REPORT

SITE ALTERATION AND FILL MANAGEMENT PLAN

14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario

Submitted to:

Lafarge Canada Inc.
6509 Airport Road
Mississauga, Ontario
L4V 1S7

Submitted by:

Golder Associates Ltd.
100 Scotia Court,
Whitby, Ontario, L1N 8Y6 Canada
+1 905 723 2727

19115436

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Distribution List

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1.0 INTRODUCTION

1.1 Description of Proposed Development

Golder Associates Ltd., a member of the WSP family of companies ("WSP Golder"), was retained by Lafarge Canada Inc. ("Lafarge") to prepare a Site Alteration and Fill Management Plan ("FMP") in support of a site alteration permit application for the property located at 14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario (the "Site"). The Site, which is owned and will be operated by Lafarge, is located on the west side of Durham Regional Road 30 and is 850 m north of Durham Regional Highway 47. The Site is 37.49 hectares ("ha") and forms part of Lafarge's Stouffville Pit which is currently licensed under the Aggregate Resources Act. Concurrent with this application Lafarge has applied to the Ministry of Natural Resources and Forestry ("MNRF") to amend the rehabilitation plan and to surrender a portion of the Aggregate Resources Act license subject to approval of the site alteration permit. Directly to the west of the Site is a property that is subject to a site alteration permit issued by the Town of Whitchurch-Stouffville (the "Town"). The Site location is presented in Figure 1. The remainder of the property, subject to the Aggregate Resources Act license, will continue to be operated and rehabilitated in accordance with the conditions of the Site plans approved by the MNRF.

The purpose of the site alteration application to implement a grading plan that takes into account the approved site alteration permit for the lands located to the west and to ensure the final landform is suitable for agricultural purposes. The application proposes to accept suitable excess fill from construction projects in the surrounding area and to restore the northeast corner of the property to match the elevation of surrounding lands. It is noted that filling this area will be a continuation of the approved site alteration occurring west of the Lafarge property. Fill will be placed such that the final topographic contours at the Site will be visually consistent with the elevations of the surrounding lands and match the original grade at Durham Regional Road 30. Following the completion of the proposed alteration, the proposed future use of the Site is for agricultural crop production. The proposed site alteration does not include the storage of bulk fuel or bulk chemicals at the Site.

The FMP was prepared in accordance with the applicable requirements of the Town of Whitchurch-Stouffville's (the "Town") document titled "*Guideline for Site Alteration and Fill Permit*" (undated).

1.2 Proposed Final Grading Plan

The existing conditions are presented in Drawing 1. The final grade and surface cover are presented in Drawing 3 including the calculated slope grades and surface water runoff direction. The final cover design will be reviewed by an agronomist to confirm that the topsoil layer is suitable for agricultural use.

2.0 SITE BACKGROUND

2.1 Site Description

The existing Aggregate Resources Act license boundary and elevations are presented in Drawing 1. The Aggregate Resources Licence area is 169.19 ha in size of which 37.49 ha is proposed to be filled (the "Site"). The Site is highly disturbed from its former use for aggregate extraction. The Site is bounded to the east by Durham Regional Road 30 and is principally surrounded to the north by agricultural fields, to the south is an aggregate extraction pit operated by Lafarge, and to the west by an aggregate extraction pit owned by Lee Sand and Gravel.

Access to the Site is from the entrance/exit for Lafarge's Stouffville Pit on Durham Regional Road 30 and there is an existing interior road (pavement or gravel surfaced) leading from the entrance to the south side of the proposed Site. The proposed Site is represented by the floor of the former aggregate extraction area. Inert imported material will be placed above the water table; an anthropogenic pond near the northwest corner will be backfilled with material native to the Site prior to placement of imported clean excess soil.

2.2 Geotechnical Investigation

A Factual Geotechnical Investigation was completed by WSP Golder for the proposed Site between May 1 and May 10, 2019, to obtain information on the general subsurface soil and shallow groundwater conditions. The Factual Geotechnical report is provided as Appendix A and was used to assist in the preparation of the grading plan and FMP.

2.3 Hydrogeologic Investigation and Baseline Groundwater Monitoring

The objective of the investigation was to assess the hydrogeological conditions and characterize the baseline groundwater quality at the Site. The Hydrogeogical Investigation and Baseline Monitoring Report completed by WSP Golder is provided as Appendix B. The report presents the following findings:

- There are 24 water well records located within a 500 m radius of the proposed Site on lands not owned by Lafarge. Of these water well records, 10 wells were reported as water supply wells and the other 14 were reported as test holes, observation wells, monitoring wells, or not in use. Lafarge has seven wells, of which four well records are located within the Site and three well records are located within the adjacent pit owned and operated by Lafarge;
- The Site is not located within a within a Wellhead Protection Area ("WHPA") but is within a highly vulnerable aquifer and significant groundwater recharge area;
- The inferred direction of groundwater flow is southwesterly;
- The hydraulic conductivities of the soil within the screened interval of the wells range from 4×10^{-6} to 6×10^{-6} metres per second ("m/s");
- The calculated groundwater velocity is 1.0 metres per year based on a horizontal gradient of 0.002 m/m and geometric mean hydraulic conductivity of 4.9×10^{-6} m/s; and,
- The reported concentrations of benzene, toluene, ethylbenzene, and xylenes ("BTEX"), petroleum hydrocarbons ("PHCs"), volatile organic compounds ("VOCs"), metals, hydride-forming metals, and other regulated parameters in groundwater were below the respective Table 2 site condition standards.

The importation of fill meeting the Table 2.1 site condition standards is not anticipated to result in any unacceptable impact to groundwater quality, since the site condition standards for soil are protective of groundwater users. The proposed groundwater monitoring program is provided in Section 3.6 and included in Appendix B.

2.4 Natural Heritage Evaluation

The proposed fill operation was assesed by WSP Golder for ecological implications under the policies of the Oak Ridges Moraine Conservation Plan ("ORMCP"); the Provincial Policy Statement; the policies of the Town and The Regional Muncipality of York (the "Region") Official Plans ("OPs"); and, other relevant legislation including the *Fisheries Act*; *Conservation Authorities Act*; and, Endangered Species Act.

The entire proposed site alteration will occur within the disturbed areas associated with the existing aggregate extraction pit including the open disturbed areas, anthorpogenic ponds, cultural meadow, and cultural thicket as per the approval final rehabilitation plan for the Site. Based on the analyses in the Natural Heritage Evaluation Report, no adverse impacts to the significant natural features and functions are expected provided the following best management practices are implemented:

- Clearly demarcate and maintain the site alteration boundaries;
- Maintain a recommended setback of 30 m from the north Site boundary to protect the significant woodland in the northern portion of the Site;
- Install silt fencing (or similar) along the significant woodland setback to prevent encroachment into the setback area and to prevent indirect effects of the infilling on the woodland. Following completion of the fill and grading activities the fencing shall be removed. The silt fencing will be a non-woven geotextile with a material density of 270R or greater. A typical silt fence barrier installation drawing is provided in Appendix J;
- To be compliant with the *Migratory Birds Convention Act* (“MBCA”), all vegetation clearing and Site preparation activities (e.g., grading), which will involve the removal of vegetation, should occur outside of the breeding bird season (April 10 to August 15). If this is not possible, construction disturbance must be preceded by a nesting survey conducted by a qualified biologist. If any active nests are found during the nesting survey, a buffer will be installed around the nest to protect against disturbance. Vegetation within the protection buffer cannot be removed until the young have fledged the nest;
- Ensure all equipment is cleaned prior to transportation and use on the Site to avoid the spread or introduction of invasive species seed;
- Implement standard construction best management practices and operational controls, including sediment, dust and erosion controls, and spill prevention during site alteration activities using Lafarge’s Operational Control protocol provided in Appendix J; and,
- Utilize the mobilization protocol, found in Lafarge’s Operational Control protocol provided in Appendix J prior to deploying in a new area, sub-section, and/or phase of the project or subsequent to a stoppage in activity for whatever reason.

