FINAL

REPORT

Updated Design and Operations Report

Renfrew Landfill Site

Submitted to:

Town of Renfrew

Department of Development and Works
127 Raglan Street South
Renfrew, Ontario
K7V 1P8

Submitted by:

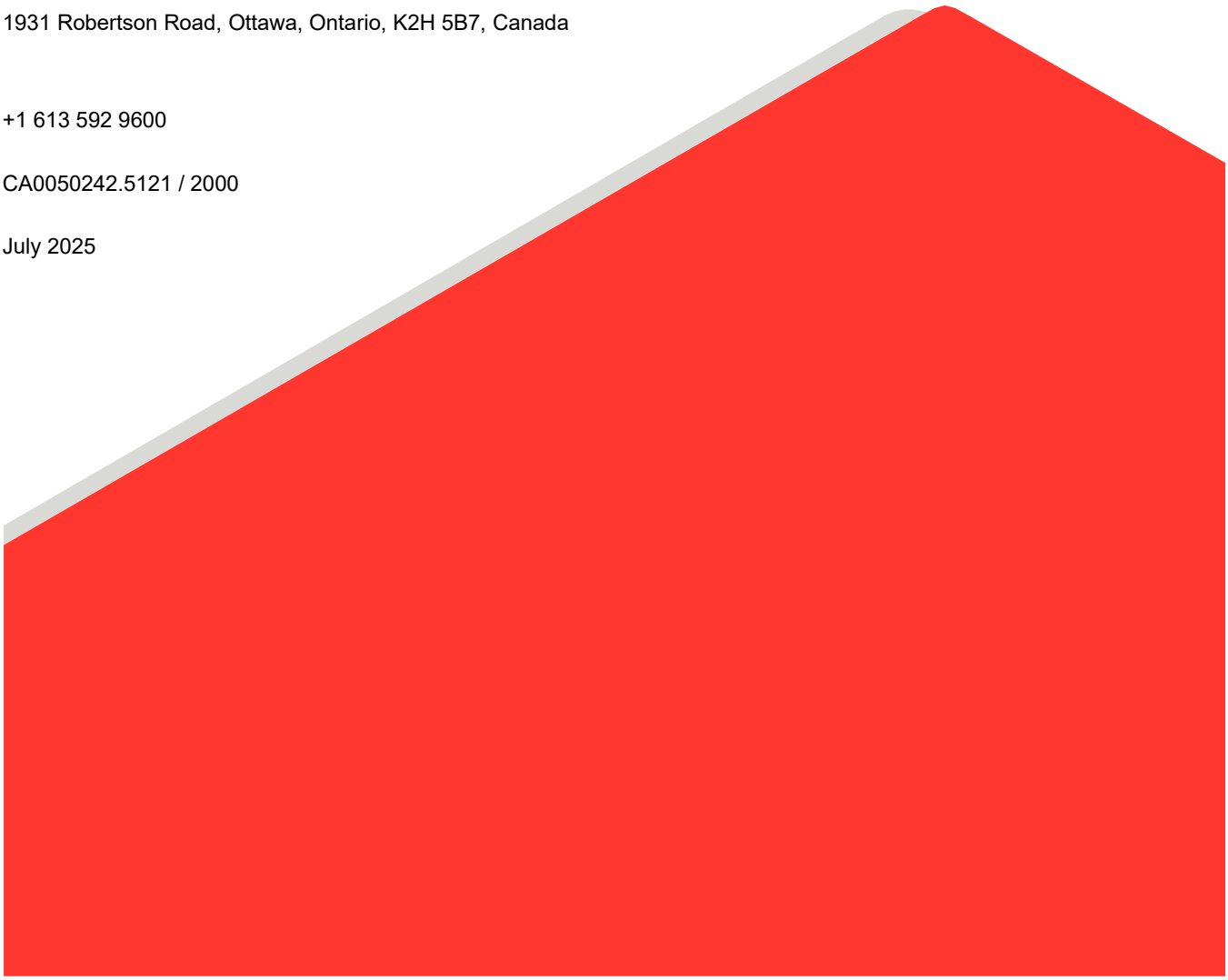
WSP Canada Inc.

1931 Robertson Road, Ottawa, Ontario, K2H 5B7, Canada

+1 613 592 9600

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1.0 INTRODUCTION

This document, prepared by WSP Canada Inc. (WSP), is the Updated Design and Operations Report ("D&O") for the Renfrew Landfill Site (herein referred to as the "Site") that is owned and operated by the Town of Renfrew (herein referred to as the "Town"). This D&O Report supports an application by the Town to amend Environmental Compliance Approval (ECA) No. A410401 issued by the Ministry of Environment, Conservation and Parks (MECP), with the most recent issue date of December 4, 2024. The ECA is provided in **APPENDIX A**.

The purpose of the application to amend ECA No. A410401 is to revise the waste fill limit and final contours, as well as hours of operation and permitted daily and intermediate cover material, at the Site. The current ECA permits the disposal of solid non-hazardous waste at the Site as described in Amendment #1 to the Operation and Development Report for the Renfrew Landfill Site (Trow, 2002). The licensed waste footprint defined therein occupies an area of approximately 10 hectares and the landfill configuration provides a total maximum capacity for waste and daily cover of 1,069,000 million cubic metres (m^3). Of the maximum capacity, the Site is currently approved for the use of 557,400 m^3 in Stages 1, 2, 3 and 4, and recognizes Stage 5 as a future phase requiring submission of an updated D&O Report and hydrogeological assessment to the MECP for approval in accordance with Condition 7(6) of the current ECA. The approved final contours provided in Amendment #1 of the Operation and Development Report (Trow, 2002) are not considered constructable as designed at this time. This is because the topography surrounding the north edge of the landfill footprint has changed since the 2002 design due to aggregate (sand) extraction, resulting in a previously approved landfill design that cannot be constructed as proposed without importing significant amounts of fill material. In addition, the changes to the topography surrounding the landfill footprint in the north portion of the Site since 2002 has resulted in steeper angles of the native sand slopes than what would be required to provide an adequate factor of safety against failure (sloughing) of these slopes that are immediately adjacent to the north side of the landfill area. A geotechnical assessment carried out by WSP dated January 2025 confirmed that the native sand slopes surrounding the north side of the landfill are potentially unstable in the areas where the slope is greater than 2 horizontal to 1 vertical (2H:1V) (WSP, 2025). Further, the ability to place additional waste with adequate compaction and cover application to the approved top of waste elevations is significantly limited by the existing landfill geometry (i.e., steep waste slopes). While landfilling within the south area of the landfill (i.e., the future Stage 5) has not been undertaken to a significant height above ground surface (which occurred prior to 1993), the approved design in this area of the Site would require the construction of waste slopes exceeding 2H:1V in some locations, which is generally not advisable for various operational, stability and erosion-related reasons.

On January 11, 2024, a call was held between representatives of the Town, WSP, MECP Ottawa District Office, groundwater and surface water reviewers from the Technical Support Section of the MECP Eastern Region Office, and MECP Environmental Permissions Branch during which the above issues were identified. During the January 2024 call, it was confirmed that an update to the D&O Report for the Renfrew Landfill Site is required as part of the application to amend ECA No. A410401 to revise the waste fill limit and final waste contours, including a revision to the groundwater and surface water monitoring programs for the Site as related to the proposed waste fill limit revision. It was also confirmed by MECP that a hydrogeological assessment is not required in support of the ECA amendment. A technical memorandum providing the details of the proposed revisions to the groundwater and surface water monitoring programs was submitted to the MECP District Office for distribution to the groundwater and surface water technical reviewers on March 11, 2025. Concurrence was received from the surface water reviewer (subject to some modifications which have been included in Section 5.2) in a memorandum dated April 29, 2025 and from the groundwater reviewer in an email dated June 10, 2025. A

summary email from the January 2024 call and the correspondence from MECP groundwater and surface water reviewers demonstrating their concurrence is provided in **APPENDIX B**.

1.1 Background

The Operations and Development report (Trow, 1997) provides information on the waste disposal history at the Site. The Renfrew Landfill Site has been used for waste disposal collected within the Town since the mid-1950's. Between the mid-1970's and 1993, waste collection and landfill operation was handled by a private contractor. The Town assumed operational control of the landfill after 1993. Landfill operation was again contracted out to a private contractor some time after 1993 (exact date unknown); the Town again assumed operational control of the landfill in 2019.

Prior to 1993, waste was placed in the south portion of the Site (i.e., the future Stage 5 as discussed in Section 3.0). The Operation and Development Report (Trow, 1997) indicates that this area (therein referred to as the "eastern portion" of the Site) was capped in 1996. Based on the borehole log at OMM4 located within the area of Stages 1 through 4 (refer to Section 3.0) which reports the presence of "assorted garbage", it is considered that waste was also placed in this area of the Site prior to 1993 (exact date of advancement of the borehole at OMM4 not known). It is understood that no landfilling in the south part of the Site (Stage 5) has taken place since 1993.

Domestic curbside waste collected by private contractors to the Town is delivered to the Site 3 days per week for disposal, as well as commercial waste collected primarily from industrial and commercial operations and individual businesses. Additionally, waste has historically and continues to be brought daily to the Site by non-licensed haulers including town residents, building contractors, commercial and industrial operations from within the Town.

The Town's Water Pollution Control Plant (WPCP) utilizes the landfill Site for the disposal of sewage sludge. The WPCP was constructed in the late 1960's. Historically, the sewage sludge delivered to the landfill was classified as undigested; the plant provided primary sewage treatment with phosphorus removal accomplished by ferric chloride addition, coagulation and sedimentation. Sludge from the primary settlement tank was passed through a coil filter at the plant for dewatering to a solids content of approximately 20% and the dewatered sludge was stored for transfer to the landfill Site three to five times per week for co-disposal with the waste. The Operations and Development Report describes issues related to lateral spreading of the historically received sewage sludge due to its liquidity. An alternative method of constructing dedicated trenches for the sewage sludge was attempted, but after 2 to 3 months the trenches would reportedly become unstable and would not support vehicle traffic (limiting available space for landfill development) (Trow, 1997). The location of these historic trenches is not known. Presently, sewage sludge is still received at the Site daily, however the treatment process has been replaced following commissioning of a new facility in August 2009, and the resulting sewage sludge is now classified as aerobically digested and dewatered. Disposal practices for the dewatered and digested sewage sludge were outlined in a memorandum by Golder Associates Ltd. (Golder) (now WSP) dated January 4, 2021 (discussed further in Section 4.7).

The Town's recycling program, initiated in 1990, consisted of bi-weekly curbside pick-up, and presently involves weekly collection (rotating between cardboard/fibre and co-mingled containers) from residential sources (by the Common Collection System managed by Circular Materials per O.Reg. 321/21) and some limited institutional sources (by the Town). Since at least 1996-1997 at the time of preparation of the previous Operations and Development Report, the program included glass, cardboard, metal, newsprint, and magazines but also included plastic containers, brown paper bags, and boxboard. Scrap metal and appliances (white goods) were also accepted and segregated for removal by a contractor for recycling (Trow, 1997). Presently, curbside collected

materials are moved directly for processing and do not come to the landfill Site. The Town maintains a series of bins at the landfill Site for small load drop offs waste segregation and is approved to receive blue box waste (in accordance with O.Reg. 101/94), waste electrical and electronic equipment (WEE), durable goods materials stream (DGMS) and white goods containing refrigerants.

The Town also operates a Household Hazardous Waste (HHW) Depot for the receipt and transfer of municipal hazardous waste and municipal special waste (MHSW). The HHW Depot was constructed in 1998, and was first approved by the MECP in an amendment to ECA No. A410401 in 2009. Design and operational requirements for the HHW Depot are provided in the D&O Report for the HHW Depot by Golder dated December 2010.

2.0 SITE DESCRIPTION

2.1 Site Location and Service Area

The Renfrew Landfill Site is located in the Town of Renfrew, Renfrew County within the Ottawa Valley, approximately 8 kilometres (km) southwest of the Ottawa River and approximately 0.5 km northwest of the Bonnechere River. The Town is located adjacent to Highway 17, 90 km northwest of Ottawa, 23 km northwest of Arnprior, and 45 km southeast of Pembroke. Within the town, the landfill site is located at 376 Bruce St, as shown on **Figure 1**.

The Site accepts waste generated within the boundaries of the Town of Renfrew with the exception of MHSW materials which are accepted for transfer from the Town of Renfrew, Addington Highlands Township, Town of Arnprior, Admaston Bromley Township, Horton Township, Greater Madawaska Township, McNab Braeside Township, and Township of Whitewater Region.

2.2 Site Boundaries and Land Use

The total area of the Renfrew Landfill Site is indicated in ECA No. A410401 to be approximately 40.73 hectares, with a licensed waste footprint occupying an area on-site of approximately 10 hectares. It is noted that the total Site property appears to be smaller than 40.73 hectares; it is estimated that the property is approximately 27.49 hectares. The Town is in the process of registering the property on title, which requires a legal survey, and the total area of the property will be confirmed at that time. Further, the revised waste limit and final contours presented in this report result in a waste fill limit of 10.6 hectares (refer to Section 3.1). The site property boundaries and proposed waste fill limit are illustrated in the Site Plan, **Figure 4**.

The Landfill Site is bounded by a cemetery on the east side, a major arterial road into the Town of Renfrew (Bruce Street) on the south side, private property in the Township of Horton to the north and a combination of open space and a residential area (Grigg Avenue/Moore Street) to the west. All residences in the immediate vicinity of the Renfrew Landfill Site (i.e., to the south across Bruce Street, and to the west – Grigg Avenue/Moore Street area) are serviced by the Town of Renfrew's water supply.

The Landfill Site is zoned as Disposal Industrial according to the Town of Renfrew's Zoning By-Law 46-2010. The proposed western extension to the waste fill limit (refer to Section 3.1) is presently zoned Environmental Protection which does not allow for landfilling, however the use of this part of the property owned by the Town is permitted by General Provision 3.22 of Zoning By-Law 3.22 which states permits the use of this land for the purpose of a public service (i.e., waste disposal) by the Municipality. It is the Town's intention to formally update the zoning of the Environmental Protection area in the future.

2.3 Topography and Drainage

The Site is located in a low-lying area south of local bedrock highlands. Prior to landfilling, much of the outwash sands and gravels (refer to Section 2.4) were removed by either erosion or human activity. The removal of material has resulted in the formation of an exposed sand escarpment with a height up to 30 metres (m) greater in elevation than the waste disposal area surrounding the Site (Trow, 1997).

The waste disposal area is bounded to the west by a marshy area within the “south buffer lands” owned by the Town. Overland drainage from the landfill area is directed to a natural depression or “sump” near the southwest corner of the property, adjacent to the embankment on which Bruce Street is located. The Operations and Development Report (Trow, 1997) indicates that there is no natural surface water outlet from the landfill site and that water leaves the site by infiltrating into the groundwater regime and/or by evaporation and evapotranspiration processes. It has been indicated that drainage from the marshy area is also directed past the waste footprint via a culvert that discharges to the sump area near the southwest corner of the landfill property, adjacent to Bruce Street, for infiltration.

2.4 Geology and Hydrogeology

The Operations and Development Report (Trow, 1997) describes the geological regime in the vicinity of the Site as being a relatively thick accumulation of glacial outwash sands and gravels. The thickness of the granular overburden materials observed at borehole OMM15 located on top of the native sand escarpment to the immediate north of the Site was terminated in overburden described as grey, fine-grained packed, clay sand at a depth of about 55 m (elevation of approximately 80 metres above sea level (masl) based on subsequently surveyed top of pipe elevation at this monitoring location). At BH10-1 located on Site to the south of the waste limit, overburden was reported to a depth of 40.5 m (approximately 56.7 masl) before terminating in cobbles and boulders (noted as possibly bedrock). The Operations and Development Report (Trow, 1997) reports that an overburden thickness in excess of 60 m was observed at OMM13, located in the south portion of the Site; however, this borehole log could not be located.

The Operations and Development Report (Trow, 1997) notes that, based on available mapping, fine grained marine clays and silts extend onto the property and possibly underlie portions of the swamp and wetlands covering much of the western portion of the property, and that a thin veneer of fine grained materials is believed to underlie a small pond located between Bruce Street and the Bonnechere River. In general, occurrences of silt and clay reported in borehole logs on and in the vicinity of the Site are noted as being “minor”, or as occurring with sand. At OMM15 (located off-site to the north) and OMM4 (located within the waste fill area at the northwest side of the Site), clay with sand was reported at the bottom of the borehole logs (i.e., it was not fully penetrated) at an estimated elevation of approximately 80 masl and 93.5 masl, respectively (noting that these elevations are based on limited data and/or are inferred from surveys undertaken at a later date). Conversely, BH10-1, extends from elevation 97masl to depths greater than OMM15 and OMM4, and does not indicate the presence of clay within the soils encountered to that depth.

Estimates of the horizontal hydraulic conductivities (K) of the overburden unit in the vicinity of the monitoring well intake screens were calculated from rising head tests performed on selected monitoring wells (OMM1 and OMM5) on August 13, 2009. The data from rising head tests were analyzed using the Hvorslev method (Hvorslev, 1951) and test results for the rising head tests conducted in 2009 are given in Golder (2010a). The horizontal hydraulic conductivity ranged from 3.0×10^{-3} cm/s to 5.5×10^{-3} cm/s. These values are considered generally representative

of what would be expected for the sand overburden deposit present in the subsurface at the site (Freeze and Cherry, 1979).

Groundwater flow in the unconfined granular deposit has been reported to be generally from north to south, toward Bruce Street and the Bonnechere River. Previous annual monitoring reports have indicated that the groundwater flow is locally affected by the high topographic relief near the perimeter of the property, groundwater recharge within the marshy area south of the waste footprint and by mounding of groundwater beneath the waste (Trow, 2005). The Bonnechere River is located approximately 220 m south of Bruce Street and represents a point of discharge for groundwater migrating across the Renfrew Landfill Site.

Based on a review of the historic borehole log for OMM 4, which indicates that the bottom of the waste mound is at an elevation of approximately 102 masl, it is estimated that the water table under the northwest half of the licensed fill area (i.e., Stage 4) is approximately 5 to 6 m below the underside of the waste. Based on a review of the borehole log for BH11-01, which indicates that the bottom of the waste mound is at an elevation of approximately 96.9 masl, it is estimated based on groundwater elevations measured across the site that the water table at the southeast portion of Stage 4 is below the approximate underside of the waste by approximately 2 to 3 m, noting that the water level in BH11-01 is typically within or near the bottom of the waste which could be related to localized geological or perched conditions.

During the January 11, 2024 pre-consultation meeting with the MECP regarding the requirements for the proposed application for amendment to ECA A410401 to revise the waste fill limit and final contours, it was confirmed that a hydrogeological assessment report would not be required. A hydrogeological assessment is required to be submitted to the MECP for review prior to commencement of landfilling in “Stage 5” (discussed further in Section 3.0).

2.5 Contaminant Attenuation Zone

Since 2018, the Town has taken steps to gain control of the groundwater use downgradient of the Site for the purposes of establishing a contaminant attenuation zone (CAZ) over the area between Bruce Street and the Bonnechere River, south of the existing landfill property. Condition 1(18) of the December 2024 revision to ECA NO. A410401 requires that the Town establish a CAZ either by fee simple or by establishing a groundwater easement and submit to the Director a Certificate of Requirement. The time frame for establishing the CAZ is noted in Condition 8(15) as two years from the date of the December 2024 ECA. There are presently no known groundwater users downgradient of the Site, and the Town has amended the Official Plan to include a condition with the intent of facilitating the Town to obtain groundwater rights of any land in the Area of Potential Leachate Impact for which development is proposed. Many of the properties in this area are already owned by the Town and an update on land ownership and/or groundwater easement is provided annual in the Site monitoring report. Over time the Town will obtain the groundwater rights of the land considered to be in the area of potential leachate impact, at which point a CAZ can be registered on title.

3.0 SITE DEVELOPMENT

3.1 Waste Fill Limit and Capacity

The approved maximum capacity of the Site presented in Amendment #1 to the Operation and Development Report for the Renfrew Landfill Site (Trow, 2002) is 1,069,000 m^3. This volume is inclusive of waste, daily cover, and intermediate cover, but excludes the final cover. Of the maximum capacity, the Site is currently approved for the use of 557,400 m^3 in Stages 1, 2, 3 and 4, as described in in the Operation and Development Report (Trow,

1997). The total potential volumetric capacity of the future Stage 5 is therefore 511,600 m^3. Final waste contours and the waste fill limit for the Site (inclusive of Stages 1 through 5) were provided in Figure 8 of Amendment #1 to the Operation and Development Report (Trow, 2002).

The overall volumetric capacity remaining at the Site was estimated by WSP in 2025 based on a comparison between the November 20, 2024 topographic survey of the Site (aerial survey (drone) undertaken by Canadian UAV Surveys) and the previous final contours (Trow, 2002) within the licensed fill limit. The estimated total volumetric capacity remaining at the Site in 2024 was approximately 702,066 m^3; this estimated remaining airspace accounts for fill above the previous final contours, as well as an estimated fill beyond the approved waste limits of about 11,250 m^3; both of these were considered to detract from the total remaining capacity. It should be noted that of the 11,250 m^3 of fill beyond approved limits, approximately 2,750 m^3 is either planned to be relocated to within the waste limit by the Town or falls within the proposed extended area of the current waste limit discussed below. The remaining 8,500 m^3 of fill beyond approved limits located near the northwest edge of the waste limit was approved to remain in place (refer to Condition 7(11) of ECA No. A410401).

In the 2004 Ground and Surface Water Monitoring Report (Trow, 2005), it was reported that the remaining site capacity was previously calculated based on a base survey completed in 1993. The overall remaining site capacity in 1993 was estimated to be 961,805 m^3. Of this remaining volume, 533,634 m^3 remained available in Stages 1 through 4, leaving 428,171 m^3 in Stage 5. Since no landfilling in Stage 5 has taken place since 1993, the predicted volume remaining in Stage 5 in 1993 should remain unchanged. As such, considering the estimated overall remaining site capacity of 702,066 m^3 as of November 2024, 273,895 m^3 is estimated to remain in the approved Stages 1 through 4.

The proposed waste fill limit and final contours for the approved Stages 1 through 4 (referred to henceforth as simply “Stage 4”) and the future Stage 5 are presented in **Figures 4 through 8**. The waste fill limit is approximately 10.6 hectares.

The proposed waste fill limit is revised from the previous approximately 10 hectare fill limit presented in Addendum #1 to the Operation and Development Report (Trow, 2002). The proposed waste limit incorporates an extension to the west by approximately 30 m (forming part of the approved Stage 4), and an adjustment to the southeast by approximately 21 m (forming part of the future Stage 5). The extension to the waste limit to the west within Stage 4 is proposed to address existing steep waste slopes within the north and west parts of Stage 4. The proposed adjustment to the southeast portion of Stage 5 is proposed to address steep waste slopes proposed by the Stage 5 final contours (Trow, 2002). While the area of the waste limit is proposed to increase as a result of the proposed final contour revisions, it should be noted that the final contours propose that new waste only be placed within a 9.7 hectare area. As part of the final contour revision described further below, the toe of the proposed waste slope has been moved inward by about 25 m in the southwest portion of the landfill to provide sufficient space for present and future operational features (i.e., perimeter access road, final cover and toe ditch) between the toe of the waste and natural site features (i.e., native sand slopes and the marshy area). The waste limit has not been modified in these areas to reflect the proposed limit of new waste placement as it is presumed that waste may have been placed within this approved area of the site as part of historical operations. Additionally, the proposed toe of the waste is also located inward from the approved waste fill limit on the north side of the landfill as a result of the presence of steep sand slopes (discussed further in Section 3.3).

The proposed final contours for the entire landfill (including Stage 4 and Stage 5) as presented in **Figures 4 and 6 through 8** provide a total volume of 702,915m^3 above the waste in place as of November 2024, which is about 849m^3 greater than the airspace remaining. Based on the revised final contours for the Site and including the

approved 8,500 m^3 of fill beyond approved limits, it is estimated that the new total capacity of the Renfrew Landfill is 1,069,849m^3. The proposed final contours for the approved Stage 4 as presented in **Figures 5 through 8** provide a total volume of 264,458 m^3 above the waste in place as of November 2024, which is about 9,437m^3 less than the estimated airspace remaining in Stage 4 (generally less than one year of typical airspace consumption at the Site). As a result, the total capacity of Stage 4 is reduced from 557,400m^3 to about 547,963m^3 and the total capacity of Stage 5 increased from 511,600m^3 to 521,886m^3 (i.e., increased by the volume reduced from Stage 4 and the overall volume gained of 849m^3).

3.2 Final Contour Design

The design upon which the maximum volumetric capacity of the Renfrew Landfill was established and approved (Trow, 1997 and 2002) pre-dates Ontario Regulation 232/98 and the associated Landfill Standards. As such, the designed final contours did not adhere to O.Reg. 232/98, which requires that the final slopes above grade within the waste fill zone at the time of site closure not exceed four units horizontal to one unit vertical (4H:1V) and are not less than 20 units horizontal to one unit vertical (20H:1V). The approved final contours (Trow, 1997 and 2002) included slopes that were steeper than 4H:1V, and the top deck area of the landfill was generally flatter than 20H:1V.

As described in Section 3.1, the proposed revision to the final contours does not involve a significant increase to the maximum capacity for the Site and therefore is not an expansion. As such, O.Reg. 232/98 does not explicitly apply; however, the current final contours presented in **Figures 4 through 8** were revised to incorporate minimum 20H:1V slopes within the top deck area of the landfill. The proposed final contours were designed with 3H:1V final slopes. This is generally either consistent with the existing approval or represented a significant flattening of the final contours presented in the previous design (Trow 2002) (i.e., along the east side of Stage 5 where final slopes would have been steeper than two units horizontal to one unit vertical - 2H:1V), or were necessary to capture the waste in place in Stage 4 as of November 2024 and in consideration of space limitations due to natural site features (i.e., native sand slopes and the marshy area). Except in very limited localized areas and due to space constraints, the current final contours do not exceed 3H:1V. 3H:1V slopes are considered to be sufficiently shallow that erosion of final cover soils is not expected to be a concern that would result in excessive maintenance. Geotechnical considerations related to the final waste contours are provided in Section 3.8.

Additionally, some adjustments to the maximum height of the landfill are proposed as a result of the revised top of waste contours. At the north end of the Site in Stage 4, the top elevation of the landfill has increased by about 1.7 m, from approximately 130 masl in the approved design to approximately 131.7 masl in the proposed revised design. This is proposed to minimize the volume of waste in place in Stage 4 requiring regrading to meet the top of waste contours, and to provide a minimum top slope of twenty horizontal units to one vertical unit (20H:1V). The maximum elevation of the new proposed top of waste in Stage 4 is generally below the elevation of the nearby surrounding native sand slopes to the north and east (i.e., the adjacent property boundary where the buffer is only 30m), and is generally not anticipated to result in increased potential nuisance issues related to dust, odour, or noise on neighbouring properties. As a result of the changes to the waste fill limit and contours and the flattening of the slopes within the south portion of the Site (i.e., Stage 5), the top elevation of the landfill in this area has decreased by about 5m, from approximately 130 masl in the approved design to approximately 125 masl in the proposed design.

It should be noted that there are considerable operational limitations to landfilling around the west, north and northeast sides of the landfill, including the steep adjacent sand slopes and existing steep waste slopes. As such, the contours proposed in **Figures 4 through 8** are considered to be the maximum contours that could potentially

be achieved. If existing conditions around the site prevent the Town from reaching these maximum contours, the final slopes should generally not exceed 3H:1V where possible to minimize potential concerns related to slope stability and the maintenance of final cover.

3.3 Landfill Development and Phasing

Historically, landfilling has occurred in Stages 1, 2, 3, 4 and historically prior to 1993 a limited amount in 5 of the Site as defined in Amendment #1 to the Operations and Development Report (Trow, 2002). Development of the Site since 2002 did not progress sequentially through Stages 1 through 4 as outlined; however, it is considered that since that time the Town has been landfilling in Stages 1 through 4, generally situated in the northern portion of the licensed fill limit. It is considered that waste has not been placed in “Stage 5”, generally toward the south side of the licensed fill limit, since the capacity estimate undertaken by Trow in 1993 as discussed in Section 3.1.

The proposed final waste contours refer to “Stage 4”, which is inclusive of the volume remaining in Stages 1 through 4 as described in Amendment #1 to the Operations and Development Report. This includes the northern portion of the licensed fill limit. Stage 4 also includes the proposed western extension of the fill limit. Landfilling in Stage 4 is to be completed prior to the Town progressing with landfilling in Stage 5 in accordance with Condition 7(6) of the ECA.

Part of the remaining work in Stage 4 will involve the remediation of the steep waste slopes present on the west and north sides of the landfill. While the proposed final contours generally encompass most of the fill above the approved final contours in these areas, the waste placed in recent years in these areas of the Site is considered not to be optimally compacted. In addition to an inefficient use of airspace, the low degree of compaction could result in longer term issues related to differential settlement or possible waste slope instability, particularly at the current geometry that in some areas is steeper than what would generally be considered to be an inherently stable waste slope. Due to the steep slope of the waste in these areas, placement of daily cover has not been possible. The Town has indicated their intent to remediate the steep waste slopes through a combination of buttressing, regrading, compaction and covering of the waste from these slopes, all of which would occur within the area of the proposed western extension of the waste fill limit. The westward extension of the waste fill limit in this area provides a relatively large and flat area for the Town to place and compact soil and/or the regraded waste in horizontal lifts from the bottom up, allowing the Town to remediate the steep slopes and realize the capacity on the west side of the Site that is currently inaccessible due to the steep waste slopes, and to achieve proper compaction and cover of the waste placed in this area. Remediation of the steep waste slopes should be undertaken prior to normal landfilling operations being relocated to this area. Remediation efforts should not be undertaken during wet periods of the year, as the presence of water could increase the risk of waste slope instability. During remediation efforts, the slopes should be monitored for signs of instability, i.e., tension cracks forming in the slope crest area.

Stage 5 encompasses the south portion of the Site, as well as the northeast corner area. Prior to 1993, waste material was placed within the southern portion of the footprint of Stage 5; however, further landfilling is understood not to have occurred in this area since that time. Prior to additional waste placement in Stage 5, the Town is required to submit an updated D&O Report and hydrogeological assessment to the MECP for approval in accordance with Condition 7(6) of the current ECA.

The existing native sand topography adjacent to the north edge of the landfill footprint has changed since the 2002 design due to aggregate (sand) extraction. The changes to the topography around the landfill footprint in the north portion of the Site since 2002 has resulted in steeper angles than what would be required to provide an

adequate factor of safety against slope failure (sloughing). A geotechnical assessment by WSP (WSP, 2025) confirmed that the native sand slopes surrounding the landfill are potentially unstable in the areas where the slope is greater than 2H:1V. It was therefore recommended that until such time that the native sand slopes are regraded such that they are 2H:1V or less, waste placement should not proceed beyond the toe of the existing native sand slopes, which is inward from the toe of waste presented in the current approved final contours and decreases the airspace available in this portion of the Site. As the sand in this area of the Site forms part of a reserve of cover material, the Town intends that these slopes be regraded both to improve stability and to extract the available cover material; however, this activity is not planned as part of the near-term development of the Site. Therefore, it is proposed that placing waste to the final grades in the northeast and east portion of Stage 4 could occur as a later component of development of this part of the Site to allow equipment access for the excavation of the sand. In this case, it is recommended that interim waste slopes be generally limited to 4H:1V for ease of future waste placement on top in this relatively narrow area of the Site. General recommendations for this excavation activity are provided in the geotechnical memorandum by WSP (WSP, 2025), however it is recommended that a geotechnical review and/or design of the sand slopes be undertaken based on their condition at the time of planned excavation in consideration of their geometry at that time, and relevant safety and access requirements.

3.4 Final Cover

Consistent with Condition 7(9) of ECA No. A410401, in areas where landfilling has been completed to final contours, a minimum 600 millimetre thick layer of soil of medium permeability and 150 millimetres of topsoil (to support vegetative cover) shall be placed. Fill areas shall be progressively completed and final cover placed as landfill development reaches final contours. Upon closure, the final cover should be aesthetically pleasing, control infiltration, and be suitable for the Site's planned end use.

As discussed in Section 3.2, final slopes will range between 20H:1V on the top deck area, to as steep as 3H:1V. It is considered that final cover soil of medium permeability (i.e., a sandy soil material) would be internally stable at slopes of 3H:1V. Measures should be taken as necessary to prevent erosion, such as the establishment and maintenance of vegetation. If needed, implementation of other erosion control methods during establishment of vegetation (e.g., erosion control matting) could be considered.

3.5 Buffer Areas

Buffer areas between the proposed limit of waste and the property boundary exist as follows:

- Minimum 30m to the north and east of Stage 4.
- Approximately 200m to the west of Stage 4.
- Approximately 45m to 60m to the east of Stage 5.
- Approximately 120m to the south of Stage 5
- Minimum 40m to the west of Stage 5.

As described in Section 3.1, an approved FBAL exists between the north limit of Stage 4 and the property boundary as shown on **Figure 2.**

3.6 Site Closure

At least two years prior to Site closure, a closure plan will be prepared and submitted to the MECP Director and District Manager detailing the termination of landfilling operations at the Site, proposed requirements for post-closure and proposed end use. The Closure Plan shall include:

- A plan showing Site appearance after closure.
- A description of the proposed end use of the Site.
- A description of how pollinator friendly plants were considered in the final vegetative cover for the landfill and/or in the landscaping within the Site.
- A description of the procedures for closure of the Site (advance notification of the public of the landfill closure, posting a sign at the Site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements, completion, inspection and maintenance of the final cover and landscaping, site security, removal of unnecessary landfill-related structures, buildings and facilities, and final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas).
- A schedule indicating the time-period for implementing the procedures for closure of the Site.
- Descriptions of the procedures for post-closure care of the Site, including operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas, record keeping and reporting, and complaint contact and response procedures.
- An assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas.
- An updated estimate of the Contaminating Life Span of the Site, based on the results of the monitoring programs to date.

The Site shall be closed in accordance with the closure plan as approved by the MECP.

3.7 Landfill Gas

As per *O.Reg.* 232/98, there is no requirement for a landfill site with a total capacity of less than 1.5 million m^3 to include a landfill gas collection and control system. A landfill gas collection and flaring system is therefore not proposed for the Renfrew Landfill (total capacity of 1,069,000 m^3).

Landfill gas is monitored as part of the annual monitoring program for the Site (refer to Section 5.3) in on-Site structures (i.e., the scale house and garage) and at 8 landfill gas monitoring wells on Site. Additionally, the Town undertakes monthly landfill gas monitoring in on-site buildings using a hand held gas detection unit.

3.8 Geotechnical Considerations

As discussed in Section 2.4, soil material in the vicinity of the Site consists of glacial outwash soils. Boreholes drilled on site generally confirm that these glacial outwash soils are very thick, likely exceeding 40 m below the base of the landfill. The soil material reported in the boreholes on the site is predominantly sandy, with frequent occurrences of gravel (logged a “stones” or “pebbles”) and occasional occurrences of cobbles or fine-grained soils (silt and clay). In general, the occurrences of clay in the subsurface are noted as being “minor” or as occurring

with sand, and do not suggest a clay or silt deposit of significance from a geotechnical perspective within the soils encountered to that depth. At OMM15 (located off-site to the north) and OMM4 (located within the waste fill area at the northwest side of the Site), clay with sand was reported at the bottom of the borehole logs (i.e., it was not fully penetrated) at an estimated elevation of approximately 80 masl and 93.5 masl, respectively (noting that these elevations are based on limited data and/or are inferred from surveys undertaken at a later date). Conversely, BH10-1 extends from elevation 97masl to depths greater than OMM15 and OMM4, and does not indicate the presence of clay within the soils encountered to that depth. As discussed in Section 2.4, groundwater is estimated to be located between 2 and 6 m below the bottom of the waste, noting that the water level in BH11-01 is typically within or near the bottom of the waste.

The boreholes located within the boundary of the Site provide limited geotechnical data; however, geotechnical data from limited boreholes located at the south side of the Site (BH07-5) and off-Site to the south (BH07-1 through BH07-4) indicate generally loose to compact and occasionally very dense sands, suggesting a competent subgrade with adequate strength to support the progressive development of the landfill to its full height of approximately 32m. The inherent internal strength of the native sand deposit is also demonstrated by the stability of the relatively steep native sand slopes on the perimeter of the landfill. As discussed in Section 1.0, the native sand slopes, which are in some areas 20m high, exceed 2H:1V; aside from some surficial sloughing where the sand has more recently been extracted and vegetation has not been established, the slopes have been globally stable for over a decade at slopes that are at a typical angle of repose of sandy soil material. While clay has been observed in some of the boreholes across the Site, there does not appear to be a significant deposit present in the subsurface below the landfill that would affect the performance (stability) of the landfill. The presence of the water table approximately 2 to 6m below the bottom of the waste is also geotechnically favorable with respect to the overall stability of the landfill.

The glacial outwash soils are considered to be predominantly granular soil types that will undergo limited compression under the applied load of the landfilled waste. It is also noted that there is no landfill infrastructure beneath the existing landfill that could be adversely affected by compression of subgrade soils under the weight of the waste.

It is noted that while the proposed final contours have been designed with slopes exceeding 4H:1V (i.e., the maximum slope set out in O.Reg. 232/98), this represents in many cases around the Site a significant improvement on the grade of the waste slopes from what exists currently or from what has been previously approved. In general, 3H:1V waste slopes are considered inherently stable, provided that the waste is compacted and steps are taken to reduce the potential for perched water / leachate within the waste, such as avoiding or minimizing the use of low permeability soils as daily cover of the waste materials. The slopes proposed in Stage 4 (~3H:1V slopes) reduce the current waste slopes that have been constructed significantly steeper, while minimizing the amount of waste regrading required, and not dramatically increasing the footprint of the waste. Around the west and north sides of Stage 4, if slopes of 4H:1V were to be recommended, either a significant volume of waste in place (above the amount to be regraded as discussed in Section 3.3) would be required to be removed; while some regrading of the waste is considered to be required to achieve suitable compaction and overall remediation of the steep waste slopes, removal of significant volumes of waste material incurs environmental risk, including leachate and odour management, and risk to worker health and safety from the excavation of waste materials, encountering perched leachate and landfill gas. Alternatively, on the west side of the site, final slopes of 4H:1V could be achieved by a further extension of the waste fill limit to the west; however, this is limited by the presence of the marshy area, and the identification of this area between the toe of the waste and the marshy area as a suitable location for future stormwater management (refer to Section 3.9). Due to the

proximity of the waste limit to the northern and eastern property boundary, an extension of the waste limit would not be possible without encroaching into the 30m buffer. In the area surrounding Stage 5, 3H:1V waste slopes are considerably flatter than the slopes that would be required to achieve the elevations shown in the approved design by Trow, and are proposed to minimize the potential volume reduction from a requirement to further flatten these slopes.

