Prepared By:

Municipality Of West Grey

Annual Monitoring Report (2022) - Neustadt Landfill Site
MECP Certificate of Approval No. A2610-01

GMBP File: 213090

April 2023

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ANNUAL MONITORING REPORT (2022) - NEUSTADT LANDFILL SITE

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1. INTRODUCTION

The Neustadt Landfill Site is located on Part of Lot 3, Concession 14, on the east side of Hanover Road in the geographic Town of Neustadt, Former Normanby Township, Municipality of West Grey, where shown on Figure 1. According to the County mapping and available reports previously completed for the Site, the closed Neustadt Landfill Site is currently comprised of an area of approximately 2.9 hectares (7.26 acres), of which 0.45 hectares (1.1 acres) was used for landfilling. The landfill site is currently maintained by the Corporation of the Municipality of West Grey.

The Neustadt landfill site operated as a small rural landfill until 1992, at which time it was closed and capped. It has been inactive and has received no additional waste since that time. The area surrounding the landfill property is characterized by mixed use properties, including commercial, agricultural, and residential, which are serviced by the Municipal water system. The site is currently monitored annually under Ministry of the Environment, Conservation and Parks (MECP; formerly the MOE(CC)) Provisional Certificate of Approval (for the closure of the landfilling site) No. A2610-01, enclosed in Appendix A. An annual monitoring report, summarizing the monitoring results from previous years, is to be prepared and submitted to the MECP by May 31st each year. This annual report is being submitted to satisfy the recommended reporting requirements for the closed Neustadt Landfill site for 2021.

2. GENERAL SITE OPERATIONS

Based on a review of historical operations and information provided by the Municipality, it is understood that the landfill accepted only non-hazardous solid waste consisting primarily of domestic and municipal waste. In order to satisfy Condition 1 of the existing *Certificate of Approval for the closure of the landfilling site*, final grading and capping of the entire landfill area was reportedly completed in 1992. Capping of the fill area ensures the waste is unexposed, thus reducing infiltration and the subsequent generation of leachate. Based on the issuance of a CofA for landfill closure, it is understood that final closure of the Neustadt Landfill Site was completed in consultation with the MECP and as per the standard landfill closure practices (i.e. Closure Plans and/or documentation) that were applicable at that time (i.e. the early 1990's).

According to the previous Hydrogeologic Report prepared by Morrison Beatty Limited, landfill operations were to consist of 6-meter-deep trenches and, by 1990, the trench-filling method was nearing its end. A test-pitting program conducted by Henderson, Paddon and Associates (HPA) in 2005 provided greater certainty with respect to the defined footprint and nature of waste. The footprint of waste, as interpreted by the results of the test pit program, is depicted on Figure 2, and a cross-section (section locations are outlined on Figure 2 (i.e., A-A')), showing the interpretation of the results of the test pit program, as per HPA, is provided on Figure 3. It is noted that the vertical limit of waste was below the test pit bottom depth, as a result, the interpreted bottom of waste contour reflects the 6-meter-deep trenches referred to in the Morrison Beatty report. This would suggest that the groundwater table has the potential to intersect the base of the refuse pile. Furthermore, the test pits revealed that the covered waste is comprised mainly of cans, glass, scrap metal, and bricks with minor amounts of wood, wrappers, and plastic bags. During the period of operation, waste was typically burned as a normal practice and typical part of landfilling at that time.

Common protocol for closed landfill Sites requires that the site be inspected on a regular basis following Site closure by the owner and/or consultant. It is recommended that Site inspections be completed in conjunction with the required monitoring program, and should ensure the following items are inspected:

(i) potential settlement areas;
(ii) the final cover and vegetation;
(iii) site aesthetics;
(iv) site security (i.e. fencing);
(v) drainage; and
(vi) rodent control.

Settlement areas causing surface ponding should be filled and covered with topsoil and vegetation to promote drainage. During the sampling program for the current monitoring period, no leachate seeps were observed, and the ground cover system and site drainage continued to appear adequate.

3. SUMMARY OF SITE SETTING

3.1 Site Setting

The Site historically operated as a small rural landfill until final closure in July 1992. The property is situated on Part of Lot 3, Concession 14, in the former Normanby Township, County of Grey, in the northerly portion of the geographic town of Neustadt. The Landfill footprint is located on the southeasterly portion of the property and occupies approximately 0.45 ha within the 2.9 ha site, as shown on Figure 2. The landfill is now closed, capped and covered with various grasses and some shrubs.

The Site is surrounded by mixed use properties, including residential, agricultural, and commercial. On the southwest portion of the property is a municipal Fire Hall with road access to Hanover Road (County Road 10). It is noted that the area adjacent to the landfill property is serviced by a municipal water system that obtains its raw water from a groundwater supply. The municipal wells are located approximately 1 kilometer to the south of the Site. Furthermore, prior to the provision of a municipal water supply system, a former water supply well was located on the west portion of the Site which serviced the Fire Hall. The Fire Hall well was reportedly decommissioned in 2004 in accordance with Ontario Regulation 903.

The landfill mound was reportedly constructed by placing refuse into the side of a natural ridge or terrace formation. The landfill now forms a slope from the upper reaches of the terrace, down towards the northwest, into a localized marshy wetland area which is part of the Meux Creek floodplain. The floodplain area, within which a pond exists, is generally flat with a gentle slope towards the north and west. At the northwest corner of the Site, a shallow channel emerges and conveys surface water from the wetland area into the roadside ditch that is situated along County Road 10.

A D4 Study for the closed landfill site was completed by GM BluePlan Engineering Limited (GMBP, formerly Gamsby and Mannerow or G&M) in 2008 as a planning provision. Based on the findings of the D4 Study, development on the properties surrounding the landfill site is controlled through the municipal planning process.

3.2 Geologic Conditions

The landfill is located within the physiographic region known as the Horseshoe Moraines (Chapman and Putnam, 1973). The region is covered by a complex of till ridges, kame-moraines, outwash plains, and spillways, interspersed with more smoothly moulded till plains and drumlinized areas. The tills of the area tend to be loamy (i.e., fine-grained) and contain numerous stones and boulders. According to physiographic mapping, the site is situated along a former glacial spillway.

According to the *Grey and Bruce Counties Groundwater Study* (2003), the bedrock in the area belongs to the Upper Silurian Salina Formation which is characterized by interbedded grey-brown limestone and bituminous shale. Reportedly, the bedrock in the area is approximately 10 to 44 meters deep and generally slopes to the west. Based on information from previous reports, the bedrock to the west of the landfill (i.e. Firehall Well) was found to be at approximately 31 m below ground surface (mbgs). The groundwater flow within the bedrock unit in the vicinity of the Site is reported to be in a northwesterly direction.

3.3 Overburden Characteristics

Based on the borehole logs (Appendix C) and the detailed discussion provided in the Hydrogeologic Report prepared by Morrison Beatty (August 1990), the shallow overburden at the Site can be primarily described as glaciolacustrine deposits characterized by a sequence of silt, clayey silt and sandy silt, ranging from 11 to 13 meters in depth. It is noted that, although a distinct change in color from brown to grey is noted at approximately 3 mbgs, the composition of the shallow overburden unit remains the same. The Elma Till, which underlies the shallow overburden silt unit, is a compact to dense grey stony silt. This unit was encountered at three locations (i.e. OW-1 [former location in proximity to MV-4], OW-2 and OW-3 series wells) at elevations in the range of 271 to 278 masl. The surface of the Elma Till unit, below the landfill, reportedly dips to the west and is herein referred to as the deeper overburden.

Additionally, it is noted that in 1987 three test pits were completed to a depth of 3 to 4 meters within the low wetland area to the west of the landfill. Consistent with the location of the test pits within the old floodplain of Meux Creek, layers of gravel and stiff blue clay interpreted to be of a more recent alluvial origin were identified. No evidence of gravel or clay was found in the boreholes to the west of the landfill which were drilled at higher elevations above the level of the wetland.

The hydraulic conductivity, obtained using the Hvorslev Method of interpreting slug tests, for three site wells screened within the shallow overburden was determined to be in the range of 2.0×10^{-5} to 2.6×10^{-5} cm/sec. Based on the information available, the hydraulic conductivity of the deeper overburden is likely in the range of 10^{-8} cm/sec, or less.

It is noted that a more detailed description of the overburden characteristics, including additional cross-sections, is provided in the Hydrogeologic Report prepared by Morrison Beatty (August 1990). As site conditions generally remain the same, the site geology and hydrogeology discussions therein remain relevant. As a result, the reader is referred to the Hydrogeologic Report for a more detailed assessment.

3.4 Hydrogeologic Conditions

3.4.1 Groundwater

In 1989, a total of nine monitoring wells were initially installed at the Neustadt Landfill Site by Morrison Beatty Consulting Engineers. In 1993, seven of these original monitoring locations were found to be vandalized, (i.e., missing and/or destroyed). Following consultation with the MECP, GMBP installed 5 new/replacement monitoring wells, including GM2-3, GM2-9, GM3-7, GM3-12 and GM5-3 in June 1994. Where possible (i.e., OW3), the former well locations were filled with bentonite in order to properly seal them off.

Currently, ten (10) monitoring wells are sampled once annually in the fall including the nine installed by GMBP (four of which were newly installed in 2019 in consultation with the MECP) and one of the original monitoring locations (i.e., OW4-3). Groundwater monitoring locations are presented on Figure 2 and the borehole logs and well installation details for the existing monitoring wells are provided in Appendix C. Based on the information available, the wells are screened at various depths within the shallow overburden unit which is generally characterized by the native silty soils.

Water levels are measured in all available wells during each monitoring event to determine the direction of groundwater flow at the landfill site. Historical water level elevations, including the most recent data, are provided in Table 1 and a groundwater contour plan is provided on Figure 4.

Consistent with the topography, historical and current groundwater monitoring at on-site wells indicates that the shallow groundwater flow direction is to the northwest. Based on the Hydrogeologic Report (August 1990), the site is on the edge of a recharge-discharge boundary, such that the upland area (i.e., the area around the landfill) is a local groundwater recharge area (i.e., a downward hydraulic gradient) and groundwater discharge (i.e., an upwards gradient) is exhibited downgradient of the landfill, within the low-lying flat areas of the property. The groundwater eventually flows to Meux Creek. These observations are consistent with water levels measured at nested well locations and the existence of the wetland and surface water features on the westerly portion of the site.

As the plan of operation reportedly stipulated 6 meter deep trenches, it appears that the refuse depth may have intersected the water table. Based on estimates by Morrison Beatty (August 1990), the estimated saturated refuse thickness may be up to 2 meters depending on seasonal variation and fluctuations in the groundwater table. Furthermore, based on the overburden thickness of approximately 11 to 13 meters, the lower permeability of the underlying Elma Till unit compared to the shallow silt unit, and the upwards gradients noted within the western portion of the site, it is reasonable to expect that there would be no impacts to the deeper groundwater system, including the deeper overburden unit and the bedrock. Therefore, it is inferred that groundwater recharge from the landfill footprint would likely become part of the shallower groundwater system, and as groundwater flows to the northwest, it would subsequently discharge to the wetland features.

3.4.2 Surface Water

Surface water from the landfill flows from southeast to northwest across the Site and drains towards Meux Creek. The Site is located within the Meux Creek drainage basin. Meux Creek joins Carrick Creek approximately 3 kilometres north of Neustadt, and eventually discharges into the South Saugeen River.

The Site has a small pond located centrally on-site and a larger pond on the northern portion of the property associated with a wetland system. The pond intersects the shallow groundwater table of the wetland and has no apparent inlets and outlets. Flows from the Site are directed to the northwest of the site into a roadside-ditch drainage system. The ditch system eventually connects to Meux Creek, located approximately 200 metres to the west of the site.

A tile drain reportedly extends from the fields upgradient of the landfill, beneath the landfill, and discharges near the base of the landfill, into a wetland area (monitoring location S-1). Surface water from the south enters the site via a ditch and culvert system (monitoring location S-3), which directs flow into the central pond (refer to Figure 2). Water from the central pond is directed to the northerly wetland and larger pond, prior to discharging to the roadside ditch (monitoring location S-2) and Meux Creek surface water systems.

4. WATER QUALITY MONITORING

4.1 Monitoring Program

Groundwater monitoring at the Neustadt Landfill site was first completed in 1989 from a similar network of wells situated within the current 2.9 hectare area of the Site. Based on the Hydrogeologic Report, the active area of landfilling was directly upgradient of OW5-3 at that time. A more formal groundwater and surface water monitoring program was established in 2001. The monitoring program is conducted to evaluate the impacts landfill leachate may potentially have on the water resources in the vicinity of the Site. Initially, the annual monitoring program consisted of twice annual sampling that was required from the seven (7) monitoring locations and from two surface water sampling locations (i.e. S-1 and S-2). A third surface water sampling location was added as a reference for background surface water quality in 2003 (i.e., S-3). Based on recommendations in the 2005 Annual Report and with concurrence from the MECP provided in correspondence dated September 7, 2006 (provided in Appendix B), starting in 2007 the sampling frequency was reduced to once annually in the fall. Four additional groundwater monitoring wells were installed in 2019 downgradient of the landfill footprint, as presented on the attached Figures. The locations, depths, and screen intervals for the newly installed monitoring wells were determined based on specific consultation with the MECP regional hydrogeologist.

Based on the analytical parameters established by HPA (reference Table is provided in Appendix B) and the requested inclusion of potassium and total dissolved solids (TDS), as stated in correspondence from the MECP dated September 4, 2014, the current monitoring program includes the following groundwater and surface water quality parameters:

Groundwater:
pH, conductivity, hardness, alkalinity, phenols, dissolved organic carbon (DOC), chloride, sulphate, nitrite, nitrate, ammonia, TKN, TDS and metals (i.e. Ca, Fe, Mg, K, and Na).

Surface Water:
pH, conductivity, alkalinity, phenols, chloride, total ammonia, iron, potassium, TDS and total phosphorus, as well as the measurement of the field temperature, pH and dissolved oxygen.

Since 2007, methane gas monitoring has also been conducted once annually in the fall, typically in conjunction with the annual water sampling. There are currently six (6) methane gas probes at the Site including GM2-9 and GM3-7, installed in 1994, and MV-1 through MV-4 which were installed in 2008 to monitor methane gas production within the fill area (i.e., MV-3) and along the eastern and southern compliance limits, where shown on Figure 2.

During the current monitoring period, the groundwater, surface water, and methane gas monitoring was completed on September 28th. Summaries of the historical groundwater and surface water analytical results, updated with the 2022 data, are provided in Appendix D and Appendix E, respectively. The laboratory Certificates of Analysis for the current reporting period is included in Appendix F.

4.2 Sampling Procedures

For the groundwater sampling, the static groundwater level and well depth are measured in each monitoring well prior to purging three casing volumes of stagnant water from each monitoring well. GMBP personnel also check to ensure that all monitoring wells are properly secured and in compliance with O.Reg. 903. After purging, monitoring wells are allowed to recharge with fresh groundwater before sampling occurs. Groundwater purging and sampling is conducted using dedicated Waterra™ tubing and inertial-type pumps. Samples are collected in laboratory supplied containers and are kept chilled following completion of the sampling program and sent within 24 hours of the sampling event to Bureau Veritas Laboratories (BVL) in Mississauga for analysis. Samples collected for metals are placed in laboratory supplied containers without preservative and are filtered and preserved by BVL prior to analysis.

Surface water samples are collected by submerging the appropriate sample container into the water body and removing the container when a sufficient volume of sample has been collected. During collection, contact with the bottom sediment is avoided to prevent stirring-up sediment. When collecting surface water samples, direct dipping of the sample bottle is completed unless the bottle contains preservative. For those samples requiring preservative, a clean unpreserved bottle is used to obtain the sample which is then transferred into the appropriate preserved bottle. The surface water temperature, pH and dissolved oxygen is measured and recorded at the time of sampling.

5. DETERMINATION OF REASONABLE USE CRITERIA FOR THE SITE

5.1 Determination of Action Levels

MECP Guideline B-7 establishes the basis for determining what constitutes the reasonable use of groundwater on properties adjacent to landfill sites. By applying the Reasonable Use Concept, the potential use of groundwater for domestic consumption will almost always provide the lowest allowable concentration limits. MECP Procedure B-7-1 provides technical details for the application of the reasonable use approach. A change in the quality of groundwater on an adjacent property, where the reasonable use is determined to be for drinking water, will be acceptable only where:

i) Quality is not degraded by more than 50% of the difference between background concentrations and the Ontario Drinking Water Standards (ODWS) for non-health related parameters, and

ii) Quality is not degraded by more than 25% of the difference between background concentrations and the ODWS for health related parameters.

Background concentrations are considered to be the quality of groundwater prior to any contamination from landfill activities.

5.2 Background Groundwater Quality

Shallow Overburden: Upper Silt Unit

Background concentrations are considered to be the quality of the groundwater prior to any contamination from landfilling activities. As part of previous Annual Monitoring Reports, further evaluation of the background conditions, background groundwater quality and RUC parameter concentrations was completed within the framework of MECP Guideline B-7. The RUC comparisons using all measured leachate indicator parameters are provided below.

For RUC assessment purposes, monitoring well GM2-9 was selected as the background well as it is located upgradient of the landfill footprint, which results in the least potential for influence or impact from the landfill. Historical and on-going water quality results also support the use of GM2-9 as a background well as the results indicate that this monitoring location typically has lower indicator parameter concentrations. Historical analytical results, provided in Appendix D, were used to calculate average values of indicator parameters for the subsequent calculation of the RUC values. The background concentration ranges, averages, and the resulting RUC values for several indicator parameters are summarized on Table 2.

The background water quality is typical of a carbonate system and is generally highly mineralized with an average background hardness of approximately 326 mg/L. The background chloride concentrations are typically less than 5 mg/L, sodium concentrations are less than 10 mg/L and the specific conductance (i.e., conductivity at 25° Celsius) is, on average, approximately 600 uS/cm.

It is noted that the hardness concentration typically exceeds the RUC at all monitored locations. Therefore, the elevated hardness concentrations (i.e., up to 500 mg/L) alone do not appear to be related to impacts from landfill leachate and can typically be attributed to natural background conditions.

Shallow Overburden: Lower Silt Unit (i.e., Near Interface with Elma Till Unit)

Review of the water quality data indicates that the water quality at monitoring wells GM3-12 and OW-8(5)D differs from that noted at other upgradient monitoring locations. Review of the well properties and the data available indicate the following:

- Monitoring well GM3-12 is screened to, at minimum, an elevation of greater than 4 meters deeper than other monitoring wells at the site and in close proximity to the interface between the shallow silt unit and the underlying till; and,

- Comparison of water levels at the well couplet GM3-7 and GM3-12 indicate that upwards vertical gradients exist near the base of the slope. Vertical gradients calculated using the data from 2006 through the current monitoring period indicate that an average upwards gradient of 0.31 m/m (ranging between 0.14 and 0.70) exists at this location.

Based on the upgradient to cross-gradient location of this well relative to the fill area, the well depth, the inferred groundwater flow direction and the upwards gradients noted, the water quality at GM3-12 and OW-8(5)D is interpreted to be influenced primarily by the deeper aquifer system and is not likely influenced by landfill leachate. Water quality from the deeper aquifer system appears to be characterized by the following:

- Low alkalinity: typically less than 100 mg/L as compared to an average of 280 mg/L at other upgradient monitoring locations;
- Elevated conductivity (i.e., greater than 2,200 µS/cm);
- High hardness: Averaging approximately 1,500 mg/L as compared to an average of less than 700 mg/L at all other monitoring locations;
- Elevated sodium concentrations: typically in the range of 30 to 40 mg/L, while chloride concentrations remain relatively low, averaging 6 mg/L;
- High sulphate concentrations, averaging approximately 1,500 mg/L; and
- High total dissolved solids concentrations (TDS), averaging about 2,150 mg/L.

When compared to the background groundwater quality and the leachate influenced groundwater characteristics, water quality that is influenced by groundwater from the deeper aquifer system most notably/distinctly has increased sulphate concentrations and lower alkalinity, in combination with chloride concentrations that remain below 10 mg/L. Several of the other defining parameters (i.e., conductivity, hardness and TDS) are not unique to groundwater derived from the deeper system and could also be caused by several other potential factors including, but not limited to, landfill leachate, agricultural practices, and/or road salting activities in the fire hall parking lot and along County Road 10.

5.3 Calculation of Objective Levels

The objective levels for several groundwater quality indicator parameters were calculated to evaluate the acceptable level of contaminant concentrations at the Site boundary. Background concentrations (Cb) are the site-specific values (discussed in the previous section). The Provincial maximum concentrations (Cr) are identified in the Ontario Drinking Water Standards (June 2003, revised June 2006). Acceptable concentrations at the site boundary (Cm) are calculated from MECP Procedure B-7-1 using the following formula.

$$Cm = Cb + x(Cr - Cb)$$

Where:
Cm = Maximum concentration acceptable in groundwater beneath an adjacent property.
Cb = Background concentration.
Cr = Maximum concentration that should be present in groundwater for domestic consumption according to the ODWS.
x = 0.5 for non-health related parameters (AO and OG) and 0.25 for health related parameters (MAC and IMAC).

AO = Aesthetic Objective
OG = Operational Guideline
MAC = Maximum Acceptable Concentration, Parameters Related to Health
IMAC = Interim Maximum Acceptable Concentration, Parameters Related to Health

It should be noted that if background concentrations exceed the ODWS, the objective level is set at the background concentration. A summary of the average background concentrations and resulting RUC values is provided in Table 2 and a summary of the analytical results for the current monitoring period compared to the RUC and ODWS is provided in Table 3.

To determine if leachate is impacting shallow groundwater, individual indicator parameters were evaluated in conjunction with other indicator parameters and concentration trends. Monitoring wells with elevated and stable concentrations of the identified naturally elevated constituents, that show no increases in other leachate indicator parameters, are deemed un-impacted by landfill leachate. Additionally, comparison of known leachate impacted groundwater is compared to the groundwater chemistry at locations with naturally elevated concentrations to determine if leachate contributes to the elevated concentrations measured.

5.4 Surface Water – Provincial Water Quality Objectives

The purpose of surface water quality management at the Site is to achieve the requirements established in the Provincial Water Quality Objectives (PWQO) set out by the MECP. The criteria set out by the PWQO, summarized in Table 4, were established to ensure that surface waters are of a quality which is satisfactory for aquatic life and recreation. Areas that have water quality surpassing the PWQO requirements are to be maintained at or above the applicable objectives. Areas that have water quality that does not presently meet the PWQO are not to be degraded any further and are to be upgraded if practical. Background surface water quality at the Neustadt Landfill site is represented by monitoring location S-3.

6. MONITORING RESULTS AND DISCUSSION

Leachate is produced when surface water percolates down through refuse resulting in impacted water that has the potential to migrate along the surface or in the ground. Landfill derived leachate that enters into the surface water and/or groundwater is often attenuated by natural mechanisms along the water migration pathway. The attenuation of leachate can occur by dilution, biologic activity, and geochemical mechanisms. To determine the presence of (or potential impacts from) leachate, several indicator parameters are monitored and a trend analysis is conducted to determine changes in water quality over time.

Upon closure, landfill sites are generally considered to have a 25-year ‘contaminating’ lifespan, during which time leachate production peaks, and then reduces (although may continue at a reduced level indefinitely). The cover material acts to limit the volume of surface water percolating down through the refuse, thereby limiting leachate production through surface water percolation. However, due to the depth of waste placement, it is likely that groundwater flow through the bottom of the refuse pile frequently occurs resulting in leachate production from the flow of groundwater through the base of the landfill. Since the Neustadt Landfill is small (i.e., 0.45 ha), had a low rate of waste placement and likely had some of the waste burned prior to burial, its contaminating lifespan is anticipated to be significantly less than 25-years. Furthermore, the landfill site has been closed for greater than 25 years, and is expected to be past its peak contaminating period.

The following sections evaluate the potential impacts on-site and for off-site impacts to the area surrounding the closed Neustadt Landfill Site using the historical and recent water quality data available. The groundwater quality results for the current monitoring period are summarized in Table 3 and historical groundwater quality data and graphical trends of select indicator parameters are included in Appendix D. As previously noted, hardness concentrations in groundwater consistently exceed the ODWS operational guidelines, which is consistent with groundwater flowing through carbonate-rich soils.

6.1 Leachate Characterization

Leachate generation is typically greatest directly beneath the landfill and at the perimeter of the landfilled area (i.e., in near-source wells). Based on our assessment, and consistent with the MECP Comments provided in the September 4, 2014 correspondence, monitoring well GM5-3 is considered to be the well closest to providing the characteristics of leachate-impacted groundwater. It is a shallow downgradient monitoring well located within 10 m of the landfill footprint, and is directly at the toe of the slope. As would be expected due to its close proximity to the landfilled area, well GM5-3 has historically shown the greatest influence, albeit minor, from landfill leachate. Groundwater chemistry at this location is noted to have the following characteristics:

- Elevated conductivity in the range of 1,300 µS/cm, as compared to an average in the range of 600 to 650 mg/L noted at upgradient wells screened within the upper silt till unit;
- An average alkalinity of approximately 540 mg/L, as compared to an average of 280 mg/L at upgradient wells screened within the upper silt till unit;
- Elevated hardness averaging 650 mg/L as compared to an average of 350 mg/L at upgradient wells screened within the upper silt till unit;
- Elevated ammonia concentrations, typically in the range of 2.7 to 6.0 mg/L as compared to less than 1.3 mg/L at other monitoring locations;
- Elevated sodium and chloride concentrations that have recently been in the range of 15 to 50 mg/L;
- An average DOC concentration of 5.5 mg/L as compared to typically less than 2 mg/L at the upgradient monitoring locations;
- Slightly elevated sulphate concentrations in the range of approximately 60 to 165 mg/L, compared to less than 62 mg/L at upgradient monitoring wells GM2-3 and GM2-9;
- Higher potassium concentrations, in the range of 24 to 27 mg/L versus less than 3 mg/L at all other monitoring locations; and
- Nitrate and nitrite concentrations that are consistently low (i.e., no greater than 0.2 mg/L and 0.05 mg/L), when detected.

Groundwater quality trends at well GM5-3 indicate that the leachate indicator parameter concentrations are generally stable to decreasing, in particular since 2005/2006. Chloride concentrations, which were historically reported to be as high as approximately 100 mg/L, have remained below 30 mg/L since 2010 suggesting that, as would be expected for a small landfill site that has been closed for greater than 25 years, the landfill is past its peak contaminating period. It is noted that, at this monitoring location, which is proximal to the landfill mound, chloride concentrations have consistently remained below the objective level of 127 mg/L.

Based on the analytical data obtained from the leachate well and with consideration to the groundwater quality associated with the deeper aquifer system, the primary leachate indicator parameters identified for the Site include alkalinity, chloride, ammonia, and to a lesser degree conductivity, sodium, DOC and hardness.

6.2 On-Site Groundwater Quality - Downgradient of the Landfill Footprint

As previously discussed, groundwater is inferred to flow from southeast to northwest across the site. Monitoring well GM5-3 monitors groundwater quality directly downgradient of the landfill footprint and within approximately 5 meters of the limit of placed waste. This monitoring location best represents leachate impacted groundwater quality for the Neustadt Landfill Site. An additional distance of approximately 120 meters separates well GM5-3 from the downgradient property boundary. An evaluation of the historical analytical results indicates that the primary leachate indicator parameters for the Site include alkalinity, chloride, ammonia, and to a lesser degree conductivity, sodium, DOC and hardness.

Monitoring well GM4-3 is located approximately 25 m downgradient of the landfill footprint. The analytical trend graphs for a period of over 25 years of monitoring display stable water quality trends since the initial sampling programs completed in the 1980s. Compared to background groundwater quality, this monitoring location displays increased hardness and sodium concentrations, and relatively low concentrations of chloride (i.e., less than 10 mg/L). However, lower alkalinity in the range of 220 mg/L, as compared to 300 mg/L in the background wells, and an average sulphate concentration of approximately 310 mg/L, which is higher than the average sulphate concentration associated with both background and leachate impacted groundwater of approximately 55 mg/L and 150 mg/L, respectively, is also noted.

In consideration of the decreased alkalinity and elevated sulphate concentrations, groundwater quality at this monitoring location appears to primarily reflect influence from the deeper overburden system, with minimal, if any, influence from landfill leachate. The presence of groundwater from the deeper overburden system at this shallow monitoring well located in close proximity to the base of the landfill footprint indicates that upwards gradients exist in the vicinity of the base of the steeper slope located on the southeastern portion of the Site (Cross-Section is provided in Figure 3). Based on these findings, it is inferred that the downward migration of leachate impacted groundwater is limited by the upwards gradients that become established as groundwater migrates to the northwest.

6.3 Boundary Conditions

Compliance Limits to the South and East of the Fill Area

Since groundwater flow is inferred to be to the northwest, the property boundaries to the south and east are considered to be hydraulically upgradient of, and/or cross-gradient to the landfill. Therefore, the flow of potentially leachate impacted groundwater from the landfill across these compliance boundaries is not anticipated. Groundwater quality along the eastern compliance boundary is monitored in the shallow upper silt overburden at well couplet GM2-3/GM2-9 and along the southern compliance boundary at well GM3-7. Groundwater quality near the interface between the shallow and deep overburden (i.e., between the silt unit and the Elma Till) is monitored at GM3-12.

As previously reported, monitoring well GM2-9 has been selected to represent background groundwater quality within the shallow groundwater at the site. It is noted that the water quality in well GM2-3 is generally similar to that noted in GM2-9, with the exception of the nitrate and nitrite concentrations that were historically noted to be higher in the shallower monitoring well. While these were historically considered to be unrelated to landfill leachate and were attributed to agricultural practices that were occurring upgradient and to the east of the Site, nitrate and nitrite concentrations have been reported to be lower, and similar to background conditions since 2013, and have been below the laboratory detection limits since 2014.

Along the southern compliance boundary, the shallow groundwater quality at well GM3-7 is similar to background with the exception of the following:

TABLE 5: Comparison of Alkalinity and Sulphate Concentrations at Background Shallow Groundwater Monitoring Locations

Parameter	Well ID	GM3-7	GM2-9 (Background)
Alkalinity (mg/L)	Range	210 to 260	235 to 370
	Average	242	281
Sulphate (mg/L)	Range	50 to 270	50 to 63
	Average	115	57

Based on the upwards gradients consistently measured at wells GM3-7 and GM3-12 and the distinct water quality associated with the deeper system (i.e., in well GM3-12), most notably a lower alkalinity and higher sulphate concentration, groundwater quality in well GM3-7 is interpreted to be somewhat influenced by the deeper groundwater system.

Compliance Limits to the North and West of the Fill Area

The furthest downgradient shallow groundwater monitoring well previously sampled, well OW6-3, was located in the northwest portion of the Site where shallow groundwater was inferred to have upward hydraulic gradients (Figure 2). This well was located greater than 120 meters downgradient of the historical fill area and was within 5 meters of the compliance limit to the north and within 20 meters of the compliance limit to the west. Therefore, this monitoring location (i.e., OW6-3) was considered to represent groundwater quality migrating to the northwest and across the downgradient compliance limits to the north and west of the property. Based on the upward gradients within the northwest portion of the Site, the proximity of well OW6-3 to County Road 10, the potential for road-salt impacted overland flow from the Fire Hall to the north, and the proximity and downgradient location of this well to the highly organic wetland/pond area, it is noted that several different factors including groundwater flow from the deeper overburden, road salt impacts, influence from the wetland area and/or leachate impacts may ultimately have had an effect on the groundwater quality at that former monitoring well location.

Since 2016, OW6-3 has not been sampled as it was damaged, and ultimately destroyed. Review of historical data and the long-term concentration trend graph, provided in Appendix D, indicates that the water quality at OW6-3 was relatively stable. Comparison of the groundwater quality to the RUC showed that alkalinity, DOC, hardness, iron, TDS, and sulphate commonly exceeded the RUC. In addition to the RUC exceedances, sodium and chloride concentrations were somewhat elevated, averaging approximately 21 mg/L and 27 mg/L, respectively, and sulphate concentrations were noted to range between 110 and 511 mg/L. These sulphate concentrations were frequently greater than those reported in the leachate well.

Based on the combination and relative magnitude of various parameter concentrations, the groundwater quality at OW6-3 appears to have been primarily affected by its proximity to the shallow wetland areas, where naturally occurring organic carbon would be expected, and road salt application, with varying influence from the deeper groundwater system. This finding is consistent with the Hydrogeologic Report (Morrison Beatty, 1990), which states that '*OW6-3, which is on the far side of the wetland from the landfill, is affected more from the organic deposits and road run-off. The upward gradients that exist below the wetland should prevent leachate contaminants from migrating more than a few tens of metres from the landfill*'.

Based on the absence of landfill-leachate derived impacts at this monitoring location historically noted and the stable concentration trends, albeit somewhat variable, direct replacement of this monitoring location was not considered necessary. Therefore, it was previously recommended that well OW6-3 be decommissioned in accordance with O.Reg.903. Based on that recommendation, four additional downgradient monitoring wells were installed onsite in 2019, and OW6-3 was decommissioned by the licensed well driller at that time. OW7-3 was installed approximately 85 m northwest of the historical landfill mound. Comparison of the groundwater quality to the RUC indicates that alkalinity, DOC, hardness, and TDS exceed the RUC guidelines at OW7-3. In addition to these RUC exceedances, sodium and chloride concentrations are slightly elevated.

Based on the various elevated parameter concentrations, the groundwater quality at well OW7-3 appears to be consistent with the historical concentrations observed at OW6-3. OW7-3 appears to also be primarily affected by its proximity to the shallow wetland area located immediately north of the well, with varying influence from the deeper groundwater system.

OW8-3(S) and OW8-5(D) were installed approximately 55 metres west/northwest of the landfill mound and approximately 50 meters east of the compliance boundary. OW8-3(S) was installed within a medium sandy silt unit, and OW8-5(D) was installed at an approximate depth of 4.57 metres and screened within the lower stiff silt unit.

As previously reported, the analytical data from OW8-5(D) is similar to the groundwater quality reported at OW3-12, where elevated levels of conductivity, hardness, sodium and sulphate are observed, but low levels of other leachate indicator parameters are noted. When compared to the background groundwater quality and the leachate influenced groundwater characteristics, the increase in sulphate concentration and lower alkalinity, suggests that groundwater at this location is influenced from the deeper aquifer system rather than leachate. OW8-3(S) was installed directly adjacent to OW8-5(D), but was installed to a depth of 2.74 mbgs, and the screened interval is within the upper sandy silt unit. RUC exceedances were reported during the current sampling period for DOC, hardness, sulphate and TDS. Similar to OW7-3, the monitoring well was installed in close proximity to an onsite ponded feature where naturally occurring organic carbon is expected.

Groundwater monitoring well OW9-3 was installed to a depth of 2.89 meters and screened within a silt and gravel layer. Based on the current monitoring results, the groundwater quality at OW9-3 is similar to background with the exception of calcium, chloride, DOC and sodium. Based on the analytical results, OW8-3(S) and OW9-3 may be displaying slight influence from leachate. Continued monitoring of these locations will be conducted to discern if this decreasing trend continues.

6.4 Surface Water Quality

Since the Site is currently capped and closed, leachate generation, which occurs when water infiltrates through the refuse, will occur predominantly in the subsurface. Consequently, leachate impacts to surface water could potentially occur from a leachate break-out from the landfill mound or impacted groundwater discharge to the surface water features.

In addition to the background monitoring location S-3, surface water samples are currently collected from S-1, which is at the end of a tile drain located within 10 meters of the toe of the landfill, and from S-2, which represents the downstream surface water discharge location for the Site and is located where the stream passes under County Road 10 (Figure 2). The surface water quality results for the current monitoring period, compared to the Provincial Water Quality Objectives (PWQO), are provided in Table 4 and the historical surface water quality data is provided in Appendix E.

Review of the surface water quality data for the Site indicates stable trends of leachate indicator parameters and general compliance with the PWQO. Background surface water quality, as measured at S-3, historically indicates that elevated iron concentrations at the Site, often in exceedance of the PWQO, and phosphorus concentrations that are periodically noted to exceed the PWQO, are naturally occurring. The occurrence of iron and phosphorous are consistent with surface water quality in an organic-rich marshy area.

Historical surface water quality results are provided in the Hydrogeological Report prepared by Morrison and Beatty (August 1990). An assessment of leachate quality, based on a sample collected during a period of low flow from the tile drain immediately downgradient of the landfill (i.e., S-1 in June 1988), suggested the following leachate characteristics/strength:

Conductivity:	2,300 µS/cm	Potassium:	228 mg/L	DOC:	6.8 mg/L
Alkalinity:	904 mg/L	Sulphate:	385 mg/L	Sodium:	76.3 mg/L
Hardness:	933 mg/L	Chloride:	89.75 mg/L		

These findings are similar to the leachate characteristics observed at monitoring location GM5-3, which is discussed in detail in Section 6.1 of this Report.

Based on the surface water quality data and trend analyses, there is no evidence of recent or historical impacts to surface water related to the landfill and the surface water quality trends appear to be stable (i.e., at S-1 and S-2). Since the landfill site has been closed and capped for over 25 years, and based on the site setting and groundwater quality trends, it is anticipated that potential impacts would remain similar or gradually improve with time.

6.5 Water Quality Discussion and Summary

The Neustadt Landfill, which has been closed since 1992, is considered to be a small-scale landfill that had a low rate of waste placement and likely had some of the waste burned prior to burial. As a result, its contaminating lifespan is anticipated to be less than the typical 25-years. Since the landfill site has been closed for greater than 25 years and the water quality noted at the most proximal well to the landfill (i.e. GM5-3) has displayed a decrease in leachate indicator parameter concentrations over a period of several years, it is expected that the landfill is past its peak contaminating period.

