

5. Supporting Studies

The following reports/studies have been prepared in support of the proposed applications, as summarized below.

5.1 Archaeological Assessment

A Stage 1-2 Archaeological Assessment was prepared by Lincoln Environmental Consulting Corp. (“LEC”) to identify if archaeological resources are present on the Site.

The Stage 1 Assessment was based on a desktop review of historical data. It determined that the Site has moderate to high potential for archaeological resources based on ideal soil conditions for agriculture and access to potable water via Canagagigue Creek. As a result, a Stage 2 Assessment was recommended.

The Stage 2 Assessment was conducted on July 15, 2021 and included a test pit survey at 5 metre intervals for the meadow and woodlot portions of the Site. The industrial building and existing gravel parking lot were not subject to the test-pit analysis as they were previously disturbed by the former landfill use and unlikely to have any archaeological potential. All test pits revealed the meadow and woodlot areas were previously disturbed and contained clay and gravel fill. No artifacts were recovered. The wet areas of the Site were deemed to be disturbed and were not studied.

The Stage 2 Assessment resulted in no archaeological finds, and further archaeological assessment was not recommended.

5.2 Functional Servicing and Stormwater Management Report

A Functional Servicing and Stormwater Management Report has been prepared by R.J. Burnside & Associates Limited (“R.J. Burnside”) (dated December 2021) to identify the servicing and grading design and constraints of the Site, and to evaluate the stormwater management opportunities and constraints, including:

- Calculating the allowable and proposed runoff rates for development;
- Evaluating suitable methods for attenuation and treatment of stormwater runoff; and,
- Demonstrating compliance of the proposed stormwater control measures with the policies and guidelines of the Grand River Conservation Authority (“GRCA”) and the Township of Woolwich.

The report identifies that the functional level analysis and design that has been carried out demonstrates that the Proposed Development can be graded as per the standards of the Township of Woolwich and that the stormwater management requirements can be met.

Storm Drainage

The Site currently drains south towards Canagagigue Creek, although a portion of the Site, at the north boundary, drains towards the ditch that runs south of the Kissing Bridge Trail. The ditch conveys flows west to Arthur Street North, and eventually south to Canagagigue Creek.

The proposed stormwater management strategy was designed using criteria contained within the Township of Woolwich's Design Guidelines, the GRCA guidelines, the Canagagigue Creek Watershed Plan, and the MECP SWM Planning and Design Manual, which includes:

- Enhanced Protection Level water quality control, to provide long-term average removal of 80% of suspended solids, as specified in the MECP's SWM Planning and Design Manual;
- Water quantity control of the 2-year through 100-year design storms; and,
- Post-development peak flows are to be controlled to existing conditions.

The Proposed Development has been designed with a bio-retention facility for stormwater quality and quantity control. The proposed grading directs the drainage overland to the bio-retention facility located in the southern portion of the Site. The bio-retention facility will provide water quality treatment and water quantity attenuation prior to outletting flows to Canagagigue Creek along the southern property line. A permit will be required from the GRCA for grading and outlets into the regulated area associated with the floodplain for the Canagagigue Creek.

An external drainage area of approximately 7.5 hectares (18.5 acres) drains towards the Site. Most of the drainage is captured in the Kissing Bridge Trail ditch north of the Site, which conveys stormwater runoff west towards Arthur Street North. There is an existing ditch that runs along the east side of the Site that will convey external flows if the Kissing Bridge Trail ditch exceeds capacity. The existing ditch along the east side of the Site is to remain open and will be conveyed to the Township within a 12.25 metre strip of land.

Grading

The grading design for the Site has been completed in compliance with the following requirements and constraints:

- Conformance of the grading and drainage criteria outlined within the Township of Woolwich's Design Guidelines;
- Matching of existing grades along the property boundary;
- Control and conveyance of stormwater within the project Site; and,
- Providing major overland flow route to convey runoff to the stormwater management facility.

The proposed parking lot expansion will be graded at a 1% slope and will direct drainage overland to the proposed bio-retention facility.

