



Terraprobe

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

**LANDFILL IMPACT ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
LOT 1, CONCESSION 11, INNISFIL
(NORTHEAST CORNER HWY 27 AND SALEM ROAD)
BARRIE ANNEX LAND, ONTARIO**

Prepared for: DiPoce (Innisfil) Inc.
c/o MHBC Planning
13 Poyntz Street
Barrie, ON
L4M 3N6

Attention: Mr. Dan Amadio, BES, Senior Planner

**File No. 3-10-6080
October 12, 2010
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DiPocce (Innisfil) Inc.
c/o MNBC Planning
13 Poyntz Street
Barrie, ON
L4M 3N6

Attention: Mr. Dan Amadio, BES, Senior Planner

**RE: LANDFILL IMPACT ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
LOT 1, CONCESSION 11, INNISFIL
(NORTHEAST CORNER HWY 27 AND SALEM ROAD)
BARRIE ANNEX LAND, ONTARIO**

Dear Sir:

We are pleased to provide our assessment of the potential impact from a closed landfill site on a proposed residential development located at the northeast corner of Highway 27 and Salem Road, Lot 1, Concession 11, Town of Innisfil, Barrie Annex Lands, County of Simcoe, Ontario (see Figure 1). The subject land is within 500m of a closed Private landfill site. Therefore, an assessment with respect to MOE Guideline D-4 has been requested by the County of Simcoe.

The purpose of the assessment undertaken was to characterize the local and regional geologic and hydrogeologic conditions around the proposed residential building site and determine the likelihood of any adverse effect particularly with respect to leachate generation and/or methane gas generation impacting the proposed works.

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EXECUTIVE SUMMARY

Terraprobe was retained to carry out a D4 Landfill Impact Assessment for an approximate 66 acre (27 ha) proposed lot for residential development at the northeast corner of Highway 27 and Salem Road, Lot 1, Concession 11, Innisfil, Barrie Annex Lands, Simcoe County, Ontario (see Figure 1).

The subject lands are within a 500m zone from a closed landfill site. The subject lands are located adjacent to former MTO landfill site (Holly) number A252204.

The Holly landfill site abuts the subject lands to the southeast at 4165 Salem Road, Lot 1, Concession 11, Barrie Annex lands, County of Simcoe, Ontario.

An MTO landfill site was operated under Certificate of Approval Number A252204 issued by the Ministry of the Environment of Ontario (MOE). The subject property received MTO (Ministry of Transportation) road wastes including: street sweepings, concrete and culverts, catchbasin cleanouts, sand, gravel, inert fill, asphalt, waste aggregate highway/picnic related refuse including wood, paper, glass and metal.

The MTO acquired the site in 1946, and the last waste was deposited in 1992, although most of the waste deposition occurred in the 1970's.

The MTO applied and received approval for a WDS (waste disposal site) in 1972 to dispose of roadside garbage; the WDS is 5 acres of a 40 acre parcel and the 35 remaining acres were used as a gravel pit. The waste has reportedly been removed.

The waste disposal site has a total area of 8.1 ha. Only 2.0 ha were used for waste disposal. 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.

This site has been remediated and all waste deposited has been removed and 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*.



Since the late 90's several hydrogeological and environmental assessments of the landfill site including Geophysical Surveys, extensive Monitoring Plans, an Environmental Investigation, a Phase II ESA and an Operations and Closure Plan were conducted by various consulting firms.

Terraprobe has retained via the Freedom of Information Act, a box full of correspondence, reports and assessments between the MTO, MOE and their respective Consultants.

The site was characterized, hydrogeological conditions assessed, methane gas, leachate and lateral extent of the waste etc. were all evaluated and reported in a number of reports and pieces of correspondence. The waste was also removed and confirmatory sampling has indicated that there is no potential impact on the surrounding areas.

Pertinent excerpts from these pieces of correspondence have been appended as reference for this report.

Correspondence between MTO, MOE and Consultants concluded in 2001 that all waste deposited at this site over the years of operation has been removed and the site cleaned up to Table A criteria.

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.

The studies/reports conclude that the residential development of the lot should be able to proceed without any adverse impacts on or from the landfill site. All waste and contaminated soil has been removed from the site. Groundwater and soil sampling confirm that the Holly landfill site meets Table A criteria as outlined in the Guideline for Use at (Contaminated) Sites in Ontario

The groundwater quality in the landfill has been monitored since 1994 and no significant impacts have been noted over these years. 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.