The landfill mound was reportedly constructed by placing refuse in 6-meter deep trenches into the side of a ridge or terrace formation. The fill area, which is located on the southeastern portion of the property, now forms a slope from the upper reaches of the terrace down toward the northwest. The remainder of the property is generally flat with a gentle slope towards the north and west. Based on the information available, a downwards gradient exists near the top of the ridge (as indicated by water level data for well couplet GM2-3 and GM2-9) with documented upwards vertical gradients becoming apparent near the base of the mound. Based on the vertical gradients noted at well couplet GM3-7 and GM3-12, the groundwater quality noted at downgradient well GM4-3, which reflects influence from the deeper flow system, and the existence of the wetland and surface water features on the westerly portion of the site, upwards gradients are interpreted to exist within the northwestern portion of the Site.

A summary and comparison of the leachate indicator parameter concentration ranges and averages for groundwater quality (i) in the background wells; (ii) derived from the deeper flow system (i.e., interface well); (iii) impacted by landfill leachate; and (iv) in the downgradient compliance well, is provided in Table 6 below:

TABLE 6: Water Quality Comparison (Ranges and Averages)

Parameter mg/L or µS/cm*	Upgradient Upper Silt Unit (i.e. Background) (GM2-3, GM2-9, GM3-7)		Lower Silt Unit Interface Well (GM3-12)		Leachate Well (GM5-3)		Downgradient (Compliance) (OW6-3)	
	Range	Average	Range	Average	Range	Average	Range	Average
Conductivity*	554 to 871	627	2,210 to 2,430	2,357	1,060 to 1,570	1,300	881 to 1,560	1,190
Alkalinity	214 to 400	280	61 to 155	76	360 to 680	550	271 to 512	380
Hardness	293 to 485	342	1,097 to 1,800	1,525	493 to 767	650	470 to 929	666
Ammonia	0.03 to 0.92	0.16	0.15 to 1.3	1.0	2.7 to 6.0	4.6	0.02 to 0.49	0.17
Sodium	2.1 to 11.3	6.4	26.5 to 38.0	32.8	22.6 to 54.3	34	12.5 to 25.3	21
Chloride	2.1 to 6.3	3.7	5.1 to 7.5	6.0	16 to 104	48	4.1 to 36.3	27.3
DOC	0.5 to 12	1.8	0.6 to 5.2	1.3	2.9 to 14.1	5.6	2.0 to 12.7	5.2
Sulphate	3 to 270	62	1,367 to 1,620	1,490	41 to 163	140	110 to 511	252
Potassium	1 to 2 (5 samples)		3 (2 samples)		27 (2 samples)		2.5 (2 samples)	

*Ranges and Averages provided are based on the available data from 1993 to 2015. Since that time, groundwater quality trends have continued to be relatively stable.

Compliance with MECP Guideline B-7 is monitored downgradient and along the compliance boundary to the north and west of the Site, which was previously monitored at well OW6-3. Review of the available data (i.e., up to and including November 2015) indicates that the water quality at OW6-3 was relatively stable and had not likely been affected by landfill-leachate impacted groundwater. As previously reported, four additional downgradient monitoring wells (i.e., OW7-3, OW8-3(S), OW8-5(D), and OW9-3) were installed at the Site in 2019 as requested by the MECP.

Although the groundwater quality at these compliance locations differs from the background groundwater quality, a comparison of the combination and relative magnitude of various parameter concentrations suggests that groundwater quality at these locations are primarily effected by: proximity to the shallow wetland areas where naturally occurring organic carbon is expected, and/or by road salt application (along County Road 10 and in the Fire Hall parking area), with varying influence from the deeper groundwater system. This interpretation is consistent with previous reports and with the findings of several previous studies.

Within the wetland area and at the most downgradient surface water sampling location, there is no evidence of impacts to surface water related to the landfill and the long-term surface water quality trends remain stable. Since the landfill site has been closed and capped for over 25 years, it is anticipated that potential impacts would remain similar or would continue to improve with time.

It is noted that, as part of the initial Hydrogeologic Report (Morrison Beatty, 1990), a water quality evaluation was conducted to determine the potential impacts from the landfill. The findings of that report concluded that '*In summary, the current impact of the landfill on water quality is negligible. This study identified no significant degradation of downgradient surface water or groundwater and no evidence of off-site leachate impacts'.* Based on the lack of impacts to groundwater and surface water historically noted within the 2.9 hectare area combined with the continued improvement of groundwater quality at the toe of the landfill and the continued lack of landfill leachate derived impacts at the compliance well, the potential for future off-site impacts continues to be considered negligible.

7. POTENTIAL IMPACTS DUE TO LANDFILL GAS PRODUCTION

Landfill gas is produced during the degradation of organic compounds buried within a landfill. In particular, methane gas is produced during anaerobic decomposition of organic matter. Methane gas is a potential concern since it has the potential to migrate and accumulate in concentrations above the lower explosive limit (LEL) when it is produced in sufficient volumes. The LEL for methane is approximately 5% in air.

Methane gas is lighter than air, and therefore, typically vents from the subsurface to the air where soil permeability permits. Low permeability soil layers or frozen ground conditions can prohibit the natural venting of methane gas and result in the lateral migration of methane. The migration of methane gas from landfills in significant concentrations typically decreases with distance from the landfill footprint.

Based on the location of the landfill, which is situated within the side of a terrace feature, the potential for methane gas migration is expected to be primarily to the south or east. Based on the shallow groundwater table and flow toward the north and west and since the landfill waste was deposited above this grade, gas migration off-site toward the north and west is not likely to occur. Furthermore, surface water features on-site to the west and north would force the natural venting of potential methane gas if it were to migrate in these directions.

Methane gas monitoring has been conducted to the south and east of the landfill, at the methane gas probes installed at GM2-9 and GM3-7 in 1994 and from four additional gas probes (i.e. MV1 through MV4) that were installed in March 2008 to further investigate the potential for methane gas migration, including under frozen ground conditions. The locations of the gas monitoring probes are shown on Figure 2 and the installation details for the methane gas monitors installed in 2008 are provided in Appendix C. A summary of the methane gas monitoring results, from 2006 to present, is provided in Table 7.

Following the installation of the four additional gas probes, methane gas monitoring was conducted at all six gas probes and two additional monitoring wells on three separate events under frozen ground conditions. During all three monitoring events initially conducted in March 2008, methane gas was measured to be below 1% of the LEL, including at MV-3, which is located within the landfill footprint. Methane gas monitoring conducted since that time, including the most recent data, indicates that methane gas concentrations continue to remain below 1% of the LEL. Therefore, the risk for off-site methane gas migration is considered to be low.

8. CONCLUSIONS

1. The closed Neustadt Landfill Site historically accepted primarily municipal waste and solid, non-hazardous waste until closing in 1992. The landfill footprint occupies approximately 0.45 ha within the 2.9 ha site. A test-pit program completed by HPA revealed that the covered waste is comprised mainly of cans, glass, scrap metal, and bricks with minor amounts of wood, wrappers, and plastic bags. Reportedly, during the period of operation, waste was typically burned as a normal part of historical landfilling practices.

2. In order to satisfy Condition 1 of the existing *Certificate of Approval for the closure of the landfilling site*, final grading and capping of the entire landfill area was reportedly completed in 1992. Based on the issuance of a CofA for the landfill closure, it is understood that final closure of the Neustadt Landfill Site was completed in consultation with the MECP (formerly the MOE) and as per the standard landfill closure practices (i.e., Closure Plans and/or documentation) that were applicable at that time (i.e., the early 1990's).

3. During the current reporting period, no leachate seeps were observed and the ground cover system, site drainage and fencing continued to appear adequate.

4. The groundwater flow within the shallow overburden is generally to the northwest. Consistent with the existence of the localized wetland and surface water features on the western portion of the site, the site is on the edge of a recharge-discharge boundary, such that groundwater recharge (i.e., downward hydraulic gradients) is exhibited at the top of the landfill mound and groundwater discharge (i.e., upwards gradients) is exhibited downgradient of the landfill, within the low-lying flat areas of the property. As a result, it is inferred that groundwater recharge from the landfill footprint would likely become part of the shallower groundwater system and would subsequently discharge to the surface water features within the western portion of the property. Therefore, it is reasonable to expect that there would be no impacts to the deeper groundwater system.

5. When compared to the background groundwater quality and the leachate influenced groundwater characteristics, water quality that is influenced by groundwater from the deeper aquifer system most notably/distinctly has increased concentrations of sulphate and lower alkalinity, in combination with chloride concentrations that remain below 10 mg/L.

6. Based on the analytical data obtained from the leachate well and historical sampling from SW-1, and with consideration to the groundwater quality associated with the deeper aquifer system, the primary leachate indicator parameters identified for the Site include alkalinity, chloride, ammonia, and to a lesser degree conductivity, sodium, DOC and hardness.

7. Compliance with MECP Guideline B-7 is monitored downgradient and along the compliance boundary to the west of the site at wells OW7-3, OW8-3(S), OW8-5(D) and OW9-3. It is noted that several different potential factors including groundwater flow from the deeper overburden, road salt impacts, influence from the wetland area and/or leachate impacts may affect the groundwater quality at the current downgradient groundwater monitoring locations. Further monitoring of these locations will be conducted to discern if an elevated trend becomes apparent.

8. Within the wetland area and at the most downgradient surface water sampling location, there is consistently no evidence of impacts to surface water related to the landfill and the surface water quality trends continue to be stable.

9. The Hydrogeological Assessment previously completed by others in 1990 included a water quality evaluation that was completed to determine potential impacts to groundwater and surface water from the landfill. The findings of the 1990 report concluded that *'the impact of the landfill on water quality is negligible (*at that time*). This study identified no significant degradation of downgradient surface water or groundwater and no evidence of off-site leachate impacts'*. Since that time (i.e., greater than 25 years has passed since the 1990 Study), the groundwater quality has continually improved, as shown through the findings of the annual monitoring program. Based on the lack of impacts historically noted at the compliance monitoring locations, combined with the continued improvement of groundwater quality at the toe of the landfill, the potential for future off-site impacts is considered to be negligible.

10. Methane gas monitoring, conducted consistently since 2006 along the southern and eastern property boundaries, indicates that methane gas concentrations are remaining below 1% of the LEL. Therefore, the risk for off-site methane gas migration is considered to be low.

9. RECOMMENDATIONS

1. It is recommended that visual inspections of the premises and monitoring wells continue to be conducted in conjunction with the water quality and gas monitoring programs for the Site.

2. Based on the monitoring data, there continues to be little to no indication of surface water or groundwater quality degradation at the site and no evidence of off-site leachate impacts. Due to the relatively limited potential for continued impacts to groundwater quality, the potential for future off-site impacts is considered to be low, particularly since the water quality at the compliance monitoring locations continues to show no impacts related to the landfill. Based on the long-term availability of monitoring data, the stable to decreasing long-term trends that have been observed in the leachate well, and the fact that the landfill has been closed for more than 25-years, we continue to recommend that consideration be given to reducing the annual monitoring and reporting to a frequency of once every 5-years.

3. It is recommended that sampling continue to occur from the established monitoring locations, as practicable, including the ten (10) groundwater monitoring wells, three (3) surface water sampling locations and six (6) gas monitoring probes. Groundwater and surface water quality parameters measured should continue to include the following:

   Groundwater:
   pH, conductivity, hardness, alkalinity, phenols, dissolved organic carbon (DOC), chloride, sulphate, nitrite, nitrate, ammonia, TKN, TDS and metals (i.e. Ca, Fe, Mg, K and Na).

   Surface Water:
   pH, conductivity, alkalinity, phenols, chloride, total ammonia, iron, potassium, TDS and total phosphorus, as well as the measurement of the field temperature, pH and dissolved oxygen.

All of which is respectfully submitted,

GM BLUEPLAN ENGINEERING LIMITED
Per:

A.W. Bringleson, B.E.S., C.E.T.

M. D. Nelson, M.Sc., P.Eng.

FIGURES

213090
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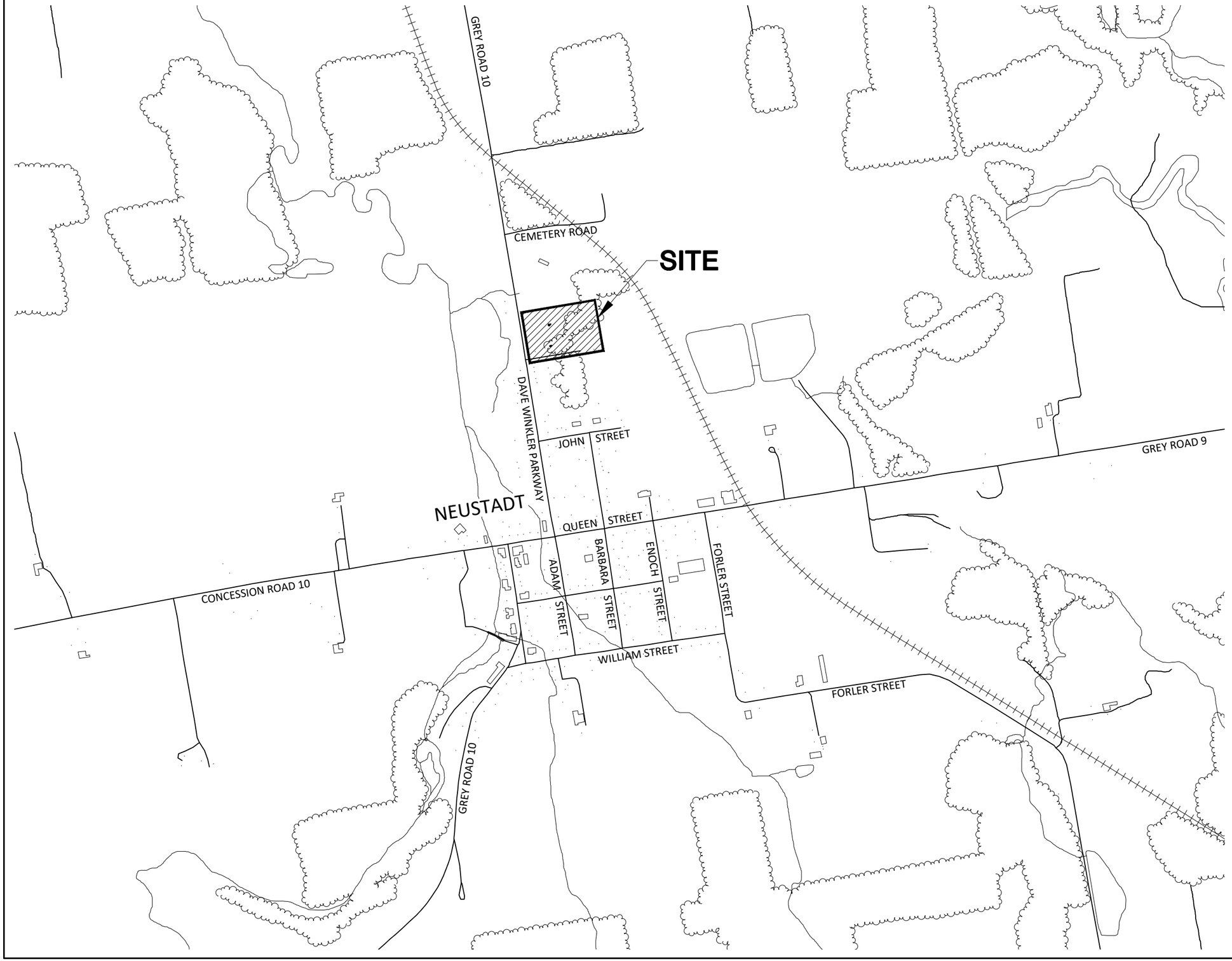
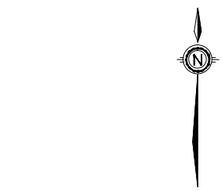
Neustadt Landfill
Municipality of West Grey





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APRIL 2023

SITE LOCATION MAP AND LANDFILL PROPERTY BOUNDARY

Figure No. 1

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Neustadt Landfill
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S-2 (APPROX. LOCATION)

IB

A

POND

WETLAND

APPROXIMATE PROPERTY BOUNDARY/COMPLIANCE LIMIT

IB

OW 7-3

EX. CSP

279

280

MV-1

280 281 282 283 284 285 286 287 288 289 290 291

OW 4-3

OW 8-3(S)

OW 8-5(D)

POND

291

MV-2

S-1

COUNTY ROAD 10

FIRE HALL

EX. CSP

280

G.M. 5-3

CLOSED LANDFILL AREA

G.M. 2-3

A'

WATER SUPPLY WELL (DECOMMISSIONED 2004)

280

150mmØ BIG 'O' UNDERDRAIN LOCATION APPROXIMATE

MV-3

G.M. 2-9

289

OW 9-3

PUMPING STATION

EX. CSP

EX. GATE

280

GRAVEL

G.M. 3-12

MV-4

IB

289

S-3

G.M. 3-7

10 5 0 10 20 30

1:750 (m)

281 282 283 284 285 286 287 288 289

LEGEND

- MONITORING WELL
- FORMER WATER SUPPLY WELL
- MV-1 — METHANE MONITOR
- S-3 — SURFACE WATER SAMPLING STATION
- 289 — EXISTING CONTOURS
- EXISTING SWALE
- LANDFILL AREA (BASED ON TEST PITS COMPLETED BY H&P ON MAY 19, 2005)

SCALE = 1:750

APRIL 2023

SITE LAYOUT

Figure No. 2

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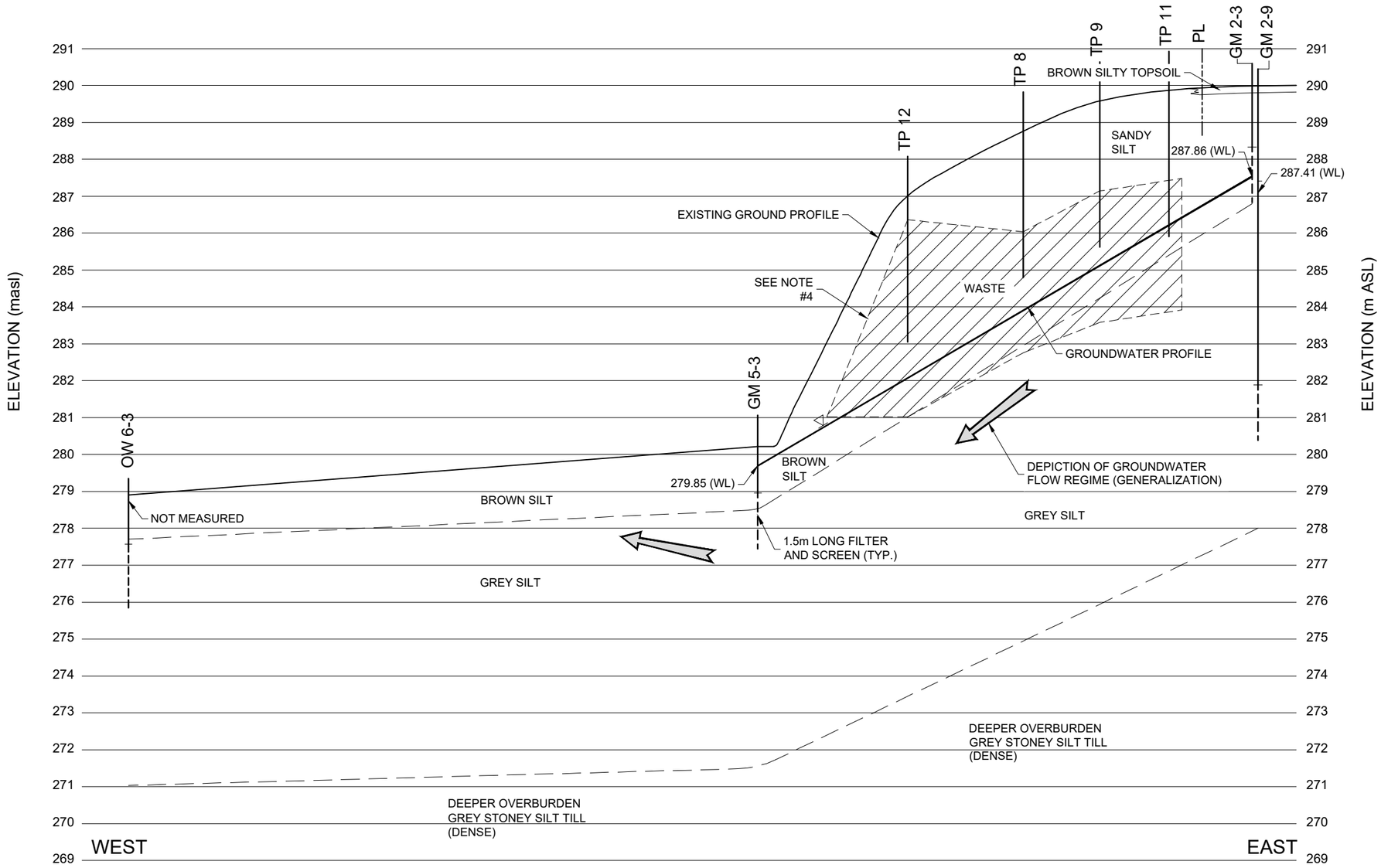

SECTION A-A'

1:1,250 HORIZONTAL
1:125 VERTICAL

NOTE:

1. FOR LOCATION OF SECTION A-A' REFER TO FIGURE No. 2.
2. GEOLOGICAL CROSS-SECTION PROVIDED IS BASED ON THE RESULTS OF THE TEST PIT PROGRAM CONDUCTED BY HENDERSON, PADDON AND ASSOCIATES DATED MAY 19, 2005, AND THEIR INTERPRETATION PROVIDED IN THE 2006 ANNUAL MONITORING REPORT.
3. WATER LEVELS MEASURED NOVEMBER 2021.
4. ACCORDING TO THE HYDROGEOLOGICAL REPORT (MORRISON BEATTY, AUG. 1990), WASTE WAS TO BE PLACED IN TRENCHES, UP TO 6m IN DEPTH.

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CROSS-SECTION A-A'

Figure No. 3

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S-2 (APPROX. LOCATION)
CL = 33mg/L

IB

POND

APPROXIMATE PROPERTY BOUNDARY/COMPLIANCE LIMIT

WETLAND

OW 7-3
GW EL. = 279.34
CL = 29mg/L

EX. CSP

279

280

OW 8-3(S)
GW EL. = 279.61
CL = 73mg/L

OW 8-5(D)
GW EL. = 279.57
CL = 19mg/L

POND

INFERRED DIRECTION OF GW FLOW

OW 4-3
GW EL. = 279.36
CL = 9.1mg/L

MV-1

MV-2

S-1
CL = 46mg/L

CLOSED LANDFILL AREA

G.M. 5-3
GW EL. = 279.16
CL = 18mg/L

EX. CSP

FIRE HALL

WATER SUPPLY WELL
(DECOMMISSIONED 2004)

G.M. 2-3
GW EL. = 286.21
CL=3.2

750mm Ø BIG 'O' UNDERDRAIN LOCATION APPROXIMATE

MV-3

G.M. 2-9
GW = DRY
CL = DRY

OW 9-3
GW EL. = 280.00
CL = 200mg/L

PUMPING STATION

EX. CSP

EX. GATE

GRAVEL

MV-4

G.M. 3-12
GW = 281.36
CL = 8mg/L

S-3
CL = 21mg/L

G.M. 3-7
GW = 279.32
CL = 3.9mg/L

COUNTY ROAD 10

10 5 0 10 20 30
1:750 (m)

LEGEND

- MONITORING WELL
- FORMER WATER SUPPLY WELL
- MV-1 — METHANE MONITOR
- S-3 — SURFACE WATER SAMPLING STATION
- 289 — EXISTING CONTOURS
- EXISTING SWALE
- LANDFILL AREA (BASED ON TEST PITS COMPLETED BY H&P ON MAY 19, 2005)
- GENERAL DIRECTION OF GROUNDWATER FLOW
- 279 — INTERPRETED POTENTIOMETRIC SURFACE
- GW EL. — DENOTES GROUNDWATER ELEVATION, masl
- Cl — DENOTES CHLORIDE CONCENTRATION, mg/L

SCALE = 1:750
APRIL 2023

GROUNDWATER FLOW PLAN

Figure No. 4

BluePlan ENGINEERING

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TABLES

TABLE 1
SUMMARY OF HISTORICAL GROUNDWATER ELEVATIONS
NEUSTADT LANDFILL SITE

Well ID	Reference Elevation	Screened Interval	Jul-01		Oct-01		Jun-02		Oct-02		May-03	
			Water Level		Water Level		Water Level		Water Level		Water Level	
	TOC (masl)	(masl)	DTW(mbTOC)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)
GM2-3	290.59	286.81 - 288.33	3.37	287.22	2.95	287.64	Dry	<286.83	Dry	<286.83	2.18	288.41
GM2-9	290.45	280.38 - 281.90	3.75	286.70	3.90	286.55	3.36	287.09	5.58	284.87	3.07	287.38
GM3-7	284.76	276.33 - 277.85	3.50	281.26	4.02	280.74	3.11	281.65	6.31	278.45	2.51	282.25
GM3-12	285.08	272.02 - 273.54	2.95	282.13	3.02	282.06	2.74	282.34	4.64	280.44	2.30	282.78
GM5-3	281.06	277.44 - 278.96	1.41	279.65	1.52	279.54	1.63	279.43	2.32	278.74	1.40	279.66
OW4-3	280.92	276.85 - 278.37	1.83	279.09	1.31	279.61	1.43	279.49	1.83	279.09	1.32	279.60
OW6-3	279.94	275.85 - 277.37	1.53	278.41	1.14	278.80	1.33	278.61	1.95	277.99	1.11	278.83

Well ID	Reference Elevation	Screened Interval	Sep-03		Apr-04		Sep-04		Apr-05		Sep-05	
			Water Level		Water Level		Water Level		Water Level		Water Level	
	TOC (masl)	(masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)
GM2-3	290.59	286.81 - 288.33	2.94	287.65	2.24	288.35	3.70	286.89	2.15	288.44	3.71	286.88
GM2-9	290.45	280.38 - 281.90	3.45	287.00	2.95	287.50	4.09	286.36	2.95	287.50	4.91	285.54
GM3-7	284.76	276.33 - 277.85	3.93	280.83	2.59	282.17	4.37	280.39	2.61	282.15	6.21	278.55
GM3-12	285.08	272.02 - 273.54	2.95	282.13	2.32	282.76	3.19	281.89	2.33	282.75	4.29	280.79
GM5-3	281.06	277.44 - 278.96	1.54	279.53	1.33	279.73	1.81	279.25	1.26	279.80	2.16	278.90
OW4-3	280.92	276.85 - 278.37	1.33	279.60	1.28	279.64	1.60	279.32	1.32	279.60	1.81	279.11
OW6-3	279.94	275.85 - 277.37	1.17	278.77	1.13	278.81	1.45	278.49	1.14	278.80	1.72	278.22

Well ID	Reference Elevation	Screened Interval	Apr-06		Sep-06		Nov-07		Oct-08		Sep-09	
			Water Level		Water Level		Water Level		Water Level		Water Level	
	TOC (masl)	(masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)
GM2-3	290.59	286.81 - 288.33	1.85	288.74	Dry	<286.83	Dry	<286.83	3.01	287.58	Dry	<286.83
GM2-9	290.45	280.38 - 281.90	2.99	287.46	5.09	285.36	4.97	285.48	3.41	287.04	5.03	285.42
GM3-7	284.76	276.33 - 277.85	2.42	282.34	5.64	279.12	5.26	279.50	3.67	281.09	5.07	279.69
GM3-12	285.08	272.02 - 273.54	2.15	282.93	4.07	281.01	4.95	280.13	2.78	282.30	3.90	281.18
GM5-3	281.06	277.44 - 278.96	1.23	279.83	2.07	278.99	2.32	278.74	1.46	279.60	2.05	279.01
OW4-3	280.92	276.85 - 278.37	1.30	279.62	1.66	279.26	1.68	279.24	1.38	279.54	1.37	279.55
OW6-3	279.94	275.85 - 277.37	1.10	278.84	1.48	278.46	1.58	278.36	1.05	278.89	1.16	278.78

TABLE 1
SUMMARY OF HISTORICAL GROUNDWATER ELEVATIONS
NEUSTADT LANDFILL SITE

Well ID	Reference Elevation TOC (masl)	Screened Interval (masl)	Nov-10 Water Level		Nov-11 Water Level		Sep-12 Water Level		Nov-13 Water Level		Nov-14 Water Level	
			Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)
GM2-3	290.59	286.81 - 288.33	2.78	287.81	2.45	288.14	DRY	<286.83	1.80	288.79	2.89	287.70
GM2-9	290.45	280.38 - 281.90	3.25	287.20	3.05	287.40	5.67	284.78	2.77	287.68	3.22	287.23
GM3-7	284.76	276.33 - 277.85	3.05	281.71	2.98	281.78	6.46	278.30	2.41	282.35	3.13	281.63
GM3-12	285.08	272.02 - 273.54	2.44	282.64	2.22	282.86	4.56	280.52	2.00	283.08	2.36	282.72
GM5-3	281.06	277.44 - 278.96	1.4	279.66	1.36	279.70	2.39	278.67	1.30	279.76	1.38	279.68
OW4-3	280.92	276.85 - 278.37	1.39	279.53	1.42	279.50	1.93	278.99	1.48	279.44	1.52	279.40
OW6-3	279.94	275.85 - 277.37	1.05	278.89	1.05	278.89	1.85	278.09	1.04	278.90	1.10	278.84

Well ID	Reference Elevation TOC (masl)	Screened Interval (masl)	Nov-15 Water Level		Oct-16 Water Level		Nov-17 Water Level		Nov-18 Water Level		Nov-19 Water Level	
			Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)
GM2-3	290.59	286.81 - 288.33	3.65	286.94	DRY	<286.83	2.59	288.00	3.06	287.53	3.33	287.26
GM2-9	290.45	280.38 - 281.90	3.80	286.65	4.30	286.15	3.04	287.41	3.36	287.09	3.55	286.90
GM3-7	284.76	276.33 - 277.85	3.62	281.14	6.83	277.93	2.57	282.19	3.76	281.00	4.09	280.67
GM3-12	285.08	272.02 - 273.54	2.73	282.35	4.15	280.93	2.08	283.01	2.68	282.40	2.88	282.20
GM5-3	281.06	277.44 - 278.96	1.49	279.57	2.23	278.83	1.19	279.88	1.36	279.70	1.37	279.69
OW4-3	280.92	276.85 - 278.37	1.59	279.33	1.51	279.41	1.49	279.43	1.59	279.33	1.58	279.34
OW6-3	279.94	275.85 - 277.37	1.19	278.75	NM	NM	NM	NM	NM	NM	NM	NM
OW7-3	280.80	276.94 - 278.46	--	--	--	--	--	--	--	--	1.41	279.39
OW8-3 (S)	281.24	277.52 - 279.04	--	--	--	--	--	--	--	--	1.57	279.67
OW8-5(D)	281.23	275.73 - 277.73	--	--	--	--	--	--	--	--	1.50	279.73
OW9-3	281.42	277.61 - 279.13	--	--	--	--	--	--	--	--	1.00	280.42

Well ID	Reference Elevation TOC (masl)	Screened Interval (masl)	Oct-20 Water Level		Nov-21 Water Level		Sep-22 Water Level	
			Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)	Meas. (m)	Elev. (masl)
GM2-3	290.59	286.81 - 288.33	3.70	286.89	2.73	287.86	4.38	286.21
GM2-9	290.45	280.38 - 281.90	4.22	286.23	3.04	287.41	DRY	--
GM3-7	284.76	276.33 - 277.85	5.17	279.59	2.58	282.18	5.44	279.32
GM3-12	285.08	272.02 - 273.54	3.67	281.41	2.03	283.05	3.72	281.36
GM5-3	281.06	277.44 - 278.96	1.98	279.08	1.21	279.85	1.9	279.16
OW4-3	280.92	276.85 - 278.37	1.61	279.31	1.52	279.40	1.56	279.36
OW6-3	279.94	275.85 - 277.37	--	--	--	--	--	--
OW7-3	280.80	276.94 - 278.46	1.63	279.17	1.39	279.41	1.46	279.34
OW8-3 (S)	281.24	277.52 - 279.04	1.77	279.47	1.53	279.71	1.63	279.61
OW8-5(D)	281.23	275.73 - 277.73	1.76	279.47	1.51	279.72	1.66	279.57
OW9-3	281.42	277.61 - 279.13	1.57	279.85	0.90	280.52	1.42	280.00

Notes:
1. Elevations in masl (metres above sea level).
2. TOC = Top of Casing
3. DTW (mbTOC) = Measured depth to water in metres below TOC; Elev. (masl) = Elevation in masl.
4. TOC elevations and screened intervals were obtained from the 2012 Annual Monitoring Report, Genivar Inc.
5. Water level elevations prior to 2013 were obtained from the 2012 Annual Monitoring Report, Genivar Inc.
6. Since 2013 water levels have been measured by GM BluePlan Engineering Limited (GMBP).
7. NM = Not Measured

TABLE 2
SITE SPECIFIC BACKGROUND CONCENTRATIONS AND GUIDELINE B-7-1 RUC DETERMINATION
NEUSTADT LANDFILL SITE

GROUNDWATER INDICATOR PARAMETERS NEUSTADT LANDFILL SITE					
Parameter (mg/L)	**Maximum Concentration (Cr)**	**ODWS Classification**	**Background Concentration Range [n]**	**Background Concentration (Cb)**	**Objective Level (Cm)**
Alkalinity	500	OG	252 - 370 [22]	283	392
Ammonia	NV	NV	<0.05 - 0.26 [22]	0.14	NV
Calcium	NV	NV	55 - 110 [22]	73	NV
Chloride	250	AO	0.7 - 4.2 [22]	3.25	127
Conductivity (uS/cm)	NV	NV	572 - 680 [22]	604	NV
DOC	5	AO	<1.0 - 8.8 [22]	2.0	3.5
Hardness	80 to 200	OG	277 - 370 [22]	326	326
Iron	0.3	AO	<0.01 - 1.15 [22]	0.33	0.33
Magnesium	NV	NV	25 - 37.7 [22]	35	NV
Nitrate	10	MAC	<0.1 - 0.55 [22]	0.1	2.58
Nitrite	1	MAC	<0.1 [22]	0.1	0.25
pH (no units)	6.5 to 8.5	OG	7.15 - 8.62 [22]	7.75	6.5 to 8.5
Phenols	NV	NV	<0.001 - 0.007 [22]	0.001	NV
Sodium	200	AO	6.2 - 10.4 [19]	7.5	104
Sulphate	500	AO	3.0 - 63 [20]	55	278
Total Kjeldahl Nitrogen	NV	NV	0.17 - 6.17 [22]	2	NV
Total Dissolved Solids	500	AO	328 - 360 [17]	345	423

Notes:

1. [n] = number of data points used to determine the average background concentration.

2. Available data from OW2-10/GM2-9 collected from 1993 to Nov 2013 was used to calculate background concentrations.

3. mg/L = milligrams per litre; uS/cm = microsiemens per centimetre; NV = No Value.

4. AO = Aesthetic Objective; OG = Operational Guideline
   MAC = Maximum Acceptable Concentration, Parameters Related to Health
   IMAC = Interim Maximum Acceptable Concentration, Parameters Related to Health

MOE Procedure B-7-1

$Cm = Cb + x(Cr - Cb)$

Where:

Cm = Maximum concentration acceptable in groundwater beneath an adjacent property.
Cb = Background concentration.
Cr = Maximum concentration that should be present in groundwater for domestic consumption according to the Ontario Drinking Water Standards (ODWS).
x = 0.5 for non-health related parameters and 0.25 for health related parameters.