Erosion and Sediment Control

The erosion and sediment control plan for the Site will be designed in conformance with the standards outlined by the Greater Golden Horseshoe Area Conservation Authorities in the *Erosion and Sediment Control Guideline for Urban Construction Erosion and Sediment Control Guidelines* (2006). Details for erosion and sedimentation control during construction will be subject to GRCA approval prior to the issuance of the site alteration permit.

During the site grading works, the report identifies that there is potential for sediment-laden runoff to be directed towards the existing creek. Therefore, prior to any grading activity, the erosion and sediment control strategy will include the following:

- Temporary sediment control fence installed along the development boundary prior to any grading activity;
- Gravel 'mud-mats' at construction vehicle entrances to minimize off-site tracking of sediments;
- All disturbed areas will be stabilized as quickly as possible to minimize the opportunity for erosion; and,
- Material stockpiles (if required) are to be located in appropriate locations.

All temporary erosion and sediment control measures are to be routinely inspected and repaired during construction, as required. Temporary controls are not to be removed until the areas they serve have been restored and stabilized.

5.3 Geotechnical Report

A Geotechnical Investigation has been prepared by CMT Engineering (dated October 25, 2021) to assess the existing soil and groundwater conditions encountered on the Site. Included in the assessment are the soil classification and groundwater observations, comments and recommendations regarding dewatering considerations, site servicing, excavating, and backfilling, pavement design/drainage, gravel base

design/drainage, alternative pavement/gravel base design/drainage, soil design properties, and a summary of the laboratory results.

The report identifies that Site preparation for the proposed parking lot expansion and reconstruction is anticipated to include topsoil stripping, vegetation grubbing, removal of fill and unsuitable soils, removal or relocation of any existing services, the subexcavation of all relatively loose/soft native soils deemed not capable of supporting the design, followed by the placement of structural fill (as required) and site grading to achieve the proposed grade.

The report includes recommendations on the following aspects that have been reflected in the Functional Servicing and Stormwater Report prepared in support of the Proposed Development:

- Soil Design Parameters;
- Site Preparation;
- Excavations;
- Construction Dewatering Considerations;
- Pavement Parking Design/Drainage;
- Gravel Parking Design/Drainage;
- Alternative Pavement/Gravel Parking Design/Drainage; and,
- Excess Soil Management.

5.4 Guideline D-6 Compatibility Study

A Guideline D-6 Compatibility Study was prepared by R.J. Burnside (dated October 2021) to assess potential noise, dust, odour, and vibration impacts of the Proposed Development on surrounding residential uses. The Study was prepared in accordance with the D-6 Compatibility between Industrial Facilities and Sensitive Land Uses Guidelines, which aims to prevent or reduce conflict between sensitive and industrial land uses.

The report identifies that the Proposed Development is considered a 'Class I' operation according to the D-6 Guidelines as the use will not produce vibration or odour and will produce limited dust and noise. Outside storage is limited to the trailers which will be moved infrequently and during daytime hours only. Class I uses have a recommended Minimum Separation Distance of 20 metres and a Potential Influence Area of 70 metres.

Residential dwellings are a sensitive land use and are located along Riverside Drive East and along High Street and George Street. Being adjacent land uses the current separation distance is 0 metres, which does not meet the D-6 Guideline's Minimum Separation

Distance. The shortest distance between the proposed truck-accessible area and a residential property line is 25 metres.

Accordingly, since compatibility guidelines are to be implemented through planning instruments, as appropriate for the circumstances, R.J. Burnside conducted further investigations to determine if the Proposed Development would be compatible with the adjacent residential uses in relation to noise, vibration, dust, and odour.

Noise

As the Site is proposed to be used for an expanded transport truck and trailer parking lot, noise generation will be limited to the driving and idling of transport trucks. Traffic is expected to be limited to one truck per hour bringing a trailer and there will be up to eight trucks per day. Operations will be limited to daytime hours and each truck is expected to be on the Site for up to 10 minutes.

In the worst-case scenario, the predicted sound level at the mutual property line for the closest residence to a truck accessible area on the Site is 49 decibels, which is below the Ministry's limit. As a result, there is not expected to be a significant noise issue for surrounding residents.

Dust

The proposed parking area will be gravel which can create dust that travels beyond the Site and cause nuisance for the adjacent residential uses.

