Consulting Engineers
9 Auriga Drive
Ottawa, Ontario
K2E 7T9
Tel: (613) 226-7381

Geotechnical Engineering
Environmental Engineering
Hydrogeology
Materials Testing
Building Science
Rural Development Design
Retaining Wall Design
Noise and Vibration Studies

patersongroup.ca

April 29, 2026
File: PE5584-LET.07

Barrhaven Conservancy Development Corporation
3713 Borrisokane Road
Ottawa, Ontario
K2J 4J4

Attention: **Mr. David Lopez**

Subject: **Landfill Impact Assessment**
3288 Borrisokane Road
Ottawa, Ontario

Dear Sir,

Further to your request, Paterson Group (Paterson) has prepared a Landfill Impact Assessment for the aforementioned property, to assess potential impacts from the City of Ottawa's Trail Road Landfill facility, in support of the proposed municipal Site Plan Application.

1.0 Background Information

The subject parcel of land, currently referred to as 3288 Borrisokane Road, is situated on the west side of Borrisokane Road, approximately 190m north of the Jock River and approximately 235m south of Strandherd Drive. The subject property is approximately 35.64 hectares in size.

The active Trail Road Landfill facility is currently owned and operated by the City of Ottawa and is located further south of the subject lands, southwest of Highway No.416. More specifically, the footprint of the landfill is approximately 1.2 km south of the subject property at its closest point, while the associated dewatering pond within the landfill site boundary, is situated approximately 1 km south of the subject property.

Given the subject property is within 3 km of the landfill, a landfill impact assessment was completed. This study is to demonstrate that the Trail Road Landfill facility will not have adverse affects on the proposed residential subdivision.

The former Nepean Landfill is situated to the east-southeast of the Trail Road landfill facility, approximately 1.8 km southwest of the subject property. Given the Trail Road Landfill facility is currently active and is in closer proximity to the subject property, the Trail Road Landfill facility is the primary focus of this assessment.

2.0 2024 Environmental Monitoring and Operating Report

As part of this assessment, Paterson reviewed the 2019, 2020, 2021 and 2024 Trail Road Landfill Site Monitoring and Operating Reports prepared by Dillon Consulting for the City of Ottawa. The findings of the more recent 2024 report are discussed below; no significant differences in monitoring results were noted in 2024 from the 2019, 2020 and 2021 reports.

The following summarizes highlighted key points regarding the groundwater flow and leachate plumes outlined in the 2024 report:

- Groundwater was monitored at various levels in the subsoil units and within various zones and locations including down-gradient of the landfill. No significant change in groundwater flow patterns were observed.

- From a hydrogeology perspective, groundwater flow in the shallow aquifer was generally northwards from the northern portion of the Trail Road Landfill facility (shallow aquifer was not present across the southern portion of the landfill).

- The groundwater modelling study indicated that the deep aquifer flow regime could potentially be influenced by long-term dewatering associated with the new development area to the east. Based on more recent groundwater elevation measurements, the deep aquifer groundwater flow appears to be directed toward the northeast.

- Based on the analytical results, weak to moderate leachate impacts were present in the shallow aquifer, predominately within the Cedar Forest, in the northeast section of the Trail Road Landfill facility. The leading side of this plume was dilute, and it was estimated that the plume has migrated approximately 300 m north of the landfill footprint.

- The shallow groundwater plume was contained within the landfill property, although some encroachment of leachate affected groundwater may have occurred within the Highway No.416 right-of-way adjacent to the east of the landfill. Dillon stated that the impacts were likely associated with the landfill expansion in this area, representing a temporary condition.

Leachate loading was expected to diminish with placement of the Final Cover System (Stage 1 in 2016, Stage 2 in 2020, and the eastern portion of Stage 3 in 2021). It is noted that final cover installation on the western portion of the Stage 3 (Stage 3B) began in 2024.