3.9 Surface Water Management

There is no engineered stormwater management system proposed during the operational period of the landfill. Previous investigations of the Site indicate that there is no natural surface water outlet from the landfill Site. Surface water has been interpreted to exit the site via the subsurface and/or by evaporation and evapotranspiration processes only. Stormwater runoff from the landfill areas is directed to a natural depression or “sump” near the southwest corner of the property. Drainage from the marshy area in the south buffer lands is directed past the waste footprint via a culvert that discharges to the same sump area, adjacent to the Bruce Street embankment, for infiltration. In addition to the culvert, WSP has also observed a natural depression or drainage swale that runs along a similar alignment to the culvert, discharging to the same approximate area as the culvert outfall. Surface water flow has been observed in this swale during very wet periods, although in previous years stagnant surface water conditions have been observed in the area of this swale due to beaver activity.

There is currently no detailed stormwater management design proposed for the closed landfill. The Operations and Development Report (Trow, 1997) proposed that the slope of the landfill be constructed to direct runoff into the dry catchment area at the northern edge of the Site, where surface water from the active fill area would infiltrate to the groundwater regime at this location. The catchment area proposed in the 1997 Operations and Development Report is located approximately in the location of the FBAL, which has been approved by the MECP to remain in place as discussed in Section 3.1, and there is insufficient space between the waste slopes (both as-constructed as of 2024 and proposed) for a dry catchment area along the north side of the landfill. Due to the prevalence of sandy soils on the Site, it is still considered that one or more dry catchment areas are in general an appropriate means of stormwater management post-closure. Potential locations for a dry catchment area include the area west of the western extension of Stage 4 / east of the marshy area, within the 30m buffer immediately northeast of Stage 4, or to the south of Stage 5 between the waste limit and Bruce Street. This can be further assessed in future at the time of preparation of the closure plan and, if stormwater management is indicated to be required, the measures can be designed and approved at that time. Due to the significant operational limitations to landfilling around the west, north and northeast sides of the landfill, including the steep native sand slopes, the limited space between the toe of the waste slope and the steep sand slopes, and the steepness of the existing waste slopes, it is considered that a stormwater management design would be most appropriately designed following the completion of waste placement and concurrently with the design of final cover and perimeter access so that the location and size of dry catchment areas, as well as design of a toe ditch for conveyance of runoff toward the catchment area(s) can be undertaken based on the actual waste slope geometry achieved. The proposed final contours discussed in Section 3.2 have been designed in consideration of future stormwater and access requirements at closure, generally maintaining space between the waste slopes and adjacent limiting features along the perimeter (i.e., steep sand slopes, marshy area) for final cover, an access road and toe ditch.

4.0 SITE OPERATIONS

4.1 Hours of Operation

The Site is currently open to receive waste from the public year-round for disposal in the Landfill, at the small loads drop off and the HHW Depot, from 8:30 am – 4:00 pm on Tuesday, Wednesday, and Thursday, and from 8:30 am – 2:00 pm on Friday and Saturday. A future re-use centre, as described in Condition 10(7) of ECA No. A410401, is also approved to receive waste during these times. It is proposed that the Site be permitted to receive waste from the public year-round at these site facilities Monday through Saturday from 8:00 am to 6:00pm.

Equipment on Site is currently permitted to be operated between the hours of 7:00 am – 5:00 pm every day of the week. It is proposed that this be changed to 7:00 am – 7:00 pm every day of the week.

The above time periods may be extended to accommodate seasonal or unusual quantities of waste with prior written approval from the MECP District Manager.

4.2 Staff Qualifications

All employees that operate any aspect of the Site are trained in accordance with the Town's training plan. The training plan is revised from time to time to reflect ongoing site activities, but in general is developed to provide employees with knowledge in:

- Occupational health and safety concerns pertaining to the processes and wastes to be handled;
- Relevant waste management legislation, regulations and guidelines;
- Environmental concerns pertaining to the waste to be handled;
- Management procedures including the use and operation of equipment for the processes and wastes to be handled pertaining to their role;
- Emergency response procedures;
- Procedures for the control of nuisance conditions;
- Procedures for refusal of unacceptable waste loads; and
- Requirements of the Site's Environmental Compliance Approval.

4.3 On-Site Roads

Entry to the Site is provided via a paved road from Bruce Street, down a grade to the scale house. Beyond this point the roads are constructed on the native sand material and/or on imported fill and/or non-hazardous waste soil material.

The location of existing Site roads is shown in **Figure 2**. A road providing access to the northeast corner of the landfill is currently present along the east side of the site, turning west to provide access up to the top deck of the north/northwest portion of the landfill (i.e., Stage 4). A ring road exists around the north side of the landfill connecting to the west corner of the site, however vehicle access is occasionally limited due to road conditions during periods of precipitation, and the presence of steep sand slopes north and northeast of the landfill. In 2023 and 2024, the Town constructed an alternate road located south of existing waste mound within Stage 4 which provides access to the northwest corner of the site.

The Town is responsible for maintaining access and road conditions, including snow clearance and dust suppression where required.

Upon completion of landfilling and construction of final cover, a ring road (or, alternatively, two roads providing separate access to the north perimeter of the landfill from the east side and the west side) should be constructed to provide access for the purpose of maintaining final cover and addressing emergency situations such as fires. The design of the approved ring road described in the November 29, 2011 letter by Golder (Item 21 of Schedule 1 to ECA No. A410401) should be reviewed and revised at that time.

4.4 Fencing and Security

There is existing page wire perimeter fence around portions of the Site. A non-continuous wooden fence is in place along the south side of the property at the entrance gate on Bruce Street. Unauthorized entry is also discouraged by the escarpment formed from erosion and historic aggregate extraction that generally surrounds the Site. It is noted that near background monitoring well OMM15, an overgrown trail is present that could lead off-site. The scale house is equipped with three security cameras facing various directions.

The only vehicle access to the Site, from Bruce Street, is equipped with a lockable gate. The number of keys and personnel with authorized access should be monitored and maintained by the site manager.

4.5 Entrance Signage

An entrance sign is installed and maintained by the Town and is visible and legible from the Site access gate off of Bruce Street. The following information is included on the sign:

- The name of the Site and owner;
- The ECA number;
- The name of the operator;
- Normal hours of operation;
- Allowable and prohibited waste types;
- The telephone number to which complaints may be directed;
- A warning against unauthorized access;
- A 24 hour emergency telephone number; and
- A warning against dumping outside the Site.

Signs are also present on Site to direct vehicles to drop off areas for waste, recyclables, and the HHW Depot. Signs at the recycling depot inform users what materials are acceptable and direct users to appropriate storage areas.

4.6 Landfill Equipment and Weigh Scales

The waste receipt operations have and will continue to utilize an on-Site weigh scale for all incoming waste, as well as for weighing outgoing diverted materials that are being sent to licensed recycling and reprocessing facilities. The location of the weigh scale is shown on **Figure 2**. The weigh scale operator inspects and records

the incoming waste loads. If types of waste that are unacceptable for disposal are encountered in incoming loads, the hauling vehicle is refused entry.

The current on-site equipment is as follows:

- A Caterpillar 816K waste compactor is used for compaction as needed on daily basis and depending on waste volume received.
- A Caterpillar 938M wheel loader used throughout the day to spread, shape and break up waste and to place daily cover material.

The Town may replace or supplement this equipment with other suitable equipment types from time to time as required for landfilling operations.

4.7 Waste Receipt and Placement

Waste material brought to the Site and accepted for disposal are either disposed of directly at the active working face, or, for small loads, are disposed of in designated bins within the material diversion area. Waste received at the Site are inspected by trained personnel prior to acceptance to confirm that the waste type is permitted to be received at the Site for disposal. Waste bins located within the small loads drop off area include two 40 cubic yard bins for household waste and two 6 cubic yard bins for food waste. These waste bins, or other residual materials that cannot be transferred off site for recycling that are received in the material diversion area, are transferred to the active tipping area as needed.

Waste will be placed and compacted in the remainder of the landfill in horizontal lifts. The thickness of the lifts may vary depending on the volume of waste received in a given day and the variable size of the active working face, but generally should be in the range of 1m to 3m, not exceeding 5m. The waste lifts will be compacted with three to five passes of the landfill compactor. Compaction of the lifts should occur on as flat an area as possible to maximize compaction. Where practical based on incoming waste volumes, the working face of the landfill should be minimized during each working day (i.e., avoiding spreading the waste over a large area), and the lift thickness maximized for the purpose of minimizing the airspace consumed by cover soil material.

Occasionally, oversized waste materials are received at the Site from local industry that may present difficulties in handling and compaction, or result in damage to equipment. To the extent possible, these waste materials should be placed in areas of the active cell that limit the required amount of spreading and that won’t impede the compactor from operating.

Digested and dewatered sewage sludge received from the Town’s Water Pollution Control Plant (WPCP) is typically disposed of immediately and not stored for any length of time. The sludge is initially dumped in an area of the waste footprint located away from the active tipping face area to avoid interaction between the regular landfill traffic and the sludge material. If necessary to increase the workability of the material such that it can be effectively pushed and compacted for landfilling, the aerobically digested and dewatered sludge is mixed with sand or ground wood materials. The sludge is then spread in an area in advance of the operating face where it is immediately covered with daily cover, or with other waste, compacted and covered with daily cover. At Town’s discretion if the received material is particularly odorous or the volume is large, the Town could consider omitting the mixing with sand and/or wood chips and immediately covered with 30 centimetres (cm) of soil.

4.8 Waste Cover

Weather permitting, the waste will be covered on a daily basis with 150 millimetres (mm) of soil cover material. Sandy soil material from on-Site soil reserves or imported soil material are suitable as daily cover material. Additionally, contaminated soil material classified as non-hazardous in accordance with O.Reg. 347 is currently utilized as alternative daily cover on the site; this was noted as an accepted practice during consultation with the MECP in March of 2023, however it is proposed that the use of non-hazardous contaminated soil for daily and intermediate cover be added to the ECA for clarity. Non-hazardous contaminated soil intended to be used for daily or intermediate cover would be stockpiled within the waste fill limit. In addition to the use of soil material for daily waste cover, the Site is approved for alternative daily cover consisting of a tarpauline, or ground woodwaste (with ground drywall components). It is proposed to continue the use of these daily cover soil materials during completion of landfilling, as set out in current ECA conditions 7(9) and 7(10).

If placement of waste in a portion of the landfill is to be suspended for a period of greater than 6 months, interim soil cover with an increased thickness of a total of 300 mm will be applied (current ECA Condition 7(9)). When filling is resumed in this area, the additional cover soil can be removed for re-use.

4.9 Hazardous Household Materials Depot

The Hazardous Household Waste (HHW) Depot is governed by a separate Design and Operations report, prepared by Golder Associates Ltd., dated December 2010 (or as amended and listed in the ECA) (Golder, 2010b).

4.10 Re-Use Centre

The Town is approved to establish a Re-Use Centre at the Site for the durable goods materials stream (DGMS). The details of the Re-Use program are provided in a letter from Golder, dated June 2020. The Re-Use Centre would receive and temporarily store non-hazardous and re-usable items that are made available to the public. The Re-Use Centre would consist of two seacan-style containers, approximately 12.2 metres in length, 2.4 metres wide and 2.6 metres high, and would be located northwest of the HHW Depot facility.

Acceptable items would include small furniture, sporting goods, toys, books, housewares, electronics, building supplies and small engine equipment. Hazardous materials, food waste, liquids, potential unsanitary items, textiles and bulky items would not be accepted. All incoming items would be inspected by the by employees of the Site to confirm that it is approved to be accepted. A record of materials would be kept on Site. The maximum quantity of material permitted to be stored is 50 m^3. Items would be kept for a period of 6 months, after which they would be disposed of or recycled. The Re-Use Centre would operate during the operating hours for the Site, and drop off limited to residents of the Town of Renfrew. Although approved the re-use centre has not yet been constructed.

4.11 Handling of Other Materials

4.11.1 Tires

Rubber tires arriving at the Site are segregated and stored in a specified area within the gravel pad material diversion area. The tires accumulate until sufficient numbers are present on-Site and then the tires are removed for recycling.

4.11.2 Recyclable Materials

Small load drop off recyclable materials, including typical blue and black box curbside recyclables and scrap metal are accepted at the landfill site in the gravel pad material diversion area (refer to **Figure 2**). Recyclable materials are stored in marked bins within the diversion area, including at the grade-separated saw-toothed small load drop off area. Storage bins are as follows:

- Four 10 cubic yard bins for cardboard
- One 10 cubic yard bin for co-mingled (blue box) recyclables
- Two 20 cubic yard bins for scrap metal

Bins are emptied weekly for cardboard and co-mingled recyclables, and weekly (summer) to monthly (winter) for metal and removed off-site for recycling by licensed private haulers and/or under coordination through provincially regulated recycling programs.

4.11.3 Refrigerated Appliances

Refrigerated appliances (e.g., air conditioners, refrigerators, freezers, heat pumps, etc.) that are delivered to the Site are stored in a separate area in an upright position prior to having the chlorofluorocarbon (CFC) refrigerant removed. A trained and licensed technician will remove the CFC refrigerant and affixes a sticker to the appliance once this has been completed. A scrap metal dealer subsequently removes these items from the Site. Alternatively, appliances containing refrigerants are permitted to be shipped off-Site for removal of the refrigerants by a licensed technician.

4.11.4 Contaminated Soil

Contaminated soil may be received at the Site, contingent upon its generator demonstrating to the Town that the contaminated soil is a non-hazardous waste in accordance with Ontario Regulation 347 (as amended by Ontario Regulation 324) (RRO 1990, Reg 347; O Reg 324/22).

4.11.5 Wood and Brush

Leaf & yard materials, brush and clean wood are accepted at the site and stockpiled in an area to the east of the waste footprint as shown on **Figure 2**. The Town retains a Contractor with mobile equipment to chip and/or grind these materials on an as needed basis; the chipped product is used for daily cover or mixed with sewage sludge for disposal. Chipping is usually carried out once per year.

4.11.6 Waste Electrical and Electronic Equipment

WEEE is accepted at the site and stored in a 10 cubic yard bin located within the diversion area until it is removed by a Contractor for recycling. Bi-weekly in summer monthly in winter

4.11.7 Other Materials

Other materials that are received and stored in the material diversion area include bricks, concrete, shingles, demolition materials, drywall and bulky waste (i.e., furniture). These materials are ground and/or removed to the active working area of the landfill as required.

4.12 Site Controls

4.12.1 Dust Control

With respect to dust control, the landfill activities that potentially generate particulate matter include travel on gravel and unpaved roads, the excavation, loading and unloading of cover material, waste placement and compaction within the working face, and wind erosion.

Dust emissions from travel on gravel and unpaved roads can be minimized by exercising speed controls for all vehicles on the Site. Roads should be maintained using materials having a low silt content, and dust suppressant should be applied when necessary. Where feasible and practical, movements of soil (i.e. excavation activities and movements of cover soils) should be minimized during extremely dry and windy weather conditions.

Completed areas of the landfill will progressively receive final cover and seed to establish vegetative cover, thereby reducing the particulate matter generated on-site due to wind erosion.

The landfill Site being in a low lying area is beneficial from minimizing dust nuisance issues to surrounding neighbours.

4.12.2 Litter Control

Litter control is required for housekeeping purposes and to reduce potential safety and health hazards. The landfill and waste diversion areas should be operated so as to minimize the generation of litter. Daily application of soil or approved alternative daily cover, as well as limiting the extent of the active working face of the landfill are means of reducing litter. Regular inspection and housekeeping should be undertaken in the waste diversion area, and bins and stockpiles should be maintained in good repair and condition.

Completed areas of the landfill will progressively receive final cover and seed to establish vegetative cover, thereby reducing the potential for wind-blown litter.

Landfill staff will pick up litter from around the Site on a regular basis and as required. Collected litter will be disposed at the working face or small loads drop off area. The location of the landfill within a low-lying area surrounded by embankments on all sides provides some isolation of the operations with respect to litter blowing off-Site.

4.12.3 Odour Control

Landfill odours may originate from exposed waste at the working face, or landfill leachate (which could potentially emerge to surface as seeps at the toe of the sideslopes). This odour is generally regarded as unpleasant. The location of the landfill within a low-lying area surrounded by embankments on all sides provides some isolation of the operations with respect to odour migration.

Odour is mitigated through the regular application of cover soils. The landfill should also be regularly inspected for leachate seeps, and mitigative actions to address them and to maintain cover soils taken as needed. Particularly odorous waste should be covered promptly. Maintaining a small active working face will also help to minimize odours.

Complaints related to odour are generally not raised by neighbours or customers of the Site, and additional odour control measures have not been required to date. The proposed final contours will raise the maximum elevation of the landfill by approximately 1.7m within Stage 4 above the approved contours presented in the Operation and Development Report (Trow, 1997), and lower the maximum elevation by 5m within Stage 5. The proposed

increase in elevation in Stage 4 is proposed so as to capture waste already in place which has been filled above the approved final contours. The proposed maximum elevation is generally below the elevation of the nearby surrounding embankments to the north and east. The proposed revisions to the final contours are not anticipated to result in additional issues related to odour management provided that regular application of cover material occurs.

4.12.4 Noise Control

The location of the landfill within a low-lying area surrounded by embankments on all sides provides some isolation of the operations with respect to noise. The Site is only permitted to be operated between the hours of defined in the ECA (proposed to be 7am to 7pm). Landfill equipment should also be routinely maintained and kept in good repair. Complaints related to noise are generally not raised by neighbours or customers of the Site, and additional control measures related to noise have not been required to date.

The proposed final contours will raise the maximum elevation of the landfill by 1.7m within Stage 4 above the approved contours presented in the Operation and Development Report (Trow, 1997), and lower the maximum elevation by 5m within Stage 5. The proposed maximum elevation is generally below the elevation of the nearby surrounding embankments to the north and east. The proposed revisions to the final contours are not anticipated to result in additional issues related to odour management provided that regular application of cover material occurs.

4.12.5 Bird and Non-Bird Vector Control

Birds do not present a persistent nuisance issue at the Site, and the Town has not needed to undertake specific actions for the management of birds. The Site is surrounded by forested areas, and the Town has reported that predator birds are observed from time to time which are considered to be a natural deterrent to nuisances birds such as gulls.

Non-bird vector control is undertaken occasionally by the Town through employment of third-party pest control services.

In general, the regular application of soil cover and minimization of the size of the active working area of the landfill serves as a measure to control the prevalence of vectors. Bins housing putrescible waste within the waste diversion area should be routinely inspected and kept in good condition to prevent entry by vectors.

4.12.6 Wildlife Management

Wildlife or signs of wildlife, with the exception of beavers, raccoons and ground hogs (discussed below) and vectors as described in Section 4.12.5, have rarely been observed at the Site, and control measures have not been required to date. In general, the regular application of soil cover serves as a measure to prevent attraction of wildlife from the waste disposal area.

Historically, beaver activity has been observed in the marshy area near the southwest corner of the Site. This should continue to be monitored and mitigative actions if the activity disrupts surface drainage toward the “sump” (refer to Section 2.3).

Raccoons and ground hogs are observed from time to time at the site. While they have not presented a persistent nuisance issue at the Site, their presence is monitored and pest control services will be contracted as needed.

4.12.7 Site Inspections

An inspection of the entire Site and all equipment on the Site is conducted each day the Site is in operation by landfill operations staff to confirm that:

- the Site is secure.
- the operation of the Site is not causing any nuisances.
- the operation of the Site is not causing any adverse effects on the environment.
- the Site is being operated in compliance with the Environmental Compliance Approval.

A record of daily inspections is kept in a daily log book and includes the date/time of the inspection, the name and signature of the person who conducted the inspection, and any findings, recommendations, or remedial actions taken as a result.

A copy of the daily inspection form is provided in **APPENDIX D**.

4.12.8 Complaints Protocol

Complaints received by the owner are recorded and numbered electronically. The following information is recorded:

- The nature of the complaint;
- The date and time of the complaint; and
- The name, address, and telephone number of the complainant if they are willing provide this information.

Upon receiving a complaint, the Town will proceed to take the necessary actions to eliminate the cause of the complaint and forward a formal reply to the complainant. The Town will also complete and retain on-Site a report written within one week of the complaint date listing the actions taken to resolve the complaint and any recommendations for remedial measures and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

4.13 Emergency Response

An Emergency Response Plan specifically for the Site will be kept up-to-date, and a copy retained in a central location on the Site and will be accessible to all staff at all times. The Emergency Response Plan will deal with the prevention of, preparedness for, and response to a recovery from an emergency. The Emergency Response Plan will be reviewed every five years by the Town of Renfrew and updated if needed. Copies of the most current Emergency Response Plan will be provided to the the local fire department.

The Emergency Response Plan will contain the telephone numbers of the person(s) responsible for the Site, the MECP's District Office, and Spills Action Centre.

In the event of an emergency at the Renfrew Landfill, 911 emergency response services, the Ontario Spill Response Centre (1-800-268-6060), and the Town's Chief Administrative Officer will be contacted as appropriate. The MECP District Manager will be notified of the occurrence and any corrective action taken in writing within three days of the emergency incident.

4.13.1 Emergency Spill Response Procedure

If a spill occurs, the spill area will be isolated and clean fill from the Site would be used to contain the spill. When it is safe to do so, the spill incident will be immediately reported to the Ministry's Spill Action Centre at 1-800-268-6060. The spill incident will be recorded in a log book that details the nature of the emergency situation, the action taken for clean-up, and correction and prevention of future occurrences. All wastes resulting from an emergency situation will be managed and disposed of in accordance with O.Reg. 347.

Emergency response personnel will be adequately trained in accordance with the training plan prepared by the Town (discussed in Section 4.2). Training will include but not be limited to management of wastes resulting from emergency situations, and location, maintenance and use of equipment and materials required to handle the emergency situation.

4.13.2 Fire/Explosion emergency Response Procedure

Burning of wastes at the Town of Renfrew Landfill is prohibited.

Small, localized fires will be dealt with, if possible, using fire extinguishers located in the on-Site buildings and on heavy equipment. The area of the fire will be evacuated, and the Fire and Emergency Services will be called (911) to provide advice or to perform follow up inspections.

In the event of a larger fire, a fire within the waste, or explosion, staff will evacuate the area and will direct all residents and vehicles to leave the Site and assemble in a location away from the danger area, and Fire and Emergency Services would be called (911). The Town of Renfrew Fire Department is equipped and trained for handling fires at the landfill. The Town of Renfrew Fire Department, Town of Renfrew Police Department, Town of Renfrew Department of Development and Environment (or Public Works Emergency line after hours), and the MECP District office would be contacted and advised of the situation as soon as possible.

A stockpile of sand fill will be maintained near the active fill area for the purpose of extinguishing fires. In the event of fire, if safe to do so, landfill staff would attempt to contain the fire with sand cover material, applied in 1-2 metres of thickness until the fire department arrives.

4.13.3 Flood Emergency Response Procedure

The nearest water body to the Site is the Bonnechere River, which is located to the south of the site, and separated by Bruce Street which is considerably elevated compared to the River and the Site. Based on the topographical and hydrogeological conditions as discussed in Section 2.3 and 2.4, it is considered that a flood is of low risk to the Site and no Flood Emergency Response Procedure is required.

5.0 ENVIRONMENTAL MONITORING PROGRAMS AND CONTINGENCY PLAN

5.1 Groundwater Monitoring Program

A proposed revision to the groundwater monitoring program was submitted to the MECP groundwater technical support section for review in support of the ECA amendment application to revise the final contours for the Site. Concurrence from the MECP groundwater reviewer for the following program was received in an email dated June 10, 2025 and is provided in **APPENDIX B**. Monitoring locations are provided on **Figures 2, 4 and 5**.

Monitoring Sessions	Sampling Stations	Laboratory Parameters	Field Parameters
Spring and Fall	OMM5, OMM6, OMM7, OMM8, OMM9, OMM14S, OMM14M, OMM14D, OMM15, BH10-1, BH10-2A, BH10-2B, BH11-01 Two new monitoring wells near waste limit extension (see **Figures 4 and 5**)	Arsenic, barium, boron, cadmium, chromium, calcium, copper, iron, lead, magnesium, manganese, mercury, potassium, sodium, zinc, chloride, nitrate, nitrite, total phosphorous, alkalinity, ammonia, chemical oxygen demand (COD), dissolved organic carbon (DOC), hardness, sulphate, total dissolved solids (TDS), total Kjeldahl nitrogen (TKN), phenols	Temperature, pH, conductivity
Spring and Fall	OMM6, OMM7, OMM14S, OMM14M, BH10-2B, BH11-01	E.coli, fecal coliforms, total coliforms	
Fall	OMM7, OMM8, OMM9, OMM14D, OMM15, BH11-01	Volatile organic compounds (VOCs)	

It is recommended that as part of the hydrogeological assessment required to begin landfilling in Stage 5, this monitoring program be reviewed and revised as may be required.

5.1.1 Groundwater Trigger Mechanism

As discussed in Section 2.5, the Town is moving forward with gaining all groundwater rights downgradient of the landfill Site as CAZ. As such, and since groundwater is interpreted to discharge to the Bonnechere River, there is no proposed groundwater trigger mechanism and only a surface water trigger mechanism.

5.1.2 Groundwater Contingency Plan

As discussed in Section 2.5, the Town is moving forward with gaining groundwater rights downgradient of the landfill Site as CAZ.

5.2 Surface Water Monitoring Program

A proposed revision to the surface water monitoring program was submitted to the MECP surface water technical support section for review in support of the ECA amendment application to revise the final contours for the Site. Concurrence from the MECP surface water reviewer for the following program (which includes their proposed modification) was received in a memorandum dated April 29, 2025 and is provided in **APPENDIX B**. Monitoring locations are provided on **Figures 2 and 3.**

Monitoring Sessions	Sampling Stations	Laboratory Parameters	Field Parameters
Spring (May), Summer (August) and Fall (October)	S6 (on-Site) S7D, S8 and S9 (Bonnechere River)	Arsenic, barium, boron, cadmium, chromium, calcium, copper, iron, lead, magnesium, manganese, mercury, potassium, sodium, zinc, chloride, nitrate, nitrite, total phosphorous, alkalinity, ammonia, biochemical oxygen demand (BOD), chemical oxygen demand (COD), dissolved organic carbon (DOC), hardness, phenols, total dissolved solids (TDS), total Kjeldahl nitrogen (TKN), total suspended solids (TSS)	Temperature, pH, conductivity, dissolved oxygen, and flow

5.2.1 Surface Water Trigger Mechanism

The approved surface water trigger mechanism is provided in the letter dated July 20, 2023 (revised in December 2024) by WSP forming Item 28 of Schedule 1 to ECA No. A410401, and is as follows:

The objective of the surface water trigger mechanism is to use results of the ongoing surface water monitoring program to monitor for consistent impacts resulting from the discharge of landfill leachate-impacted groundwater to surface water within the Bonnechere River and to trigger the implementation of a contingency plan if necessary to protect downstream surface water quality within the river.

The Leachate Indicator Parameters for the Renfrew Landfill are identified as alkalinity, ammonia, DOC, TKN, boron, iron, manganese and potassium. The Compliance Evaluation Parameters are considered to be the Leachate Indicator Parameters with PWQO: iron, boron, and unionized ammonia. At the request of the MECP Surface Water Reviewer in comments provided on November 15, 2024, manganese will also be considered a Compliance Evaluation Parameter.

Of the three surface water sampling locations in the Bonnechere River, the Compliance Evaluation Locations are proposed to be S9, which is located adjacent to the Site and S8, which is located further downstream of S9 and the landfill.

The surface water Trigger Concentration is a concentration of a single Compliance Evaluation Parameter at a single Compliance Evaluation Location. For the Renfrew landfill the Trigger Concentration is 75% of the PWQO if the surface water Compliance Evaluation Parameter is a Policy 1 parameter. Alternatively, if the Compliance Parameter is a Policy 2 parameter, the surface water Trigger Concentration is the background surface water quality concentration at S7D collected during the same monitoring event. The Trigger Concentration for manganese will be the concentration provided by the Canadian Water Quality Guidelines (CWQGs) for the protection of aquatic life for dissolved manganese.

If the exceedance of a Trigger Concentration is confirmed, a three-step process will be initiated for the purpose of determining whether implementation of the contingency plan is warranted.

The three-step process will be as follows:

Step 1

Assess whether or not the exceedance of the Trigger Concentration is likely due to the discharge of leachate-impacted groundwater into the river or whether it is partially or wholly explicable by other factors. This can be achieved by immediately re-sampling all surface water locations in the monitoring program within 60 days of the exceedance of the Trigger Concentration if deemed necessary. If re-sampling confirms that the concentration is above the Trigger Concentration, this shall be considered one trigger exceedance.

Step 2

When three confirmed consecutive sampling sessions exceeding the Trigger Concentration occur representatives of the Town and the MECP will discuss the results of Step 1 to decide whether implementation of an additional investigation program and/or the contingency plan is warranted.

Step 3

If the conclusion of Step 3 is affirmative, then the additional investigation program and/or the contingency plan would be implemented.

5.2.2 Surface Water Contingency Plan

A letter dated July 20, 2021 by Golder (now WSP) forming Item 29 of Schedule 1 to ECA No. A410401 provides a summary of possible contingency measures to be considered by the Town in the event of a site-specific trigger level creating surface water impacts to the Bonnechere River. Contingency measures identified in the letter include a purge well system, purge well system with cut off wall or an interceptor trench.

5.3 Landfill Gas Monitoring Program

5.3.1 Indoor Gas Monitoring Program

Indoor gas readings are collected from the garage during the spring and fall monitoring sessions. Further, indoor gas monitoring is conducted monthly by Town staff in the garage and scales.

It should be noted that the large bay doors for the garage are typically left open during operational hours. It was noted in the 2016 MECP Site Inspection that the garage doors should remain closed during monitoring.

5.3.2 Landfill Gas Monitoring

Landfill gas monitoring from gas monitoring wells GW1, GW2, GW3, GW4 and GW09-1 located within the waste mound, and GW07-5, GW11-1 and GW14-01 installed outside of the waste mound, are monitored during the spring and fall monitoring session. The location of these gas monitoring wells is shown on **Figure 2**.

5.4 Annual Reporting

A written report on the development, operation and monitoring of the Site, is completed annually. This Annual Report shall be submitted to the MECP District Manager by March 31st of the year following the period being reported upon. The Annual Report generally includes the results and interpretive analysis of the results of groundwater, surface water and landfill gas monitoring, compliance assessment, areas of landfilling during the reporting period, an estimate of the airspace consumed and capacity remaining, and other operational items as required by Condition 6(7) of ECA No. A410401.

6.0 LIMITATIONS AND USE OF REPORT

This report was prepared for the exclusive use of the Town of Renfrew; it is understood that this report is intended for submission to the MECP. The report, which specifically includes all tables, figures and appendices, is based on data and information collected by WSP Canada Inc. and is based solely on the conditions of the properties at the time of the work, supplemented by historical information and data obtained by WSP Canada Inc. as described in this report.

The assessment of environmental conditions and possible hazards at this site has been made using the results of physical measurements and chemical analyses of groundwater and surface water from a number of locations. The Site conditions between sampling locations have been inferred based on conditions observed at borehole and monitoring well locations. Subsurface conditions may vary from these sampled locations.

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

Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. WSP Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The findings and conclusions of this report are valid only as of the date of this report. If new information is discovered in future work, including excavations, borings, or other studies, WSP Canada Inc. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required. The groundwater monitors installed during the course of this investigation or previous investigations by WSP Canada Inc. have been left in place. These groundwater monitors are the property of the Town of Renfrew and not WSP Canada Inc.

Electronic media is susceptible to modification, deterioration and incompatibility. In the event that data or reports provided by WSP Canada Inc. are distributed and/or electronically posted, WSP Canada Inc. does not warrant, guarantee, or make any representations regarding the use of, or results in terms of correctness, accuracy, reliability or current conditions. No express or implied warranty or fitness for a particular use is made. Any use of the electronic information will be at the sole risk of the party making use of this information.

This limitations statement is considered an integral part of this report.

Signature Page

WSP Canada Inc.



Andria Caletti, P.Eng.
Senior Geo-Environmental Engineer

Trish Edmond, P.Eng.
Senior Geo-Environmental Engineer

ALC/PLE/PAS/kdv

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Figures



LEGEND

SITE BOUNDARY

REFERENCE(S)

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REVIEWED	ALC
APPROVED	ALC

PROJECT

UPDATED DESIGN AND OPERATIONS REPORT
RENFREW LANDFILL SITE

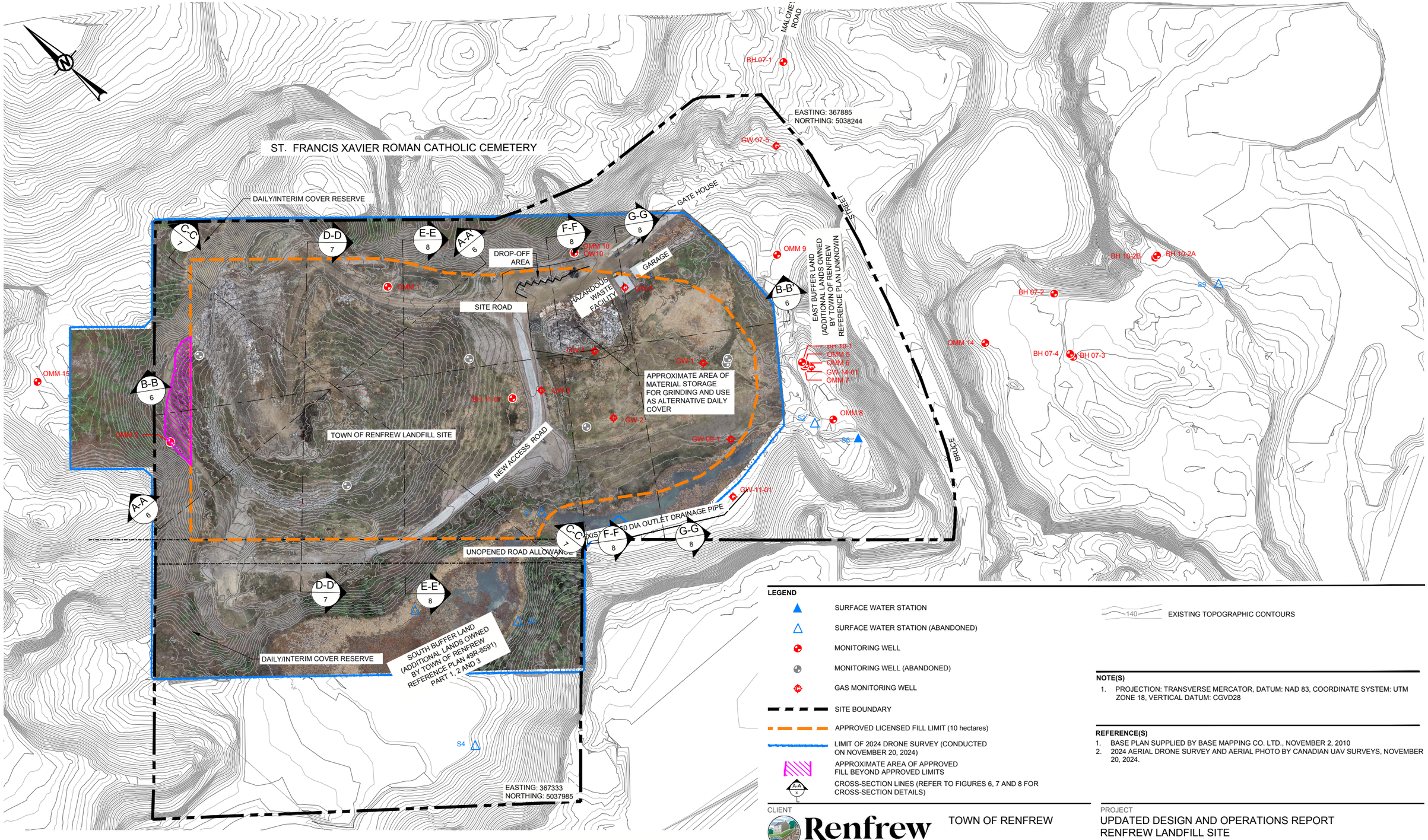
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KEY PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

- SURFACE WATER STATION
- SURFACE WATER STATION (ABANDONED)
- MONITORING WELL
- MONITORING WELL (ABANDONED)
- GAS MONITORING WELL
- SITE BOUNDARY
- APPROVED LICENSED FILL LIMIT (10 hectares)
- LIMIT OF 2024 DRONE SURVEY (CONDUCTED ON NOVEMBER 20, 2024)
- APPROXIMATE AREA OF APPROVED FILL BEYOND APPROVED LIMITS
- CROSS-SECTION LINES (REFER TO FIGURES 6, 7 AND 8 FOR CROSS-SECTION DETAILS)
- 140 EXISTING TOPOGRAPHIC CONTOURS

NOTE(S)

1. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

REFERENCE(S)

1. BASE PLAN SUPPLIED BY BASE MAPPING CO. LTD., NOVEMBER 2, 2010
2. 2024 AERIAL DRONE SURVEY AND AERIAL PHOTO BY CANADIAN UAV SURVEYS, NOVEMBER 20, 2024.

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APPROVED	ALC

PROJECT
UPDATED DESIGN AND OPERATIONS REPORT
RENFREW LANDFILL SITE

TITLE
SITE PLAN - EXISTING CONDITIONS (NOVEMBER 2024)

PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

- BONNECHERE RIVER SURFACE WATER STATION
- BONNECHERE RIVER SURFACE WATER STATION (ABANDONED)
- SITE BOUNDARY
- APPROVED LICENSED FILL LIMIT (10 hectares)

NOTE(S)

1. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18.
2. VERTICAL DATUM: CGVD28.