TABLE 3
SUMMARY OF GROUNDWATER QUALITY DATA - 2022
NEUSTADT LANDFILL SITE

Parameter	Units	Background (4)	ODWS	Criteria Type	RUC	Upgradient (East)		Crossgradient (South)		Downgradient (Base of Landfill)		Downgradient (Northwest)			Downgradient (Southwest)
Well ID						GM2-3	GM2-9	GM3-7	GM3-12	GM5-3	OW4-3	OW7-3	OW8-3(S)	OW8-5(D)	OW9-3
Sampling Date						28-Sep-22	28-Sep-22	28-Sep-22	28-Sep-22	28-Sep-22	28-Sep-22	28-Sep-22	28-Sep-22	28-Sep-22	28-Sep-22
Alkalinity	mg/L	283	30-500	OG	392	220	DRY	220	66	**550**	200	**440**	260	**450**	**280**
Ammonia	mg/L	0.14	NV	NA	NV	0.07		0.05	0.74	1.4	0.33	2.9	1.3	4.1	0.92
Calcium	mg/L	73	NV	NA	NV	76		91	470	190	130	180	320	160	300
Chloride	mg/L	3.25	250	AO	127	3.2		3.9	8.0	18	9.1	29	73	19	**200**
Conductivity	µS/cm	604	NV	NA	NV	610		680	2300	1300	940	1100	1800	940	1900
DOC	mg/L	2.0	5	AO	3.5	0.66		0.66	0.91	**3.5**	0.7	**6.7**	**3.8**	**7.2**	3.0
Hardness	mg/L	326	80-100	OG	326	**340**		**370**	**1600**	**730**	**520**	**610**	**1000**	**490**	**980**
Iron	mg/L	0.33	0.3	AO	0.33	<0.02		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Magnesium	mg/L	35	NV	NA	NV	37		34	94	62	47	36	56	23	56
Nitrate	mg/L	0.1	10	MAC	2.58	0.15		0.27	0.42	0.11	<0.10	1.4	0.89	<0.10	<0.10
Nitrite	mg/L	0.1	1	MAC	0.25	<0.010		0.02	**0.26**	0.08	0.03	0.18	0.06	0.03	0.07
pH	Unitless	7.75	6.5-8.5	OG	6.5-8.5	8.15		8.00	7.81	7.77	8.01	7.82	7.8	7.91	7.69
Phenols	mg/L	0.001	NV	NA	NV	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Potassium	mg/L	NA	NV	NA	NV	2.0		2.0	3.0	19	2.0	6.0	3.0	3.0	4.0
Sodium	mg/L	7.5	200	AO	104	6.4		8.2	35	16	17	21	40	15	47
Sulphate	mg/L	55	500	AO	278	60		130	**1400**	120	**300**	120	**630**	9.9	**400**
TKN	mg/L	1.95	NV	NA	NV	0.50		0.49	1.5	1.8	0.52	4.4	2.1	5.2	2.2
TDS	mg/L	345	500	AO	423	345		**425**	**1970**	**730**	**625**	**670**	**1180**	**495**	**1210**

Notes:
1. ODWS = Ontario Drinking Water Quality Standards.
2. MAC = Maximum Acceptable Concentration; IMAC = Interim Maximum Acceptable Concentration; AO = Aesthetic Objective; OG = Operational Guideline
3. RUC = Reasonable Use Criteria.
4. NV = No Value; NA = Not Applicable or Not Analyzed.
5. Background concentrations are derived from the averages of OW2-10/GM2-9 from 1993 to 2013.
6. Values in bold are greater than the Reasonable Use Criteria.
7. Shaded values are greater than the ODWS.
8. Samples analyzed by Maxxam Analytics Inc.
9. ISW = Insuffient Water

TABLE 4
SUMMARY OF SURFACE WATER QUALITY DATA - 2022
NEUSTADT LANDFILL SITE

Parameter / Sampling Location / Sampling Date	Units	PWQO	S-1	S-2	S-3
			28-Sep-22	28-Sep-22	
Alkalinity	mg/L	See Note 5	88	210	DRY
Ammonia	mg/L	NV	<0.05	<0.05	
Ammonia (Un-Ionized)	mg/L	0.02	0.0007	0.0002	
Chloride	mg/L	NV	43	13	
Conductivity	µS/cm	NV	340	2300	
Iron	mg/L	0.30	0.23	<0.02	
pH	Unitless	6.5-8.5	8.07	7.96	
Phenol	mg/L	0.001*	<0.001	<0.001	
Phosphorus	mg/L	0.03*	0.01	0.006	
Total Dissolved Solids	mg/L	NV	170	1950	
Potassium	mg/L	NV	2.0	3.0	
Temperature (Field)	°C	NV	13.1	10.6	

Notes:
1. PWQO refers to the Provincial Water Quality Objectives established by the Ministry of the Environment (July 1994).
2. * denotes IPWQO - Interim Provincial Water Quality Objective.
3. NV = No Value
4. Values shaded and in bold are greater than the (I)PWQO.
5. Alkalinity should not be decreased by more than 25% of the natural concentration.
6. Samples analyzed by Maxxam Analytics Inc.

TABLE 7
SUMMARY OF HISTORICAL METHANE GAS MONITORING RESULTS (2006 TO PRESENT)
NEUSTADT LANDFILL SITE

Gas Probe Location	GM2-3	GM2-9	GM3-7	GM5-3	MV-1	MV-2	MV-3	MV-4
Screened Interval (mbgs)	1.5 - 3.0	1.3 - 4.3	0.4 - 2.8	1.3 - 2.8	1.0 - 4.0	1.1 - 4.1	1.2 - 4.2	0.9 - 3.9
Date								
April 25, 2006	0	0	--	--	--	--	--	--
September 18, 2006	0	0	--	--	--	--	--	--
November 5, 2007	0	0	--	--	--	--	--	--
March 6, 2008	<1	<1	<1	<1	--	--	--	--
March 13, 2008	<1	<1	<1	--	<1	<1	<1	<1
March 31, 2008	<1	<1	<1	--	<1	<1	<1	<1
September 29, 2009	--	0	0	--	0	0	--	0
November 15, 2010	--	0	0	--	0	0.2	0	0
November 10, 2011	--	0	0	--	0	0	0	0
September 20, 2012	--	0	0	--	0	0	0	0
January 17, 2014	--	0	0	--	0	0	0	0
November 4, 2014	--	0	0	--	0	0	0	0
November 4, 2015	--	0	0	--	0	0	0	0
October 26, 2016	0	0	0	--	0	0	0	0
November 13, 2017	0	--	0	--	0	0	0	0
November 14, 2018	0	0	0	--	0	0	0	0
October 21, 2020	0	--	0	--	0	0	0	0
November 12, 2021	0	--	0	--	0	0	0	0
September 28, 2022	0	--	0	--	1	0	0	0

Notes:
1. "mbgs" - metres below ground surface
2. All values measured in % lower explosive limit (LEL) for methane, unless otherwise noted.
3. Gas probes in GM2-9 and GM3-7 installed in same borehole as monitoring well. The gas probe at GM2-9 is screened from 1.3 to 4.3 mbgs and GM3-7 is screened from approximately 1.2 to 2.7 mbgs.
4. -- No measurement recorded.
5. Measurements recorded prior to 2013 were recorded by HPA/Genivar and presented in previous Annual Reports for the Site.

APPENDIX A:
ENVIRONMENTAL COMPLIANCE APPROVAL

Ministry of the Environment
Waste Management Branch

File A —

APPLICATION FOR A CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

A-2610

IMPORTANT NOTE

THIS FORM MUST BE SUBMITTED THROUGH THE OFFICE OF THE REGIONAL WASTE MANAGEMENT ENGINEER

(SEE SECOND SHEET FOR INSTRUCTIONS FOR COMPLETING THIS FORM)

1. Owner (Applicant) — Under the Environmental Protection Act and the Regulations, this application is made by:— Village of Neustadt, (Name) Neustadt, Ontario. (Address)

2. Type of disposal site — For the ~~Reissue~~ Issue of a Certificate of Approval for a ~~Dump~~ LANDFILL Site

3. Site location — Located Con 14 Pt Lt 3 Hanover Road East, Neustadt, Ontario.

IF APPLICATION IS FOR REISSUE, COMPLETE SECTIONS 4 AND 5 (A OR B)

4. Previous Certificate details — Certificate / Provisional Certificate of Approval:— No. .... for this site was issued on:— 197

5. Changes. (A) The following changes in use, operation or ownership (have occurred since the date of the original application) OR (are proposed)

(B) No change in use, operation or ownership of the site has occurred since the date of the original application. ☐

IF APPLICATION IS FOR ISSUE, COMPLETE SECTIONS 6, 7, 8 AND 9

6. Operator. — The site will be operated in conformity with the Environmental Protection Act and the regulations by:— Mr. Reuben Hein, (Name) Neustadt, Ontario. (Address)

7. Publication of Notice. — Notice of this application has been published in the N/A (Name of Newspaper) on the following dates

and a copy of the notice is attached. ☐

8. Municipal Certificate (Non-municipal applicants only) — A certificate, that the site does not contravene any of the by-laws of the Village of Neustadt (Municipality) Signed by Audrey L. Helwig, (Name) Clerk. (Position) is attached.

9. Additional information — The required supporting information to this application is attached. ☒

Dated this 7th day of December 19 72

Corporation of the Village of Neustadt
(Mrs.) Audrey L. Helwig
Signature of Owner-Applicant Clerk-Treas.

Ministry of the Envir nt
Waste Management Branch A-3618

SUPPORTING INFORMATION TO AN APPLICATION FOR APPROVAL OF A LANDFILL DISPOSAL SITE

APPLICANT TO COMPLETE ITEMS 1-4 INCLUSIVE

1. SITE DETAILS

Applicant: Village of Neustadt

Site Location: Con 14 Pt Lt 3 Tenovar Road East, Neustadt, Ontario.

Total area of Site	9½ Acres
Total usable area for waste disposal	3 Acres
Anticipated Lifetime	20 Years
Distance to nearest watercourse	1000 ft.
Distance to nearest potable well water supply	1000 ft.
Depth of well noted above	20 ft.
Distance to dwelling	800 ft.
Distance to public road measured from working area	800 ft.
Distance to cemetery	2000 ft.
Depth from original surface to bottom of waste	20 ft.
Depth from original surface to top of fill	25 ft.

Ground conditions encountered measured from original surface

From ..... To .....
From ..... To .....
From ..... To .....
From ..... To .....

Depth to watertable below surface ..... ft.
on ..... 197.....

General description of site (location, topography etc.)

Gravel consistency soil on top of muskeg. flat field with small hill in S.E. corner.

Proposed use of land after site fully utilized

Agriculture as planned at present.

2. Wastes to be Disposed of Comprise

Domestic	85 %
Commercial	15 %
Industrial Waste	%
Hauled Liquid Industrial Waste	%
Agricultural Waste	%
Hazardous Waste	%
Hauled Sewage	%
*Other	%
	100%

*Describe .....

Origin and Composition of Principal Components of Waste (other than domestic and commercial)

FOR OFFICIAL USE

File A

FOR REGIONAL USE

Authorities Consulted:

Health Unit	☐ Objection	☐ No Objection
O.W.R.C.	☐ Objection	☐ No Objection
A.M.B.	☐ Objection	☐ No Objection
Municipality	☐ Objection	☒ No Objection
Conservation Authority	☐ Objection	☐ No Objection

Other .....

Inspection Record Forms Attached Yes ☑ No ☐

Number of Forms 1

Regional Engineer's Report Attached ☑

Ground water monitoring Yes ☐ No ☐

Surface water monitoring Yes ☐ No ☐

3. Quantities

Total Tons per Day 3 ton max.
Total Gallons per Day .....
Estimated ☒ or Measured ☐
Site operated 1 days from 8a.m. to 5 p.m.
Population served 591
Names of Municipalities served

Village of Neustadt

Official Plan ☐ Zoning Bylaw ☐

Site land zoned .....
Adjacent land zoned .....

Equipment Owned ☐ Rented ☑

4. The Following Documents are Attached

Prepared by
Mrs. Audrey L. Welwir, Clerk-Treas.

DATED December 7th, 1972.
Corporation of the Village of
(Mrs.) [signature]
Signature of Owner (Applicant)
Clerk-Treas

No Carbon R

Ontario

Ministry of the Environment

PROVISIONAL CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

Provisional Certificate No. 261001

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to

Corporation of the Village of Neustadt

Neustadt, Ontario

for the Landfill Site

located Part of Lot 3, Concession 14, Hanover Road East

Village of Neustadt

subject to the following conditions:

1. That the site shall be closed off prior to June 30, 1974.
2. That the practice of open burning of domestic wastes shall be discontinued.

This Provisional Certificate expires on the 31st day of July, 1974

Dated this 18th day of September, 1973

Director, Waste Management Branch

MOE 14-201

ENVIRONMENTAL APPEAL BOARD

Member - L. C. DeGroot
Member - E. G. Marsh

December 4, 1974

In The Matter Of: Sections 77, 78 and 80 of The Environmental Protection Act, 1971,

- and -

In The Matter Of: Ministry of the Environment Provisional Certificate of Approval For A Waste Disposal Site being Provisional Certificate No. 261001, dated the 18th day of September, 1973, and issued to The Corporation of The Village of Neustadt, Neustadt, Ontario,

- and -

In The Matter Of: an appeal by The Corporation of the Village of Neustadt, dated the 27th day of September, 1973, from the conditions imposed in issuing the said Provisional Certificate,

O R D E R

Upon motion made to this Board by way of appeal from the conditions imposed in issuing Ministry of the Environment Provisional Certificate of Approval for a Waste Disposal Site No. 261001, upon hearing the evidence adduced by the Village of Neustadt and the Ministry of the Environment and upon hearing counsel for the Village of Neustadt and the Ministry of the Environment,

This Board hereby orders that:

(1) Condition No. 1 on the said Provisional Certificate be and hereby is altered as follows: the site may remain open on condition that the Village of Neustadt submit no later than the fifth day of February, 1975 an application to the Ministry of the Environment for an upgraded waste disposal site, the said application to be accompanied by a formal proposal prepared by the Village's Consulting Engineer.

(2) That Condition No. 2 on the said Provisional Certificate be and hereby is confirmed.

T. M. Murphy, Board Secretary.

PROPOSED PLAN OF OPERATION

VILLAGE OF NEUSTADT WASTE DISPOSAL SITE

The following recommendations are offered by this office to the Village of Neustadt Council regarding improved operations at the Neustadt Waste Disposal Site to meet the minimum requirements for a certified landfill site as outlined in Regulation 824, Section 10, of the Environmental Protection Act.

They are as follows:

1. All exposed refuse on the existing one hundred and twenty foot working face (see attached sketch for explanation) is to be compacted and covered with at least 6" of suitable cover material.

   All exposed refuse at the extreme northern edge of the existing working face, past the 120' mark is to be compacted and covered as specified under the Regulation 824, with at least 2' of suitable cover material and a final gradient slope of not greater than 30°.

   Because of the height involved, if dumping of domestic refuse on the northern 50' of the existing working face continues, this will prove costly in trying to maintain an effective area ramp operation. The stockpiled fill material on the western side of the plateau could be used to complete this operation.

2. Provisions are to be made for the addition of suitable fill material to properly close off the toe of the completed working face. The areas noted should be altered in such a manner as to direct the leachate into the ground were a greater retention time of the leachate would be the positive results of such action.

3. All existing branches, tree stumps and wood products located on the southeastern part of the property upon obtaining permission from this Ministry, should be burned under supervision to accommodate the proposed area ramp operation, noted in the attached sketch as Area A. All non-putrescible wastes should be separated and if not disposed of in another manner, periodically flattened and added to the working face.

4. Required Amounts of Suitable Cover Material -
   Based on - Site Production of 350 Cu. Yd./year or 30 Cu. Yd./ month.
   -Site is to be covered a total of 16 times/year, as follows:

   Once a month for eight months (Spring, Fall and Winter), twice a month in the summer, (June through September inclusive).

   To meet minimum requirements of 6" of suitable cover material, 80 Cu. Yds/year of cover material is required.

   In each of the proposed areas, this figure has been computed into the final life expectancy of that area, which roughly works out to a total of 2/3 domestic refuse to 1/3 cover material, following a rigid compacting and covering programme.

It has been established that proper compaction techniques employed at landfill sites will increase the amount of refuse per cubic yard approximately two thirds that of the initial volume.

Except for the area ramp operation in Area A, very little fill material will have to be hauled to the site.

Any additional fill material remaining from the trenching operations can be utilized in the final 2' of cover material that is required at the site when landfilling operations are completed.

Area Ramp Method - Area A

Procedures to be followed are:

(a) Limit the length of the working face to no greater than 15' in length, commencing from the southern end of the existing working face.

(b) At the end of each month, bi-monthly during the summer, these segments should be compacted and covered with at least 6" of suitable cover material to form self-contained cells of domestic refuse.

(c) When the entire working face is completed with these 15' cells then a second lift should be started on the completed cells in the same manner as the first lift, thus eventually working across the undulated area, directly east of the present working face. If the length of the working face is kept to a minimum, then this in turn will keep the amount of exposed refuse to a minimum, reduce littering and generally improve operations at the site.

Note: If proper compacting and covering operations are adhered to, Area A has the capacity to accept wastes for approximately three years, this includes all required cover material.

(d) When Area A is completed, 2' of final cover material should be added and the area seeded and gravel added for an access road, which is to lead to Areas B,C,D,E.

Trench Operation - Area B

(a) Excavate trench as outlined in attached sketch,
(b) Stockpile fill material on north side of trench,
(c) Construct ramp at eastern end of trench,
(d) Compacting and covering operation to be maintained as previously mentioned. Preferably, heavy equipment should be tracked with a bucket capable of carrying fill material into the trench,
(e) All domestic refuse should be compacted up against the western trench wall and covered with at least 6" of suitable cover material once per month and bi-monthly during the summer, to form a self-contained cell, thus working in an easterly direction, filling the trench up. Trenches C,D,E,F,G, are to be completed in that order, with a combined life expectancy of 7 years, based on present population rates. Excavated fill material from Trench F should be stockpiled on the southern side of the trench.
(f) After trenches are completed the final cover of 2' of suitable material should be completed and the entire area seeded.

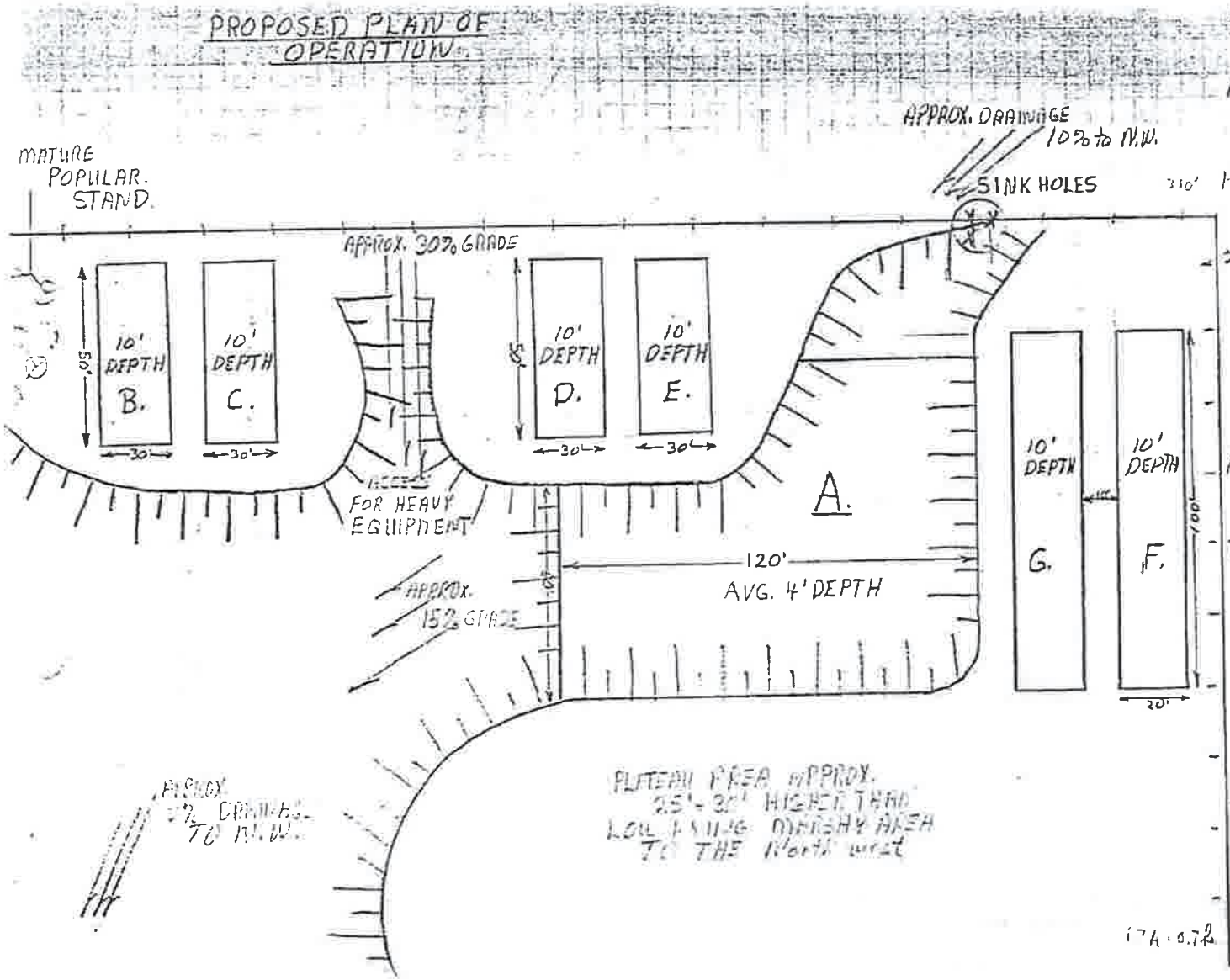
7. Because of the method of operation carried out by Mr. R. Seip, Collections System Operator for the Neustadt Waste Disposal Site, this office feels that more adequate supervision as required under subsection 2 & 12, Section 10, Regulation 624, should be initiated at the site. If the site is to continue with a minimum of supervision then proper signs should be placed at the site to ensure that the above mentioned closures are adhered to.

8. If a proper landfilling operation is established at the site then the need to burn domestic refuse at the site will be greatly reduced. It is therefore recommended that the practice of open burning of domestic wastes shall be discontinued. This procedure has been found to cause indiscriminate dumping of waste in areas other than working areas of site contributing to a disorderly operation thereof.

Prepared by

P. E. Bye,
Environmental Officer.

PROPOSED PLAN OF OPERATION



EST. EMBRACES SITE 350 yd.³ / year

AREA A. - UTILIZE AREA METHOD

CAPACITY = 1304 yd.³

AREA B.C.D.E.

CAPACITY OF EACH TRENCH = 555 yd.³

AREA F.G.

CAPACITY OF EACH TRENCH = 746 yd.³

LIFE EXPECTANCY

AREA-A - 3 years
B.C.D.E. - 4 years
F.G. - 3 years
Total 10 years "BASED on PRES POPULATION"

NOTE: LIFE EXPECTANCY OF EACH AREA INCLUDES THE REQUIRED AMOUNT OF SUITABLE FILL MATERIAL

SCALE: 20'

DWN. BY: P.B.

DATE: MARCH 24 1975

NEUSTADT WASTE DISPOSAL SITE

The Corporation of the Village of Neustadt

NEUSTADT, ONTARIO

N0G 2M0

OFFICE OF THE
VILLAGE CLERK

APRIL 18th, 1975.

Ministry of the Environment,
[illegible] St.E., Suite 108,
[illegible], Ontario.

Attn: Mr. W.Pace,P.Eng.

Dear Sir:

RE: Proposed Plan of Operation,
Neustadt Waste Disposal Site.

This is to advise that the Council ofthe Village of Neustadt has accepted the proposed plan of operation to up-grade the village waste disposal site as presented by the district environmental officer,Mr. P.Dye.

You will be contacted as soon as a bull-dozer is available,so that we may proceed under your supervision.

Yours very truly,

(Mrs.) Audrey L.Helwig,
Clerk-Treasurer,
Village of Neustadt.

Ontario

MINISTRY USE ONLY

File A —

APPLICATION FOR A CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

IMPORTANT NOTE: This form must be submitted through the office of the Regional Waste Management Engineer

See back of form for instructions for completing this form.

1. Owner (Applicant) — Under the Environmental Protection Act and the Regulations, this application is made by:—
   Corporation of the Village of NEUSTADT. (Name)
   NEUSTADT, Ontario, NOG 2MO (Address)

2. Type of disposal site — For the ~~Issue~~ Reissue of a Certificate of Approval for a Landfill Site

3. Site location — Located Part Lot 3, Con.14, Hanover Road EAST, Village of Neustadt

IF APPLICATION IS FOR REISSUE, COMPLETE SECTIONS 4 AND 5 (A OR B)

4. Previous Certificate details — ~~Provisional~~ Provisional Certificate of Approval:— No. 261001 for this site was issued on — April 10th, 1973.

5. Changes
   (A) The following changes in use, operation or ownership (have occurred since the date of the original application) OR (are proposed) — This site has been up-graded to a landfill site.
   (B) No change in use, operation or ownership of the site has occurred since the date of the original application. ☐

IF APPLICATION IS FOR ISSUE, COMPLETE SECTIONS 6 AND 7.

6. Operator — The site will be operated in conformity with the Environmental Protection Act and the regulations by:— (Name) (Address)

7. Additional Information — The required supporting information to this application is attached. ☒

Dated this 15th day of May 19 ?? Signature of Owner—Applicant

PPORTING INFORMATION TO AN PLICATION FOR APPROVAL OF LANDFILL DISPOSAL SITE

APPLICANT TO COMPLETE ITEMS 1-4 INCLUSIVE

1. Site Details

APPLICANT
Corporation of the Village of Neustadt

SITE LOCATION
Pt Lot 3, Con. 14
Hanover Road East, Neustadt, Ontario.

TOTAL AREA OF SITE: 9¾ ACRES	TOTAL AREA TO BE UTILIZED FOR WASTE DISPOSAL: 3 ACRES
ANTICIPATED LIFETIME: 15 YEARS	DISTANCE TO NEAREST WATERCOURSE: 1000 FT
DISTANCE TO NEAREST POTABLE WELL WATER SUPPLY: 1000 FT.	DEPTH OF WELL NOTED AT LEFT: 20 FT.
DISTANCE TO DWELLING: 800 FT.	DISTANCE TO PUBLIC ROAD MEASURED FROM WORKING AREA: 655 FT.
DISTANCE TO CEMETERY: 2000 FT.	DEPTH FROM ORIGINAL SURFACE TO BOTTOM OF WASTE: — FT.

DEPTH FROM ORIGINAL SURFACE TO TOP OF FILL: — FT.

GROUND CONDITIONS ENCOUNTERED, MEASURED FROM ORIGINAL SURFACE
FROM — TO —
FROM — TO —
FROM — TO —
FROM — TO —

DEPTH TO WATERTABLE BELOW SURFACE: — FT. ON DATE: — 19—

GENERAL DESCRIPTION OF SITE (LOCATION, TOPOGRAPHY, ETC.)
Site located east side County Road 10, northeast corner of the village.

PROPOSED USE OF LAND AFTER SITE FULLY UTILIZED
Not known.

2. Wastes to be disposed of comprise

DOMESTIC	85 %	AGRICULTURAL WASTE	%
COMMERCIAL	15 %	HAZARDOUS WASTE	%
INDUSTRIAL WASTE	%	HAULED SEWAGE	%
HAULED LIQUID INDUSTRIAL WASTE	%	*OTHER	%

*DESCRIBE

ORIGIN AND COMPOSITION OF PRINCIPAL COMPONENTS OF WASTE (OTHER THAN DOMESTIC AND COMMERCIAL)

FOR REGIONAL OFFICE USE

Authorities consulted:	OBJECTION	NO OBJECTION
HEALTH UNIT	☒	☐
A.M.B.	☐	☐
MUNICIPALITY	☐	☐
CONSERVATION AUTHORITY	☐	☐
SANITARY ENGINEERING	☐	☐
INDUSTRIAL WASTES	☐	☐
WATER QUANTITY	☐	☐
OTHER	☐	☐
	☐	☐

Inspection Record Forms attached Yes ☐ No ☐
Number of Forms —
Regional Engineer's Report attached ☐

	REQUIRED	AVAILABLE
Ground Water monitoring	Yes ☐ No ☐	Yes ☐ No ☐
Surface Water monitoring	Yes ☐ No ☐	Yes ☐ No ☐

3. Quantities

TOTAL TONS PER DAY	TOTAL GALLONS PER DAY
3 ton per week	

ESTIMATED ☐ OR MEASURED ☐

SITE OPENED Tues DAYS FROM 8a.m. to 6p.m.

POPULATION SERVED 550

NAMES OF MUNICIPALITIES SERVED
Village of Neustadt

OFFICIAL PLAN ☐ ZONING BY-LAW ☐

SITE LAND ZONED	ADJACENT LAND ZONED

EQUIPMENT OWNED ☐ RENTED ☒

4. The following documents are attached

PREPARED BY
Mrs. Audrey L. Helwig,
Clerk-Treasurer

DATED
May 15th, 1975.

SIGNATURE OF OWNER (APPLICANT)

Ministry of the Environment

Ontario

NOTICE

TO: Village of Neustadt,
Neustadt,
Ontario.

You are hereby notified that Provisional Certificate of Approval No. 261001 has been issued to you subject to the conditions outlined therein.

The reasons for the imposition of these conditions are as follows:

To ensure the orderly and systematic development and operation of the site in accordance with the Environmental Protection Act and Regulations made pursuant thereto.

You may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board.

This Notice should be served upon:

Environmental Appeal Board,
365 Bay Street,
Suite 300,
Toronto, Ontario.
M5H 2V3

AND

The Director,
Section 3a, E.P.A.,
Ministry of the Environment
135 St. Clair Ave. West,
Toronto, Ontario.
M4V 1P5.

DATED at Toronto this 13th day of June, 1975.

D. P. Caplice

Director,

Ontario
Ministry of the Environment

Provisional Certificate No. 241001

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A
WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Village of Neustadt,
Neustadt,
Ontario.

for the 3 acre landfilling
located Part of Lot 3, Concession 14,
Hanover Road East,
Village of Neustadt, Grey County.
Site

subject to the following conditions:

1. That the waste disposal site located on Part of Lot 3, Concession 14, Hanover Road East, be developed and maintained in accordance with the plan of operation and drawing issued by the Owen Sound Regional Office on April 17, 1975, to the Village of Neustadt and approved by the Council.

This Provisional Certificate expires on the 30th day of November, 19 76

Dated this 13th day of June, 19 75

D. P. Caplice
DIRECTOR, SECTION 3 (a) E.P.A.

L 14/201

Ministry of the Environment
Ontario

Provisional Certificate No. A 261001

PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Village of Neustadt
Stephana Street
Neustadt, Ontario
N0G 2M0

3A

for the use and operation of a 1.2 hectare landfilling site within a total area of 3.74 hectares

9 A

all in accordance with the following plans and specifications: Plan of operation and drawing issued by the Owen Sound District Office on April 17, 1975 to the Village of Neustadt and approved by Council in a letter dated April 18, 1975

Located: Part of Lot 3, Concession 14
Hanover Road East
Village of Neustadt, County of Grey
as described in Schedule "A" attached hereto

which includes the use of the site only for the disposal of the following categories of waste (NOTE: Use of the site for additional categories of wastes requires a new application and amendments to the Provisional Certificate of Approval) Domestic and commercial wastes.

and subject to the following conditions:

1. No operation shall be carried out at the site after sixty days from this condition becoming enforceable unless this Certificate including the reasons for this condition has been registered by the applicant as an instrument in the appropriate Land Registry Office against title to the site and a duplicate registered copy thereof has been returned by the applicant to the Director.

Dated this 11th day of June, 1980.

Director, Section 39,
The Environmental Protection Act, 1971

117523

Ministry of the Environment

Ontario

NOTICE

TO: Village of Neustadt
Stephane Street
Neustadt, Ontario
N0G 2M0

You are hereby notified that Provisional Certificate of Approval No. A 261001 has been issued to you subject to the conditions outlined therein.

The reasons for the imposition of these conditions are as follows:

The reason for the condition requiring registration of the Certificate is that Section 46 of the Environmental Protection Act, 1971 prohibits any use being made of the lands after they cease to be used for waste disposal purposes in order to protect future occupants of the site and the environment from any hazards which might occur as a result of waste being disposed of on the site. This prohibition and potential hazard should be drawn to the attention of future owners and occupants by the Certificate being registered on title.

You may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board.

This Notice should be served upon:

The Secretary,
Environmental Appeal Board,
1 St. Clair Ave. West,
5th Floor,
Toronto, Ontario.
M4V 1K7

AND

The Director,
Section 39
Ministry of the Environment,

DATED this 11th day of June , 1980 .

Director,
Section 39
Ministry of the Environment.

MOE 1044 8/78

SCHEDULE "A"

ALL AND SINGULAR that certain parcel or tract of land and premises, situate, lying and being in the Township of Normanby, in the County of Grey and being composed of that portion of Lot Number Three (3) in the Fourteenth (14th) Concession of the said Township more particularly described as follows:

PREMISING that the westerly limit of said lot has a bearing of north seven degrees, thirty minutes west (N7°30'W) and relating all bearings herein thereto

FIRSTLY: Commencing at a point in the westerly limit of said lot at a distance of 1525.92 feet measured northerly from the southwesterly angle of said lot;

THENCE northerly along the said westerly limit of said Lot a distance of 330 feet;

THENCE north eighty-three degrees east (N83°E) parallel with the lines between the thirteenth (13th) and fourteenth (14th) Concessions of said Township a distance of 660 feet;

THENCE south seven degrees, thirty minutes east (S7°30'E) parallel with the said westerly limit a distance of 330 feet;

THENCE south eighty-three degrees west (S83°W) a distance of 660 feet to the place of beginning, containing by admeasurement five (5) acres, be the same more or less.

SECONDLY: Commencing at a point in the westerly limit of said Lot at a distance of 1864.70 feet measured northerly from the southwesterly angle of said Lot;

THENCE north eighty-three degrees, thirty minutes east (N83°30'E) a distance of 655.38 feet to a post;

THENCE north seven degrees, thirty minutes west (N7°30'W) parallel with said westerly limit a distance of 294.36 feet to a post;

THENCE south eighty-three degrees, thirty minutes west (S83°30'W) a distance of 655.38 feet to the westerly limit of said lot;

THENCE southerly along the said westerly limit a distance of 294.36 feet to the place of beginning.

Ministry of the Environment
Ontario

Provisional Certificate No. A261001 (Revised)
Revised (1)

PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE

Under the Environmental Protection Act and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Village of Neustadt,
P. O. Box 66,
Stephana Street,
Neustadt, Ontario.
N0G 2M0

for the use and operation of a 1.2 hectare landfilling site within a total area of 3.74 hectares

all in accordance with the following plans and specifications: Plan of operation and drawing issued by the Owen Sound District Office on April 17, 1975 to the Village of Neustadt and approved by Council in a letter dated April 18, 1975.

Located:

Part of Lot 3, Concession 14,
Hanover Road East,
Village of Neustadt, County of Grey

which includes the use of the site only for the disposal of the following categories of waste (NOTE: Use of the site for additional categories of wastes requires a new application and amendments to the Provisional Certificate of Approval) Domestic and commercial wastes

and subject to the following conditions:

1) Burning of any waste other than segregated brush and clean wood wastes is prohibited.

2) Access to the burning area by the public and other unauthorized personnel will be prohibited when burning is carried out.

3) Supervision of the burning operation shall be provided by the operating authority.

4) A consultant's report outlining the hydrogeological characteristics and any remaining capacity available for further landfilling at this waste disposal site shall be submitted to the Owen Sound District Office of the Ministry of the Environment by no later than June 1, 1987 in order to allow for any further waste disposal operations to be conducted at this site beyond that date.

Dated this 15 day of _____, 19 80

Director, Section 38
Environmental Protection Act

Ministry of the Environment
Ontario

NOTICE

TO: Village of Neustadt
P. O. Box 66
Stephana Street
Neustadt, Ontario
N0G 2M0

You are hereby notified that Provisional Certificate of Approval No. A261001 has been issued to you subject to the conditions outlined therein.

The reasons for the imposition of these conditions are as follows:

1) The reason for Condition 1 is that the burning of wastes other than segregated brush, lumber, and clean wood results in unacceptable emissions of air contaminants and may present a hazard to the health of nearby persons or may create a nuisance.

2) The reason for Conditions 2 and 3 is that restricted access to the burning area and adequate supervision are required to ensure that burning is carried out in a proper manner under the proper conditions and only the proper types of waste are burned. The use and operation of the site without theses conditions may create a nuisance or may result in a hazard to the health or safety of any person.

3) The reason for Condition 4 is that the completion of the consultant's report is considered urgent because it is estimated that the remaining available life expectancy of this site is very limited.

You may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board.

This Notice should be served upon:

The Secretary
Environmental Appeal Board
1 St. Clair Ave. West
5th Floor
Toronto, Ontario
M4V 1K7

and

The Director
Section 38 Environmental
Protection Act
Ministry of the Environment
985 Adelaide St. South
London, Ontario
N6E 1V3

Dated at London this 15th day of Dec 19 87.

Director
Section 38 Environmental
Protection Act
Ministry of the Environment

Ontario

Ministry of the Environment / *Ministère de l'Environnement*

Provisional Certificate of Approval for a Waste Disposal Site

Certificat provisoire d'autorisation du lieu d'élimination des déchets

Provisional Certificate of Approval No. A2610-01
Certificat provisoire d'autorisation nº

Under the Environmental Protection Act and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Aux termes de la Loi sur la protection de l'environnement et des règlements y afférents et sous réserve des restrictions qui s'y appliquent, ce Certificat provisoire d'autorisation est délivré à:

Village of Neustadt
P. O. Box 66
Neustadt, Ontario
N0G 2M0

for the closure of the landfilling site

Located: Part Lot 3, Concession 14,
Hanover Road East,
Neustadt, Ontario

Subject to the following conditions:

1) Final grading of the closed landfill site shall be completed by July 31, 1992 in a manner acceptable to the Owen Sound District Officer.

2) Monitoring at the closed waste disposal site shall be carried out as directed in writing by the Owen Sound District Officer.

3) No further use of the closed waste disposal site shall be permitted without the written acceptance of the Owen Sound District Officer.

All in accordance with the:

i) Application for Approval dated August 5, 1991;

ii) the Resolution of Council dated August 1, 1991;

iii) letter from Ms. Noble dated August 6, 1991 with the supporting information.

Dated this date ce 4th *day of jour de* October 19 91

Director, Section 38
Environmental Protection Act
Directeur, Section 38
Loi sur la protection de l'environnement

1408 (10/86)

APPENDIX B:
CORRESPONDENCE

101819

RECEIVED
SEP 0 8 2006
DCS

Ministry of the Environment
Southwestern Region
Barrie District Office
1580 20th St E
Owen Sound ON N4K 6H6
Fax: (519)371-2905
Telephone: (519) 371-6191

Ministère de l'Environnement
Direction régionale du Sud-Ouest
Bureau du district de Barrie
1580 rue 20th E
Owen Sound ON N4K 6H6
Télécopieur: (519)371-2905
Téléphone : (519) 371-6191

Ontario

September 7, 2006

Mr. Ken Gould
Municipality of West Grey
402813 Grey Rd. 4
RR 2
Durham, ON, N0G 1R0

RE: Neustadt Landfill Annual Monitoring Report
Reference Number 5782-6D7MAF

Dear Mr. Gould:

We have received a copy of the report titled "Annual Monitoring Report, Municipality of West Grey, Neustadt Landfill" dated May 2006 and prepared by Henderson Paddon & Associates Limited.