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.

This D4 Study has been carried out for DiPoce (Innisfil) Inc. c/o MHBC Planning for lands adjacent to the landfill. Using information from the existing closed landfill site to the northwest of the subject lands a D4 Study has been conducted in accordance with the guidelines presented by the Ministry of the Environment.



1. BACKGROUND

The proposed development site is to be located on the north side of Salem Road, east of Highway 27 and is legally described as Part Lot 1, Concession 11, Township of Innisfil, Barrie Annex Land, County of Simcoe, as shown on Figures 1 to 3.

The proposed residential development will be serviced with municipal water and sewage. The site is currently vacant, undeveloped land. There are no fixed plans for the proposed development.

It has been identified that the closed private landfill site indicated in the Ministry of Environment Registry is located within 500m of the proposed development.

It is reported in the June 1991, Waste Disposal Site Inventory that the landfill site #A252204's official closing date was September 1, 1980. In correspondence between MOE and AMEC in 2001, it was stated that the last waste deposited was in 1992, although most of the waste deposition occurred in the 1970's. The Holly landfill previously accepted MTO associated road wastes including street sweepings, concrete and culverts, catchbasin cleanouts, sand, gravel, inert fill, asphalt, waste aggregate highway/picnic related refuse including wood, paper, glass and metal. 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.

An extensive assessment of the closed landfill was conducted by Gartner Lee, AMEC, Dames and Moore Canada, AGRA, Geomar Inc. and Trow Consulting Engineers Ltd. for the owner (MTO) with Ministry of the Environment involvement. Several reports and/or correspondence associated with the landfill site assessment as summarized below. Excerpts are also appended.

- Appendix A: Electromagnetic Survey: Geomar Geophysics Ltd., dated April 1994
- B: Environmental Investigation: Trow Consulting Engineers, dated May 24, 1995
- C: Operations and Closure Plan: Trow Consulting Engineers, dated May 24, 1995
- D: Installation of Observation Well No. 6 Dames & Moore Canada, dated October 30, 1996
- E: Appendix A Hyd-Eng. Inc. Geophysical Survey Report, dated June 21, 1999



- F: Phase II Environmental Site Assessment: AGRA Earth & Environmental Limited,
dated November 1999
- G: Report on Separation of Solid Foreign Material
- H: MOE Correspondence

In October 1996, a new water well (6 of 6) was drilled on the subject property to account for vertical hydraulic gradient at the landfill site. The water well was advanced to a depth of 16.2m. A return visit concluded that groundwater in sand and surrounding till was under the influence of Unit Gradient.

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.

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.

Dames & Moore concluded in November 1996:

A review of the data indicates that local groundwater quality is not being adversely affected by waste disposal at the Holly landfill site. 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.

Gartner Lee Limited concluded in 1997 (Dec 15):

Groundwater 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 elevated nitrate observed at the Holly site may also be attributed to agricultural uses in the area and/or to the naturally elevated nitrates.

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.

Based on the low levels of leachate 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 affects on the surrounding groundwater regime based on the *Reasonable Use Guideline* concentrations calculated in the Environmental Investigation - MTO Holly Pit Waste Disposal Site, Trow Consulting Engineers Ltd., May 1995. This is further demonstrated at the downgradient monitor OW5, which shows no leachate effects. Please see AMEC's Figure 2 for MW location.

2. LANDFILL SITE SETTING

A review of the available reports for the site in question was undertaken by Terraprobe as part of this assessment. Terraprobe obtained a box of correspondence and reports through the Freedom of Information Act via the MOE. The Ministry of Transportation obtained rights to use the lands on the south half of Lot 1, Concession 11 in the Township of Innisfil. The MTO obtained the lands in 1946. It is reported that the majority of the waste was deposited in the 1970's; the last waste was deposited in 1992. This was conducted under a Ministry of Environment Certificate of Approval A252204. This certificate, dated August 19, 1976 allowed for the disposal of domestic and commercial wastes. The waste received at the site included: street sweepings, concrete and culverts, catchbasin cleanouts, sand, gravel, inert fill, asphalt, waste aggregate highway/picnic related refuse including wood, paper, glass and metal. The estimated quantity of the waste was a total of 50 tonnes per year. The site was to operate 2 days per week. The entire Holly landfill site (including buffer) was 8:1 ha; 2.0 ha used for waste disposal. The Holly landfill site was also formerly occupied by a mobile asphalt plant and also used as a sand and gravel pit.