REFERENCE(S)

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PROJECT
UPDATED DESIGN AND OPERATIONS REPORT
RENFREW LANDFILL SITE

TITLE
SURFACE WATER SAMPLING LOCATIONS IN THE BONNECHERE RIVER

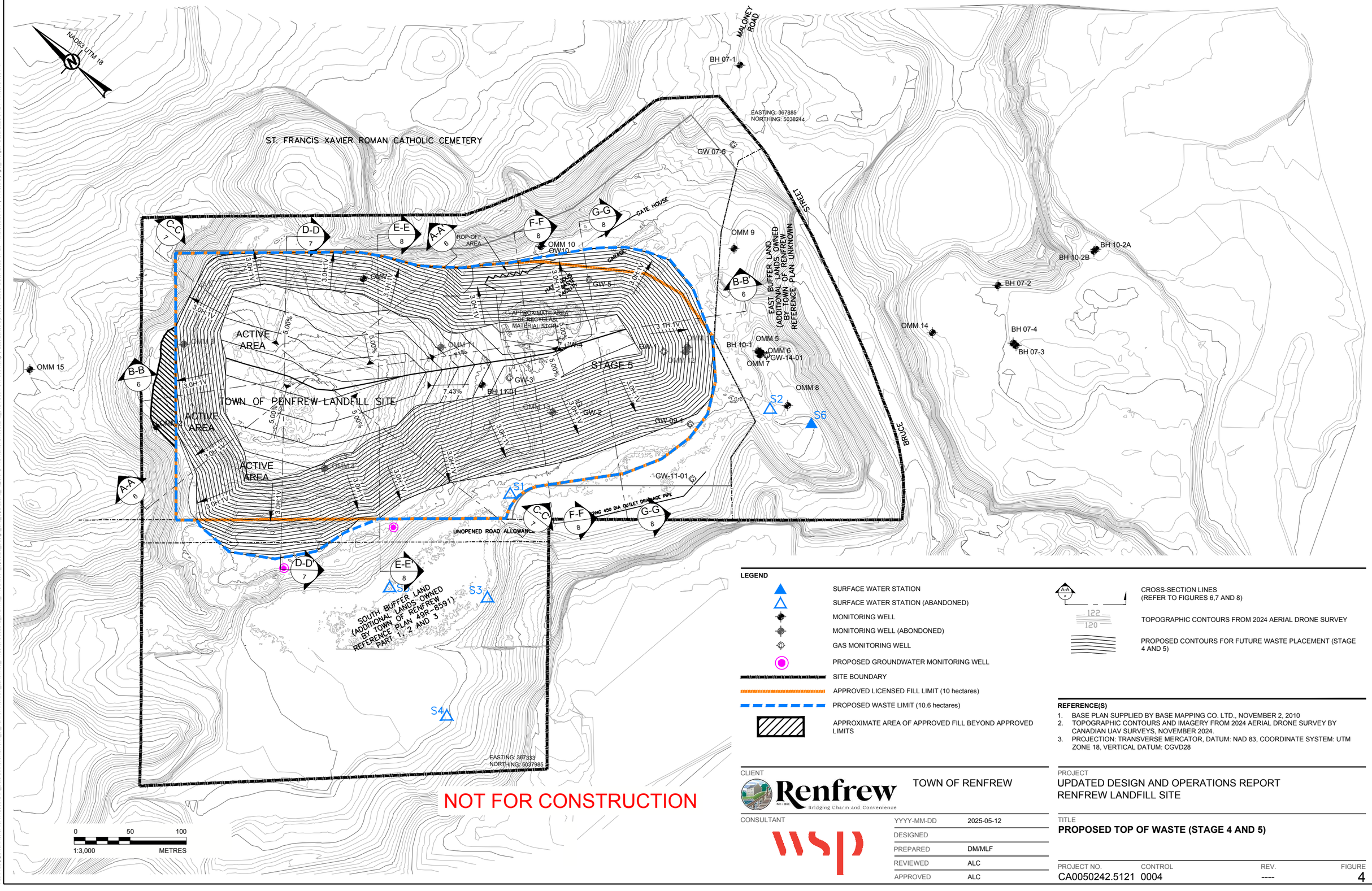
PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

- SURFACE WATER STATION
- SURFACE WATER STATION (ABANDONED)
- MONITORING WELL
- MONITORING WELL (ABONDONED)
- GAS MONITORING WELL
- PROPOSED GROUNDWATER MONITORING WELL
- SITE BOUNDARY
- APPROVED LICENSED FILL LIMIT (10 hectares)
- PROPOSED WASTE LIMIT (10.6 hectares)
- APPROXIMATE AREA OF APPROVED FILL BEYOND APPROVED LIMITS
- CROSS-SECTION LINES (REFER TO FIGURES 6,7 AND 8)
- TOPOGRAPHIC CONTOURS FROM 2024 AERIAL DRONE SURVEY
- PROPOSED CONTOURS FOR FUTURE WASTE PLACEMENT (STAGE 4 AND 5)

REFERENCE(S)

1. BASE PLAN SUPPLIED BY BASE MAPPING CO. LTD., NOVEMBER 2, 2010
2. TOPOGRAPHIC CONTOURS AND IMAGERY FROM 2024 AERIAL DRONE SURVEY BY CANADIAN UAV SURVEYS, NOVEMBER 2024.
3. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

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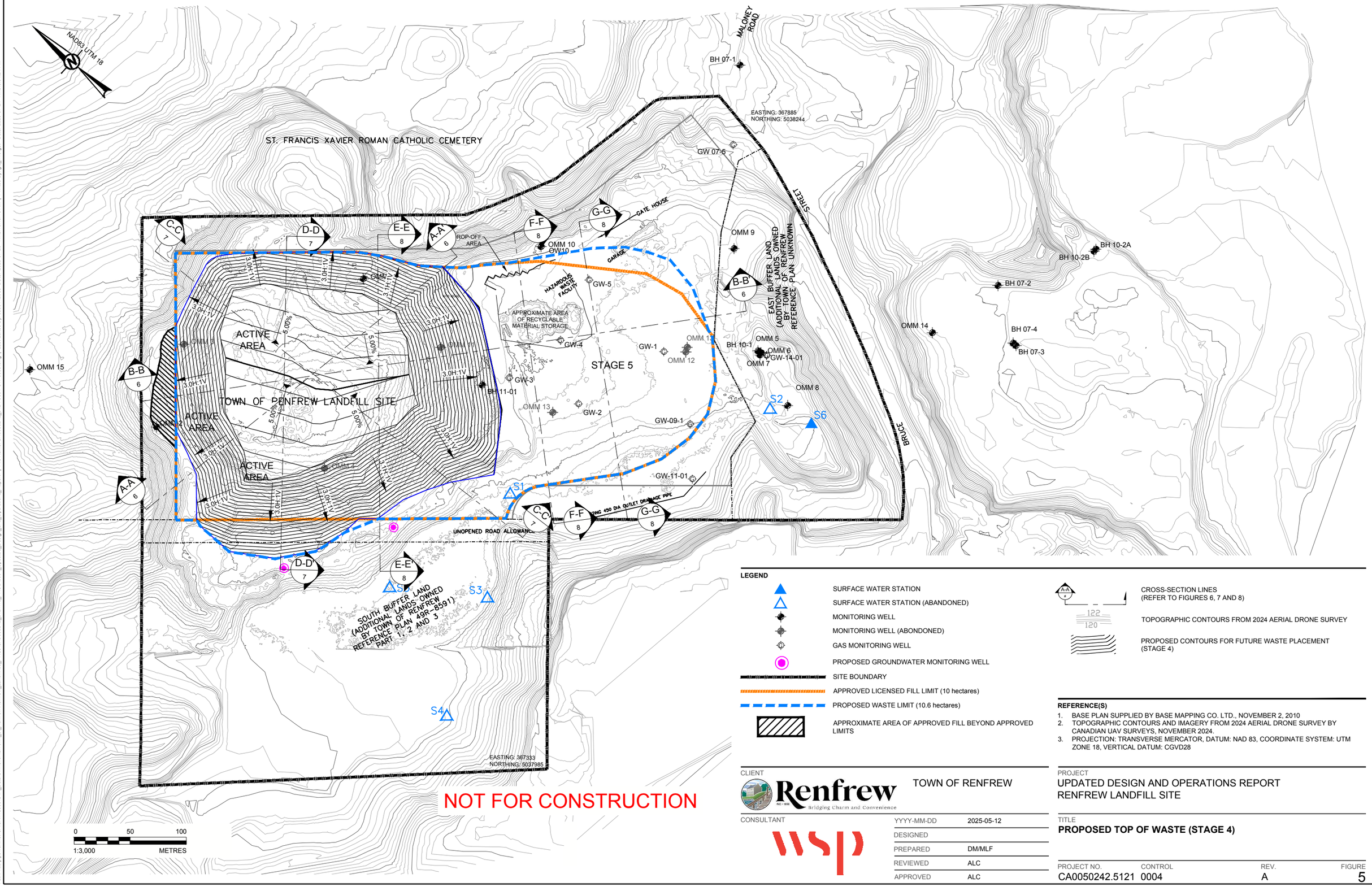
PROJECT
UPDATED DESIGN AND OPERATIONS REPORT
RENFREW LANDFILL SITE

TITLE
PROPOSED TOP OF WASTE (STAGE 4 AND 5)

PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

- SURFACE WATER STATION
- SURFACE WATER STATION (ABANDONED)
- MONITORING WELL
- MONITORING WELL (ABONDONED)
- GAS MONITORING WELL
- PROPOSED GROUNDWATER MONITORING WELL
- SITE BOUNDARY
- APPROVED LICENSED FILL LIMIT (10 hectares)
- PROPOSED WASTE LIMIT (10.6 hectares)
- APPROXIMATE AREA OF APPROVED FILL BEYOND APPROVED LIMITS
- CROSS-SECTION LINES (REFER TO FIGURES 6, 7 AND 8)
- TOPOGRAPHIC CONTOURS FROM 2024 AERIAL DRONE SURVEY
- PROPOSED CONTOURS FOR FUTURE WASTE PLACEMENT (STAGE 4)

REFERENCE(S)

1. BASE PLAN SUPPLIED BY BASE MAPPING CO. LTD., NOVEMBER 2, 2010
2. TOPOGRAPHIC CONTOURS AND IMAGERY FROM 2024 AERIAL DRONE SURVEY BY CANADIAN UAV SURVEYS, NOVEMBER 2024.
3. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

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PROJECT
UPDATED DESIGN AND OPERATIONS REPORT
RENFREW LANDFILL SITE

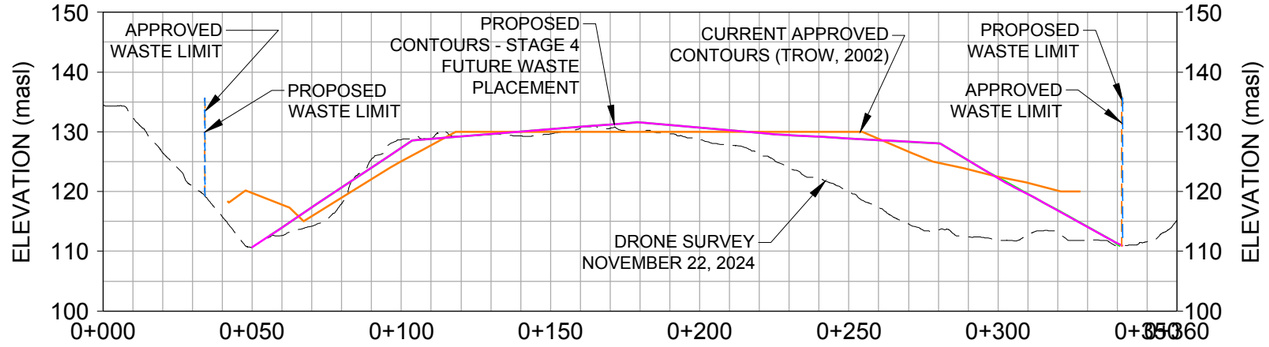
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PROPOSED TOP OF WASTE (STAGE 4)

PROJECT NO.	CONTROL	REV.	FIGURE
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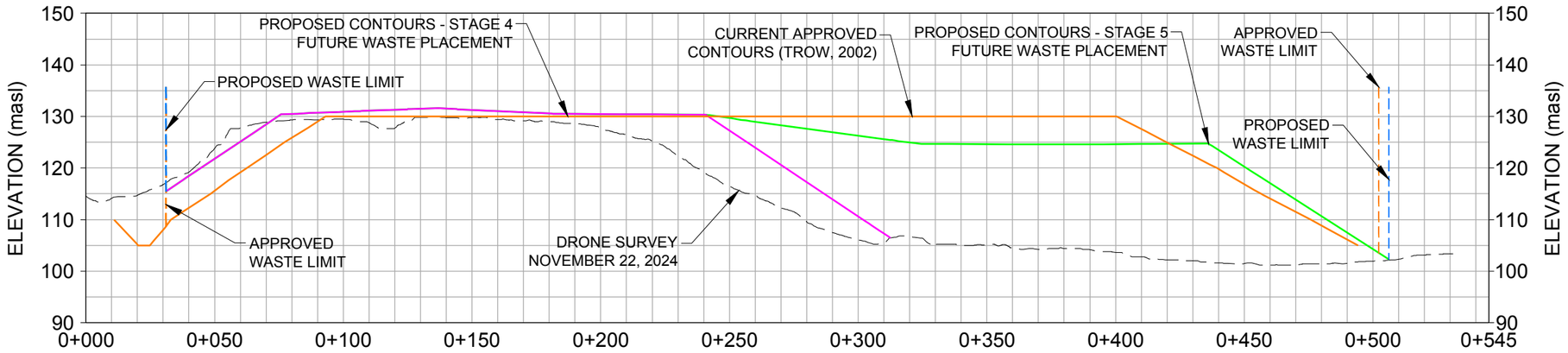
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VERT. - X2

A-A CROSS SECTION

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SCALE 1:2,000 m
VERT. - X2

B-B CROSS SECTION

2 4 5

NOT FOR CONSTRUCTION

0 50 100

1:2,000 METRES

CLIENT

Renfrew — Bridging Charm and Convenience

TOWN OF RENFREW

CONSULTANT

wsp

YYYY-MM-DD	2025-05-12
DESIGNED	
PREPARED	DM/MLF
REVIEWED	ALC
APPROVED	ALC

PROJECT

UPDATED DESIGN AND OPERATIONS REPORT
RENFREW LANDFILL SITE

TITLE

CROSS SECTION A-A AND B-B

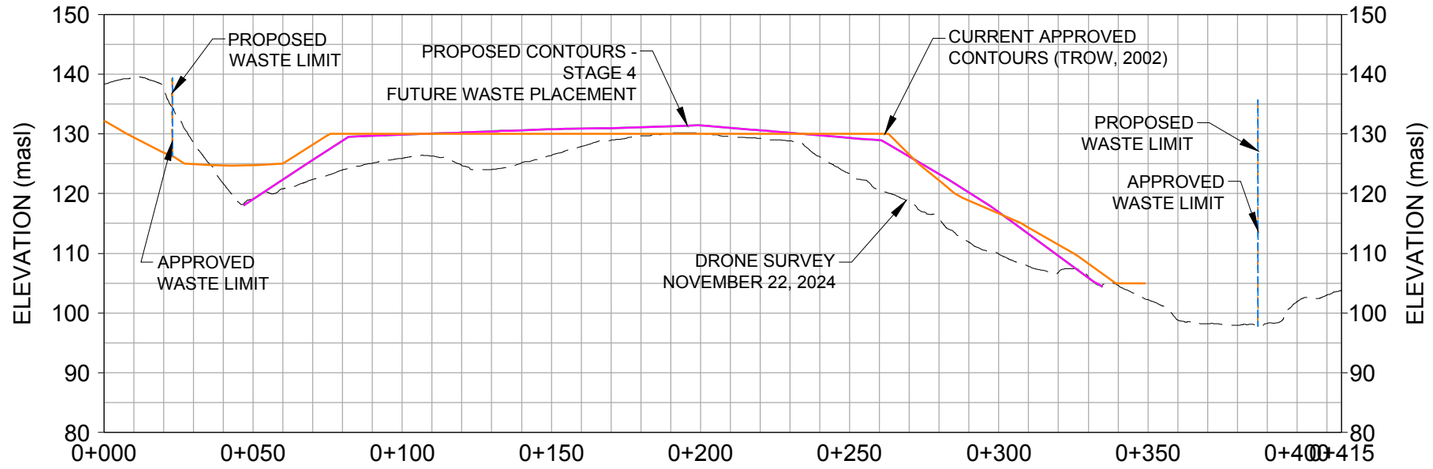
PROJECT NO.	CONTROL	REV.	FIGURE
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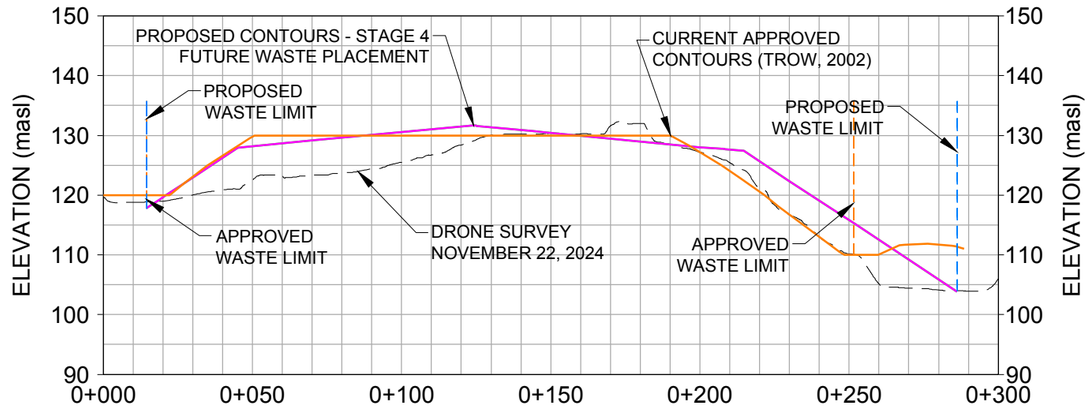
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VERT. - X2

C-C CROSS SECTION

2 4 5



SCALE 1:2,000 m
VERT. - X2

D-D CROSS SECTION

2 4 5

NOT FOR CONSTRUCTION

0 50 100

1:2,000 METRES

CLIENT

Renfrew
Bridging Charm and Convenience

TOWN OF RENFREW

CONSULTANT

wsp

YYYY-MM-DD	2025-05-12
DESIGNED	
PREPARED	DM/MLF
REVIEWED	ALC
APPROVED	ALC

PROJECT

UPDATED DESIGN AND OPERATIONS REPORT
RENFREW LANDFILL SITE

TITLE

CROSS SECTION C-C AND D-D

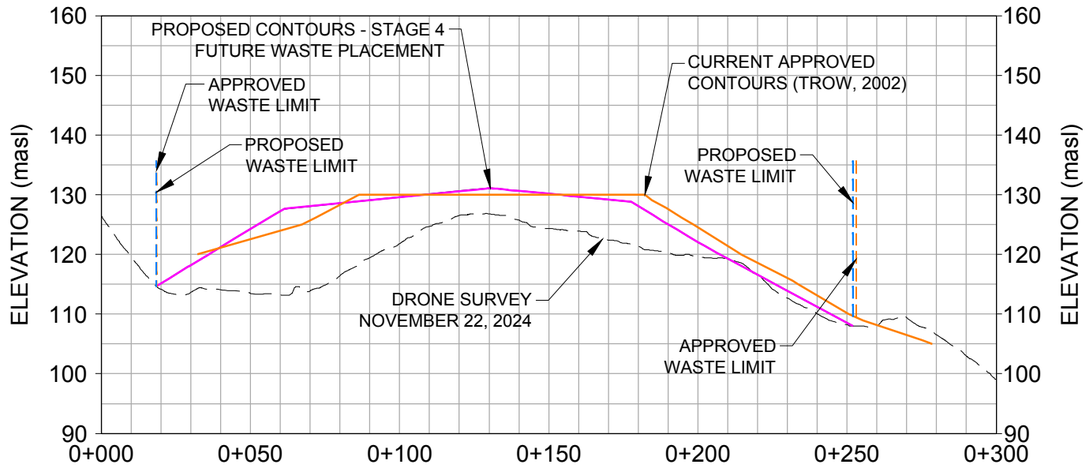
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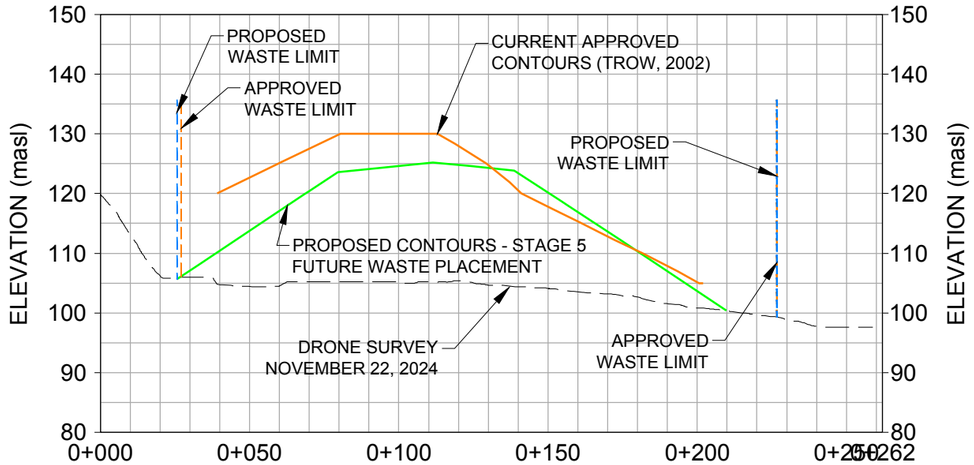
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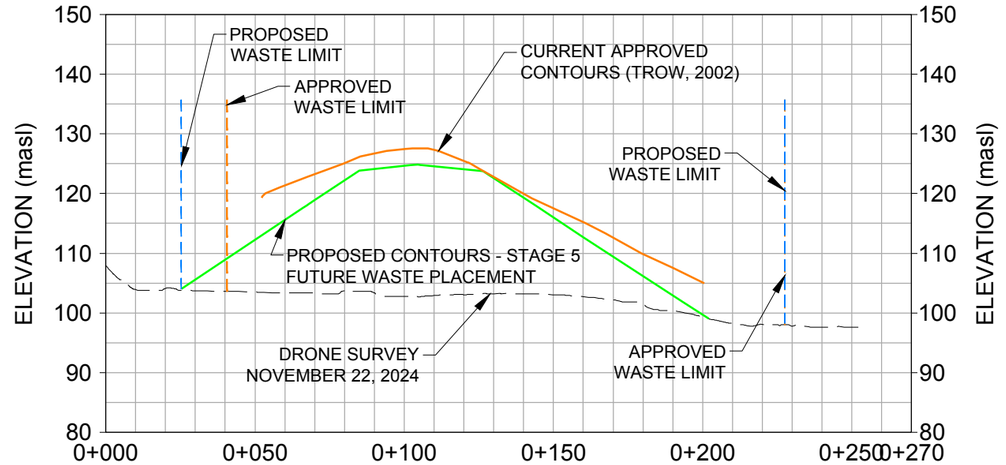
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SCALE 1:2,000 m
VERT. - X2
E-E CROSS SECTION
2 4 5



SCALE 1:2,000 m
VERT. - X2
F-F CROSS SECTION
2 4 5



SCALE 1:2,000 m
VERT. - X2
G-G CROSS SECTION
2 4 5

NOT FOR CONSTRUCTION

0 50 100
1:2,000 METRES

CLIENT
Renfrew
Bridging Charm and Convenience
TOWN OF RENFREW

CONSULTANT
wsp

YYYY-MM-DD	2025-05-12
DESIGNED	
PREPARED	DM/MLF
REVIEWED	ALC
APPROVED	ALC

PROJECT
UPDATED DESIGN AND OPERATIONS REPORT
RENFREW LANDFILL SITE

TITLE
CROSS SECTIONS E-E, F-F AND G-G

PROJECT NO.	CONTROL	REV.	FIGURE
CA0050242.5121	0004	A	8

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
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APPENDIX A

Environmental Compliance Approval A410401

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A410401
Issue Date: December 4, 2024

The Corporation of the Town of Renfrew
127 Raglan St S
Renfrew, Ontario
K7V 1P8

Site Location: Renfrew Landfill Site
376 Bruce St
Renfrew Town, County of Renfrew
K7V 3Z8

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the use and operation of 10 hectare waste disposal/transfer site within a total site area of 40.73 hectares.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this Environmental Compliance Approval and any Schedules to it;

"Batteries" within the context of this Approval, mean discarded devices in which energy was stored as electricity or converted into electricity and was used as a source of power and include Batteries as defined in O. Regulation 30/20;

"Blue Box Waste" within the context of this Approval, means:

a. each of the categories set out in Schedule 1 of O. Regulation 101/94 (entitled "Blue Box Waste"), including Part I ("Basic Blue Box Waste") and Part II ("Supplementary Blue Box Waste") of O. Regulation 101/94; and

b. discarded Blue Box Materials, as defined in O. Regulation 391/21;

"Contaminating Life Span" means contaminating life span as defined in Ontario Regulation 232/98;

"DGMS" means Durable Goods Materials Stream waste consisting of, but is not limited to, waste with the potential for reuse, recycle or resale such as furniture, woody items and materials, waste electrical and electronic equipment, textiles, carpets, scrap metal, mattresses, box springs, consumer goods, sports equipment and ceramic waste generated within the service area;

“Director” means any Ministry employee appointed in writing by the Minister pursuant to section 5 of the EPA as a Director for the purposes of Part II.1 of the EPA;

“District Manager” means the District Manager of the local district office of the Ministry in which the Site is geographically located;

"EEE" within the context of this Approval, means electrical and electronic equipment as defined in O. Regulation 522/20, the equipment subject to requirements of O. Regulation 522/20 and the equipment listed in O. Regulation 522/20 but exempted from the requirements of O. Regulation 522/20;

"EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;

“Generator” means the operator of a waste generation facility;

"Guideline C-4" means the Ministry's Guideline C-4 entitled "The Management of Biomedical Waste in Ontario", dated March 31, 2016 and updated July 16, 2021 and as amended;

"Guideline" means the Ministry publication "Guidelines for environmental protection measures at chemical and waste storage facilities, May 2007" as amended.

"HHW Depot" means that part of the Site where waste management activities pertaining to the bulking and temporary storage pending transfer of MHSW takes place;

"MHSW" within the context of this Approval, means waste that is limited to the following materials:

a. Municipal Hazardous Waste and Municipal Special Waste as defined in O. Regulation 387/16; and

b. discarded materials derived/originating from Hazardous and Special Products as defined in O. Regulation 449/21;

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

“NMA” means the *Nutrient Management Act, 2002,* S.O. 2002, c. 4, as amended;

“O. Reg. 101/94” means Ontario Regulation 101: (Recycling and Composting of Municipal Waste), made under the EPA, as amended;

“O. Reg. 232/98” means Ontario Regulation 232/98: (Landfilling Sites), made under the EPA, as

amended;

"O. Regulation 30/20" means Ontario Regulation 30/20: Batteries, made under the Resource Recovery and Circular Economy Act, as amended;

"O. Regulation 387/16" means Ontario Regulation 387/16: Municipal Hazardous or Special Waste, made under the Waste Diversion Transition Act, as amended;

"O. Regulation 389/16" means Ontario Regulation 389/16: Waste Electrical and Electronic Equipment, made under the Waste Diversion Transition Act, as amended;

"O. Regulation 391/21" means O. Reg. 391/21: Blue Box, made under the Resource Recovery and Circular Economy Act, as amended;

"O. Regulation 449/21" means Ontario Regulation 449/21: Hazardous and Special Products, made under the Resource Recovery and Circular Economy Act, as amended;

"O. Reg. 463/10" means Ontario Regulation 463/10 (Ozone Depleting Substances and Other Halocarbons), made under the EPA, as amended;

"O. Regulation 522/20" means Ontario Regulation 522/20: Electrical and Electronic Equipment, made under the Resource Recovery and Circular Economy Act, as amended;

“Ontario Drinking Water Quality Standards” means Ontario Regulation 169/03 (Ontario Drinking Water Quality Standards), made under the SDWA, as amended;

“Operator” means any person, other than the Owner's employees, authorized by the Owner as having the charge, management or control of any aspect of the Site and includes its successors or assigns;

“Owner” means any person that is responsible for the establishment or operation of the Site being approved by this Approval, and includes the Corporation of the Town of Renfrew and its successors and assigns;

"OWRA" means the *Ontario Water Resources Act,* R.S.O. 1990, c. O.40, as amended;

“PA” means the *Pesticides Act,* R.S.O. (1990), c. P.11, as amended;

“Provincial Officer” means any person designated in writing by the Minister as a provincial officer pursuant to Section 5 of the OWRA, Section 5 of the EPA, Section 17 of the PA, Section 4 of the NMA, or Section 8 of the SDWA;

“Regional Director” means the Regional Director of the local Regional Office of the Ministry in which the Site is located;

“Reg. 347” means R.R.O. 1990, Reg. 347: (General - Waste Management), made under the EPA, as

amended;

“Reg. 903” means R.R.O. 1990, Reg. 903: (Wells), made under the OWRA, as amended;

"Resource Recovery and Circular Economy Act" means the *Resource Recovery and Circular Economy Act,* 2016, S.O. 2016, c. 12, Sched. 1, as amended;

"Re-Use Centre" means the public drop-off platform/building protected from atmospheric precipitation and other elements, where public can drop off or pick up DGMS;

“SDWA” means the *Safe Drinking Water Act, 2002* , S.O. 2002, c. 32, as amended;

"Schedules" means the following schedules attached to this Approval and forming part of this Approval namely:

- Schedule 1 - Supporting Documentation;
- Schedule 2 - Surface Water Monitoring Program; and
- Schedule 3 - Groundwater Monitoring Program;

“Site” means the entire waste disposal site, including the buffer lands, and contaminant attenuation zone at Renfrew Landfill Site, 376 Bruce St
Renfrew Town, County of Renfrew;

“Trained Personnel” means personnel knowledgeable in the following through instruction and/or practice:

- relevant waste management legislation, regulations and guidelines;
- major environmental concerns pertaining to the waste to be handled;
- occupational health and safety concerns pertaining to the processes and wastes to be handled;
- management procedures including the use and operation of equipment for the processes and wastes to be handled;
- emergency response procedures;
- specific written procedures for the control of nuisance conditions;
- specific written procedures for refusal of unacceptable waste loads; and
- the requirements of this Approval;

"Waste Diversion Transition Act" means the *Waste Diversion Transition Act,* 2016, S.O. 2016, c. 12, Sched. 2, as amended;

"WEEE" within the context of this Approval, means waste electrical and electronic equipment consisting of devices that required an electric current to operate. WEEE is limited to the following:

a. the devices listed in O. Regulation 389/16; and
b. discarded devices originating/derived from the EEE;

"White Goods Containing Refrigerants" means the White Goods which contain, or may contain refrigerants; and

"White Goods" means the white goods (appliances) with or without the refrigerants.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL

Compliance

1. The Owner and Operator shall ensure compliance with all the conditions of this Approval and shall ensure that any person authorized to carry out work on or operate any aspect of the Site is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2. Any person authorized to carry out work on or operate any aspect of the Site shall comply with the conditions of this Approval.

In Accordance

3. Except as otherwise provided by this Approval, the Site shall be designed, developed, built, operated and maintained in accordance with the documentation listed in the attached Schedule 1.

4. Construction and installation of the aspects of the Re-use centre defined and approved in this Approval must be completed within five (5) years of the later of:

    a. the date this Approval; or

    b. if there is a hearing or other litigation in respect of the issuance of this Approval, the date that this hearing or litigation is disposed of, including all appeals.

5. This Approval ceases to apply in respect of the aspects of the and Re-use centre defined and approved in this Approval that have not been constructed or installed before the later of the dates identified in condition 1.4 above.

Interpretation

6. Where there is a conflict between a provision of any document listed in Schedule 1 in this Approval, and the conditions of this Approval, the conditions in this Approval shall take

precedence.

7. Where there is a conflict between the application and a provision in any document listed in Schedule 1, the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and that the Ministry approved the amendment.

8. Where there is a conflict between any two documents listed in Schedule 1, the document bearing the most recent date shall take precedence.

9. The conditions of this Approval are severable. If any condition of this Approval, or the application of any condition of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

Other Legal Obligations

10. The issuance of, and compliance with, this Approval does not:
    a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or
    b. limit in any way the authority of the Ministry to require certain steps be taken or to require the Owner and Operator to furnish any further information related to compliance with this Approval.

Adverse Effect

11. The Owner and Operator shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the Site, including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

12. Despite an Owner, Operator or any other person fulfilling any obligations imposed by this Approval the person remains responsible for any contravention of any other condition of this Approval or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect to the natural environment or impairment of water quality.

Change of Ownership

13. The Owner shall notify the Director, in writing, and forward a copy of the notification to the District Manager, within 30 days of the occurrence of any changes in the following information:
    a. the ownership of the Site;
    b. the Operator of the Site;
    c. the address of the Owner or Operator; and

d. the partners, where the Owner or Operator is or at any time becomes a partnership and a copy of the most recent declaration filed under the Business Names Act, R. S. O. 1990, c. B.17, shall be included in the notification.

14. No portion of this Site shall be transferred or encumbered prior to or after closing of the Site unless the Director is notified in advance and sufficient financial assurance is deposited with the Ministry to ensure that these conditions will be carried out.

15. In the event of any change in ownership of the Site, other than change to a successor municipality, the Owner shall notify the successor of and provide the successor with a copy of this Approval, and the Owner shall provide a copy of the notification to the District Manager and the Director.

Registration on Title Requirement

16. Prior to dealing with the property in any way, the Owner shall provide a copy of this Approval and any amendments, to any person who will acquire an interest in the property as a result of the dealing.

17. a. Within ninety (90) calendar days from the date of issuance of this Approval, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:
    i. a plan of survey prepared, signed and sealed by an Ontario Land Surveyor, which shows the area of the Site where waste has been or is to be deposited at the Site;
    ii. proof of ownership of the Site;
    iii. a letter signed by a member of the Law Society of Upper Canada or other qualified legal practitioner acceptable to the Director, verifying the legal description provided in the Certificate of Requirement;
    iv. the legal abstract of the property; and
    v. any supporting documents including a registerable description of the Site.

    b. Within fifteen (15) calendar days of receiving a Certificate of Requirement authorized by the Director, the Owner shall:
    i. register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
    ii. submit to the Director and the District Manager, written verification that the Certificate of Requirement has been registered on title.

Registration on Title Requirement - Contaminant Attenuation Zone (CAZ)

18. Within ninety (90) calendar days from the date of establishing a Contaminant Attenuation Zone (CAZ) (overburden and/or bedrock aquifers) in either fee simple or by way of a groundwater easement, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:

a. If rights are obtained in fee simple, the Owner shall provide:
   i. documentation evidencing ownership of the CAZ obtained in compliance with O.Reg. 232/98, as amended;
   ii. a completed Certificate of Requirement and supporting documents containing a registerable description of the CAZ; and
   iii. a letter signed by a member of the Law Society of Upper Canada; or other qualified legal practitioner acceptable to the Director, verifying the legal description of the CAZ.

b. Within fifteen (15) calendar days of receiving a Certificate of Requirement signed or authorized by the Director, the Owner shall:
   i. register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
   ii. submit to the Director and the District Manager, written verification that the Certificate of Requirement has been registered on title.

c. If rights are obtained by way of a groundwater easement, the Applicant shall:
   i. provide a copy of the easement;
   ii. provide a plan of survey signed and sealed by an Ontario Land Surveyor for the CAZ; and
   iii. submit proof of registration on title of the groundwater easement to the Director;

d. The Owner shall not amend or remove or consent to the removal of the easement or CAZ from title without the prior written consent of the Director.

Inspections by the Ministry

19. No person shall hinder or obstruct a Provincial Officer from carrying out any and all inspections authorized by the OWRA, the EPA, the PA, the SDWA or the NMA, of any place to which this Approval relates, and without limiting the foregoing:
   a. to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this Approval are kept;
   b. to have access to, inspect, and copy any records required to be kept by the conditions of this Approval;
   c. to inspect the Site, related equipment and appurtenances;
   d. to inspect the practices, procedures, or operations required by the conditions of this Approval; and
   e. to sample and monitor for the purposes of assessing compliance with the terms and conditions of this Approval or the EPA, the OWRA, the PA, the SDWA or the NMA.

Information and Record Retention

20. a. Except as authorized in writing by the Director, all records required by this Approval shall be retained at the Site for a minimum of two (2) years from their date of creation.

b. The Owner shall retain all documentation listed in Schedule 1 for as long as this Approval is valid.

c. All monthly summary reports of waste records collected are to be kept at the Site until they are included in the Annual Report.

d. The Owner shall retain employee training records as long as the employee is working at the Site.

e. The Owner shall make all of the above documents available for inspection upon request of Ministry staff.

21. The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action under this Approval or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:
    a. an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any term or condition of this Approval or any statute, regulation or other legal requirement; or
    b. acceptance by the Ministry of the information's completeness or accuracy.

22. The Owner shall ensure that a copy of this Approval, in its entirety and including all its Notices of Amendment, and documentation listed in Schedule 1, are retained at the Site at all times.

23. Any information related to this Approval and contained in Ministry files may be made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, RSO 1990, CF-31.

2. SITE OPERATION

Operation

1. The Site shall be operated and maintained at all times including management and disposal of all waste, in accordance with the EPA, Reg. 347, and the conditions of this Approval. At no time shall the discharge of a contaminant that causes or is likely to cause an adverse effect be permitted.