Staff from our technical support section have reviewed the report and provide the following comments:

The site appears to be in compliance with the Reasonable Use guideline for chloride. Background groundwater quality is poor, characterized by elevated levels of hardness, iron and DOC. Two monitoring wells at the foot of the waste represent leachate impacts. The leachate is relatively weak, and some elevated levels are observed in the downgradient boundary well, but well within the RUG criteria. No surface water impacts were observed.

The report recommends two monitoring events for 2006, to be reduced to one event per year in the fall for the following years. The ministry supports this recommendation since there appears to be no need to maintain the current frequency of twice a year.

A number of additional recommendations are made in setcion 7.0 of the report which should be implemented, including:

- methane gas probes should be monitored only during the fall monitoring event;
- an annual monitoring report should be prepared and submitted to the MOE;
- surface water sampling should be done following a rainfall event to avoid dry conditions;
- efforts to locate and properly abandon destroyed monitors should continue;
- protective casings for monitors GM2-3, 2-9 should be re-cemented.
- new waterra tubing should be installed at monitors GM6-3 and OW6-3.

If you have any questions concerning the above, please contact the undersigned.

Yours truly,

Ian Mitchell , P.Eng.
District Engineer
Owen Sound Area Office

File Storage Number: SI GR WG C14 610

cc. Helmut Pfeiffer – MOE, Owen Sound
Theo Beukeboom – MOE, London
Brian Scott – Henderson Paddon, Owen Sound

RECOMMENDED LONG TERM MONITORING PROGRAM - 2007 & BEYOND
Municipality of West Grey
Neustadt Landfill

101819 **Sept. 11, 2006**

	Date	Location	Analytical Parameters
A	WATER LEVELS Fall	GM2-3, GM2-9, GM3-7, GM3-12, GM5-3, OW4-3, OW6-3, TP1B-87	
B	SAMPLING Fall	Groundwater - GM2-3, GM2-9, GM3-7, GM3-12, GM5-3, OW4-3, OW6-3	GWC - hardness, alkalinity, Cl, conductivity, $NH_4(N)$, $N0_3(N)$, $N0_2(N)$, pH, sulphate, TDS, DOC, sodium Metals - iron, Ca, Mg Phenol - phenols, TKN
	Fall	Surface Water - S1, S2, S3	GWC - alkalinity, Cl, conductivity, NH4(N), pH, phosphorus Metals - iron Phenol - phenols Dissolved Oxygen (field)
C	Fall	Methane Gas - GM2-9, GM3-7	

Duplicates: 1 in 10 per water type (groundwater, surface water)
For analysis with Caduceon use Lab quote # QE030623

Ministry of the Environment and Climate Change
Southwestern Region
Owen Sound District Office
3rd Flr
101 17th St
Owen Sound ON N4K 0A5
Fax: (519) 371-2905
Tel: (519) 371-6191

Ministère de l'Environnement et de l'Action en matière de changement climatique
Direction régionale du Sud-Ouest
Bureau du district d'Owen Sound
101 rue 17th, 3ème étage
Owen Sound ON N4K 0A5
Télécopieur: (519) 371-2905
Tél:(519) 371-6191

Ontario

September 4, 2014

Mr. Ken Gould
Municipality of West Grey
402813 Grey Road # 4
RR # 2
Durham ON N0G 1R0

Dear Mr. Gould,

RE: Neustadt Landfill Site 2013 Annual Monitoring Report

We have received a copy of the report titled "Annual Monitoring Report (2013), Neustadt Landfill Site" dated May 29, 2014 and prepared by GM BluePlan Engineering Limited. Staff from our technical support section reviewed the report and our regional hydrogeologist provides the following comments:

The purpose of this review is to assess the hydrogeological aspects and compliance of the site with the Reasonable Use Guideline (B7) (RUG).

Property and Site Setting

The site and compliance boundary should be clearly indicated in the report. We could not find the 1991 supporting documents listed in the October 1991 approval in our files. In the 1975 application of Approval of a Landfill Disposal Site document, the area to be utilized for waste disposal is 3 acres on a 9 1/4 acre site; dimensions which do not match the current situation. The consultant should confirm the site and compliance boundaries for the site.

Monitoring and Report Program Objectives and Requirements

For clarity, the reference and a description of the monitoring program and any agreed upon changes should be in the report. Since this information may be found in documents which are not attached to the report, it would be helpful to have the information available.

Physical Setting (Geology/Stratigraphy and Hydrogeology)

While we appreciate that this site is small and has been closed since 1992, and that leachate is

likely attenuated, the conceptual site model for the site is very limited. The groundwater and surface water interaction is also not well demonstrated.

In Figure 3, the water elevations in wells GM2-3 and GM2-9 are not presented as they are in Table 1 of the Blue Plan Engineering report. If Wells GM2-3 and GM2-9 are considered to be completed in separate aquifers, the conceptual model should reflect that.

Monitoring Program (MW location, frequency, field and lab parameters and analysis, ECA requirements, procedures and methods, QA/QC, operational monitoring)

This site has 7 groundwater monitoring wells which are for the most part located near the landfilling area. These monitoring wells are completed in the shallow overburden as well as in the intermediate/deeper overburden. Water level monitoring and sampling occurs once a year in the fall. The report indicates that groundwater samples are monitored for: pH, conductivity, hardness, alkalinity, phenols, DOC, chloride, sulphate, nitrate, nitrite, ammonia, TKN and some metals (calcium, iron, manganese and sodium). The current list of parameters for the groundwater wells is too limited to allow the construction of a piper diagram. Additional parameters, such as potassium and TDS should be added.

Monitoring Results (Historical data, flow, quality, leachate characterization, landfill gas, control system monitoring)

Piper plots would assist in the interpretation of the water chemistry for the site. Using the 2002 analytical results, our hydrogeologist constructed a piper plot. Based on the 2002 data, our hydrogeologist interprets GM3-12 to be on its own, GM5-3 and GM2-9 to be somewhat together while the rest of the wells plot together. Monitoring well GM5-3 is the well closest to providing leachate characterization. It is constructed at the toe of the slope, however, it has a long screen extending possibly over two stratigraphical units (or weathered vs unweathered). Therefore, leachate sampled from this well may be diluted. A current piper diagram for the site is recommended.

GM2-9 is used as a background well, however we regard its use with caution. Although the water may be a upgradient of the landfill, it may not be representative of the shallow aquifer.

Based on the 2002 piper plot and on the current chemistry of well OW6-3, our hydrogeologist does not necessarily agree that the water chemistry in that well is influenced by deeper water. Again, the long screen straddling the stratigraphy might influence the chemistry of this well. In addition, the data supporting the direction of the vertical flow is unsupported and should be verified.

We could not locate the logs for monitoring wells GM4-3 and OW6-3 in the report.

The analytical results, especially in regards to metals, have drastically changed between 2012 and 2013. For example, iron was not detected in 2013. There has also been a change in consultant, laboratory and sampling/filtration method (ie. field vs laboratory filtration). A discussion should be provided in this regards.

Assessment, Interpretation and Discussion (flow direction, water quality, gas impact, effectiveness of engineering controls, adequacy of the monitoring program, need for contingency measures)

In the 2012 Annual Report, Genivar reported seeing a standpipe laying on the ground near GM3-12 and GM3-7 during the 2011 monitoring program. At that time, the Consultant was unable to locate the source of the casing. During our site visit of July 29th 2014, we also observed a casing on the ground at the same location. As mentioned by Genivar, continued efforts should be make to locate and properly abandon destroyed monitoring wells.

It would be helpful to know if well OW6-3 was repaired.

Reasonable Use Assessment

Using wells GM3-7, GM3-12 and OW6-3 in the assessment of Reasonable Use, the exceedances were as follows:

Some of the chemistry is puzzling, particularly as it relates to nitrogen (not specifically organic nitrogen). The integrity of the wells should be investigated and a discussion regarding the presence of elevation nitrogen should be provided in the report.

We are not aware of a contingency plan and contingency measures relating to groundwater for this site or a closure plan including a discussion regarding the contaminating lifespan of the site. A closure plan should identify a trigger mechanism and contingency plan (ie. which wells, what parameters, and what trigger levels for each parameter). 75% of the RUG is commonly adopted as a trigger level. In the event that an exceedance of a trigger level is confirmed, actions will be required to address the cause of the exceedance or to mitigate the situation. Our hydrogeologist would further suggest selecting more than one parameter exceedance to trigger an action as well as consultation with the MOECC to avoid getting a plan of action over parameters such as alkalinity and hardness singularly.

Conclusion

This site does not currently meet the Reasonable Use Guideline, however the parameters for which the site exceeds can, for the most part, be explained by background water chemistry. In the documents reviewed, there is no predetermined mechanism by which exceedances ought to be addressed.

Recommendations

- This annual report for this site could use another cross-section and a revised conceptual site model.
- The wells need to be examined to ensure that they are properly maintained and also that they provide meaningful information with respect to any potential impacts of this landfill on the environment.

- Additional parameters should be added to the list of analytical parameters to assist in the interpretation of the water chemistry.
- The presence of nitrogen in the wells should be furthermore investigated.
- A closure plan should be provided for this site.
- We do not agree with the Consultant's recommendation to reduce the frequency of groundwater monitoring. Given the comments above, the landfill should continue to be monitored yearly.

If you have any questions concerning this letter, please contact the undersigned at (519) 371-6191.

Yours truly,

Ian Mitchell , P.Eng.
District Engineer
Owen Sound District Office

File Storage Number: SI GR WG C14 610

cc. Helmut Pfeiffer, MOE, Owen Sound
M.D. Nelson, GM BluePlan, Owen Sound
Helene Pierard, MOE, London

GM BluePlan ENGINEERING

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May 27, 2015
Our File: 213090

Ministry of the Environment and Climate Change
Owen Sound District Office
101-17th Street East, Third Floor
Owen Sound, ON N4K 0A5

Attention: Mr. Ian Mitchell, P.Eng.
District Engineer

Re: Neustadt Landfill Report
Certificate of Approval No. A2610-01
(for the Closure of Landfilling Site)
Response to MOECC Comments

Dear Ian,

This letter is written in response to correspondence from the Ministry of the Environment and Climate Change (MOECC) to the Municipality of West Grey (dated September 4, 2014) which summarized comments from your Regional Hydrogeologist pertaining to the *Annual Monitoring Report (2013), Neustadt Landfill Site,* dated May 29, 2014 and prepared by GM BluePlan Engineering Limited (GMBP). It is noted that the 2014 Annual Monitoring Report is being submitted in conjunction with this response to comments and that several of the comments have been addressed within the framework of the annual report. In particular, Sections 5 and 6 of the report have been revised to include additional discussion regarding the groundwater system and water chemistry, including an analysis of influence to water quality based on differing hydro-stratigraphic units.

Several of the comments not addressed within the Annual Monitoring Report are addressed as follows:

i. The closed landfill site was operated as a small rural landfill until 1992, with only 0.45 ha of the originally approved 1.21 ha (3 acres) used for landfilling.

ii. We concur that the Site and compliance boundary should be clearly indicated in the report. It is noted that the *approximate property boundary/compliance limit* is outlined and labelled on Figure 2 and Figure 4 in both the 2013 and 2014 Annual Reports.

iii. As per the reviewers request, the reference documents related to the monitoring program and any agreed upon changes are provided in Appendix B of the 2014 Annual Monitoring Report.

iv. Potassium and total dissolved solids have been added to the list of parameters, as requested in the MOECC Comments.

v. A more detailed assessment of the background groundwater quality (GM2-9), leachate characterization (GM5-3) and defining characteristics of water quality associated with groundwater flow from the deeper overburden (GM3-12) has been provided in the 2014 Annual Monitoring Report. In addition, a summary table comparing the concentration ranges and averages for various indicator parameters for background groundwater quality, leachate impacted groundwater, groundwater quality in the deeper overburden and groundwater quality in the compliance well is provided as Table 6 in the 2014 Annual Report.

vi. The well logs for OW4-3 and OW6-3 have been located in our archived files and have been included in Appendix B of the 2014 Annual Monitoring Report.

vii. Although iron concentrations appear to differ from those measured in samples obtained from the previous consultant, further evaluation is not provided as we cannot comment on the actual sampling methodology and field protocols used by others. Iron is not considered a reliable indicator parameter on its own since it is considered ubiquitous in the subsurface and its concentration in groundwater is controlled by pH and redox conditions. Furthermore, iron is not considered to be a primary indicator parameter, therefore further assessment of these results is considered to be redundant. The use of several more reliable indicator parameters is considered to provide the key information in the assessment.

viii. The reviewer states that *'continued efforts should be made to locate and properly abandon destroyed monitoring wells'*. Although not stated in the Annual Report, as part of all on-going monitoring programs conducted by GMBP for all landfill sites, it is assumed that continued efforts are being made to locate and properly abandon destroyed monitoring wells, where applicable, including at the Neustadt Landfill site. This is considered to be part of the standard monitoring protocol.

ix. The broken hinge on OW6-3 will be scheduled to be repaired in the fall of 2015.

We continue to recommend a reduced monitoring program frequency for this site. It is our opinion that the Neustadt landfill site poses very little regulatory "risk", and believe that it is past its peak leachate generation stage and nearing the end of its monitoring period. In addition, we believe that it would be prudent to give weight to (i) the nature of site, such as its size and historical fill rate; (ii) previous studies and reports; and (iii) historical MOE involvement during the review process. Key factors contributing to a "holistic" review of the landfill site include:

- The landfill site closed in 1992, i.e., 23 years ago;
- The site operated as a small/local landfill with a 0.45 ha footprint;
- The fill rate to achieve closure would have been relatively small and likely extended over 20 years;
- Several different professionals, under separate scopes of work, have consistently had the opinion that the site meets the Reasonable Use Concept and that off-site impacts are not expected. In particular, the 1990 Hydrogeologic Assessment (Morrison and Beatty), concluded that no off-site impacts were anticipated at that time. Past reporting, Site reviews and MOECC correspondence that support these findings have included, but are not limited to, the following documents:
  i. Hydrogeologic Report, Phase II, Village of Neustadt Landfill (Morrison Beatty, August 1990);
  ii. Correspondence addressed to Mr. Ken Gould, Municipality of West Grey, prepared by Theo Beukeboom, MOE London, dated September 7, 2006; Re. Neustadt Landfill Annual Monitoring Report.
  iii. Annual Monitoring Report 2006, Municipality of West Grey, Neustadt Landfill (Henderson, Paddon and Associates Limited, May 2007);
  iv. Correspondence addressed to Mr. Ken Gould, Municipality of West Grey, prepared by Alison Munro, MOE London, dated September 19, 2007; Re. Neustadt Landfill Annual Monitoring Report.
  v. Annual Monitoring Report 2007, Municipality of West Grey, Neustadt Landfill, (Henderson, Paddon and Associates, May 2008);
  vi. D-4 Study for the Closed Neustadt Landfill Site, Part Lot 3, Concession 14, Municipality of West Grey, (Gamsby and Mannerow Limited, June 2008);
  vii. Letter Report addressed to Mark Turner, Corporation of the Municipality of West Grey, prepared by B. Benson, Henderson, Paddon and Associates Limited, dated May 5, 2008; Re. Results of Methane Monitoring, Former Village of Neustadt Landfill Site.
- Groundwater quality at well GM5-3 located directly downgradient of the fill area shows only minor leachate influence at this time;
- The MOE has been involved with the site during its development, closure and post-closure periods;
- It is reasonable to expect that the contaminating lifespan for the Neustadt landfill is passed;

- Based on the nature of the landfill (including consideration of waste placement mostly older than 25 years) and the analytical data collected to date, it is reasonable to expect that the water quality would either be at a stasis, or more likely improving; and
- Since the water quality at the property boundary meets the RUC, the water quality downgradient of the landfill is not getting worse (and likely improving), it only follows that the site will continue to meet the RUC with water quality likely improving with time.

As such, we believe it is practical to continue with phasing out the monitoring program and maintaining the established development controls for the site. Further, we believe that this approach is consistent with the approach accepted for many small, closed, former municipal landfill sites.

In closing, while we concur with several of comments/requests provided by the MOECC, we continue to recommend the reduced monitoring schedule for the Neustadt Landfill site.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

Matthew Nelson, M.Sc. P. Eng. P. Geo.
MN/an
Encl.

cc: Ken Gould, Municipality of West Grey
File No. 213090

GM BluePlan ENGINEERING

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May 17, 2016
Our File: 213090

Township of West Grey
#402813 Grey Road #4
R. R. # 2
Durham, ON N0G 1R0

Attention: Mr. Ken Gould

Re: Neustadt Landfill Report (2015)
Certificate of Approval No. A2610-01
(for the Closure of Landfilling Site)

Dear Ken,

Please find enclosed two copies of the Annual Monitoring Report (2015) for the closed Neustadt Landfill Site. As requested by the MOECC, a copy of the Monitoring and Screening Checklist, included in the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOECC, 2010) has also been enclosed with the annual report. It should be noted that the attached checklist is not intended to replace the Annual Monitoring Report, but rather provide a general summary of the annual findings. Consequently, for details regarding the annual monitoring program and site operations, please refer directly to the report.

In general, the environmental monitoring results are consistent with the results from previous years, which indicate that there is no leachate influence being measured in the wells located onsite and that the Reasonable Use Guideline continues to be met. Since the findings of the annual monitoring program continue to indicate that there are no leachate related impacts and the water quality results are generally consistent with background conditions, we continue to recommend a reduced monitoring program frequency for this site.

As previously stated, it is our opinion that the Neustadt landfill site poses very little regulatory "risk", and we believe that it is past its peak leachate generation stage and nearing the end of its monitoring period. In addition, we believe that it would be prudent to give weight to (i) the nature of site, such as its size and historical fill rate; (ii) previous studies and reports; and (iii) historical MOE involvement during the review process. Key factors contributing to a "holistic" review of the landfill site include:

- The landfill site closed in 1992, i.e., 24 years ago;
- The site operated as a small/local landfill with a 0.45 ha footprint;
- The fill rate to achieve closure would have been relatively small and likely extended over 20 years;
- Several different professionals, under separate scopes of work, have consistently had the opinion that the site meets the Reasonable Use Concept and that off-site impacts are not expected. In particular, the 1990 Hydrogeologic Assessment (Morrison and Beatty), concluded that no off-site impacts were anticipated at that time. Past reporting, Site reviews and MOECC correspondence that support these findings have included, but are not limited to, the following documents:
    i. Hydrogeologic Report, Phase II, Village of Neustadt Landfill (Morrison Beatty, August 1990);
    ii. Correspondence addressed to Mr. Ken Gould, Municipality of West Grey, prepared by Theo Beukeboom, MOE London, dated September 7, 2006; Re. Neustadt Landfill Annual Monitoring Report.
    iii. Annual Monitoring Report 2006, Municipality of West Grey, Neustadt Landfill (Henderson, Paddon and Associates Limited, May 2007);
    iv. Correspondence addressed to Mr. Ken Gould, Municipality of West Grey, prepared by Alison Munro, MOE London, dated September 19, 2007; Re. Neustadt Landfill Annual Monitoring Report.

v. Annual Monitoring Report 2007, Municipality of West Grey, Neustadt Landfill, (Henderson, Paddon and Associates, May 2008);
vi. D-4 Study for the Closed Neustadt Landfill Site, Part Lot 3, Concession 14, Municipality of West Grey, (Gamsby and Mannerow Limited, June 2008);
vii. Letter Report addressed to Mark Turner, Corporation of the Municipality of West Grey, prepared by B. Benson, Henderson, Paddon and Associates Limited, dated May 5, 2008; Re. Results of Methane Monitoring, Former Village of Neustadt Landfill Site.

- Groundwater quality at well GM5-3 located directly downgradient of the fill area shows only minor leachate influence at this time;
- The MOE has been involved with the site during its development, closure and post-closure periods;
- It is reasonable to expect that the contaminating lifespan for the Neustadt landfill is passed;
- Based on the nature of the landfill (including consideration of waste placement mostly older than 25 years) and the analytical data collected to date, it is reasonable to expect that the water quality would either be at a stasis, or more likely improving; and
- Since the water quality at the property boundary meets the RUC, the water quality downgradient of the landfill is not getting worse (and likely improving), it only follows that the site will continue to meet the RUC with water quality likely improving with time.

As such, we believe it is practical to continue with phasing out the monitoring program and maintaining the established development controls for the site. Further, we believe that this approach is consistent with the approach accepted for many small, closed, former municipal landfill sites.

I trust that this is sufficient for your records at this time. Please do not hesitate to contact me if you have any questions, or should you wish to discuss this further.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

Matthew Nelson, M.Sc. P. Eng. P. Geo.
MN/an
Encl.

cc: Mr. Ian Mitchell, P.Eng., Ministry of the Environment & Climate Change
File No. 213090

Ministry of the Environment and Climate Change

101 17th St. E., 3rd Floor
Owen Sound, ON N4K 0A5
Tel': 519 371-2901
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Ministère de l'Environnement et de l'Action en matière de changement climatique

101, 17e rue Est, 3e étage
Owen Sound ON N4K 0A5
Tél.: 519 371-2901
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Ontario

September 7, 2016

Mr. Brent Glasier
Municipality of West Grey
402813 Grey Road # 4
RR # 2
Durham ON N0G 1R0

Dear Mr. Glasier,

Re: Neustadt Landfill Site 2015 Annual Monitoring Report
MOE File: SI GR WG C14 610

We have received a copy of the report titled "Annual Monitoring Report (2015), Neustadt Landfill Site" dated May 2016 and prepared by GM BluePlan Engineering Limited. Staff from our technical support section reviewed the above report and our regional hydrogeologist provides the following comments:

The purpose of this review is to assess the hydrogeological aspects and compliance of the site with the Reasonable Use Guideline (B7) (RUG).

Property and Site Setting

The compliance boundary to the site should be clearly indicated in the figures of the report.

As mentioned in Ministry's letter dated September 4, 2014, the dimensions of the landfill property in the 1975 application for Approval document do not match that of reported on page 1 of the report. A letter from GM Blue Plan dated May 27, 2015 indicates that the site only 0.45 ha of the original 1.21 ha was used. Whether the approved property size was 2.9 ha or 3.74 ha is important for the ECA and should be confirmed.

Physical Setting (Geology/Stratigraphy and Hydrogeology)

The conceptual site model is very limited and given the hydrogeological complexity of the site, additional information is required. Additional cross-sections should be provided in the report to help illustrate the groundwater movement between the different hydrogeological units and the resulting groundwater chemistry.

Of note, the hydrogeological study (Morrison Beatty, 1990) which is quoted in the Annual Monitoring Report provides useful information with respect to hydrogeology and geochemistry. Furthermore, the report offers some insight about the depth of the trenches, where waste was deposited, and the groundwater levels within the waste.

Monitoring Results

Table 3 - "ISW" – We are assuming means insufficient water.

Assessment, Interpretation and Discussion

It would be helpful to have more than 3 parameters graphed for each well.

Reasonable Use Assessment

Using wells GM3-7, GM3-12 and OW6-3 in the assessment of Reasonable Use, the exceedences were as follows:

Year		2015		
	RUG	GM3-7	GM3-12	OW6-3
alkalinity	392	250	67	***490***
hardness	326	***340***	***1600***	***680***
sulphate	278	69	***1400***	150
DOC	3.5	0.68	1.1	***8.5***
TDS	423	354	***2220***	***696***

The site does not currently meet the Reasonable Use Guideline, however the parameters for which the site exceeds can, for the most part be attributed to the influence of deeper groundwater and to background conditions. In the documents MOECC reviewed, there is no predetermined mechanism by which exceedences ought to be addressed. A revised ECA and a closure plan may be helpful to all parties.

Despite the explanation in the report attributing the presence of nitrate and nitrite in some of the wells to background (p.10), our hydrogeologist still have some uncertainty about the integrity of the wells. This is aggravated by the fact that the construction standards (sealing of the annular space) aren't consistent with today's requirements and that the ministry has no information with regards to how the old wells were abandoned (plugged and sealed).

Conclusions and Recommendations

The ministry does not agree with the proposal of the Consultant to reduce the monitoring and reporting to once every 5 years. There are still some uncertainties about this site. If the conceptual site model is revised and a couple of rounds of enhanced monitoring of the leachate wells is undertaken, we may consider reducing the monitoring and reporting to biannual.

We note that the gas probes appear to be installed in monitoring well annular space and screened in unidentified material. Proper construction of the gas probes should be confirmed to ensure sample results are valid.

If you have any questions concerning this letter, please contact the undersigned at (519) 371-6191.

Sincerely,

Ian Mitchell
District Engineer
Owen Sound District

cc. Helmut Pfeiffer, MOE, Owen Sound
M.D. Nelson, GM BluePlan, Owen Sound
Helene Pierard, MOE, London

March 9, 2018
Our File: 213090

Ministry of the Environment and Climate Change
Owen Sound District Office
101 17th Street East (3rd Floor)
Owen Sound, ON N4K 0A5

Attention: Mr. Ian Mitchell

Re: Neustadt Landfill Site
Annual Monitoring Report (2017) and
Response to MOECC Comments
ECA No. A2610-01

Dear Ian:

Please find enclosed two copies of the Annual Monitoring Report for 2017 for the closed Neustadt Landfill Site. This report is being submitted on behalf of the Municipality of West Grey to fulfill the requirements of the Environmental Compliance Approval No. A2610-01 (ECA). A copy of the completed Monitoring and Screening Checklist included in the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOECC, 2010) has also been enclosed with the report as per the MOECC's request. It should be noted that the attached checklist is not intended to replace the Monitoring Report, but rather provide a general summary of the findings. Consequently, for details regarding the annual monitoring program and site operations, please refer directly to the report.

RESPONSE TO MOECC COMMENTS (dated September 7, 2016)

MOECC comments pertaining to the 2015 Annual Monitoring Report for the Site were provided in correspondence dated September 7, 2016. No additional MOECC comments pertaining to the 2016 Annual Report were provided during the reporting year. Comments are addressed on a point-by-point basis below with reference to those provided within the letter and are also addressed in the report, where applicable. A copy of the correspondence is provided in Appendix B of the Report.

Property and Site Setting

Comment 1:
The reviewer states that *'the compliance boundary to the Site should be clearly indicated in the Figures of the report'.* The compliance boundary is clearly outlined on Figure 2 and Figure 4, and is labeled as the 'approximate property boundary/compliance limit'.

Comment 2:
The Ministry suggests that the dimensions of the landfill property in the 1975 Application for Approval document do not match that reported in the recent Annual Reports. Although the area of the Site, referenced in the previous approvals, suggest that the Site area was 3.74 hectares, our records continue to suggest that the total site area at this time is 2.9 hectares. The compliance limits for the 2.9 hectare area are outlined in the Figures provided.

Although the Site area is less than that originally approved, on-going monitoring and reporting for the site continues to suggest that compliance of the site with respect to the Reasonable Use Guidelines is being achieved within the 2.9 hectare area. These findings are consistent with the conclusions of the Morrison Beatty Report which, in 1990, concluded that *'the current impact of the landfill on water quality is negligible. This study identified no significant degradation of downgradient surface water or groundwater and no evidence of off-site leachate effects'.* This conclusion was based on an assessment from the same monitoring network that was limited to monitoring within the 2.9 hectare area.

Physical Setting (Geology/Stratigraphy and Hydrogeology)

Comment 3:
The reviewer states *'that the conceptual model is limited and given the hydrogeological complexity of the Site, additional information is required'.* Based on further review of the available information, and consistent with the assessment provided in the Hydrogeological Study prepared by Morrison Beatty (August 1990), it is our understanding that the conceptual model for the site is relatively simple. However, in recognition of the reviewers concerns, a more detailed description of the Site geology and hydrogeology, with specific reference to the Hydrogeologic Report prepared by Morrison Beatty (August 1990), was provided in the 2016 Annual Report and is included in the 2017 Annual Report. Furthermore, in order to provide additional clarity, the interface between the shallow silt unit and the underlying Elma till unit identified at three locations in previous borehole logs for the Site (i.e. OW-1, OW-2 and OW-3, Morrison, Beatty Ltd.), has been depicted in the Cross-Section provided in the Report (Figure 3).

While it is recognized that Morrison Beatty identified some additional overburden units not referenced in the summary provided in the Annual Report, these were limited in extent, and were deemed to have no influence on the overall groundwater flow regime for the Site. Based on the MOECC reviewer comments, it appears that the reviewer is under the impression that the conceptual model for the site is complicated by a series of different hydrogeological units. Should the Site geology, and its overall effect on the groundwater flow regime, continue to be considered over-simplified, additional detail, with specific reference to the different hydrogeological units and their relative influence on the overall conceptual model/groundwater flow regime for the site is requested.

Comment 4:
The reviewer states that the Report (i.e. Hydrogeological Study, August 1990) *'offers some insight about the depth of the trenches, where waste was deposited and the groundwater levels within the waste'.* In order to address this comment, a copy of the report, in its entirety, was requested by GMBP from the MOECC. Based on the additional information obtained from Sections 1 and 2, which were not previously in GMBP's files, refuse placement occurred in 6 meter deep trenches. As a result, Morrison Beatty estimated that the thickness of saturated refuse was approximately 2 meters. The Cross-Section has been updated to depict the vertical extent of waste placement (i.e. 6 meters) and the Report has been updated to reflect these findings. It is however noted, that the limits of landfilling shown on the Figures provided (i.e. Plan View) continue to reflect the findings of the Test Pit investigations completed by Burnside on May 19, 2005.

Monitoring Results

Comment 5:
ISW = Insufficient Water, as described in the Notes provided in Table 3 and Table 4.

Assessment and Interpretation

Comment 6:
As requested, additional parameters including hardness, sodium, sulphate, potassium and ammonia have been added to the groundwater quality graphs provided in the appendices.

Reasonable Use Assessment

Comment 7:
The reviewer concurs with the interpretation provided in the Annual Report, which generally states that while the site does not currently meet the RUC, the exceedances can, for the most part, be attributed to the influence of deeper groundwater and to other factors, including background conditions. The reviewer indicates that *'there is no pre-determined mechanism by which exceedances ought to be addressed. A revised ECA and a closure plan may be helpful'.*

As previously stated, it is our opinion that the Neustadt Landfill Site poses very little regulatory "risk", and we believe that it is past its peak leachate generation stage and nearing the end of its monitoring period. Furthermore, groundwater quality shows stable to decreasing concentration trends and there is no evidence of recent or historical impacts to surface water related to the landfill. Therefore, it is our opinion that for a closed landfill site which is past its peak (yet minimal) leachate generation period, there would be no benefit gained from the establishment of a predetermined mechanism (i.e. a Trigger Mechanism and Contingency Plan) by which exceedances would be addressed.

In addition, with respect to the on-going request for a Closure Plan, and as stated in recent Annual Reports - Based on the issuance of an Approval *for the closure of the landfilling site*, it is understood that final closure of the Neustadt Landfill Site was completed in consultation with the MOECC and as per the standard landfill closure practices (i.e. Closure Plans and/or documentation) that were applicable at that time (i.e. the early 1990's).

Comment 8:
The reviewer continues to be concerned about the on-going detection of nitrate and nitrite at the upgradient monitoring locations GM2-3 and, to a lesser degree, GM2-9. While the reviewer's concerns pertaining to the well integrity are addressed below, in terms of the overall purpose of the monitoring and reporting program, these concentrations are interpreted to be directly related to the agricultural fields located upgradient of the Site and are typically not detected at the on-site monitoring locations. As a result, these local nitrate and nitrite concentrations have no bearing on the overall evaluation of Site compliance.

In 1989, a total of nine monitoring wells were initially installed at the Neustadt Landfill Site by Morrison Beatty Consulting Engineers. As seven of these original monitoring locations were found to be vandalized in 1993, (i.e. missing and/or destroyed), monitoring well replacement and abandonment was arranged. Following consultation with the MOECC, GMBP (formerly Gamsby and Mannerow) installed 5 new/replacement monitoring wells, including GM2-3, GM2-9, GM3-7, GM3-12 and GM5-3 in June 1994. Where possible (i.e. at OW3), the wells locations were filled with bentonite in order to properly seal them off. The remainder of the previous well locations could not be located and could therefore not be properly abandoned (i.e. plugged and sealed). However, based on the site conditions and the likelihood that the remaining holes from the vandalized wells would have likely collapsed within the 25-year period following their removal, it is unlikely that these would provide a conduit for nitrate/nitrite-impacted surface water that would have an appreciable impact on groundwater quality.

Furthermore, the reviewer questions the integrity of the upgradient replacement wells. These wells include a bentonite seal at the surface and, where applicable, above the sandpack surrounding the screen. It is unclear how the 'sealing of the annual space' would effect the interpretation of nitrate/nitrite concentrations upgradient of the Site. However, in order to clarify the well construction, the annular space was backfilled with native material during construction. In order to address comments pertaining to gas probes installed in monitoring wells annular space, these probes were screened within the backfilled native materials and gas readings obtained from these wells are considered to be valid.

Comment 9:
The MOECC's position that additional reports (i.e. a Closure Plan and Trigger Mechanism and Contingency Plan), an updated ECA, and on-going annual monitoring and reporting is needed continues to be contrary to GMBP's opinion that the Neustadt Landfill site is past its peak leachate generation stage (which was minimal at its peak), poses very little regulatory risk and is nearing the end of its monitoring period. Again, based the most recent Approval for closure of the landfill, Site closure was completed in consultation with the MOECC and was completed as per the standard landfill closure practices that were applicable at that time. As discussed, GMBP's interpretation is consistent with historic reports which suggested no off-site impacts are evident.

In order to more efficiently address the MOECC concerns, it is proposed that a workplan be developed in consultation with the MOECC. The workplan would outline the location and depth of two to three monitoring locations which could be used to confirm compliance along the existing downgradient compliance boundaries. It is assumed that annual monitoring from the expanded monitoring network for a period of two years could then be used to provide the level of certainty required to reduce the annual sampling and reporting frequency to reflect that of a closed landfill with negligible impacts (i.e. one every five years).

I trust this is sufficient for your use at this time. Please do not hesitate to contact me if you have any questions.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

A.W. Bringleson, B.E.S., C.E.T.

Matthew Nelson, P.Eng., P.Geo.

