O. Reg. 347.

3.2 Liquid industrial and hazardous waste

For proposals in the vicinity of landfills and dumps that have accepted liquid industrial, toxic or hazardous waste, the Ministry shall expect proponents to undertake further investigations and

provide a report to the approving authority. Where there is evidence of off-site migration of contaminants, the Ministry shall require abatement measures beyond those discussed in this guideline.

Environmental considerations

Environmental considerations shall be considered by all parties involved in the production, review and approval of a study/evaluation report.

4.1 Operating sites

Factors to be considered when land use is proposed near an operating site include: landfill-generated gases, ground and surface water contamination by leachate, odour, litter, contaminant discharges from associated vehicular traffic, visual impact, dust, noise, other air emissions, fires, surface runoff, and vectors and vermin. Particular attention shall be given to the production and migration of methane gas.

4.2 Non-operating sites

Factors to be considered when land use is proposed on or near a non-operating site include: ground and surface water contamination by leachate, surface runoff, ground settlement, visual impact, soil contamination and hazardous waste, and landfill-generated gases. Particular attention shall be given to the production and migration of methane gas.

4.3 Assessment

The adverse effects of the factors listed in Sections 4.1 and 4.2 of this guideline may create:

- a hazard or health/safety risk;
- a nuisance to man; and/or
- degradation of the natural environment.

The overall extent, number, degree and frequency of contaminant discharges and visual problems can vary with each site. Consideration must be given to the nature of proposed land use(s).

Reference should be made to Reference (a) (Section 7.0), if particular site conditions warrant obtaining further information with respect to methane gas.

4.4 Buffering techniques

One or a combination of buffers, as defined in GuidelineD-1: "Land Use Compatibility", may be employed in a given situation.

4.5 Hydrogeologic/engineering studies

4.5.1 Responsibility

Where the hydrogeologic and geologic setting of the proponent's property and the inter-relationship with gas and/or leachate from the fill area are unknown, Ministry staff shall recommend to the approving authority that the proponent engage a qualified hydrogeologist and/or engineer to determine the subsurface conditions and, where necessary, propose remedial measures.

4.5.2 Exceptions

The Ministry shall not normally recommend a formal site investigation, as recommended in Section 4.5.1, when its staff is satisfied that the evaluation of existing data indicates the absence of a problem.

4.6 Controls and monitoring for adverse effects

Where appropriate, Ministry staff shall recommend, as a condition of approval, that a proponent include controls to deal with adverse effects or risks to health or safety and that the approving authority monitor contaminant migration and carry out inspections of control facilities.

In the event that the approving authorities lack the expertise or resources to perform such inspections, they shall employ qualified consultants to do so.

4.7 Monitoring on private property

Where the approving authority requires monitoring and inspections on private property, Ministry staff shall recommend that a contract be executed between the proponent and the municipality, in the form of, or as part of an agreement that may be registered on title and run with the land. Documents which are able to be registered on title are identified in References (b) and (c) (see Section 7.0).

Land use considerations

5.1 Sensitive land use

The Ministry will normally recommend against proposals for sensitive land use (see Section 5.1.1. for details) adjacent to operating landfills, and on land used for waste disposal purposes where there are completed or partially completed fill areas.

Where land uses are proposed for approval on non operating landfills and dumps under Section 46 of the Environmental Protection Act, the Ministry normally shall not permit residential or other sensitive land use. Further details are provided in Reference (d) of Section 7.0.

5.1.1 Sensitive land uses for landfills currently in operation

Any existing or committed land use which includes:

- a permanent structure used in animal husbandry; or

- agricultural land used for pasturing livestock; or

- a permanent structure where:

 - a person sleeps, or

 - a person is present on a full time basis;

- but not including food or motor vehicle service facilities adjacent to a highway, utility operations, scrap yards, heavy industrial uses, gravel pits, quarries, mining or forestry activities; or

- cemeteries

5.1.2 Compatible land uses for landfills currently in operation

Compatible land uses may include:

utilities and above grade transportation routes except major highways;

fences;

wood harvesting and other forestry activities;

certain farming activities;

industrial uses, including incinerators permitted to operate under O. Reg. 347;

gravel pits and quarries, and other mining activities(provided the landfill water table is not affected); or

such land uses which would not be threatened by any hazard to public health or safety and would not be impaired by nuisance effects.

5.2 Land use within 30 metres of a fill area

5.2.1 Operating sites

No land use may take place within 30 metres of the perimeter of a fill area. This is a minimum distance.

Each operating landfill shall have an on-site operational/maintenance buffer area identified on the Certificate of Approval. This buffer shall be no less than 30 metres; it is normally 60-100 metres.

5.2.2 Non-operating sites

Where technical controls for leachate, or leachate and gas are required surrounding a fill area, no land use may take place within 30 metres of its perimeter. This distance maybe reduced to 20 metres in cases where only gas controls are necessary.

5.3 Land use within 500 metres of a fill area

The Ministry considers the most significant contaminant discharges and visual problems to be normally within 500 metres of the perimeter of a fill area. Accordingly, the Ministry recommends this distance be used as a study area for land use proposals. Ministry staff shall ensure that the proponent has evaluated the presence and impact of any adverse effects or risks to health and safety and that necessary remedial measures are taken when land use proposals are within this distance. This assessment shall be based on the nature and knowledge of the disposal site, and the nature of land use(s) proposed.

Actual influence areas for the considerations listed in Section 4.1 and 4.2 of this guideline will vary with the individual landfill or dump. Where the actual influence area of a site has been determined to be less than the 500 metre study area set out in this section, the study area for land use proposals can be reduced to coincide with the actual influence area.

5.4 Land use beyond 500 metres of a fill area

Where significant impacts are encountered at or beyond 500 metres, the study area within which an assessment for any change in land use is recommended, shall be extended beyond the 500 metre area set out in Section 5.3. Historical evidence in Ontario has shown that the maximum distance within which adverse effects could be experienced while a landfill is operating is up to 3 kilometres.

In exceptional hydrogeologic situations, such as areas of fractured rock or sand, where it is anticipated that leachate or gas from a non-operating landfill or dump could migrate beyond 500 metres and pose a problem, Ministry staff shall recommend that proponents carry out hydrogeologic and/or engineering studies for land use proposals beyond 500 metres of a fill area (see Section 4.5 for more details).

5.5 Significant impacts

The Ministry shall recommend against land use proposals where proponents have not incorporated feasible remedial measures to prevent or minimize adverse effects (as discussed in Section 4.3).

5.6 Sequential development

In considering long-range planning, the Ministry may recommend that proponents delay or phase certain types of land use to coincide with closure of sections of a landfill, or the

operation itself, as nuisance effects are reduced or eliminated. This approach shall only be permitted in cases where no risks to health or safety are present.

Responsibilities

6.1 Operators and/or owners of landfills or dumps

The Ministry shall require operators and/or owners of operating landfills and non operating landfills and dumps to comply with the Environmental Protection Act and O. Reg. 347 (Waste Management) requirements for the control of adverse effects caused by these facilities.

6.2 Proponents/consultants

Ministry staff shall recommend to the approving authority that the proponent provide a report on environmental considerations(see Section 4.0) and, where necessary, propose and implement appropriate control measures. These measures shall include design details and specifications for any control device or facility.

6.3 Municipalities

The local municipal authority is responsible for ensuring that proponents implement and monitor proper control measures associated with new, sensitive developments. It also shall ensure that periodic inspections of operating landfills and non-operating landfills and dumps for contaminant migration and potential hazards are carried out.

6.4 Ministry

With respect to its mandate for landfills and dumps, the Ministry shall exercise the following responsibilities:

6.4.1 Near land used or to be used for waste disposal purposes

Ministry staff will expect proponents and municipalities to fulfill their responsibility to protect public health and safety in areas of land use near a landfill or dump, and to prevent significant

impacts from difficult-to-control nuisance effects which may extend beyond the lands under the Certificate of Approval for an operating landfill.

6.4.2 On land used for waste disposal purposes

Where a proponent submits a land use proposal for approval under Section 46 of the Environmental Protection Act, the proponent must assure Ministry staff and the municipality that the proposal contains adequate measures for the protection of public health and safety, in order to facilitate the Minister making a decision on approval.

Where an approval under EPA Section 46 is not required from the Minister, Section 6.4.1 of this guideline applies.

Reference documents

Procedure D-4-1: "Assessing Methane Hazards from Landfill Sites"

Ministry of Consumer and Commercial Relations Bulletin No.91003: "Environmental Warnings/Restrictions"

Ministry of Consumer and Commercial Relations Bulletin No.80023: "Registration of Certificates & Provisional Certificates"

Guideline D-7: "Requests for Land Use Approval Under EPA, Section 46" (under development)

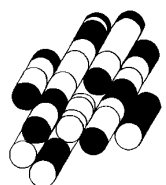
Procedure D-1-1: "Land Use Compatibility: Procedure for Implementation"

Procedure D-1-3: "Land Use Compatibility: Definitions"

Guideline D-1: "Land Use Compatibility"