Signs

2. The Owner shall install and maintain a sign at the entrance to the Site. The sign shall be visible and readable from the main road leading to the Site. The following information shall be included on the sign:

    a. the name of the Site and Owner;
    b. the number of the Approval;
    c. the name of the Operator;
    d. the normal hours of operation;
    e. the allowable and prohibited waste types;
    f. the telephone number to which complaints may be directed;
    g. a warning against unauthorized access;
    h. a twenty-four (24) hour emergency telephone number (if different from above); and
    i. a warning against dumping outside the Site.

3. The Owner shall install and maintain signs to direct vehicles to drop off areas for waste, recyclable and HHW Depot.

4. The Owner shall provide signs at recycling depot and HHW Depot informing users what materials are acceptable and directing users to appropriate storage areas.

Vermin, Vectors, Dust, Litter, Odour, Noise and Traffic

5. The Site shall be operated `and maintained such that the vermin, vectors, dust, litter, odour, noise and traffic do not create a nuisance.

Burning Waste Prohibited

6. Burning of waste at the Site is prohibited.

Site Access

7. Waste shall only be accepted for disposal, HHW Depot, small loads drop off and re-use centre at the Site during the following times:

Tuesdays, Wednesdays, Thursday	:8:30 am to 4:00 pm
Friday, Saturday	:8:30 am to 2:00 pm

8. On-site equipment may be operated seven (7) days a week from 7 am to 5 pm.

9. With the prior written approval from the District Manager, the time periods may be extended to accommodate seasonal or unusual quantities of waste.

Site Security

10. No waste shall be received, landfilled or removed from the Site unless a site supervisor or an attendant is present and supervises the operations during operating hours. The Site shall be closed when a site attendant is not present to supervise landfilling operations.

11. The Site shall be operated and maintained in a safe and secure manner. During non-operating hours, the Site entrance and exit gates shall be locked and the Site shall be secured against access by unauthorized persons.

3. EMPLOYEE TRAINING

1. A training plan for all employees that operate any aspect of the Site shall be developed and implemented by the Owner or the Operator. Only Trained Personnel shall operate any aspect of the Site or carry out any activity required under this Approval.

4. COMPLAINTS RESPONSE PROCEDURE

1. If at any time the Owner receives complaints regarding the operation of the Site, the Owner shall respond to these complaints according to the following procedure:

    a. The Owner shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint;

    b. The Owner, upon notification of the complaint, shall initiate appropriate steps to determine possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint and forward a formal reply to the complainant; and

    c. The Owner shall complete and retain on-site a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and any recommendations for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

5. EMERGENCY RESPONSE

1. All Spills as defined in the EPA shall be immediately reported to the **Ministry's Spills Action Centre at 1-800-268-6060** and shall be recorded in the log book as to the nature of the emergency situation, and the action taken for clean-up, correction and prevention of future occurrences.

2. In addition, the Owner shall submit, to the District Manager a written report within three (3) business days of the emergency situation, outlining the nature of the incident, remedial measures taken, handling of waste generated as a result of the emergency situation and the measures taken to prevent future occurrences at the Site.

3. All wastes resulting from an emergency situation shall be managed and disposed of in accordance with Reg. 347.

4. All equipment and materials required to handle the emergency situations shall be:
   a. kept on hand at all times that waste landfilling and/or handling is undertaken at the Site; and
   b. adequately maintained and kept in good repair.

5. The Owner shall ensure that the emergency response personnel are familiar with the use of such equipment and its location(s).

6. INSPECTIONS, RECORD KEEPING AND REPORTING

Daily Log Book

1. A daily log shall be maintained in written or electronic format and shall include the following information:
   a. the type, date and time of arrival, hauler, and quantity (tonnes) of all waste and cover material received at the Site;

   b. the area of the Site in which waste disposal operations are taking place;

   c. a record of litter collection activities and the application of any dust suppressants;

   d. a record of the daily inspections; and

   e. a description of any out-of-service period of any control, treatment, disposal or monitoring facilities, the reasons for the loss of service, and action taken to restore and maintain service.

2. Any information requested, by the Director or a Provincial Officer, concerning the Site and its operation under this Approval, including but not limited to any records required to be kept by this Approval shall be provided to the Ministry, upon request.

Daily Inspections and Log Book

3. An inspection of the entire Site and all equipment on the Site shall be conducted each day the Site is in operation to ensure that: the Site is secure; that the operation of the Site is

not causing any nuisances; that the operation of the Site is not causing any adverse effects on the environment and that the Site is being operated in compliance with this Approval. Any deficiencies discovered as a result of the inspection shall be remedied immediately, including temporarily ceasing operations at the Site if needed**.**

4. A record of the inspections shall be kept in a daily log book that includes:
   a. the name and signature of person that conducted the inspection;

   b. the date and time of the inspection;

   c. the list of any deficiencies discovered;

   d. the recommendations for remedial action; and

   e. the date, time and description of actions taken.

5. A record shall be kept in the daily log book of all refusals of waste shipments, the reason(s) for refusal, and the origin of the waste, if known.

Annual Report

6. A written report on the development, operation and monitoring of the Site, shall be completed annually (Annual Report). The Annual Report shall be submitted to the District Manager, by March 31st of the year following the period being reported upon.

7. The Annual Report shall include but not be limited to the following information:

   a. the results and an interpretive analysis of the results of all leachate, groundwater, surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs;

   b. an assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the Site, and the adequacy of and need to implement the contingency plans;

   c. site plans showing the existing contours of the Site; areas of landfilling operation during the reporting period; areas of intended operation during the next reporting period; areas of excavation during the reporting period; the progress of final cover, vegetative cover, and any intermediate cover application; facilities existing, added or removed during the reporting period; and site preparations and facilities planned for installation during the next reporting period;

   d. an estimate of the volume of waste, daily and intermediate cover, and final cover deposited or placed at the *Site* during the reporting period and a calculation of the total volume of *Site* capacity used during the reporting period;

e. a calculation of the remaining capacity of the Site and an estimate of the remaining Site life;

f. a summary of the monthly and total annual quantity (tonnes) of waste received at the Site and recyclables transferred from the Site;

g. a summary of any complaints received and the responses made;

h. a discussion of any operational problems encountered at the Site and corrective action taken;

i. any changes to the Design and Operations Report and the Closure Plan that have been approved by the Director since the last Annual Report;

j. a report on the status of all monitoring wells and a statement as to compliance with Reg. 903; and

k. any other information with respect to the Site which the District Manager may require from time to time.

7. LANDFILL DESIGN AND DEVELOPMENT

Approved Waste Types

1. Only municipal waste as defined under Reg. 347 being solid non-hazardous shall be accepted at the Site for landfilling.

2. The Owner shall develop and implement a program to inspect waste to ensure that the waste received at the Site is of a type approved for acceptance under this Approval.

3. The Owner shall ensure that all loads of waste are properly inspected by Trained personnel prior to acceptance at the Site and that the waste vehicles are directed to the appropriate areas for disposal or transfer of the waste. The Owner shall notify the District Manager, in writing, of load rejections at the Site within one (1) business day from their occurrence.

Capacity

4. The maximum volumetric capacity of the Site, consisting of the waste, daily cover and intermediate cover, but excluding the final cover is 1,069,000 cubic metres.

5. The Site is approved for the design, operation and use of 557,400 cubic meters of the maximum volumetric capacity of the Site in Stages 1, 2, 3 and 4 as described in Item 6 of Schedule 1.

6. At least two (2) years prior to utilizing capacity in Stage 5 the Owner shall submit to the Director for approval, a design and operation plan with up to date engineering and environmental standards and a detailed hydrogeological assessment for proper and safe development of the remainder of the Site. If the Owner does not intend to use the remaining capacity the Owner shall submit a Closure Plan as per condition 9 of this Approval.

Service Area

7. a. Only waste that is generated within the boundaries of the Town of Renfrew may be accepted at the Site for landfilling.

b. Notwithstanding condition 7.7.a, MHSW that is generated within the boundaries of the Town of Renfrew, Addington Highlands Township, Town of Arnprior, Admaston Bromley Township, Horton Township, Greater Madawaska Township, McNab Braeside Township and Township of Whitewater Region may be accepted at the HHW Depot for transfer.

Cover

8. Alternative materials to soil may be used as weekly and interim cover material, based on an application with supporting information and applicable fee for a trial use or permanent use, submitted by the Owner to the Director, copied to the District Manager and as approved by the Director via an amendment to this Approval. The alternative material shall be non-hazardous according to Reg. 347 and will be expected to perform at least as well as soil in relation to the following functions:
   a. Control of blowing litter, odours, dust, landfill gas, gulls, vectors, vermin and fires;
   b. Provision for an aesthetic condition of the landfill during the active life of the Site;
   c. Provision for vehicle access to the active tipping face; and
   d. Compatibility with the design of the Site for groundwater protection, leachate management and landfill gas management.

9. Cover material shall be applied as follows:
   a. **Daily** Cover - Weather permitting, deposited waste shall be covered **daily** in a manner acceptable to the District Manager so that no waste is exposed to the atmosphere;

   b. Intermediate Cover - In areas where landfilling has been temporarily discontinued for six (6) months or more, a minimum thickness of 300 millimetre of soil cover or an approved thickness of alternative cover material shall be placed; and

   c. Final Cover - In areas where landfilling has been completed to final contours, a

minimum 600 millimetre thick layer of soil of medium permeability and 150 millimetres of top soil (vegetative cover) shall be placed. Fill areas shall be progressively completed and rehabilitated as landfill development reaches final contours.

10. Tarpauline, ground woodwaste and ground drywall are hereby approved to be used as alternative daily cover material subject to the operational procedures described in Items 22 (b), 23 and 24 in Schedule 1.

11. a. As requested by the Owner, the area of "Fill Beyond Approved Limits" is hereby approved to be left at the location marked in Figure 2 submitted with the Item 15 of Schedule 1.

b. No waste shall be deposited in the above area in condition 7.11.a.

c. The area in above condition 7.11.a shall be marked with stakes for identification as "Fill Beyond Approved Limits".

12. The construction of an on-site ring road at the Renfrew Landfill Site is approved, to return the Site to the original conditions as per the original landfill design, and to provide improved access to portions of the Site, as described in Item 21 of Schedule 1.

13. Sludge disposal shall be in accordance with the Item 30 of Schedule 1.

8. LANDFILL MONITORING

Landfill Gas

1. a. The Owner shall ensure that any buildings or structures at the Site contain adequate ventilation systems to relieve any possible landfill gas accumulation to prevent methane concentration reaching the levels within its explosive range. Routine monitoring for explosive methane gas levels shall be conducted in all buildings or structures at the Site, especially enclosed structures which at times are occupied by people.

b. Outdoor landfill gas monitoring shall be conducted twice per year at GW1, GW2, GW3, GW4, GW07-5, GW09-1, GW11-01 and GW14-01.

Compliance

2. The Site shall be operated in such a way as to ensure compliance with the following:

a. Reasonable Use Guideline B-7 for the protection of the groundwater at the Site; and

b. Provincial Water Quality Objectives included in the July 1994 publication entitled Water Management Policies, Guidelines, Provincial Water Quality Objectives, as amended from time to time or limits set by the Regional Director, for the protection of the surface water at and off the Site.

Surface Water and Groundwater

3. The Owner shall monitor surface water and ground water in accordance with the monitoring programs outlined in documents listed in Schedules 2 and 3.

4. A certified Professional Geoscientist or Engineer possessing appropriate hydrogeologic training and experience shall execute or directly supervise the execution of the groundwater monitoring and reporting program.

Groundwater Wells and Monitors

5. The Owner shall ensure that all groundwater monitoring wells which form part of the monitoring program are properly capped, locked and protected from damage.

6. Where landfilling is to proceed around monitoring wells, suitable extensions shall be added to the wells and the wells shall be properly re-secured.

7. Any groundwater monitoring well included in the on-going monitoring program that is damaged shall be assessed, repaired, replaced or decommissioned by the Owner, as required.

    a. The Owner shall repair or replace any monitoring well which is destroyed or in any way made to be inoperable for sampling such that no more than one regular sampling event is missed.

    b. All monitoring wells which are no longer required as part of the groundwater monitoring program, and have been approved by the Director for abandonment, shall be decommissioned by the Owner, as required, in accordance with Reg. 903, to prevent contamination through the abandoned well. A report on the decommissioning of the well shall be included in the Annual Report for the period during which the well was decommissioned.

Trigger Mechanisms and Contingency Plans

8. Trigger mechanisms shall be in accordance with the Item 28, Schedule 1.

9. Contingency plan in the event of a confirmed exceedance of a site-specific trigger level relating to leachate mounding or groundwater or surface water impacts due to leachate shall be in accordance with the Item 29, Schedule 1.

10. In the event of a confirmed exceedance of a site-specific trigger level relating to leachate mounding or groundwater or surface water impacts due to leachate, the Owner shall immediately notify the District Manager, and an investigation into the cause and the need for implementation of remedial or contingency actions shall be carried out by the Owner in accordance with the approved trigger mechanisms and associated contingency plans.

11. If monitoring results, investigative activities and/or trigger mechanisms indicate the need to implement contingency measures, the Owner shall ensure that the following steps are taken:

    a. The Owner shall notify the District Manager, in writing of the need to implement contingency measures, no later than 30 days after confirmation of the exceedances;

    b. Detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the Owner to the Director for approval; and

    c. The contingency measures shall be implemented by the Owner upon approval by the Director.

12. The Owner shall ensure that any proposed changes to the site-specific trigger levels for leachate impacts to the surface water or groundwater, are approved in advance by the Director via an amendment to this Approval.

Changes to the Monitoring Programs, Trigger Mechanisms and Contingency Plans

13. The Owner may request to make changes to the monitoring program(s), trigger mechanisms and/or contingency plan to the District Manager in accordance with the recommendations of the Annual Report. The Owner shall make clear reference to the proposed changes in a separate letter that shall accompany the Annual Report.

14. Within fourteen (14) days of receiving the written correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the environmental monitoring program, trigger mechanisms and/or contingency plans, the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager and all other correspondences and responses related to the changes, to the Director requesting the Approval be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.

Contaminant Attenuation Zone

15. Within two (2) years from the date of this Approval, the Owner shall complete acquiring the ground water easement to the Contaminant Attenuation Zone required to bring the

Site into compliance with respect to groundwater. The Owner shall submit annually, with the Annual Report under condition 6.6, a summary of progress in the reporting year on the acquisition of the groundwater easement to the Contaminant Attenuation Zone. The Owner may request to extend the deadline for acquisition of the property rights and/or groundwater easement to the District Manager. Within fourteen (14) days of receiving written correspondence confirming that the District Manager is in agreement with the extension, the Owner shall forward the concurrence to the Director requesting that the Approval be amended to approve the extension.

16. Once established the Owner must continue to own the property rights or groundwater easement to the Contaminant Attenuation Zone for all of the Contaminating Life Span of the Site.

17. The ownership of the property rights must include the rights to:
    a. discharge contaminants from the operations at the Site into the Contaminant Attenuation Zone;

    b. enter into the Contaminant Attenuation Zone and onto the surface above the Contaminant Attenuation Zone for purposes of testing, monitoring, intercepting contaminants and carrying out remedial work;

    c. install, operate and maintain works, for the purposes mentioned in the condition 8.16.b in the Contaminant Attenuation Zone, including on the surface above the Contaminant Attenuation Zone; and

    d. prevent the owner(s) of the land(s) in which the Contaminant Attenuation Zone is located from interfering with the functioning of the Contaminant Attenuation Zone or with the exercise of any of the rights mentioned in this subsection.

18. The Owner shall notify the Director in writing within thirty (30) days after any change in his, her or its ownership of the property rights in the Contaminant Attenuation Zone.

19. The Owner shall ensure that the written easement agreement, specified in condition 8.14. includes an agreement of the property owner(s) of the land(s) required for the Contaminant Attenuation Zone, to register a Certificate of Requirement on title to the land(s) to be used as the Contaminant Attenuation Zone.

9. CLOSURE PLAN

1. At least two (2) years prior to closure, the Owner shall submit to the Director for approval, with copies to the District Manager, a detailed Site closure plan pertaining to the termination of landfilling operations at this Site, post-closure inspection, maintenance and monitoring, and end use. The plan shall include the following as a minimum but are not limited to:

a. a plan showing Site appearance after closure;
b. a description of the proposed end use of the Site, that shall include a discussion on the Environmental Assessment commitments (if applicable) to dedicate portion of the lands within the Site that are not required for site post-closure operations and monitoring, to be used for community recreational purpose;
c. a description of how pollinator friendly plants were considered in the final vegetative cover for the landfill and/or in the landscaping within the Site;
d. a description of the procedures for closure of the Site:
    i. advance notification of the public of the landfill closure;

    ii. posting a sign at the Site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;

    iii. completion, inspection and maintenance of the final cover and landscaping;

    iv. site security;

    v. removal of unnecessary landfill-related structures, buildings and facilities; and

    vi. final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;

e. a schedule indicating the time-period for implementing sub-conditions i to vi above;

f. descriptions of the procedures for post-closure care of the Site, including:
    i. operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;

    ii. record keeping and reporting; and

    iii. complaint contact and response procedures;

g. an assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas; and

h. an updated estimate of the Contaminating Life Span of the Site, based on the results of the monitoring programs to date.

2. The Site shall be closed in accordance with the closure plan as approved by the Director.

10. WASTE DIVERSION

Approved Waste Types for Transfer

1. The Site is limited to receive the following Waste categories:

    a. Blue Box Waste as defined in this Approval;

    b. MHSW as listed in the documentation in item 19, Schedule 1;

    c. WEEE as defined in this Approval;

    d. White Goods Containing Refrigerants as defined in this Approval; and

    e. DGMS, as defined in this Approval.

2. The Owner shall ensure that:

    a. all bins and waste storage areas are clearly labelled;

    b. all lids or doors on bins shall be kept closed during non-operating hours and during high wind events; and

    c. if necessary to prevent litter, waste storage areas shall be covered during high winds events.

3. The Owner/Operator shall remove the refrigerant as defined in O. Reg. 463/10 in accordance with the following:
    a. all White Goods containing refrigerants which have not been tagged by a licensed technician to verify that the equipment no longer contains refrigerants, shall be stored in a separate area in an upright position; and

    b. White Goods containing refrigerants received at the Site shall be shipped off-Site in order to have the refrigerants removed by a licensed technician in accordance with O. Reg. 463/10; or

    c. the refrigerant shall be removed at the Site by a licensed technician, in accordance with O. Reg. 463/10, prior to shipping White Goods off-Site; and

    d. a detailed log of all White Goods containing refrigerants received shall be maintained. The log shall include the following:

        i. date of the record;

        ii. types, quantities and source of White Goods containing refrigerants

received;

iii. details on removal of refrigerants as required by O. Reg. 463/10; and

iv. the quantities and destination of the White Goods and/or refrigerants transferred from the Site.

4. The Owner shall transfer waste and recyclable materials from the Site as follows:
   a. recyclable materials shall be transferred off-site once their storage bins are full;

   b. scrap metal shall be transferred off-site at least twice a year;

   c. tires shall be transferred off-site as soon as a load for the contractor hired by the Owner has accumulated or as soon as the accumulated volume exceeds the storage capacity of its bunker; and

   d. immediately, in the event that waste is creating an odour or vector problem.

5. The Owner shall notify the appropriate contractors that waste and recyclable wastes that are to be transferred off-site are ready for removal. Appropriate notice time, as determined by the contract shall be accommodated in the notification procedure.

6. Collection, storage and transfer of Waste Electrical and Electronic Equipment shall be in accordance with the documents in the Schedule 1.

7. Operation of the proposed re-use centre (Item 26 in Schedule 1) is hereby approved as proposed.

11. MHSW TRANSFER STATION (HHW DEPOT)

1. Notwithstanding condition 7.1, MHSW from households; and industrial, commercial and/or institutional Generators shall be accepted at the HHW Depot. Waste from Generators other than households shall only be accepted at the HHW Depot pursuant to conditions 11.2 to 11.19.

2. The HHW Depot shall be operated in accordance with documents in the Schedule 1.

3. The Design and Operations Report shall be retained at the Site; kept up to date through periodic revisions; and be available for inspection by Ministry staff. Changes to the Design and Operations Report shall be submitted to the Director for approval.

4. a. The HHW Depot shall only accept for bulking and temporary storage pending transfer to an approved carrier for disposal elsewhere, the following hazardous waste classes: 112, 121, 145, 146, 148, 212, 213, 221, 222, 242, 243, 251, 252,

261, 263, 312 and 331, as outlined in the New Ontario Waste Classes, January 1986.

b. For waste type 312 (restricted to sharps only), the Owner shall ensure that:

i. waste type 312 shall be accepted and handled by Trained Personnel only;

ii. waste type 312 shall be shipped in accordance with the Guideline C-4;

iii. where there is a conflict between the Guideline C-4 and the conditions of an approval issued to contractor or agent of the Owner which allows for the transportation of waste type 312 (restricted to sharps and syringes only), the conditions of that approval shall prevail;

iv. waste type 312 shall be packaged in dedicated, leak-proof, puncture-resistant containers capable of withstanding the weight of the waste and specifically designed for storage of sharps and syringes;

v. the waste containers have well fitted lids which cannot be removed once closed; and

vi. the container shall be marked with the universal biohazard symbol and labelled "Biomedical Waste/Déchets Biomédicaux".

c. For the waste types 261, the Owner shall ensure that:

i. waste type 261 shall be accepted and handled by Trained Personnel only;

ii. waste class 261 shall be packaged in dedicated, rigid, puncture-resistant, leak-proof containers designed specifically for that purpose;

iii. the waste containers shall have lids which cannot be removed once closed; and

iv. the waste containers shall be marked with the appropriate pharmaceutical symbol and labelled.

d. i. Batteries may be stored outdoors provided they are stored in a manner which protects the batteries from the effects of atmospheric precipitation.

ii. Automotive batteries are to be stored in a secure area and provided with a containment area to ensure containment of any leakage or spilled battery acid.

e. i. The waste mercury thermostats shall be checked for any damaged or broken thermostats and spilled mercury upon receipt at the HHW Depot.

ii. Mercury spill kit(s) shall be used during handling of the waste mercury thermostats at the HHW Depot to contain unexpected spills or leaks of mercury.

5. The HHW Depot may accept incidental household hazardous waste discovered in waste delivered to the Site, provided:
   a. the waste is characterized as being one or more of the Waste Class Nos. in condition 11.4 above; and
   b. the waste is labelled in accordance with the requirements of s.80 of Reg. 347.

6. Incidental waste which does not conform to condition 5.b above shall either be:
   a. returned to the Generator; or
   b. in the absence of a known Generator, characterized and managed in accordance with Reg. 347.

7. A detailed record shall be made of any incidental waste discovered at the Facilities, including but not limited to:

   a. the date;
   b. the type of waste;
   c. the amount of waste;
   d. the condition of the container; and
   e. how the waste was managed.

8. a. The Owner shall implement the protocol in Item 20 of Schedule 1 for the Generator users of the HHW Depot.

   b. When accepting waste from the Generators, the Owner shall only accept waste from the Generators who have signed the protocol.

9. The HHW Depot shall be supervised at all times during operating hours by staff that have been adequately trained to handle spill emergencies.

10. Waste received at the HHW Depot shall be stored in the following manner:

    a. propane cylinders shall be stored outdoors in a segregated area in a manner which prevents cylinders from being knocked over or cylinder valves from being damaged;

    b. all other waste shall be stored in a covered area such that it is sheltered from rain and snow;

    c. all liquid wastes shall be stored in secondary containment that meets the requirements of the Ministry document entitled "Guidelines for Environmental

Protection Measures at Chemical and Waste Storage Facilities" dated May 2007;

d. containers and storage areas containing flammable and/or ignitable materials shall be adequately grounded;

e. storage containers shall be clearly labelled indicating the type and nature of the hazardous waste stored as required by applicable legislation;

f. incompatible waste types shall be segregated during storage;

g. batteries shall be stored in a secure area apart from other wastes and provided with a containment area to ensure against leakage or spilled battery acid; and

h. all waste being transported from the HHW Depot shall be transported in accordance with Reg. 347 and the Environmental Protection Act.

11. The Owner shall not offer MHSW for reuse unless:

a. the waste is in its original packaging, and the label on the package is legible;

b. the waste has been inspected by trained personnel to ensure the waste meets the requirements for reuse for that specific waste type; and

c. the waste is one of the following:
   i. waste paint, subject to the requirements of condition 11.12 below;
   ii. aerosols;
   iii. waxes and soaps;
   iv. motor oil, provided the original container has never been opened;
   v. antifreeze, provided the original container has never been opened;
   vi. household cleaning products, other than bleach or ammonia, that are no more than 5 years old;
   vii. drywall compound;
   viii. cement; and
   ix. fertilizers that do not contain pesticides, provided the original container/packaging has never been opened.

d. All waste offered for reuse shall be inspected by Trained Personnel to ensure that waste meets the requirements for reuse for that specific waste.

12. The Owner shall only offer waste paint for reuse provided that the following conditions are met:

a. the waste paint is contained in the original manufacturer's container;

b. the original manufacturer's label containing product information use and product

hazards is clearly legible;

c. the original manufacturer's container is in an undamaged state such that the material may be transported without risk of leaks or spills; and

d. the Owner does not suspect the paint to have been manufactured prior to 1972.

13. The Owner shall only accept MHSW from Generators under the following restrictions:

a. the owner shall only receive MHSW from Generators that have entered into an agreement with the owner in accordance with the protocol described in condition 11.8 above;

b. no waste shall be received from Generators where the Generator's activities include waste management;

c. the Owner may only receive up to 60 kg of MHSW waste per year per Generator;

d. the Owner may only receive up to a maximum of 300 litres of liquid industrial waste per year per Generator;

e. the Owner shall not receive subject waste from single Generator more than 4 times per year;

f. no hazardous waste shall be received in containers greater than 25 litres in size;

g. no liquid industrial waste shall be received in containers greater than 25 L in size;

h. where a load consists of a combination of hazardous waste and liquid industrial waste, the sum total of the wastes may not exceed 90 kg per load;

i. all containers shall be closed, secured and maintained so that under normal conditions of transport, including handling, there will be no accidental release of waste;

j. no containers other than those with an intact seal that cannot be opened without breaking or noticeably tampering with the seal shall be accepted at the HHW Depot;

k. no broken or leaking containers, or containers otherwise unsuitable for the type of waste they contain, shall be accepted at the HHW Depot;

l. all containers shall be identified with a label which contains the company name, address, telephone number, the name of the company representative and the contents of the container;

m. all containers shall have a certificate meeting the requirements of condition 11.14 below is affixed to the container; and

n. hazardous waste in sealed containers that is accepted at the site shall not be bulked, and the waste will be exempt from the land disposal restriction requirements.

14. No container of MHSW from Generators shall be accepted by the Owner unless the waste has been characterized by the Generator and the container has a certificate affixed to it stating the following:

a. "All waste in this container is hazardous industrial waste, hazardous waste chemical or characteristic waste";

b. "No waste in this container has been mixed, blended, bulked or in any other way intermingled with any other waste or material";

c. "This waste has been generated solely at [insert name of Generator]'s facility which generates no greater than 5kg of hazardous industrial waste, hazardous waste chemical and characteristic waste in any month and is being accumulated for transportation purposes only";

d. "This container and seal comply with the requirements of the Generator Registration Manual"; and

e. "The total weight of this container does not exceed 30kg".

15. The Owner shall have in place an emergency response services program to attend to the clean-up any spills of MHSW or liquid industrial waste that occur during the transit of waste, by Generators that have entered into an agreement with the Owner, from the point of generation to the Owner's Site.

16. The Owner shall instruct all Generators to contact the emergency response services program immediately should a hazardous and/or liquid industrial waste spill occur while waste is in transit.

17. The Owner shall provide to the waste Generator the contact information for the emergency response services program, and the means with which to initiate contact (e.g. cellular phone), and shall inform the Generator of the need for this information to be available in the vehicle used to transport hazardous and/or liquid industrial waste at all times that waste is being transported.

18. Generators who have entered into an agreement with the Owner in accordance with the protocol described in condition 11.8 shall not require further approval under Part V of the Act, and shall be exempt from the requirements of Section 16 of Reg. 347, subject to the

following conditions:

a. each Generator transports its wastes to the HHW Depot using its own vehicle(s);

b. each Generator has a copy of the agreement entered into with the Owner in the vehicle at the time of waste transport;

c. each Generator transports its wastes as specified in the condition 11.13 and in accordance with the protocol described in condition 11.8; and

d. waste transported by Generators shall be transported on municipal roads unless a permit has been obtained from the Ontario Ministry of Transportation in accordance with Section 2 of the Dangerous Goods Transportation Act, R.S.O. 1990, Chapter D.1 to allow for the transport of dangerous goods on highways.

19. For Generators who have entered into an agreement with the Owner in accordance with the protocol described in condition 11.8, Sections 18-23 of Reg. 347 do not apply. Waste that is not part of the agreement with the Owner continues to be subject to the requirements of Reg. 347.

Schedule 1
Supporting Documentation

1. Application for a Certificate of Approval for a Waste Disposal Site dated January 4, 1971 including supporting information submitted with the application.

2. Site location map entitled "Town of Renfrew Waste Disposal Site".

3. Site plan entitled "Municipal Owned Sanitary Disposal Area"

4. The March 31, 1999, completed Ministry form, Application for Approval of a Waste Disposal Site, signed by Wayne Fraser of the Town of Renfrew.

5. The undated report, Renfrew HHW Depot Application, with attached Appendices "A" to "G".

6. Town of Renfrew Landfill Site Application to Amend Certificate of Approval A410401 and Supporting Documentation prepared by Oliver, Mangione, McCalla & Associates and dated March 2, 1998.

7. Letter from J.A. McKee of Trow Consulting Engineers Ltd. to E. Zaltsberg of the MOE dated February 28, 2002 re: Town of Renfrew Landfill Site.

8. Addendum #1 Operation & Development Report Town of Renfrew Landfill Site prepared by Trow Consulting Engineers Ltd. and dated February 28, 2002.

9. Letter from L.A. McKee of Trow Consulting Engineers Ltd. to E.Zaltsberg of the MOE dated March 28, 2002 re: Town of Renfrew Landfill Site.

10. 2001 Ground and Surface Water Monitoring Report Town of Renfrew Landfill prepared by Trow Consulting Engineers Ltd. and dated March, 2002.

11. Application for a Provisional Certificate of Approval for a Waste Disposal Site dated May 28, 2002 and signed by W.P. Fraser, the Director of Development & Works, Corporation of the Town of Renfrew.

12. Letter dated July 28, 2005 Re: Town of Renfrew Landfill Site, Compliance Report to Andrew Polley, Ministry of the Environment, from Michel Asselin and Hiran Sandanayake, Trow Associates Inc.

13. Application for a Provisional Certificate of Approval for a Waste Disposal Site dated April 23, 2008.

14. Letter dated April 14, 2008 from Michel Asselin, P.Eng., Director of Development Works addressed to the Ministry of the Environment, Environmental Assessment and Approvals Branch.

15. Letter dated April 30, 2008 from P.A.S. Benson, M.Eng., P.Eng., Golder Associates Ltd. addressed to the Ministry of the Environment, Environmental Assessment and Approvals Branch.

16. Application for a Provisional Certificate of Approval for a Waste Disposal Site dated May 1, 2008.

17. Report titled "2008 Annual Report, Renfrew Landfill Site", dated March 2009 prepared by Golder Associates Limited.

18. Table 4 (revised) titled "Proposed 2010 Groundwater Monitoring Program", dated November 2009, submitted VIA electronic mail on November 18, 2009.

19. Report titled "Town of Renfrew, Household Hazardous Waste Depot" dated December 2010 and prepared by Pamela Russell, P.Eng., Associate, Senior Waste Engineer, and Michael Cant, Associate, Canadian Waste Sector Leader, Golder Associates Ltd.

20. Report titled "Responsibilities for Industrial, Commercial and Institutional Users of the HHW Depot, Town of Renfrew HHW Depot" dated December 2010 and prepared by Pamela Russell, P.Eng., Associate, Senior Waste Engineer, and Michael Cant, Associate, Canadian Waste Sector Leader, Golder Associates Ltd.

21. Application for Administrative Amendment to Provisional Certificate of Approval No. A410401, proposed ring road for the Renfrew Landfill located in Renfrew, Ontario, prepared by Golder Associates Ltd. on behalf of the Corporation of the Town of Renfrew, dated November 29, 2011, and supporting documentation.

22. Application, dated March 22, 2013, signed by Michel Asselin, Developments and Works Director. Re: Approval for the use of Tarp and Ground Woodwaste as Alternative Daily Cover, and to change the operating hours of the Landfill, and Household Hazardous Waste Facility. This application contains the following attachments:

    (a) Renfrew Landfill Site Plan of final contours updated, dated August 31, 2012, made by Golder Associates Ltd.
    (b) "Attachment A", dated March 22, 2013. Re: Supporting information about Operational Enhancements, Operation Hours Change and Alternative Daily Cover at the Site.
    (c) Letter dated December 13, 2012, from Michel Asselin, Renfrew Developments and Works Director, to adjacent Neighbours of the landfill Site, and a List of Notice Recipients. Re: Information about the proposed Operational hours change, and the use of new alternatives for Daily Cover at the Site.

23. A letter dated July 29, 2013, from Megan K. Farnel, P. Eng. Environmental Engineer, Golder Associates Ltd. to Aracelis Carbonell, Project Engineer Intern, Waste Division,

MOE, EAB. Re: Response to General letter, dated May 23, 2013. Re: Comments about application to amend the ECA: A410401, MOE Reference No: 2220-96DRQW. This letter has the following attachments:

(a) Table 1: "Diverted Materials".
(b) Letter dated July 26, 2013 from Andria Caletti, Engineer in Training, Golder Associates Ltd. to Director of Environmental Approvals Access, and Service Integration Branch, MOE. Re: Renfrew Landfill proposed Monitoring Program amendment response to approved changes, with the following attachments:

    (i) Tables 1: "2013 Groundwater Monitoring Program", Table 2: "2013 Surface Water Monitoring Program", and Table 3: "2013 Landfill Gas Monitoring Program".
    (ii) Letter dated July 15, 2013, from Steve Burns, Ottawa MOE District Manager, to Mike Asselin, Public Works Director of Town of Renfrew. Re: Proposed Monitoring Program amendment.
    (iii) Letter dated May 24, 2011, from S. Richards, M. Sc., P. Eng., Golder Associates Ltd., Environmental Engineer, to Steve Burns, Ottawa MOE District Manager. Re: Proposed changes to the Surface and Groundwater Monitoring Program and Landfill Gas Monitoring, Renfrew Landfill Site.

24. A letter dated August 26, 2013, from Megan K. Farnel, P. Eng. Environmental Engineer, Golder Associates Ltd., to Aracelis Carbonell, Project Engineer Intern, Waste Division, MOE, EAB. Re: Supporting information about the application to amend the ECA A410401, MOE Ref: 2220-96DRQW.

25. Letter report Re: Request to Amend Surface Water and Groundwater Monitoring Program at the Renfrew Landfill, dated January 27, 2020 from Andria Caletti, P.Eng. and Trish Edmond, M. E. Sc., P.Eng., Golder Associates Ltd. to Director, Ministry of the Environment, Conservation and Parks.

26. Letter report dated June 5, 2020 from Emily Bacon, M.Eng., E.I.T. and Trish Edmond, M.E.Sc., P.Eng, Golder Associates Ltd. to Mr. Tyler Armstrong, Town of Renfrew, Re: Supplemental Information for a Re-Use Centre at Renfrew Landfill Site.

27. Environmental Compliance Approval Application dated March 20, 2024 and signed Amanda Springer, Manager of Environmental Services
The Corporation of the Town of Renfrew, including the attached supporting documentation.

28. Letter dated July 20, 2023 (revised December 2024) from Andria L. Caletti, P. Eng., Environmental Engineer and Trish L. Edmond, M.E.Sc., P.Eng. Principal, Geoenvironmental Engineer, WSP Canada, to Tracy Hart, District Manager, Ottawa District Office, Ministry of Environment, Conservation and Parks Re: Summary of Revised Trigger Mechanism for the Renfrew Waste Disposal Site (ECA No. A4104010).

29. Letter dated July 20, 2021 from Emily Bacon, M.Eng., EIT, Environmental Consultant and Trish Edmond, M.E.Sc., P.Eng., Principal, Geoenvironmental Engineer, Golder Associates Ltd., to Tracy Hart, District Manager, Ottawa District Office, Ministry of Environment, Conservation and Parks Re: Summary of Possible Surface Water Contingency Measures for the Renfrew Waste Disposal Site (ECA No. A4104010), Renfrew, Ontario.

30. Letter report dated January 18, 2021 addressed to Tracy Hart, District Manager Ministry of Environment, Conservation and Parks (MECP), Ottawa MECP District Office Re: REVIEW OF SEWAGE SLUDGE DISPOSAL PRACTICES, RENFREW LANDFILL, RENFREW, ONTARIO, prepared by Emily Bacon, M.Eng., EIT and Trish Edmond, Golder Associates Ltd.

Schedule 2
Surface Water Monitoring Program

Monitoring Sessions	**Sampling Stations**	**Laboratory Parameters**	**Field Parameters**
Spring and Fall	S7D, S8, S9	Boron, iron, manganese, potassium, alkalinity, ammonia, dissolved organic carbon (DOC), total Kjeldahl nitrogen (TKN)	Temperature, pH, conductivity, dissolved oxygen, and flow
Spring and Fall	S6	Arsenic, barium, boron, cadmium, chromium, calcium, copper, iron, lead, magnesium, manganese, mercury, potassium, sodium, zinc, chloride, nitrate, nitrite, total phosphorous, alkalinity, ammonia, biochemical oxygen demand (BOD), chemical oxygen demand (COD), dissolved organic carbon (DOC), hardness, phenols, total dissolved solids (TDS), total Kjeldahl nitrogen (TKN), total suspended solids (TSS)	Temperature, pH, conductivity, dissolved oxygen, and flow

Schedule 3
Groundwater Monitoring Program

Monitoring Sessions	**Sampling Stations**	**Laboratory Parameters**	**Field Parameters**
Spring and Fall	OMM 5, OMM 6, OMM 7, OMM 8, OMM 9, OMM 14S, OMM 14M, OMM 14D, OMM 15, BH10-1, BH10-2A, BH10-2B, BH11-01	Arsenic, barium, boron, cadmium, chromium, calcium, copper, iron, lead, magnesium, manganese, mercury, potassium, sodium, zinc, chloride, nitrate, nitrite, total phosphorous, alkalinity, ammonia, chemical oxygen demand (COD), dissolved organic carbon (DOC), hardness, sulphate, total dissolved solids (TDS), total Kjeldahl nitrogen (TKN), phenols	Temperature, pH, conductivity
Fall	OMM 7, OMM 8, OMM 9, OMM 14D, OMM15, BH11-01	Volatile organic compounds (VOCs)	

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

GENERAL

- The reason for conditions 1.1, 1.2, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.18, 1.19 and 1.20 is to clarify the legal rights and responsibilities of the Owner and Operator under this Approval.