As the Site will be a parking lot, speed and volume will be limited and thus dust generation will be limited. The separation distance between the parking area and the mutual property lines will allow dust plumes to dilute.

The limits for dust are based on 24-hour and annual averages, making it unlikely that the Proposed Development will exceed the limits.

Odour and Vibration

There are no odour or vibration sources on the proposed parking lot.

Conclusions

R.J. Burnside determined that the potential impacts of the Class I use on surrounding sensitive uses is low and does not pose a negative impact in relation to noise, dust, odour, or vibration. Despite a reduced setback that does not meet the D-6 Guidelines, adverse impacts from the Proposed Development are not expected and the development is compatible with the surrounding residential uses.

5.5 Guideline D-4 Study

A Guideline D-4 Study has been prepared by R.J. Burnside (dated December 23, 2021) to assess the potential for impacts, related to the Bolender Landfill, to affect the proposed extension of the existing parking lot onto the east portion of the Site. The Guideline D-4 Study has been prepared in accordance with the Ministry of Environment, Conservation, and Parks ("MECP") *Guideline D-4 Land Use on or Near Landfills and Dumps*, in tandem with Procedure D-4-1, *Assessing Methane Hazards from Landfill Sites*.

The study indicates that:

- Groundwater, surface water, and nuisance impacts from the closed Bolender Landfill are present, however, unlikely to affect the proposed expansion of the existing gravel parking lot over the east portion of the closed landfill site;
- Landfill gas (primarily methane) is above the LEL in the underlying waste and soil at several locations across the Site;
- Monitoring of methane by GHD Group on behalf of the Township has been ongoing for decades and recent verbal discussions indicate that the current program has determined there is no significant potential for an off-site impact, and further, that no further monitoring on behalf of the Township is required; and,
- Methane gas is not expected to impact the proposed use of the surface as a gravel parking lot for truck and trailer parking with no on-ground storage as it will allow methane to vent naturally. This should be confirmed with one year of quarterly gas monitoring following the construction of the parking lot.

The study provides the following recommendations as a result of the investigation:

- The proposed expansion of the gravel parking lot can be undertaken with conditions to ensure the health and safety of surface users and the protection of the environment. These conditions should include:
 - The parking lot can be constructed of gravel;
 - The parking lot is only to be used for parking of trucks and trailers with no buildings or on-ground storage; and,
 - Quarterly monitoring for one year of the gas probes, monitoring wells, and surficial soils for the presence of methane after the parking lot construction. The results should be reviewed after each sampling event and the monitoring program amended, if required, based on criteria outlined in the report.
- Comments from the MECP following their review of the draft D-4 report and related environmental assessment reports should be taken into consideration during construction of the parking lot extension.

5.6 Environmental Site Assessment

R.J. Burnside has prepared a Phase One Environmental Site Assessment (dated October 21, 2021) and a Phase Two Environmental Site Assessment (“ESA”) (dated November 5, 2021) to assess the environmental conditions of the Site. The purpose of the Phase One and Phase Two ESAs is for environmental due diligence associated with the expansion of the parking area.

The Phase One ESA was completed by R.J. Burnside in July 2021. The Phase One ESA identified that the historical property use at the Site was industrial and commercial, with adjacent property uses including commercial, industrial, parkland, and residential.

The records review indicate that the Site was used for agricultural cash crop production from 1878 to 1962. The Site operated as a municipal landfill from 1962 to 1969 and was decommissioned when the Ontario Water Resources Commission determined that a landfill in this location would pollute the Canagagigue Creek. The Bolender Landfill is located on the east portion of the Site and has been monitored using methane gas probes since 1983.

In the 1980s the site transitioned to commercial use, including use as a gas station, automobile repair and body shop, and salvage yard. The Site is currently used for tractor trailer storage and maintenance and includes a one storey building with a basement that was the former autobody shop.

Potentially Contaminating Activities (“PCA”) were identified on the Site, including PCA #10 Commercial Autobody Shops, PCA#28 Gasoline & Associated Products in Fixed Tanks, PCA#49 Salvage Yard (including automobile wrecking), PCA#59 Waste Disposal and Waste Management. In addition, PCA#46 Rail Yards, Tracks, and Spurs was identified adjacent to the north property boundary associated with the former railway tracks. To verify soil and groundwater quality at the Site, a Phase Two ESA drilling and groundwater sampling program was recommended.