- Leachate influenced groundwater identified within the deep aquifer was also reported to be contained within the landfill property in the downgradient flow direction (i.e. towards the Dewatering Pond, located to the north of the landfill). Some impacts above the Reasonable Use Criteria were noted to the south and east of the site, along Trail Road, however, these impacts were expected to be mitigated once the Final Cover System was completed.

- The bedrock aquifer beneath the landfill site was reported to not have been impacted by leachate.

- The proposed 2025 Environmental Monitoring Program was stated to be the same as the 2024 program, with some modifications, including supplemental sampling on recently installed wells.

3.0 Landfill Impact Assessment

3.1 Existing Waste Disposal Facility

The Trail Road Landfill facility is operated and maintained in accordance with the Environmental Compliance Approvals (ECAs) issued by the Ontario Ministry of the Environment, Conservation and Parks (MECP) and accepts the following wastes:

- Solid, non-hazardous municipal waste which includes wastes generated by residential, commercial, and industrial sectors, and contaminated fill; and
- Dewatered, digested, and lime stabilized sewage/sludges from the Robert O. Pickard Environmental Centre.

The Trail Road Landfill, which commenced operations in 1980, consists of five development stages. Stages 1 and 2 were designed as natural attenuation fill areas, while Stages 3, 4, and 5 incorporate engineered controls, including clay and geomembrane liners and leachate collection systems.

Filling of the initially approved capacity within Stages 1 through 4 progressed until mid-2007. In 2005, approval was granted for a vertical expansion over Stages 1 to 4, along with the development of a new engineered cell (Stage 5). Following mid-2007, filling

activities shifted to the Stage 1 expansion and have since advanced through subsequent stages, including placement within the newly constructed Stage 5 subcell (Stage 5A) in 2024.

In 2016, the leaf and yard waste composting facility was relocated to 4377 Barnsdale Road, south of the Trail Road Landfill site; it had previously operated on-site in the general area of Stage 5.

A separation distance of approximately 1.2 km exists between the southern portion of the subject property and the Trail Road Landfill facility property boundary.

Based on the 2024 report, the estimated remaining life of the Trail Road Landfill facility would be 9.8 years. However, this value is said to be dependent on future waste generation and diversion rates.

3.2 Local Geology

The Trail Road Landfill facility and surrounding lands are situated on a northwest-southeast trending ridge of glacially deposited sand and gravel. A deep sand and gravel aquifer is present beneath the entire site, while a shallow sand aquifer is present above a discontinuous clay layer, which has an influence over the local hydrogeology and therefore landfill leachate and groundwater influences in the area (i.e. high attenuation capacity). Bedrock in the area consists of limestone.

Based on Geotechnical Investigations completed by Paterson for the subject property, in April 2026, the site stratigraphy generally consists of topsoil underlain by a silty clay deposit. The findings of the Geotechnical Investigations generally confirm the reported geology.

3.3 Surface Runoff

Surface runoff from the east side (Stages 1 and 2) of the Trail Road Landfill facility drains to rip-rap swales along the sides of the active and capped landfill areas. A stormwater by-pass is present at the northeastern corner of Stage 1, which collects overland runoff, ultimately ending up in the stormwater management pond (northeastern corner of the site). Surface runoff from the west side (Stages 3 and 4) of the Trail Road Landfill facility is directed towards a ditch just north of these Stages, towards Cambrian Road, and then to the east, towards the stormwater management pond.

From the stormwater management pond, surface water flows to the east, under Highway No.416, where it then flows in a northerly direction through roadside ditches along Borrisokane Road, finally ending up in the Jock River.

Dillon stated monitoring was completed at stations within the drainage area at the northeastern corner of the Trail Road Landfill facility, at downstream locations along the drainage path to the Jock River, and within the Jock River.

Surface water runoff from the Trail Road Landfill facility does not appear to have had adverse effects on surface water receptors, as parameter concentrations (if detected) were below Canadian Water Quality Guideline (CWQG) and/or Provincial Water Quality Objective (PWQO) standards, except for total phosphorus and occasional total kjeldahl nitrogen (TKP) iron and chloride concentrations.