- The reasons for conditions 1.3, 1.4, 1.5 and 7.6 are to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.

- The reasons for condition 1.11 are to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the Director is informed of any changes.

- The reasons for condition 1.12 are to restrict potential transfer or encumbrance of the Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Approval.

- The reason for condition 1.13 is to ensure that the successor is aware of its legal responsibilities.

- The reasons for conditions 1.14, 1.15 and 1.16 are that the Part II.1 Director is an individual with authority pursuant to Section 197 of the Environmental Protection Act to require registration on title and provide any person with an interest in property before dealing with the property in any way to give a copy of the Approval to any person who will acquire an interest in the property as a result of the dealing.

- The reason for condition 1.17 is to ensure that appropriate Ministry staff has ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this Approval. This condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the Act, the OWRA, the PA, the NMA and the SDWA.

- Condition 1.21 has been included in order to clarify what information may be subject to the Freedom of Information Act.

SITE OPERATION

- The reasons for conditions 2.1, 2.5 and 6.3 are to ensure that the Site is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.

- The reason for conditions 2.2, 2.3 and 2.4 is to ensure that users of the Site are fully aware of important information and restrictions related to Site operations and access under this Approval.

- The reasons for condition 2.6 are open burning of municipal waste is unacceptable because of concerns with air emissions, smoke and other nuisance effects, and the potential fire hazard.

- The reasons for condition 2.7, 2.8 and 2.9 are to specify the hours of operation for the landfill site and a mechanism for amendment of the hours of operation, as required.

- The reasons for condition 2.10 and 2.11 are to ensure that the Site is supervised by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person and to ensure the controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no site attendant is on duty.

EMPLOYEE TRAINING

- The reason for condition 3.1 is to ensure that the Site is supervised and operated by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person.

COMPLAINTS RESPONSE PROCEDURE

- The reason for condition 4.1 is to ensure that any complaints regarding landfill operations at this Site are responded to in a timely and efficient manner.

EMERGENCY RESPONSE

- Conditions 5.1 and 5.2 are included to ensure that emergency situations are reported to the Ministry to ensure public health and safety and environmental protection.

- Conditions 5.3, 5.4 and 5.5 are included to ensure that emergency situations are handled in a manner to minimize the likelihood of an adverse effect and to ensure public health and safety and environmental protection.

RECORD KEEPING AND REPORTING

- The reason for conditions 6.1 and 6.2 is to ensure that accurate waste records are maintained to ensure compliance with the conditions in this Approval (such as fill rate, site capacity, record keeping, annual reporting, and financial assurance requirements), the EPA and its regulations.

- The reason for conditions 6.4 and 6.5 is to ensure that detailed records of Site inspections are recorded and maintained for inspection and information purposes.

- The reasons for conditions 6.6 and 6.7 are to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design,

operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.

LANDFILL DESIGN AND DEVELOPMENT

- The reason for conditions 7.1 to 7.7 inclusive is to specify the approved areas from which waste may be accepted at the Site and the types and amounts of waste that may be accepted for disposal at the Site, based on the Owner's application and supporting documentation.

- Condition 7.8 is to provide the Owner the process for getting the approval for alternative daily and intermediate cover material.

- The reasons for condition 7.9 are to ensure that daily/weekly and intermediate cover are used to control potential nuisance effects, to facilitate vehicle access on the Site, and to ensure an acceptable site appearance is maintained. The proper closure of a landfill site requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the Site.

- Condition 7.10 is included to approve alternative daily cover material for the Site.

- The reason for condition 7.11.a is included to approve the request by the Owner to leave the waste in Fill Beyond Approved Limits in the same location. This reason for this approval is to ensure that the waste is dealt with in an environmentally acceptable manner.

- Condition 7.11.b and 7.11.c are included to ensure that this waste does not result in a hazard or nuisance to the natural environment or any person. The proper closure of this area requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the Site.

- The reason for condition 7.12 is to approve the construction of the proposed on-site ring road at the Renfrew Landfill Site, to return the Site to the original conditions as per the original landfill design, and to provide improved access to portions of the Site, all in accordance with the application for approval dated November 29, 2011, and supporting information and documentation prepared by Golder Associates Ltd. on behalf of the Corporation of the Town of Renfrew.

LANDFILL MONITORING

- Reasons for conditions 8.1.a and 8.1.b are to ensure that landfill gas is monitored and all buildings at the Site are free of any landfill gas accumulation, which due to a methane gas component may be explosive and thus create a danger to any persons at the Site.

- Condition 8.2 is included to provide the groundwater and surface water limits to prevent water pollution at the Site.

- Conditions 8.3 and 8.4 are included to require the Owner to demonstrate that the Site is performing

as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.

- Conditions 8.5, 8.6 and 8.7 are included to ensure the integrity of the groundwater monitoring network so that accurate monitoring results are achieved and the natural environment is protected.

- Conditions 8.8 to 8.12 inclusive are added to ensure the Owner has a plan with an organized set of procedures for identifying and responding to potential issues relating to groundwater and surface water contamination at the Site's compliance point.

- Conditions 8.13 and 8.14 are included to streamline the approval of the changes to the monitoring plans and trigger mechanisms and contingency plans.

- Condition 8.15 to 8.19 inclusive is included to require the Owner to obtain property rights and/or groundwater easements on land(s) that is required for a Contaminant Attenuation Zone that is necessary for attenuation of contamination resulting from the operation of the Site to bring the Site into compliance with Reasonable Use Guideline B-7.

CLOSURE PLAN

- The reasons for condition 9 are to ensure that final closure of the Site is completed in an aesthetically pleasing manner, in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.

WASTE DIVERSION

- Condition 10 is included to ensure that the recyclable materials are stored in their temporary storage location and transferred off-site in a manner as to minimize a likelihood of an adverse effect or a hazard to the natural environment or any person.

HHW

- The reasons for the condition 11 are to approve collection of MHSW and to ensure that the wastes are managed in a manner that protects the environment and the health and safety of the public.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A410401 issued on July 20, 2020

In accordance with Section 139 of the *Environmental Protection Act,* you may by written notice served upon me and the Ontario Land Tribunal within 15 days after receipt of this notice, require a hearing by the Tribunal. Section 142 of the *Environmental Protection Act* provides that the notice requiring the hearing ("the Notice") shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;

b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the *Environmental Protection Act,* a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

Registrar*
Ontario Land Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5
OLT.Registrar@ontario.ca

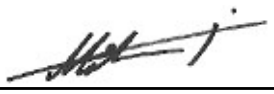
and

The Director appointed for the purposes of Part II.1 of the *Environmental Protection Act*
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Ontario Land Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349 or 1 (866) 448-2248, or www.oltt.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the *Environmental Protection Act.*

DATED AT TORONTO this 4th day of December, 2024



Mohsen Keyvani, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

RM/
c: District Manager, MECP Ottawa
Andria Caletti, P.Eng., WSP Canada Inc.

APPENDIX B

MECP Consultation Record

From:	Munasinghe, Ranjani (MECP)
To:	Caletti, Andria; Ponalo, Thandeka (MECP); Tieu, Emily (She/Her) (MECP); Martin, Eric (He/Him) (MECP); Cruikshank, Dana (MECP); Amanda Springer; Eric Withers; Edmond, Trish
Subject:	RE: Renfrew Landfill (ECA A410401) - Summary of Pre-Consultation January 2024
Date:	January 23, 2024 7:34:41 AM
Attachments:	image001.png

Good Morning,

Please see the highlighted section. We agreed you can use stage 5 area as long as 557,400 m^3 is not exceeded by this action. But to change the design you still require an amendment to the ECA.

Kind Regards,

Ranjani Munasinghe, Ph.D., P.Eng. (She/Her)
Senior Waste Engineer | Waste Approvals
T: 437-776-5578

If you have any accommodation needs or require communication supports or alternate formats, please let me know.

Si vous avez des besoins en matière d'adaptation, ou si vous nécessitez des aides à la communication ou des médias substituts, veuillez me le faire savoir.

From: Caletti, Andria <andria.caletti@wsp.com>
Sent: Friday, January 19, 2024 10:35 AM
To: Ponalo, Thandeka (MECP) <Thandeka.Ponalo@ontario.ca>; Tieu, Emily (She/Her) (MECP) <Emily.Tieu@ontario.ca>; Munasinghe, Ranjani (MECP) <Ranjani.Munasinghe@ontario.ca>; Martin, Eric (He/Him) (MECP) <Eric.Martin2@ontario.ca>; Cruikshank, Dana (MECP) <Dana.Cruikshank@ontario.ca>; Amanda Springer <aspringer@renfrew.ca>; Eric Withers <ewithers@renfrew.ca>; Edmond, Trish <trish.edmond@wsp.com>
Subject: Renfrew Landfill (ECA A410401) - Summary of Pre-Consultation January 2024

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi All,

The following is a summary of the call held on January 11, 2024 regarding the short-term landfilling and proposed final contour revision at the Renfrew Landfill Site (Site) (ECA No. A410401). Materials presented at the meeting are attached.

Attending:

Ministry of the Environment, Conservation and Parks (MECP): Thandeka Ponalo (District Office), Emily Tieu (District Office), Ranjani Munasinghe (Permissions), Eric Martin (GW TS), Dana Cruikshank (SW TS)
Town of Renfrew (Town): Amanda Springer, Eric Withers

WSP: Trish Edmond, Andria Caletti

WSP indicated that the purpose of the meeting was to confirm the regulatory requirements and approval process associated with some short and long term options that the Town is considering in order to address some existing conditions impacting landfill operations at the Site. WSP presented the agenda for the meeting, which included a discussion of the existing conditions having an impact on operations, proposed solutions (i.e., update to the final contours and/or waste fill limit), discussion of regulatory requirements and review/approval process, and discussion of plans for short term landfilling in the area of the site that has historically been understood to be "Stage 5".

Overview of Existing Conditions

WSP described the following two issues that are impacting landfill operations at the Site:

1. **Steep Waste Slopes** along the north and west sides of the landfill that have been developed over time are too steep to adequately compact and provide soil cover. There is some fill above the approved contours that cannot safely be removed due to the steepness of the slopes, noting that the approved contours are irregular and not feasible or practical to landfill to in some areas of the landfill. Due to the height of the steep slopes and their extents along the west and north sides of the landfill, it was acknowledged that this could not be rapidly addressed by the Town, and an engineering solution is required to address the issue.
2. **Steep Native Sand Slopes** around the north and west sides of the landfill have been identified to be potentially unstable as they are in some cases much steeper than 2H:1V. For reasons related to safety, waste placement in close proximity to the toe of these sand slopes should not occur until the sand slopes are flattened. In particular in the north corner where there remains airspace based on the existing final contours, there is limited space between the edge of the waste and the toe of the native sand slope, so continued landfilling in this area to meet the approved contours would require building up the top of the waste mound; without the ability to fill near the toe of slope, there is a risk of repeating the development of steep waste slopes as occurred on the west side of the landfill.

Proposed Solution: Final Contour / Waste Limit Revision

Consistent with previous discussions with the MECP in 2023, the Town is planning to submit an ECA Amendment to revise the final contours for the Site. The revised final contours would capture the fill above approved contours, buttress the steep waste slopes, correct the irregularities in the current approved contours and would consider requirements to regrade or limit landfilling adjacent to the native sand slopes. The revised contours would be developed to respect the existing identified but unapproved capacity of the landfill of 1,069,000 m^3 defined by Condition 7.4 of ECA No. A410401. It was clarified by the MECP that revised contours should also be provided showing the extent of proposed waste placement up to a volume of 557,400 m^3, which is the volume that is currently approved for landfilling without submission and approval of documentation defined by Condition 7.6 of ECA No. A410401.

As part of the revision to the final contours, the Town is considering a change in the waste fill limit.

The proposed change would extend the waste fill limit toward the west (while not exceeding the approved capacity for the site, and respecting the required 30m buffer). The MECP confirmed that a hydrogeological study would not be required to support such a change to the waste limit, unless the revision resulted in a volume exceeding 557,400 m^3 in which case a hydrogeological study would be required in accordance with Condition 7.6 of ECA No. A410401. GW TS and SW TS indicated that they had no issue with the westward extension of the waste limit as described.

The MECP clarified that a revision to the final contours (whether the waste limit is proposed to change or not) would require:

- A revision to the Design and Operations (D&O) Report for the Site, to be submitted as supporting documentation for the ECA Amendment Application for the final contour revision.
- Concurrence from Groundwater and Surface Water Technical Support with the monitoring programs proposed in the D&O Report.
    - Both the representatives from GW TS and SW TS agreed that the proposed monitoring programs could be provided separate from the D&O Report for review.
    - The representative from SW TS indicated that they would like for the proposed surface water monitoring program to include the full suite of leachate indicator parameters for the stations in the Bonnechere River.

Short-Term – Landfilling in Stage 5

WSP presented the existing figures from the D&O Report (1997) indicating a delineation between "Stage 4" (i.e., approved) and "Stage 5" (requiring approval). As discussed above, the Town is limited in their ability to continue to place waste in the west, north and east portions of the Site due to the steep waste slopes and / or steep native sand slopes, and as such the Town would like to undertake landfilling at the south toe of the existing landform (shown as Stage 2-4). Consistent with the discussion regarding the final contour re-design, it was agreed that the requirement for submissions in accordance with Condition 7.6 of ECA No. A410401 would be triggered by the intended placement of waste in excess of 557,400 m^3 and not based on the specific location of waste placement relative to the delineation indicated in the D&O Report. It was agreed that provided that the 557,400 m^3 is not exceeded by this action, the Town could undertake landfilling in this area as soon as needed without submission or approval requirements.

Change to Operating Hours

The Town indicated that they are considering a change to the operating hours for the Site. The MECP confirmed that this could be included in the ECA Amendment Application for the final contour revision, or as a separate application for an administrative amendment. The MECP (Permissions) indicated that neighbours within 500m of the site are required to be notified of proposed changes.

If you have any comments on this record, please don't hesitate to contact us.

Thank you,

Andria

Andria Caletti
Geo-Environmental Engineer, Waste Team Lead
P.Eng.
She/Her

T+ 1 613-592-9600
M+ 1 613-983-4654

WSP Canada Inc.
1931 Robertson Road
Ottawa, Ontario
K2H 5B7 Canada

wsp.com

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Renfrew Landfill Site

Waste Contour / Waste Fill Limit Modifications

ECA No. A410401

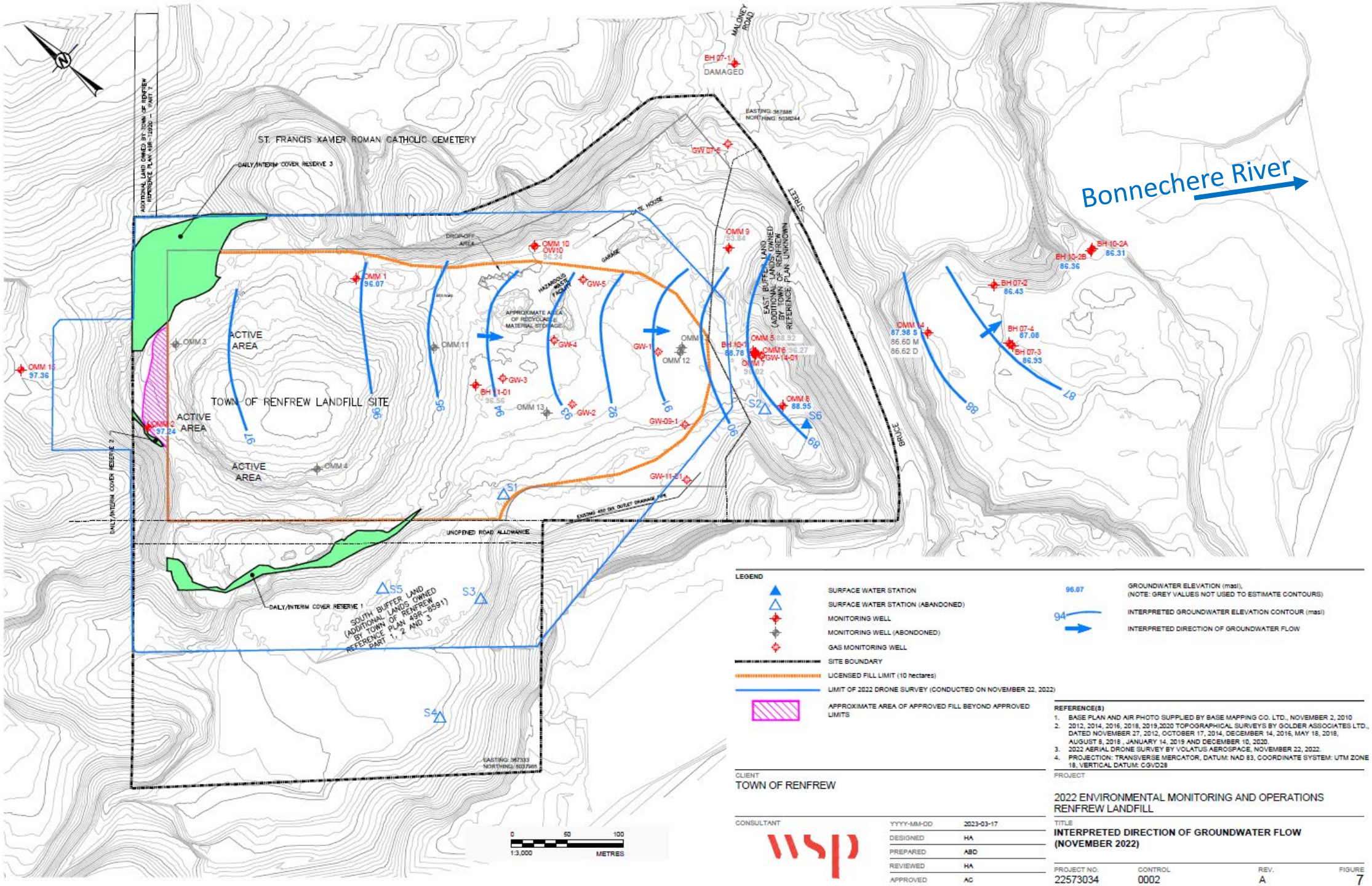
January 11, 2024

Purpose of Meeting:

Confirm the regulatory requirements and review process / timeline associated with some short- and long-term options to address existing conditions affecting landfilling operations at the Renfrew Landfill Site.

Agenda

1) Overview of Existing Conditions
2) Proposed Solution: Final Contour / Waste Fill Limit Revision
3) Regulatory Requirements and Review Process
4) Landfilling in Stage 5



LEGEND

- SURFACE WATER STATION
- SURFACE WATER STATION (ABANDONED)
- MONITORING WELL
- MONITORING WELL (ABONDONED)
- GAS MONITORING WELL
- SITE BOUNDARY
- LICENSED FILL LIMIT (10 hectares)
- LIMIT OF 2022 DRONE SURVEY (CONDUCTED ON NOVEMBER 22, 2022)
- APPROXIMATE AREA OF APPROVED FILL BEYOND APPROVED LIMITS
- 96.07 GROUNDWATER ELEVATION (masl), (NOTE: GREY VALUES NOT USED TO ESTIMATE CONTOURS)
- 94 INTERPRETED GROUNDWATER ELEVATION CONTOUR (masl)
- INTERPRETED DIRECTION OF GROUNDWATER FLOW

REFERENCE(S)

1. BASE PLAN AND AIR PHOTO SUPPLIED BY BASE MAPPING CO. LTD., NOVEMBER 2, 2010
2. 2012, 2014, 2016, 2018, 2019,2020 TOPOGRAPHICAL SURVEYS BY GOLDER ASSOCIATES LTD., DATED NOVEMBER 27, 2012, OCTOBER 17, 2014, DECEMBER 14, 2016, MAY 18, 2018, AUGUST 8, 2018 , JANUARY 14, 2019 AND DECEMBER 10, 2020.
3. 2022 AERIAL DRONE SURVEY BY VOLATUS AEROSPACE, NOVEMBER 22, 2022.
4. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

CLIENT
TOWN OF RENFREW

CONSULTANT
wsp

PROJECT
2022 ENVIRONMENTAL MONITORING AND OPERATIONS
RENFREW LANDFILL

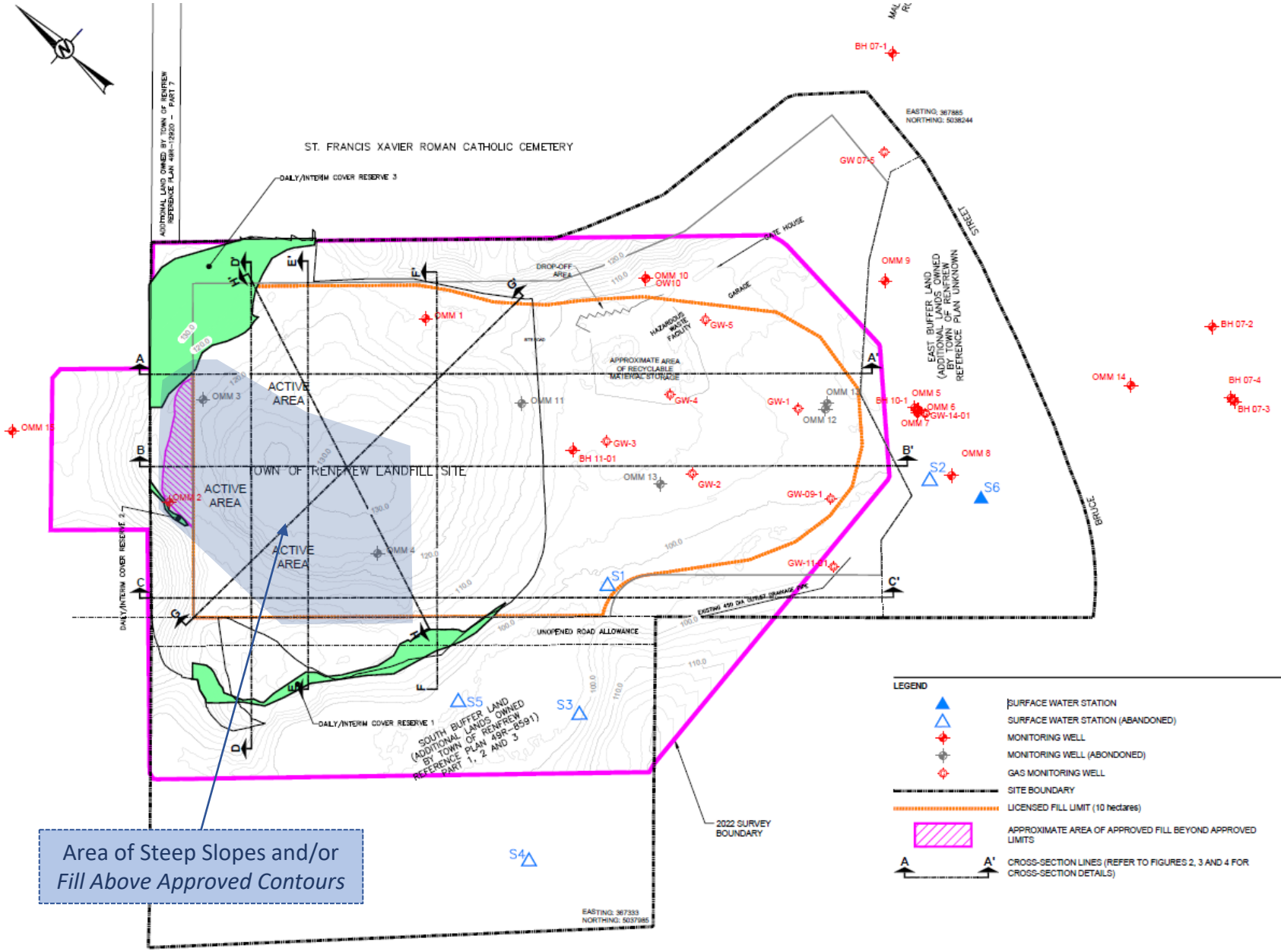
TITLE
INTERPRETED DIRECTION OF GROUNDWATER FLOW (NOVEMBER 2022)

YYYY-MM-DD	2023-03-17
DESIGNED	HA
PREPARED	ABD
REVIEWED	HA
APPROVED	AC

PROJECT NO.	CONTROL	REV.	FIGURE
22573034	0002	A	7

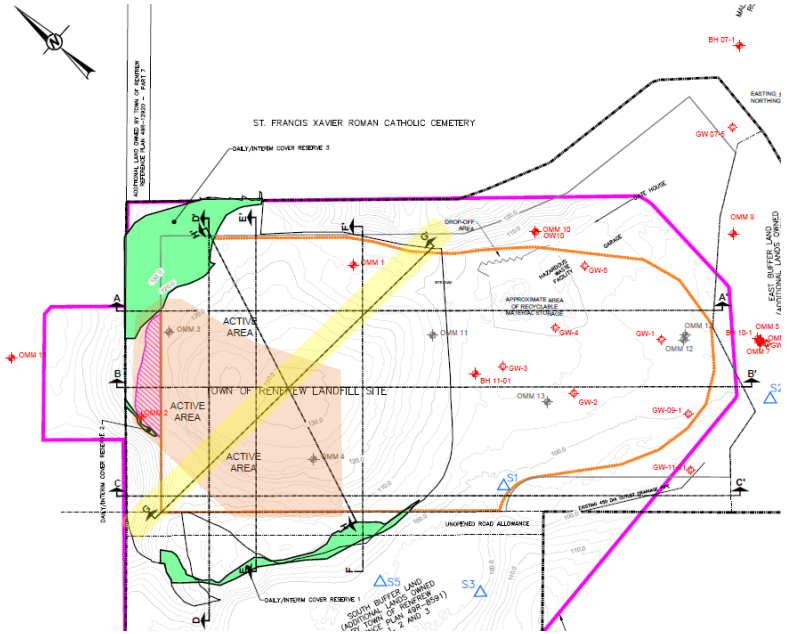
Issue 1: Steep Waste Slopes

- Existing slopes are **too steep** to landfill (compaction and soil cover)
- There is existing *Fill Above Approved Contours*
  - Not feasible to remove and relocate the *Fill Above Approved Contours* due to steepness of existing slopes
- Approved Contours are irregular, and in some locations not feasible to achieve



Area of Steep Slopes and/or *Fill Above Approved Contours*

Section G-G’

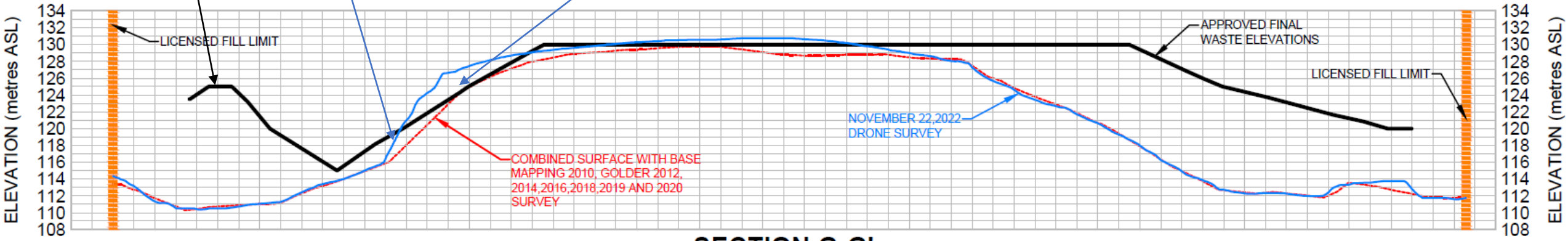




Approved Contours not Feasible

Slope: ~0.9H:1V

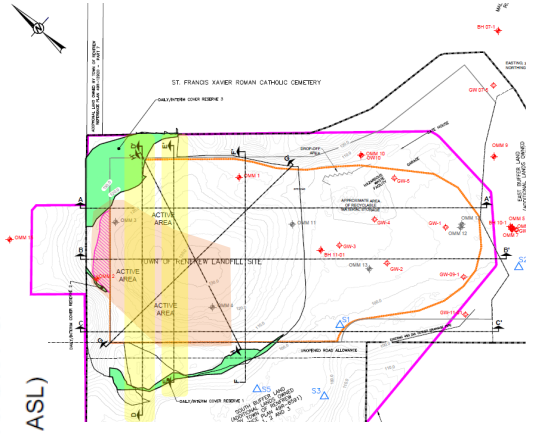
Fill Above Approved Contours

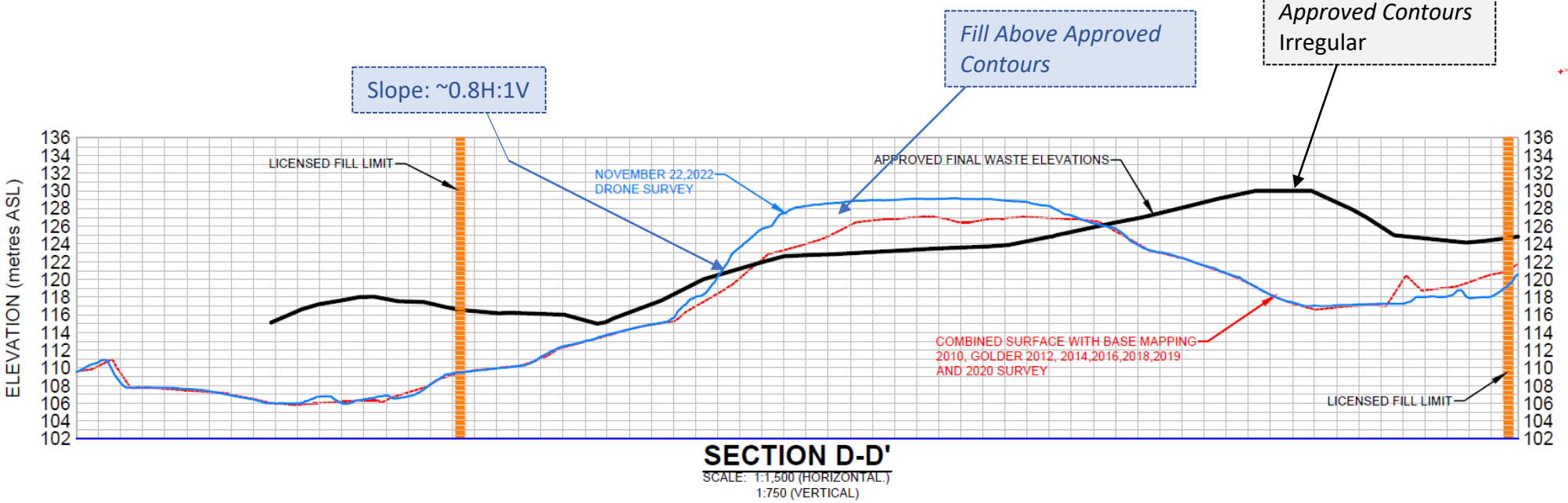


SECTION G-G'

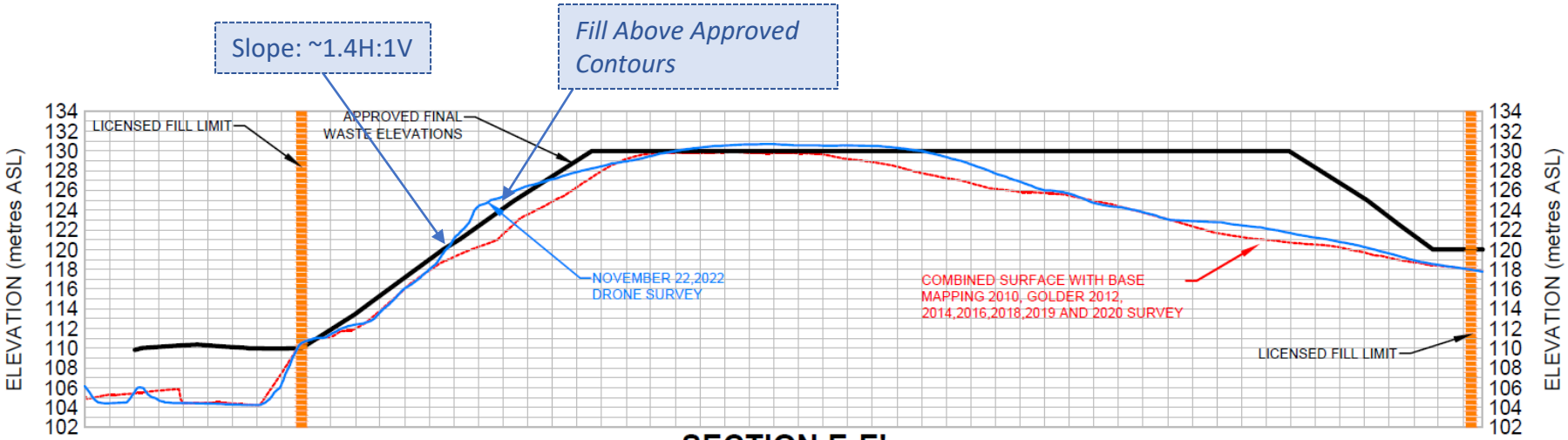
SCALE: 1:1,500 (HORIZONTAL.)
1:750 (VERTICAL)

Section D-D’ and E-E’





SECTION D-D'
SCALE: 1:1,500 (HORIZONTAL.)
1:750 (VERTICAL)

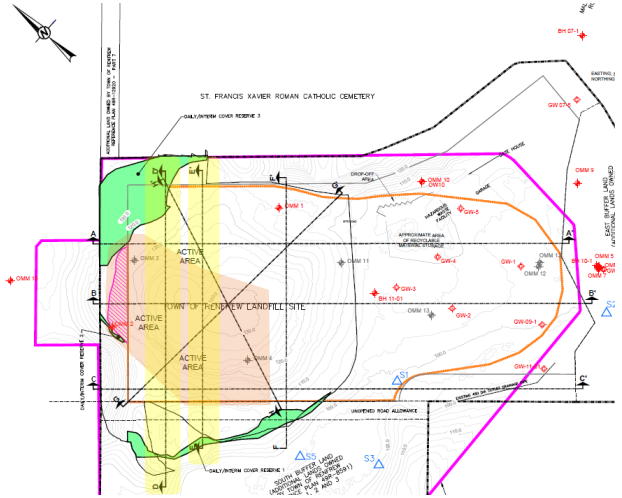


SECTION E-E'
SCALE: 1:1,500 (HORIZONTAL.)
1:750 (VERTICAL)

Section D-D’ and E-E’