Encl.
cc: Brent Glasier, Municipality of West Grey
File No. 213090

APPENDIX C:
AVAILABLE BOREHOLE LOGS AND WELL INSTALLATION DETAILS

GAMSBY AND MANNEROW LIMITED
CONSULTING PROFESSIONAL ENGINEERS
GUELPH - OWEN SOUND

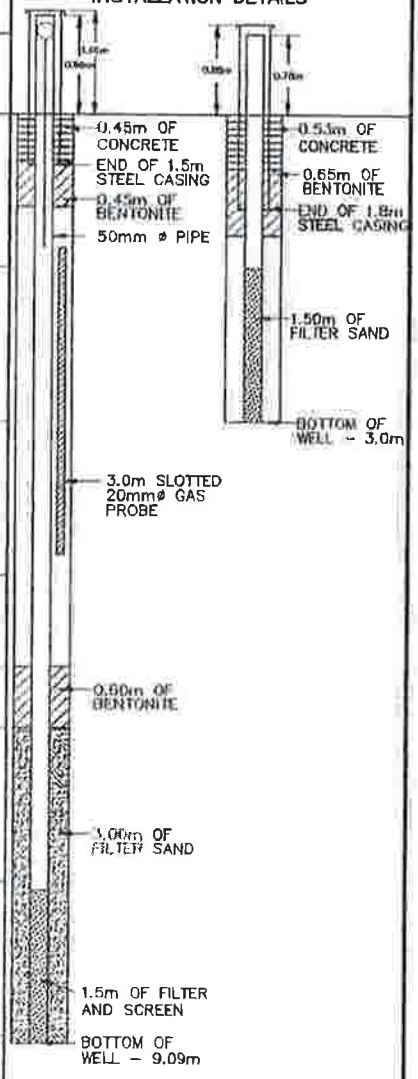
RECORD OF BOREHOLE NO. GM 2-3 GM 2-9

PROJECT : NEUSTADT LANDFILL
DATE : JUNE 21, 1994
PROJECT No.: M-1341
LOCATION : VILLAGE OF NEUSTADT
FIELD ENG./TECH : B. DUBEAU

DEPTH (m)	DESCRIPTION	NUMBER	TYPE	PENETRATION RESISTANCE
	GROUND ELEVATION:			
	BROWN SILTY TOPSOIL			
	BROWN SILT, TRACE OF CLAY, SOFT	1	SS	12
1.5	BROWN SILT, WET	2	SS	8
3.0	GREY SILT, TRACE OF CLAY, SOFT	3	AS	6
4.5	GREY SILT, BECOMING MORE COMPACT WITH DEPTH	4	SS	33
6.0	GREY SILT, COMPACT, SEAMS OF WET AND LOOSER SILT/FINE SAND	5	SS	41
7.5		6	SS	38
9.0	GREY SILT, COMPACT	6	SS	28
10.5				
12.0				

SHEAR STRENGTH kPa (kgf)
FV. NAT. ■ REM. □
UC ● PP ▲
PENETRATION RESISTANCE
DYNAMIC CONE X
STANDARD PENETRATION ●
20 40 60 80

STANDPIPE INSTALLATION DETAILS



NOTES: STANDARD PENETRATION FOR LAST 0.3m OF SPLIT SPOON

DRILLING METHOD: HOLLOW STEM AUGER
ENGINEER: W.E. DUBEAU

GAMSBY AND MANNEROW LIMITED
CONSULTING PROFESSIONAL ENGINEERS
GUELPH - OWEN SOUND

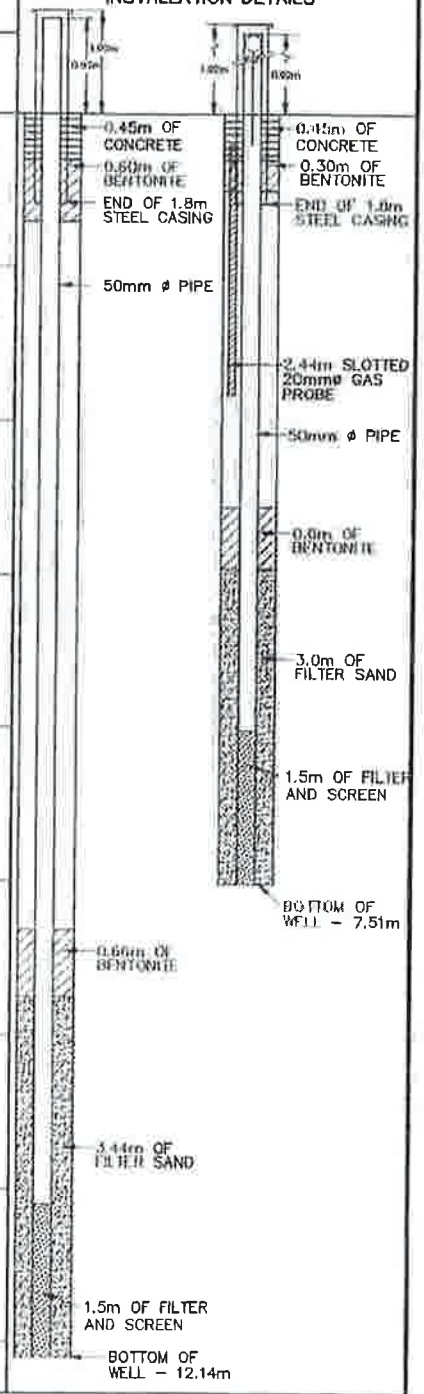
RECORD OF BOREHOLE NO. GM 3-7 GM 3-12

PROJECT : NEUSTADT LANDFILL
DATE : JUNE 21, 1994
PROJECT No.: M-1341
LOCATION : VILLAGE OF NEUSTADT
FIELD ENG./TECH : B. DUBEAU

DEPTH (m)	SOIL PROFILE: DESCRIPTION	LEGEND	ELEVATION	SAMPLE: NUMBER	TYPE	PENETRATION RESISTANCE
	GROUND ELEVATION:					
	DARK BROWN SILTY TOPSOIL			1	SS	16
	BROWN SILT FILL FEW STONES					
1.5	DARK BROWN CLAYEY SILT FILL			2	SS	6
	ORGANICS AND TOPSOIL					
3.0	BROWN SILT, TRACE OF SAND, WET			3	AS	19
	BROWN SILT, COMPACT					
4.5	GREY CLAYEY SILT, MEDIUM TO STIFF, WET			4	SS	20
6.0	GREY SILT, SOME CLAY, MEDIUM STIFFNESS, WET			5	SS	14
7.5	GREY SILT, SOME CLAY			6	SS	16
	GREY SILTY CLAY, MEDIUM STIFFNESS					
9.0	GREY SILT, SOME CLAY SEAMS OF VERY FINE SAND WET			7	SS	16
10.5	GREY SILT, SOME CLAY			8	SS	14
12.0	GREY SILT, TRACE OF SAND, COMPACT			9	SS	31

SHEAR STRENGTH kPa (ksf)
FV. NAT. ■ REM. □
UC ● PP ▲
PENETRATION RESISTANCE
DYNAMIC CONE X
STANDARD PENETRATION ●
20 40 60 80

STANDPIPE INSTALLATION DETAILS



NOTES:

DRILLING METHOD: HOLLOW STEM AUGER
ENGINEER: W.E. DUBEAU

GAMSBY AND MANNEROW LIMITED
CONSULTING PROFESSIONAL ENGINEERS
GUELPH - OWEN SOUND

RECORD OF BOREHOLE NO. GM 5-3

PROJECT : NEUSTADT LANDFILL DATE : JUNE 21, 1994 PROJECT No.: M-1341

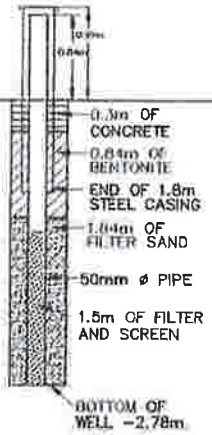
LOCATION : VILLAGE OF NEUSTADT FIELD ENG./TECH : B. DUBEAU

DEPTH (m)	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	PENETRATION RESISTANCE
	GROUND ELEVATION:					
	BROWN SILT FILL, SOME ORGANICS			1	SS	11
	BROWN SILT FILL FEW STONES					
1.5	BROWN SILT FILL TRACE OF SAND			2	SS	2
	BLACK CLAYEY TOPSOIL SOFT AND DAMP					
3.0	GREY SILT, COMPACT AND WET			3	SS	20
4.5						
6.0						
7.5						
9.0						
10.5						
12.0						

SHEAR STRENGTH kPa (ksf)
FV. NAT. ■ REM. □
UC ● PP ▲

PENETRATION RESISTANCE
DYNAMIC CONE X
STANDARD PENETRATION ●
20 40 60 80

STANDPIPE INSTALLATION DETAILS



NOTES:

DRILLING METHOD: HOLLOW STEM AUGER ENGINEER: W.E. DUBEAU

morrison beatty limited
consulting engineers and hydrogeologists
4000 dixie road, Mississauga, ontario (416) 624 – 9200

OW4-3

CLIENT VILLAGE OF NEUSTADT FILE NO. 665-881

PROJECT LANDFILL STUDY LOCATION NEUSTADT, ONTARIO

GEOLOGIST/ENGINEER KJS DATE COMPLETED March 14, 1989

DESCRIPTION	DEPTH metres	DEPTH feet	SAMPLE no.	SAMPLE type	SAMPLE "N"	WELL DETAIL	REMARKS BLOWS PER FOOT
279.9m						1.5m protective steel casing.	
						end cap.	
PEAT, black, moist.						cement seal.	
SILT, yellow-brown, gravelly, compact, moist.	1	5	1	SS	24	bentonite seal.	
SILT, grey, compact to dense, occassional clayey or gravelly layers (till).	2		2	SS	7	50mm flush joint PVC pipe; silica sand pack.	
	3	10	3	SS	8	50mm 10 slot PVC screen.	
			4	SS	40	screw on cap.	
	4	15	5	SS	59	backfill with cuttings.	
SILT, grey, dense							
E.O.H. 4.57m.	5						
	6	20					
	7	25					
	8						
	9	30					
	10	35					
	11						
	12	40					
	13	45					
	14						
	15	50					
	16						
	17	55					
	18	60					

BLOWS PER FOOT: 10 20 30 40 50 60 70 80 90

GS- GRAB SAMPLE SS - SPLIT SPOON ST - SHELBY TUBE "N" BLOWS PER FOOT WATER LEVEL ▽

morrison beatty limited
consulting engineers and hydrogeologists
4800 dixie road, ste, mississauga, ontario (416) 624 – 0500

OW6-3

CLIENT VILLAGE OF NEUSTADT FILE NO. 665-881

PROJECT LANDFILL STUDY LOCATION NEUSTADT, ONTARIO

GEOLOGIST/ENGINEER KJS DATE COMPLETED March 15, 1989

DESCRIPTION	DEPTH metres	DEPTH feet	SAMPLE no.	SAMPLE type	SAMPLE "N"	WELL DETAIL	REMARKS BLOWS PER FOOT 10 20 30 40 50 60 70 80 90
278.9m							1.5m protective steel casing. end cap.
PEAT, black, moist to wet.							cement seal.
SILT, brown, wet to saturated.	1	5				▽	bentonite seal.
SILT, gray, saturated.	2		1	SS	11		50mm flush joint PVC pipe.
	3	10	2	SS	18		50mm 10 slot PVC screen.
E.O.H. 3.048m	4						end cap.
		15					
	5						
	6	20					
	7						
		25					
	8						
	9	30					
	10						
		35					
	11						
	12	40					
	13						
		45					
	14						
	15	50					
	16						
		55					
	17						
	18	60					

GS- GRAB SAMPLE SS - SPLIT SPOON ST- SHELBY TUBE "N" BLOWS PER FOOT WATER LEVEL ▽

TABLE 1 - SUMMARY OF METHANE MONITOR INSTALLATIONS
Former Village of Neustadt Landfill Site
Municipality of West Grey

May 2008

Monitor	Depth Interval (mbgs)[1]	Simplified Stratigraphy	Screened Interval (mbgs)	Height of Casing Above Ground Surface (m)	Encountered Water Depth (mbgs)	Remarks
MV-1	0 - 0.5 0.5 - 4.4	Dark brown TOPSOIL with roots Light brown SILTY SAND	1.0 to 4.0	0.63	Dry	
MV-2	0 - 0.15 0.15 - 4.1	Dark brown TOPSOIL Light brown silty sand mixed with waste (glass and plastics) (FILL)	1.1 to 4.1	0.50	Dry	Waste material encountered below 1.4 m depth.
MV-3	0 - 0.15 0.15 - 1.1 1.1 - 4.2	Dark brown TOPSOIL Light brown silty clay (FILL) Dark brown/black material mixed with waste (burnt metal, plastics, glass bottles) and gravel/cobbles (FILL)	1.2 to 4.2	0.45	Dry	
MV-4	0 - 0.3 0.3 - 2.2 2.2 - 3.9	Dark brown TOPSOIL with roots Brown SAND and GRAVEL Brown SILTY SAND	0.9 to 3.9	0.69	0.6	Water inflow from sand and gravel.

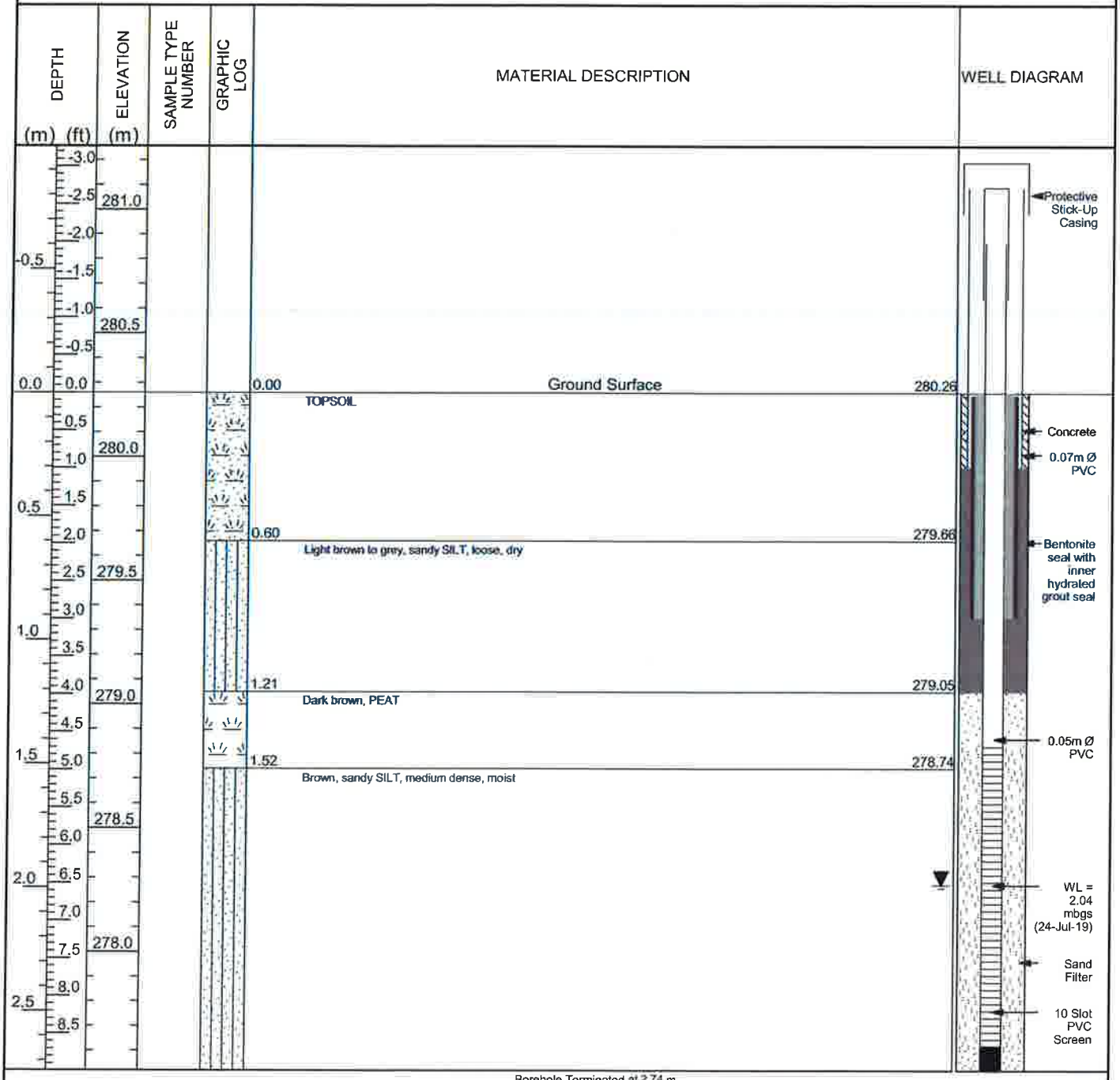
Notes:

1. "mbgs" - metres below ground surface.
2. Monitors installed on March 6, 2008.
3. For monitor locations, see Figure 1.
4. Table to be read in conjunction with accompanying letter.

Borehole ID: OW8-3(S)

BluePlan ENGINEERING

CLIENT Municipality of West Grey
PROJECT NAME Neustadt Landfill
PROJECT NUMBER 213090
PROJECT LOCATION Conc. 14, Part Lot 3, Hanover St
DATE COMPLETED 2019/07/24
CONTRACTOR London Soil Test
LOGGED BY JW
METHOD Hollow Stem Auger
WELL CONSTRUCTION 0.05m Ø PVC
NOTES Double cased MW with 0.05m Ø PVC and 0.07m Ø PVC



Borehole Terminated at 2.74 m.

Borehole ID: OW8-5(D)

BluePlan ENGINEERING

CLIENT Municipality of West Grey
PROJECT NAME Neustadt Landfill
PROJECT NUMBER 213090
PROJECT LOCATION Conc. 14, Part Lot 3, Hanover St
DATE COMPLETED 2019/07/24
CONTRACTOR London Soil Test
LOGGED BY JW
METHOD Hollow Stem Auger
WELL CONSTRUCTION 0.05m Ø PVC
NOTES

DEPTH (m)	DEPTH (ft)	ELEVATION (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0	0	281			0.00 Ground Surface 280.29	Protective Slick-Up Casing
					TOPSOIL	Concrete
		280			0.60 279.69	0.07m Ø PVC
					Light brown to grey, sandy SILT, loose, dry	Bentonite seal with inner hydrated grout seal
1		279			1.21 279.08	
					Dark brown, PEAT	
					1.52 278.77	
					Brown, sandy SILT, medium dense, moist	
2		278				
3		277			3.04 277.25	0.05m Ø PVC
					Brown, SILT, stiff, wet	WL = 3.20 mbgs (24-Jul-19)
						Sand Filter
4		276				10 Slot PVC Screen

Borehole Terminated at 4.57 m.

Borehole ID: OW9-3

BluePlan ENGINEERING

CLIENT	Municipality of West Grey	**PROJECT NAME**	Neustadt Landfill
PROJECT NUMBER	213090	**PROJECT LOCATION**	Conc. 14, Part Lot 3, Hanover St
DATE COMPLETED	2019/07/24	**CONTRACTOR**	London Soil Test
LOGGED BY	JW	**METHOD**	Hollow Stem Auger
WELL CONSTRUCTION	0.05m Ø PVC	**NOTES**	Double cased MW with 0.05m Ø PVC and 0.07m Ø PVC

DEPTH (m)	DEPTH (ft)	ELEVATION (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.0	0.0	280.5			0.00 Ground Surface 280.50 Dark brown, TOPSOIL with organics	Protective Stick-Up Casing
0.5		280.0			0.45 280.05 Dark brown, PEAT	Concrete 0.07m Ø PVC Bentonite seal with inner hydrated grout seal
1.0		279.5				
1.5		279.0				0.05m Ø PVC
					278.68	WL = 1.71 mbgs (24-Jul-19)
2.0		278.5			1.82 Brown, SILT with gravel, moist becoming wet with depth	Sand Filter
2.5		278.0				10 Slot PVC Screen

Borehole Terminated at 2.89 m.

BluePlan ENGINEERING

Borehole ID: OW7-3

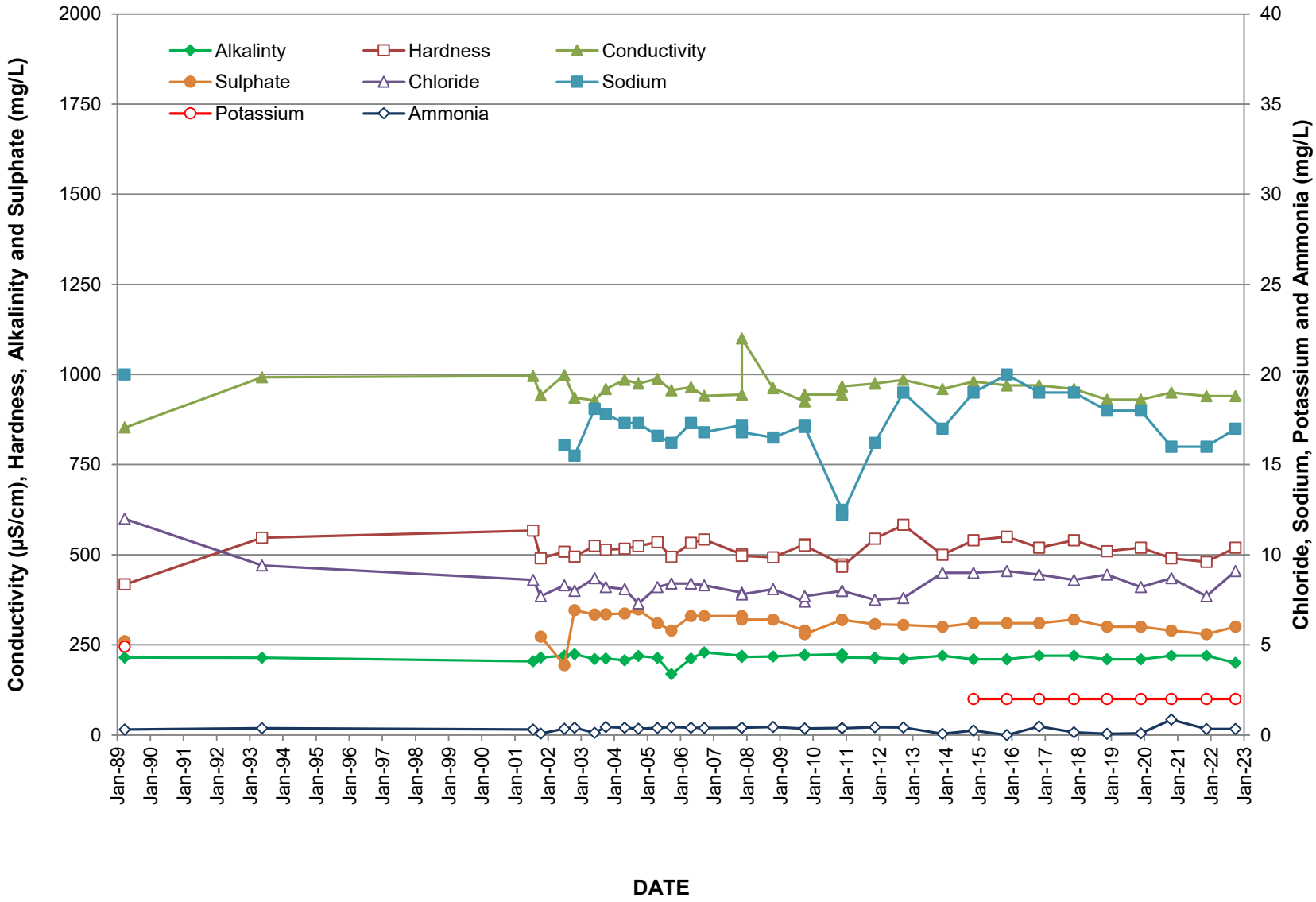
CLIENT Municipality of West Grey
PROJECT NAME Neustadt Landfill
PROJECT NUMBER 213090
PROJECT LOCATION Conc. 14, Part Lot 3, Hanover St
DATE COMPLETED 2019/07/24
CONTRACTOR London Soil Test
LOGGED BY JW
METHOD Hollow Stem Auger
WELL CONSTRUCTION 0.05m Ø PVC
NOTES Double cased MW with 0.05m Ø PVC and 0.07m Ø PVC

DEPTH (m)	DEPTH (ft)	ELEVATION (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
-0.5	-3.0 to -0.5	280.5				Protective Stick-Up Casing
0.0	0.0	280.0			0.00 Ground Surface 279.83	
					Dark brown, TOPSOIL with organics	Concrete; 0.07m Ø PVC
0.5	0.5 to 1.5	279.5			0.45 279.38	
					Dark brown, PEAT	Bentonite seal with inner hydrated grout seal
1.0	2.0 to 3.0	279.0				
	3.5 to 4.5	278.5				0.05m Ø PVC
1.5	5.0 to 6.0	278.0			1.82 278.01	WL = 1.70 mbgs (24-Jul-19)
					Brown, SILT with some gravel, moist becoming wet with depth	
2.0	6.5 to 7.5	277.5				Sand Filter
2.5	8.0 to 9.0	277.0				10 Slot PVC Screen

Borehole Terminated at 2.89 m.

APPENDIX D:
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS (TABLES & GRAPHS)

MONITORING WELL GM4-3

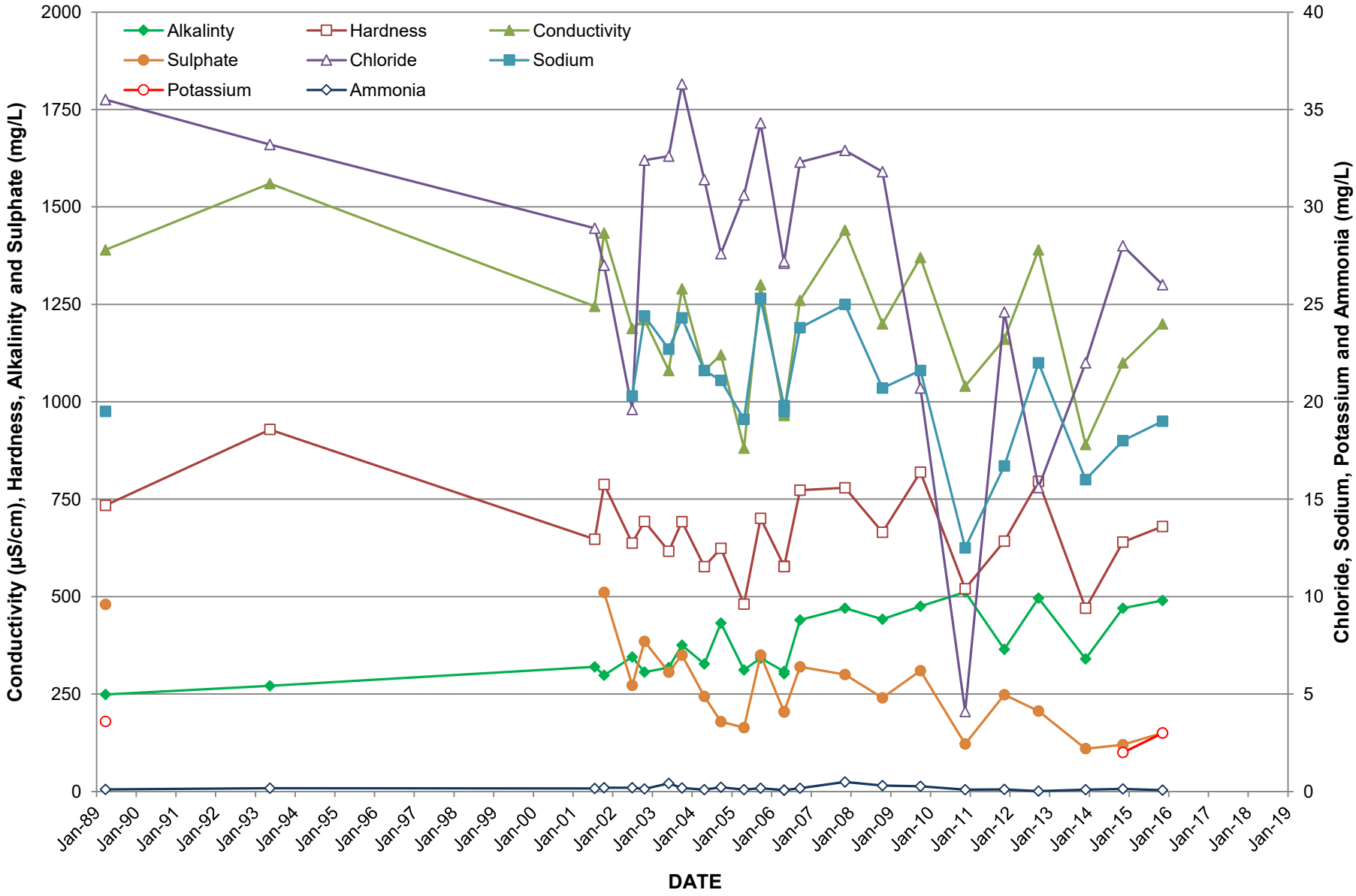


Historic Groundwater Quality Data
Neustadt Landfill Site

OW4-3																		
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG	NA	NA	AO	NA	AO	OG	AO	NA	MAC	MAC	OG	NA	NA	AO	AO	NA	AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Mar-89	215	0.305	97.6	12	853	2.6	**418**	0.04	42.2	0.1	0.01	7.90	0.0085	4.9	20	260	0.67	
May-93	214	0.378	138	9.4	992	1.6	**547**	0.15	48.7	0.1	<0.01	7.67	<0.001				0.73	
Jul-01	204	0.31	130	8.6	996	1	**567**	**1.2**	58.9	2.4	<0.1	7.52	<0.001				0.61	
Oct-01	215	0.08	121	7.7	942	2	**490**	0.16	45.7	0.7	<0.1	7.63	<0.001			273	0.25	**596**
Jun-02	220	0.35	124	8.3	999	<0.5	**508**	**1.39**	48.2	<0.1	**0.3**	7.30	<0.001		16.1	194	0.53	
Oct-02	224	0.41	123	8	936	0.6	**495**	**1.49**	45.5	0.1	<0.1	8.26	<0.001		15.5	**346**	0.57	**678**
May-03	211	0.12	130	8.7	928	0.5	**524**	0.19	48.5	<0.1	<0.1	7.78	<0.001		18.1	**334**	0.6	**668**
Sep-03	212	0.44	127	8.2	960	**5**	**514**	**1.33**	47.9	0.1	<0.1	7.82	<0.001		17.8	**335**	0.45	**667**
Apr-04	207	0.41	130	8.1	985	0.5	**517**	**0.86**	47.1	<0.1	<0.1	7.62	<0.001		17.3	**337**	0.5	**665**
Sep-04	219	0.35	127	7.3	975	0.5	**524**	**1.83**	50	0.1	<0.1	8.21	<0.001		17.3	**348**	0.51	**684**
Apr-05	214	0.39	132	8.2	988	0.7	**535**	**1.09**	50.1	<0.1	<0.1	8.47	<0.001		16.6	**310**	0.55	
Sep-05	169	0.44	121	8.4	956	**6.3**	**494**	0.172	46.6	<0.1	<0.1	7.34	<0.001		16.2	**290**	0.48	**584**
Apr-06	212	0.4	132	8.4	965	1	**533**	**0.77**	49.3	<0.1	<0.1	7.78	<0.001		17.3	**330**	0.54	**667**
Sep-06	229	0.39	137	8.3	941	2.3	**542**	**1.73**	48.6	0.1	<0.1	7.46	<0.001		16.8	**330**	0.47	**687**
Nov-07	220	0.41	125	7.9	944	1.4	**501**	**1.71**	46.2	<0.1	<0.1	7.24	<0.001		17.2	**330**	0.87	**662**
Nov-07	216	0.41	123	7.8	1100	2.4	**497**	**1.71**	45.9	0.1	<0.1	7.41	<0.001		16.8	**320**	0.8	**653**
Oct-08	218	0.44	127	8.1	962	1	**493**	**1.58**	42.6	<0.1	<0.1	7.59	<0.001		16.5	**320**	0.5	**648**
Sep-09	222	0.35	131	7.4	925	0.8	**529**	**1.43**	48.8	<0.1	<0.1	7.26	<0.001		17.2	**290**	0.41	**632**
Sep-09	221	0.36	130	7.7	944	0.9	**525**	**1.42**	48.5	0.1	<0.1	7.33	<0.001		17.1	**280**	0.42	**621**
Nov-10	224	0.39	111	8	944	0.9	**473**	**2.27**	47.6	0.1	<0.1	7.16	<0.001		12.5	**319**	0.74	**637**
Nov-10	215	0.38	109	8	967	0.9	**467**	**2.25**	47	0.1	<0.1	7.11	<0.001		12.2	**319**	0.72	**629**
Nov-11	214	0.43	129	7.5	975	1.7	**544**	**1.48**	53.6	<0.1	<0.1	7.72	<0.001		16.2	**307**	0.56	**647**
Sep-12	211	0.42	145	7.6	985	0.90	**583**	**1.4**	53.6	0.2	<0.1	7.86	<0.001		19	**305**	0.53	**661**
Nov-13	220	0.06	120	9	960	0.69	**500**	<0.1	47	0.3	<0.01	7.97	<0.001		17	**300**	0.21	
Nov-14	210	0.25	140	9	980	0.96	**540**	<0.02	49	0.25	0.032	7.99	<0.001	2	19	**310**	0.24	**692**
Nov-15	210	<0.050	140	9.1	970	1.1	**550**	<0.02	50	0.18	0.055	7.90	<0.001	2	20	**310**	<0.50	**682**
Oct-16	220	0.47	130	8.9	970	1.4	**520**	<0.02	48	0.98	0.192	7.88	<0.001	2	19	**310**	0.74	**690**
Nov-17	220	0.15	130	8.6	960	0.80	**540**	<0.02	50	0.21	0.024	7.86	<0.001	2	19	**320**	0.22	**615**
Nov-18	210	0.062	130	8.9	930	0.71	**510**	<0.02	46	0.33	<0.01	7.80	<0.001	2	18	**300**	0.11	**590**
Nov-19	210	0.099	130	8.2	930	0.54	**520**	<0.02	48	0.25	<0.01	7.98	<0.001	2	18	**300**	0.11	**700**
Oct-20	220	0.86	120	8.7	950	0.99	**490**	<0.02	47	0.55	0.258	7.86	<0.0010	2	16	**290**	0.96	**630**
Nov-21	220	0.34	120	7.7	940	0.58	**480**	<0.02	44	0.12	0.066	7.88	<0.0010	2	16	**280**	0.41	**625**
Sep-22	200	0.33	130	9.1	940	0.7	**520**	<0.02	47	<0.10	0.03	8.01	<0.0010	2	17	**300**	0.52	**625**
Average	214	0.34	127	8.4	960	1.3	**515**	**0.84**	48	0.24	0.060	7.71	<0.001	2.29	17.1	**306**	0.52	**649**
Std. Dev.	10	0.15	9	0.8	38	1.3	32	0.78	3.1	0.44	0.065	0.33	NA	0.92	1.7	30	0.21	32

Notes:
1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006)
2. AO = Aesthetic Objective; OG = Operational Guideline; MAC = Maximum Acceptable Concentration; IMAC = Interim Maximum Acceptable Concentration
3. NA = Not Applicable or Not Analyzed
4. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
5. * indicates outlier interpreted as sample or lab error.
6. Values reported as less than detection limits used as ½ detection limit for calculation of averages and plotting.
7. Values in bold are greater than the Reasonable Use Criteria.
8. Shaded values are greater than the ODWS.

MONITORING WELL GM6-3



Historic Groundwater Quality Data
Neustadt Landfill Site

OW6-3																		
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG			AO		AO	OG	AO		MAC	MAC	OG			AO	AO		AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Mar-89	249	0.105	222	35.5	1390	**8.9**	**734**	0.14	43.5	<0.1	0.01	7.62	0.002	3.6	19.5	480	0.32	
May-93	271	0.169	287	33.2	1560	2.2	**929**	0.14	51	0.1	<0.01	7.36	0.004				0.54	
Jul-01	320	0.15	195	28.9	1245	2	**647**	**1.12**	38.7	0.6	<0.1	7.37	<0.001				0.5	
Oct-01	298	0.19	234	27	1433	**6**	**788**	**3.21**	49.5	<0.1	<0.1	7.35	<0.001			**511**	0.6	**1028**
Jun-02	345	0.19	188	19.6	1188	**5.6**	**637**	**0.56**	40.7	0.5	<0.1	7.08	<0.001		20.3	272	0.65	
Oct-02	306	0.13	208	32.4	1210	**3.7**	**693**	**0.83**	42.1	0.1	<0.1	7.92	<0.001		24.4	**385**	0.53	**883**
May-03	318	0.41	182	32.6	1080	**3.9**	**616**	0.06	39.2	0.1	<0.1	7.67	<0.001		22.7	**306**	0.55	**780**
Sep-03	375	0.18	198	36.3	1290	<1	**692**	**0.989**	48	0.1	<0.1	7.73	<0.001		24.3	**350**	0.58	**888**
Apr-04	327	0.09	169	31.4	1080	2.7	**577**	**0.965**	37.4	<0.1	<0.1	7.58	<0.001		21.6	244	0.71	**701**
Sep-04	**432**	0.21	178	27.6	1120	**4.4**	**624**	**0.94**	43.3	0.1	<0.1	8.14	<0.001		21.1	179	0.93	**710**
Apr-05	312	0.09	137	30.6	881	2.2	**481**	0.193	33.9	<0.1	<0.1	8.30	<0.001		19.1	164	1.47	
Sep-05	342	0.17	200	34.3	1300	**12.7**	**701**	0.164	48.9	<0.1	<0.1	7.24	<0.001		25.3	**350**	1.53	**866**
Apr-06	308	0.07	170	27.1	965	**4.2**	**578**	0.041	37.5	<0.1	<0.1	7.48	0.002		19.8	204	3.91	**643**
Apr-06	302	0.07	169	27.2	971	2.9	**577**	0.036	37.5	<0.1	<0.1	7.64	<0.001		19.5	205	4.3	**640**
Sep-06	**440**	0.17	228	32.3	1260	**6.7**	**773**	**0.685**	49.7	<0.1	<0.1	7.23	<0.001		23.8	**320**	4.12	**924**
Nov-07	**470**	0.49	226	32.9	1440	**7**	**779**	**0.972**	52	0.1	<0.1	7.33	<0.001		25	**300**	3.15	**930**
Oct-08	**442**	0.3	200	31.8	1200	**7.7**	**665**	**0.507**	40.1	<0.1	<0.1	7.49	<0.001		20.7	240	4.27	**804**
Sep-09	**475**	0.26	241	20.7	1370	**5.7**	**819**	**1.11**	52.5	<0.1	<0.1	7.05	<0.001		21.6	**310**	6.54	**941**
Nov-10	**512**	0.09	141	4.1	1040	**8**	**520**	**0.828**	40.6	0.1	<0.1	6.93	<0.001		12.5	122	2.63	**631**
Nov-11	365	0.1	180	24.6	1160	**6.3**	**642**	**0.495**	46.9	<0.1	<0.1	7.51	<0.001		16.7	248	1.07	**738**
Sep-12	**496**	0.02	227	15.6	1390	**5.9**	**796**	0.033	55.7	0.2	<0.1	7.60	<0.001		22	206	2.83	**832**
Nov-13	340	0.097	130	22	890	**4.7**	**470**	<0.1	31	<0.1	<0.01	7.85	<0.001		16	110	1.9	
Nov-14	**470**	0.13	190	28	1100	**7.1**	**640**	<0.02	41	<0.1	<0.01	7.96	<0.001	2	18	120	<1.0	**704**
Nov-15	**490**	0.073	200	26	1200	**8.5**	**680**	<0.02	46	<0.10	<0.01	7.87	<0.001	3	19	150	0.86	**696**
Average	375	0.16	196	27.6	1198	**5.4**	**669**	**0.59**	44	0.11	<0.1	7.55	0.0008	2.87	20.6	263	1.93	**797**
Std. Dev.	81	0.11	36	7.2	180	2.7	110	0.69	6.4	0.14		0.34	0.0008	0.81	3.2	110	1.71	120

Notes:
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3. NA = Not Applicable or Not Analyzed
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5. * indicates outlier interpreted as sample or lab error.
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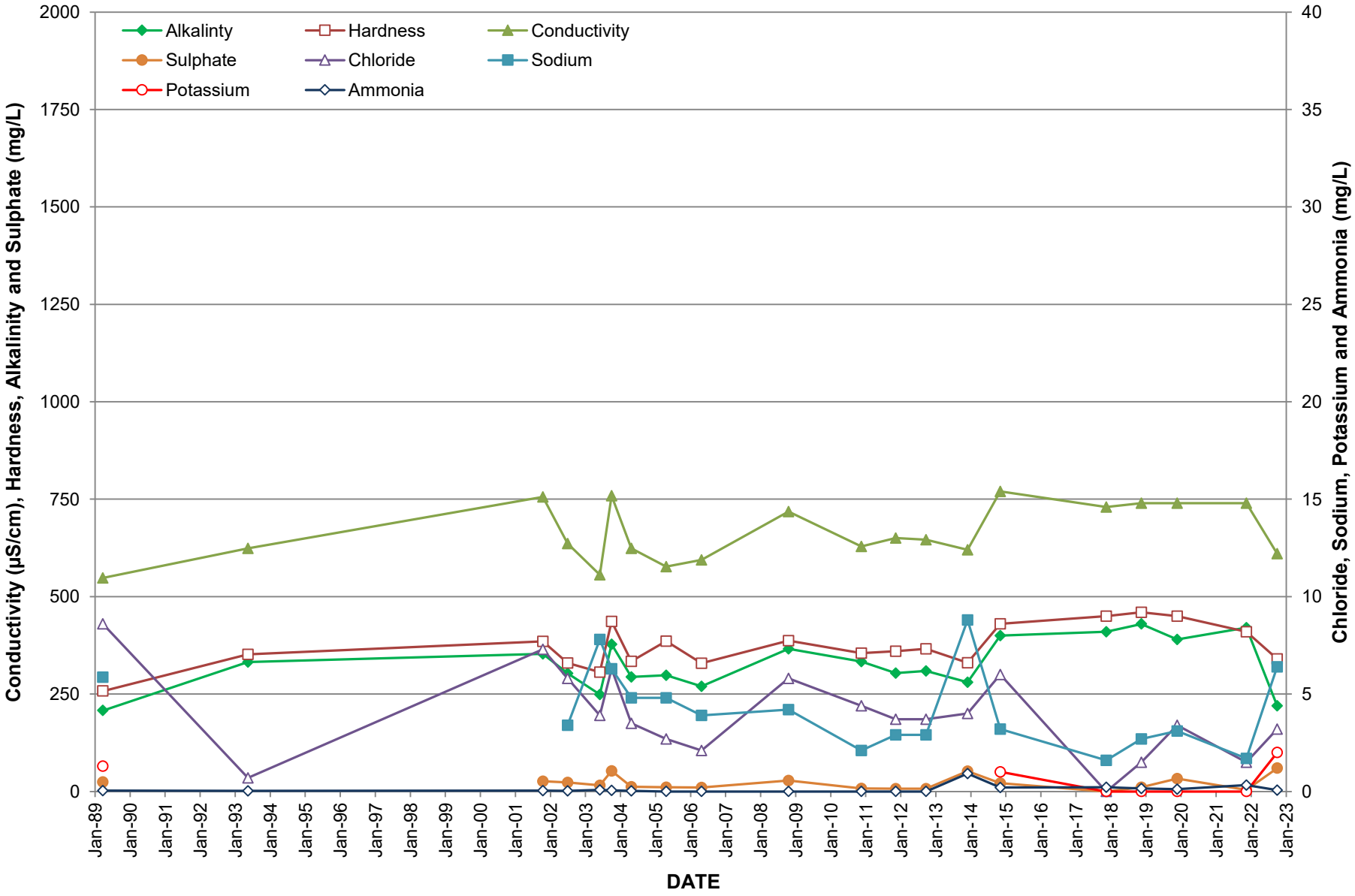
7. Values in bold are greater than the Reasonable Use Criteria.
8. Shaded values are greater than the ODWS.