The Natural Heritage Evaluation Report is provided in Appendix C.

2.5 Stage 1 Archaeological Assessment

A Stage 1 Archaeologic Assessment was completed to compile all available information about the known and potential archaeological resources within the Site and proposed fill area and to provide direction for the protection, management and/or recovery of these resources, consistent with Ministry of Tourism, Culture and Sport (“MTCS”) guidelines (MTCS 2011). The Stage 1 Archaeological Assessment Report is provided as Appendix D.

The report found that the entirety of the Site and proposed fill area was identified as disturbed: exhibiting slope (greater than 20%) or previous construction or grading activities and does not exhibit archaeological potential and no further archaeological assessment of this Site is required. The Stage 1 Archaeological Assessment Report was reviewed by the Ministry of Tourism, Culture and Sport and entered into the Ontario Public Register of Archaeological Reports on October 19, 2019.

3.0 SITE ALTERATION PLAN

The Site Alteration Plan describes the procedures, practices, and operational controls that will be implemented by Lafarge.

3.1 Schedule of Works

3.1.1 Site Preparation and Construction Mobilization

The proposed site alteration will begin upon permit approval, to completion of rehabilition as set out in the amended site plan approved under the Aggregate Resources Act (”ARA”), the partial surrender of the aforementioned license #6619 issued under the ARA and the implementation of recommendations identified in the mobilization protocol (Appendix J), which will include, but not be limited to, a nesting bird survey as detailed in Section 2.4.

Other initial activities to prepare the Site for fill importation will include the construction of a lockable gate to control Site access and the implementation and testing of operational controls.

The Site will be registered with Resource Productivity and Reuse Authority (”RPRA”) in accordance with Ontario Regulation (”O. Reg.”) 406/19 to support responsible Excess Soil Management and allow for tracking of material across the full chain of custody.

In keeping with bylaw requirements, and Lafarge policy, an operational risk assessment will be conducted and updated periodically during the site alteration. A risk management matrix is provided as Appendix E which lists potential risks associated with large scale fill operations, possible preventative measures to avoid any risks, and recommend mitigations to address risk. Lafarge will assume responsibility for managing these risks during fill placement and will be responsible for performing risk assessments on a regular basis.

3.1.2 Construction

The proposed site alteration plan is presented in Drawing 2. The total volume of material required to build the proposed contour is 8,047,200 cubic metres (”m^3”). Anticipating a rate of sourcing and import of appropriate material of between 500,000 to 1,000,000 m^3 per year, the expected duration of construction activities is expected to take between eight and 16 years. The site alteration activities would be undertaken in parallel with building material manufacturing activities occuring elsewhere under the remaining and active footprint of the ARA licence #6559.

Operational controls will be monitored to ensure effectiveness and mechanisms put in place to continuously improve as new technologies and solutions are identified in keeping with Lafarge’s commitments to beneficially reuse material, to prevent adverse impacts, and to support positive environmental and community benefits.

Digital tools will be used to track inbound material, monitor Site conditions, and confirm beneficial reuse. This will provide for real time monitoring of the Site and the maintenance of a cumulative record of import to supplement and support monthly, semi-annual, and annual reporting as set out in Section 3.16.

3.1.3 Site Alteration Close-Out

Once the final target grading is achieved, a Phase Two Environmental Site Assessment will be undertaken to confirm that the Site can transition from its current land use to the more sensitive final land use (agricultural). The Site’s former use as aggregate extraction is considered an industrial property use, as defined by O. Reg. 153/04. The intended final property use is agricultural.

At this time, Lafarge has no intention to construct a building at the completion of the site alteration and does not foresee the need for a building permit, which would trigger a mandatory requirement for the Town to ensure that a Record of Site Condition (”RSC”) is obtained prior to permit issuance. It is understood, however, that filing a RSC is a requirement of the site alteration agreement and permit approval. A RSC will be filed for agricultural land use at the completion of the site alteration. A copy of the Letter of Acknowledgement from the MECP will be provided to the Town. Groundwater monitoring, Site controls, and security will be maintained until the RSC is acknowledged.

The final cover and growing medium will be installed and Lafarge will work with qualified professionals, as required, to transition land into productive agricultural use.

3.2 Hours of Operation

Standard operating hours will be 7:00 am to 5:00 pm Monday to Friday (with a one-hour grace period for trucks on-route). No site alteration activities will be conducted:

i) Between the hours of 5:00 pm and 7:00 am Monday to Friday;

ii) Anytime on a Saturday, Sunday or Statutory Holiday; and,

iii) During any weather or operating conditions where Site conditions are unsafe and/or operational controls are determined to be insufficent to mitigate adverse impacts from site alteration activity (e.g., wind warning has been issued by Environment Canada, heavy rain).

3.3 Site Security and Access Control

The current Site security mesaures in place for the whole property and the aggregate operaton will remain in place for the duration of additional construction activities related to the site alteration permit. Additionally, access to the Site will be specfically controlled by the installation of fencing and an access gate at the entrance to the Site. The gate will be locked after hours.

Security cameras will be installed at the entrance and exit of the area subject to the site alteration permit and directed along Durham Road 30 to provide on-going monitoring of public routes used to access the Site. During operating hours, access to the Site will be controlled by a full-time gatekeeper who will stop every truck entering the Site to confirm the load is inbound from a pre-qualified source, perform a preliminary visual inspection, and to confirm that the driver is adhering to all other Site access conditions. The Site will also be staffed with trained field technicians who will receive manifests, flag trucks to ensure safe unloading, and conduct a visual and olfactory inspection of unloaded soil. The field technicians will also monitor and record temporary placement of material for audit sampling and confirm beneficial reuse in accordance with the proposed grading plan. Further details on access control are provided in Section 4.3.

3.4 Site Layout

The existing Site topography, existing surface water flow conditions and the limits of the proposed Site are provided in Drawing 1. The fill placement process is presented in Drawing 2. Fill placement will begin on the east side moving progressively westwards.

In general, fill will be imported to achieve final elevations that generally match the existing ground surface elevations at the limits of the fill area.

The proposed final elevations and the proposed final surface water flow on, and around, the Site are provided on Drawing 3. Interim and final topographies will be graded in a manner that allows surface water to flow towards the central to southeast areas of the proposed Site. This will direct water toward existing infrastructure on-Site to manage water volumes, allow for infiltration, and prevent runoff onto adjacent lands, infrastructure, and properties. Further details are provided in the subsuquent section (Section 3.5).