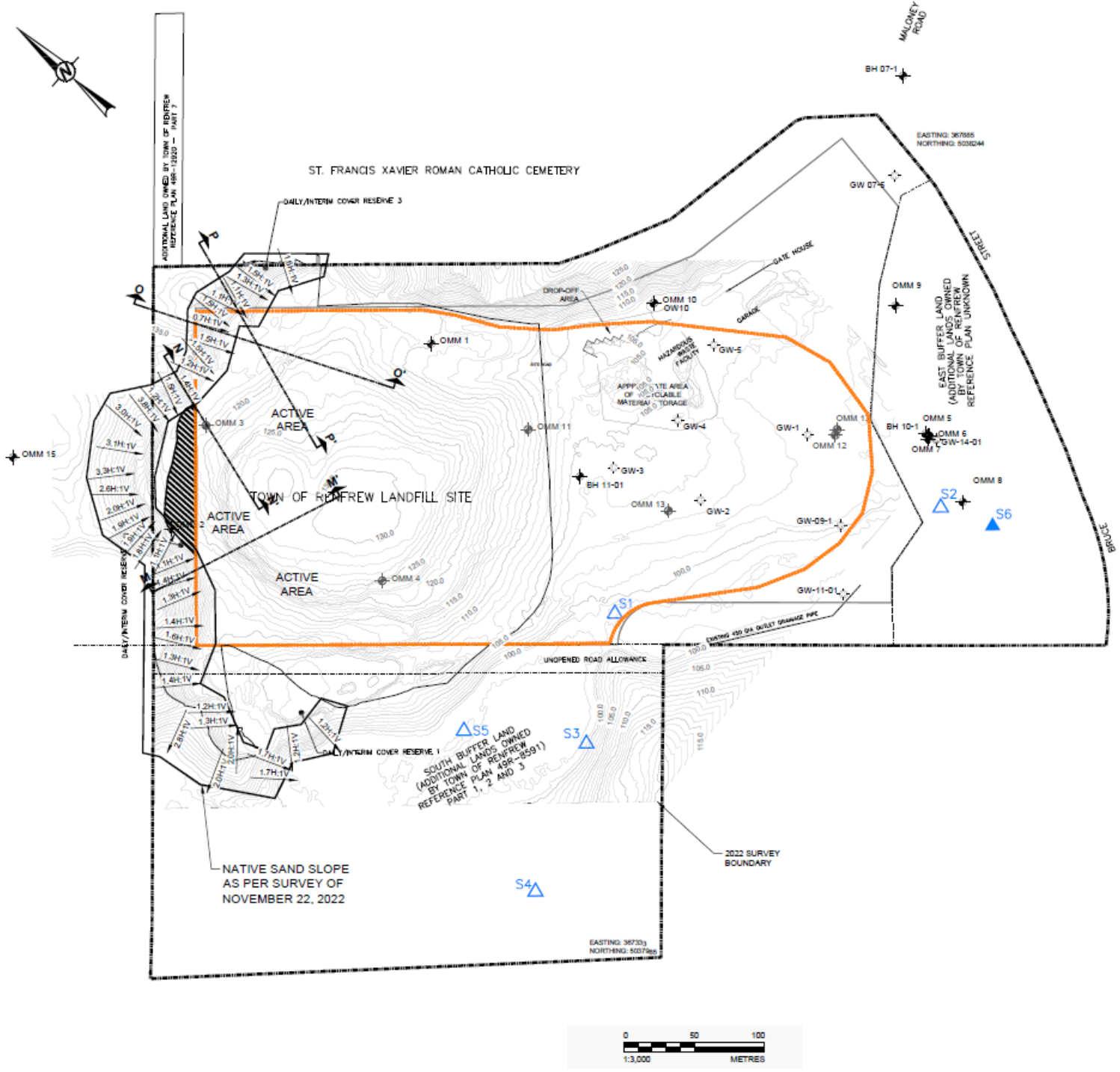


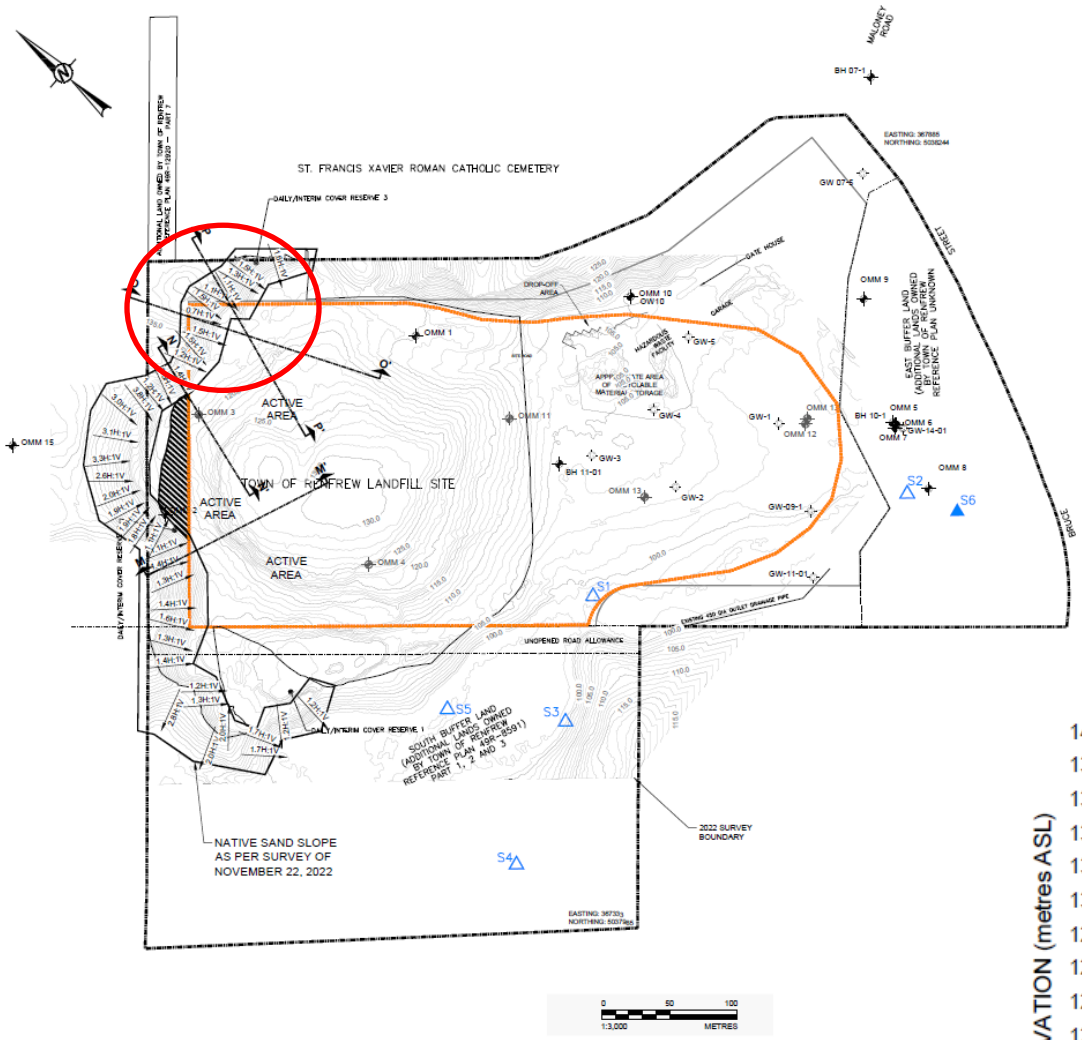




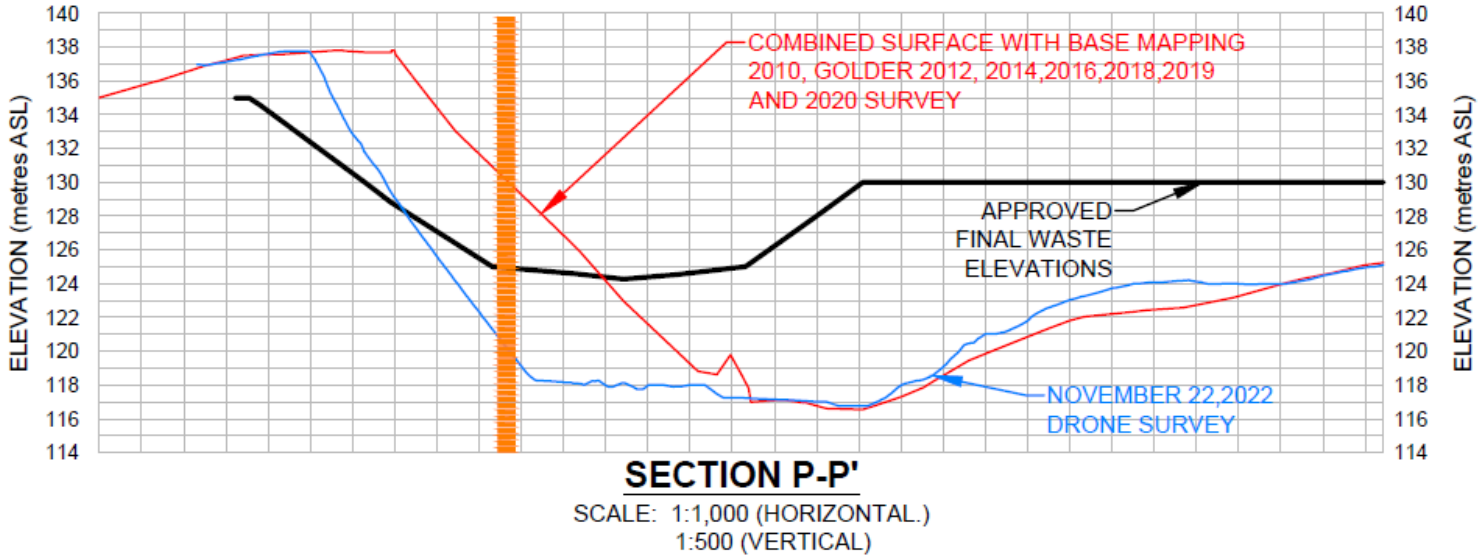
Issue 2: Steep Native Sand Slopes

- Steep native sand slopes around north and west sides of landfill are considered potentially unstable (>2H:1V)
- For reasons of safety, there is limited ability to place waste at the toe of slope
  - Continued waste placement at top of slope risks development of new steep waste slopes









SECTION P-P'

SCALE: 1:1,000 (HORIZONTAL.)
1:500 (VERTICAL)

Proposed Solution: Final Contour / Waste Fill Limit Revision

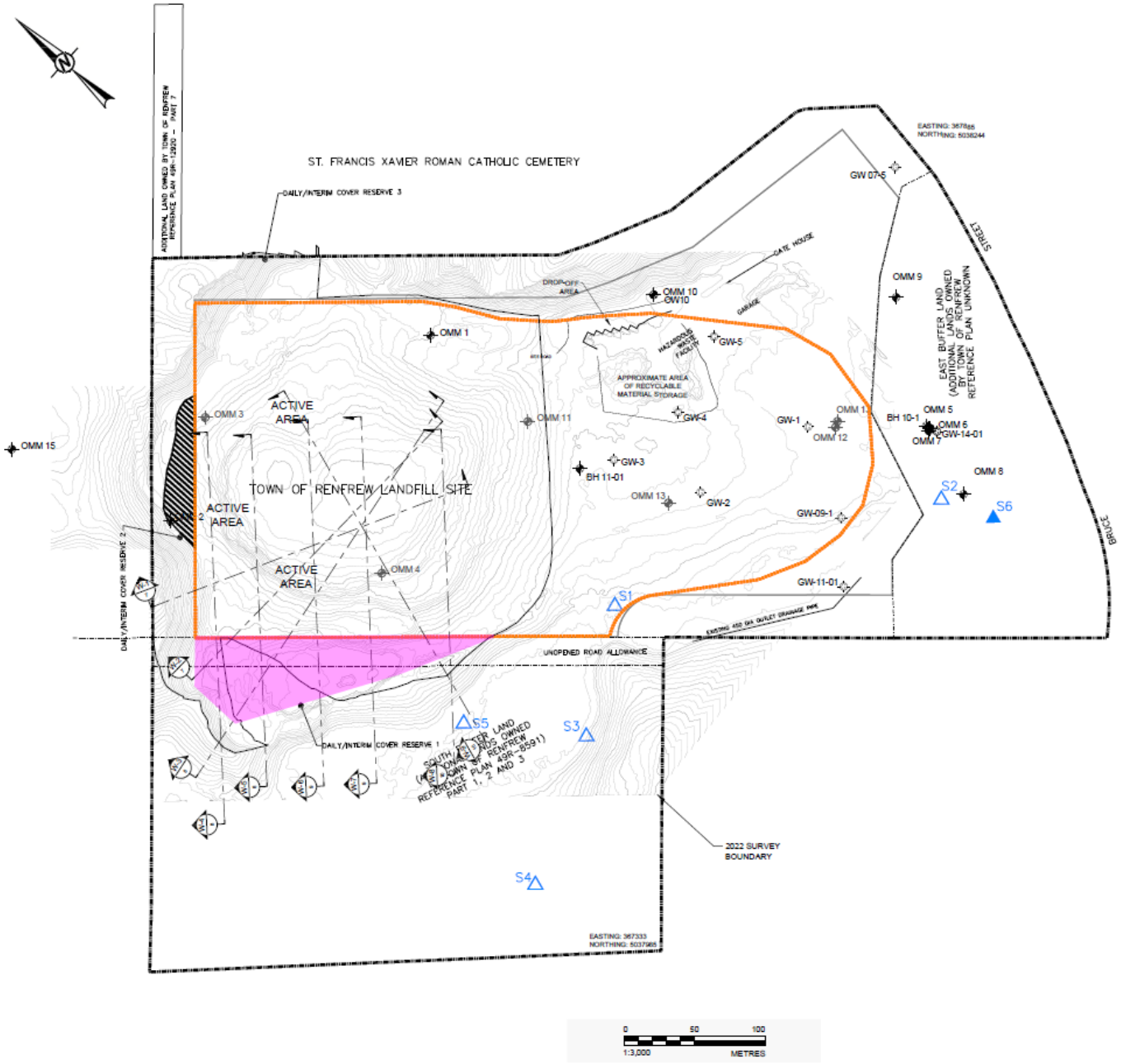
Submit for approval (ECA Amendment) *Revised Final Contours* to:

- Capture *Fill Above Approved Contours / Fill Beyond Approved Limits*
- Buttress steep waste slopes
- Correct irregularities in the *Approved Contours*
- Consider requirements to regrade and/or limit landfilling adjacent to native sand slopes

The *Revised Final Contours* would be developed to respect the existing capacity defined in **Condition 7.4 of ECA No. A410401**, which states:

> *The maximum volumetric capacity of the Site, consisting of the waste, daily cover and intermediate cover, but excluding the final cover is 1,069,000 cubic metres.*

The *Fill Above Approved Contours / Fill Beyond Approved Limits* would be included in the approved volumetric capacity of 1,069,000 m^3.

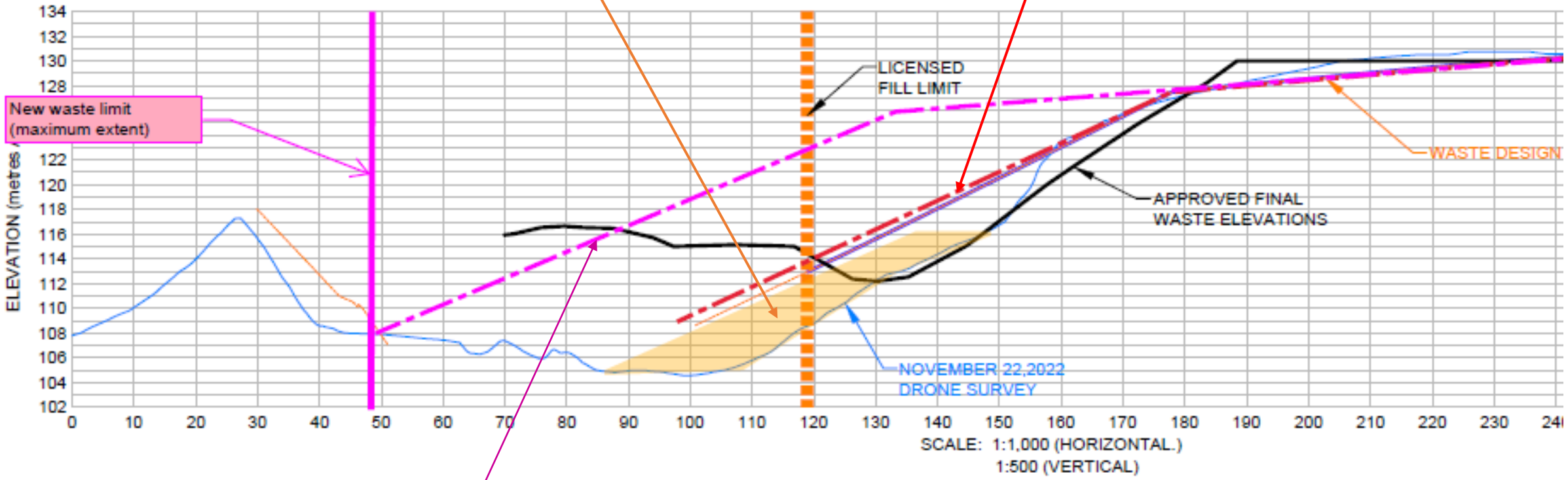


Option for Contour Revision: Extend Waste Fill Limit to the West

- Respect approved maximum capacity (1,069,000 m^3)
- Maintain minimum 30m buffer with property boundary
- More efficient use of airspace (see next slide)
- Potential hydrogeological benefit (i.e., re-allocating available airspace to location that is further upgradient)

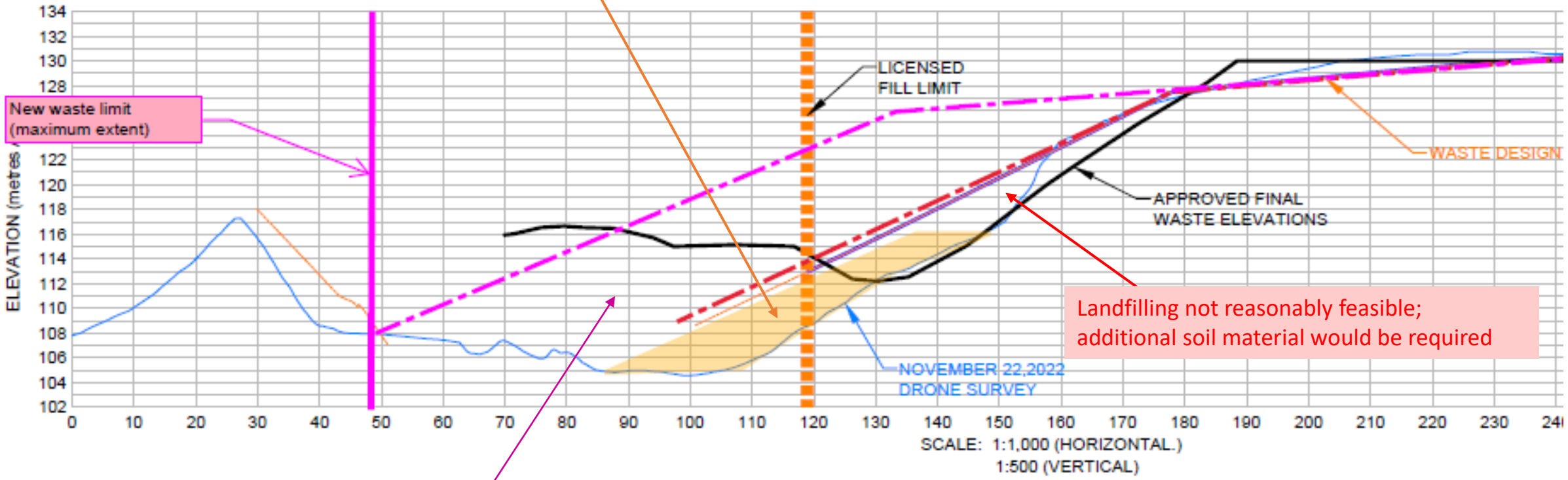
Soil Buttress required to facilitate waste slope regrading; construction planned for 2024
(Note: uncontaminated soil outside of waste fill limit)

Revised Contours with no extension
(Conceptual Only)



Revised Contours with Extended Waste Fill Limit
(Conceptual Only)

Soil Buttress required to facilitate waste slope regrading; construction planned for 2024
(Note: uncontaminated soil outside of waste fill limit)



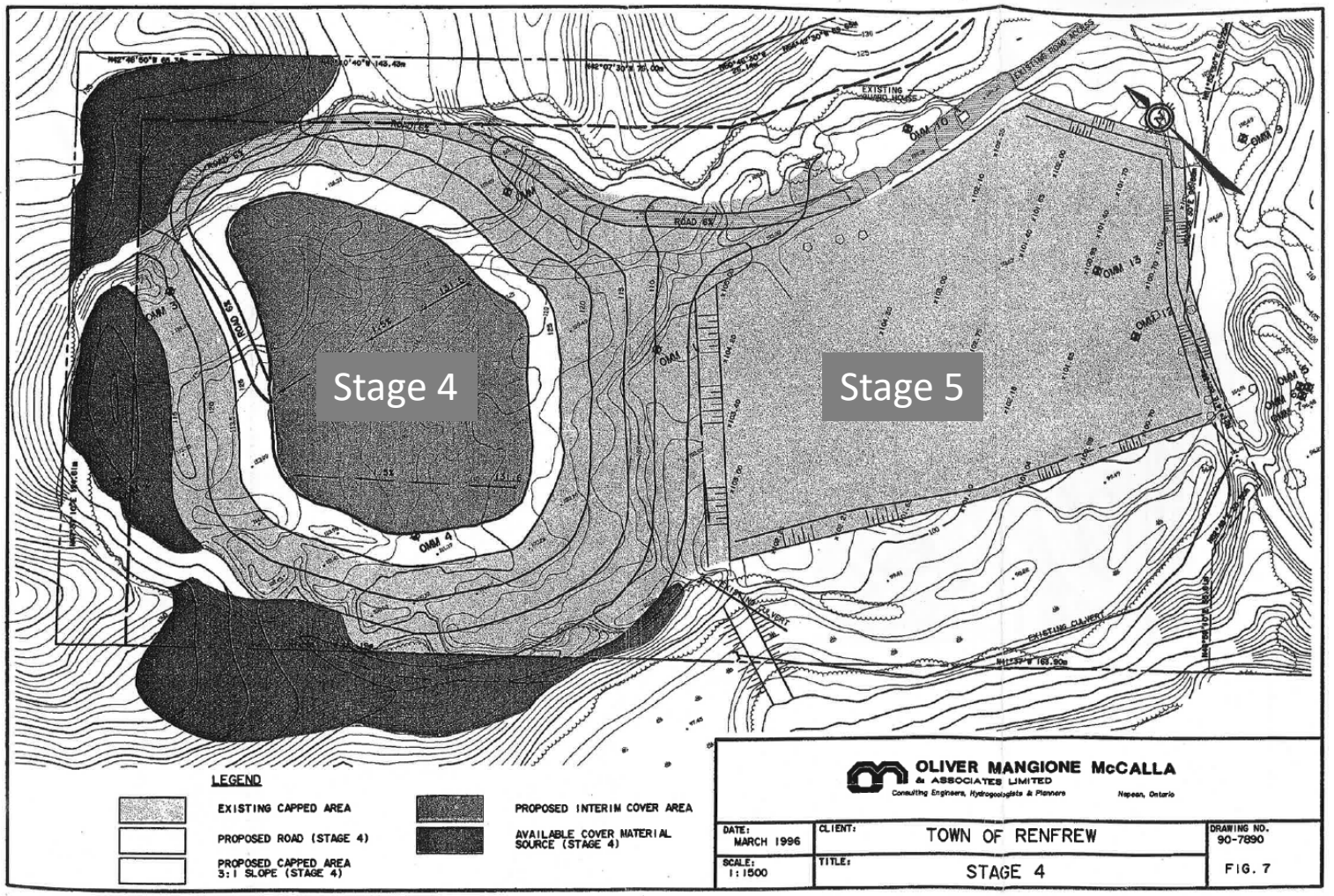
Landfilling not reasonably feasible; additional soil material would be required

Extending footprint allows opportunity for new waste placement as part of slope rehabilitation

Question: What would be required (i.e., assessments, reports, consultation, etc.) in order to revise the waste fill limit?

Note: no change to the total approved capacity proposed. Minimum 30m buffer with property boundary to remain.

Question: What would be the process for the approval (review by Technical Support, ECA Amendment, etc.)? What would be the timeline for review once submitted?



Temporary Landfilling in Stage 5

Due to issues with existing steep waste slopes and steep native sand slopes, there are limited areas in the short term for the Town to continue to landfill in Stage 4.

The Town is considering a request for permission for limited, short-term placement of waste in the northernmost portion Stage 5 (adjacent to Stage 4).

Condition 7.6 of ECA No. A410401 states:

> *At least two (2) years prior to utilizing capacity in Stage 5 the Owner shall submit to the Director for approval, a **design and operation plan** with up to date engineering and environmental standards and a detailed **hydrogeological assessment** for proper and safe development of the remainder of the Site. If the Owner does not intend to use the remaining capacity the Owner shall submit a Closure Plan as per condition 9 of this Approval.*

The Town would be requesting permission for time and/or volume-limited placement of waste in Stage 5 prior to completion of the documentation required by Condition 7.6.

Question: What would be the process for the approval for interim limited landfilling in Stage 5?

Ministry of the Environment, Conservation and Parks
Eastern Region
1259 Gardiners Road, Unit 3
Kingston ON K7P 3J6
Phone: 613.549.4000
or 1.800.267.0974

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région de l'Est
1259, rue Gardiners, unité 3
Kingston (Ontario) K7P 3J6
Tél: 613 549-4000
ou 1 800 267-0974

Ontario

M E M O R A N D U M

April 29, 2025

TO: Thandeka Ponalo
Sr. Environmental Officer
Eastern Region

FROM: Dana Cruikshank
Surface Water Specialist
Eastern Region

RE: 2024 Monitoring Report
Summary Letter Revised Trigger mechanism Renfrew WDS
Renfrew Landfill Site, CoA: A410401
Town of Renfrew
ECHO Ref #: 1-688112897

I have reviewed the above report dated March 2025 as well as the technical memo dated March 11 prepared by WSP Canada with respect to surface water concerns only.

Report Overview:

For 2024 WSP reports:

- The total area of the Renfrew Site is 40.7 ha with a footprint of 10 ha. The site is bounded by a cemetery to the north, Bruce St on the east side, private property to the west and residential and open space to the south. The WDS also has a marshy area in the south buffer lands.

- The estimated remaining site life is 20 years.

- Groundwater flow across the site is from northwest to southeast toward Bruce Street and Bonnechere River located 220 m east of Bruce St.

- Leachate at Renfrew WDS is characterized by elevated concentrations of alkalinity, ammonia, arsenic, barium, boron, chloride, DOC, hardness, iron, manganese, nitrite, TP, sodium, TDS, TKN and sulphate.

- Groundwater monitors east of Bruce St have been evaluated for road salting activities. Based on this evaluation the Leachate Indicator short list has been reduced to alkalinity, ammonia, boron, DOC, iron, manganese, potassium and TKN.

- WSP concludes that the site may be operating according to MECP Guideline B-7.

- Overland drainage from the landfill area and the marsh area is directed to a natural depression “sump” (S6) near the southeast corner of the property, adjacent to the embankment on which Bruce Street is located. There is no natural surface water outlet from the landfill site and that water leaves the site by infiltrating into the groundwater regime and/or by evaporation and evapotranspiration processes.

- There is no available surface water sampling station at the Renfrew Landfill site for the purpose of monitoring ‘background’ surface water quality in the marshy area within the south buffer lands.

- The surface water quality at S3, S4 and S5 in the marshy area were interpreted to be impacted by landfill leachate but were removed from the sampling program in 2020. S6 is also considered to be impacted by landfill leachate.

- Bonnechere River stations were sampled for the short list of leachate indicator parameters only and there were no exceedances of PWQO with the exception of iron at S8 in the spring.

- In 2023, 3 locations were monitored in the Bonnechere River. S7D is located upriver of the site and S7D is downstream of the dam. S9 is adjacent to the site where groundwater is expected to discharge to the River and S8 is located downstream 400 m from S9 and upriver of the sewage treatment plant.

- Data from the Bonnechere River was also compared to concentrations at the water treatment plant. All were below WTP concentrations except for alkalinity, iron and manganese.

- WSP concludes that it does not appear that Renfrew Landfill is having an observable impact on water quality in the Bonnechere River.

- Recommends continued monitoring of the water quality stations in the Bonnechere River

- A new trigger mechanism has been proposed based on water quality data in the Bonnechere River.



Reviewer's Comments

The reviewer averaged all the data for the three stations in the Bonnechere River from 2018-2024. Concentrations reported as < MDL were converted to the MDL using the precautionary approach e.g. (< 10 converts to 10). Differences in average concentrations were calculated. Where the downstream stations had average concentration differences greater than 25% (deemed significant) the cells were shaded yellow. Where downstream stations had concentrations better than 25 % of upstream, they were coloured green. The relative concentration column shows the relative concentrations for each parameter as you move upstream to downstream (S7D-S9-S8)

Table 1 presents the average concentrations and percentage differences in the Bonnechere Stations.

S9, adjacent to the site had elevated average concentrations of ammonia and manganese than upstream at S7D. S8 when compared to S7D had elevated concentrations of manganese compared to upstream.

The column sparkline shows that S9 has relatively higher average concentrations of ammonia, DOC and manganese than either S7D or S8.

The 2018-2024 data suggests that there is a minor impact to water quality in the Bonnechere River at the adjacent station S9 as a result of leachate contaminated groundwater entering the River. However, this changes from year to year as there is

significant variability in concentrations at the three River locations throughout the year. In particular, ammonia, DO, TKN, phosphorus TSS, boron, manganese, iron, lead and potassium show significant standard deviation from the average concentration**.**

Table 1: Average Concentrations and Percentage Differences in the Bonnechere Stations.

Parameter	Unit	S7D	S9	S8	Relative Conc		7 vs 8	7 vs 9	9 vs 8
Alkalinity (Total as CaCO3)	mg/l	68.3125	67.125	68.3125			0	2	-2
Ammonia, unionized	ug/l	0.508125	0.934375	0.69875			-38	-84	25
Ammonia Nitrogen	ug/l	27.5	46.25	32.5			-18	-68	30
Biochemical Oxygen Demand, 5 Day	ug/l	2000	2000	2000			0	0	0
Bromide	ug/l	100	100	100			0	0	0
Chemical Oxygen Demand	ug/l	17500	16000	16500			6	9	-3
Chloride	ug/l	11000	11000	11000			0	0	0
Conductivity (Field)	uS/cm	233.0938	198.625	237.5625			-2	15	-20
Dissolved Organic Carbon	ug/l	6193.75	7575	6175			0	-22	18
Dissolved Oxygen (Field)	mg/l	9.28625	10.23813	10.86688			-17	-10	-6
Fluoride	ug/l	100	100	100			0	0	0
Hardness, Calcium Carbonate	ug/l	80000	76500	75000			6	4	2
Nitrate as N	ug/l	100	100	100			0	0	0
Nitrite as N	ug/l	50	50	50			0	0	0
Nitrogen, Total Kjeldahl	ug/l	400	393.75	343.75			14	2	13
pH (Field)	-	7.640625	7.783125	7.819375			-2	-2	0
Phosphorus	ug/l	20	10	10			50	50	0
Phosphorus, Total Orthophosphate	ug/l	500	500	500			0	0	0
Sulphate	ug/l	6000	5500	5500			8	8	0
Temperature (Field)	deg c	9.555625	9.4775	9.525			0	1	-1
Total Dissolved Solids	ug/l	102000	92000	91000			11	10	1
Total Suspended Solids	ug/l	2500	2500	3000			-20	0	-20
Antimony	ug/l	0.5	0.5	0.5			0	0	0
Arsenic	ug/l	1	1	1			0	0	0
Barium	ug/l	32.5	30.5	30.5			6	6	0
Beryllium	ug/l	0.5	0.5	0.5			0	0	0
Boron	ug/l	15.75	15.8125	16.125			-2	0	-2
Cadmium	ug/l	0.1	0.1	0.1			0	0	0
Calcium	ug/l	21550	20600	20250			6	4	2
Chromium	ug/l	5	5	5			0	0	0
Cobalt	ug/l	0.5	0.5	0.5			0	0	0
Copper	ug/l	1.25	0.55	0.6			52	56	-9
Iron	ug/l	472.375	287.75	366.125			22	39	-27
Lead	ug/l	0.65	0.2	0.2			69	69	0
Magnesium	ug/l	6280	6015	5985			5	4	0
Manganese	ug/l	42.3125	59.25	39.125			8	-40	34
Mercury, dissolved	ug/l	0.1	0.1	0.1			0	0	0
Molybdenum	ug/l	0.5	0.5	0.5			0	0	0
Nickel	ug/l	1	1	1			0	0	0
Potassium	ug/l	1449.875	1404.563	1519.375			-5	3	-8
Selenium	ug/l	1	1	1			0	0	0
Silver	ug/l	0.1	0.1	0.1			0	0	0
Sodium	ug/l	9130	8510	8465			7	7	1
Thallium	ug/l	0.1	0.1	0.1			0	0	0
Tungsten	ug/l	10	10	10			0	0	0
Uranium	ug/l	0.2	0.15	0.15			25	25	0
Vanadium	ug/l	0.85	0.5	0.55			35	41	-10
Zinc	ug/l	7.5	5	5			33	33	0
Zirconium	ug/l	1	1	1			0	0	0
Phenolics, Total Recoverable	ug/l	1	1	1			0	0	0

In summary, the data suggests very minor water quality impacts at S9 adjacent to the site at some times of the year for some leachate indicator parameters. None of these are a concern at this point.

The table below has been suggested to be the surface water sampling program for Renfrew Landfill.

Table 1: Proposed Surface Water Monitoring Program

Monitoring Sessions	Sampling Stations	Laboratory Parameters	Field Parameters
Spring and Fall	S6 (on-Site) S7D, S8 and S9 (Bonnechere River)	Arsenic, barium, boron, cadmium, chromium, calcium, copper, iron, lead, magnesium, manganese, mercury, potassium, sodium, zinc, chloride, nitrate, nitrite, total phosphorous, alkalinity, ammonia, biochemical oxygen demand (BOD), chemical oxygen demand (COD), dissolved organic carbon (DOC), hardness, phenols, total dissolved solids (TDS), total Kjeldahl nitrogen (TKN), total suspended solids (TSS)	Temperature, pH, conductivity, dissolved oxygen, and flow

The proposed sampling frequency is spring and fall. As seen below the reviewer has suggested three times per year which includes a summer sample during low flow periods when there is less water in the River and potential water quality impacts could be greater due to a lessen dilution effect.

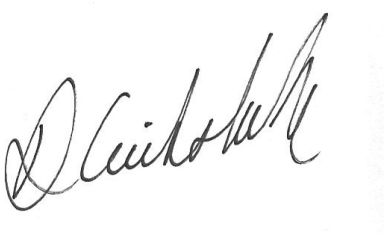
S6 has no surface water outlet and therefore surface water impacts are to the marshy/ponded area remain on-site. My understanding is that any infiltration from this area to groundwater would be picked up with he groundwater monitoring well network. If adding the summer event is an issue then the reviewer would be agreeable to dropping S6 in favour of a summer monitoring event.

Recommendations

1. The water sampling in the Bonnechere River should be done at consistent times of the year to make the data more consistent for year to year comparisons and better to assess as to whether the landfill is causing an impact or not (May, August, October)

2. Metals should be sampled in 2025 on three occasions and then reassessed for the 2025 annual report. Based on the two samples from 2024 some metals probably don't need to be analyzed while others do.

If you have questions or comments regarding the above, please do not hesitate to ask me.



ec: Victor Castro (WRU Supervisor)
Christina Klein (TSS Manager)
Matthew Degeer (Groundwater Reviewer)
Patrick Lalonde (A Ottawa District Supervisor)

From:	Ponalo, Thandeka (MECP)
To:	Caletti, Andria; Amanda Springer
Cc:	ewithers; Edmond, Trish
Subject:	RE: TS GW Renfrew Landfill Site
Date:	June 10, 2025 1:37:42 PM
Attachments:	image001.png image002.png

Good afternoon,

The groundwater reviewer reviewed the document entitled “Proposed Groundwater and Surface Water Monitoring Program Supporting Revised Waste Fill Limit and Final Contours ECA Amendment Application, Renfrew Landfill Site, Renfrew, Ontario”. They provided the following for your consideration:

- WSP is proposing an expansion for the waste fill limit along the western and northwestern aspects of landfill to address slope stability and to achieve proper compaction of waste placed in this area. It is proposed that the landfill expansion lands would extend approximately 40 m west of the currently approved footprint and would not increase the final capacity of the landfill as per ECA A410401.

- Groundwater monitoring of this area is not captured by the current monitoring well configuration and WSP has proposed that two new monitoring wells be installed adjacent to and downgradient of the proposed expansion. It is proposed that the wells be installed after placement of fill in the proposed area for safety considerations.

- They have no concerns with the expansion of the landfilling footprint to achieve stable ground conditions and a safer working environment.

- They have no concerns with the proposed monitoring well installations and timeline.

- They have reviewed the list of groundwater parameters proposed for the amended ECA and have no concerns.

Regards,

Thandeka Ponalo
Environmental Compliance Officer | Badge #1943 | Ottawa District Office | Eastern Region
Ministry of the Environment, Conservation and Parks| Government of Ontario
(613) 858-0695 | thandeka.ponalo@ontario.ca
2430 Don Reid Drive, Unit 103
Ottawa ON K1H 1E1

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Are you reporting a pollution incident or environmental concern? Please use the ministry's online pollution reporting tool or for more urgent matters contact the Pollution Hotline at 1(866) 663-8477.

From: Caletti, Andria <andria.caletti@wsp.com>
Sent: Monday, June 9, 2025 11:50 AM
To: Ponalo, Thandeka (MECP) <Thandeka.Ponalo@ontario.ca>; Amanda Springer <aspringer@renfrew.ca>
Cc: Eric Withers <ewithers@renfrew.ca>; Edmond, Trish <trish.edmond@wsp.com>
Subject: RE: TS GW Renfrew Landfill Site

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Hi Thandeka,

Thank you for this – we may have more questions and comments as we review this in detail, however we note that the attached memorandum providing proposed changes to the groundwater monitoring program was not listed as a document that was included in this TS review. Can you please confirm that this document was provided to the reviewer and the anticipated timeline for receipt of comments on that proposed program? We had understood that these comments would be provided some time in May. Submission of the ECA amendment application to revise the final contours of the landfill is pending concurrence from the groundwater reviewer on the proposed program.

Thanks for your attention to this. Please don't hesitate to call if you have any questions.

Andria

Andria Caletti
Geo-Environmental Engineer, Waste Team Lead
P.Eng.
She/Her

T +1 613-592-9600
M +1 613-983-4654

wsp

From: Ponalo, Thandeka (MECP) <Thandeka.Ponalo@ontario.ca>
Sent: June 9, 2025 11:34 AM
To: Amanda Springer <aspringer@renfrew.ca>
Cc: ewithers <ewithers@renfrew.ca>; Caletti, Andria <andria.caletti@wsp.com>
Subject: TS GW Renfrew Landfill Site

Good morning,

Please find attached the groundwater memo for the Renfrew Landfill Site. If you have any questions, please do not hesitate to contact me.

Thank you,

Thandeka Ponalo
Environmental Compliance Officer | Badge #1943 | Ottawa District Office | Eastern Region
Ministry of the Environment, Conservation and Parks| Government of Ontario
(613) 858-0695 | thandeka.ponalo@ontario.ca
2430 Don Reid Drive, Unit 103
Ottawa ON K1H 1E1

Ontario

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Are reporting a spill? Please contact the Ministry of the Environment, Conservation and Parks, Spills Action Centre at (416)325-3000 or 1(800) 268-6060.

Are you reporting a pollution incident or environmental concern? Please use the ministry's online pollution reporting tool or for more urgent matters contact the Pollution Hotline at 1(866) 663-8477.

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APPENDIX C

Borehole Logs

LIST OF ABBREVIATIONS

The abbreviations commonly employed on Records of Boreholes, on figures, and in the text of the report are as follows:

I. SAMPLE TYPE

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO or DP	Seamless open-ended, driven or pushed tube samplers
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample
DT	Dual tube sample
DD	Diamond drilling

II. PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg. (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split spoon sampler for a distance of 300 mm (12 in.).