Surface water monitoring is performed yearly to assess surface water flow and quality from the Trail Road Landfill facility. Based on the findings of the 2024 report, surface runoff is not considered to have the potential to negatively affect the subject property.

3.4 Local Groundwater Flow

According to the 2024 report, groundwater on the eastern side of the Trail Road Landfill facility (Stages 1 and 2) in the shallow aquifer flows in a northerly direction, into the Cedar Forest. Based on more recent groundwater elevation measurements, the deep aquifer groundwater flow appears to be directed toward the northeast, influenced by long-term dewatering associated with the new development area to the east.

3.5 Hydrogeological Review

The infiltration of rainwater into the landfill and decomposing waste creates a liquid called leachate which, if not managed properly, has the potential to impact groundwater in the vicinity of a landfill. In assessing the potential for groundwater contamination by leachate, the local geology and hydrology, approved engineering controls, and continued groundwater monitoring programs were considered.

As noted previously, shallow groundwater flow at the Trail Road Landfill facility is in a northerly direction, upgradient relative to the subject lands. Despite its upgradient orientation, leachate produced at the Trail Road Landfill facility is not considered to have the potential to impact the subject property given the presence of the Jock River south of the subject property and it's eastward flow towards the Rideau River, the low permeability of the deep clay deposit beneath the area of the subject lands, the separation distance from the Trail Road Landfill facility and the groundwater monitoring results obtained during the 2024 monitoring program (further discussed in Section 3.10).

According to the 2024 monitoring program, deep groundwater flow beneath the Trail Road Landfill facility is cross-gradient relative to the subject property. Based on the cross-gradient orientation, separation distance and analytical test results obtained during the

2024 monitoring program, the potential for leachate impacts in the deep aquifer beneath the subject lands is considered to be negligible.

Based on 2024 monitoring, no leachate affects were identified in the bedrock aquifer beneath the Trail Road Landfill facility.

3.6 Engineering Controls

Engineered controls include a clay and geomembrane bottom liner and a leachate collection and removal system on the western side of the landfill footprint (Stages 3, 4 and 5). Leachate is collected from the western-central portion of the landfill (Stage 3) using a gravity drainage system, which is directed to a collector manhole. In the western portion of the landfill (Stage 4), the collected leachate is mechanically pumped to the manhole. In the westernmost portion of the landfill (Stage 5), the leachate is directed southeast towards sump pit locations and then mechanically pumped to the central pumping facility.

As of 2012, the collected leachate is pre-treated at the Trail Road Landfill facility to achieve compliance with the Sewer Use discharge permit, allowing leachate to be sent to the Robert O. Pickard Environmental Centre (ROPEC).

It should be noted that the eastern side of the landfill footprint (Stages 1 and 2) was engineered as a natural attenuation fill area, so no leachate is collected from the eastern portion of the landfill. Leachate from Stages 1 and 2 is said to decrease with the installation of a new geomembrane and the completion of the Final Cover System.

Up to three times per year, water level measurements and sampling of 80 monitoring wells for chemical analysis of several common leachate indicator parameters occurs. Additionally, surface water samples near the Trail Road Landfill facility, including the Jock River, are obtained. Groundwater and surface water samples are collected and analyzed to assess the extent of potential landfill impacts.

Additionally, a trigger monitoring program was established and implemented at the Trail Road Landfill facility during the landfill expansion process such that discharging groundwater should not affect surface water to the point where unacceptable surface water quality would result off-site.

3.7 Ground Settlement

Based on the separation distance of 1.2 km between the subject property and Trail Road Landfill facility property limits, settlement of the existing ground surface across the subject property is not expected to occur as a result of the landfilling activities.

3.8 Visual Impact

Based on the separation distance of 1.2 km between the subject property and Trail Road Landfill facility property, potential visual impact from the Trail Road Landfill facility on the subject property is considered to be negligible.