3.5 Stormwater Management and Erosion Control

The existing topographic depression created by aggregate extraction will continue to prevent off-Site discharge of stormwater runoff under standard operating conditions and will act as as significant stormwater managment control. During site alteration, the following mitigation methods will be used by the Owner to control erosion, sedimentation, and surface water flows:

- Grading outside the Site will be maintained at the existing condition. During fill placement, the interim grading will maintain surface water flows towards the central to southeast areas for the purpose of infiltration;
- The fill placement will be performed in sequential phases (starting at the east side, moving progresively westward);
- All surface water runoff will be conveyed south towards the existing on-Site open water pond and situation ponds and managed within the Site. No increase in off-Site surface water flow (annual or peak flow) is anticipated. Stormwater will infiltrate or be collected in ponds related to the aggregate operations, returing to the natural watershed conditions downstream of the Site; and,
- Lafarge is responsible for maintaining all erosion and sediment control measures in working condition at all times. Lafarge will inspect erosion and sediment control devices as part of their inspection will be maintained in the Site's electronic environmental management system and be available for review by the Site Supervisor. Lafarge shall repair the control measures within 48 hours after any deficiency is noted.

Additional measures will be put in place as part of the Site Close-Out process by Lafarge at the completion of the site alteration to ensure that Lafarge has fulfilled obligation as set out in the Town's Site Alteration Bylaw 2019-068-RE. These measures will include, but not be limited to:

- 100 millimetre of topsoil seeded with grasses (or other ground cover suitable for agricultural purposes) and confirmation of vegetation of area at the end of fill placement; and,
- Sediment control fencing will remain in place until the finished elevation has been achieved, topsoil placed, and the vegetative cover is confirmed to be adequately seed germinated.

Further details on the location and specifications for these mitigation methods is provided in Drawing 2. It is acknowledged that prior to reaching the final proposed grades, a stormwater management plan will be provided to the Town for review and comment.

3.6 Groundwater Monitoring

A summary of the existing groundwater conditions is provided in Section 2.3. The importation of excess soil meeting the Table 2.1 site condition standard (agricultural use, coarse soil texture) is not anticipated to result in any unacceptable impact to groundwater quality since these standards were developed to protect groundwater from contaminants that could potentially leach from soil and migrate to a water supply well. To further manage the inbound material and prevent the risk of groundwater impact related to inappropriate material being imported to the Site, Lafarge will follow provincial requirements that leachate screening be undertaken by source sites to characterize material in accordance with Part B, Section (5) of the Soil Rules. Lafarge's proposed audit sampling protocol also includes leachate extraction being completed by an accredited environmental laboratory using one of the following approved procedures: the Ministry of the Environment, Conservation and Parks ("MECP") Synthetic Precipitation Leaching Procedure ("SPLP") (E9003 or mSPLP), the SPLP (US EPA SW-846 Method 1312), the Toxicity Characterization Leaching Procedure ("TCLP") (US EPA SW-846 Method 1311), or another method approved by the Director.

Given community concerns and the importance of the groundwater supply to local residential users, Lafarge will also implement a groundwater monitoring program to provide confirmation that preventative measures have been effective. This will also confirm that there has been no impact to the quality of groundwater flowing from the Site. The Groundwater Monitoring Program report is provided as Appendix F and summarized as follows:

- Install one data logger which will be downloaded during the semi-annual monitoring events;
- Semi-annual collection (spring and fall) of groundwater samples from the four existing monitoring wells;
- Groundwater monitoring will begin once the site alteration permit is issued;
- Groundwater samples will be analyzed for petroleum hydrocarbons (including benzene, toluene, ethylbenzene and xylenes), polycyclic aromatic hydrocarbons, volatile organic compounds ("VOC"), metals, hydride-forming metals and other regulated parameters (i.e., chloride, free cyanide, hexavalent chromium, and mercury);
- Monitoring results will be compared to the Table 2 site condition standards. If the reported concentration of a parameter is above its standard, resampling will be conducted at the applicable monitoring well, with the sample submitted for analysis of the relevant parameter group. If two successive samples from the same location exceed the Table 2 site condition standards, Lafarge will notify the Town and advise of any further actions that may be necessary; and,
- The proposed monitoring program will continue following the completion of the site alteration and will be terminated once the Letter of Acknowledgement for the filing of the RSC is provided to the Town. Monitoring wells will be decommissioned as per Ontario Regulation 903 (as amended) when the wells are no longer in use. Copies of the decommissioning records will be provided to the Town and Region.

As part of the annual report, statistical analysis will be completed to identify any increases in groundwater parameter concentrations related to the fill operations. The baseline analyte concentrations from all monitoring wells will be used to calculate an upper confidence limit ("UCL") for each analyte, representing the Site-wide variability in analyte concentration (i.e., background groundwater quality). Baseline conditions will be established over the first two years of semi-annual monitoring. Time-series concentration plots will be prepared in comparison to applicable Table 2 site condition standards and the UCL, placing the results of the monitoring program in a context that appropriately considers the inherent variability of analyte concentrations in groundwater, the background analyte concentrations, and the relevant standard.As filling progresses, the monitoring well casings will require additional lengths of 50-millimetre ("mm") diameter polyvinyl chloride ("PVC") riser piping to be added so that the top of pipe remains above the top of fill elevation. Any changes to monitoring wells will be undertaken by a qualified and licenced well technician. After each extension, top of pipe elevations will be re-established and recorded in the environmental management system.

3.7 Protection of Water Wells

Twenty-four well records were identified within a 500 m radius of the Site boundaries. Of these records, four records are located within the proposed Site and three records are located within the adjacent lands owned and operated by Lafarge. None of the remaining 17 well records outside the Site boundaries are within 3 m of the Site boundaries and it is noted that 10 of these records were reported as water supply with the remainder either test holes, observation wells, monitoring wells, or not in use. In accordance with Ontario Regulation 903, and as per the Town's "*Guideline for Site Alteration and Fill Permit*", the proposed Site will maintain a five metre setback from the property boundary. The proposed site alteration is not excpected to damage the water wells outside the property boundary. The four wells inside the proposed Site will be raised as the area is filled and used for monitoring purposes during the site alteration activities. Should one of these wells become damaged the well will be decommissioned and a replacement well will be installed.

It is noted that the Site is not located within a Wellhead Protection Area and the proposed Site and Fill Area activities pose minimal negative potential to Regional water supply wells. The GMP, provided as Appendix E, will monitor groundwater quality during the site alteration and for two years after its completion.

3.8 Protection of Septic Systems

There are three septic systems located on Lafarge's property located to the south of the proposed Site area. There is one septic system located north of the maintenance shop that consists of a holding tank that is regularly pumped out. There are two other septic systems each equipped with a tank and tile bed; one is located to the north of the materials laboratory and the other to the east of the office. Both systems are equipped with a tank and tile bed.

The private residences to the north and south of the Site are located outside the zone of potential impact. Under a conservative assumption that these residences have septic systems, the proposed site alteration would not impact these septic systems.