MONITORING WELL GM2-3



Historic Groundwater Quality Data
Neustadt Landfill Site

GM2-3																		
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG	NA	NA	AO	NA	AO	OG	AO	NA	MAC	MAC	OG	NA	NA	AO	AO	NA	AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Mar-89	208	0.041	66	8.6	548	1.3	258	0.09	22.6	**6.7**	0.01	8.19	<0.001	1.3	5.86	24.5	0.44	
May-93	332	0.035	93.9	0.7	624	ND	**352**	0.01	28.4	<0.01	<0.01	7.57	<0.001				0.29	
Oct-01	353	0.04	107	7.3	756	<1	**385**	<0.01	28.7	**10.1**	<0.1	7.20	<0.001			26.4	0.3	**432**
Jun-02	303	0.03	92.3	5.8	636	<0.5	**330**	0.09	24.1	1.8	<0.1	7.17	<0.001		3.4	23.4	0.61	
May-03	249	0.08	86.4	3.9	556	0.7	306	0.13	21.9	**13.5**	<0.1	7.70	<0.001		7.8	16	0.54	345
Sep-03	378	0.05	118	6.3	759	3.0	**436**	0.005	34.2	1.2	<0.1	7.64	<0.001		6.3	53	0.05	**450**
Apr-04	294	0.03	95.5	3.5	624	0.7	**334**	0.01	23.1	**7.2**	<0.1	7.41	<0.001		4.8	12	0.48	347
Apr-05	298	<0.01	109	2.7	577	1.4	**386**	0.005	27.8	**13.5**	<0.1	8.11	<0.001		4.8	11	1.19	
Apr-06	270	<0.01	94	2.1	594	0.8	**329**	<0.005	23	**10.8**	<0.1	7.43	0.003		3.9	10	2.59	343
Oct-08	366	<0.01	109	5.8	718	1.5	**387**	<0.005	27.6	**4.3**	<0.1	7.55	<0.001		4.2	28	2.03	413
Nov-10	333	<0.01	97.9	4.4	629	1.5	**355**	<0.005	26.8	**4.6**	<0.1	6.85	<0.001		2.1	8	3.05	360
Nov-11	304	<0.01	105	3.7	650	1.4	**360**	0.024	23.9	**7.6**	<0.1	7.56	<0.001		2.9	7	1.34	359
Sep-12	309	<0.01	104	3.7	646	1.3	**366**	0.028	26.1	**7.7**	<0.1	7.59	<0.001		2.9	7	0.87	363
Nov-13	280	0.92	73	4.0	620	1.3	**330**	<0.1	36	0.38	0.011	8.08	0.0063		8.8	52	5	
Nov-14	**400**	0.20	120	6.0	770	1.0	**430**	0.2	34	<0.10	0.01	7.79	<0.001	1	3.2	21	2.9	**432**
Nov-17	**410**	0.22	130	<1.0	730	1.1	**450**	<0.02	29	<0.10	<0.01	7.63	<0.001	<1	1.6	<1.0	0.33	330
Nov-18	**430**	0.16	130	1.5	740	0.9	**460**	<0.02	33	<0.10	<0.01	7.57	<0.001	<1	2.7	11	0.16	355
Nov-19	390	0.12	120	3.4	740	0.7	**450**	0.05	36	<0.10	<0.01	7.95	<0.001	<1.0	3.1	33	0.32	**470**
Nov-21	**420**	0.33	120	1.5	740	0.99	**410**	<0.02	28	<0.10	<0.010	7.79	0.0011	<1	1.7	4.3	0.59	380
Sep-22	220	0.065	76	3.2	610	0.66	**340**	<0.02	37	0.15	<0.010	8.15	<0.0010	2	6.4	60	0.5	345
Average	327	0.17	102	4.1	663	1.1	**373**	0.04	29	**4.49**	0.006	7.65	0.0010	1.0	4.2	22.6	1.2	382
Std. Dev.	65	0.24	18	2.1	73	0.6	54	0.05	5	4.80	0.00	0.35	0.0014	0.0	2.1	17	1.3	45

Notes:
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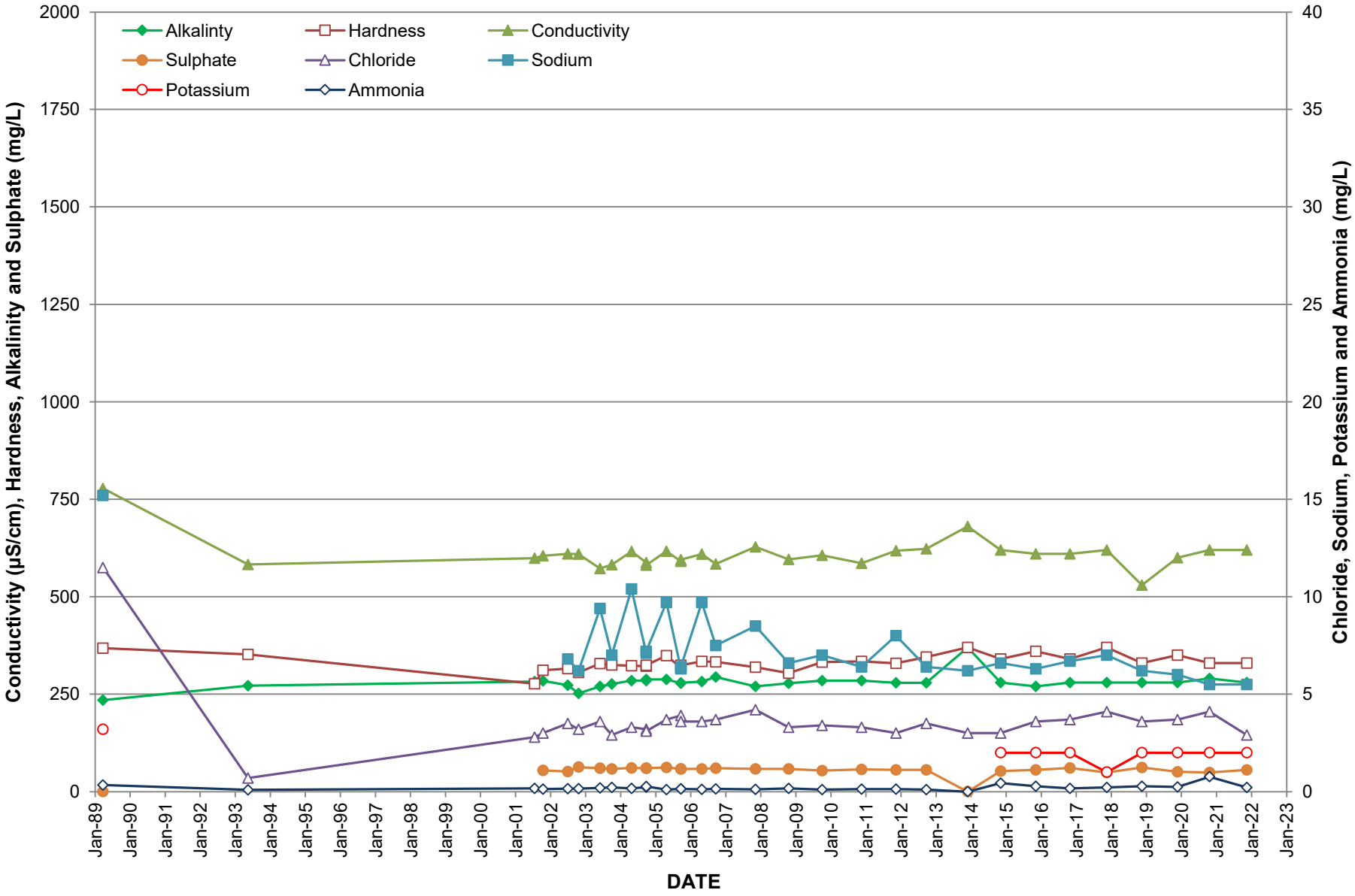
7. Values in bold are greater than the Reasonable Use Criteria.
8. Shaded values are greater than the ODWS.

MONITORING WELL GM2-9



Historic Groundwater Quality Data
Neustadt Landfill Site

GM2-9																		
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG			AO		AO	OG	AO		MAC	MAC	OG			AO	AO		AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Mar-89	235	0.342	81.9	11.5	778	1.2	**368**	0.16	39.6	<0.1	0.01	7.97	0.0015	3.2	15.2	170*	0.45	
May-93	272	0.095	70.2	0.7	583	0.7	**352**	<0.01	34.2	0.1	<0.01	7.79					0.32	
Jul-01	282	0.17	55.1	2.8	599	<1	277	**0.73**	33.8	0.5	<0.1	7.59	<0.001				0.46	
Oct-01	284	0.13	67.4	3	605	1	311	0.02	34.7	<0.1	<0.1	7.70	<0.001			54.4	0.38	340
Jun-02	273	0.15	68.1	3.5	610	2.5	315	**0.68**	35.3	<0.1	<0.1	7.45	<0.001		6.8	51.3	0.68	
Oct-02	252	0.15	68.6	3.2	609	0.6	306	0.1	32.7	<0.1	<0.1	8.19	<0.001		6.2	63	0.17	328
May-03	270	0.19	74.2	3.6	572	0.9	**329**	**0.82**	34.8	0.1	<0.1	7.93	<0.001		9.4	60	0.41	346
Sep-03	276	0.22	72.2	2.9	582	**5**	325	**0.665**	35.1	<0.1	<0.1	7.94	<0.001		7	58	0.23	343
Apr-04	285	0.16	73.1	3.3	616	0.9	323	**0.811**	34.2	<0.1	<0.1	7.69	<0.001		10.4	61	1.35	355
Sep-04	285	0.23	69.7	3.2	588	1.3	322	**0.341**	36	<0.1	<0.1	8.29	<0.001		7.1	60	0.4	347
Sep-04	288	0.26	70.1	3.1	581	1.4	324	**0.337**	36.1	<0.1	<0.1	8.34	<0.001		7.2	60	0.56	349
Apr-05	288	0.11	77.8	3.7	617	2	**349**	0.237	37.6	<0.1	<0.1	**8.62**	<0.001		9.7	62	0.62	
Sep-05	278	0.14	71.8	3.9	591	**6.6**	318	0.029	33.6	<0.1	<0.1	7.43	<0.001		6.3	58	0.71	341
Sep-05	279	0.14	73.4	3.6	595	**8.8**	324	0.027	34.1	<0.1	<0.1	7.54	<0.001		6.4	58	1.21	343
Apr-06	282	0.12	75	3.6	609	0.6	**334**	0.324	35.6	<0.1	<0.1	7.64	<0.001		9.7	58	3.22	351
Sep-06	294	0.14	74.7	3.7	584	3.1	**333**	0.203	35.6	<0.1	<0.1	7.52	<0.001		7.5	60	4.59	360
Nov-07	270	0.12	71.6	4.2	628	1.6	319	0.063	34	<0.1	<0.1	7.42	<0.001		8.5	58	6.17	342
Oct-08	278	0.16	68.8	3.3	596	1.1	304	0.114	32.1	<0.1	<0.1	7.56	0.007		6.6	58	2.59	337
Sep-09	285	0.1	73.6	3.4	606	0.7	**332**	0.037	36.1	0.1	<0.1	7.22	<0.001		7	54	5.82	348
Nov-10	285	0.13	71.7	3.3	586	1.2	**334**	**1.15**	37.7	<0.1	<0.1	7.15	<0.001		6.4	57	6.13	349
Nov-11	279	0.13	72.7	3	618	2	**329**	**0.531**	35.9	<0.1	<0.1	7.67	<0.001		8	56	0.39	345
Sep-12	279	0.11	76.5	3.5	623	1	**345**	0.017	37.3	<0.1	<0.1	7.95	<0.001		6.4	56	5.55	349
Nov-13	370	<0.05	110	3	680	1.1	**370**	<0.1	25	0.55	<0.01	7.87	<0.001		6.2	3*	<2	
Nov-14	280	0.44	77	3	620	0.79	**340**	<0.02	37	<0.10	0.061	8.09	<0.001	2	6.6	53	<10	384
Nov-15	270	0.28	79	3.6	610	0.59	**360**	<0.02	39	<0.1	0.014	7.99	<0.001	2	6.3	56	0.52	356
Oct-16	280	0.16	75	3.7	610	1.1	**340**	<0.02	37	<0.10	0.023	8.03	<0.001	2	6.7	61	0.58	340
Nov-17	280	0.22	82	4.1	620	0.69	**370**	<0.02	39	<0.10	<0.01	7.94	<0.001	1	7.0	49	0.45	340
Nov-18	280	0.28	73	3.6	530	0.69	**330**	<0.02	35	<0.10	<0.01	7.93	<0.001	2	6.2	62	0.28	330
Nov-19	280	0.24	77	3.7	600	**<0.50**	**350**	<0.02	39	0.24	0.02	8.04	<0.001	2	6.0	51	0.57	375
Oct-20	290	0.77	72	4.1	620	0.8	**330**	<0.02	37	<0.10	0.109	8.03	<0.0010	2	5.5	49	1	335
Nov-21	280	0.22	73	2.9	620	0.57	**330**	<0.02	35	<0.10	0.028	7.92	<0.0010	2	5.5	56	0.42	335
Sep-22	**DRY**																	
Average	281	0.20	74	3.60	609	1.74	**332**	0.24	35	0.09	0.09	7.82	0.001	2.02	7.42	57	1.7	347
Std. Dev.	20	0.13	8.3	1.59	40	1.92	20	0.32	2.7	0.12	0.12	0.33	0.001	0.55	2.00	4	2.0	13

Notes:
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2. AO = Aesthetic Objective; OG = Operational Guideline; MAC = Maximum Acceptable Concentration; IMAC = Interim Maximum Acceptable Concentration
3. NA = Not Applicable or Not Analyzed
4. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
5. * indicates outlier interpreted as sample or lab error.
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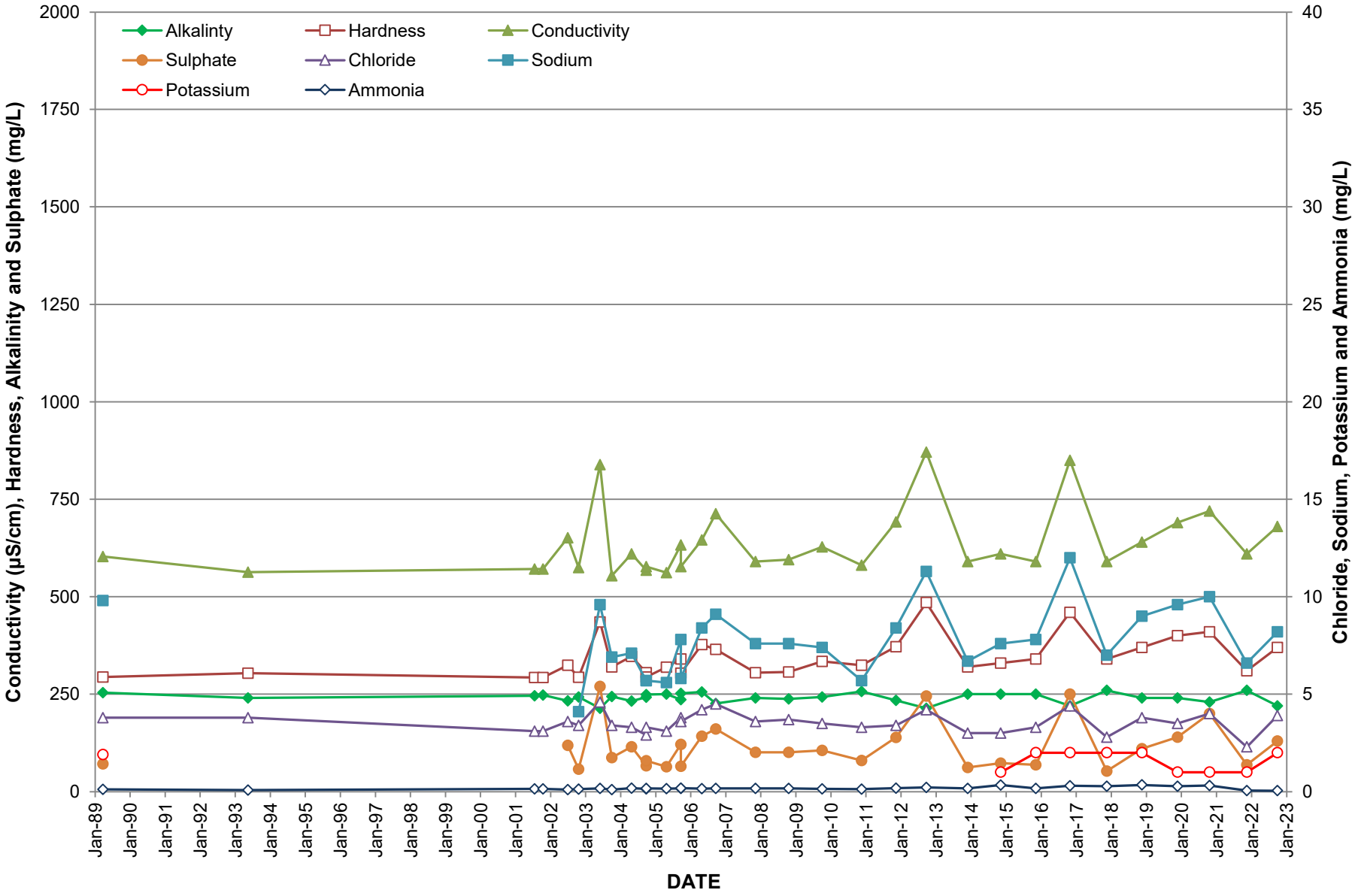
7. Values in bold are greater than the Reasonable Use Criteria.
8. Shaded values are greater than the ODWS.

MONITORING WELL GM3-7

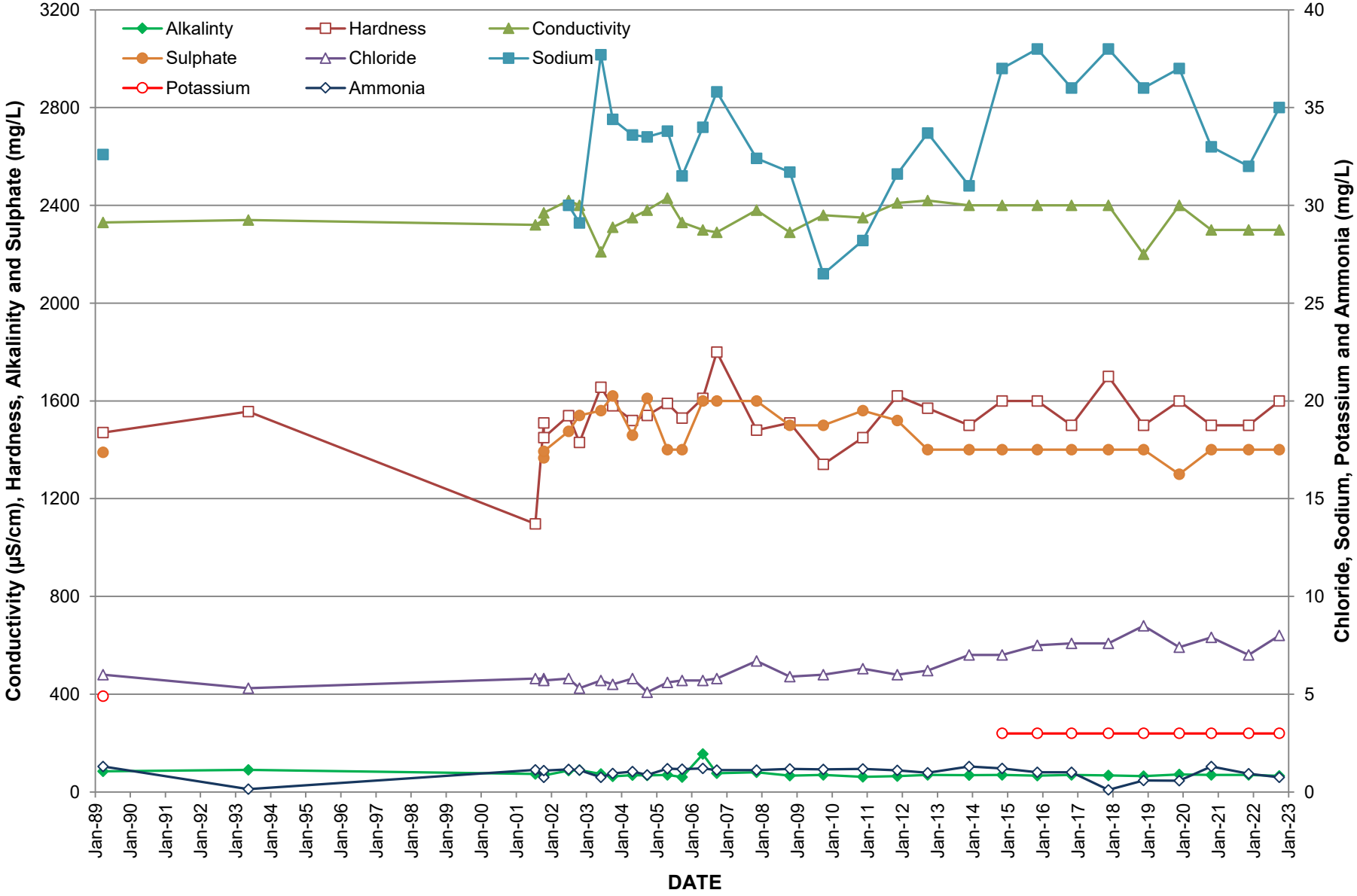


Historic Groundwater Quality Data
Neustadt Landfill Site

GM3-7																		
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG	NA	NA	AO	NA	AO	OG	AO	NA	MAC	MAC	OG	NA	NA	AO	AO	NA	AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Mar-89	254	0.117	68	3.8	603	1.1	294	0.11	30	0.1	0.01	7.80	<0.001	1.9	9.81	71	0.27	
May-93	240	0.077	72.2	3.8	563	1	304	***304**	29.9	0.1	<0.01	7.76	<0.001				0.43	
Jul-01	246	0.14	63.8	3.1	571	**12**	293	**0.45**	32.6	<0.1	<0.1	7.73	<0.001				0.44	
Oct-01	248	0.14	63	3.1	571	**9**	293	0.24	33	<0.1	<0.1	7.74	<0.001				0.47	
Jun-02	233	0.11	74.6	3.6	651	**7**	324	<0.1	33.4	<0.1	<0.1	7.64	<0.001			119	0.45	380
Oct-02	243	0.13	66.6	3.4	575	1	293	**0.61**	30.8	0.7	<0.1	7.33	<0.001		4.1	57.9	0.28	
May-03	214	0.16	104	4.6	839	0.6	**435**	0.24	42.7	<0.1	<0.1	8.28	<0.001		9.6	270	0.48	**562**
Sep-03	244	0.11	76.9	3.4	554	0.5	320	0.33	31.1	<0.1	<0.1	7.89	<0.001		6.9	87	0.39	352
Apr-04	232	0.18	85	3.3	610	**4**	**347**	**0.77**	32.8	<0.1	<0.1	7.89	<0.001		7.1	115	0.2	384
Sep-04	242	0.14	72.3	2.9	568	0.5	305	**0.513**	30.3	0.1	<0.1	7.68	<0.001		5.7	66	0.5	323
Sep-04	249	0.16	66.6	3.3	577	0.8	294	0.131	30.9	0.1	<0.1	8.40	<0.001		5.7	79	0.29	336
Apr-05	250	0.15	73.4	3.1	562	1	319	**0.538**	32.9	<0.1	<0.1	**8.66**	<0.001		5.6	64	0.73	
Sep-05	236	0.16	82.5	3.8	633	**4.3**	**340**	0.037	32.6	<0.1	<0.1	7.59	<0.001		7.8	121	0.82	389
Sep-05	252	0.18	71.1	3.6	577	0.9	304	**0.356**	30.8	<0.1	<0.1	7.83	<0.001		5.8	65	4.44	328
Apr-06	256	0.15	90.3	4.2	646	2.8	**377**	0.1	36.7	0.2	<0.1	7.64	<0.001		8.4	142	3.76	**438**
Sep-06	226	0.16	87.9	4.5	713	3	**365**	0.086	35.4	0.1	<0.1	7.57	<0.001		9.1	161	3.49	**436**
Nov-07	240	0.17	74.3	3.6	590	1	305	<0.005	29.1	<0.1	<0.1	7.69	<0.001		7.6	101	3.13	361
Oct-08	238	0.17	74.6	3.7	595	0.9	307	<0.005	29.2	<0.1	<0.1	7.72	<0.001		7.6	101	3.03	360
Sep-09	243	0.14	78.7	3.5	628	0.7	**334**	0.188	33.4	0.2	<0.1	7.23	<0.001		7.4	106	1.75	377
Nov-10	257	0.13	74.3	3.3	581	1.1	324	0.083	33.7	<0.1	<0.1	7.09	<0.001		5.7	80	1.69	352
Nov-11	234	0.18	89.6	3.4	692	0.9	**372**	0.313	36	0.1	<0.1	7.76	<0.001		8.4	139	0.6	419
Sep-12	214	0.21	121	4.2	871	1.1	**485**	0.057	44.3	0.2	<0.1	7.98	<0.001		11.3	245	8.37	**557**
Nov-13	250	0.16	76	3	590	0.76	320	<0.1	32	0.12	<0.01	7.96	<0.001		6.7	62	<2	
Nov-14	250	0.34	79	3	610	0.86	**330**	<0.02	32	0.14	0.014	8.07	<0.001	1	7.6	73	<10	388
Nov-15	250	0.16	82	3.3	590	0.68	**340**	<0.02	33	0.22	0.051	7.99	<0.001	2	7.8	69	0.62	354
Oct-16	220	0.30	120	4.4	850	1.2	**460**	<0.02	40	0.19	0.095	7.98	<0.001	2	12	250	0.75	**568**
Nov-17	260	0.28	81	2.8	590	0.74	**340**	<0.02	34	<0.10	<0.01	7.97	<0.005	2	7	53	0.55	310
Nov-18	240	0.35	91	3.8	640	0.64	**370**	<0.02	34	0.14	0.031	7.77	<0.0010	2	9	110	0.30	350
Nov-19	240	0.28	100	3.5	690	**<0.50**	**400**	<0.02	38	0.14	0.076	8.02	<0.001	1	9.6	140	0.58	**465**
Oct-20	230	0.32	100	4	720	0.65	**410**	<0.02	38	<0.10	0.154	7.97	<0.0010	1	10	200	0.43	**510**
Nov-21	260	0.059	75	2.3	610	0.5	310	<0.02	30	<0.10	<0.010	7.93	<0.0010	1	6.6	69	0.36	345
Sep-22	220	0.05	91	3.9	680	0.66	**370**	<0.02	34	0.27	0.021	8	<0.0010	2	8.2	130	0.49	**425**
Average	241	0.17	82	3.5	636	2.0	**343**	0.17	34	0.12	0.05	7.83	<0.001	1.59	7.79	115	1.44	403
Std. Dev.	13	0.08	15	0.52	84	2.7	50	0.21	3.7	0.12	0.03	0.31	NA	0.51	1.82	60	1.85	76

Notes:
1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006)
2. AO = Aesthetic Objective; OG = Operational Guideline; MAC = Maximum Acceptable Concentration; IMAC = Interim Maximum Acceptable Concentration
3. NA = Not Applicable or Not Analyzed
4. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
5. * indicates outlier interpreted as sample or lab error.
6. Values reported as less than detection limits used as ½ detection limit for calculation of averages and plotting.
7. Values in bold are greater than the Reasonable Use Criteria.
8. Shaded values are greater than the ODWS.

MONITORING WELL GM3-12



Historic Groundwater Quality Data
Neustadt Landfill Site

GM3-12																		
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG	NA	NA	AO	NA	AO	OG	AO	NA	MAC	MAC	OG	NA	NA	AO	AO	NA	AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Mar-89	84.3	1.3	438	6.0	2330	1.6	**1470**	0.06	91	<0.1	<0.01	7.74	<0.001	4.9	32.6	**1390**	1.49	
May-93	90.4	0.147	476	5.3	2340	1.2	**1556**	0.05	88.8	0.1	<0.01	7.63	<0.001				0.4	
Jul-01	73	1.13	326	5.8	2320	2	**1097**	**1.34**	68.6	0.5	<0.1	7.32	<0.001				1.33	
Oct-01	77	0.74	448	5.8	2340	<1	**1510**	**0.52**	95	0.8	<0.1	7.47	<0.001			**1367**	1.3	**1999**
Oct-01	68	1.09	432	5.7	2370	1	**1450**	**0.76**	90	<0.1	<0.1	7.41	<0.001			**1394**	1.48	**1994**
Jun-02	87	1.15	457	5.8	2420	<0.5	**1540**	**1.83**	96.6	<0.1	<0.1	7.26	<0.001		30	**1475**	1.4	
Oct-02	89	1.12	431	5.3	2400	0.9	**1430**	**1.63**	85.8	0.1	<0.1	7.99	<0.001		29.1	**1540**	1.53	**2153**
May-03	73	0.75	498	5.7	2210	0.8	**1656**	**2.26**	100	<0.1	<0.1	7.67	<0.001		37.7	**1560**	1.49	**2248**
Sep-03	64	0.94	476	5.5	2310	2	**1580**	**1.69**	95.3	0.1	<0.1	7.63	<0.001		34.4	**1620**	1.25	**2276**
Apr-04	69	1.04	458	5.8	2350	0.6	**1520**	**0.641**	90.9	0.1	<0.1	7.52	<0.001		33.6	**1460**	1.41	**2092**
Sep-04	68	0.87	453	5.1	2380	0.8	**1540**	**1.1**	98.3	0.1	<0.1	7.93	<0.001		33.5	**1610**	1.67	**2250**
Apr-05	70	1.19	469	5.6	2430	0.8	**1590**	**0.406**	101	<0.1	<0.1	8.07	<0.001		33.8	**1400**	1.36	
Sep-05	61	1.16	455	5.7	2330	1.8	**1530**	**0.787**	94.9	<0.1	<0.1	7.31	<0.001		31.5	**1400**	1.99	**2050**
Apr-06	155	1.2	485	5.7	2300	0.9	**1610**	**0.638**	97.1	<0.1	<0.1	7.65	<0.001		34	**1600**	1.52	**2270**
Sep-06	76	1.11	541	5.8	2290	1.2	**1800**	0.248	108	0.1	<0.1	7.46	<0.001		35.8	**1600**	2.78	**2340**
Nov-07	80	1.12	444	6.7	2380	**5.2**	**1480**	0.306	90.7	0.1	<0.1	7.42	<0.001		32.4	**1600**	2.86	**2200**
Oct-08	67	1.18	472	5.9	2290	1.2	**1510**	**1.36**	79.3	<0.1	<0.1	7.54	<0.001		31.7	**1500**	1.73	**2180**
Sep-09	70	1.15	401	6	2360	0.9	**1340**	**1.11**	81.5	0.1	<0.1	7.04	<0.001		26.5	**1500**	2.08	**2060**
Nov-10	62	1.18	427	6.3	2350	1.1	**1450**	**0.654**	93.8	0.1	<0.1	6.97	<0.001		28.2	**1560**	1.63	**2150**
Nov-11	65	1.1	461	6	2410	1.6	**1620**	0.031	108	0.2	<0.1	7.46	<0.001		31.6	**1520**	1.7	**2170**
Sep-12	70	0.98	455	6.2	2420	1	**1570**	0.01	104	0.2	<0.1	7.63	<0.001		33.7	**1400**	1.7	**2050**
Nov-13	69	1.3	440	7	2400	1	**1500**	<0.1	87	0.29	0.082	7.67	<0.001		31	**1400**	6.2	
Nov-14	70	1.2	490	7	2400	1.1	**1600**	<0.02	94	0.32	**0.323**	7.64	<0.001	3	37	**1400**	2.2	**2210**
Nov-15	67	1.0	500	7.5	2400	1.1	**1600**	<0.02	97	<0.1	0.137	7.25	<0.001	3	38	**1400**	1.4	**2220**
Oct-16	70	1.0	460	7.6	2400	0.9	**1500**	<0.02	93	0.32	0.624	7.66	<0.001	3	36	**1400**	1.4	**2200**
Nov-17	68	0.11	500	7.6	2400	0.88	**1700**	<0.02	100	0.65	0.047	7.59	<0.001	3	38	**1400**	0.49	**2070**
Nov-18	65	0.59	460	8.5	2200	0.94	**1500**	<0.02	89	0.77	0.062	7.44	<0.001	3	36	**1400**	0.64	**2020**
Nov-19	71	0.57	500	7.4	2400	0.67	**1600**	<0.02	99	0.55	0.305	7.73	<0.001	3	37	**1300**	0.93	**2240**
Oct-20	70	1.3	430	7.9	2300	0.91	**1500**	<0.02	92	0.33	0.348	7.56	<0.0010	3	33	**1400**	1.4	**2110**
Nov-21	70	0.93	440	7	2300	0.69	**1500**	<0.02	87	0.2	0.193	7.67	<0.0010	3	32	**1400**	1.2	**2160**
Sep-22	66	0.74	470	8	2300	0.91	**1600**	<0.02	94	0.42	0.256	7.81	<0.0010	3	35	**1400**	1.5	**1970**
Average	74	0.98	458	6.36	2349	1.2	**1531**	**0.57**	93	0.22	0.11	7.55	<0.001	3.19	33.4	**1462**	1.7	**2147**
Std. Dev.	17	0.30	37	0.92	58	0.8	118	0.66	8.1	0.22	0.13	0.24	NA	0.60	3.00	90	1.0	101

Notes:
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3. NA = Not Applicable or Not Analyzed
4. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
5. * indicates outlier interpreted as sample or lab error.
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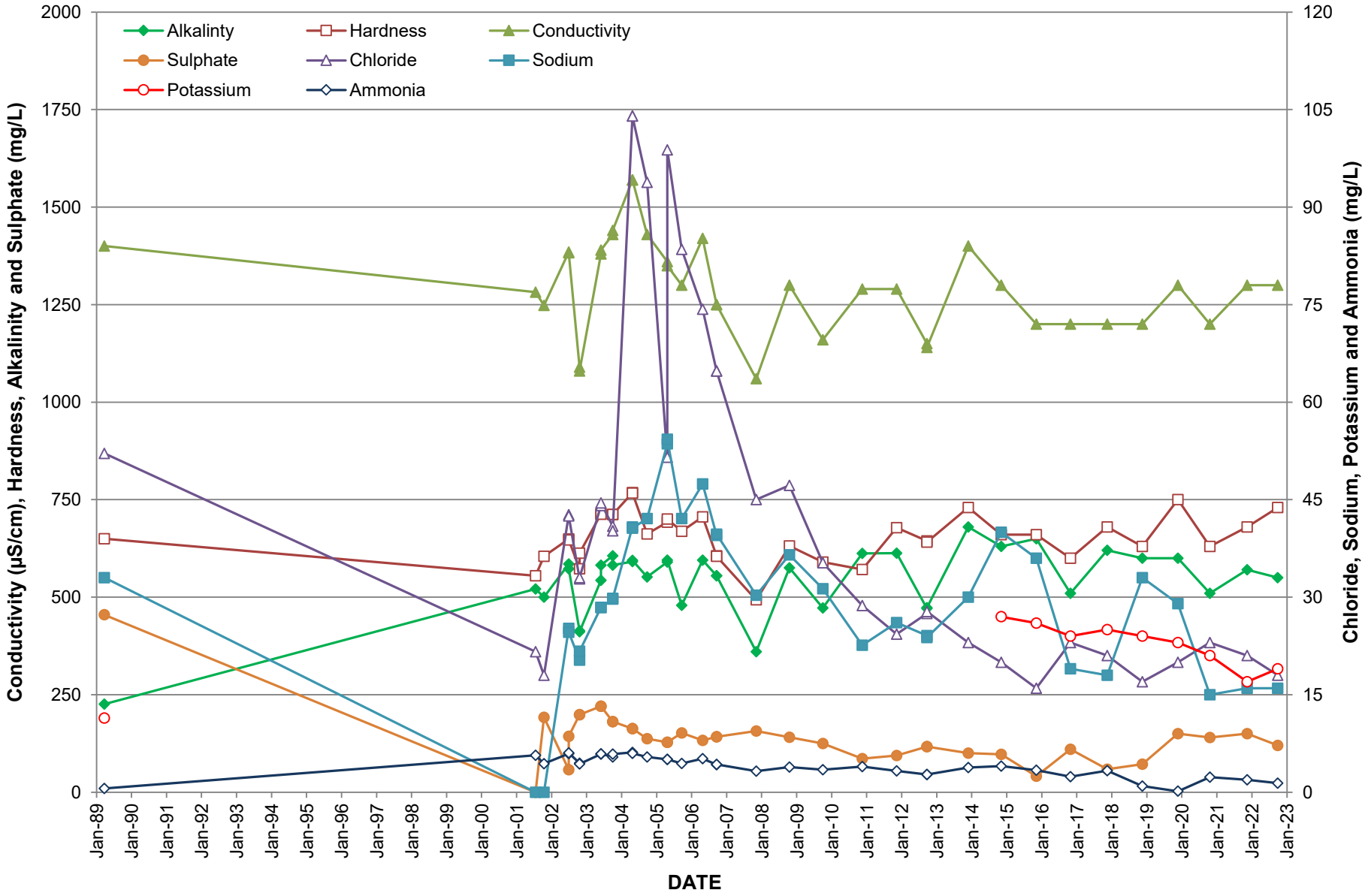
7. Values in bold are greater than the Reasonable Use Criteria.
8. Shaded values are greater than the ODWS.