Wastes were deposited near the centre of the site; the sand pit was located at the north end of the site.

The areal extent of deposited waste (four separate areas) was estimated to be approximately 16,300m² (0.8



acres) and fell within the boundaries of the former Holly Pit and the adjacent property to the west. Approximately 11500m³ of refuse and waste materials were deposited at the site.

Soil samples submitted for O. Reg. 347 Leachate Analysis have concluded that the soils were non-registerable, non-hazardous solid wastes.

AMEC, AGRA and Trow were commissioned by the MTO to conduct studies to assess and characterize the landfill, to remediate the landfill site through the removal of all waste and to confirm the site has been remediated to Table A standards of *Guideline for Use at Contaminated Sites in Ontario*.

It has been confirmed that all waste has been removed from the Holly landfill site. 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

The balance of the site has more recently been unused vacant land.

AMEC's report (2000 Spring Monitoring Program) summarized 2000 groundwater chemistry for the six (6) onsite monitoring wells and concluded that OW-2 exhibited elevated nitrate concentrations above the Reasonable Use Guideline.

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.

The concentrations of leachate-related parameters (ie., iron, nitrate, DOC, TKN) in the monitoring wells within the landfill area are lower than the RUG 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 RUG but was below the ODWO and OW-4B. However, none of the



affected wells are at or near the downgradient property boundary. Please see AMEC's attached Figure 2: Site Plan for monitoring well locations.

No groundwater impacts were found at or near any of the property boundaries with respect to the RUG at the Holly site.

AMEC, on behalf of MTO, has completed the remediation of the Holly site.

Gas vapour monitoring was carried out by Trow using an MSA Model 60 (methane) and an HNU Photo Ionization Detector (non-methane), on May 24, 1994 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.

3. SUBSURFACE CONDITIONS

The subsurface conditions encountered in the Simcoe Lowlands are well documented. The subject lands are located within the Lake Simcoe Basin. Sand, silt and clay are common deposits to the area. The subject lands are situated within the Newmarket Till deposit characterized by sandy silt to silt matrix, moderate to high in matrix carbonate content, clast content moderate to high. The ground water table was identified as being generally 1m to 2m below grade.

The landfill site is located on the west edge of a topographic high point. Based on this location it is expected shallow groundwater flow is relatively flat and will directionally travel towards the north/northwest of the topographic high as identified in the Phase II report conducted by AGRA and the Environmental Study conducted by Trow.

Leachate and landfill gas monitoring has been conducted within the landfill site boundaries and has not indicated any significant concentration of groundwater or soil vapour contaminants migrating any direction



from the landfill site. Trow concluded that the leachate generated at this site is considered likely to be very weak and the natural dilution processes will be adequate to ensure regulatory compliance.

During the final assessment of the landfill characterization, MOE in their review of the Remediation Report prepared by AMEC, concluded that all waste deposited at this site over the years of operation have been removed and the site cleaned up to Table A criteria.

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.

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.

4. Review

Terraprobe has reviewed the following; Electromagnetic Survey: Geomar Geophysics Ltd., dated, April 1994; Environmental Investigation: Trow Consulting Engineers, dated, May 24, 1995; Operations and Closure Plan: Trow Consulting Engineers, dated, May 24, 1995; Installation of Observation Well No. 6; Appendix A Hyd-Eng. Inc. Geophysical Survey Report, dated, June 21, 1999; Phase II Environmental Site Assessment: AGRA Earth & Environmental Limited, dated November 1999; Report on Separation of Solid Foreign Material; MOE Correspondence, which relate to the surrounding lands and landfill site in question.

Based on review of these documents, our review of geologic and topographic mapping and our review of previous records for the closed landfill in relation to the subject property, we provide the following observations/summary points of interest;

- Geological mapping of the area indicates that both the subject property and closed landfill site are located on glaciolacustrine deposits of primarily sand, gravelly sand & gravel of the Pleistocene Era.