3.9 Protection of Houses, Buildings and Other Structures

No site alteration will be completed within three metres of any building or structure.

3.10 Protection of Adjacent Properties

The proposed site alteration will not occur within five metres of the east and north Site boundaries. Site alteration will occur up to the west and south shared boundaries with Lee Sand & Gravel to match the proposed grades for the approved filling at their property. Further protection for the adjacent north and east properties includes the installation of sediment fencing along the perimeter of the Site.

3.11 Support of Earth Structures

The proposed site alteation does not include the construction of any support of earth structures including retaining walls.

3.12 Subsurface Drainage Systems

The proposed site alteration does not involve any installation or alteration of subsurface drainage systems.

3.13 Tree Protection

The Site was previously used as an aggregate extraction pit and there are relatively few trees in its central area. The Natural Heritage Study, provided as Appendix C, identified one significant woodland. Tree protection in this area will be maintained through a 30 m buffer from edge of the woodland. The buffer, or setback, will be demarcated with a physical barrier (e.g., silt fencing) to prevent encroachment during the proposed site alteration. The location of the setback area is provided on Drawing 2.

3.14 Operational Controls to Manage Environmental and Community Impacts

3.14.1 Traffic Control and Transportation Plan

A transportation impact study was prepared by The Municipal Infrastructure Group Ltd. (”TMIG”) and is provided as Appendix G. A summary of the transportation impact study (”TIS”) is provided as follows:

- The haul route for the proposed infilling will be via the existing ingress and egress to York-Durham Line with the access on Hillsdale Drive being used for the trucks egress from the Site;
- Importation of excess soil will result in a total of 1,000 fill loads per day (i.e., 1,000 tri-axle trucks with a capacity of 10 m^3). The TIS data was collected in August 2021 (i.e., the peak operating month for the Site) The surveyed traffic data was increased to account for missing volumes at certain intersections. The resulting traffic volumes were then grown to 2022 to derive existing traffic conditions. Similarly, 2028 and 2033 future background volumes were derived by growing the derived 2022 existing condition volumes;
- A total of 149 fill trucks were documented accessing the Site as part of the TIS survey. A total of 851 additional fill trucks per day would need to be added to the traffic forecast to account for the 1,000 daily fill trucks; however, for the purpose of conservative analysis, the 1,000 fill truck trips were added to the road network essentially double-counting the 149 fill truck trips that were included in the TIS survey. Therefore, the full trip generation for the 1,000 fill trucks (equivalent to 240 trips in the a.m. with 120 inbound and 120 outbound trips) and 44 trips in the p.m. (22 inbound and 22 outbound) was added onto the roadway as part of the TIS;
- Review of existing, future background, and future total conditions confirms that the increased fill truck activity can be accomodate by the boundary road network. Delays and volume-to-capacity ratios at all turning movements are deemed acceptable along with projected queuing;
- TMIG confirmed that there would be no projected queuing concerns for the increased fill trucks internally to the Site should the appropriate queuing mitigation measures be implemented;
- A review of available sightlines at the Hillsdale Drive and York-Durham Line intersection confirmed that there were no projected concerns. The outbound trucks will utilize part of the shoulder to enter onto York-Durham Line in order to limit encroachment onto the northbound lane;
- The following is recommended, to be applied to the 2028 future background conditions:
  - Provide a northbound left-turn lane, southbound left-turn lane, and southbound right-turn lane at the intersection of York-Durham at Regional Highway 47 and optimize the signal timing splits.
  - Optimize the signal timing splits at the intersection of Goodwood Road at Regional Highway 47.

- It is recommended that the intersection of York-Durham Line at Aurora Road be monitored by the Region to identify when operations will become critical during the a.m. peak hour and worsen during the p.m. peak hour in order to provide remedial measures under future conditions.
- A northbound left-turn lane at York-Durham Line and Highway 47 intersection be provided at the intersection of the Stouffville Pit access (inbound) and York-Durham Line under 2028 future total conditions. The lane is recommended to be designed with a 50 m storage, a 135 m deceleration length, and 140 m taper length.
- A northbound left-furn lane at the York-Durham Line and Highway 47 intersection is recommended with a 50 m storage while the southbound left- and right-turn lanes at the York-Durham Line and Highway 47 intersection are recommended with a 70 m storage in order to accomodate the projected queues.

Overall, the proposed development application would be acceptable with limited impact to the boundary road network traffic operations subject to the recommended improvements along the roadway being implemented under future background conditions and any additional recommendations detailed within the report provided as Appendix G.

3.14.2 Mud Track Out

Mud track out mitigation measures will include the following:

- The haul route will consist of existing paved roads and a 650 m gravel access road to the south side of the proposed Site area which are highlighted in Drawing 2 to access the Site Area;
- The outbound lane will be constructed in the Site Area toward the exit to Hillsdale Drive. The outbound lane will include the following:
  - a rumble plate comprised of metal angled bars spaced 270 millimetres and will consist of two 2.4 m long grids with two 1.2 m long ramps on either end of the grids. The grids and ramps are 3.6 m wide; and,
  - 50 m of pavement extending from the rumble place to the Site exit.
- Installing cameras to allow for continuous monitoring of road conditions at the entrance, at the exit, and along main public roadways;
- Regular inspections, approximately every two hours, of road conditions on Site and on proximate public roadways including Hillsdale Road and Durham Regional Road 30 by field technicians and recording of conditions electronically using Lafarge's environmental management system; and,
- Maintaining a full-time power sweeper and watering truck at the Site to wash the base asphalt on the internal haul route, Hillsdale Drive, and on Durham Regional Road 30 (as needed).

Mud track out onto public roadways is not expected to occur during normal operation; however, exceptions caused by extreme weather events may occur. If excessive mud track out onto public roadways occurs that is caused by an extreme weather event, import will be suspended until further mitigation measures can be implemented and that the supplementary operational controls are confirmed to be effective.

3.14.3 Dust Management

A Dust Management Plan has been developed and is in effect for the overall property including proposed Site area. To supplement controls indentified in the propety wide plan, best management practices for dust control have been identified and presented in Appendix H. The additional measures are summarized in Table 1.

Table 1: Preventative Procedures and Control Measures for Fugitive Dust Emissions

Emission Source	BMPs		Description	Frequency
Unpaved Roadways	**Preventative Procedure**	Road Maintenance	Ensure surface materials are smooth, reapply gravel to reduce silt content	Monthly
		Speed Controls	Limit vehicle speed to 25 kilometres per hour.	Continual
	Reactive Control Measure	Watering	Water will be applied as a dust suppressant during non-freezing conditions.	At least 2 litres/m² after 12 hours of any previous wetting (i.e., rain or water truck) on hot dry days and within 48 hours on cooler, humid days, or as visually necessary during the twice daily inspections conducted by the Plant Manager or acting Supervisor, whichever is more frequent
Material Storage	**Preventative Procedure**	Material Placement	Material will be unloaded on level ground for inspection in keeping with Lafarge's Health and Safety Guideline for Fill Importation. Unloading will occur in designated areas with windbreaks and pile height will be confirmed to be below level of windbreak prior to unloading.	Continual
	Reactive Control Measure	Watering	Water will be applied as a dust suppressant during high windspeed conditions (i.e., greater than 28 kilometres per hour*)	When windspeeds are greater than 28 km/hr
Material Handling	**Preventative Procedure**	Maintain Minimum Drop Height	Material will be unloaded on level ground for inspection in keeping with Lafarge's Health and Safety Guideline for Fill Importation. Once material has been audit sampled and confirmed to be suitable for beneficial reuse, material will be moved using a bulldozer limited the drop distance to the shortest possible distance.	Continual

Emission Source	BMPs		Description	Frequency
	Reactive Control Measure	Cease Operations, Watering	Cease operations or apply water as a dust suppressant during high windspeed conditions (i.e., greater than 28 kilometres per hour*).	At windspeeds greater than 28 km/hr, operations will be stopped, and stockpiles will be covered or watered if visible dust is generated

*In the absence of on-Site anemometer (or wind meter), available resources (such as the internet or local television/radio weather forecasts) should be used to monitor wind speed.