MONITORING WELL GM5-3



Historic Groundwater Quality Data
Neustadt Landfill Site

GM5-3																		
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG	NA	NA	AO	NA	AO	OG	AO	NA	MAC	MAC	OG	NA	NA	AO	AO	NA	AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Mar-89	226	0.563	158	52.1	1400	**9**	**650**	0.18	62	0.1	0.01	7.91	0.002	11.4	33	455	0.72	
Jul-01	**521**	5.66	130	21.6	1282	**7**	**555**	**7.72**	55.9	<0.1	<0.1	7.11	<0.001		NA	NA	5.97	
Oct-01	**500**	4.37	143	18	1248	**11**	**605**	**8.62**	60.1	0.6	<0.1	7.28	<0.001		NA	192	6.38	**772**
Jun-02	**585**	5.95	145	42.7	1385	**3.6**	**649**	**5.76**	69.7	0.7	<0.1	6.93	<0.001		25.2	57.9	8.56	
Jun-02	**573**	6.04	145	42.5	1383	**3.7**	**647**	**28**	69.1	<0.1	<0.1	7.01	<0.001		24.6	143	8.68	
Oct-02	**414**	4.44	134	32.8	1090	3.5	**573**	**5.08**	57.8	<0.1	<0.1	8.11	<0.001		20.3	199	5.19	**728**
Oct-02	**411**	4.33	144	33	1080	2.9	**613**	**5.46**	61.6	0.1	<0.1	8.10	<0.001		21.7	199	5.2	**745**
May-03	**543**	5.86	160	44.1	1380	3.5	**713**	**9.15**	76.2	0.1	<0.1	7.50	<0.001		28.4	220	6.7	**872**
May-03	**582**	5.89	160	44.5	1390	**3.7**	**713**	**9.11**	76.1	0.1	<0.1	7.53	<0.001		28.4	220	7.15	**895**
Sep-03	**606**	5.42	160	40.9	1430	**14**	**712**	**8.49**	75.9	0.1	<0.1	7.50	<0.001		29.7	181	6.58	**895**
Sep-03	**582**	5.85	160	40.2	1440	**9**	**712**	**8.48**	75.9	<0.1	<0.1	7.53	<0.001		29.8	181	6.49	**880**
Apr-04	**591**	6.13	172	104	1570	3.5	**768**	**10.5**	82.5	<0.1	<0.1	7.34	<0.001		40.8	163	7.04	**935**
Apr-04	**594**	5.97	171	104	1570	3.4	**767**	**10.6**	82.3	<0.1	<0.1	7.36	<0.001		40.6	163	7.23	**936**
Sep-04	**552**	5.4	152	93.8	1430	**4.2**	**662**	**8.72**	68.5	0.2	<0.1	8.01	<0.001		42.1	137	6.16	**841**
Apr-05	**590**	5.04	152	51.5	1360	3	**692**	**8.14**	76	<0.1	<0.1	7.99	<0.001		53.6	128	5.86	
Apr-05	**595**	5.06	154	98.8	1350	3.2	**700**	**8.22**	76.9	<0.1	<0.1	7.95	<0.001		54.3	128	6.05	
Sep-05	**479**	4.43	168	83.5	1300	**14.1**	**669**	**5.87**	60.5	<0.1	<0.1	6.99	<0.001		42.1	152	5.59	**806**
Apr-06	**595**	5.15	160	74.3	1420	**4**	**706**	**8.12**	74.8	<0.1	<0.1	7.17	<0.001		47.4	133	5.61	**861**
Sep-06	**555**	4.24	142	64.8	1250	**13**	**606**	**5.89**	60.9	0.1	<0.1	7.06	<0.001		39.5	142	4.91	**822**
Sep-06	**555**	4.28	142	64.8	1250	**10**	**605**	**6.02**	60.8	0.2	<0.1	7.07	<0.001		39.7	142	4.88	**822**
Nov-07	360	3.23	117	45	1060	2.9	**493**	**3.24**	48.9	0.1	<0.1	7.42	<0.001		30.3	157	3.83	**644**
Oct-08	**575**	3.88	157	47.2	1300	**4.3**	**631**	**4.26**	57.9	<0.1	<0.1	7.14	<0.001		36.5	141	4.88	**819**
Sep-09	**472**	3.44	140	35.3	1160	3.5	**590**	**5.35**	58.4	0.1	<0.1	6.84	<0.001		31.3	125	4.14	**709**
Nov-10	**612**	3.94	126	28.7	1290	**4.2**	**571**	**11.2**	62.3	<0.1	<0.1	6.75	<0.001		22.6	86	4.25	**727**
Nov-11	**613**	3.26	150	24.3	1290	**4.3**	**678**	**8.69**	73.8	<0.1	<0.1	7.34	<0.001		26.1	94	4.09	**775**
Sep-12	**471**	2.71	153	27.5	1150	3.3	**644**	**4.57**	63.6	0.2	<0.1	7.62	<0.001		24.1	117	3.91	**703**
Sep-12	**473**	2.72	152	27.8	1140	3.5	**641**	**4.24**	63.4	0.1	<0.1	7.61	<0.001		23.8	117	3.79	**702**
Nov-13	**680**	3.8	170	23	1400	**4.2**	**730**	<0.1	74	<0.1	0.043	7.67	<0.001		30	100	3.9	
Nov-14	**630**	4	160	20	1300	**5**	**660**	<0.02	64	0.17	0.033	7.86	<0.001	27	40	97	4.1	**762**
Nov-15	**650**	3.4	160	16	1200	**6.1**	**660**	<0.02	63	<0.1	0.013	7.72	<0.001	26	36	41	3.7	**612**
Oct-16	**510**	2.4	150	23	1200	2.8	**600**	<0.02	56	0.12	0.084	7.65	<0.001	24	19	110	2.9	**662**
Nov-17	**620**	3.3	170	21	1200	**4.0**	**680**	<0.02	63	<0.10	<0.010	7.57	<0.0020	25	18	59	3.8	**635**
Nov-18	**600**	0.95	150	17	1200	**5.5**	**630**	0.020	59	<0.10	0.011	7.44	<0.0010	24	33	72	1.1	**665**
Nov-19	**600**	0.16	180	20	1300	**5.4**	**750**	<0.02	73	0.21	<0.01	7.79	<0.001	23	29	150	0.45	**850**
Oct-20	**510**	2.3	160	23	1200	2.8	**630**	<0.02	57	0.42	0.219	7.87	<0.0010	21	15	140	2.3	**715**
Nov-21	**570**	1.9	180	21	1300	3.3	**680**	<0.02	57	<0.10	0.018	7.54	<0.0010	17	16	150	2.2	**740**
Sep-22	**550**	1.4	190	18	1300	3.5	**730**	<0.02	62	0.11	0.075	7.77	<0.0010	19	16	120	1.8	**730**
Average	**544**	3.97	155	43.0	1297	**5.3**	**657**	**5.7**	66	0.13	0.05	7.49	<0.001	22	31.1	145	4.76	**775**
Std. Dev.	88	1.63	15	26	123	3.2	61	5.34	8.4	0.15	0.033	0.37	NA	4.8	10.2	69	2.02	91

Notes:
1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006)
2. AO = Aesthetic Objective; OG = Operational Guideline; MAC = Maximum Acceptable Concentration; IMAC = Interim Maximum Acceptable Concentration
3. NA = Not Applicable or Not Analyzed
4. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
5. * indicates outlier interpreted as sample or lab error.
6. Values reported as less than detection limits used as ½ detection limit for calculation of averages and plotting.
7. Values in bold are greater than the Reasonable Use Criteria.
8. Shaded values are greater than the ODWS.

Historic Groundwater Quality Data
Neustadt Landfill Site

OW7-3																		
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG	NA	NA	AO	NA	AO	OG	AO	NA	MAC	MAC	OG	NA	NA	AO	AO	NA	AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Nov-19	**540**	3.3	200	26	1100	**7.9**	**670**	<0.02	44	<0.10	<0.01	7.90	<0.001	9.0	17	83	5.3	**705**
Oct-20	**490**	4.2	190	25	1200	**6.1**	**650**	<0.02	42	<0.10	<0.010	7.91	<0.0010	8.0	17	180	4.4	**760**
Nov-21	**450**	2.6	210	30	1300	**5.5**	**680**	<0.02	40	0.19	0.079	7.72	<0.0010	6.0	20	270	3.2	**790**
Sep-22	**440**	2.9	180	29	1100	**6.7**	**610**	<0.02	36	1.44	0.18	7.82	<0.0010	6.0	21	120	4.4	**670**
Average	480	3	195	28	1175	6.6	653	0.01	41	0.4	0.1	7.8	0.005	7.3	18.8	163	4.3	731
Std. Dev.	39	1	11	2	83	0.9	27	0.00	3.0	0.6	0.1	0.1	0.000	1.3	1.8	71	0.7	47

Notes:

1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006)
2. AO = Aesthetic Objective; OG = Operational Guideline; MAC = Maximum Acceptable Concentration; IMAC = Interim Maximum Acceptable Concentration
3. NA = Not Applicable or Not Analyzed
4. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
5. * indicates outlier interpreted as sample or lab error.
6. Values reported as less than detection limits used as ½ detection limit for calculation of averages and plotting.
7. Values in bold are greater than the Reasonable Use Criteria.
8. Shaded values are greater than the ODWS.

Historic Groundwater Quality Data
Neustadt Landfill Site

OW8-3(S)																	
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG	NA	NA	AO	NA	AO	OG	AO	NA	MAC	MAC	OG	NA	NA	AO	AO	NA	AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Nov-19	**500**	3.6	200	24	1100	**6.2**	**630**	<0.02	29	<0.10	<0.01	7.71	<0.001	4.0	30	130	4.8	**700**
Oct-20	**550**	5.3	170	25	1000	**7.0**	**540**	<0.02	26	<0.10	0.037	7.72	<0.0010	3.0	19	19	5.6	**560**
Nov-21	**520**	3.4	170	23	1000	**7.1**	**520**	<0.02	25	<0.10	<0.010	7.66	<0.0010	3.0	16	24	4.5	**580**
Sep-22	**260**	1.3	320	73	1800	**3.8**	**1000**	<0.02	56	0.89	0.059	7.8	<0.0010	3.0	40	630	2.1	**1180**
Average	458	3.4	215	36	1225	6.0	673	0.01	34	0.26	0.05	7.7	0.001	3.3	26	201	4.3	755
Std. Dev.	115	1.4	62	21.2	334	1.3	194	0.00	12.8	0.36	0.01	0.05	0.00	0.4	9.5	252	1.3	251

Notes:

1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006)
2. AO = Aesthetic Objective; OG = Operational Guideline; MAC = Maximum Acceptable Concentration; IMAC = Interim Maximum Acceptable Concentration
3. NA = Not Applicable or Not Analyzed
4. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
5. * indicates outlier interpreted as sample or lab error.
6. Values reported as less than detection limits used as ½ detection limit for calculation of averages and plotting.
7. Values in bold are greater than the Reasonable Use Criteria.
8. Shaded values are greater than the ODWS.

Historic Groundwater Quality Data
Neustadt Landfill Site

OW8-5(D)																		
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG	NA	NA	AO	NA	AO	OG	AO	NA	MAC	MAC	OG	NA	NA	AO	AO	NA	AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Nov-19	190	1.4	430	19	2100	2.2	**1400**	<0.02	76	<0.10	<0.01	7.89	<0.001	6.0	31	**980**	1.7	**1840**
Oct-20	120	0.7	470	15	2500	1.2	**1500**	<0.02	84	0.37	0.20	7.58	<0.0010	5.0	31	**1400**	0.74	**2120**
Nov-21	170	0.91	420	15	2200	1.5	**1300**	<0.02	70	<0.10	0.04	7.60	<0.0010	4.0	27	**1200**	1.5	**1990**
Sep-22	450	4.1	160	19	940	7.2	**490**	<0.02	23	<0.10	0.03	7.91	<0.0010	3.0	15	**9.9**	5.2	**495**
Average	233	1.8	370	17	1935	3.0	1173	0.01	63	0.1	0.1	7.7	0.01	4.5	26	897	2.3	1611
Std. Dev.	128	1.4	123	2.0	593	2.4	400	0.00	23.8	0.1	0.1	0.2	0.00	1.1	6.6	534	1.7	652

Notes:

1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006)
2. AO = Aesthetic Objective; OG = Operational Guideline; MAC = Maximum Acceptable Concentration; IMAC = Interim Maximum Acceptable Concentration
3. NA = Not Applicable or Not Analyzed
4. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
5. * indicates outlier interpreted as sample or lab error.
6. Values reported as less than detection limits used as ½ detection limit for calculation of averages and plotting.
7. Values in bold are greater than the Reasonable Use Criteria.
8. Shaded values are greater than the ODWS.

Historic Groundwater Quality Data
Neustadt Landfill Site

OW9-3																		
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG	NA	NA	AO	NA	AO	OG	AO	NA	MAC	MAC	OG	NA	NA	AO	AO	NA	AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Nov-19	**460**	0.94	170	22	1000	**4.4**	**560**	<0.02	32	<0.10	0.058	7.74	<0.001	4.0	24	91	1.5	**650**
Oct-20	300	1.6	280	**140**	1700	2.8	**900**	<0.02	51	<0.10	0.037	7.71	<0.0010	4.0	42	**440**	1.8	**1150**
Nov-21	**490**	0.61	190	38	1200	**5.7**	**640**	<0.02	38	0.12	0.016	7.45	<0.0010	4.0	21	150	1.3	**780**
Sep-22	**280**	0.92	300	200	1900	**3**	**980**	<0.02	56	<0.10	0.066	7.69	<0.0010	4.0	47	400	2.2	**1210**
Average	383	1.0	235	100	1450	4.0	770	0.01	44	0.07	0.04	8	0.001	4	34	270	1.7	948
Std. Dev.	93	0.4	56	73	364	1.2	175	0.00	9.7	0.03	0.02	0.12	0.000	0.0	11.2	152	0.3	238

Notes:

1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006)
2. AO = Aesthetic Objective; OG = Operational Guideline; MAC = Maximum Acceptable Concentration; IMAC = Interim Maximum Acceptable Concentration
3. NA = Not Applicable or Not Analyzed
4. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
5. * indicates outlier interpreted as sample or lab error.
6. Values reported as less than detection limits used as ½ detection limit for calculation of averages and plotting.
7. Values in bold are greater than the Reasonable Use Criteria.
8. Shaded values are greater than the ODWS.

Historic Groundwater Quality Data
Neustadt Landfill Site

Firehall																		
Parameter	Alkalinity	Ammonia	Calcium	Chloride	Conductivity	DOC	Hardness	Iron	Magnesium	Nitrate	Nitrite	pH	Phenols	Potassium	Sodium	Sulphate	TKN	TDS
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	30-500	NV	NV	250	NV	5	80-100	0.3	NV	10	1	6.5-8.5	NV	NV	200	500	NV	500
	OG	NA	NA	AO	NA	AO	OG	AO	NA	MAC	MAC	OG	NA	NA	AO	AO	NA	AO
RUC	392	NV	NV	127	NV	3.5	326	0.33	NV	2.58	0.25	6.5-8.5	NV	NV	104	278	NV	423
Mar-89	62	NA	568.8	12.5	2240	0.7	**1752**	**39.5**	80	0.1	NA	6.77	<0.001	2.73	13.5	**1650**	0.25	NA
May-93	169	0.302	558	48.7	2610	0.5	**1713**	**2.93**	76.7	<0.1	<0.01	7.22	2.5	NA	ND	ND	0.48	NA

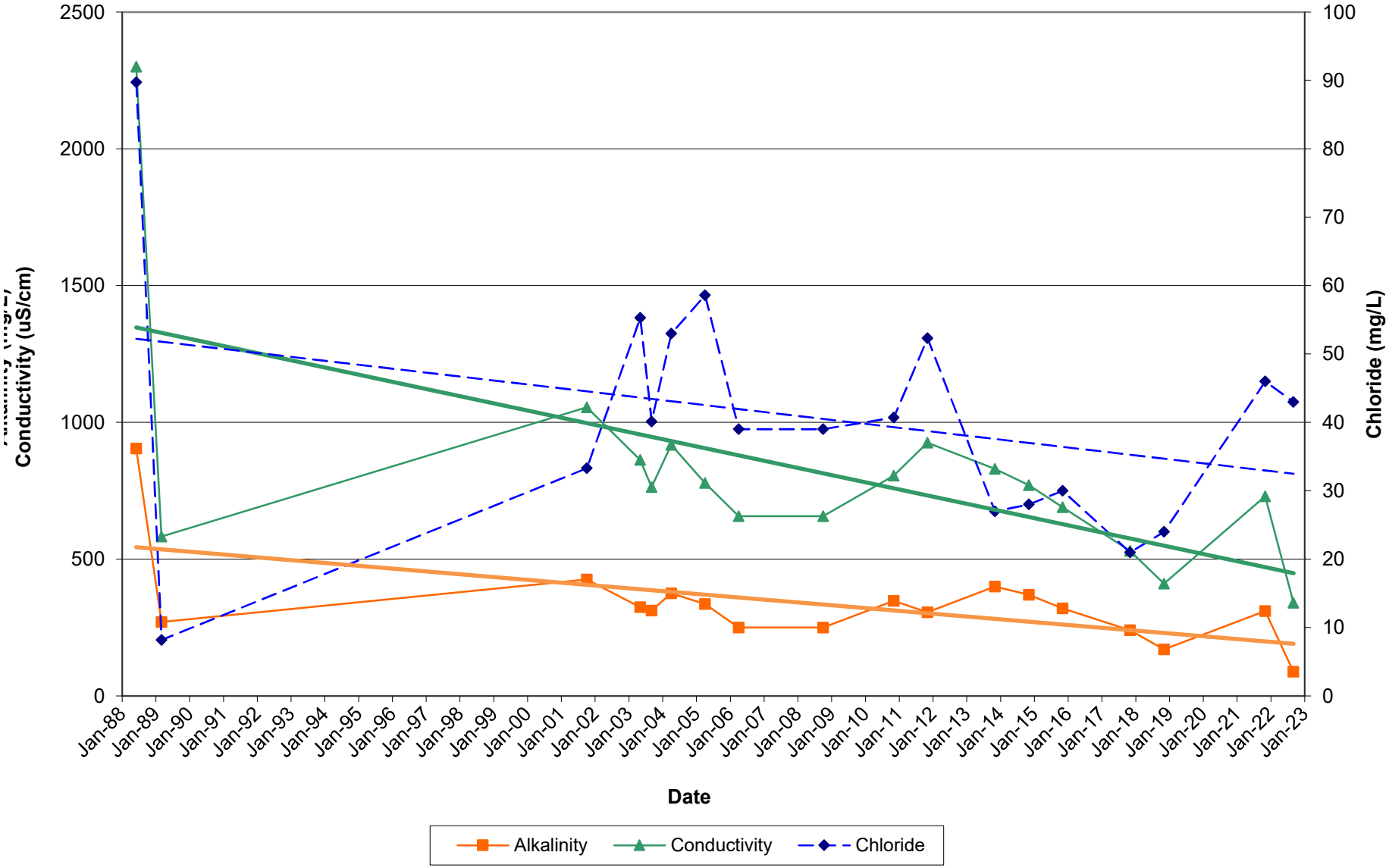
APPENDIX E:
SUMMARY OF SURFACE WATER ANALYTICAL RESULTS (TABLES & GRAPHS)

Historic Surface Water Quality Data
Neustadt Landfill Site

S1														
Parameter	Alkalinity	Ammonia	Ammonia (Un-Ionized)	Chloride	Conductivity	Iron	pH	Phenol	Phosphorus	Potassium	TDS	DO (Field)	pH (Field)	Temperature (Field)
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	°C
PWQO	See Note 3	NV	0.02	NV	NV	0.3	6.5-8.5	0.001*	0.03*	NV	NV	NV	6.5-8.5	NV
Jun-88	*904*	*0.006*		*89.75*	*2300*		*8.10*			*228.4*				
Mar-89	270	0.020		8.2	582	0.08	7.81	<0.001		1.0				
Jul-01	DRY													
Oct-01	425	<0.01	ND	33.3	1055	**1.02**	7.20	<0.001	ND					
Jun-02	DRY													
Oct-02	DRY													
May-03	324	0.06	0.0011	55.3	863	0.23	7.98	<0.001	0.02			8.5	7.8	16.1
Sep-03	312	0.08	0.0046	40.1	763	0.28	8.00	<0.001	0.02			11	8.4	13.7
Apr-04	375	0.04	0.0004	53	918	0.16	8.22	<0.001	0.02			NA	7.8	8.2
Sep-04	DRY													
Apr-05	336	<0.01	<0.0003	58.6	778	0.08	8.14	<0.001	0.03			10	8.3	7.5
Sep-05	DRY													
Apr-06	250	0.07	0.0005	39	657	0.11	7.94	<0.001	0.01			9	7.7	7.5
Sep-06	DRY													
Nov-07	DRY													
Oct-08	250	0.07	0.0005	39	657	0.11	7.94	<0.001	0.01			9	7.7	7.5
Sep-09	DRY													
Nov-10	347	<0.01	<0.0003	40.7	805	0.13	7.41	<0.001	0.02			9.5	8.2	8.6
Nov-11	306	<0.01	<0.01	52.3	926	0.11	8.04	<0.001	<0.01			9	8.1	7.9
Sep-12	DRY													
Nov-13	400	<0.05	<0.0010	27	830	0.04	8.11	<0.001	<0.002			NA	NA	8.0
Nov-14	370	<0.05	<0.0005	28	770	0.06	8.17	<0.001	0.008	2	434	10.3	7.7	9.7
Nov-15	320	<0.05	<0.0005	30	690	**1.3**	8.21	<0.001	**0.15**	2	362	8.8	7.37	10.4
Oct-16	DRY													
Nov-17	240	<0.050	<0.001	21	530	**0.60**	8.25	<0.0010	0.006	3	245	NA	NA	0.0
Nov-18	170	0.052	<0.001	24	410	0.19	7.86	<0.0010	0.017	2	230	10.6	7.45	3.3
Nov-19	DRY													
Oct-20	DRY													
Nov-21	310	<0.050	<0.001	46	730	0.03	8.2	<0.0010	0.006		415	8.18	7.87	8.1
Sep-22	88	<0.050	0.0007	43	340	0.23	8.07	<0.0010	0.012	2	170	8.17	7.78	13.1
Average	300	0.033	0.0010	38	724	0.28	7.97	<0.001	0.023	2.2	309	9.34	7.86	8.64
Std. Dev.	84	0.025	0.0016	14	185	0.36	0.29	NA	0.036	0.4	109	0.95	0.31	3.91

Notes:
1. PWQO refers to the Provincial Water Quality Objectives established by the Ministry of the Environment (July 1994).
2. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
3. Alkalinity should not be decreased by more than 25% of the natural concentration.
4. Values shaded and in bold are greater than the (I)PWQO
5. * denotes IPWQO - Interim Provincial Water Quality Objective (July 1994)
6. NA = Not Analyzed; NV = No Value

S1
Conductivity, Chloride, and Alkalinity



File No. 213090
GM BluePlan Engineering Limited

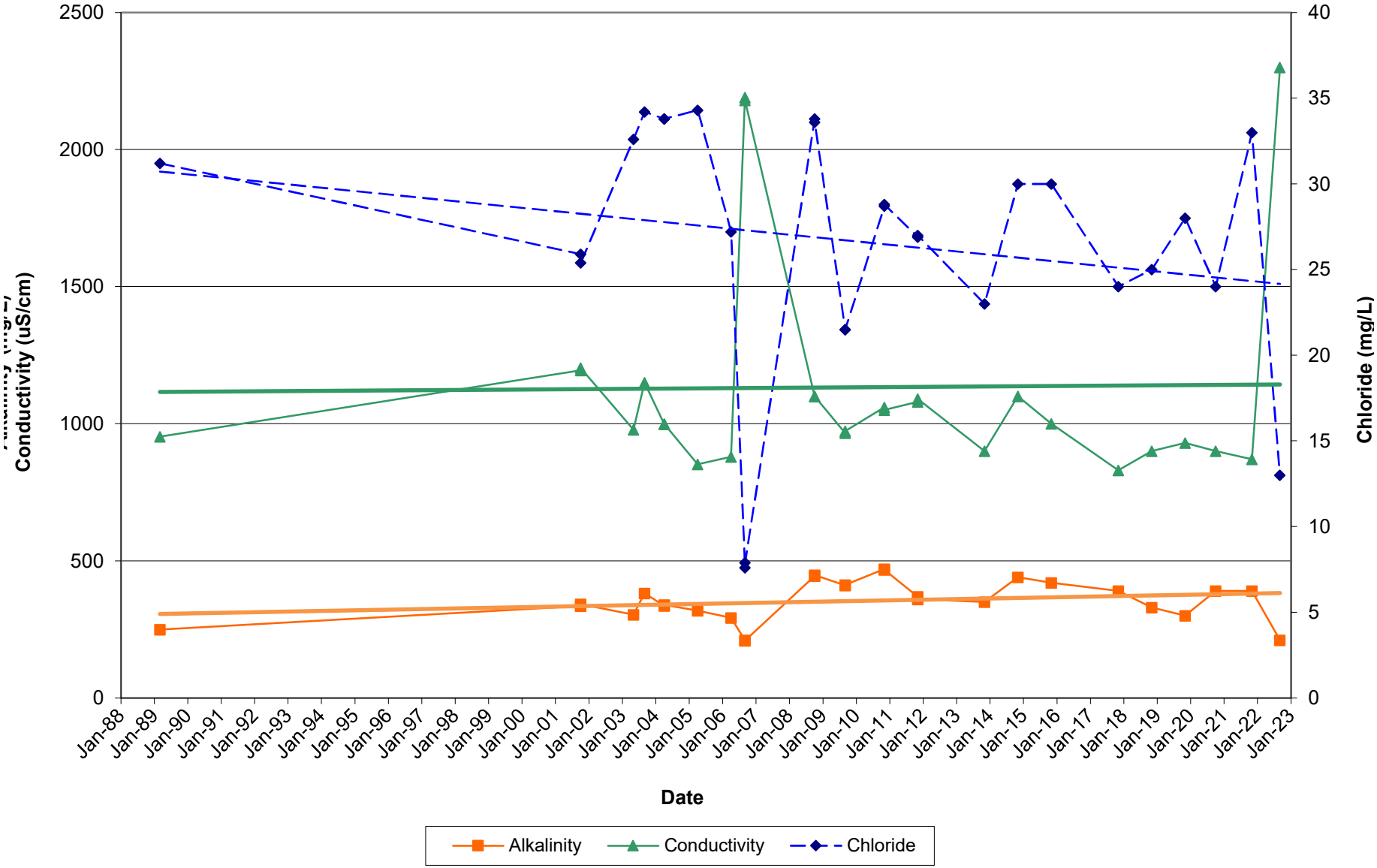
Historic Surface Water Quality Data
Neustadt Landfill Site

S2														
Parameter	Alkalinity	Ammonia	Ammonia (Un-Ionized)	Chloride	Conductivity	Iron	pH	Phenol	Phosphorus	Potassium	TDS	DO (Field)	pH (Field)	Temperature (Field)
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	°C
PWQO	See Note 3	NV	0.02	NV	NV	0.3	6.5-8.5	0.001*	0.03*	NV	NV	NV	6.5-8.5	NV
Mar-89	249	0.019		31.2	953	0.02	7.69	0.0025		4.2				
Jul-01	DRY													
Oct-01	335	<0.01	ND	25.9	1195	0.09	7.66	<0.001	0.01			NA	NA	NA
Oct-01	342	<0.01	ND	25.4	1203	0.12	7.63	<0.001	0.02			NA	NA	NA
Jun-02	DRY													
Oct-02	DRY													
May-03	303	0.02	0.0002	32.6	978	**0.32**	7.70	<0.001	0.02			6	7.5	20.3
Sep-03	381	0.08	0.0017	34.2	1150	**0.53**	7.72	<0.001	0.02			7	8.0	12.1
Apr-04	336	<0.01	0.00	33.8	998	0.29	8.17	<0.001	0.02			NA	7.7	14
Apr-04	339	0.02	ND	33.8	999	0.21	8.17	<0.001	0.02			NA	NA	NA
Sep-04	DRY													
Apr-05	318	<0.01	0.0003	34.3	852	0.23	8.36	<0.001	0.02			8.1	8.1	12.4
Sep-05	DRY													
Apr-06	292	<0.01	0.00	27.2	879	0.14	7.90	<0.001	0.02			7	7.8	8.4
Sep-06	210	<0.01	0.0001	7.6	2190	0.15	7.74	<0.001	0.02			NA	7.7	15.9
Sep-06	209	<0.01	ND	7.9	2180	0.13	7.73	<0.001	0.01			NA	NA	NA
Nov-07	DRY													
Oct-08	444	0.02	0.00	33.8	1100	0.17	7.82	<0.001	**0.06**			6	7.8	10.3
Oct-08	448	0.02	ND	33.6	1100	0.20	7.96	<0.001	**0.05**			NA	NA	NA
Sep-09	410	<0.01	<0.0002	21.5	966	0.05	7.23	<0.001	0.02			3	7.9	12.9
Sep-09	412	<0.01	ND	22	973	0.03	7.20	<0.001	0.02			NA	NA	NA
Nov-10	470	<0.01	<0.0002	28.7	1060	**0.40**	7.30	<0.001	0.02			8	8.2	5.2
Nov-10	467	0.02	ND	28.8	1050	**0.38**	7.39	<0.001	0.02			NA	NA	NA
Nov-11	369	<0.01	<0.01	26.9	1080	0.11	7.82	<0.001	<0.01			7	7.7	7.4
Nov-11	359	<0.01	ND	27	1090	0.27	7.86	<0.001	<0.01			NA	NA	NA
Sep-12	DRY													
Nov-13	350	<0.05	<0.0005	23	900	**0.34**	8.03	<0.001	0.015			NA	NA	1.0
Nov-14	440	0.068	0.0003	30	1100	**0.66**	8.16	<0.001	0.011	3	676	6.87	7.49	7.4
Nov-15	420	0.054	0.0001	30	1000	**0.52**	8.05	<0.001	0.019	5	634	5.8	7.01	8.2
Oct-16	DRY													
Nov-17	390	<0.050	<0.001	24	830	0.24	8.03	<0.0010	0.012	3	430	NA	NA	4
Nov-18	330	0.053	<0.001	25	900	0.18	7.81	<0.0010	0.005	4	605	10.7	7.12	1.4
Nov-19	300	0.062	0.0006	28	930	0.14	7.97	<0.001	0.008	4	630	NA	NA	4
Oct-20	390	0.21	0.0003	24	900	**0.4**	7.93	<0.0010	0.014	4	570	3.75	7.23	10.2
Nov-21	390	<0.050	0.0001	33	870	**0.31**	8.06	<0.0010	0.015		490	5.7	7.56	6.4
Sep-22	210	<0.050	0.0002	13	2300	<0.02	7.96	<0.0010	0.006	3	1950	7.89	7.24	10.6
Average	354	0.028	0.0006	26.6	1133	0.25	7.82	<0.001	0.019	3.8	748	6.63	7.63	9.06
Std. Dev.	75	0.042	0.0012	7.3	398	0.16	0.29	NA	0.012	0.7	492.3	1.89	0.35	4.95

Notes:

1. PWQO refers to the Provincial Water Quality Objectives established by the Ministry of the Environment (July 1994).
2. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
3. Alkalinity should not be decreased by more than 25% of the natural concentration.
4. Values shaded and in bold are greater than the (I)PWQO
5. * denotes IPWQO - Interim Provincial Water Quality Objective (July 1994)
6. NA = Not Analyzed; NV = No Value

S2
Conductivity, Chloride, and Alkalinity



File No. 213090
GM BluePlan Engineering Limited

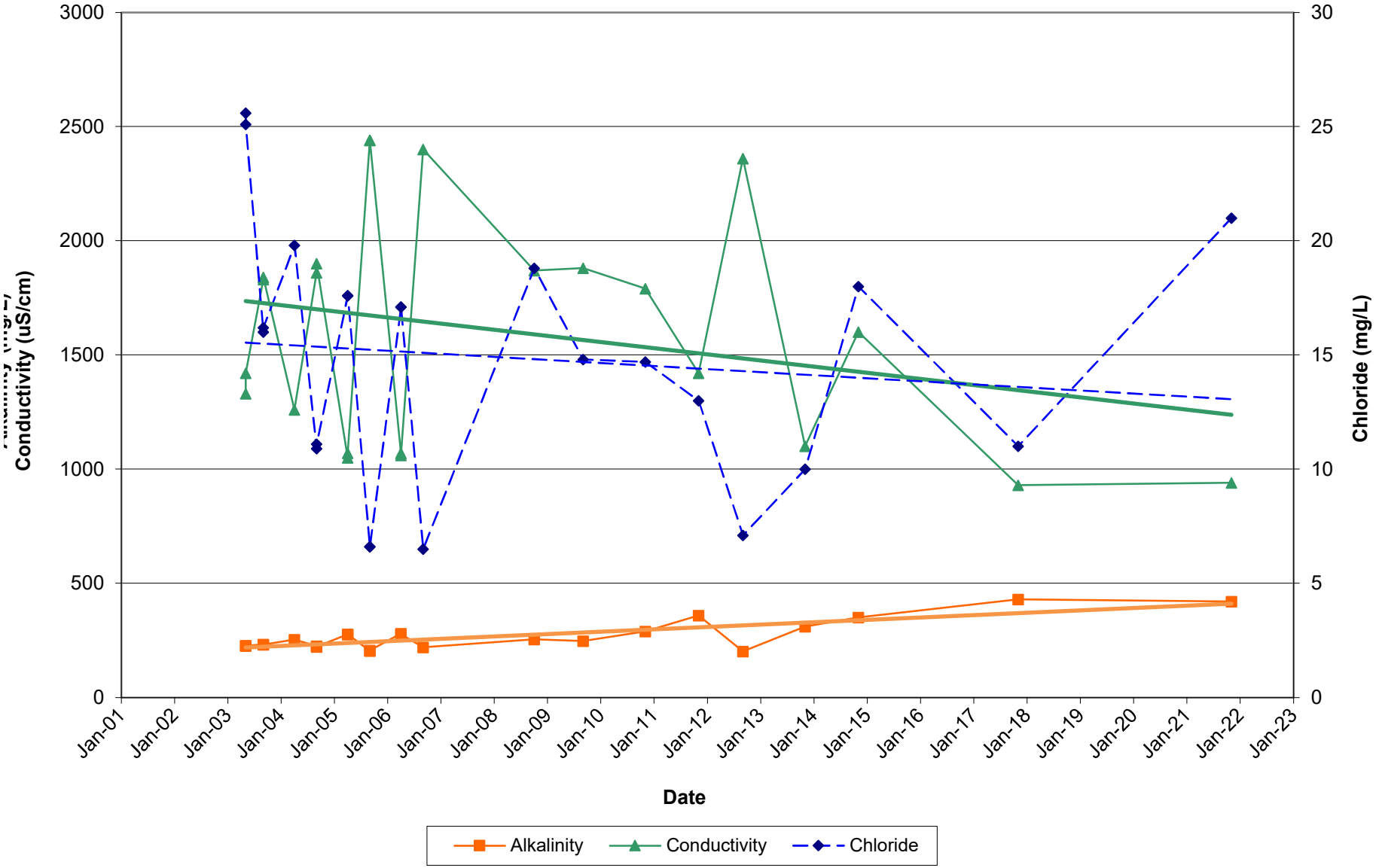
Historic Surface Water Quality Data
Neustadt Landfill Site