- The waste disposal site has a total area of 8.1 ha. Only 2.0 ha were used for waste disposal. 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.
- The landfill site and the subject property share a boundary line. The subject lands are proposed for residential development. No plans are currently available.
- The landfill has been constructed on the west edge of a topographic high with relatively flat groundwater flow; inferred to be towards the north/northwest. The groundwater in sand and surrounding till is reported to be under the influence of Unit Gradient.
- The groundwater quality in the landfill has been monitored since 1994 and no significant impacts have been noted over these years. 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 a remedial action plan.
- This site has been remediated and all waste deposited has been removed and sampling of groundwater and soils has confirmed that the site meets Table A criteria for residential and parkland use as outlines in the Guideline for Use at Contaminated Sites in Ontario.
- Studies basically conclude that the residential development of the lot should be able to proceed without any adverse impacts on or from the landfill site. All waste and contaminated soil has been removed from the site.
- Based on the low levels of leachate 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 affects on the surrounding groundwater regime based on the Reasonable Use Guideline concentrations calculated in the Environmental Investigation - MTO Holly Pit Waste Disposal Site, Trow Consulting Engineers Ltd., May 1995. This is further demonstrated at the downgradient monitor OW5, which shows no leachate effects.



5. DISCUSSION WITH RESPECT TO MOE GUIDELINE D4 (Land Use On Or Near Landfills And Dumps)

The D4 Guideline is essentially intended to protect the health, safety, convenience and welfare of residences from potential adverse effects from landfills and dumps by restricting or controlling land use in their facility. Since the subject property is within 500m of a closed landfill site, some form of assessment is warranted.

The 500m distance is somewhat arbitrary but has been adopted as a reasonable conservative zone of influence in most cases.

In reference to Section 4 “Environmental Conditions”, the existing site, would be categorized as indicated in 4.2 as a “non-operating” site. Reports obtained by Terraprobe through the FOI Act indicate that the site was fully remediated in 2001. The guidelines suggest that in these circumstances it is important to consider ground and surface water contamination by leachate, surface runoff, ground settlement, visual impact, soil contamination and hazardous waste and landfill generated gases.

In particular, attention needs to be given to the production and migration of methane gas at the site.

The combination of the reports and assessments carried out by Trow, AMEC, Dames & Moore Canada, AGRA, Hyd-Eng and Geomar provides sufficient information to suggest that there should not be any adverse effect to groundwater, soil or methane generation associated with this landfill as it would pertain to the proposed development of the subject lands. As indicated in MOE correspondence dated April 27, 2001 all waste deposited at this site over the years of operation have been removed and the site cleaned up to Table A criteria.

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.

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.



With respect to Guideline D-4, the factors discussed above have been assessed for this site addressing potential adverse effect including; a hazard or health/safety risk; a nuisance to main; and/or degradation of the natural environment.

- A. Soil gases have been monitored by Trow within the landfill site in installed monitoring wells/gas probes. As described above, measured gas vapour readings were non-detectable.

Landfill gas is a by-product of decomposing organic matter. Methane moves readily through porous, granular soils such as those encountered at the site. Boundaries to methane migration include saturated zones and improvisions layers such as frozen ground. The readings were taken in May 1994.

- B. Based on the review of previous reports, it does not appear that any migration of leachate has occurred towards the west and northwest of the landfill within the shallow groundwater in the overburden soils.

The groundwater quality in the landfill has been monitored since 1994 and no significant impacts have been noted over these years. No putrescible waste 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.

The concentrations of leachate-related parameters (ie., iron, nitrate, DOC, TKN) in the monitoring wells within the landfill area are lower than the RUG values calculated by Trow (1995b).

The groundwater flow direction under static conditions has been documented. The landfill has been constructed on the west edge of a topographic high with relatively flat flow; inferred to be towards the north/northwest. The groundwater in sand and surrounding till is reported to be under the influence of Unit Gradient.

Leachate and landfill gas monitoring has been conducted within the landfill site boundaries and has not indicated any significant concentration of groundwater or soil



vapour contaminants migrating any direction from the landfill site. Trow concluded that the leachate generated at this site is considered likely to be very weak and the natural dilution processes will be adequate to ensure regulatory compliance.