Hours of operation will be restricted during any period in which a wind warning for the area has been issued by Environment and Climate Change Canada and during any time where weather, traffic and unusual events would compromise the ability of site alteration activities to be conducted in a safe and environmentally sound manner with due consideration of the public.

Adequate signage will be deployed on the internal haul road to avoid trucks straying off the maintained road surface and a speed limit of 25 kilometres per hour on the haul road will be posted.

3.14.4 Noise

A noise assessment report, including noise mitigation measures, is provided as Appendix I. A summary of the noise control measures is provided as follows:

- Fill operations may occur anywhere on the Site using two dozers at elevations of 331 masl and lower, or using one dozer at elevations of 337 masl and lower;
- When the fill exceeds an elevation of 337 masl, the operating areas using one or two dozers will be limited to the central (one dozer) and southern (two dozers) areas of the Site except for the purpose of adding fill that will become the foundation of the noise berms as this temporary activity constitutes construction and is exempt from assessment. Refer to Figure 3 included in the noise report provided as Appendix I;
- Following construction of the noise berms, the operating areas for one dozer will be in the north part of the fill area adjacent to the berms and two dozers are permitted in the remaining areas of the Site. Refer to Figure 4 included in the noise report provided as Appendix I; and,
- The sound emission levels from equipment employed at the Site will not exceed the following assumed sound levels:
  - Dozer (each) – 112 dBA
  - Excavator or Front-End Loader – 106 dBA
  - Moving Truck – 101 dBA

3.15 Public Complaints Procedure

As a long term member of the community, Lafarge understands the importance of providing a forum for regular input and feedback and to address complaints with solutions. The intent of the public complaint procedure is to provide rapid complaint response while encouraging the identification of improved operational procedures to prevent recurrence of the issue.

Lafarge will maintain an online system for receiving public complaints. The online site will consist of basic information including Lafarge's name, Operator's name (if different than Lafarge), and their contact information including email address and telephone number. The website will provide an automatic response to any email received. Complaints received through the public complaint system or from a Town bylaw officer will be assessed to determine if the complaint requires prompt action. Each complaint will be investigated by Lafarge and the findings of the investigation will be documented by Lafarge in the form of an Incident Report. Where a complaint is received from a member of the public, within two business days Lafarge will provide a response directly to the member of public that includes a summary of the complaint, the findings of the investigation, and the actions taken to address the concern. A copy of this response will be provided to the Town. As appropriate, the Incident Report will note any operational protocols that require revision to minimize the potential for a recurrence of the concern.

Incident Reports for complaints will be retained on file by Lafarge for the duration of the site alteration. All incident reports will be included as part of the monthly operations report described in Section 3.18.

Where involved, other applicable parties (e.g., drivers, source sites) will be notified of complaints, and the complaint resolution. These communications will documented in the Incident Report.

3.16 Reporting

3.16.1 Monthly Operations Reports

Each operations report will include:

- a summary of the audit testing program (log of samples collected from each source site, result, and laboratory reports);
- a summary of incident reporting (including complaints and the status of complaint resolution);
- copies of field reports for each Site inspection of erosion and sediment control devices with documentation of any required repairs (to be inspected on a two hour frequency);
- a log documenting daily inspections (two hour frequency) of the condition of the internal haul road public roadways, documenting the measures undertaken to minimize dust emissions and mud track out;
- a field report for the daily Site inspections;
- copies of source site approval letters prepared by a Qualified Person ("QP") documenting that each source site satisfied the requirements of the source site acceptance protocol presented in Section 4.2;
- cumulative record of import over the duration covered by the report providing truck count, fill quantities received from each source, associated confirmatory auide sample information, and location of placement; and,
- operations reports will be submitted to the Town for review and comment within 30 business days of month end.

Monthly reports will be available to the Town electronically for the duration of the site alteration permit.

3.16.2 Semi-Annual Report

The semi-annual report represents an interim report by Lafarge that provides the Town with an update on the Site operations. Each semi-annnual report will include the applicable monthly operations report and a summary of the resolution of all complaints received over the reporting period. The semi-annual report will include progress updates from the previous six month period on filling and/or operational incidents that may have occurred including, but not limited to, any actions and improvements related to erosion and sediment control. The semi-annual report will include an operational review and audit by a third party Qualified Person and Lafarge providing an assessment of conformance to permit requirements and any necessary corrective action recommendations. The semi-annual report would include recommendations for changes to the FMP to address any compliance issues, complaints, or other incidents identified during the previous six months, if identified as being required.

Semi-annual reporting will be submitted within 45 days of the end of the reporting period.

3.16.3 Annual Reporting

The annual report is an expanded version of the semi-annual report and includes a confirmation of the imported fill volume reported during the reported period as determined by topographic survey. Lafarge will provide the annual report to the Town a minimum of three months prior to the expiry of the site alteration permit. The report will include the results of an operational review and audit by a third party Qualified Person and Lafarge. The annual report would include recommendations for changes to the FMP to address any compliance issues, complaints, or other incidents identified during the previous year, if identified as being required. A summary of the year's activities will include:

- Cumulative record of import identifying each individual source of material, the associated characterization report identifying the source as appropriate, the number of truckloads received from each source, the volume of imported soil received from each source, and the audit sample record applicable to each inbound load during the reporting period;
- Confirmation of beneficial reuse of imported material including location of placement of excess soil in the Site Area during the reporting period;
- A summary of complaints received and corrective actions taken;
- SPLP audit results during the reporting period and groundwater monitoring results;
- Traffic and signage review;
- Review of operational controls including, but not limited to, controls preventing mud track out, dust, and erosion and sediment emissions;
- Other environmental monitoring results, as required; and,
- Summary of compliance audits and assessments.

4.0 FILL MANAGEMENT PLAN

4.1 Fill Quality Criteria

As required by the Town's site alteration bylaw 2019-068-RE, fill imported to the Site shall meet the Table 2 generic site condition standards (agriculture property use, coarse soil texture) presented in the Ministry of Environment, Conservation and Parks ("MECP") document entitled "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*", dated April 15, 2011. An excess soil regulation, Ontario Regulation ("O. Reg.") 406/19, was filed under the *Environmental Protection Act* on December 4, 2019, that includes excess soil standards (including new leachate standards) that took effect on January 1, 2021. This regulation includes new tools for better management of fill quality, including a framework for assessing source sites that requires a level of sampling and analysis that is in proportion to the potential risk that contaminants of potential concern are present along with an obligation to ensure all transport vehicles are appropriately received at the correct reuse and/or disposal sites.