A Phase Two ESA was conducted by R.J. Burnside in August 2021 to assess soil and groundwater quality at the Site for contaminants of potential concern such as petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene, xylene (BTEX), volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), and metals and inorganics.

Limits of waste from the former Bolender Landfill were determined during the test pitting program and it is confirmed that waste material does not extend off-site except for a potential small area near the rail bed ditch. Soil samples collected in the vicinity of the former

Bolender Landfill were collected above and below the waste. No waste material was submitted for laboratory analysis.

Analytical results confirm that groundwater from all wells sampled meet the Table 9 SCS, except for a slightly elevated concentration of lead at one of the monitoring well locations that appears to be anomalous.

No soil or groundwater related issues were identified that would impact the proposed parking lot expansion to the east over the unused footprint of the former landfill.

Based on the findings of the Phase Two ESA, the following recommendations are provided in the report:

- MW-1 should be resampled to evaluate the anomalous slightly elevated concentration of lead in the groundwater;
- The monitoring wells should be maintained to allow for future monitoring should Site conditions and/or land use change; and,
- The expansion of the existing gravel parking lot to the east should be done using a similar gravel surface cover as the existing parking lot area.

In addition to the Phase One ESA and Phase Two ESA studies, R.J. Burnside has provided an opinion letter (dated December 22, 2021) in response to the Region of Waterloo's request for a Record of Site Condition ("RSC") due to the prevalence of high and known threats to surface and ground water contamination on the Site. This letter has been included under separate cover.

5.7 Environmental Impact Study

An Environmental Impact Study Report ("EIS") has been prepared by Natural Resource Solutions Inc. ("NSRI") in support of the Proposed Development to identify the natural features present on the Site, to determine any impacts on the natural features and/or buffers as a result of the Proposed Development, and to provide recommendations for mitigating impacts, where necessary.

A Terms of Reference ("TOR") for the EIS was submitted to the Region of Waterloo, Township of Woolwich, and the Grand River Conservation Authority ("GRCA") for review and comment in advance of finalizing the EIS.

All species of wildlife on the Site observed during field surveys were recorded. Further, the following surveys were completed by NSRI in preparation of the EIS:

- Breeding Bird Survey;

- Herpetofauna Survey;
- Bat Habitat Assessment;
- Aquatic Habitat Assessment; and,
- Insect Survey.

In conjunction with the EIS, NSRI has prepared an inventory of trees on the Site, as well as adjacent trees where driplines are within 6 metres of the anticipated development area. The tree inventory includes an analysis of the tree locations, species, DBH, crown radius, general health, and any general comments. Trees on the Site south of the Canagagigue Creek were not inventoried as no development is proposed south of the creek.

Although small woodlands are present on the Site, the EIS establishes that they do not meet the criteria for significance in accordance with the Region of Waterloo Official Plan. Further, no significant wetlands are present within the Site or broader study area. A small marsh is present but will be protected from future development as its located within the 'Open Space' block.

The Site is within the regulated area of the Grand River Conservation Authority ("GRCA") associated with two regulated watercourses – the Canagagigue Creek and Tributary A. The Canagagigue Creek run along the southern edge of the Site and is considered to be a Fish Habitat according to the Region of Waterloo Official Plan mapping of the Greenlands Network. 'Tributary A' is located along northern edge of the Site and runs along the south of the Kissing Bridge Trailway. The EIS identifies that the quality of this features appears to be degraded by runoff from the industrial use (Elmira Pet Products) to the north that discharges via a culvert into this feature before flowing westwards to Arthur Street North.

A single genetically pure butternut tree was identified by NSRI biologists during the field surveys on the Site, located near the southeast corner of the existing development area within a small cultural meadow. A Butternut Health Assessment ("BHA") was completed to determine its categorization under the Ministry of Natural Resources and Forestry ("MNR") criteria and was submitted to the Ministry of Environment, Conservation, and Parks ("MECP") on January 14, 2022. The BHA is currently under review and considered to be approved following a 30-day review period.