- C. Surface runoff from the landfill site will be to the north and northwest following surface topography. The subject property is located downgradient of the landfill site; the site has been remediated and meets Table A of the MOE *Guideline for Use at Contaminated Sites in Ontario*. There is no potential impact from surface runoff from this landfill to the subject property associated with the previous landfill waste.
- D. The potential for ground settlement must be addressed as part of a D4 assessment. The subject property is not located on the landfill material and is therefore not prone to settlement issues associated with degradation of loose and/or organic fills. Any future settlement and/or ponding of the landfill area will have no affect on the proposed residential development. All deposited wastes have been removed from the Holly landfill.
- E. The proposed development site is currently protected by a significant visual buffer of treed landscape from the landfill site. The landfill site is currently vacant, unused land and overgrown grasses, brush and small shrub growth that has developed in the last 10 to 30 years.

It is not anticipated that this site will ever be 'active' again. A formal application by the landfill owner to the MOE has been filed to officially close off the landfill with the correct identifying boundaries. In this regard, no noise, odours or blowing of loose waste related to landfill operations is anticipated at this site; all waste materials have been removed.

- F. 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.



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.

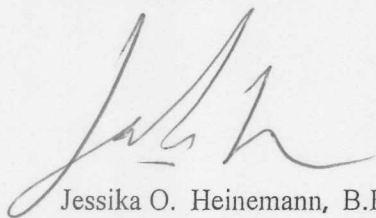
It is also important to indicate that this is a closed, remediated landfill. Therefore, further dumping or disposal will not be permitted. Thus, there is no concern with respect to the possible placement of additional landfill materials closer to the subject property at a later date.

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.

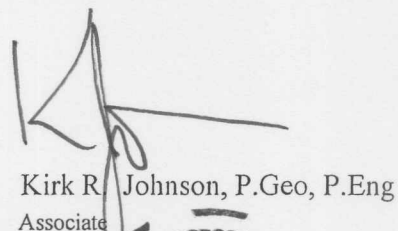
Sincerely,

Terraprobe Inc.



Jessika O. Heinemann, B.E.S

JOH/ct
Barrie Office

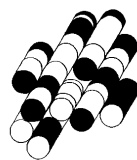


Kirk R. Johnson, P.Geo, P.Eng
Associate



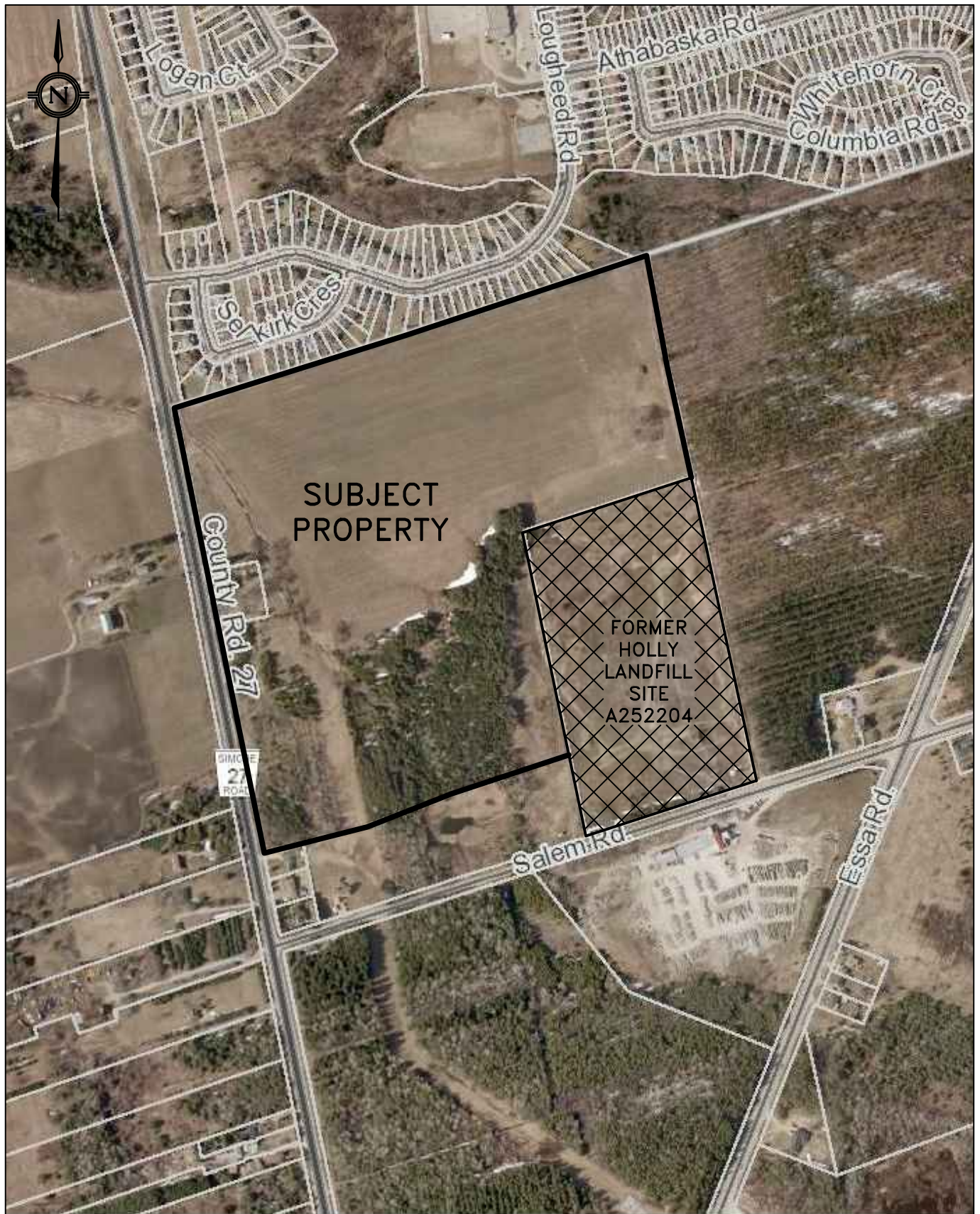
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FIGURES