To adhere to O. Reg. 406/19, imported fill consisting of soil that meets the Table 2.1 excess soil standards (agricultural property use), provided in the document titled "*Rules for Soil Management and Excess Soil Quality Standards*", dated November 19, 2019, will be applied for fill importation to this Site. Where imported fill is placed at least 1.5 metres below the final grade, the Table 2 generic site condition standards for sodium adsorption ratio and electrical conductivity are deemed not to be exceeded (noting that the Table 2.1 excess soil standards are not applicable to sodium adsorption ratio and electrical conductivity). Fill materials shall be restricted to topsoil, soil, rock, stone, clean concrete (unpainted and without rebar) or sod, excluding reclaimed fill. Clean concrete shall only be transported to the Site in loads that are not mixed with soil.

Fill imported to the Site shall be free of discolouration, staining, and/or odours that are potentially associated with petroleum hydrocarbons or other contaminants, regardless of whether the excess fill meets the applicable site condition standards. In addition, fill imported to the Site may not contain the any of the following materials, which are prohibited: putrescible materials (including but not limited to yard waste and wood), painted or coated concrete, cement fines, rebar, plastic, scrap metal, asphalt, petroleum hydrocarbons, shingles, rubbish, glass, garbage, termites, organic chemicals, liquid industrial wastes, and toxic chemicals and other contaminants.

4.2 Source Site Acceptance Protocol

An application to ship excess fill to the Site shall be prepared by a Qualified Person as defined by O. Reg. 153/04 acting on behalf of the owner of the proposed source site. The scope of the application will vary depending on the applicability of O. Reg. 406/19 to the source site.

Where the source site is required to comply with the planning requirements of O. Reg. 406/19, the minimum reporting requirements of O. Reg. 406/19 must be met. Details pertaining to the minimum reporting requirements are outlined in *Rules for Soil Management and Excess Soil Quality Standards*, dated November 19, 2019.

Where the source site is exempt from the planning requirements of O. Reg. 406/19, the application must include the following:

1) Name of the source site property owner or their authorized agent (herein after referred to as the applicant);

2) A geotechnical description of the excess soil to be shipped to the Site and the reason for its excavation;

3) A scaled map showing the limits of the excavation from which excess fill will be shipped;

4) An assessment of the past uses of the source site to determine the likelihood that one or more contaminants have impacted soil in a location where soil will be excavated at the source site. The assessment may take the form of a Phase One Environmental Site Assessment (”ESA”) completed in accordance with O. Reg. 153/04 or a Past Uses Report prepared in accordance with the MECP document titled *”Rules for On-Site and Excess Soil Management*”. The report(s) must be dated within 18 months of the date of proposed fill shipment to the Site. Older reports may be acceptable provided they are accompanied by an acceptable professional opinion from the QP that the report conclusions remain valid;

5) Sampling and analysis at the source site is required. The sampling and analysis program need only consider soils within the proposed excavation area. If the report referenced in Item 4 does not identify any relevant potentially contaminanting activities, then at a minimum, soil will be sampled for analysis of petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylenes (”BTEX”), metals, hydride-forming metals, electrical conductivity, and sodium adsorption ratio, in addition to any contaminants of concern that are associated with any relevant potentially contaminanting activities; and,

6) A soil characterization report prepared by a Qualified Person acting on behalf of the source site is required. The report shall include a description of the sampling locations, sample collection procedures, and parameters analyzed. Sample analysis must be conducted by a laboratory accredited in accordance with the requirements of O.Reg. 153/04. A rationale for the selection of the sampling locations and the parameters for testing that is based on the findings of the report referenced in Item 4 must be included. Samples must be representaive of excess fill to be imported to the Site. All methods of field investigation shall comply with the relevant standards of practice including the requirements for field investigations presented in Part VIII and Schedule E of O.Reg. 153/04. Analytical results shall be compared to the standards for acceptable fill quality defined in Section 4.1.

In lieu of Items 4, 5, and 6 the source site may provide a Record of Site Condition (”RSC”) that describes the current environmental condition of the excavation area at the source site, demonstrating that the source site satisfies the standards for acceptable fill quality defined in Section 4.1. The RSC must be dated within 18 months of the date of proposed fill shipment to the Site. Older RSCs may be acceptable provided they are accompanied by an acceptable professional opinion from Qualified Person that that its findings remain valid.

Where excess fill that does not meet the requirements of Section 4.1 is present at a proposed source site, additional documentation will be required to demonstrate that the lateral and vertical extents of soil impacts at the source site are adequately characterized and that appropriate supervisory measures are in place during excavation to ensure that this material is excluded from importation (e.g., the unacceptable excess fill was removed from the project area and confirmatory sampling has been completed).

Upon receipt of a complete application, Lafarge will retain a Qualified Person to review the application submitted by the source site to confirm that the application materially satisfies the requirements of the acceptance protocol and, subject to its review findings, will issue a concurrence letter to Lafarge. Excess soil will only be imported to the Site from approved source sites. The review will be available to the Town at any time during filling in electronic format.

4.3 Registry Notification

As required under Section 19, O.Reg. 406/19, Lafarge will file notice on the excess soil registry of its intent to operate a reuse site.

4.4 Access Control and At-the-Gate Inspection

Every vehicle transporting soil to the Fill Area will be tracked using the SoilFLO platform (or equivalent) meeting the tracking requirements of O. Reg. 406/19. SoilFLO is an automated ticketing process that will be used for each source site by the generator and receiver. Details of each source site (i.e., address and location where soil was excavated) will be prepopulated into the software. As each truch is located with soil destined for the Fill Area the source site will enter details related to that specific truck load including the name of the hauling company, description of soil, and vehicle license plate number. When the truck departs the source site the electronic ticket is submitted which records the date and time of departure and includes the expected time of arrival. The receiving site can track the truck load in real time and using the same software records when the truck arrives and whether the shipment is accepted or rejected.

Reports can be generated from the SoilFLO platform that can include details on every truck load accepted at the Site for every active source site.

The inspection at the gate will include a review of the contents of each vehicle from an elevated platform to identify unusual odours or staining, or the presence of prohibited materials indicating the potential presence of contaminants. Any truck where the load contains evidence of potential contaminants will be refused access to the Site. An incident report will be prepared any time a truck is refused access to the Site.

The truck inspection location, consisting of a trailer, will be set back from the Site entrance by 600 m. An elevated platform will be constructed for the purpose of inspecting the load of soil when collecting the waybill. If a delay occurs at the inspection location or the fill placement area, Lafarge will ensure trucks queue along the internal access road. No trucks will be allowed to queue on Durham Regional Road 30. Lafarge will direct the source site to delay additional truck loads as needed to prevent queuing on Durham Regional Road 30.