APPENDIX C

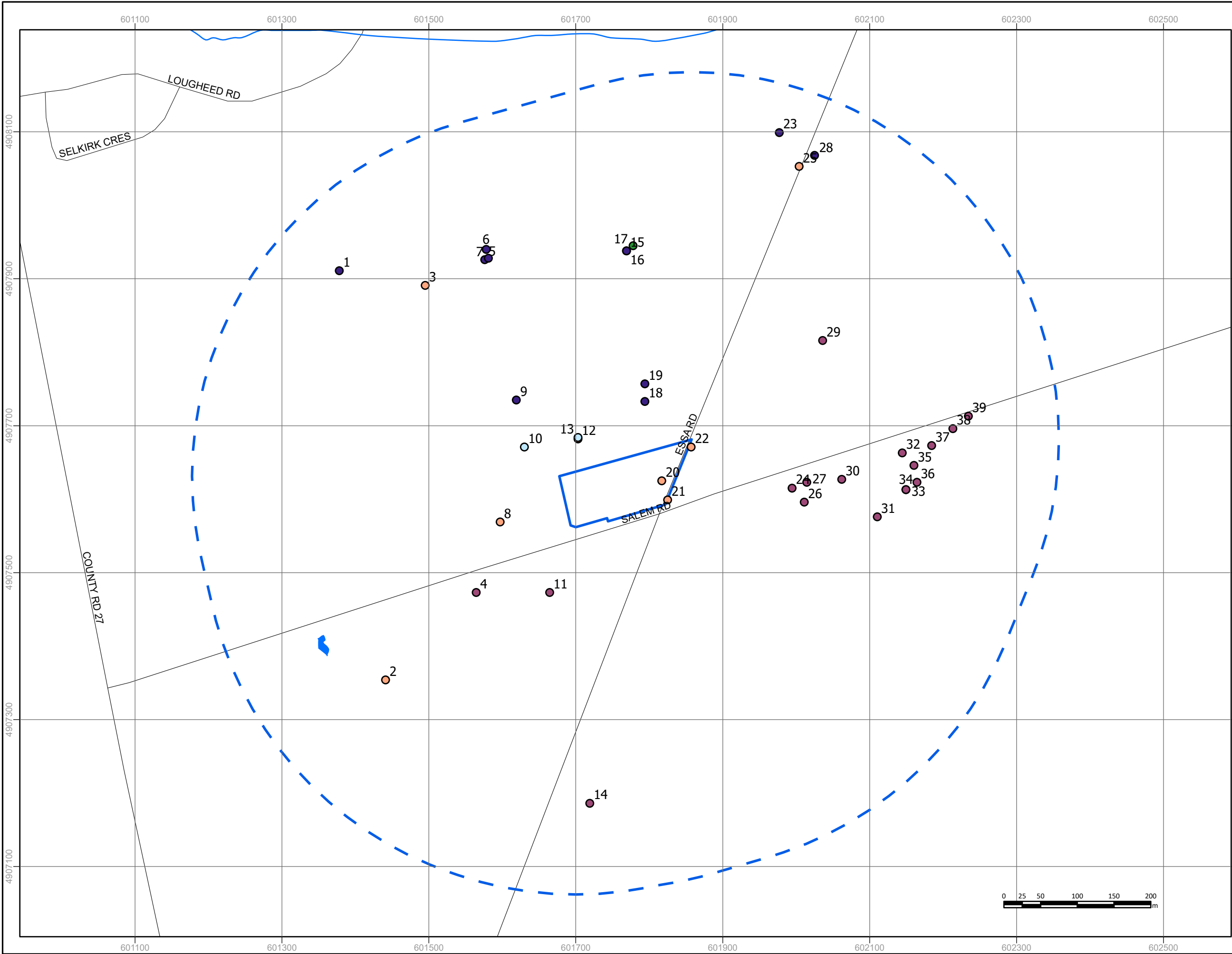
TERRAPROBE INC.



MECP Well Records Summary										
WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Well Usage		Water Found (mbgs)**	Static Water Level (mbgs)**	Top of Screen Depth (mbgs)**	Bottom of Screen Depth (mbgs)**	Date Completed
				Final Status	First Use					
1	7339765			Abandoned-Other						May 28, 2019
2	7176147	Rotary (Convent.)	4.6	Observation Wells	Monitoring	0.6		1.5	4.6	October 18, 2011
3	7176146	Rotary (Convent.)	7.6	Observation Wells	Monitoring	4.0		4.6	7.6	October 19, 2011
4	5710487	Boring	8.5	Water Supply	Domestic	4.6	4.0			October 7, 1973
5	7339768			Abandoned-Other			3.1			June 17, 2019
6	7319538			Abandoned-Other	Not Used					July 30, 2018
7	7339770			Abandoned-Other			4.0			June 17, 2019
8	7048667	Boring	25.6	Observation Wells	Monitoring					August 2, 2007
9	7319539			Abandoned-Other	Not Used					July 30, 2018
10	7353251	Auger	7.3	Other Status	Monitoring					October 17, 2019
11	5715880	Rotary (Convent.)	47.2	Water Supply	Industrial	39.7	33.2	40.0	41.5	January 31, 1979
12	7306468	Auger	4.6	Observation Wells	Monitoring	4.6		3.1	4.6	January 25, 2018
13	7333266			Other Status						April 9, 2019
14	5734437	Cable Tool	13.1	Water Supply	Domestic	12.8	1.2	11.9	12.8	June 23, 1999
15	7354623		6.7	Observation Wells	Other					June 17, 2019
16	7339771			Abandoned-Other			3.4			June 17, 2019
17	7308428									February 7, 2018
18	7319537			Abandoned-Other	Not Used					July 30, 2018
19	7319536			Abandoned-Other	Not Used					July 30, 2018
20	7319523	Rotary (Convent.)	3.1	Observation Wells	Monitoring	2.4	2.4	1.5	3.1	August 20, 2018
21	7319522	Rotary (Convent.)	4.6	Observation Wells	Monitoring	2.4	2.4	3.1	4.6	August 20, 2018
22	7319525	Rotary (Convent.)	4.6	Observation Wells	Monitoring	3.7	3.7	3.1	4.6	August 20, 2018
23	7339773			Abandoned-Other			5.5			June 17, 2019
24	5701248	Boring	12.2	Water Supply	Domestic	8.5	3.7			August 12, 1964
25	7319524	Rotary (Convent.)	3.1	Observation Wells	Monitoring	2.1	2.1	1.5	3.1	August 20, 2018
26	5734726	Cable Tool	48.5	Water Supply	Domestic	48.5	36.3	47.6	48.5	November 16, 1999
27	5709516	Cable Tool	50.9	Water Supply	Domestic	42.7	6.1	50.0	50.9	August 14, 1972
28	7328955	Other Method		Abandoned-Other	Monitoring	0.6		0.5	0.9	December 12, 2018
29	5739780	Cable Tool	6.0	Water Supply	Domestic	44.0	35.2	45.7	48.8	January 4, 2005
30	5739342	Cable Tool	24.1	Water Supply	Domestic	22.0	3.1			July 23, 2004
31	5701249	Boring	6.1	Water Supply	Domestic	2.7	2.7			October 12, 1965
32	5710004	Boring	7.0	Water Supply	Domestic	3.7	0.9			March 4, 1973
33	5710285	Cable Tool		Water Supply	Domestic	9.8	38.4	45.1	46.1	September 11, 1973
34	5723468	Cable Tool	45.4	Water Supply	Domestic	42.7	34.8	44.5	45.4	June 22, 1988
35	5719417	Cable Tool	46.9	Water Supply	Domestic	45.1	35.7	45.4	46.7	September 19, 1984
36	5709995	Boring	10.7	Water Supply	Domestic	6.1	6.1			March 5, 1973
37	5731407	Cable Tool	45.1	Water Supply	Domestic	42.7	36.0	43.6	44.5	March 6, 1995
38	5709996	Boring	9.1	Water Supply	Domestic	4.6	4.6	14.0	17.7	March 6, 1973

*Ministry of Environment, Conservation and Parks

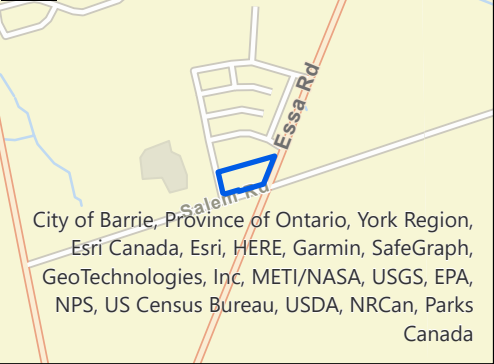
** meters below ground surface



References:

ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus Ds, USDA, USGS, AeroGRID, IGN, and the GIS User Community produced by Terraprobe Inc. Copyright (c) Queen's Printer 2020. Water Well Information System Ministry of the Environment, Conservation and Parks, 2020

Key Map



Notes:

Legend:

- Approximate Site Boundary
- Approximate Study Area; 500m
- Water Course
- Collector
- Local / Street
- Unknown
- Abandoned-Other
- Observation Wells
- Other Status
- Water Supply

Project Title:
D-4 Landfill Impact Assessment

Site Location:
901 Essa Road, Barrie, Ontario

Figure Title:
MECP Well Records Map

Designed By: MM	File No.: 02209230.000
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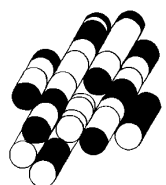
Drawn By: SSK	Scale: As Shown
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Reviewed By: UA	Appendix: C
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Date: Oct. 2022

APPENDIX D

TERRAPROBE INC.