The EIS includes an impact analysis based on the Proposed Development in relation to the sensitivity of the natural heritage features on the Site. The impact analysis identifies direct, indirect, and induced impacts as a result of the Proposed Development, as detailed below:

- **Vegetation Disturbance**

- To limit ecological impacts during construction, efforts should be made to clearly demarcate the limits of development, particularly within the vicinity of woodlands that are to be retained.
- A permanent fence is planned to enclose the gravel parking area and is recommended to be installed early in the development process to avoid impacts to retained trees.
- Designated areas should be established for construction lay-down, vehicle access and parking, equipment storage, materials stockpiling, and any on-site construction offices to ensure they are located entirely outside of the designated natural areas and buffers, and preferably not adjacent to these features to limit potential impact.
- To minimize the potential for soil compaction, construction equipment should be restricted to designated controlled vehicle access routes, particularly when working within proximity to natural features.
- **Wildlife Disturbance**
 - Noise impacts can be mitigated by restricting the daily timing of construction activities between 7:00 AM and 7:00 PM.
 - Any lighting equipment associated with construction activities should be turned off following cessation of daily construction activities, or at least turned away from adjacent natural features to avoid light wash of the areas.
 - Dust impacts should be mitigated for by moistening areas of bare, dry soil with water as needed during construction to reduce the amount of dust produced.
- **Erosion and Sedimentation Control**
 - Sediment control measures will be required to ensure that sediment laden runoff does not enter natural areas, particularly in proximity to the watercourses and the small wetland inclusion.
 - The installation of sediment and erosion control measures will be required prior to any grading or gravel additions in order to control runoff, as identified within an Erosion and Sedimentation Control Plan.
 - Clearing, grubbing, and grading activities should be timed to avoid seasonally wet periods (i.e. spring), whenever possible. Further, construction should avoid high volume rain events and significant snow melts/thaws, resuming once soils have established to reduce risk of erosion, soil compaction, and sediment release into nearby natural features.
 - An energy dissipation structure is to be designed for the headwall outlet for the bio-retention swale to ensure there is no erosion between the headwall and the Canagagigue Creek.

- **Re-vegetation**

- Planting after construction should be implemented to stabilize soils and encourage rapid re-vegetation of disturbed soils to prevent erosion and sedimentation. Seeding should be completed as soon as weather permits, following construction, generally within 2 weeks of disturbance. Additional enhancement may require application of topsoil, native seed mix and native shrubs.
- If insufficient time is available in the growing season to establish vegetative cover, an overwintering treatment such as erosion control blankets, fiber matting, or the equivalent should be applied to contain the site over the winter period. Planting of vegetative cover should then follow in the next growing season. Maintenance and inspection of the vegetative cover will continue until such time as the disturbed areas are sufficiently stabilized through vegetative growth to prevent overland runoff of suspended materials.
- Native trees and shrubs should be used.

- **Construction Equipment Maintenance**

- Machinery should arrive on site in clean condition and is to be checked and maintained free of fluid leaks. Machinery must be refueled, washed and serviced a minimum of 30m away from all natural features to prevent any deleterious substances from entering the protected areas. Fuel and other construction related materials should be stored securely away from any natural features. Construction staging areas should be located a minimum of 30m away from Canagagigue Creek. To minimize the potential for soil compaction, construction equipment should be restricted to designated controlled vehicle access routes.

- **Spill Response Plan**

- A Spill Response Plan (SRP) should be developed prior to commencement of construction. This SRP should provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other hazardous liquids and chemicals. A spill kit must also be kept on site at all times and on-site workers must be trained in the use of this kit and be fully aware of the SRP. This plan will be the responsibility of the contractor and any reports are to be submitted to the client and municipal staff.

- **Construction Debris**

- Any construction materials on the construction site should be stabilized to prevent it from entering the nearby natural features. This could include covering stockpiles with biodegradable mats or tarps. Staging and stockpiling areas should also be located away from natural features (i.e. 30m). Any waste generated from the site should be removed and disposed

of appropriately off site according to municipal standards. Construction debris, such as water bottles, coffee cups, and other waste, should be gathered and disposed of regularly (e.g., weekly) from the site and surrounding areas.