4.5 Documentation

A daily summary log will be maintained for loads received at the Site, including rejected loads. Each daily log entry will include:

a) Date;

b) Number of trucks inspected at the gate;

c) Number of trucks refused access, along with the reason for refusal; and,

d) For each source site:

- Waybill numbers for each vehicle accepted to the Site; and,
- Location of fill placement.

All source site applications and related reports, accepted waybills, daily logs will be retained by Lafarge and will be made available to the Town for review upon request, along with the approval of the source site prepared by the Qualifed Person.

Daily Site inspection reports will be completed by Lafarge, which documents the state of repair of the stormwater, erosion and sediment controls and identified corrective actions to be implemented by the Owner. Corrective actions will be completed to to the satisfaction of a professional engineer (”Engineer”) retained by Lafarge. The

Engineer will complete monthly Site inspections and will provide an inspection report documenting the inspection findings and recommendations. The monthly inspection reports will be submitted to the Town for review.

4.6 Audit Sampling

Audit samples of imported excess soil will be collected at the Site by Lafarge under the supervsion of a Qualified Person. Audit samples will be submitted to an accredited laboratory for analysis and will be analyzed for metals, hydride-forming metals, petroleum hydrocarbons, and polycyclic aromatic hydrocarbons (or other parameters as determined by the Qualified Person, considering the assessment of past uses at the source site).

Audit samples will be collected at a frequency of one sample for every 2,000 cubic metres (”m^3”) of excess fill imported from each source site. At least one audit sample will be collected for each source site regardless of whether a source site ships 2,000 m^3.

Random audit sampling will be conducted on a daily basis of *in situ* material that will consist of one sample submitted for laboratory analysis for the contaminants of concern applicable to a source site. It is noted that the Site will be accessible for audit sampling by the Town at any time. The audit sample collection procedure will include the collection of three soil samples for field screening (i.e., visual inspection, soil classification) and the submission of a worst-case sample for laboratory analysis. Audit samples will be collected at the placement area or tipping face (i.e., from a specific vehicle load immediately following placement).

If material placed at the Site is determined through audit sampling to not meet the acceptable fill criteria listed in Section 4.1, Lafarge will:

a) Suspend further shipments from the source site, since the audit sample may indicate that there is an issue with the material in either a specific vehicle or with all vehicles from the same source site. The source site will be immediately informed not to send further trucks and trucks in transit will be turned back until an investigation by a Qualified Person retained by Lafarge is completed;

b) The Qualified Person will review the source site and audit sample and provide recommendations on potential actions to prevent recurrence. The Qualified Person will be prepare a contingency plan describing further actions that may be taken to prevent the unacceptable materials from resulting in an adverse effect, potentially including removal of the unacceptable fill;

c) The source site will be suspended from further access to the Site until it submits documentation satisfactory to the Qualified Person and the Town confirming that unacceptable material has been removed from the source site and that the remaining fill to be transported to the Site is acceptable;

d) The Qualified Person will further assess fill quality in the area of the unacceptable audit sample and determine the need for further mitigating actions (e.g., removal of unacceptable fill materials for off-Site disposal) to prevent a potential adverse effect;

e) If removal of unacceptable fill is necessary, the Qualified Person will conduct confirmatory testing to confirm that the remaining fill in that area meets the acceptable fill quality criteria; and,

f) A record of the audit sample results and the subsequent actions taken will be submitted to the Town as an Incident Report along with any applicable documentation establishing the basis for those actions. Transport from the applicable source site may not resume without the Town’s approval.

4.7 Contingency Plan

If the inspection by the gatekeeper identifies material in a vehicle load that may not meet the acceptable fill criteria listed in Section 4.1, the Owner will complete the following actions:

a) If the vehicle load appears to contain minor quantity of unacceptable materials that can be readily removed by the Owner, the vehicle will be allowed access and the Owner's staff at the fill area will be advised to hold the truck on-Site until the contents can be discharged at a designated inspection area for further review. If possible, unacceptable materials will be removed from the vehicle load for off-Site disposal. Otherwise, the vehicle will be reloaded and directed to exit the Site and return the load to the source site;

b) The Owner will suspend further shipments from the source site, since the rejected load may indicate that there is an issue with the material in a specific vehicle or with all vehicles from the same source site. The source site will be immediately informed not to send further trucks and trucks in transit will be turned back until a preliminary investigation by the Owner is completed;

c) If the Owner determines that the cause of the issue is specific to a single vehicle and that corrective actions can be immediately put in place to prevent recurrence, further shipments from the source site can occur. If the cause of the issue not apparent and/or further investigation of soil conditions at the source site may be required, further investigation will be completed by a QP to determine the cause of the unacceptable fill quality and determine what measures must be implemented at the source site to prevent recurrence; and,

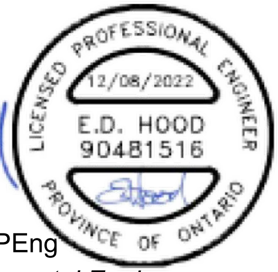
d) A record of the issue, the findings of the investigation and the corrective action(s) taken will be documented in an Incident Report, along with any applicable documentation (e.g., testing and analysis results). A copy of the Incident Report will be submitted to the Town for review.

5.0 CLOSING

We trust that this report meets the application requirements for a fill permit. If you have any questions regarding the content of this report, please do not hesitate to contact Lafarge.

Signature Page

Golder Associates Ltd.