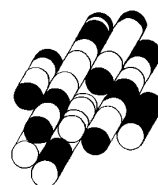
AUGUST 2010

LANDFILL SITE LAYOUT

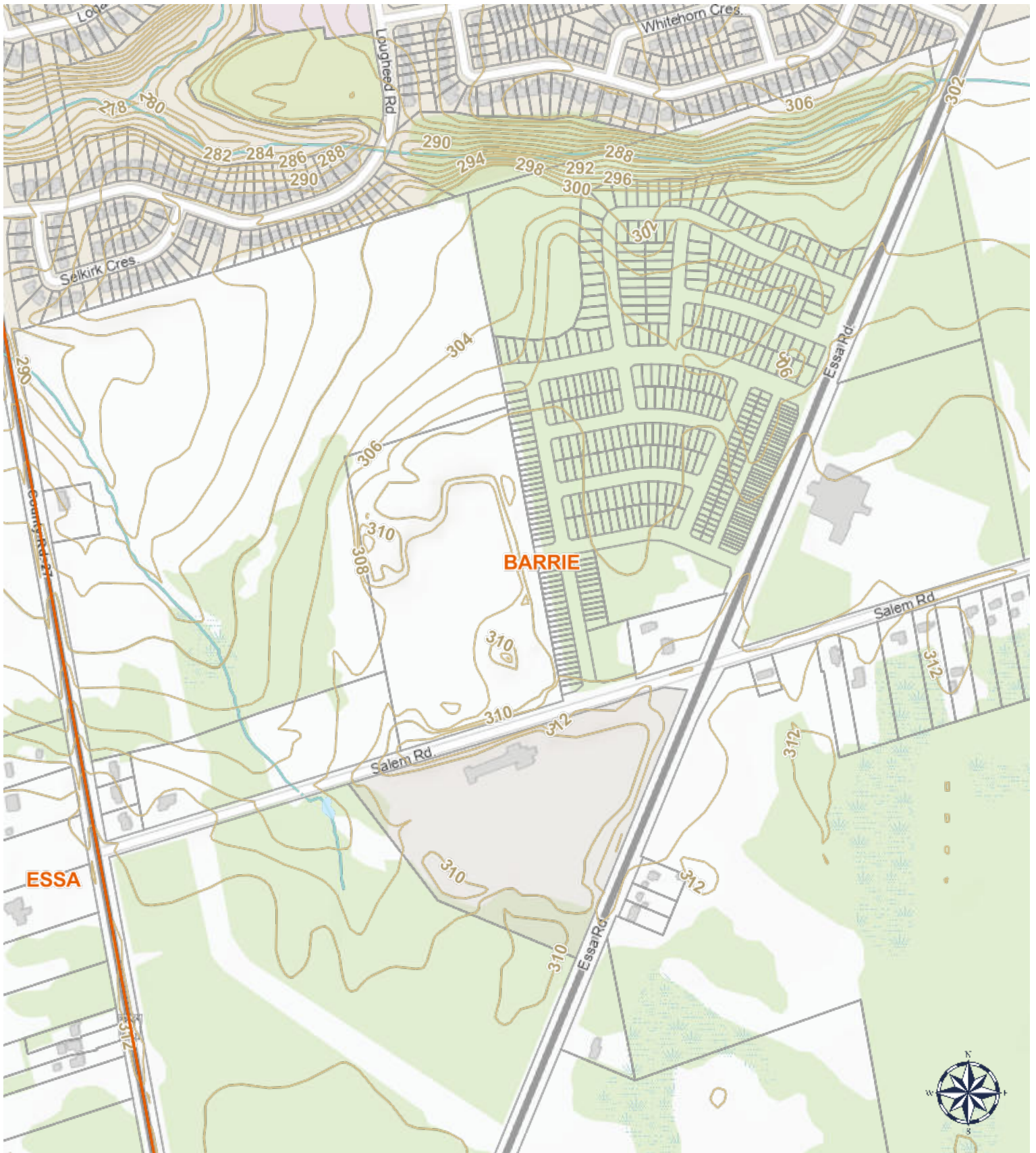
3-10-6080

APPENDIX E

TERRAPROBE INC.



County of Simcoe - Web Map



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0 100 200 300m

1 : 9,028



Nov 2, 2022

Lindsay

Unit Name: Lindsay
Group: Simcoe Group
Formation: Lindsay
Lithology: limestone
Description: limestone; nodular to black laminated (Collingwood)



54a

Limestone, dolostone, shale,
arkose, sandstone
Ottawa Group; Simcoe Group;
Shadow Lake Formation

Drift Thickness (m)



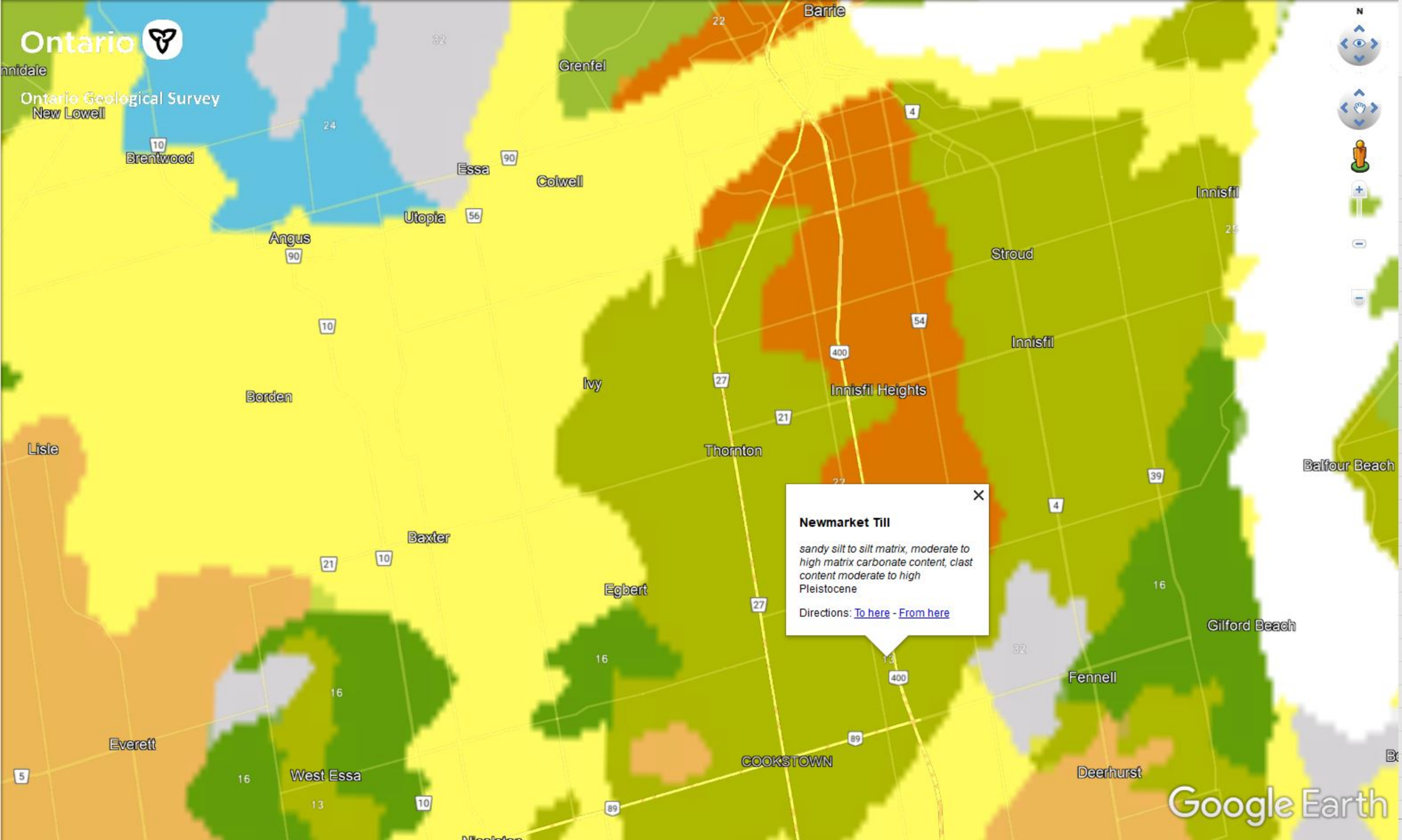
High : 262

Low : 0



**6 Till Plains
(Drumlinized)**
Till Plains (Drumlinized)

**31 Peterborough
Drumlin Field**
Peterborough Drumlin Field



Newmarket Till

sandy silt to silt matrix, moderate to high matrix carbonate content, clast content moderate to high Pleistocene

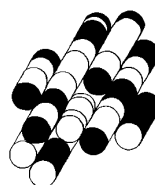
Directions: [To here](#) - [From here](#)

**6 Ice-contact stratified
depositsIce-contact
stratified deposits**

*sand and gravel, minor silt,
clay and till*

APPENDIX F

TERRAPROBE INC.





Photograph 1

Location: Landfill Site

Viewing: East

Description: Viewing wall between the residential development and the eastern portion of the Landfill Site



Photograph 2

Location: Landfill Site

Viewing: Southeast

Description: Viewing the access walking pass to the landfill from the southeast gate



Photograph 3

Location: Landfill Site

Viewing: North

Description: Viewing the backside of houses located on Brown Bear St from the landfill site





Photograph 4

Location: Landfill Site

Viewing: South

Description: Viewing driveway into landfill site. Gate opening onto Salem Road seen in middle of image at top of hill.



Photograph 5

Location: Landfill Site

Viewing: Southeast

Description: Viewing the access walking pass to the landfill from the southeast gate. Remnants of asphalt driveway to landfill.



Photograph 6

Location: Landfill Site

Viewing: North to northeast

Description: Viewing wells OW-2 (observation wells and gas probe in this location). Backside of houses located on brown Bear Street also in image.





Photograph 7

Location: Landfill Site

Viewing: South west

Description: Viewing the southwest side of landfill site. Just behind the trees is Salem Road and you can see the Unilock building red roof in the top left corner of image. Observation Well OW-4B can be seen in middle of image.



Photograph 8

Location: Landfill Site

Viewing: West

Description: Viewing the western edge of landfill site. Observation Well OW-4B can be seen in image middle left edge.



Photograph 9

Location: Landfill Site

Viewing: southwest

Description: Observation Well OW-4B. This well is located close to Salem roadway on south edge of landfill site.





Photograph 10

Location: Landfill Site
Viewing: East to Northeast
Description: Viewing observation wells OW-1B and OW-1A. Backside of houses located on brown Bear Street also in image.



Photograph 11

Location: Landfill Site
Viewing: South
Description: Viewing southern portion of landfill site. Photo taken from approximately the middle of the site facing south.