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) to drive an uncased 50 mm (2 in.) diameter, 60^0 cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH:	Sampler advanced by hydraulic pressure
PM:	Sampler advanced by manual pressure
WH:	Sampler advanced by static weight of hammer
WR:	Sampler advanced by weight of sampler and rod

Cone Penetration Test (CPT):

An electronic cone penetrometer with a 60^0 conical tip and a projected end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

III. SOIL DESCRIPTION

(a) Cohesionless Soils

Density Index (Relative Density)	**N** Blows/300 mm Or Blows/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

(b) Cohesive Soils

C_u or S_u

Consistency	kPa	Psf
Very soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1,000
Stiff	50 to 100	1,000 to 2,000
Very stiff	100 to 200	2,000 to 4,000
Hard	Over 200	Over 4,000

IV. SOIL TESTS

w	Water content
w_p or PL	Plastic limited
w_1 or LL	Liquid limit
C	Consolidaiton (oedometer) test
CHEM	Chemical analysis (refer to text)
CID	Consolidated isotropically drained triaxial test[1]
CIU	Consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	Relative density
DS	Direct shear test
Gs	Specific gravity
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	Organic content test
SO_4	Concentration of water-soluble sulphates
UC	Unconfined compression test
UU	Unconsolidated undrained triaxial test
V	Field vane test (LV-laboratory vane test)
γ	Unit weight

Note: [1] Tests which are anisotropically consolidated prior shear are shown as CAD, CAU.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$ x or log x	logarithm of x to base 10
g	acceleration due to gravity
t	time
FOS	factor of safety
V	volume
W	weight

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta \sigma'$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
ν	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial vertical effective overburden stress
$\sigma_1\sigma_2\sigma_3$	principal stresses (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3) / 3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) formerly (G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_1 or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity Index = $(w_1 - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_c	consistency index = $(w_1 - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (overconsolidated range)
C_s	swelling index
C_α	coefficient of secondary consolidation
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	overconsolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p or τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c'	effective cohesion
c_u or s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3) / 2$
p'	mean effective stress $(\sigma'_1 + \sigma'_3) / 2$
q	$(\sigma_1 - \sigma_3) / 2$ or $(\sigma'_1 - \sigma'_3) / 2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes:
[1] $\tau = c' + \sigma' \tan \phi'$
[2] shear strength = (compressive strength) / 2

PROJECT: Geotechnical Investigation - Proposed New Scale Footings
WELL / BORING NO: 1

LOCATION: Bruce Street Landfill, Town of Renfrew

STARTED: COMPLETED:
NORTHING: EASTING:
DRILLING COMPANY:
G.S. ELEV: 0 T.P. ELEV:
DRILLING EQUIPMENT:
GW DEPTH: TOTAL DEPTH: 6.7
DRILLING METHOD:
LOGGED BY: CHECKED BY:

DEPTH	STRAT.	DESCRIPTION	Elev (m)	Number	Type	Recovery (%)	N Value	PID (ppm)	WELL CONSTRUCTION
0		**ASPHALTIC CONCRETE** ~40 mm	0						
		GRANULAR FILL ~ 150 mm	-0.04						
		FILL Sand and gravel, trace asphalt pieces, fine to medium grained, well graded, brown, moist, (compact).	-0.19						
1									
			-1.4						
		SAND Trace fine grained gravel, fine to medium grained, brown, moist, (loose to compact).							
2									
3									
4									
5									
6									
			-6.71						
7		Borehole terminated @ 6.7 m depth							
8									
9									
10									
11									
12									

Trow Associates Inc.
154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Telephone: (613) 225-9940
Facsimile: (613) 225-9947
Website: www.trow.com

NOTES:

PROJECT NO. MC7890

TROW ENVIRO_BH1.GPJ_TROW ENVIRO.GDT_16/1/06

Project No: MC7890A

Log of OMM15

Project: Renfrew Landfill Site

Client: Town of Renfrew

Location: Renfrew Landfill Site

Logged by: BC

Trow

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Elev.	Number	Type	Recovery	Volatile Organic Compounds (ppmv)	Well Data	Lab Analysis
0 / 0		Ground Surface	0						
0–10		***Sand*** Dark brown, fine to medium grained sand with silt and stone. Layers of gravel.	-3.048						
10–20 / 5		***Gravel*** Boulders and coarse gravel.	-6.096						
20–55 / 10–15		***Sand, Gravel*** Dark brown, coarse grained sand and gravel. Some stones.	-17.37						
55–85 / 15–25		***Sand*** Medium to fine grained sand becoming medium to coarse grained with cobbles at 18 metres.	-26.52						
85–100 / 25–30		Auger Refusal							

Drill Method: Hollow Stem Auger

Drill Date: June 20 & 21, 2001

Hole Size: 6"

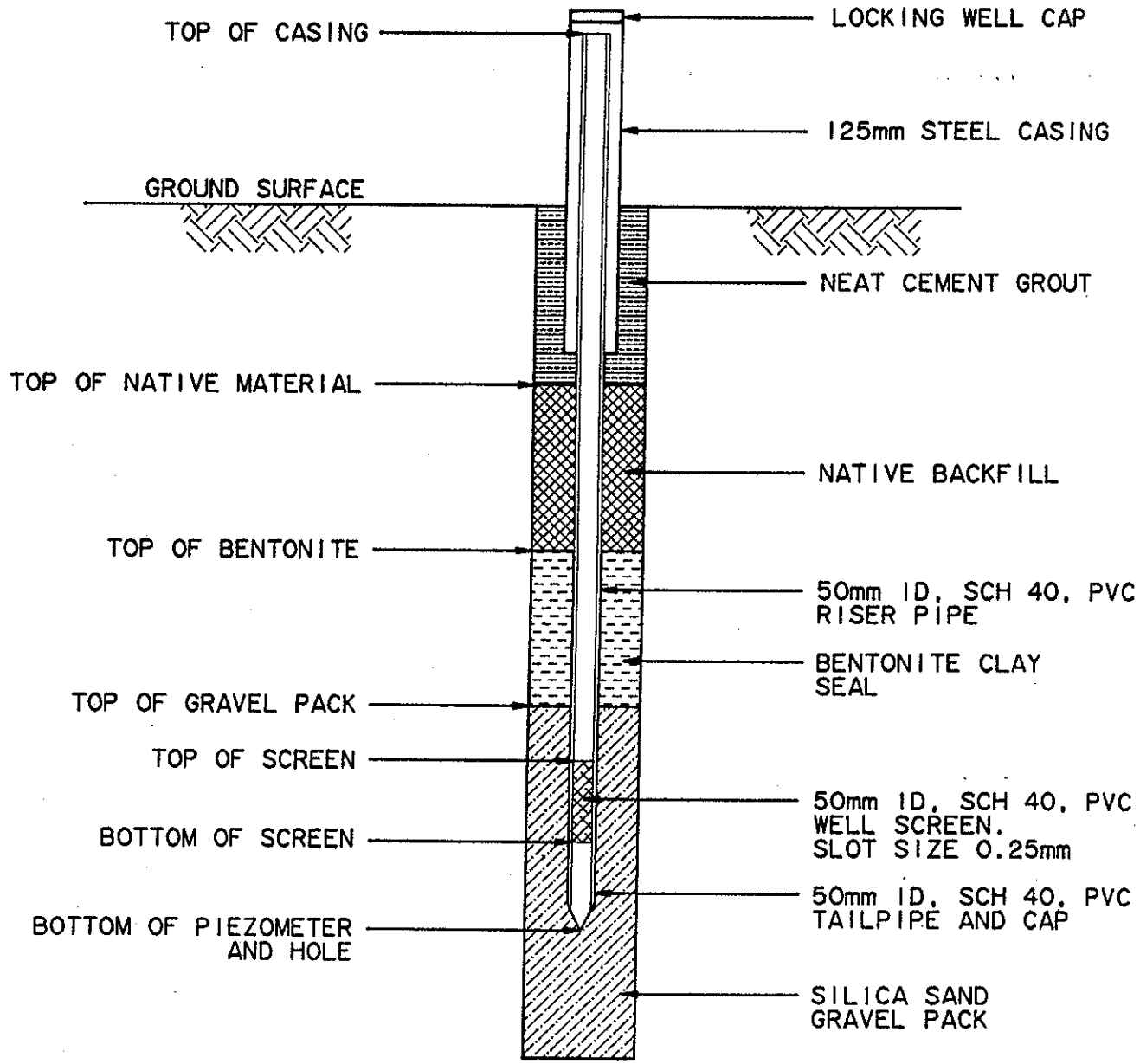
Trow Consulting Engineers Ltd.
154 Colonnade Road South
Nepean, Ontario K2E 7J5

Datum:

Checked by: JAM

Sheet: 1 of 1

OVERBURDEN
MONITORING WELL INSTALLATION



OLIVER MANGIONE McCALLA
& ASSOCIATES LIMITED
Consulting Engineers
Nepean, Ontario

DATE: FEB.. 1990	CLIENT: TOWN OF RENFREW	DRAWING NO. FIGURE 4
SCALE: N.T.S.	TITLE: MONITORING WELL DETAIL	

TABLE 1

SUMMARY OF MONITORING WELL STATISTICS

MONITORING WELL NUMBER	GROUND ELEVATION (A.S.L.)	WELL DEPTH (M)	GRAVEL PACK INTERVAL (A.S.L.)	SCREENED INTERVAL (A.S.L.)	BENTONITE SEAL (A.S.L.)	CEMENT SEAL (A.S.L.)	STATIC LEVEL ELEVATION (A.S.L.)
OMM1	111.12	17.93	92.9 - 94.8	93.8 - 94.6	94.8 - 95.1	108.1 - 109.0	95.41
OMM2	113.85	25.05	88.9 - 91.2	89.8 - 90.5	91.2 - 91.5	110.7 - 111.7	96.42
OMM3	113.71	18.59	95.1 - 97.1	95.9 - 96.7		110.3 - 111.6	96.37
OMM4	104.82	12.06	92.8 - 95.1	93.6 - 94.38		101.6 - 102.7	96.14
OMM5	96.89	29.10	67.8 - 74.0	68.7 - 69.4	74.0 - 74.3	93.5 - 94.7	88.31
OMM6	96.89	4.45	92.4 - 94.1	93.1 - 93.8	94.1 - 94.3	93.6 - 94.5	95.78
OMM7	96.89	14.94	81.9 - 85.3	82.2 - 83.0	85.3 - 85.7	93.6 - 94.8	95.78
OMM8	96.29	16.91	79.4 - 83.5	80.2 - 81.0	83.5 - 83.8	94.8 - 95.2	88.30
OMM9	102.89	17.91	85.0 - 89.5	85.9 - 86.6		100.1 - 101.0	88.09
OMM10	103.84	10.28	93.7 - 96.8	94.6 - 95.3		99.6 - 100.8	95.79
OMM11	104.32	10.60	93.7 - 95.7	94.6 - 95.3		101.2 - 103.0	95.71
OMM12	100.55	5.00	95.6 - 97.5	96.4 - 97.2		97.3 - 98.2	97.85

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BOREHOLE WELL LOG FOR TEST HOLE #1

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
120.0	0.0		
118.5 - 118.0	1.5 - 2.0		Fine grained, homogeneous, light gray sand
117.0 - 116.5	3.0 - 3.5		Fine grained, light gray sand with local silty clay horizons
115.5 - 115.0	4.5 - 5.0		Fine grained sand with minor stones
114.0 - 113.5	6.0 - 6.5		Fine grained sand with minor stones
112.5 - 112.0	7.5 - 8.0		Fine to medium grained, light brown sand
111.0 - 110.5	9.0 - 9.5		Fine to medium grained, light brown sand
109.5 - 109.0	10.5 - 11.0		Fine grained, homogeneous, light brown sand
108.0 - 107.5	12.0 - 12.5		Fine grained, homogeneous, light brown sand
106.5 - 106.0	13.5 - 14.0		Fine grained, light brown, sand with minor pebbles
105.0 - 104.5	15.0 - 15.5		Fine grained, light brown, sand, with minor pebbles
103.5 - 103.0	16.5 - 17.0		Fine grained, light brown, sand, with minor pebbles
102.0 - 101.5	18.0 - 18.5		Fine grained, light brown, sand with minor pebbles and stones

BOREHOLE WELL LOG FOR TEST HOLE #1 (cont'd)

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
100.5 - 100.0	19.5 - 20.0		Heterogeneous mixture of sand, pebbles and stones
99.0 - 98.5	21.0 - 21.5		Fine to medium grained, reddish/brown sand

BOREHOLE WELL LOG FOR OMM2

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
115.0	0.0		
113.5 - 113.0	1.5 - 2.0		Fine grained, homogeneous, light brown sand
112.0 - 111.5	3.0 - 3.5		Fine grained, homogeneous, light brown sand
110.5 - 110.0	4.5 - 5.0		Fine to medium grained, light grown sand
109.0 - 108.5	6.0 - 6.5		Fine to medium grained, light grown sand
107.5 - 107.0	7.5 - 8.0		Fine to medium grained, light grown sand
106.0 - 105.5	9.0 - 9.5		Fine to medium grained, sand with lots of pebbles
104.5 - 104.0	10.5 - 11.0		Fine to medium grained, sand with minor pebbles
103.0 - 102.5	12.0 - 12.5		Fine grained, homogeneous, light-brown sand with no stones
101.5 - 101.0	13.5 - 14.0		Fine grained, homogeneous, light-brown sand with no stones
100.0 - 99.5	15.0 - 15.5		Fine grained, homogeneous, light-brown sand with no stones
98.5 - 98.0	16.5 - 17.0	17.0	Fined grained, homogeneous, light-brown sand with no stones
97.0 - 96.5	18.0 - 18.5		Fine grained, homogeneous, light-brown sand with no stones

BOREHOLE WELL LOG FOR OMM2 (cont'd)

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
95.5 - 95.0	19.5 - 20.0		Fined grained, homogeneous, light-brown sand with no stones
94.0 - 93.5	21.0 - 21.5		Fined grained, homogeneous, light-brown sand with no stone

BOREHOLE WELL LOG FOR OMM3

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
114.0	0.0		
112.5 - 112.0	1.5 - 2.0		Fine grained, homogeneous, orange/brown sand
111.0 - 110.5	3.0 - 3.5		Fine grained, homogeneous, orange/brown sand with evidence of cross bedding
109.5 - 109.0	4.5 - 5.0		Fine grained, homogeneous, orange/brown sand
108.0 - 107.5	6.0 - 6.5		Fine grained, homogeneous, orange/brown sand
106.5 - 106.0	7.5 - 8.0		Fine grained, homogeneous, orange/brown sand
105.0 - 104.5	9.0 - 9.5		Fine grained, homogeneous, orange/brown sand
103.5 - 103.0	10.5 - 11.0		Fine grained, homogeneous, orange/brown sand
102.0 - 101.5	12.0 - 12.5		Fine grained, homogeneous, orange/brown sand
100.5 - 100.0	13.5 - 14.0		Fine grained, homogeneous, orange/brown sand
99.0 - 98.5	15.0 - 15.5	15.3	Fine grained sand with minor stones
97.5 - 97.0	16.5 - 17.0		Fine to coarse grained sand with pebbles
96.0 - 95.5	18.0 - 18.5		Fine to coarse grained sand with pebbles

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BOREHOLE WELL LOG FOR OMM4

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
104.5	0.0		
103.0 - 102.5	1.2 - 2.0		Assorted garbage
101.5 - 101.0	3.0 - 3.5		Fine grained, homogeneous, gray-brown sand with minor clay
100.0 - 99.5	4.5 - 5.0		Fine grained, homogeneous, gray-brown sand
98.5 - 98.0	6.0 - 6.5		Fine grained, homogeneous, gray-brown sand with minor stones
97.0 - 96.5	7.5 - 8.0		Fine grained, homogeneous, gray-brown sand with minor stones
95.5 - 95.0	9.0 - 9.5	9.2	Fine grained, homogeneous, gray-brown sand with silt and clay
94.0 - 93.5	10.5 - 11.0		Silty clay with fine grained sand

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BOREHOLE WELL LOG FOR OMM5

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
98.0	0.0		
96.5 - 96.0	1.5 - 2.0		Fine to medium grained, grayish-brown sand with minor stones
95.0 - 94.5	3.0 - 3.5		Fine to medium grained, grayish-brown sand with minor stones
93.5 - 93.0	4.5 - 5.0		Medium grained, dark gray sand
92.0 - 91.5	6.0 - 6.5		Fine to medium grained sand with minor pebbles
90.5 - 90.0	7.5 - 8.0		Fine to medium grained sand with some pebbles
89.0 - 89.5	9.0 - 9.5		Fine to medium grained, dark gray sand
88.5 - 88.0	10.5 - 11.0	10.8	Fine grained, dark gray sand
87.0 - 86.5	12.0 - 12.5		Fine grained, dark gray sand

Note: Borehole was completed at a depth of 30 metres but running sand prevented the collection of soil samples beyond 12.5 metres.

BOREHOLE WELL LOG FOR OMM6

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
98.0	0.0		
96.5 - 96.0	1.5 - 2.0	2.15	Fine to medium grained, grayish-brown sand with minor stones
95.0 - 94.5	3.0 - 3.5		Fine to medium grained, grayish-brown sand with minor stones
93.5 - 93.0	4.5 - 5.0		Medium grained, dark gray sand

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BOREHOLE WELL LOG FOR OMM7

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
98.0	0.0		
96.5 - 96.0	1.5 - 2.0		Fine to medium grained, grayish-brown sand with minor stones
95.0 - 94.5	3.0 - 3.5		Fine to medium grained, grayish-brown sand with minor stones
93.5 - 93.0	4.5 - 5.0		Medium grained, dark gray sand
92.0 - 91.5	6.0 - 6.5		Fine to medium grained sand with minor pebbles
90.5 - 90.0	7.5 - 8.0		Fine to medium grained sand with some pebbles
89.0 - 89.5	9.0 - 9.5		Fine to medium grained, dark gray sand
88.5 - 88.0	10.5 - 11.0	10.8	Fine grained, dark gray sand
87.0 - 86.5	12.0 - 12.5		Fine grained, dark gray sand

Note: Borehole was completed at 15.5 metres but running sand prevented the collection of soil samples beyond 12.5 metres.

BOREHOLE WELL LOG FOR OMM10

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
103.5	0.0		
102.0 - 101.5	1.5 - 2.0		Fine grained, homogeneous, light brown sand
100.5 - 100.0	3.0 - 3.5		Fine grained, homogeneous, light brown
99.0 - 98.5	4.5 - 5.0		Fine grained, homogeneous, light brown sand with minor pebbles
97.5 - 97.0	6.0 - 6.5		Fine grained, homogeneous, light brown sand with minor pebbles
96.0 - 95.5	7.5 - 8.0	8.2	Fine to coarse grained, light brown sand
94.5 - 94.0	9.0 - 9.5		Fine to coarse grained, light brown sand

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BOREHOLE WELL LOG FOR OMM9

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
103.5	0.0		
102.0 - 101.5	1.5 - 2.0		Fine grained, homogeneous, light brown sand
100.5 - 100.0	3.0 - 3.5		Fine grained, homogeneous, light brown sand
98.5 - 98.0	4.5 - 5.0		Fine grained, homogeneous, light brown sand with minor clay
97.0 - 96.5	6.0 - 6.5		Fine grained sand with minor pebbles and stones
95.5 - 95.0	7.5 - 8.0		Fine grained, light brown sand
94.0 - 93.5	9.0 - 9.5		Fine to medium grained light brown sand with minor pebbles
92.5 - 92.0	10.5 - 11.0		Fine to medium grained light brown sand with minor pebbles
91.0 - 90.5	12.0 - 12.5		Silty clay horizon
89.5 - 89.0	13.5 - 14.0	14.6	Fine grained sand with minor pebbles
88.0 - 87.5	15.0 - 15.5		Fine to coarse grained sand with pebbles and stone

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BOREHOLE WELL LOG FOR OMM11

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
111.0	0.0		
109.5 - 109.0	1.5 - 2.0		Fine grained, homogeneous, grayish-brown sand
108.0 - 107.5	3.0 - 3.5		Fine to medium grained, reddish-brown sand
105.0 - 104.5	4.5 - 5.0		Fine grained, homogeneous, grayish-brown sand
103.5 - 103.0	6.0 - 6.5		Fine grained, homogeneous, grayish-brown sand
102.0 - 101.5	7.5 - 8.0		Fine grained, grayish-brown sand with some stones (<3 cm)
100.5 - 100.0	9.0 - 9.5		Fine to medium grained grayish-brown sand with stones and minor silt and clay
99.0 - 98.5	10.5 - 11.0		Fine to medium grained grayish-brown sand with stones and minor silt and clay
97.5 - 97.0	12.0 - 12.5		Silty sand with lots of stones and boulders
96.0 - 95.5	13.5 - 14.0	15.7	Silty sand with lots of stones and boulders
94.5 - 94.0	15.0 - 15.5		Fine to medium grained orange-brown sand, no stones
93.0 - 92.5	16.5 - 17.0		Silty sand with lots of stones and minor clay

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BOREHOLE WELL LOG FOR OMM8

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
96.5	0.0		
95.0 - 94.5	1.5 - 2.0		Fine to medium grained, light brown sand with some stones
93.5 - 93.0	3.0 - 3.5		Fine grained sand, light brown and with some stones
92.0 - 91.5	4.5 - 5.0		Fine grained sand, light brown sand with some stones
90.5 - 90.0	6.0 - 6.5		Fine grained sand, light brown sand with some stones
89.0 - 89.5	7.5 - 8.0		Fine grained sand, light brown sand with some stones
87.5 - 87.0	9.0 - 9.5	9.5	Fine to coarse grained sand with some silt and clay
86.0 - 85.5	10.5 - 11.0		Fine to coarse grained sand with some silt and clay
84.5 - 84.0	12.0 - 12.5		Fine to coarse grained sand with some silt and clay
83.0 - 82.5	13.5 - 14.0		Heterogeneous sand with some stones
81.5 - 81.0	15.0 - 15.5		Fine to coarse grained sand, light brown

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BOREHOLE WELL LOG FOR OMM11

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
104.0 - 0.0			
101.0 - 100.5	3.0 - 3.5		Fine grained, dark gray sand with some silt
98.0 - 97.5	6.0 - 6.5		Fine to medium grained light brownish gray sand
96.5 - 96.0	7.5 - 8.0		Fine to medium grained light brown sand with minor pebbles
95.0 - 94.5	9.0 - 9.5	9.5	Fine to medium grained brown sand with silt, clay and stones (<10 cm)
93.5 - 93.0	10.5 - 11.0		Fine to medium grained dark gray sand, no pebbles or stones

BOREHOLE WELL LOG FOR OMM12

ACTUAL ELEVATION (M)	SAMPLE INTERVAL (M)	DEPTH TO WATER (M)	SOIL DESCRIPTION
100.5	0.0		
99.0 - 98.5	1.5 - 2.0	2.4	Fine grained, dark gray sand
96.0 - 95.5	4.5 - 5.0		Fine grained, dark gray sand with pebbles and stones (<10 cm)

APPENDIX "A"

WATER WELL RECORD OMM14

APPENDIX "B"

GEOPHYSICAL BOREHOLE LOG OMM14

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
RENFREW	RENFREW	2	14
OWNER (SURNAME FIRST)	**ADDRESS**	**DATE COMPLETED**	
JOHN L. FORGIE & SON LTD	RENFREW ONT.	DAY 13 MO 10 YR 94	

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BRN, GRY	SAND	COUBLES		0	14
GRY	BOULDER			14	15
GRY, RED, WHT	GRAVEL	COUBLES	ROUGH	15	65
" " "	BOULDERS			65	67
" " "	COUBLES	SMALL BOULDER	SOLID STONE	67	72
" " "	GRAVEL	COUBLES	COARSE	72	111
2" P.V.C. +5 to 110' also +5 to 82 also +5 to 40 - 10' screen on each set					
FILTER SAND 95 to 111 also 67 to 85 also 14 to 43					
Bentonite pellets. 85 to 95 also 43 to 67 also 9 to 14					
6¼ I.D CASING - 5' stickup, 6½' in ground & cemented					

WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERALS ☐ GAS

CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
8½	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE ☐ PLASTIC		0	111
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE ☐ PLASTIC		see above	
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET	

PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
		See above

PUMPING TEST

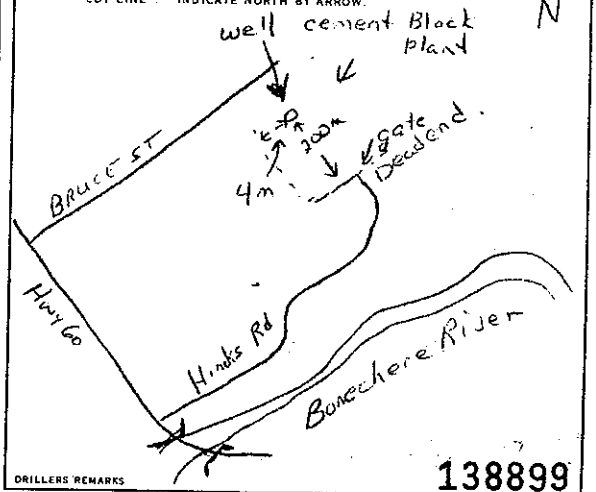
PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
☐ PUMP ☐ BAILER	GPM	HOURS MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING ☐ PUMPING ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
FEET	FEET	FEET	FEET	FEET	FEET

IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	FEET	☐ CLEAR ☐ CLOUDY
RECOMMENDED PUMP TYPE	**RECOMMENDED PUMP SETTING**	**RECOMMENDED PUMPING RATE**
☐ SHALLOW ☐ DEEP	FEET	GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS

138899

FINAL STATUS OF WELL	☐ WATER SUPPLY ☒ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL	☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ UNFINISHED ☐ DEWATERING
WATER USE	☐ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER Monitoring	☐ COMMERCIAL ☐ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED
METHOD OF CONSTRUCTION	☐ CABLE TOOL ☒ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ ROTARY (AIR) ☐ AIR PERCUSSION	☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
EARL V. MARQUARDT & SON INC	3611
ADDRESS	
RR1 Box 86 PALMER RAPIDS ONT K0J 2E0	
NAME OF WELL TECHNICIAN	**WELL TECHNICIAN'S LICENCE NUMBER**
TERRY MARQUARDT	T0062
SIGNATURE OF TECHNICIAN/CONTRACTOR	**SUBMISSION DATE** DAY 17 MO 10 YR 94
Terry Marquardt	

OFFICE USE ONLY

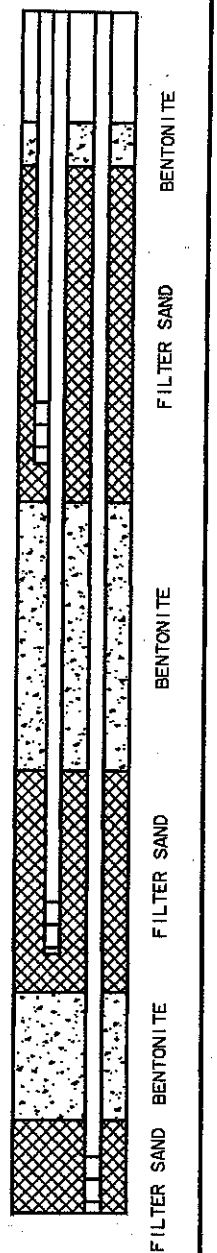
OWNER'S COPY

FORM NO. 0506 (11/86) FORM 9

OLIVER, MANGIONE, McCALLA & ASSOCIATES LIMITED
Consulting Engineers *Nepean, Ontario*

PROJECT No. 90-7890
PROJECT NAME RENFREW LANDFILL
BOREHOLE No. OMM
DATE OCTOBER 1994

DEPTH (M)	ELEV. (M)	TOTAL ORGANIC VAPOR (PPM)	SAMPLE	WATER LEVEL	SOIL DESCRIPTION	LITH-OLOGY	WELL DATA
0	103.147				GRADE		
					SHALLOW PIEZOMETER		
10					DEEP PIEZOMETER		
					SAND. GRAVEL. COBBLES		
20					BOULDERS		
					COARSE GRAVEL AND COBBLES		
30					EOH - TERMINATED IN OVERBURDEN		



Project No: MC7890A

Log of GW1

Project: Town of Renfrew Landfill Site

Client: Town of Renfrew

Location: Renfrew, Ontario

Logged by: B. Coons

Trow

Depth (ft / m)	Symbol	Description	Elev.	Sample Number	Sample Type	Recovery	Volatile Organic Compounds (ppmv: 25, 75, 125, 175)	Well Data	Lab Analysis
0 / 0		Ground Surface	0						
0 – 5 / 0 – 1		***clay*** Silty clay cap material	-1.524	1					
5 – 15 / 1 – 4		***Fill*** Waste material. Moist at approximately 4m	-4.572	2, 3, 4, 5					
15 / 4		End of Borehole							

Drill Method: Hollow Stem Auger

Drill Date: June 18, 2001

Hole Size: 150mm

Trow Consulting Engineers Ltd.

154 Colonnade Road South
Nepean, Ontario K2E 7J5

Datum:

Checked by: JAM

Sheet: 1 of 1

Project No: MC7890A

Log of GW2

Project: Town of Renfrew Landfill Site

Client: Town of Renfrew

Location: Renfrew, Ontario

Logged by: B. Coons

Trow

Depth (ft / m)	Symbol	Description	Elev.	Sample Number	Sample Type	Recovery
0 / 0		Ground Surface	0			
0–5 / 0–1.524		*clay* Silty clay cap material		1		
5–15 / 1.524–4.572		*Fill* Waste material. Moist at approximately 4m		2 3 4 5		
15 / 4.572		End of Borehole	-4.572			

Volatile Organic Compounds (ppmv): 25, 75, 125, 175

Well Data

Lab Analysis

Drill Method: Hollow Stem Auger

Drill Date: June 18, 2001

Hole Size: 150mm

Trow Consulting Engineers Ltd.
154 Colonnade Road South
Nepean, Ontario K2E 7J5

Datum:

Checked by: JAM

Sheet: 1 of 1

Project No: MC7890A

Log of GW3

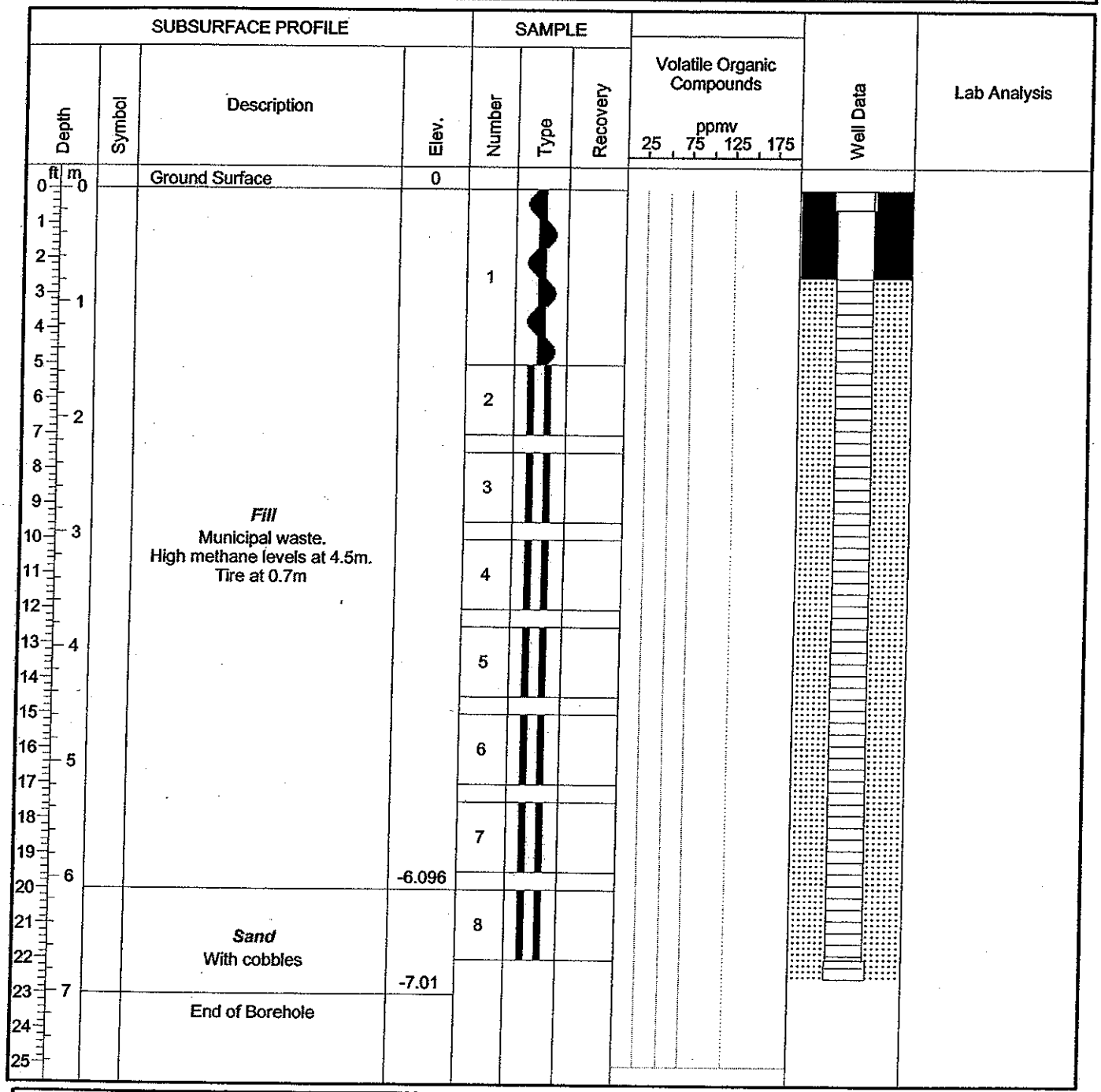
Project: Town of Renfrew Landfill Site

Client: Town of Renfrew

Location: Renfrew, Ontario

Logged by: B. Coons

Trow



Drill Method: Hollow Stem Auger

Drill Date: June 18, 2001

Hole Size: 150mm

Trow Consulting Engineers Ltd.

154 Colonnade Road South
Nepean, Ontario K2E 7J5

Datum:

Checked by: JAM

Sheet: 1 of 1

Project No: MC 7890

Log of GW4

Project: Town of Renfrew Landfill Site

Client: Town of Renfrew

Ontario

Location: Renfrew

Logged by: B. Coons

Trow

SUBSURFACE PROFILE				SAMPLE			Volatile Organic Compounds ppmv 25 75 125 175	Well Data	Lab Analysis
Depth (ft / m)	Symbol	Description	Elev.	Number	Type	Recovery			
0 / 0		Ground Surface	0						
0–4 / 0–1		***Clay*** Capping clay	-1.219	1					
4–20 / 1–6		***Fill*** Muncipal waste. Methane levels 100% LEL.	-6.096	2, 3, 4, 5, 6, 7					
20–22 / 6–7		***Sand*** Moist	-6.706	8					
22 / 7		End of Borehole							

Drill Method: Hollow Stem Auger

Drill Date: June 18, 2001

Hole Size: 150mm

Trow Consulting Engineers Ltd.
154 Colonnade Road South
Nepean, Ontario K2E 7J5

Datum:

Checked by:

Sheet: 1 of 1

Project No: MC7890A

Log of OMM15

Project: Renfrew Landfill Site

Client: Town of Renfrew

Location: Renfrew Landfill Site

Logged by: KLG

Trow

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Elev.	Number	Type	Recovery	Volatile Organic Compounds (ppmv: 25, 75, 125, 175)	Well Data	Lab Analysis
0 / 0		Ground Surface	0						
		Sand Dark brown, fine to medium grained sand with silt and stone. Layers of gravel.	-26.52						
		Sand Brown, grey sand with clay, silt and cobbles.	-45.11						
		Sand, Silt Grey sand, silt and clay.	-53.34						
		Clay, Sand Grey, fine-grained, packed clay sand.	-54.86						
200 / 60		End of Borehole							

Drill Method: Hollow Stem Auger

Drill Date: August 22, 2001

Hole Size: 6"

Trow Consulting Engineers Ltd.
154 Colonnade Road South
Nepean, Ontario K2E 7J5

Datum:

Checked by: JAM

Sheet: 1 of 1

Figure #1

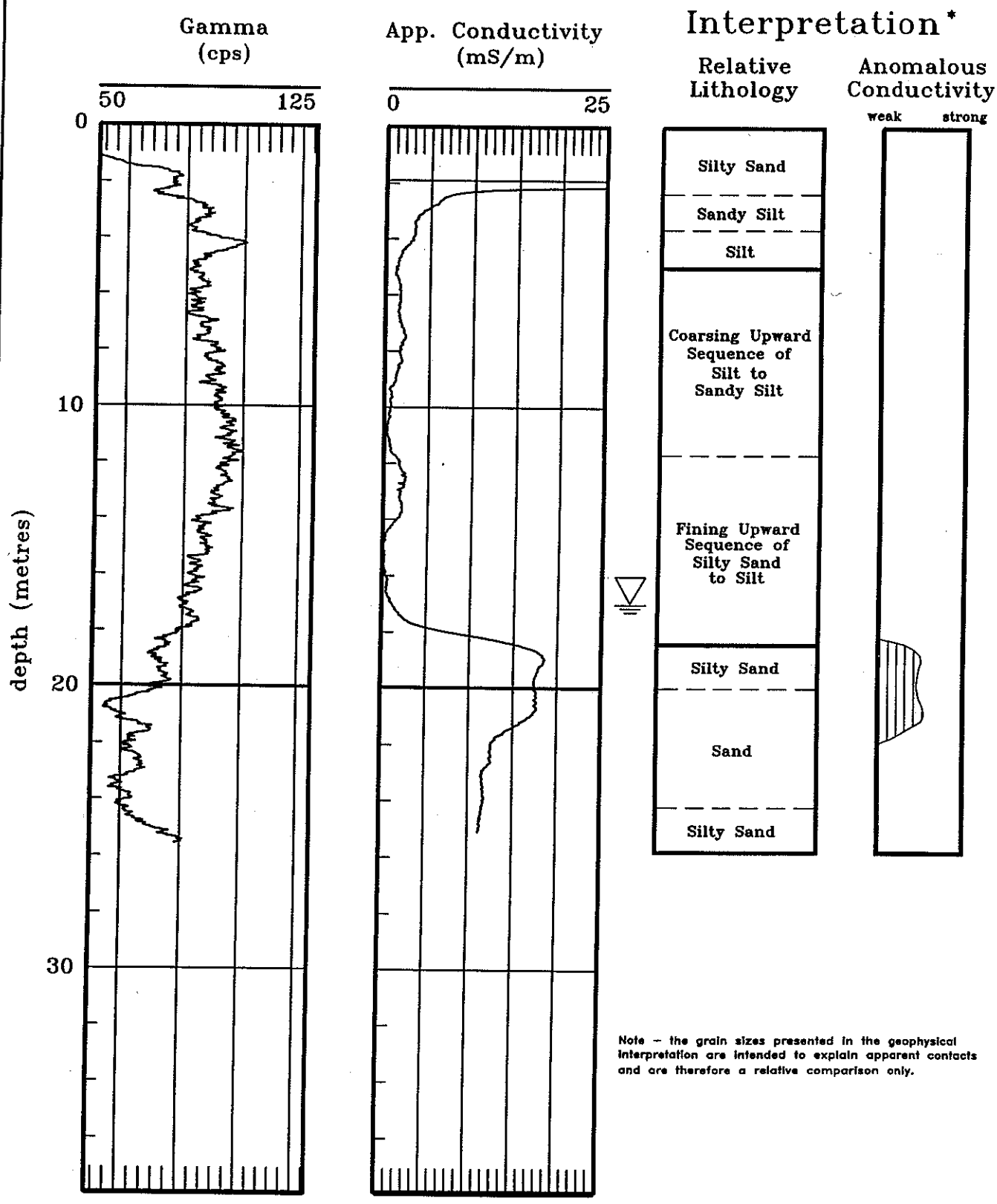
Well: OMM 2

Site: Renfrew Landfill
Renfrew, Ontario

Reference: casing
Casing Height: .83m

date: 27/09/94
scale: 1:200

Hyd-Eng
GEOPHYSICS INC.