S3														
Parameter	Alkalinity	Ammonia	Ammonia (Un-Ionized)	Chloride	Conductivity	Iron	pH	Phenol	Phosphorus	Potassium	TDS	DO (Field)	pH (Field)	Temperature (Field)
Units	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	Unitless	°C
PWQO	See Note 3	NV	0.02	NV	NV	0.3	6.5-8.5	0.001*	0.03*	NV	NV	NV	6.5-8.5	NV
May-03	227	0.16	0.0003	25.6	1330	**0.33**	7.62	<0.001	0.02			5	7.00	11.8
May-03	226	0.05	ND	25.1	1420	**0.33**	7.37	<0.001	0.02			NA	NA	NA
Sep-03	232	0.1	0.0017	16	1830	**0.53**	7.54	<0.001	0.02			9	7.80	15
Sep-03	231	0.08	ND	16.2	1840	**0.56**	7.51	<0.001	0.02			NA	NA	NA
Apr-04	253	0.05	0.0002	19.8	1260	**0.31**	7.99	<0.001	0.02			NA	7.40	9.6
Sep-04	225	0.01	0.0001	10.9	1860	0.21	7.45	0.001	**0.04**			NA	7.50	15.5
Sep-04	222	0.01	ND	11.1	1900	0.24	7.50	0.001	**0.04**			NA	NA	NA
Apr-05	276	0.02	0.0001	17.6	1050	0.07	8.00	<0.001	0.03			7.1	7.70	7.5
Apr-05	276	<0.01	ND	17.6	1070	0.07	8.04	<0.001	<0.01			NA	NA	NA
Sep-05	204	0.09	0.0017	6.6	2440	**0.45**	7.47	<0.001	0.03			10	7.90	13.5
Sep-05	206	0.02	ND	6.6	2440	**0.47**	7.50	<0.001	0.03			NA	NA	NA
Apr-06	280	0.05	0.0005	17.1	1070	**0.37**	7.66	<0.001	0.03			7	7.80	8.4
Apr-06	276	0.02	NA	17.1	1060	**0.37**	7.63	<0.001	**0.04**			NA	NA	NA
Sep-06	220	0.06	0.0004	6.5	2400	**1.45**	7.51	<0.001	**0.04**			8.5	7.40	13.4
Nov-07	DRY													
Oct-08	254	0.05	0.0002	18.8	1870	**0.54**	7.60	<0.001	<0.01			5	7.20	11.5
Sep-09	247	<0.01	<0.0001	14.8	1880	**0.37**	7.08	<0.001	0.03			3	7.70	12.8
Nov-10	289	<0.01	<0.0002	14.7	1790	**2.67**	6.96	<0.001	0.02			4	8.00	8.6
Nov-11	359	<0.01	<0.01	13	1420	0.28	7.57	<0.001	<0.01			4	7.30	8.8
Sep-12	202	0.02	<0.01	7.1	2360	**3.68**	7.67	<0.001	0.02			9	6.90	12.1
Nov-13	310	<0.05	<0.0002	10	1100	0.06	7.91	<0.001	0.005			NA	NA	6
Nov-14	350	<0.05	<0.0002	18	1600	0.07	7.87	<0.001	0.005	2	1230	5.98	7.18	9.35
Nov-15	DRY													
Oct-16	DRY													
Nov-17	430	<0.050	<0.001	11	930	0.09	7.80	<0.0010	0.008	2	500	NA	NA	5
Nov-18	DRY													
Nov-19	DRY													
Oct-20	DRY													
Nov-21	420	<0.050	<0.001	21	940	0.03	7.81	<0.0010	0.026		565	2.97	7.21	9.1
Sep-22	DRY													
Average	270	0.040	0.0010	14.9	1603	0.59	7.61	<0.001	0.022	NA	NA	6.20	7.47	10.47
Std. Dev.	65	0.038	0.0016	5.5	506	0.88	0.27	NA	0.012	NA	NA	2.42	0.34	3.04

Notes:

1. PWQO refers to the Provincial Water Quality Objectives established by the Ministry of the Environment (July 1994).
2. Data prior to 2013 was obtained from the 2012 Annual Monitoring Report prepared by Genivar Inc.
3. Alkalinity should not be decreased by more than 25% of the natural concentration.
4. Values shaded and in bold are greater than the (I)PWQO
5. * denotes IPWQO - Interim Provincial Water Quality Objective (July 1994)
6. NA = Not Analyzed; NV = No Value

S3
Conductivity, Chloride, and Alkalinity



File No. 213090
GM BluePlan Engineering Limited

APPENDIX F:
LABORATORY CERTIFICATE OF ANALYSIS

Your Project #: 213090
Site#: NEUSTADT
Site Location: NEUSTADT
Your C.O.C. #: 895873-01-01, 895873-02-01

Attention: Reporting Contacts

GM BluePlan Engineering Limited
1260 - 2nd Ave E
Unit 1
Owen Sound, ON
CANADA N4K 2J3

Report Date: 2022/10/14
Report #: R7341739
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2S2467
Received: 2022/09/29, 10:20

Sample Matrix: Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2022/10/14	CAM SOP-00448	SM 23 2320 B m
Alkalinity	10	N/A	2022/10/06	CAM SOP-00448	SM 23 2320 B m
Chloride by Automated Colourimetry	1	N/A	2022/10/11	CAM SOP-00463	SM 23 4500-Cl E m
Chloride by Automated Colourimetry	9	N/A	2022/10/03	CAM SOP-00463	SM 23 4500-Cl E m
Chloride by Automated Colourimetry	1	N/A	2022/10/05	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	11	N/A	2022/10/06	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	9	N/A	2022/10/04	CAM SOP-00446	SM 23 5310 B m
Dissolved Oxygen	2	2022/09/30	2022/09/30	CAM SOP-00427	SM 23 4500 O G m
Hardness (calculated as CaCO3)	9	N/A	2022/10/06	CAM SOP 00102/00408/00447	SM 2340 B
Lab Filtered Metals Analysis by ICP	8	2022/10/03	2022/10/06	CAM SOP-00408	EPA 6010D m
Lab Filtered Metals Analysis by ICP	1	2022/10/07	2022/10/12	CAM SOP-00408	EPA 6010D m
Total Metals Analysis by ICP	2	2022/10/04	2022/10/04	CAM SOP-00408	EPA 6010D m
Total Ammonia-N	11	N/A	2022/10/06	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2022/10/02	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (2)	8	N/A	2022/10/07	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	11	2022/09/30	2022/10/06	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	11	N/A	2022/10/04	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	1	N/A	2022/10/11	CAM SOP-00464	EPA 375.4 m
Sulphate by Automated Colourimetry	8	N/A	2022/10/04	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids	11	2022/10/03	2022/10/04	CAM SOP-00428	SM 23 2540C m
Total Kjeldahl Nitrogen in Water	9	2022/10/03	2022/10/04	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	2	2022/10/04	2022/10/05	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are

Your Project #: 213090
Site#: NEUSTADT
Site Location: NEUSTADT
Your C.O.C. #: 895873-01-01, 895873-02-01

Attention: Reporting Contacts

GM BluePlan Engineering Limited
1260 - 2nd Ave E
Unit 1
Owen Sound, ON
CANADA N4K 2J3

Report Date: 2022/10/14
Report #: R7341739
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2S2467

Received: 2022/09/29, 10:20

reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ashton Gibson, Project Manager
Email: Ashton.Gibson@bureauveritas.com
Phone# (905)817-5765

==========

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Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		TWK514			TWK514		TWK515		
Sampling Date		2022/09/28			2022/09/28		2022/09/28		
COC Number		895873-01-01			895873-01-01		895873-01-01		
	UNITS	S1	RDL	QC Batch	S1 Lab-Dup	QC Batch	S2	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	<0.050	0.050	8261253			<0.050	0.050	8261253
Conductivity	umho/cm	340	1.0	8257971			2300	1.0	8257971
Total Dissolved Solids	mg/L	170	10	8261397			1950	10	8261397
Dissolved Oxygen	mg/L	9.49		8258678	9.50	8258678	8.85		8258678
pH	pH	8.07		8257972			7.96		8257972
Phenols-4AAP	mg/L	<0.0010	0.0010	8263511			<0.0010	0.0010	8263511
Total Phosphorus	mg/L	0.012	0.004	8262668			0.006	0.004	8262668
Alkalinity (Total as CaCO3)	mg/L	88	1.0	8257961			210	1.0	8257961
Dissolved Chloride (Cl-)	mg/L	43	1.0	8258676			13	1.0	8258812

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		TWK516		TWK517			TWK517		
Sampling Date		2022/09/28		2022/09/28			2022/09/28		
COC Number		895873-01-01		895873-01-01			895873-01-01		
	UNITS	GM2-3	QC Batch	GM3-7	RDL	QC Batch	GM3-7 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Hardness (CaCO3)	mg/L	340	8257393	370	1.0	8257393			
Inorganics									
Total Ammonia-N	mg/L	0.065	8261253	0.050	0.050	8261253			
Conductivity	umho/cm	610	8257971	680	1.0	8257971			
Total Dissolved Solids	mg/L	345	8261397	425	10	8261397	455	10	8261397
Total Kjeldahl Nitrogen (TKN)	mg/L	0.50	8261277	0.49	0.20	8261277			
Dissolved Organic Carbon	mg/L	0.66	8260711	0.66	0.40	8261000			
pH	pH	8.15	8257972	8.00		8257972			
Phenols-4AAP	mg/L	<0.0010	8263511	<0.0010	0.0010	8263511			
Dissolved Sulphate (SO4)	mg/L	60	8273496	130	1.0	8258711			
Alkalinity (Total as CaCO3)	mg/L	220	8273607	220	1.0	8257961			
Dissolved Chloride (Cl-)	mg/L	3.2	8273500	3.9	1.0	8258703			
Nitrite (N)	mg/L	<0.010	8258020	0.021	0.010	8258020			
Nitrate (N)	mg/L	0.15	8258020	0.27	0.10	8258020			
Nitrate + Nitrite (N)	mg/L	0.15	8258020	0.29	0.10	8258020			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		TWK518			TWK519		TWK520		
Sampling Date		2022/09/28			2022/09/28		2022/09/28		
COC Number		895873-01-01			895873-01-01		895873-01-01		
	UNITS	GM3-12	RDL	QC Batch	GM5-3	QC Batch	OW4-3	RDL	QC Batch
Calculated Parameters									
Hardness (CaCO3)	mg/L	1600	1.0	8257393	730	8257393	520	1.0	8257393
Inorganics									
Total Ammonia-N	mg/L	0.74	0.050	8261253	1.4	8261253	0.33	0.050	8261253
Conductivity	umho/cm	2300	1.0	8257971	1300	8257971	940	1.0	8257971
Total Dissolved Solids	mg/L	1970	10	8261397	730	8261397	625	10	8261397
Total Kjeldahl Nitrogen (TKN)	mg/L	1.5	0.20	8261277	1.8	8261277	0.52	0.10	8261277
Dissolved Organic Carbon	mg/L	0.91	0.40	8261000	3.5	8260925	0.70	0.40	8260925
pH	pH	7.81		8257972	7.77	8257972	8.01		8257972
Phenols-4AAP	mg/L	<0.0010	0.0010	8264273	<0.0010	8264273	<0.0010	0.0010	8264273
Dissolved Sulphate (SO4)	mg/L	1400	5.0	8258711	120	8258711	300	1.0	8258711
Alkalinity (Total as CaCO3)	mg/L	66	1.0	8257961	550	8257961	200	1.0	8257961
Dissolved Chloride (Cl-)	mg/L	8.0	1.0	8258703	18	8258703	9.1	1.0	8258703
Nitrite (N)	mg/L	0.256	0.010	8258020	0.075	8258020	0.030	0.010	8258017
Nitrate (N)	mg/L	0.42	0.10	8258020	0.11	8258020	<0.10	0.10	8258017
Nitrate + Nitrite (N)	mg/L	0.68	0.10	8258020	0.18	8258020	0.10	0.10	8258017

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		TWK520			TWK521			TWK521		
Sampling Date		2022/09/28			2022/09/28			2022/09/28		
COC Number		895873-01-01			895873-01-01			895873-01-01		
	UNITS	OW4-3 Lab-Dup	RDL	QC Batch	OW7-3	RDL	QC Batch	OW7-3 Lab-Dup	RDL	QC Batch
Calculated Parameters										
Hardness (CaCO3)	mg/L				610	1.0	8257393			
Inorganics										
Total Ammonia-N	mg/L				2.9	0.050	8261253			
Conductivity	umho/cm				1100	1.0	8257971			
Total Dissolved Solids	mg/L				670	10	8261397			
Total Kjeldahl Nitrogen (TKN)	mg/L				4.4	0.20	8261277			
Dissolved Organic Carbon	mg/L	0.69	0.40	8260925	6.7	0.40	8260711	6.7	0.40	8260711
pH	pH				7.82		8257972			
Phenols-4AAP	mg/L				<0.0010	0.0010	8264273			
Dissolved Sulphate (SO4)	mg/L				120	1.0	8258711			
Alkalinity (Total as CaCO3)	mg/L				440	1.0	8257961			
Dissolved Chloride (Cl-)	mg/L				29	1.0	8258703			
Nitrite (N)	mg/L	0.024	0.010	8258017	0.180	0.010	8258020			
Nitrate (N)	mg/L	<0.10	0.10	8258017	1.44	0.10	8258020			
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	8258017	1.62	0.10	8258020			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		TWK545			TWK546			TWK547		
Sampling Date		2022/09/28			2022/09/28			2022/09/28		
COC Number		895873-02-01			895873-02-01			895873-02-01		
	UNITS	OW8-3(S)	RDL	QC Batch	OW8-5(D)	RDL	QC Batch	OW9-3	RDL	QC Batch
Calculated Parameters										
Hardness (CaCO3)	mg/L	1000	1.0	8257393	490	1.0	8257393	980	1.0	8257393
Inorganics										
Total Ammonia-N	mg/L	1.3	0.050	8261253	4.1	0.050	8261253	0.92	0.050	8261253
Conductivity	umho/cm	1800	1.0	8257971	940	1.0	8257971	1900	1.0	8257971
Total Dissolved Solids	mg/L	1180	10	8261397	495	10	8261397	1210	10	8261397
Total Kjeldahl Nitrogen (TKN)	mg/L	2.1	0.20	8261277	5.2	0.20	8261277	2.2	0.20	8261277
Dissolved Organic Carbon	mg/L	3.8	0.40	8260711	7.2	0.40	8261000	3.0	0.40	8260925
pH	pH	7.80		8257972	7.91		8257972	7.69		8257972
Phenols-4AAP	mg/L	<0.0010	0.0010	8264273	<0.0010	0.0010	8264273	<0.0010	0.0010	8264273
Dissolved Sulphate (SO4)	mg/L	630	5.0	8258711	9.9	1.0	8258711	400	2.0	8258711
Alkalinity (Total as CaCO3)	mg/L	260	1.0	8257961	450	1.0	8257961	280	1.0	8257961
Dissolved Chloride (Cl-)	mg/L	73	1.0	8258703	19	1.0	8258703	200	2.0	8258703
Nitrite (N)	mg/L	0.059	0.010	8258020	0.030	0.010	8258020	0.066	0.010	8258020
Nitrate (N)	mg/L	0.89	0.10	8258020	<0.10	0.10	8258020	<0.10	0.10	8258020
Nitrate + Nitrite (N)	mg/L	0.95	0.10	8258020	<0.10	0.10	8258020	0.15	0.10	8258020

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		TWK514	TWK515			TWK516		TWK517		
Sampling Date		2022/09/28	2022/09/28			2022/09/28		2022/09/28		
COC Number		895873-01-01	895873-01-01			895873-01-01		895873-01-01		
	UNITS	S1	S2	RDL	QC Batch	GM2-3	QC Batch	GM3-7	RDL	QC Batch
Metals										
Dissolved Calcium (Ca)	mg/L					76	8272827	91	0.05	8261778
Dissolved Iron (Fe)	mg/L					<0.02	8272827	<0.02	0.02	8261778
Total Iron (Fe)	mg/L	0.23	<0.02	0.02	8262859					
Dissolved Magnesium (Mg)	mg/L					37	8272827	34	0.05	8261778
Dissolved Potassium (K)	mg/L					2	8272827	2	1	8261778
Total Potassium (K)	mg/L	2	3	1	8262859					
Dissolved Sodium (Na)	mg/L					6.4	8272827	8.2	0.5	8261778

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		TWK518	TWK519	TWK520	TWK521	TWK545	TWK546		
Sampling Date		2022/09/28	2022/09/28	2022/09/28	2022/09/28	2022/09/28	2022/09/28		
COC Number		895873-01-01	895873-01-01	895873-01-01	895873-01-01	895873-02-01	895873-02-01		
	UNITS	GM3-12	GM5-3	OW4-3	OW7-3	OW8-3(S)	OW8-5(D)	RDL	QC Batch
Metals									
Dissolved Calcium (Ca)	mg/L	470	190	130	180	320	160	0.05	8261778
Dissolved Iron (Fe)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	8261778
Dissolved Magnesium (Mg)	mg/L	94	62	47	36	56	23	0.05	8261778
Dissolved Potassium (K)	mg/L	3	19	2	6	3	3	1	8261778
Dissolved Sodium (Na)	mg/L	35	16	17	21	40	15	0.5	8261778

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		TWK547		
Sampling Date		2022/09/28		
COC Number		895873-02-01		
	UNITS	OW9-3	RDL	QC Batch
Metals				
Dissolved Calcium (Ca)	mg/L	300	0.05	8261778
Dissolved Iron (Fe)	mg/L	<0.02	0.02	8261778
Dissolved Magnesium (Mg)	mg/L	56	0.05	8261778
Dissolved Potassium (K)	mg/L	4	1	8261778
Dissolved Sodium (Na)	mg/L	47	0.5	8261778

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

TEST SUMMARY

Bureau Veritas ID: TWK514
Sample ID: S1
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8257961	N/A	2022/10/06	Kien Tran
Chloride by Automated Colourimetry	KONE	8258676	N/A	2022/10/03	Alina Dobreanu
Conductivity	AT	8257971	N/A	2022/10/06	Kien Tran
Dissolved Oxygen	DO	8258678	2022/09/30	2022/09/30	Gurjot Kaur
Total Metals Analysis by ICP	ICP	8262859	2022/10/04	2022/10/04	Thuy Linh Nguyen
Total Ammonia-N	LACH/NH4	8261253	N/A	2022/10/06	Anna-Kay Gooden
pH	AT	8257972	2022/09/30	2022/10/06	Kien Tran
Phenols (4AAP)	TECH/PHEN	8263511	N/A	2022/10/04	Mandeep Kaur
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall
Total Phosphorus (Colourimetric)	SKAL/P	8262668	2022/10/04	2022/10/05	Shivani Shivani

Bureau Veritas ID: TWK514 Dup
Sample ID: S1
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Oxygen	DO	8258678	2022/09/30	2022/09/30	Gurjot Kaur

Bureau Veritas ID: TWK515
Sample ID: S2
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8257961	N/A	2022/10/06	Kien Tran
Chloride by Automated Colourimetry	KONE	8258812	N/A	2022/10/05	Alina Dobreanu
Conductivity	AT	8257971	N/A	2022/10/06	Kien Tran
Dissolved Oxygen	DO	8258678	2022/09/30	2022/09/30	Gurjot Kaur
Total Metals Analysis by ICP	ICP	8262859	2022/10/04	2022/10/04	Thuy Linh Nguyen
Total Ammonia-N	LACH/NH4	8261253	N/A	2022/10/06	Anna-Kay Gooden
pH	AT	8257972	2022/09/30	2022/10/06	Kien Tran
Phenols (4AAP)	TECH/PHEN	8263511	N/A	2022/10/04	Mandeep Kaur
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall
Total Phosphorus (Colourimetric)	SKAL/P	8262668	2022/10/04	2022/10/05	Shivani Shivani

Bureau Veritas ID: TWK516
Sample ID: GM2-3
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8273607	N/A	2022/10/14	Kien Tran
Chloride by Automated Colourimetry	KONE	8273500	N/A	2022/10/11	Alina Dobreanu
Conductivity	AT	8257971	N/A	2022/10/06	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8260711	N/A	2022/10/04	Nimarta Singh
Hardness (calculated as CaCO3)		8257393	N/A	2022/10/06	Automated Statchk

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Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

TEST SUMMARY

Bureau Veritas ID: TWK516
Sample ID: GM2-3
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lab Filtered Metals Analysis by ICP	ICP	8272827	2022/10/07	2022/10/12	Thuy Linh Nguyen
Total Ammonia-N	LACH/NH4	8261253	N/A	2022/10/06	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8258020	N/A	2022/10/07	Chandra Nandlal
pH	AT	8257972	2022/09/30	2022/10/06	Kien Tran
Phenols (4AAP)	TECH/PHEN	8263511	N/A	2022/10/04	Mandeep Kaur
Sulphate by Automated Colourimetry	KONE	8273496	N/A	2022/10/11	Samuel Law
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	8261277	2022/10/03	2022/10/04	Rajni Tyagi

Bureau Veritas ID: TWK517
Sample ID: GM3-7
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8257961	N/A	2022/10/06	Kien Tran
Chloride by Automated Colourimetry	KONE	8258703	N/A	2022/10/03	Alina Dobreanu
Conductivity	AT	8257971	N/A	2022/10/06	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8261000	N/A	2022/10/04	Nimarta Singh
Hardness (calculated as CaCO3)		8257393	N/A	2022/10/06	Automated Statchk
Lab Filtered Metals Analysis by ICP	ICP	8261778	2022/10/03	2022/10/06	Archana Patel
Total Ammonia-N	LACH/NH4	8261253	N/A	2022/10/06	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8258020	N/A	2022/10/07	Chandra Nandlal
pH	AT	8257972	2022/09/30	2022/10/06	Kien Tran
Phenols (4AAP)	TECH/PHEN	8263511	N/A	2022/10/04	Mandeep Kaur
Sulphate by Automated Colourimetry	KONE	8258711	N/A	2022/10/04	Samuel Law
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	8261277	2022/10/03	2022/10/04	Rajni Tyagi

Bureau Veritas ID: TWK517 Dup
Sample ID: GM3-7
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall

Bureau Veritas ID: TWK518
Sample ID: GM3-12
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8257961	N/A	2022/10/06	Kien Tran
Chloride by Automated Colourimetry	KONE	8258703	N/A	2022/10/03	Alina Dobreanu
Conductivity	AT	8257971	N/A	2022/10/06	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8261000	N/A	2022/10/04	Nimarta Singh

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Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

TEST SUMMARY

Bureau Veritas ID: TWK518
Sample ID: GM3-12
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)		8257393	N/A	2022/10/06	Automated Statchk
Lab Filtered Metals Analysis by ICP	ICP	8261778	2022/10/03	2022/10/06	Archana Patel
Total Ammonia-N	LACH/NH4	8261253	N/A	2022/10/06	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8258020	N/A	2022/10/07	Chandra Nandlal
pH	AT	8257972	2022/09/30	2022/10/06	Kien Tran
Phenols (4AAP)	TECH/PHEN	8264273	N/A	2022/10/04	Mandeep Kaur
Sulphate by Automated Colourimetry	KONE	8258711	N/A	2022/10/04	Samuel Law
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	8261277	2022/10/03	2022/10/04	Rajni Tyagi

Bureau Veritas ID: TWK519
Sample ID: GM5-3
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8257961	N/A	2022/10/06	Kien Tran
Chloride by Automated Colourimetry	KONE	8258703	N/A	2022/10/03	Alina Dobreanu
Conductivity	AT	8257971	N/A	2022/10/06	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8260925	N/A	2022/10/04	Nimarta Singh
Hardness (calculated as CaCO3)		8257393	N/A	2022/10/06	Automated Statchk
Lab Filtered Metals Analysis by ICP	ICP	8261778	2022/10/03	2022/10/06	Archana Patel
Total Ammonia-N	LACH/NH4	8261253	N/A	2022/10/06	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8258020	N/A	2022/10/07	Chandra Nandlal
pH	AT	8257972	2022/09/30	2022/10/06	Kien Tran
Phenols (4AAP)	TECH/PHEN	8264273	N/A	2022/10/04	Mandeep Kaur
Sulphate by Automated Colourimetry	KONE	8258711	N/A	2022/10/04	Samuel Law
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	8261277	2022/10/03	2022/10/04	Rajni Tyagi

Bureau Veritas ID: TWK520
Sample ID: OW4-3
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8257961	N/A	2022/10/06	Kien Tran
Chloride by Automated Colourimetry	KONE	8258703	N/A	2022/10/03	Alina Dobreanu
Conductivity	AT	8257971	N/A	2022/10/06	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8260925	N/A	2022/10/04	Nimarta Singh
Hardness (calculated as CaCO3)		8257393	N/A	2022/10/06	Automated Statchk
Lab Filtered Metals Analysis by ICP	ICP	8261778	2022/10/03	2022/10/06	Archana Patel
Total Ammonia-N	LACH/NH4	8261253	N/A	2022/10/06	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8258017	N/A	2022/10/02	Amanpreet Sappal
pH	AT	8257972	2022/09/30	2022/10/06	Kien Tran
Phenols (4AAP)	TECH/PHEN	8264273	N/A	2022/10/04	Mandeep Kaur

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Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

TEST SUMMARY

Bureau Veritas ID: TWK520 **Collected:** 2022/09/28
Sample ID: OW4-3 **Shipped:**
Matrix: Water **Received:** 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphate by Automated Colourimetry	KONE	8258711	N/A	2022/10/04	Samuel Law
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	8261277	2022/10/03	2022/10/04	Rajni Tyagi

Bureau Veritas ID: TWK520 Dup **Collected:** 2022/09/28
Sample ID: OW4-3 **Shipped:**
Matrix: Water **Received:** 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8260925	N/A	2022/10/04	Nimarta Singh
Nitrate & Nitrite as Nitrogen in Water	LACH	8258017	N/A	2022/10/02	Amanpreet Sappal

Bureau Veritas ID: TWK521 **Collected:** 2022/09/28
Sample ID: OW7-3 **Shipped:**
Matrix: Water **Received:** 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8257961	N/A	2022/10/06	Kien Tran
Chloride by Automated Colourimetry	KONE	8258703	N/A	2022/10/03	Alina Dobreanu
Conductivity	AT	8257971	N/A	2022/10/06	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8260711	N/A	2022/10/04	Nimarta Singh
Hardness (calculated as CaCO3)		8257393	N/A	2022/10/06	Automated Statchk
Lab Filtered Metals Analysis by ICP	ICP	8261778	2022/10/03	2022/10/06	Archana Patel
Total Ammonia-N	LACH/NH4	8261253	N/A	2022/10/06	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8258020	N/A	2022/10/07	Chandra Nandlal
pH	AT	8257972	2022/09/30	2022/10/06	Kien Tran
Phenols (4AAP)	TECH/PHEN	8264273	N/A	2022/10/04	Mandeep Kaur
Sulphate by Automated Colourimetry	KONE	8258711	N/A	2022/10/04	Samuel Law
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	8261277	2022/10/03	2022/10/04	Rajni Tyagi

Bureau Veritas ID: TWK521 Dup **Collected:** 2022/09/28
Sample ID: OW7-3 **Shipped:**
Matrix: Water **Received:** 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8260711	N/A	2022/10/04	Nimarta Singh

Bureau Veritas ID: TWK545 **Collected:** 2022/09/28
Sample ID: OW8-3(S) **Shipped:**
Matrix: Water **Received:** 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8257961	N/A	2022/10/06	Kien Tran
Chloride by Automated Colourimetry	KONE	8258703	N/A	2022/10/03	Alina Dobreanu

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Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

TEST SUMMARY

Bureau Veritas ID: TWK545
Sample ID: OW8-3(S)
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	8257971	N/A	2022/10/06	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8260711	N/A	2022/10/04	Nimarta Singh
Hardness (calculated as CaCO3)		8257393	N/A	2022/10/06	Automated Statchk
Lab Filtered Metals Analysis by ICP	ICP	8261778	2022/10/03	2022/10/06	Archana Patel
Total Ammonia-N	LACH/NH4	8261253	N/A	2022/10/06	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8258020	N/A	2022/10/07	Chandra Nandlal
pH	AT	8257972	2022/09/30	2022/10/06	Kien Tran
Phenols (4AAP)	TECH/PHEN	8264273	N/A	2022/10/04	Mandeep Kaur
Sulphate by Automated Colourimetry	KONE	8258711	N/A	2022/10/04	Samuel Law
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	8261277	2022/10/03	2022/10/04	Rajni Tyagi

Bureau Veritas ID: TWK546
Sample ID: OW8-5(D)
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8257961	N/A	2022/10/06	Kien Tran
Chloride by Automated Colourimetry	KONE	8258703	N/A	2022/10/03	Alina Dobreanu
Conductivity	AT	8257971	N/A	2022/10/06	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8261000	N/A	2022/10/04	Nimarta Singh
Hardness (calculated as CaCO3)		8257393	N/A	2022/10/06	Automated Statchk
Lab Filtered Metals Analysis by ICP	ICP	8261778	2022/10/03	2022/10/06	Archana Patel
Total Ammonia-N	LACH/NH4	8261253	N/A	2022/10/06	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8258020	N/A	2022/10/07	Chandra Nandlal
pH	AT	8257972	2022/09/30	2022/10/06	Kien Tran
Phenols (4AAP)	TECH/PHEN	8264273	N/A	2022/10/04	Mandeep Kaur
Sulphate by Automated Colourimetry	KONE	8258711	N/A	2022/10/04	Samuel Law
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	8261277	2022/10/03	2022/10/04	Rajni Tyagi

Bureau Veritas ID: TWK547
Sample ID: OW9-3
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8257961	N/A	2022/10/06	Kien Tran
Chloride by Automated Colourimetry	KONE	8258703	N/A	2022/10/03	Alina Dobreanu
Conductivity	AT	8257971	N/A	2022/10/06	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8260925	N/A	2022/10/04	Nimarta Singh
Hardness (calculated as CaCO3)		8257393	N/A	2022/10/06	Automated Statchk
Lab Filtered Metals Analysis by ICP	ICP	8261778	2022/10/03	2022/10/06	Archana Patel
Total Ammonia-N	LACH/NH4	8261253	N/A	2022/10/06	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8258020	N/A	2022/10/07	Chandra Nandlal

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Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

TEST SUMMARY

Bureau Veritas ID: TWK547
Sample ID: OW9-3
Matrix: Water

Collected: 2022/09/28
Shipped:
Received: 2022/09/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH	AT	8257972	2022/09/30	2022/10/06	Kien Tran
Phenols (4AAP)	TECH/PHEN	8264273	N/A	2022/10/04	Mandeep Kaur
Sulphate by Automated Colourimetry	KONE	8258711	N/A	2022/10/04	Samuel Law
Total Dissolved Solids	BAL	8261397	2022/10/03	2022/10/04	Shaneil Hall
Total Kjeldahl Nitrogen in Water	SKAL	8261277	2022/10/03	2022/10/04	Rajni Tyagi

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GENERAL COMMENTS

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8257961	Alkalinity (Total as CaCO3)	2022/10/06			95	85 - 115	<1.0	mg/L	0.55	20		
8257971	Conductivity	2022/10/06			101	85 - 115	<1.0	umho/cm	0	25		
8257972	pH	2022/10/06			101	98 - 103			0.33	N/A		
8258017	Nitrate (N)	2022/10/02	97	80 - 120	99	80 - 120	<0.10	mg/L	NC	20		
8258017	Nitrite (N)	2022/10/02	107	80 - 120	109	80 - 120	<0.010	mg/L	NC	20		
8258020	Nitrate (N)	2022/10/07	105	80 - 120	96	80 - 120	<0.10	mg/L	NC	20		
8258020	Nitrite (N)	2022/10/07	107	80 - 120	107	80 - 120	<0.010	mg/L	NC	20		
8258676	Dissolved Chloride (Cl-)	2022/10/03	NC	80 - 120	103	80 - 120	<1.0	mg/L	0.10	20		
8258703	Dissolved Chloride (Cl-)	2022/10/03	114	80 - 120	104	80 - 120	<1.0	mg/L	NC	20		
8258711	Dissolved Sulphate (SO4)	2022/10/04	115	75 - 125	106	80 - 120	<1.0	mg/L	4.2	20		
8258812	Dissolved Chloride (Cl-)	2022/10/05	124 (1)	80 - 120	104	80 - 120	<1.0	mg/L	2.4	20		
8260711	Dissolved Organic Carbon	2022/10/04	93	80 - 120	93	80 - 120	<0.40	mg/L	0.015	20		
8260925	Dissolved Organic Carbon	2022/10/04	100	80 - 120	99	80 - 120	<0.40	mg/L	1.9	20		
8261000	Dissolved Organic Carbon	2022/10/04	94	80 - 120	93	80 - 120	<0.40	mg/L	1.1	20		
8261253	Total Ammonia-N	2022/10/06	98	75 - 125	100	80 - 120	<0.050	mg/L	NC	20		
8261277	Total Kjeldahl Nitrogen (TKN)	2022/10/04	109	80 - 120	103	80 - 120	<0.10	mg/L	5.1	20	101	80 - 120
8261397	Total Dissolved Solids	2022/10/04					<10	mg/L	6.8	25	100	90 - 110
8261778	Dissolved Calcium (Ca)	2022/10/06	NC	80 - 120	100	80 - 120	<0.05	mg/L				
8261778	Dissolved Iron (Fe)	2022/10/06	97	80 - 120	100	80 - 120	<0.02	mg/L				
8261778	Dissolved Magnesium (Mg)	2022/10/06	NC	80 - 120	99	80 - 120	<0.05	mg/L				
8261778	Dissolved Potassium (K)	2022/10/06	97	80 - 120	99	80 - 120	<1	mg/L				
8261778	Dissolved Sodium (Na)	2022/10/06	95	80 - 120	98	80 - 120	<0.5	mg/L				
8262668	Total Phosphorus	2022/10/05	98	80 - 120	96	80 - 120	<0.004	mg/L	15	20	92	80 - 120
8262859	Total Iron (Fe)	2022/10/04	95	80 - 120	110	80 - 120	<0.02	mg/L	17	25		
8262859	Total Potassium (K)	2022/10/04	100	80 - 120	100	80 - 120	<1	mg/L				
8263511	Phenols-4AAP	2022/10/04	100	80 - 120	98	80 - 120	<0.0010	mg/L	NC	20		
8264273	Phenols-4AAP	2022/10/04	98	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
8272827	Dissolved Calcium (Ca)	2022/10/12	NC	80 - 120	102	80 - 120	<0.05	mg/L				
8272827	Dissolved Iron (Fe)	2022/10/12	98	80 - 120	104	80 - 120	<0.02	mg/L				
8272827	Dissolved Magnesium (Mg)	2022/10/12	NC	80 - 120	100	80 - 120	<0.05	mg/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8272827	Dissolved Potassium (K)	2022/10/12	NC	80 - 120	100	80 - 120	<1	mg/L	0.38	25		
8272827	Dissolved Sodium (Na)	2022/10/12	NC	80 - 120	101	80 - 120	<0.5	mg/L	0.41	25		
8273496	Dissolved Sulphate (SO4)	2022/10/11	NC	75 - 125	108	80 - 120	<1.0	mg/L	0.64	20		
8273500	Dissolved Chloride (Cl-)	2022/10/11	NC	80 - 120	103	80 - 120	<1.0	mg/L	6.9	20		
8273607	Alkalinity (Total as CaCO3)	2022/10/14			96	85 - 115	<1.0	mg/L	0.31	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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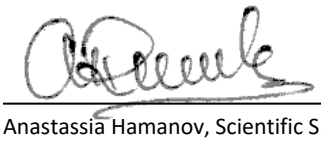
Bureau Veritas Job #: C2S2467
Report Date: 2022/10/14

GM BluePlan Engineering Limited
Client Project #: 213090
Site Location: NEUSTADT
Sampler Initials: CS

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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