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SITE FEATURES PLAN

3-10-6080

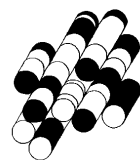


AUGUST 2010

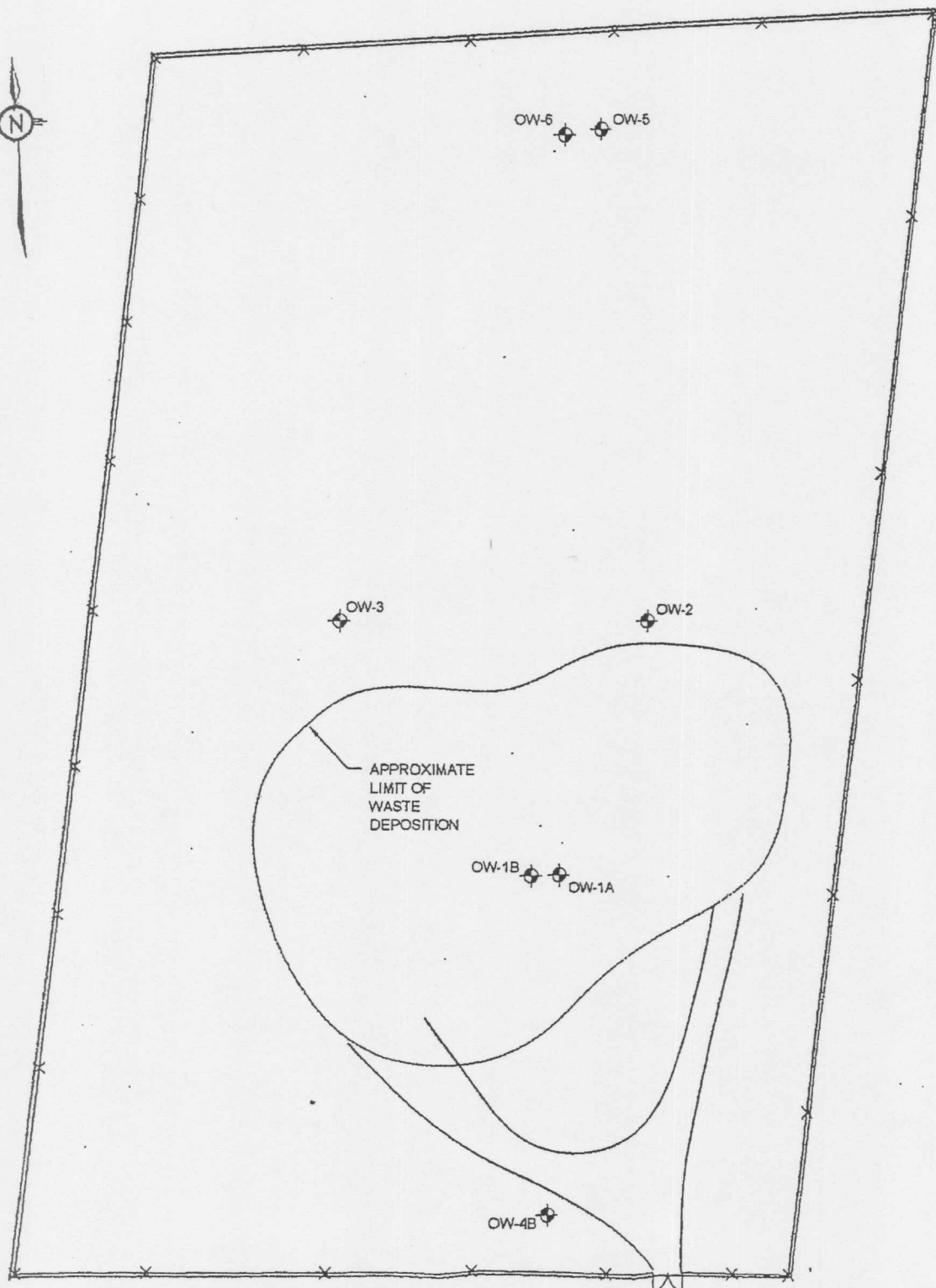
LANDFILL SITE LAYOUT

3-10-6080

APPENDIX A



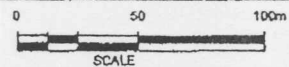
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TOWN OF INNISFIL CONCESSION 11

LEGEND

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



ONTARIO MINISTRY OF
TRANSPORTATION
SIMCOE COUNTY LANDFILL SITES
HOLLY LANDFILL SITE

SITE PLAN
A00009147 176

Ministry of the
Environment

Ministère de
l'Environnement

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April 30, 2001

Ministry of the Environment
Environmental Assessment and Approvals Branch
2 St. Clair Ave. West, Floor 12A
Toronto, Ontario
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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 1-07-33, 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.

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).

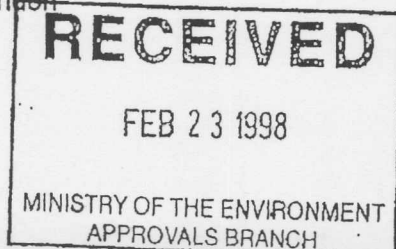
The latest Certificate of Approval for a Waste Disposal Site received from your Ministry (March 28, 1980) is also attached for your information (Attachment B). At this time, MTO would like to have the Certificate of Approval revoked. The waste on the site has been removed as cited above. We have no intention 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 23 1998



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]