Photograph 12

Location: Landfill Site
Viewing: North
Description: Viewing northern portion of landfill site. Photo taken from approximately the middle of the site facing north.





Photograph 13

Location: Landfill Site

Viewing: West

Description: Viewing western edge of landfill site. Observation Well OW-3 can be seen in mid-left of image. Black fence line located along the western edge of property is also seen on the left side of image.



Photograph 14

Location: Landfill Site

Viewing: Northeast

Description: Viewing center of landfill site with back of houses located on Brown Bear Street seen in middle-right of image.



Photograph 15

Location: Landfill Site

Viewing: North

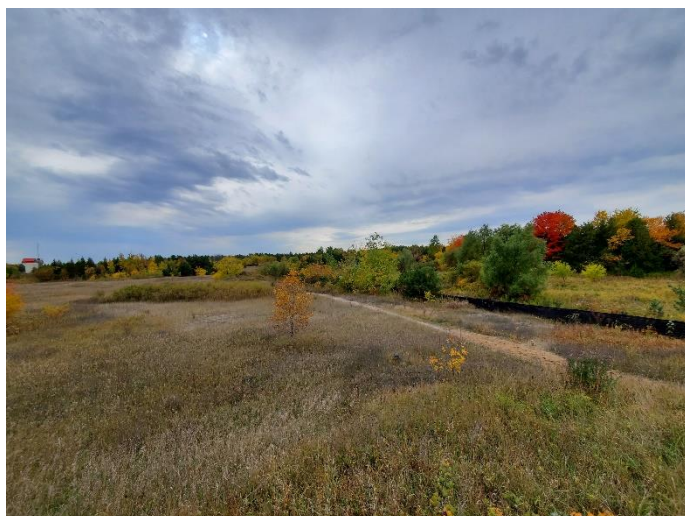
Description: Observation Wells and Gas Probes OW-3 (three in total located in this area)





Photograph 16

Location: Landfill Site
Viewing: North
Description: Third observation well/ Gas probe grouped with OW-3 wells.



Photograph 17

Location: Landfill Site
Viewing: South
Description: Viewing south edge of landfill site. Black felt fence can be seen in image as well as red roof for Unilock building in the middle-left edge.



Photograph 18

Location: Landfill Site
Viewing: East
Description: Viewing trail in landfill site leading to eastern walking access. Back of houses in image are located on Brown Bear Street.





Photograph 19

Location: Landfill Site
Viewing: Southeast
Description: Viewing landfill site middle section (lower lying areas). Backs of houses in the background of image are located on Brown Bear Street.



Photograph 20

Location: Landfill Site
Viewing: North to northwest
Description: Most northern edge of landfill site. Black felt fence can be seen in image separating the site from neighboring properties. House in mid-right side of image located on Mabern St. and Brown bear Street corner. Residential area in left edge of image located on Selkirk Crs. and Lougheed Rd.



Photograph 21

Location: Landfill Site
Viewing: East to northeast
Description: Viewing the northern property line facing east to northeast. Observation Well OW-6 seen in image. (observation well and Gas probe on site at this location).





Photograph 22

Location: Landfill Site
Viewing: North
Description: Observation wells and Gas Probe located at OW-6



Photograph 23

Location: Landfill Site
Viewing: North
Description: Observation Well and Gas Probe located at OW-5. Northside of property seen along the black fence behind wells.





Photograph 24

Location: Phase I Property
Viewing: East
Description: Viewing the adjacent commercial property located east of the Phase I Property



Photograph 25

Location: Property
Viewing: North
Description: Viewing the detached garage located northwest of the two-story house on the eastern portion of the Property



Photograph 26

Location: D4 Property
Viewing: North
Description: Viewing the Residential development behind the two-storey residential building and pool wall located on the eastern portion of the D4 Property.





Photograph 27

Location: D4 Property

Viewing: West

Description: Viewing the southeastern portion of the Property, Salem Road surrounding the Property from South, and black fence separating the eastern and western portions of the Property



Photograph 28

Location: Western portion of the Property previously used as construction staging area for the neighboring subdivision

Viewing: west

Description: Viewing the Western portion of the Property located along Brown Bear Street



Photograph 29

Location: Southwestern portion of the Property

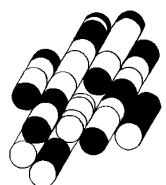
Viewing: west

Description: Residential development between the Property and the landfill site. Unilock building appears across Salem Road southwest of the property



APPENDIX G

TERRAPROBE INC.





Ontario Ministry of the Environment
Ministère de l'Environnement

Southwestern Region Région du Sud-Ouest
2nd Floor 2^e étage
659 Exeter Rd. 659, chemin Exeter
London ON N6E 1L3 London ON N6E 1V3
519-873-5000 519-873-5000

File No.

27 April 2001

MEMORANDUM

To: Chris Hyde
Barrie District Office

From: Theo Beukeboom
Groundwater Evaluator

Re: Remediation Report MTO Holly Landfill Site, 4165 salem Road,
Innisfil
prepared by AMEC, 30 March 2001

I have completed my review of the above report. It shows that all waste deposited at this site over the years of operation have been removed and the site cleaned up to Table A criteria.

On the basis of a geophysical survey, 15 sites were excavated and all waste and contaminated soils removed. After the remediation the walls and floors of the excavations were sampled and analysed for metals, VOC's and PAH's. Water samples from 8 onsite monitoring wells were collected and analysed. All results were found to be below Table A criteria.

Also a post remedial geophysical survey was conducted. Some 4 spots were identified having anomalies. Test pits were dug at those four spots but no further waste was found.

The report concludes that all waste material has been removed from the site and that on the basis of samples taken from soils and groundwater and the geophysical survey conducted after the remediation, the site meets the Table A criteria for residential and parkland use.

I concur with this conclusion.

The report recommends that MTO apply to MOE for revocation of the C of A for this site.

If MTO submits such an application, I would have no objection to granting this revocation.

Ministry of the
Environment

Ministère de
l'Environnement

54 Cedar Pointe Drive
Unit 1203
Barrie ON L4N 5R7

54 Cedar Pointe Drive
Bureau 1203
Barrie ON L4N 5R7

tel.: (705) 739-6427
fax: (705) 739-6440

April 30, 2001

Ministry of the Environment
Environmental Assessment and Approvals Branch
2 St. Clair Ave. West, Floor 12A
Toronto, Ontario
M4V 1L5

Attn: George Lai

RE: Ministry of Transportation, Holly Landfill Site
Provisional Certificate of Approval No. A252204
Part Lot 1, Concession 11, Town of Innisfil
Site Remediation Report Review
Our File: SI SI IN C11 610

The MOE Barrie District Office has completed its review of the "Remediation Report, Ministry of Transportation Holly Landfill Site, File 1-07-53, Innisfil, 4165 Salem Road, Lot 1 Concession 11 Township of Innisfil, Ontario", prepared by AMEC Earth & Environmental Ltd., dated March 30, 2001. The remediation report was submitted for review and comments, prior to an application by MTO to revoke the C of A for the landfill site.

With the removal of the waste and contaminated soil from the site and based on the analytical results of the soil and groundwater samples, and the post-remediation geophysical study, this office agrees with the consultants conclusions that the site meets the Table A criteria for residential and parkland use, as outlined in The Guideline for Use at Contaminated Sites in Ontario.

The following recommendations should be considered for implementation prior to the Provisional Certificate of Approval being revoked:

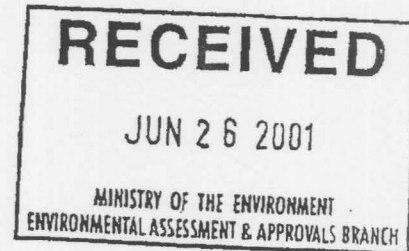
1. The site entrance gate should be replaced (recently damaged by trespassers) and access controlled by installing a heavy chain and lock.
2. "No Trespassing" signs should be posted at the entrance gate and at 30 metre intervals around the entire site perimeter.
3. "No Dumping" signs should be posted at the entrance gate and at 30 metre intervals along the South site perimeter, fronting on Salem Road.



June 25, 2001

TC85325

George Lai
Ministry of the Environment
Environmental Assessment and Approvals Branch
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5



Re: MTO Holly Landfill Site, Innisfil, Ontario; Provisional CofA # A252204

Dear Mr. Lai:

AMEC Earth & Environmental Limited (AMEC) was retained by the Ministry of Transportation of Ontario (MTO) to assess potential impacts on the above referenced site and complete a remedial action program. The MTO acquired the site in 1946, and the last waste was deposited in 1992, although most of the waste deposition occurred in the 1970s. As documented in the report discussed at our meeting in your offices on May 1, 2001, the remediation is now complete.

The groundwater quality in the landfill has been monitored since 1994 and no significant impacts have been noted over these years (reports attached). In addition, no putrescible wastes were deposited below the water table and the remnant buried waste materials (approximately 6,000 tonnes) were removed in the fall of 2000 as part of the remedial action plan.

Based on the above information, AMEC requests that the above referenced Provisional Certificate of Approval be revoked since the site is no longer a landfill. AMEC also recommends that no further monitoring be conducted on this site, since the soil and groundwater quality meet the Table A (potable) criteria from the MOE *Guideline for Use at Contaminated Sites in Ontario*, and the source of potential future impacts (the waste) has been removed.