Note – the grain sizes presented in the geophysical interpretation are intended to explain apparent contacts and are therefore a relative comparison only.

Figure #2

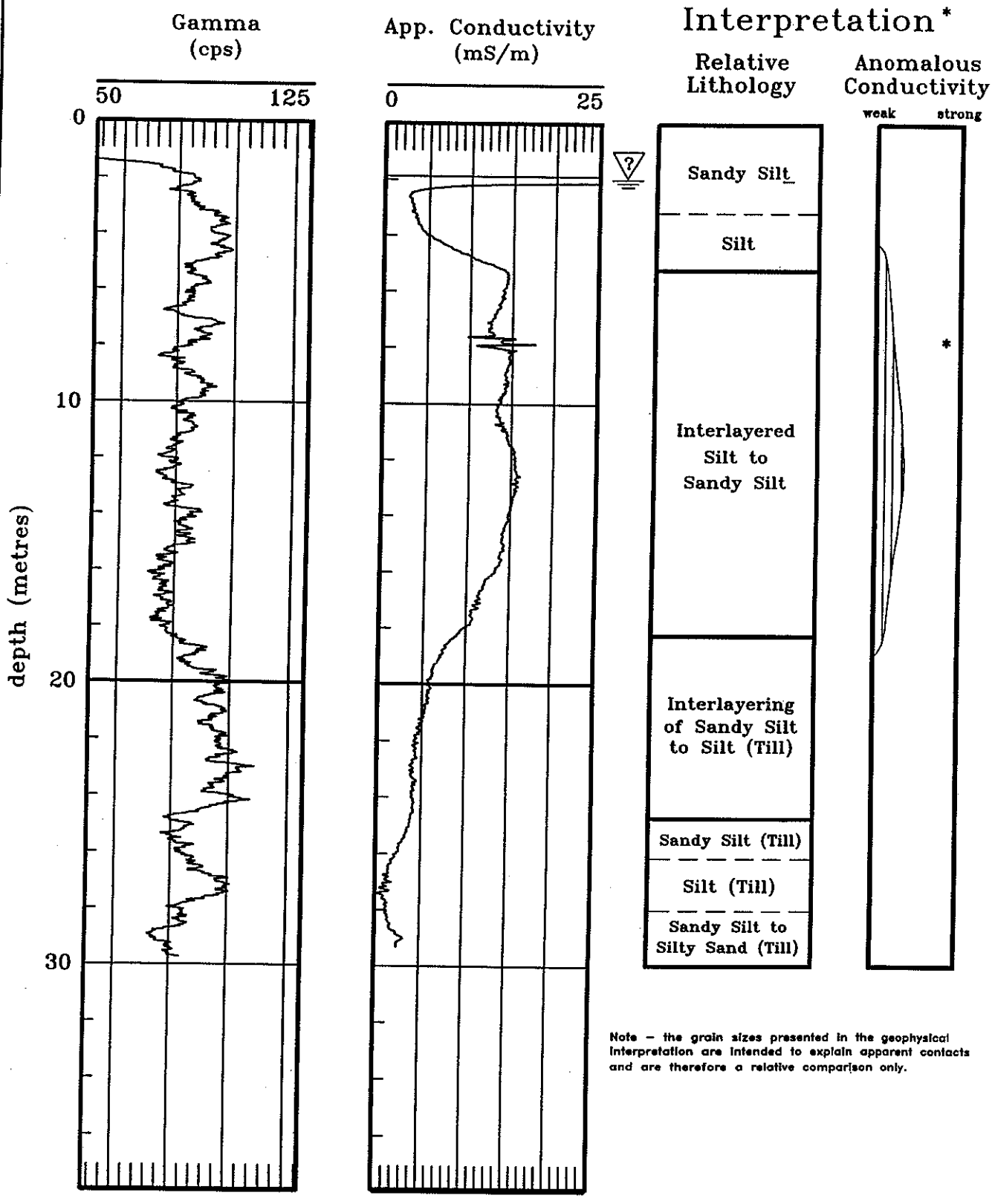
Well: OMM 5

Site: Renfrew Landfill
Renfrew, Ontario

Reference: casing
Casing Height: 1.06m

date: 27/09/94
scale: 1:200

Hyd-Eng GEOPHYSICS INC.



Note – the grain sizes presented in the geophysical interpretation are intended to explain apparent contacts and are therefore a relative comparison only.

Figure #3

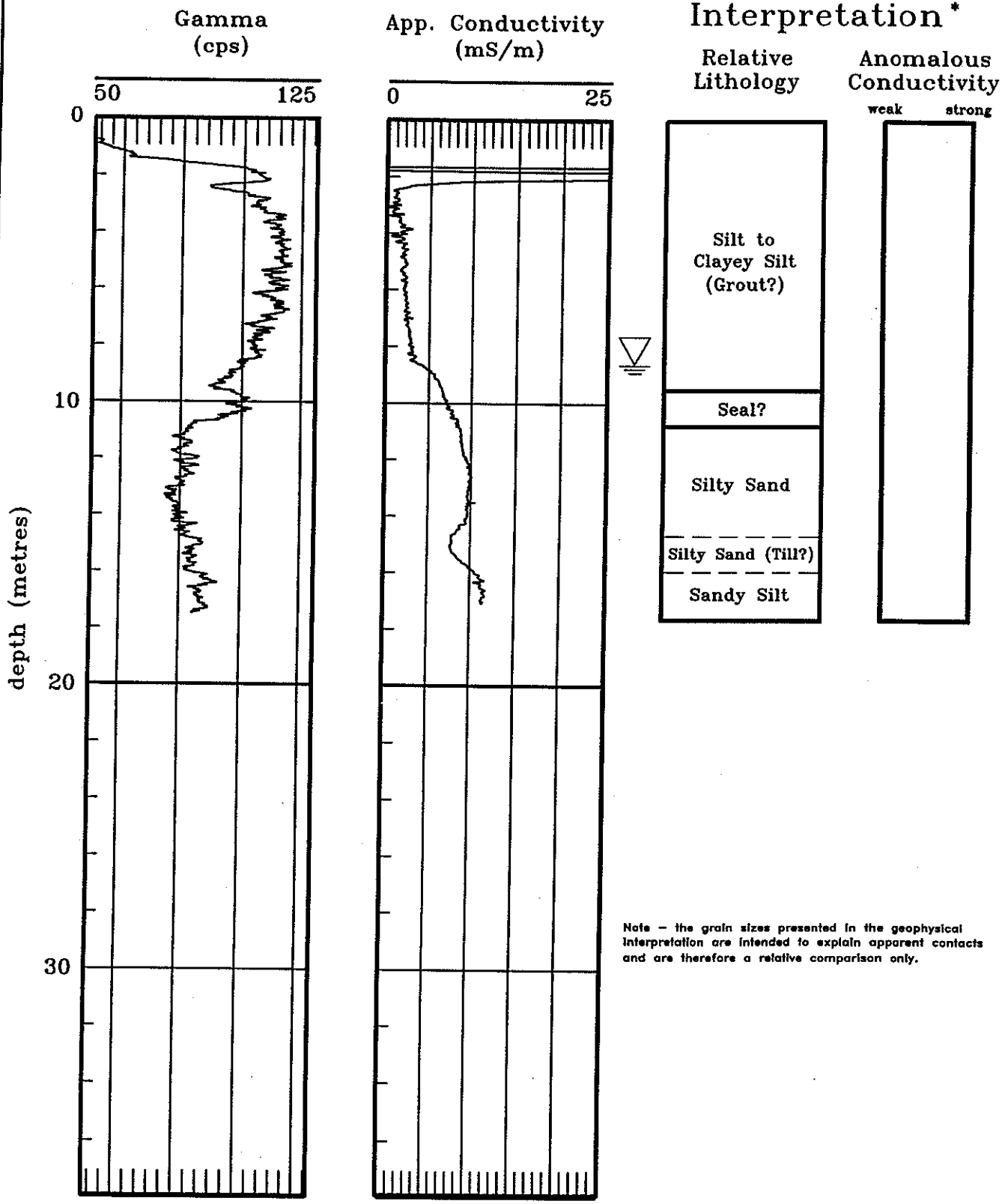
Well: OMM 8

Site: Renfrew Landfill
Renfrew, Ontario

Reference: casing
Casing Height: .90m

date: 27/09/94
scale: 1:200

Hyd-Eng GEOPHYSICS INC.



Note – the grain sizes presented in the geophysical interpretation are intended to explain apparent contacts and are therefore a relative comparison only.

Figure #4

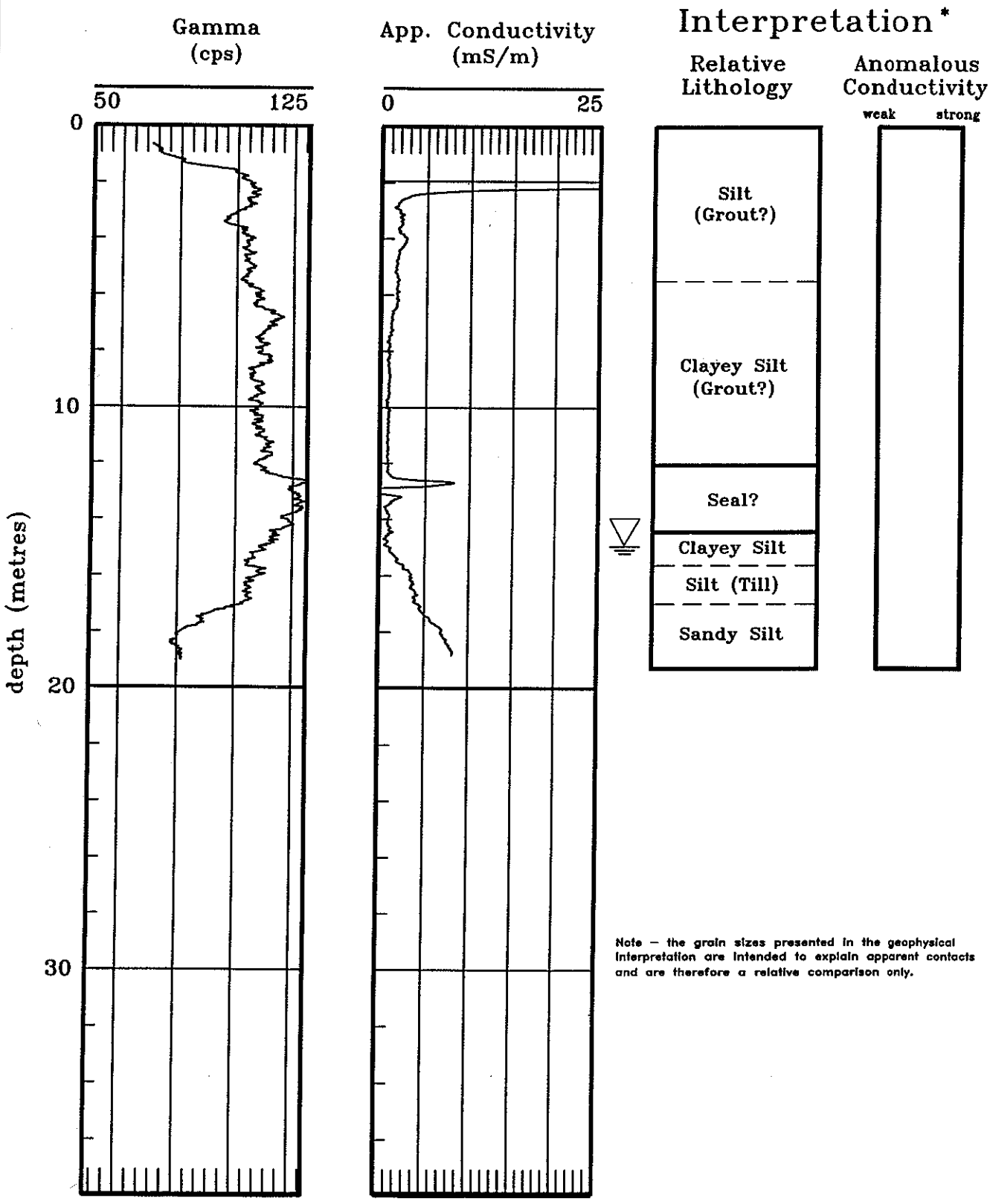
Well: OMM 9

Site: Renfrew Landfill
Renfrew, Ontario

Reference: casing
Casing Height: .91m

date: 27/09/94
scale: 1:200

Hyd-Eng
GEOPHYSICS INC.



Note – the grain sizes presented in the geophysical interpretation are intended to explain apparent contacts and are therefore a relative comparison only.

Figure #5

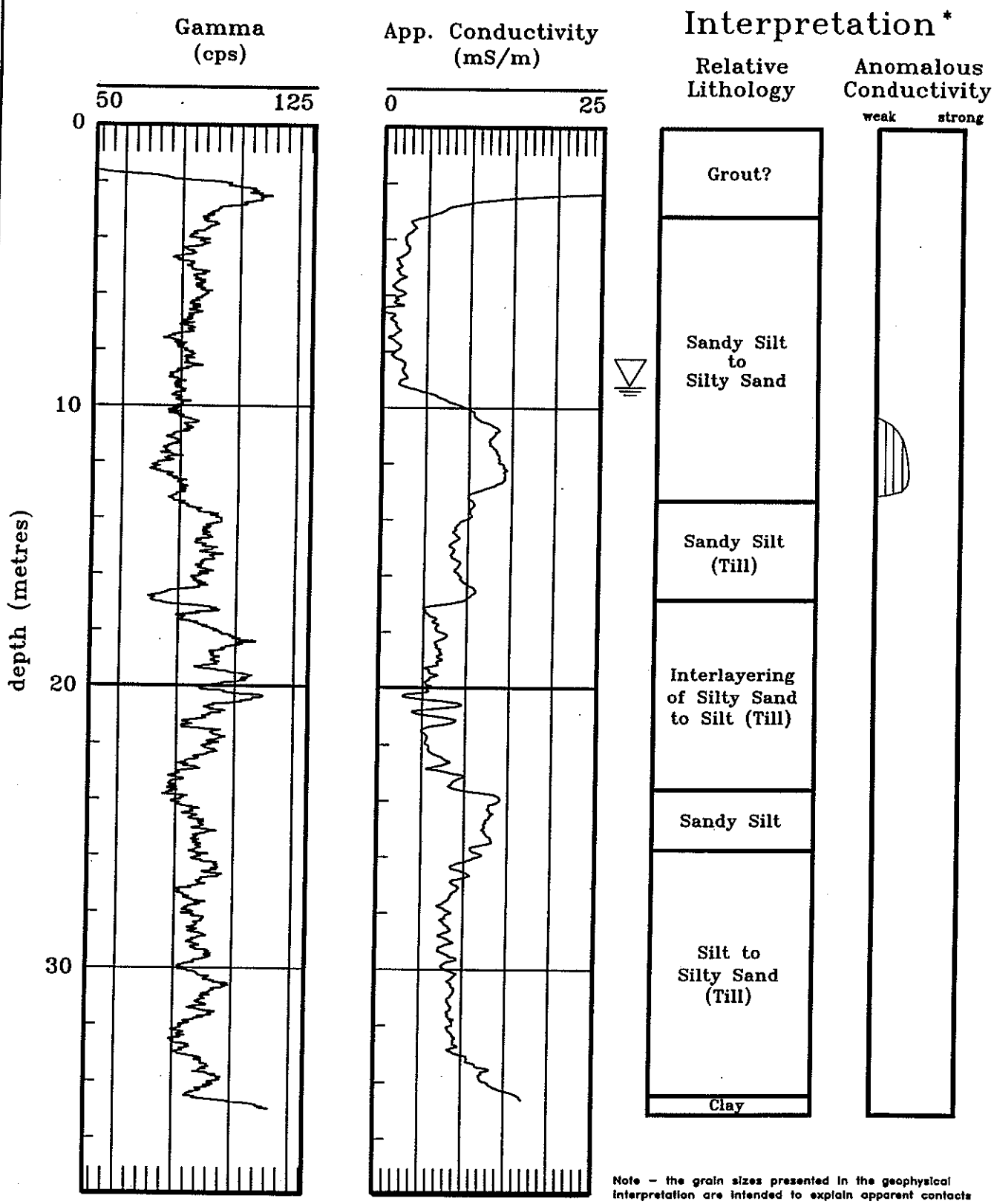
Well: OMM 13

Site: Renfrew Landfill
Renfrew, Ontario

Reference: casing
Casing Height: 1.47m

date: 27/09/94
scale: 1:200

Hyd-Eng GEOPHYSICS INC.



Note – the grain sizes presented in the geophysical interpretation are intended to explain apparent contacts and are therefore a relative comparison only.

PROJECT: 07-1122-0164

RECORD OF MONITORING WELL: BH 07-1

SHEET 1 OF 3

LOCATION: See Site Plan

BORING DATE: July 18, 2007

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		122.21							
	Power Auger 200mm Diam. (Hollow Stem)	Dark brown silty sand, some cobbles (FILL)		0.00 / 121.60							Casing Set in Bentonite Seal
1		Brown fine SAND, trace silt		0.61 / 119.77							Bentonite Seal
2											
3		Brown fine SAND, trace gravel		2.44	1	50 DO	6				
4											
5											
6					2	50 DO	22				
7				114.59							
8		Compact to dense brown fine SAND with silt, clay and fine sand layers		7.62							Native Backfill
9					3	50 DO	26				
10											
11											
12					4	50 DO	20				
13											
14											
15		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: D.J.S.

CHECKED: M.K.F.

MIS-BHS 001 07-1122-0164.GPJ GAL-MIS.GDT 02/14/14 NBHS

PROJECT: 07-1122-0164

RECORD OF MONITORING WELL: BH 07-1

SHEET 2 OF 3

LOCATION: See Site Plan

BORING DATE: July 18, 2007

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
15	Power Auger 200mm Diam. (Hollow Stem)	Compact to dense brown fine SAND with silt, clay and fine sand layers			5	50 DO	22				Native Backfill
16											
17											
18					6	50 DO	24				
19											
20											
21											
22					7	50 DO	66				
23											
24											
25					8	50 DO	26				
26											
27											
28					9	50 DO	45				
29											
30		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 75

LOGGED: D.J.S.

CHECKED: M.K.F.

Golder Associates

MIS-BHS 001 07-1122-0164.GPJ GAL-MIS.GDT 02/14/14 NBHS

PROJECT: 07-1122-0164

RECORD OF MONITORING WELL: BH 07-1

SHEET 3 OF 3

LOCATION: See Site Plan

BORING DATE: July 18, 2007

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
30		*--- CONTINUED FROM PREVIOUS PAGE ---*									
30	Power Auger 200mm Diam. (Hollow Stem)	Compact to dense brown fine SAND with silt, clay and fine sand layers									
31					10	50 DO	31				Native Backfill
32											
33											Bentonite Seal
34					11	50 DO	41				Native Cave
35											
36											
37					12	50 DO	13				50mm Diam PVC #10 Slot Screen
38				84.11							
		End of Borehole		38.10							
39											
40											
41											
42											
43											
44											
45											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: D.J.S.

CHECKED: M.K.F.

PROJECT: 07-1122-0164

RECORD OF MONITORING WELL: BH 07-2

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: July 12 & 13, 2007

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Power Auger 200mm Diam (Hollow Stem)	Brown sand, gravel and cobbles (FILL)		0.00							Casing Set in Bentonite Seal
		Yellow brown SILTY SAND, some gravel		0.61							Bentonite Seal
1		Compact brown fine SAND, trace silt		1.37	1	50 DO	12				
2											
3		Compact brown fine to medium SAND, trace gravel		2.59	2	50 DO	13				Native Backfill
4		Brown fine to coarse SAND, some gravel, occasional cobbles		3.96							
5					3	50 DO	43				
6					4	50 DO	44				Bentonite Seal
7											
8					5	50 DO	34				Native Cave
9		Brown fine to coarse SAND and GRAVEL, numerous cobbles, trace silt		8.53							
10					6	50 DO	21				
11					7	50 DO	29				38mm Diam PVC #10 Slot Screen
12											
		End of Borehole		12.19							
13											
14											
15											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: D.J.S.

CHECKED: M.K.F.

MIS-BHS 001 07-1122-0164.GPJ GAL-MIS.GDT 02/14/14 NBHS

PROJECT: 07-1122-0164

RECORD OF MONITORING WELL: BH 07-3

SHEET 1 OF 2

LOCATION: See Site Plan

BORING DATE: July 9 & 10, 2007

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Power Auger 200mm Diam (Hollow Stem)	TOPSOIL		0.00							Casing Set in Bentonite Seal
		Grey brown SILTY CLAY (Weathered Crust)		0.24							Bentonite Seal
1		Brown SAND and GRAVEL, trace silt		0.85	1	50 DO	22				
2		Loose to compact brown fine SAND, trace silt		2.13	2	50 DO	5				
3											
4											Native Backfill
5					3	50 DO	14				
6					4	50 DO	13				
7											Bentonite Seal
8					5	50 DO	8				
		Compact brown fine to coarse SAND, trace to some gravel		8.53							
9					6	50 DO	8				
10											
11					7	50 DO	18				Native Backfill
12											
13					8	50 DO	25				
14					9	50 DO	21				
15		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 75

LOGGED: D.J.S.

CHECKED: M.K.F.

Golder Associates

MIS-BHS 001 07-1122-0164.GPJ GAL-MIS.GDT 02/14/14 NBHS

PROJECT: 07-1122-0164

RECORD OF MONITORING WELL: BH 07-3

SHEET 2 OF 2

LOCATION: See Site Plan

BORING DATE: July 9 & 10, 2007

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
15	Power Auger 200mm Diam (Hollow Stem)	*--- CONTINUED FROM PREVIOUS PAGE ---*									
		Compact brown fine to coarse SAND, trace to some gravel			10	50 DO	15				
16		Dense to very dense brown SAND and GRAVEL, some cobbles		16.15							
17											
18					11	50 DO	46				
19											Native Backfill
20											
21					12	50 DO	88				
22											
23											
24											
		Grey fine to coarse SAND and GRAVEL and cobbles		24.38							38mm Diam PVC #10 Slot Screen
25											
26											
27											Native Cave
		End of Borehole		27.43							
28											
29											
30											

MIS-BHS 001 07-1122-0164.GPJ GAL-MIS.GDT 02/14/14 NBHS

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: D.J.S.

CHECKED: M.K.F.

PROJECT: 07-1122-0164

RECORD OF MONITORING WELL: BH 07-4

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: July 11, 2007

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Power Auger 200mm Diam (Hollow Stem)	TOPSOIL		0.00							Casing Set in Bentonite Seal
		Grey brown SILTY CLAY (Weathered Crust)		0.24							Bentonite Seal
1		Brown SAND and GRAVEL, trace silt		0.85							
2		Loose to compact brown fine SAND, trace silt		2.13							
3											
4											Native Backfill
5											
6											
7											
8											Bentonite Seal
		Compact brown fine to coarse SAND, trace to come gravel		8.53							Native Cave
9											
10											38mm Diam. PVC #10 Slot Screen
11		End of Borehole		10.97							
12											
13											
14											
15											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: D.J.S.

CHECKED: M.K.F.

MIS-BHS 001 07-1122-0164.GPJ GAL-MIS.GDT 02/14/14 NBHS

PROJECT: 07-1122-0164

RECORD OF GAS WELL: GW 07-5

SHEET 1 OF 2

LOCATION: See Site Plan

BORING DATE: July 13, 16 & 17, 2007

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		116.23							
0	Power Auger 200mm Diam. (Hollow Stem)	Brown and dark brown sand, trace gravel, cobbles and concrete (FILL)		0.00 / 115.32							Casing Set in Bentonite Seal; Bentonite Seal
1		Compact to dense brown fine SAND, occasional very thin silty clay seams		0.91	1	50 DO	13				
2											
3					2	50 DO	14				
4											
5					3	50 DO	31				
6				109.98							
6		Compact to dense brown fine SAND, trace silt, occasional fine to medium sand layers		6.25	4	50 DO	18				
7											
8					5	50 DO	24				
9											
10					6	50 DO	29				
11					7	50 DO	57				
12											
13					8	50 DO	27				32mm Diam PVC #10 Slot Screen
14					9	50 DO	31				
15		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: D.J.S.

CHECKED: M.K.F.

MIS-BHS 001 07-1122-0164.GPJ GAL-MIS.GDT 02/14/14 NBHS

PROJECT: 07-1122-0164

RECORD OF GAS WELL: GW 07-5

SHEET 2 OF 2

LOCATION: See Site Plan

BORING DATE: July 13, 16 & 17, 2007

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
15	Power Auger 200mm Diam. (Hollow Stem)	Compact to dense brown fine SAND, trace silt, occasional fine to medium sand layers			10	50 DO	26				32mm Diam PVC #10 Slot Screen
16											
17					11	50 DO	37				
18											
19					12	50 DO	45				
20											
21					13	50 DO	39				
22											
				93.67	14	50 DO	38				
23		Dense to compact fine SAND, some silt with occasional silty sand and silty clay seams and layers		22.56							
24					15	50 DO	39				
25											
26					16	50 DO	41				
27											
28					17	50 DO	37				
29											
30					18	50 DO	27				
		End of Borehole		88.19 28.04							

DEPTH SCALE

1 : 75

LOGGED: D.J.S.

CHECKED: M.K.F.

Golder Associates

MIS-BHS 001 07-1122-0164.GPJ GAL-MIS.GDT 02/14/14 NBHS

PROJECT: 10-1125-0036

RECORD OF BOREHOLE: 10-1

SHEET 1 OF 3

LOCATION: See Site Plan

BORING DATE: Sept. 3, 2010

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
								SHEAR STRENGTH Cu, kPa — nat V. + Q - ● rem V. ⊕ U - ○ (20 40 60 80)	WATER CONTENT PERCENT Wp — W — Wl (20 40 60 80)		
0		GROUND SURFACE		97.23							
		Brown fine sand, some gravel, occasional wire (FILL)		0.00							Bentonite Seal
1				96.01							
		Brown fine to medium SAND		1.22	1	A.S.					
2											
3											
4											
5											
6											
7	Rotary Drill/Cable Tool										
8											Silica Sand and Bentonite
9											
10											
11											
12											
13											
				83.51							
14		Brown fine to coarse SAND, trace to some cobbles		13.72	2	A.S.					
15											
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: PASB

MIS-BHS 001 1011250036-1000.GPJ GAL-MIS.GDT 03/19/14 JM

PROJECT: 10-1125-0036

RECORD OF BOREHOLE: 10-1

SHEET 2 OF 3

LOCATION: See Site Plan

BORING DATE: Sept. 3, 2010

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
15		*--- CONTINUED FROM PREVIOUS PAGE ---*									
				81.99							
		Brown to grey brown fine SAND, siltier at depth		15.24							
16											
17											
18											
19											
				77.42							
20		Brown to grey fine SAND, trace to some gravel		19.81							
21											
22	Rotary Drill/Cable Tool										
23											Silica Sand and Bentonite
24											
25											
				71.32							
26		Brown fine SAND, some gravel, occasional cobble		25.91	3	A.S.					
27											
28											
29											
30		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: PASB

MIS-BHS 001 1011250036-1000.GPJ GAL-MIS.GDT 03/19/14 JM

PROJECT: 10-1125-0036

RECORD OF BOREHOLE: 10-1

SHEET 3 OF 3

LOCATION: See Site Plan

BORING DATE: Sept. 3, 2010

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
30	Rotary Drill/Cable Tool	Brown fine SAND, some gravel, occasional cobble									
31											
32				64.62							
		Brown fine SAND, some gravel and cobbles, occasional boulder		32.61	4	A.S.					Silica Sand and Bentonite
33											
34											
35				62.18							
		Brown fine SAND, some gravel and cobbles, some boulders		35.05	5	A.S.					
36											Bentonite Seal
37											
38				59.13							Silica Sand
		Brown fine SAND and GRAVEL, COBBLES and BOULDERS		38.10							
39											
				57.45							51 mm Diam. PVC #10 Slot Screen
40		COBBLES and BOULDERS (Possible Bedrock)		39.78							
				56.69							
		End of Borehole		40.54							
41											
42											
43											
44											
45											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: PASB

MIS-BHS 001 1011250036-1000.GPJ GAL-MIS.GDT 03/19/14 JM

PROJECT: 10-1125-0036

RECORD OF BOREHOLE: 10-2A

SHEET 1 OF 3

LOCATION: See Site Plan

BORING DATE: Sept. 3, 2010

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		92.70							
0	Rotary Drill/Cable Tool	Grey brown fine SAND, some gravel and cobbles		0.00							Bentonite Seal
1											
2				90.57							
		Grey fine SAND, some gravel, occasional cobble		2.13							
3											
4											
5											
6											
7											Silica Sand and Bentonite
8											
9				83.56							
		Grey fine to coarse SAND and GRAVEL, some cobbles		9.14							
				82.95							
10		Brown fine to medium SAND, some gravel, trace cobbles		9.75							
11					1	A.S.					
12											
13											
14											
15											
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: PASB

MIS-BHS 001 1011250036-1000.GPJ GAL-MIS.GDT 03/19/14 JM

PROJECT: 10-1125-0036

RECORD OF BOREHOLE: 10-2A

SHEET 2 OF 3

LOCATION: See Site Plan

BORING DATE: Sept. 3, 2010

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
15	Rotary Drill/Cable Tool	Brown fine to medium SAND, some gravel, trace cobbles									
16											
				75.94							
17		Brown to grey brown fine SAND, trace gravel and cobbles		16.76	2	A.S.					
18											
19					3	A.S.					
20											
21											
22											Silica Sand and Bentonite
23											
24											
25											
26											
27											
				65.27							
		Brown fine SAND		27.43	4	A.S.					
28											
				64.35							
		Brown fine to medium SAND and GRAVEL, occasional to some cobbles		28.35	5	A.S.					
29											
30		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: PASB

MIS-BHS 001 1011250036-1000.GPJ GAL-MIS.GDT 03/19/14 JM

PROJECT: 10-1125-0036

RECORD OF BOREHOLE: 10-2A

SHEET 3 OF 3

LOCATION: See Site Plan

BORING DATE: Sept. 3, 2010

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
30	Rotary Drill/Cable Tool	Brown fine to medium SAND and GRAVEL, occasional to some cobbles		61.31							
31		Grey brown to brown SILTY fine SAND to SANDY SILT		31.39	6	A.S.					Silica Sand and Bentonite
32											
33				59.17							
34		Grey brown SILTY fine SAND to fine SAND, trace to some gravel		33.53	7	A.S.					Bentonite Seal
35				57.65							
36		Grey fine to medium SAND, trace to some gravel, occasional cobble		35.05	8	A.S.					Silica Sand
37											
38											51 mm Diam. PVC #10 Slot Screen
39				53.69							
		End of Borehole		39.01							Note: Casing left in, extending to bottom of hole; open at the end
40											
41											
42											
43											
44											
45											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: PASB

MIS-BHS 001 1011250036-1000.GPJ GAL-MIS.GDT 03/19/14 JM

PROJECT: 10-1125-0036

RECORD OF BOREHOLE: 10-2B

SHEET 1 OF 2

LOCATION: See Site Plan

BORING DATE: Sept. 3, 2010

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		92.69							
0	Rotary Drill/Cable Tool	Grey brown fine SAND, some gravel and cobbles		0.00							Bentonite Seal
1											
2				90.56							
		Grey fine SAND, some gravel, occasional cobble		2.13							
3											
4											
5											
6											
7											Silica Sand and Bentonite
8											
9				83.55							
		Grey fine to coarse SAND and GRAVEL, some cobbles		9.14							
				82.94							
10		Brown fine to medium SAND, some gravel, trace cobbles		9.75							
11											
12											
13											
14											Bentonite Seal
15											
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: PASB

MIS-BHS 001 1011250036-1000.GPJ GAL-MIS.GDT 03/19/14 JM

PROJECT: 10-1125-0036

RECORD OF BOREHOLE: 10-2B

SHEET 2 OF 2

LOCATION: See Site Plan

BORING DATE: Sept. 3, 2010

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
15	Rotary Drill/Cable Tool	Brown fine to medium SAND, some gravel, trace cobbles									Bentonite Seal
				75.93							
16		Brown to grey brown fine SAND, trace gravel and cobbles		16.76							Silica Sand
17											
18											
19											51 mm Diam. PVC #10 Slot Screen
20				72.27							Silica Sand
		End of Borehole		20.42							
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: PASB

MIS-BHS 001 1011250036-1000.GPJ GAL-MIS.GDT 03/19/14 JM

PROJECT: 10-1125-0036

RECORD OF BOREHOLE: 11-01

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: February 1, 2011

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		104.55							
0	Power Auger 200 mm Diam. (Hollow Stem)	Silty clay SAND, plastic and debris		0.00							Flush Mount Protective Casing Set in Bentonite
1											Bentonite Seal
2											Native Backfill and Bentonite Mix
3											
4											Bentonite Seal
5											
6		*-wet at 6.10 m depth*									
7											Silica Sand
				96.93							
8		Brown to black fine SAND		7.62							
9											
10											51 mm Diam. PVC #10 Slot Screen
				93.88							
11		End of Borehole		10.67							
12											
13											
14											
15											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: DG

CHECKED: PASB

MIS-BHS 001 1011250036-1000.GPJ GAL-MIS.GDT 03/19/14 JM

PROJECT: 10-1125-0036

RECORD OF BOREHOLE: GW11-01

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: March 4, 2011

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Power Auger 200 mm Diam. (Hollow Stem)	Black sandy ORGANICS		0.03							
		Brown medium SAND			1	50 DO	-				Bentonite Seal
1					2	50 DO	12				51 mm Diam. PVC #10 Slot Screen
2					3	50 DO	6				W.L. in Screen at 1.8 m depth at time of drilling
		End of Borehole		2.29							
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: CA

CHECKED: PASB

MIS-BHS 001 1011250036-1000.GPJ GAL-MIS.GDT 03/19/14 JM

PROJECT: 10-1125-0036

RECORD OF BOREHOLE: GW11-01

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: March 4, 2011

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Power Auger 200 mm Diam. (Hollow Stem)	Black sandy ORGANICS Brown medium SAND		0.03							Bentonite Seal
1					1	50 DO	-				
2					2	50 DO	12				51 mm Diam. PVC #10 Slot Screen
					3	50 DO	6				
		End of Borehole		2.29							W.L. in Screen at 1.8 m depth at time of drilling
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: CA

CHECKED: PASB

MIS-BHS 001 1011250036-1000.GPJ GAL-MIS.GDT 3/28/11 JM

PROJECT: 14-1125-0002

RECORD OF BOREHOLE: 14-01

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: October 2, 2014

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE									
	Excavator			0.00							Bentonite Seal
1											25 mm Diam. PVC #10 Slot Screen
		End of Borehole		1.37							
2											
3											
4											
5											

DEPTH SCALE

1 : 25

Golder Associates

LOGGED: DWM

CHECKED: MKF

MIS-BHS 001 1411250002.GPJ GAL-MIS.GDT 03/30/15 JM

APPENDIX D

Site Inspection Form

DAILY LOG FOR RENFREW LANDFILL SITE

Operated under Environmental Compliance Approval A410401

Renfrew
INC • 1858
Bridging Charm and Convenience

Date: _____ Time: _____ Conducted By: _____ Signature:_____

Daily Inspection Location/Comment:

Was litter collected Y N N/A _____

Was dust suppressant applied? Y N N/A _____

Was there any equipment out of service, and if so, what actions were taken to rectify the problem?

Y N N/A _____

_____

Was any waste refused? Y N N/A _____

Is all equipment operational? Y N N/A _____

Are fences and gates intact? Y N N/A _____

Is there excess odour? Y N N/A _____

Is there litter? Y N N/A _____

Are there new or existing leachate seeps? If yes, please indicate location on map (see next page):

Is all signage intact? Y N N/A _____

Is there any erosion of side slopes? If so, what repairs were undertaken?

Y N N/A _____

List any other deficiencies and recommend remedial actions _____

_____

Please indicate the approximate location of the active area where waste was placed today on the site plan on the next page.

Daily Cover

Was cover material placed over exposed waste at the end of the working day?

Y N N/A _____

What was the average depth of cover material?

Y N N/A _____

What was the cover material source/description? _____

Is the cover material used causing excessive dust?

Y N N/A _____

Waste Diversion

Are bins and waste storage areas clearly labelled?

Y N N/A _____

Are lids/doors on bins closed during non-operating hours and during high wind events?

Y N N/A _____

Were there any items shipped off-site? If so, describe. _____

Y N N/A _____

Other Items

Where any Incident Report Forms Completed?

Y N N/A _____

Record of Official Visitors Name: _____ Company: _____

Name: _____ Company: _____


GW 07-5
OMM 10 / OW10
OMM 9
OMM 1
GW-5
GW-4
GW-1
multiple wells
GW-3
BH11-01
GW-2
OMM 8
GW-09-1
OMM-2
GW-11-01



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