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**

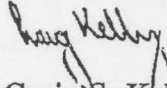
Enclosed are the results of the fall 1996 monitoring of the ^{s.N/R} Pit, and ^{s.N/R} Disposal Yards. ^{s.N/R} Holly

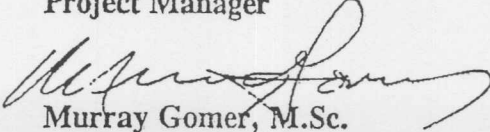
A review of the data indicates that local groundwater quality is not being adversely affected by waste disposal at these three sites. It is recommended that monitoring continue at the ^{s.N/R} site, as this site still periodically receives waste. It is also recommended that the Holly Pit site be monitored 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

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.

MINISTRY OF TRANSPORTATION
WASTE DISPOSAL SITE [WDS]

PROVISIONAL CERTIFICATE NO. A 252294

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

13.6 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
53.101 AC

18-134
18-135

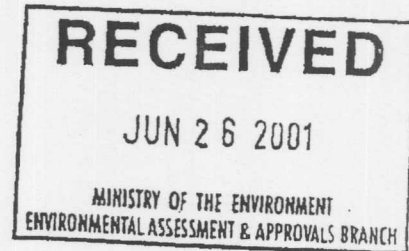
A0009146_105



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/

AMEC Earth & Environmental Limited
Traders Blvd. East, Suite 110
Mississauga, Ontario
L4Z 3K7
+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.

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



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.



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).

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.



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.