Yours truly,

Donald Ford, B.Sc.
Head, Site Assessment and Remediation
Direct Tel.: 905-568-2929
Direct Fax: 905-568-1686
E-mail: Donald.ford@amec.com

CF/

P:\DECOM\Projects\85325\Docs\MOE_revised_letter.doc

EC Earth & Environmental Limited
Traders Blvd. East, Suite 110
Mississauga, Ontario
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+1 (905) 568-2929
+1 (905) 568-1686

www.amec.com

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s.N/R

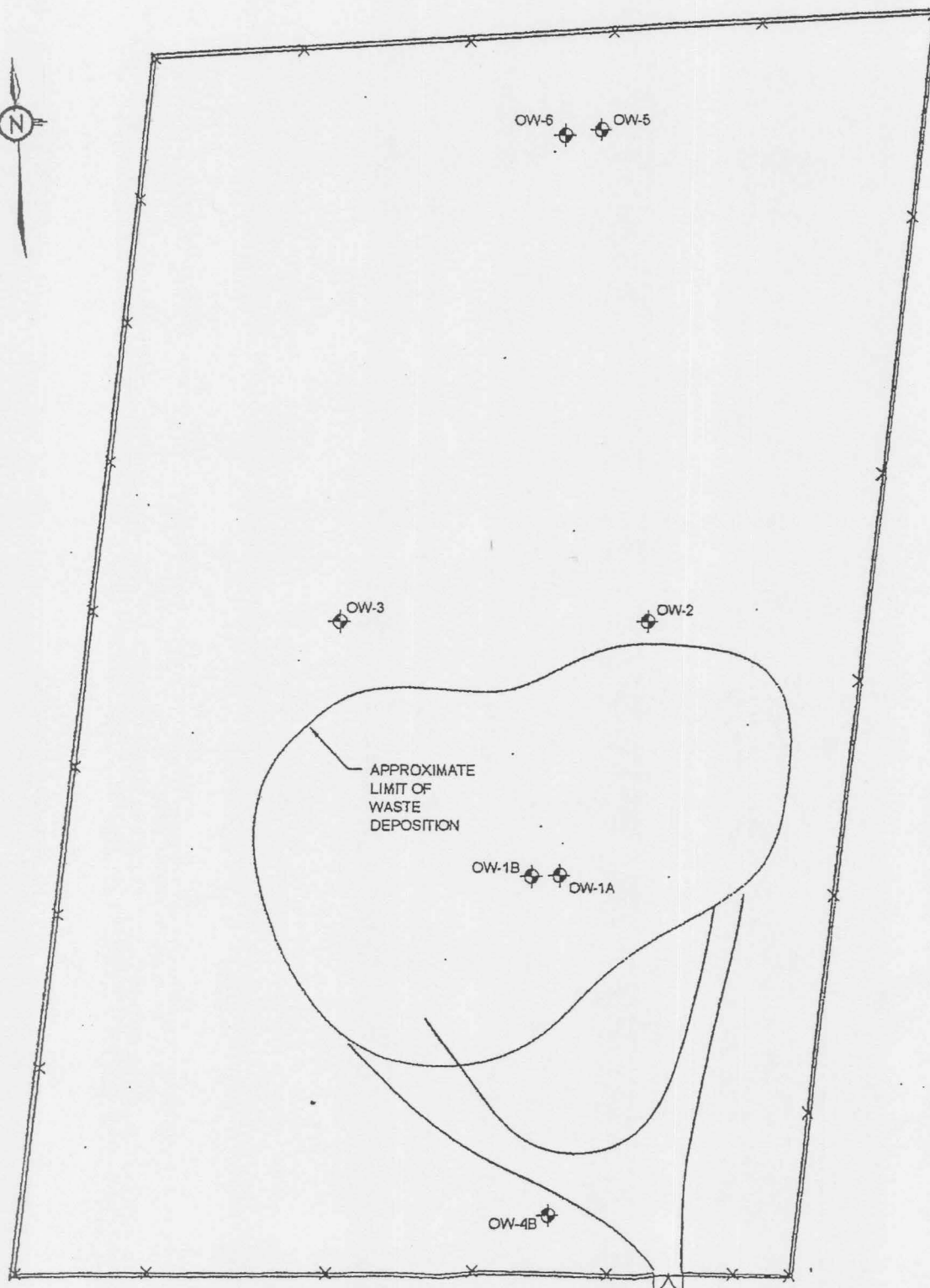
Holly Landfill Site

This landfill site is located in the south half of Lot 1, Concession 11 in the Town of Innisfil. Access via Concession 11, approximately 200 m west of the Former Highway 27 (now Simcoe County Road 27). This site was formerly used as an MTO landfill, but waste material was removed by General Waste Inc. in 1997. Some imported fill material was subsequently placed to the north of monitoring well OW-4. Further waste materials were discovered by AMEC in a detailed subsurface investigation of the site (AGRA, 1999). Seven monitoring wells (OW-1A/B to OW-6) existed as of July, 2000 on the site, including a replacement well installed by AGRA in May, 1998 (Figure 3).

Groundwater elevations in July, 2000 (Table 3) were similar to the previous data (AGRA, 1999; Gartner Lee, 1997). The groundwater flow gradient is relatively flat beneath the former landfill footprint, with flow estimated to be to the northwest.

The 2000 groundwater chemistry data are summarized in Table 4 and the Laboratory Certificates of Analysis are provided in Appendix C. The groundwater samples from monitoring well OW-2 in and below the former landfill exhibited elevated nitrate concentrations (3.2 mg/L) that are above the Reasonable Use Guideline. However, other landfill leachate indicator parameters such as chloride were present at low to moderate levels (0.8 mg/L). Therefore, the elevated nitrate concentrations observed at the Holly site may be attributed to agricultural uses in the area and/or to naturally elevated nitrates.

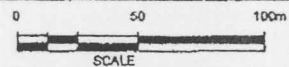
In summary, the concentrations of leachate-related parameters (i.e., iron, nitrate, DOC, TKN) in the monitoring wells within the landfill area are lower than the RUC values calculated by Trow (1995b), with the exception of DOC in OW-1A and OW-1B, and iron in OW-5. Iron concentrations in OW-5 exceeded Reasonable Use Guideline and DOC levels in OW-1A and OW-1B exceeded the respective ODWO and Reasonable Use Guideline. Sodium exceeded the RUC but was below the ODWO at OW-4B. However, none of the affected wells are at or near the downgradient property boundary.



TOWN OF INNISFIL CONCESSION 11

LEGEND

- OW-1  MONITORING WELL LOCATION
-  PROPERTY LINE
-  FENCE LINE



amec

ONTARIO MINISTRY OF
TRANSPORTATION
SIMCOE COUNTY LANDFILL SITES
HOLLY LANDFILL SITE

SITE PLAN
A00009147 176

FIGURE 2

s.N/R

Conclusions

The groundwater level and chemistry data from the July, 1999 sampling events at all three sites were generally consistent with previous data. No groundwater impacts were found at or near any of the property boundaries with respect to the RUC at the Innisfil and Holly sites (Trow, 1995a,b) or the ODWO and/or PWQO and for the Forest Home Site.

Recommendations

s.N/R

AMEC, on behalf of MTO, has completed the remediation of the Holly site, and if the C of A is revoked, the sampling program should be terminated. If the C of A has not been revoked by the spring of 2001, annual monitoring should continue.

References

AGRA Earth and Environmental Limited, 1998. *1998 Spring Monitoring, Three MTO Simcoe County Landfill Sites*. Prepared for the Ontario Ministry of Transportation, October 23, 1998.

Dames and Moore, Canada, 1996. *Fall Monitoring Event, Holly Pit Former Waste Disposal Yard*. Prepared for the Ontario Ministry of Transportation, November 1, 1996.

Gartner Lee Limited, 1997. *Monitoring Report for the Spring and Fall Sampling and Monitoring Program, Three MTO Simcoe County Landfill Sites*. Prepared for the Ontario Ministry of Transportation, December 15, 1997.

A0009147_172-000573

Ministry of
Transportation

Ministère des
Transports



Ontario

659 Exeter Road
London, Ontario
N6E 1L3 (519) 649-3119

873-4558

MAR 5 3 34 PM '98

February 19, 1998

Mr. Todd Fleet
Waste Approvals
Ministry of Environment
985 Adelaide Street South
London, Ontario
N6E 1V3

Dear Mr. Fleet:

Re: MTO Holly Site
Lot 1 Concession 11
Township of Innisfil
Certificate of Approval Number A 252204

The Ministry of Transportation is proposing the sale of the above mentioned property. It was acquired by the Ministry in August 1946. Our Ministry has completed the removal of all waste material in the site. This cleanup was done by General Waste Transport Inc. and was monitored by Mr. Bob Young of the Barrie office. A copy of the report is attached for your reference (Attachment A).

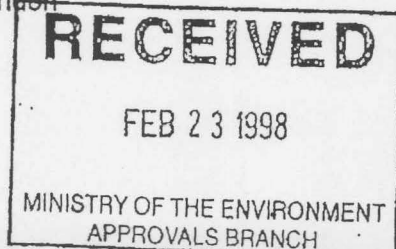
The latest Certificate of Approval for a Waste Disposal Site received from your Ministry (March 28, 1980) is also attached for your information (Attachment B). At this time, MTO would like to have the Certificate of Approval revoked. The waste on the site has been removed as cited above. We have no intention to use the site again and are proposing to sell it.

Since 1995, MTO has obtained various consultants to do groundwater monitoring at the Holly Site on an annual basis. The results from the monitoring program are attached for your reference (Attachment C). The results show only minimal salt contamination from the local service road.

Could you review the information provided and proceed with the revocation of the Certificate of Approval? If you require any further information, please contact me.