5.8 Tree Preservation Plan

A Tree Preservation Plan has been prepared by NSRI (dated January 19, 2022) to provide a tree inventory, analysis of plans against the overall health and structural integrity of trees, protection measures for trees to be retained, and recommended mitigation and compensation measures. Avoidance, mitigation, and protection measures for trees were examined to determine which trees would be impacted and which could be retained. In the case of trees requiring removal, compensation for removal has been discussed within the report.

A comprehensive inventory of trees greater than 10 cm in Diameter at Breast Height (“DBH”) on the Site was completed by NSRI Certified Arborists in May and June 2021. Trees within the subject property but south of Canagagigue Creek were not inventoried as they are proposed to remain in an ‘Open Space’ designation/zone. A complete list of trees that were assessed and their overall health has been included as an appendix to the Tree Preservation Plan.

In total, 662 trees were inventoried, consisting of 18 species. Of the trees inventoried and assessed, 647 trees (98%) are native species dominated by Manitoba Maple, and 15 trees (15%) are non-native species. Manitoba Maple represents 73% of the trees inventoried, reflecting the history of disturbance on the Site, which was once a municipal landfill. Several trees were found to be growing very close to the existing metal fencing around the gravel parking area, and many of them had been topped in the past.

Approximately half (357) of the trees inventoried are in fair condition with an improbable or possible potential for structure failure while, notable, 40% of the inventoried trees were in poor or very poor health, or dead. There are 85 Ash trees on the Site, which were inventoried to be in poor or very poor health, or dead. Most of these trees have confirmed or suspected evidence of manifestation of the Emerald Ash Borer beetle.

One Butternut tree was observed on the Site, which is listed as Endangered under the provincial *Endangered Species Act* (ESA, 2007). Under the ESA, it is an offence to kill, harm, or take a live Butternut tree that is not exempt from protection. The Butternut tree will be retained, however, the outfall pipe from the bio-retention swale is proposed to be within the regulated habitat. It is anticipated that the outlet location and associated infrastructure can be adjusted to avoid direct impacts to the tree. A Notice of Butternut Impact will need to

be submitted to the MECP at the time of site alteration to outline the nature of the harm of the species and the number/location of compensation plantings, or alternatively, the intention to pay into the conservation fund as described within Ontario Regulation 829-21.

Most inventoried trees outside of the development limit for the proposed parking lot area/bio-retention swale area are recommended for retention, including those along the north and south sides of the existing metal fence, assuming that the expansion of industrial use will leave the perimeter fencing intact.

Of the 662 trees inventoried, 286 trees are anticipated to be removed which includes 27 trees that have been identified as being in poor or very poor health and/or have probably potential for structure failure and/or are dead. The remaining 359 trees will likely require removal based on the Proposed Development and have been noted as being in fair or poor health. For trees requiring removal, a compensation strategy has been included in Section 5.0 of the Tree Preservation Plan.

The Tree Preservation Plan identifies measures for tree protection and mitigation, including:

- Prior to construction, temporary Tree Protection Fencing ("TPF") is to be installed where trees are adjacent to the limit of disturbance. It is recommended that erosion and sediment control fencing be incorporated with the TPF to prevent sediment moving into the Canagagigue Creek and adjacent drainage ditches. Details for the installation of the TPF have been included in Section 6.1 of the report.
- The removal of trees on the Site is to occur outside of the core nesting period for migratory birds, which extends from approximately April 1 through August 31. Further, to avoid impacts to bat species, tree removal should occur between October 1 and March 31.
- During construction, the TPF should be maintained in a satisfactory condition. Maintenance and refueling of machinery during construction activities is to occur at a designated location away from the trees being retained. Further, no storage of equipment, materials, or fill should occur within the tree protection zone or where feeder roots may exist.
- Should any trees identified to be retained be seriously damaged or die as a result of construction activities, the Township should be consulted to assess any compensation requirements, if necessary.
- Following construction, areas of bare soil within the construction area should be re-vegetated as soon as feasible to prevent erosion of soils and reduce dust.
- At the detailed design stage, a planting plan should be developed. Details of the planting plan can be found in Section 6.3 of the report.