3.9 Air Quality, Dust, Odour, and Noise

Based on the separation distance of 1.2 km between the subject property and Trail Road Landfill facility property and the predominant wind directions from the east and north, potential air quality, dust, odour, and noise impacts on the subject property due to the Trail Road Landfill facility are not anticipated.

3.10 Contaminated Soil and Groundwater

For this landfill impact assessment, the results from the wells below were chosen to be discussed due to their northern and down-gradient orientation with respect to the landfill.

Shallow Aquifer Monitoring Wells

Based on analytical testing completed as part of the 2021 monitoring program, a concentration of toluene just above laboratory detection limits was present in the spring sample from the shallow aquifer Monitoring Well M75-2 (situated north of Cambrian Road, adjacent to the east boundary of the dewatering pond). All VOC parameters were non-detect in the 2024 sample. Leachate indicator parameters were similar to the median reference concentrations. The groundwater at this location was not considered to have been impaired by landfill leachate.

Upper/Mid Deep Monitoring Wells

Upper/mid deep Monitoring Wells M120-1 and M184-1 and lower deep Monitoring Wells M97-1 and M104-1, situated along the central portion of the northernmost section of the Trail Road Landfill facility, north and northeast of the dewatering pond, were also sampled as part of the 2024 monitoring program.

No VOC concentrations were detected in these wells during the 2024 sampling events. Monitoring wells M97-1 and M184-1 exhibited most leachate indicator parameters elevated relative to reference concentrations. Monitoring well M120-1 also showed several leachate indicator parameters above reference concentrations. In addition, monitoring well M104-1 had all measured leachate indicator parameters elevated relative to the reference concentrations. The groundwater at these locations was not considered to have been impaired by landfill leachate.

Additionally, as described in the 2024 report section, leachate impacts in the shallow aquifer groundwater plume and deep aquifer are said to be contained within the landfill property.

Based on the information contained in the 2024 monitoring report and the separation distance, contamination of soil and groundwater at the subject property is not expected to have occurred as a result of the Trail Road Landfill facility.

3.11 Landfill Gas

In 2006, a landfill gas to energy plant was built on the Trail Road Landfill facility and commissioned during early 2007. Since then, the infrastructure has undergone substantial upgrades, including the installation of new vertical landfill gas extraction wells, upgrades to existing wells across the Trail Road Landfill Site, and the installation of a gas perimeter collection system (2018, commissioned during April 2019, completed during April 2020, and continued in a phased approach in 2021). In 2024, the Stage 5 landfill gas collection system was connected to existing infrastructure.

Landfill gas concentrations measured outside the landfill gas perimeter collection system, and closer to the property lines, were non-detect, or minimal. Concentrations complied with the Certificate of Approval. A reduction in methane concentrations was noticed in 2021, post-upgrades. No gas migration was detected beyond the landfill gas perimeter collection system. In other words, no gas migration was detected beyond the property boundary.

Further improvements to the efficiency of the landfill gas collection system are anticipated once the Final Cover System is completed (currently completed on Stages 1, 2, and eastern portion of 3). As a result, the overall vacuum exerted on the landfill by the extraction wells will be increased.

Based on the separation distance of 1.2 km between the subject property and Trail Road Landfill facility, as well as the engineered controls mitigating the spread of landfill gas, impacts from gas migration on the subject property due to the Trail Road Landfill facility are not anticipated.

4.0 Conclusion

Based on a review of the available Trail Road Landfill facility Monitoring and Operating reports (2019 through 2021 and 2024) and the separation distance between the landfill and the subject property, it is our opinion that the Trail Road Landfill facility will not have any adverse effects on the subject property and proposed residential subdivision.

5.0 Statement of Limitations

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Barrhaven Conservancy Development Corporation is not authorized without review by Paterson for the applicability of our findings to the alternative use of this report.

Paterson Group Inc.

Kuldeep Panchal, M. Eng

Mark D'Arcy, P.Eng., Q.P.ESA