Yours truly,

Geoff Sutherland
Environmental Planner - Waste Management
Southwestern Region, London



FEB 23 1998

FEB 20 1 17 PM '98

FEB 20 1 17 PM '98



Groundwater quality has remained relatively similar to that observed in 1996 at the Holly site. Most monitoring locations, in and below the former landfill, still exhibit slightly elevated nitrates (2.33 to 3.75 mg/L) with low to moderate levels of the major ions parameter such as chloride (89.6 to 228 mg/L) and trace to below detectable limits of the heavy metals. The downgradient monitor OW5 still exhibits low levels of nitrate (0.5 mg/L) and low to very low levels of the major ions such as chloride (0.53 mg/L) and trace to below detectable limits for the heavy metals. However, iron (0.68 mg/L) and aluminum (0.749 mg/L) were found to be elevated from previous sampling events, during October 1997. This monitor is also very silty and the same filtration problems may have occurred similar to OW2 at the Innisfil site, and therefore, would not be considered landfill related.

The elevated nitrate observed at the Holly site may also be attributed to agricultural uses in the area and/or to the naturally elevated nitrates. This was demonstrated at the former upgradient monitor OW4, in 1996, which had the highest nitrate concentration. Therefore, elevated nitrate concentrations may not be totally related to the landfill. However, this should be verified using the parameter ammonia, during the next monitoring event.

During 1997, chloride concentrations have increased at all locations except the background monitor OW5. These increases from October 1996 to October 1997 are:

- OW1A.....129 to 228 mg/L
- OW1B.....63.5 to 214 mg/L
- OW2.....11.1 to 89.6 mg/L
- OW3.....32.4 to 91.2 mg/L

The increase in chloride appears to be directly related to road salt effects. This was best illustrated in 1996 at the upgradient monitoring location OW4, close to the road, which had a chloride concentration of 645 mg/L and to the fact that there is no longer any waste at this site. As there is no longer any waste to generate leachate, increasing chloride could not be landfill related. It should be noted that, as stated earlier, OW4 was destroyed during grading activities at the site, however, it is expected that high levels of chloride would still persist. Therefore, these increases in chloride concentrations are not considered landfill related.

Based on the low levels of leachate related parameters (iron, nitrate, DOC, TKN and manganese), and the fact that high levels of chloride are attributed to road salt effects, the landfill is not contributing any adverse effects on the surrounding groundwater regime based on the Reasonable Use Guideline concentrations calculate in the Environmental Investigation - MTO Holly Pit Waste Disposal Site, Trow Consulting Engineers Ltd., May 1995 (Appendix G). This is further demonstrated at the downgradient monitor OW5, which shows no leachate effects.

Based on the water quality observed and the low levels of the leachate parameters, it is recommended that the sample parameter list be reduced to only reflect leachate parameters and major ions as well as the addition of ammonia. These would include:

- a) chloride, sodium, calcium, magnesium, potassium and sulphate; and
- b) alkalinity, ammonia, nitrate, nitrite, DOC, TKN, iron and manganese.

From: Bob Young
To: TOR135STCLAIR.ENE2N07.HERLIHJE
Date: 1/29/97 11:09am *
Subject: Advice on closure & use of old MTO, WDS - Town of Innisfil

Jerry:

Attached find a draft letter to MTO [for background purposes]. I am advising them to apply to "close the site". I want to have a clear understanding of what they have to do to close the site and anything else they may have to do before the site can be used for another purpose before I finalize the letter.

Background:

- * MTO applied & received approval for a WDS in 1972 to dispose of roadside garbage
- * The C of A is registered on title
- * The WDS is 5 acres of a 40 acres parcel. The 35 remaining acres were used as a gravel pit.
- * The waste has been removed.
- * The WDS & the gravel pit have been rehabilitated to final elevations. Top soil has not yet been placed on the site.
- * MTO has written to the MOEE District Office for advice on their options for future use of the site (sale to others for use as WDS/ sale to others as a subdivision or building site etc.).
- * The District feels they should close the site

Unanswered questions/ Advice request:

- * When one applies to close the site what has to happen? Who do they apply to? What documents are involved?
- * Is the C of A rescinded by Approvals Branch (AB) and a letter drafted by AB for the Minister to authorize a future use of the site to comply with S46 of the EPA.
- * What has to happen at the registry office to de-register the C of A?
- * Any further advice or comments that you have to help me deal with this matter would be appreciated.

Thanks

Bob

CC: LAENGNMI, TOR250DAVISVILLE.ENE3N03.GASBARJO

REY file c:\u\mtoholly:em6 J

29



DAMES & MOORE, CANADA

THE ENVIRONMENTAL PROFESSIONALS

7560 AIRPORT ROAD, MISSISSAUGA, ONTARIO L4T 2H5

TEL (905) 671-9921 FAX (905) 672-7784

Project: 24811-005

November 1, 1996

Ministry of Transportation
Southwestern Region
659 Exeter Road
London, Ontario
N6A 5H2

Attention: Mr. David Wake
Supervisor - Environmental Unit

Dear Sirs:

**Fall 1996 Monitoring Program
Simcoe County MTO Waste Disposal Yards
Project No. 9630-7411-3049**

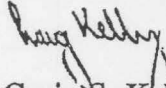
Enclosed are the results of the fall 1996 monitoring of the ^{s.N/R} Pit, and ^{s.N/R} Disposal Yards. ^{s.N/R} Holly

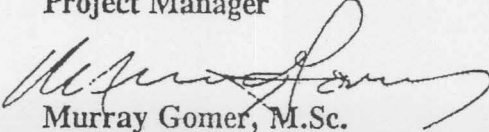
A review of the data indicates that local groundwater quality is not being adversely affected by waste disposal at these three sites. It is recommended that monitoring continue at the ^{s.N/R} site, as this site still periodically receives waste. It is also recommended that the Holly Pit site be monitored in 1997 following the completion of mining of the waste at this site, and that new monitor OW6 be checked in the spring of 1997 to see if there is any water in the well. The ^{s.N/R} observation wells should be sampled and analyzed at least one more time to verify that the nitrate levels recorded at OW4A in October 1996 were anomalous.

The covering letters pertaining to the analytical results are provided in draft form for your review. Should you have any comments or questions, please contact the undersigned.

Dames & Moore, Canada wishes to thank the MTO for the opportunity to undertake this project on behalf of the Ministry. We look forward to working with you on other projects in the near future.

Yours very truly,
DAMES & MOORE, CANADA


Craig S. Kelly, B.Sc.
Project Manager


Murray Gomer, M.Sc.
Principal-in-Charge

CSK/ja

OFFICES WORLDWIDE

A0009146 73-000000



DAMES & MOORE, CANADA

THE ENVIRONMENTAL PROFESSIONALS

7560 AIRPORT ROAD, MISSISSAUGA, ONTARIO L4T 2H5

TEL (905) 671-9921 FAX (905) 672-7784

Project: 24811-005

October 30, 1996

Ministry of Transportation of Ontario
Environmental Unit
659 Exeter Road
London, Ontario
N6A 5H2

RECEIVED

OCT 31 1996

PLANNING & DESIGN
LONDON

Attention: Mr. Geoff Sutherland
Environmental Planner

Dear Sirs:

**Installation of Observation Well No. 6
Holly Pit
MTO 1996 Simcoe County Monitoring Program
MTO Project No. 9630-7411-3049**

Dames & Moore, Canada (DMC) presents herein the results of the borehole drilling and subsequent installation of Observation Well 6/96 (OW-6/96) at MTO's former waste disposal yard at the Holly Pit, Township of Innisfil.

Due to the interpreted potential for vertical migration of groundwater before it moves laterally off the site, the terms of reference for Project No. 9630-7411-3049 included the installation of a deep monitor near the northern (downgradient) property boundary of the site. This investigation was required in order to assess the stratigraphy and groundwater quality in deeper formations underneath the site. Trow's 1994 investigation indicated that the shallow water-bearing soils beneath the surficial sand and gravel possessed a relatively high hydraulic conductivity ($\sim 2-3 \times 10^{-2}$ cm/s); the vertical extent of these soils was not known. If similar soils persisted at depth, there was potential for a high degree of vertical groundwater flow which the shallow 1994 observation wells downgradient of the fill area (OW-2/94, OW-5/94) may not intercept. The Ministry resolved to accept Trow's recommendation to drill a borehole and install an observation well in a deeper soil formation to investigate the concerns raised by Trow in their 1994 report.



The circumstances described above prevented DMC from obtaining a sample from this well at this time. The purpose of the deeper well installation was to investigate whether the highly permeable near-surface soils persisted to an extent where high vertical groundwater velocities may be carrying leachate down beyond the depth of the shallower monitors. The borehole stratigraphy indicates that this is highly unlikely. The bottom of the OW-5/94 monitor was likely at the transition from the high-permeable surficial soils to the underlying dense silty sand till. The hydraulic conductivity (K) of this till will be low, and may vary from 10^{-7} to 10^{-5} cm/s based on density and clay content. This is in marked contrast to the measured hydraulic conductivity ($\sim 2.5 \times 10^{-2}$ cm/s) in the "sandy silt" within which the shallow monitors were installed. It is expected that groundwater descending through the granular surficial units will be greatly impeded upon reaching the low-K soils, and will be largely migrating laterally along the "contact" zone between the high-K and low-K soils. The water-bearing "sandy silts" close to surface at the Holly Pit may be considered to be under a "perched" condition locally and possibly seasonally.

In summary, the borehole drilling and well installation revealed the presence of dense tills at a depth just below where the shallow monitors were installed in 1994. The tills can contain large (up to a few metres thick) bodies of granular materials (silts to sands). The groundwater in the tills appears to be under the influence of "unit hydraulic gradient", ostensibly caused by the presence of a significant groundwater drain at depth. Leachate and shallow groundwater beneath the pit will be predominantly moving laterally to the north above the transition zone between the high-K and low-K soils. Dilution of any leachate will be relatively high due to the marked contrast (3 to 5 orders of magnitude) in hydraulic conductivity between the surficial sands and underlying till, which will promote accumulation of infiltrating water at the transition zone and lateral movement in the upper water-bearing sands. DMC does not consider it necessary to drill a well in a search for groundwater quality in deeper formations but to monitor OW-6/96 in the spring when groundwater levels recover and, if possible, obtain a sample at this time.

1. Introduction

Trow Consulting Engineers Ltd. (Trow) has been retained by the Ministry of Transportation (MTO) to prepare an Operational and Site Closure Plan for the Holly Pit Waste Disposal Site (Holly Site) located on the north side of Concession Road 11, just west of Highway 27 in Innisfil, Ontario. Existing site conditions are presented in Drawing 1.

In conjunction with the Operational and Closure Plan, Trow conducted an Environmental Investigation of the Holly Site to identify existing and/or potential site impacts as a result of previous landfilling operations. Trow's findings indicated that there is no potential impact on the surrounding areas (agricultural and light industrial land-use). The Environmental Investigation is provided under separate cover.

1.1 Purpose

The purpose of this document is to detail an Operational and Closure Plan which includes an evaluation of the possible use of catch basin material and road sweepings from Simcoe County as cover material. Subsequent to acceptance of this Closure Plan by the MOEE, the measures described in this document will be implemented.

1.2 Background

The results of the environmental investigation of the Holly Pit site indicate that minor localized impact on water quality is occurring as a result of landfilling operations. There is no evidence to suggest that groundwater migrating offsite exceeds any criteria under MOEE Policy 15-08 ("Reasonable Use").

There is presently no surface drainage within the Holly Pit; all surplus moisture infiltrates to the shallow watertable aquifer. Minor ponding is observed in localized low lying areas after significant rainfall events.

4. Plan of Development and Operations

The following section outlines issues related to site preparations, engineering considerations and construction phasing as required for the Plan of Development and Operations.

4.1 Existing and Proposed Site Conditions

4.1.1 Site Survey

A topographic site survey was completed on May 4 & 5, 1994. Existing site conditions including existing site contours, the approximate aerial extent of waste disposal, the location of groundwater monitoring wells, and test pits are illustrated in Drawing No. 1.

The areal extent of deposited waste (four separate areas) is estimated to be approximately 16300 m² (0.8 acres) and falls within the boundaries of the former Holly Pit and the adjacent property to the west (see Drawing No. 1). Approximately 11500 m³ of refuse and waste materials have been disposed at the site. Sandy soil cover is variably present overlying the waste.

4.1.2 On-Site Roads

There are currently various temporary on-site roads within the floor of the Holly Pit (Dwg. #1). Temporary roads suitable for heavy vehicular traffic will be constructed as landfilling operations progress. Given the granular nature of the soils in the Holly Pit, this will not require significant effort; roads may be placed as required in most locations.

4.1.2.1 Access from Public Roads

Concession Road 11, which bounds the site to the south is the only public road leading to the landfill site. It is situated in an agricultural and light industrial area (tree farms, farms and a block plant to the south) and is occasionally traveled by heavy vehicles, farm machinery and local residential traffic. Concession Road 11 is a graveled surface secondary road which is maintained on a regular basis.

Increased traffic as a result of landfill operations will represent only a minor impact on other users of Concession Road 11 with respect to noise, dust and traffic.

The original access road to the site during landfill operations is located at the southeast corner of the site. A right-of-way along the east property line is also used for site access. Trow recommends that this intersection with Concession Road 11 be used again for site access as it is situated along a stretch that is clearly visible to traffic traveling in both directions. The location of the previous and proposed site access intersection is presented on Drawing No. 1.

5.0

CONCLUSIONS

The total volume of soil excavated was approximately 14,721 cubic metres. Material removed from the soil consisted of:

Recyclable material removed from site	120 tonnes
Non hazardous non registerable solid waste	95.72 tonnes
Registerable waste	7 drums

7. Landfill Gas Testing

Field methane and non-methane gas testing were carried out during the initial subsurface investigation work (test pits and boreholes) and in the gas monitoring probes (installed along side the groundwater monitoring wells) during our return visits. The results of Trow's gas testing are provided on the borehole (and test pit logs) and in Table 3 below.

Table 3: Gas Testing

Gas Monitoring Probe	Vapour Concentration (ppm)	
	Methane	Non-methane
OW-1A/94	<1	<1
OW-1B/94	<1	<1
OW-2/94	<1	<1
OW-3/94	<1	<1
OW-4/94	<1	<1
OW-5/94	<1	<1

* Readings taken May 24, 1994, using an MSA Model 60 (methane) and an HNU Photo-Ionization Detector (non-methane).

MINISTRY OF TRANSPORTATION
WASTE DISPOSAL SITE [WDS]

PROVISIONAL CERTIFICATE NO. A 252284

S 1/2 Lot 1, Concession 11 - Township of Innisfil
Now in the Town of Innisfil
Arrow shows 20 Ac WDS parcel (Roll No. 18-200)
Information assembled by R.E. Young June 28, 1996]

BOUNDARY

18-190
70AC
C. FISHER

18-205
63AC
COUNTY OF SIMCOE

18-206
48 AC
TOMELL
INV. LTD.

18-213
15.05 AC
18-211
34 AC
W CHAPIN

18-216
100AC
C & T WIGHT

18-192

18-200
20AC

18-209
25AC

18-195

18-196

18-197

18-198

18-210

18-214

18-215

18-186
71 AC
COUNTY OF
SIMCOE

18-187
11.95AC

18-180
18-182
18-181

18-174
18-173
18-172
18-171
18-170
18-169
18-168
18-167

18-176
40AC
G CAMPBELL

18-165
200 AC
L. J. GAUDETTE

18-163
50 AC
J & K REZINICEK

18-183

18-184

136 AC
J & G CAMPBELL

18-126
18-124

18-128

18-132
94.23 AC
QUIN-TIN HOLDINGS LTD

18-136
102.44 AC
P. S. Mc ALPINE

18-137
53.101AC

18-134
18-135

Soil and groundwater quality meet the Table A (potable) criteria from the MOE *Guideline for Use at Contaminated Sites in Ontario*, and the source of potential future impacts (the waste) has been removed. Based on these reports there is no basis to suggest that past or future contamination of the soil and/or groundwater by hazardous wastes is expected.

In summary, it is our opinion that this landfill site, due to its characterization, closure and remnant buried waste removal in 2000, will not impact the proposed residential development located at the landfills north boundary line.

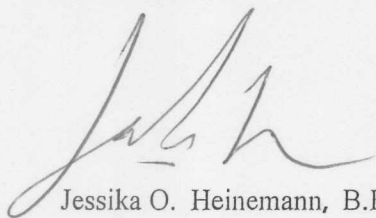
It is also important to indicate that this is a closed, remediated landfill. Therefore, further dumping or disposal will not be permitted. Thus, there is no concern with respect to the possible placement of additional landfill materials closer to the subject property at a later date.

We trust that this report adequately summarizes our recent assessment of the potential impact of this landfill site on the subject property and demonstrates that this site poses acceptable environmental risk for the proposed development of the subject lands with a residential addition. In accordance with the MOE Guideline D4 (Land Use on or Near Landfills and Dumps), we submit that no further investigation is required for the proposed development and that no control devices or facilities relating to the closed landfill site are required prior to development of the subject property.

If you should have any questions, or need further assistance, please do not hesitate to contact the undersigned.

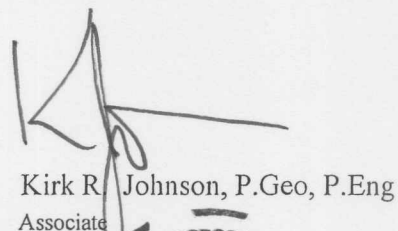
Sincerely,

Terraprobe Inc.



Jessika O. Heinemann, B.E.S

JOH/ct
Barrie Office



Kirk R. Johnson, P.Geo, P.Eng
Associate

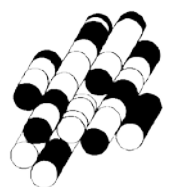


Terraprobe Inc.

Page 12

APPENDIX H

TERRAPROBE INC.

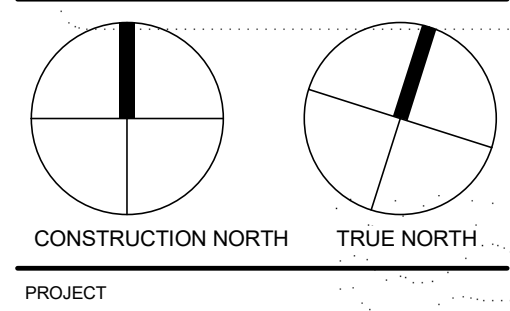


NO.	ISSUED	DATE
	CLIENT REVIEW	2022-01-12
	CLIENT REVIEW	2022-01-19

DO NOT SCALE DRAWINGS. USE ONLY DIMENSIONS MARKED. ISSUED FOR CONSTRUCTION. VERIFY CONFIGURATIONS AND DIMENSIONS ON SITE BEFORE BEGINNING WORK. NOTIFY ARCHITECT IMMEDIATELY OF ANY ERRORS, OMISSIONS OR DISCREPANCIES. CHAMBERLAIN ARCHITECT SERVICES LIMITED AND CHAMBERLAIN CONSTRUCTION SERVICES LIMITED HAVE SIMILAR OWNERSHIP. CHAMBERLAIN ARCHITECT SERVICES LIMITED HAS COPYRIGHT. CONSTRUCTING A SUBSTANTIALLY SIMILAR BUILDING WITHOUT PERMISSION MAY INFRINGE THE COPYRIGHT OWNERS RIGHTS. MAKING UNLAWFUL CHANGES TO PLANS AND DOES NOT NECESSARILY AVOID COPYRIGHT INFRINGEMENT. INFRINGEMENT IS NOT A DEFENSE TO COPYRIGHT INFRINGEMENT. ©

CLIENT
SCALE

RESIDENTIAL PARKING
Required Barrier Free Parking Over 100 spaces 1 space plus 3% of required parking spaces
Residential building containing more than 3 dwelling units 1.5 spaces per dwelling unit Met
COMMERCIAL PARKING
4.6.2.3 Parking - Multiple Uses
b) Multiple Uses in Commercial Zones: A minimum of 1 parking space per 24m² of gross floor area shall be required except where residential uses are in combination with another use, in which case the residential use components shall be at the rate identified in Table 4.6 and the additional multiple uses shall be at a rate of 1 parking space per 24m².
4.6.2.5.1 Notwithstanding any provisions to the contrary, structural columns in a parking structure may encroach into a parking space provided that the minimum width of the parking space is not less than 2.5m. Encroachment into the standard parking space width of 2.7m is not permitted where a wall, fence or similar full length obstruction is abutting any parking space. (By-law 2016-003)
COMMERCIAL LOADING SPACES
4.7.1 General Provisions
For any industrial or commercial use, permanent loading spaces shall be provided and maintained on the same lot in accordance with the following provisions:
Gross Floor Area Number of Spaces
1,000m² - 2,499m² 1 space
SMALL CAR PARKING
14.4.3 Parking and Driveway Regulations
Notwithstanding the provisions of Section 4.6.2 a maximum of 10% of the minimum parking spaces required for any non-residential parking may be for small vehicle parking spaces. Additional parking spaces provided over and above the minimum requirements may be for small vehicle parking. The dimension of a small vehicle parking space shall have a width of 2.3m and a length of 4.6m.
BICYCLE PARKING
14.4.2 Bicycle parking spaces shall be provided in accordance with the following:
a) A minimum of 0.2 spaces per unit shall be provided in all apartment units including walk-up apartments.
b) Additional spaces shall be provided for all non-residential uses in the NMu at a rate of one bicycle parking space for every 7% of required nonresidential vehicular parking spaces in the Neighbourhood Mixed Use zone.
Required 1.5 / unit x 407 unit = 611 parking
1 / 24m² x 1083 m² = 46 parking
Total 657 parking (21 to be barrier free)
Met
Required 0.2 / unit x 405 unit = 81 bicycle parking
46 Parking x 7% = 4 bicycle parking
Total 85 bicycle parking



BROWN BEAR APARTMENTS

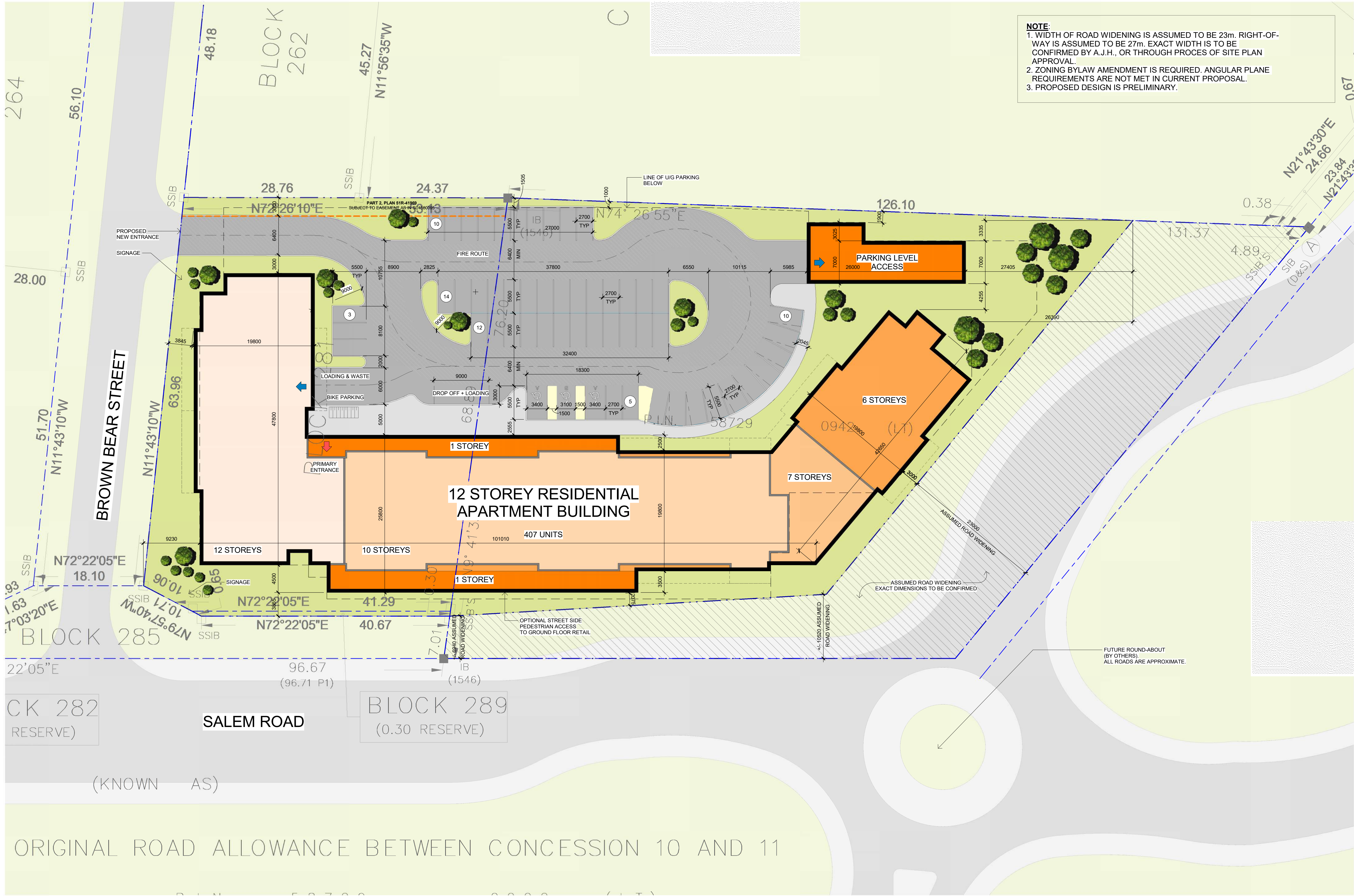
SALEM & ESSA ROAD
BARRIE, ON.

SHEET NAME

SITE PLAN

START DATE JAN. 2022
DRAWN BY MC
CHECKED BY LC
SCALE As indicated
PROJECT NO. 122001
DRAWING

A001



NOTE:
1. WIDTH OF ROAD WIDENING IS ASSUMED TO BE 23m. RIGHT-OF-WAY IS ASSUMED TO BE 27m. EXACT WIDTH IS TO BE CONFIRMED BY A.J.H., OR THROUGH PROCES OF SITE PLAN APPROVAL.
2. ZONING BYLAW AMENDMENT IS REQUIRED. ANGULAR PLANE REQUIREMENTS ARE NOT MET IN CURRENT PROPOSAL.
3. PROPOSED DESIGN IS PRELIMINARY.

1 SITE PLAN
A001 1:300

GROSS FLOOR AREA (SUMMARY)			
FLOOR SPACE	AREA (m ²)	AREA (ft ²)	%
COMMERCIAL	1083.3 m ²	11661 ft ²	4%
COMMON	5076.9 m ²	54648 ft ²	17%
RESIDENTIAL - UNITS	24105.1 m ²	259466 ft ²	89%
	30265.4 m ²	325774 ft ²	100%

SUITE MIX (SUMMARY)		
UNIT TYPE	COUNT	%
1 BR	164	40%
1 BR + DEN	179	44%
2 BR	57	14%
3 BR	7	2%
	407	100%

BICYCLE PARKING SCHEDULE		
LEVEL	DESCRIPTION	COUNT
T/O GROUND FLOOR	0.6m x 1.8m	8
T/O PARKING LEVEL 1	0.6m x 1.8m	78
TOTAL PARKING		86

PARKING SCHEDULE		
TYPE	DESCRIPTION	COUNT
T/O GROUND FLOOR		
ACC. PARKING (TYPE A)	3.4m x 5.5m	2
ACC. PARKING (TYPE B)	3.1m x 5.5m	1
LOADING	3.0m x 9.0m	1
TYPICAL PARKING	2.7m x 5.5m	51
		55
T/O PARKING LEVEL 1		
ACC. PARKING (TYPE A)	3.4m x 5.5m	6
ACC. PARKING (TYPE B)	3.1m x 5.5m	3
TYPICAL PARKING	2.7m x 5.5m	200
		209
T/O PARKING LEVEL 2		
ACC. PARKING (TYPE A)	3.4m x 5.5m	6
ACC. PARKING (TYPE B)	3.1m x 5.5m	3
TYPICAL PARKING	2.7m x 5.5m	200
		209
T/O PARKING LEVEL 3		
ACC. PARKING (TYPE A)	3.4m x 5.5m	6
ACC. PARKING (TYPE B)	3.1m x 5.5m	3
TYPICAL PARKING	2.7m x 5.5m	200
		209
TOTAL PARKING		682

SITE STATISTICS			
DESCRIPTION	AREA (m ²)	AREA (ft ²)	%
BUILDING FOOTPRINT			
BUILDING FOOTPRINT	3629.60 m ²	39069 ft ²	41.0%
	3629.60 m ²	39069 ft ²	41.0%
HARD LANDSCAPE			
ASPHALT	2375.64 m ²	25571 ft ²	26.8%
SIDEWALK	348.94 m ²	3756 ft ²	3.9%
	2724.59 m ²	29327 ft ²	30.7%
SOFT LANDSCAPE			
LANDSCAPE	2506.62 m ²	26981 ft ²	28.3%
	2506.62 m ²	26981 ft ²	28.3%
TOTAL SITE AREA	8860.80 m ²	95377 ft ²	100.0%