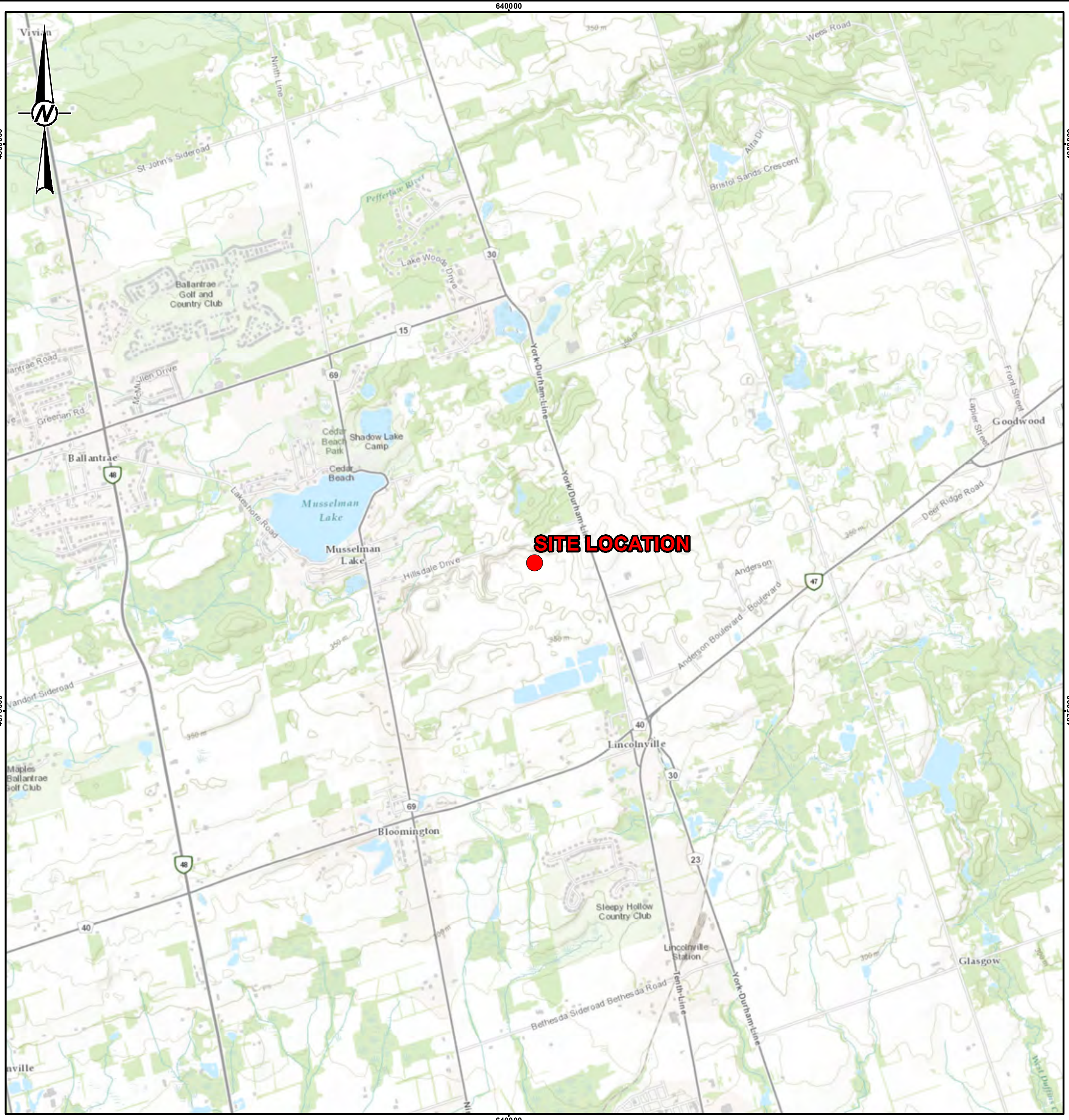
Chris Pons, BSc
Ontario Contaminated Lands - GTA East Team Lead

Eric Hood, PhD, PEng
Principal, Environmental Engineer

CP/EH/lb

https://golderassociates.sharepoint.com/sites/102618/deliverables/fill management plan/3. revision 2 - august 2022/19115436-r-rev2-site alteration and fill management plan-august 8 2022.docx

Figures



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REFERENCE(S)
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PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
LAFARGE CANADA INC.

CONSULTANT
GOLDER

YYYY-MM-DD	2020-07-16
DESIGNED	JT
PREPARED	JT
REVIEWED	CP
APPROVED	

PROJECT
SITE ALTERATION AND FILL MANAGEMENT PLAN
14204 DURHAM REGIONAL ROAD 30, STOUFFVILLE, ONTARIO

TITLE
KEY PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
19115436	0006	A	1

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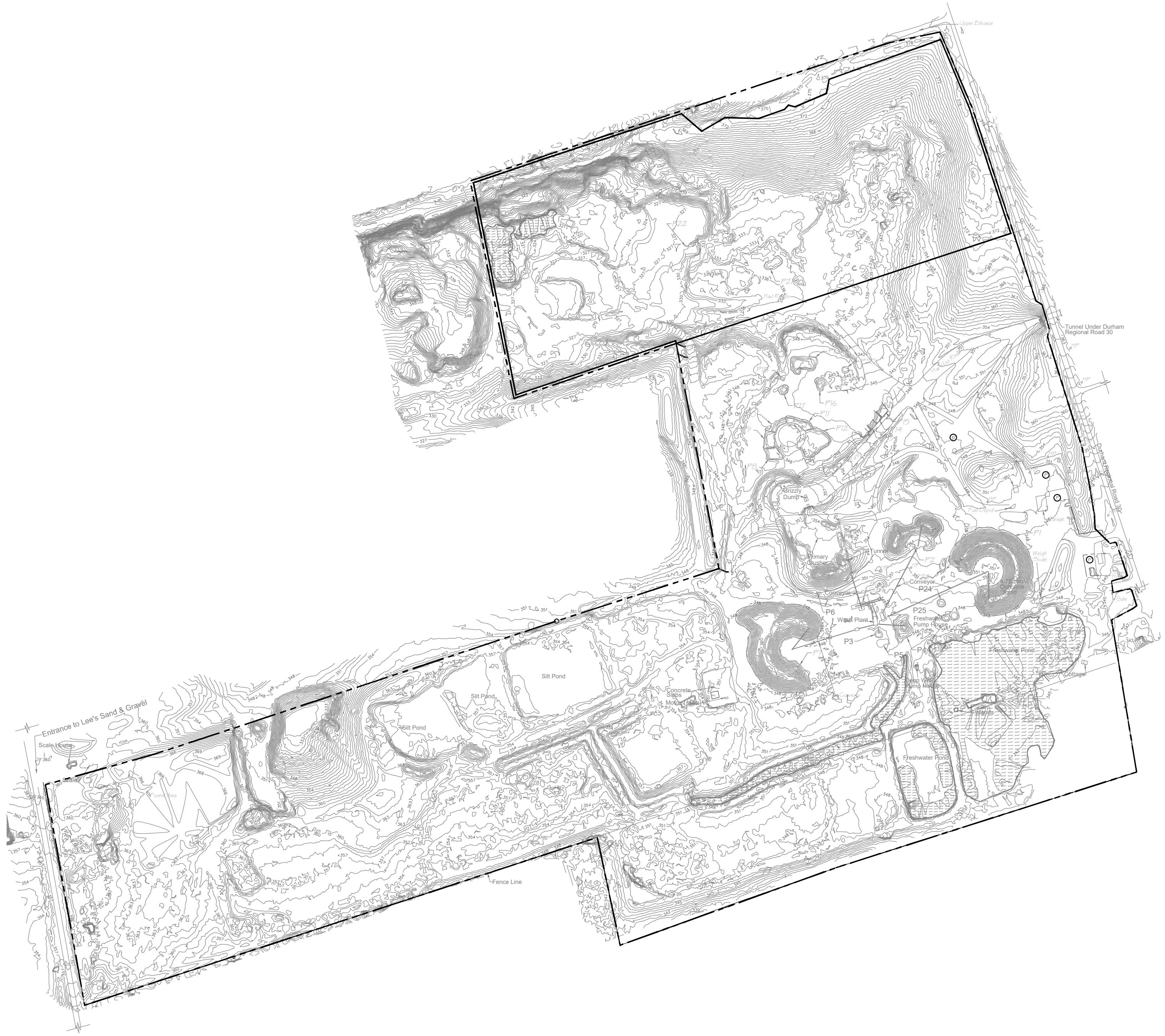

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LEGEND

PROPERTY BOUNDARY

SITE AREA

295 EXISTING CONTOUR

STORMWATER CONTROL PONDS

REFERENCE

1. BASE PLAN PROVIDED BY LAFARGE, IN AN E-MAIL DATED FEBRUARY 11, 2019.

CLIENT
LAFARGE CANADA INC.

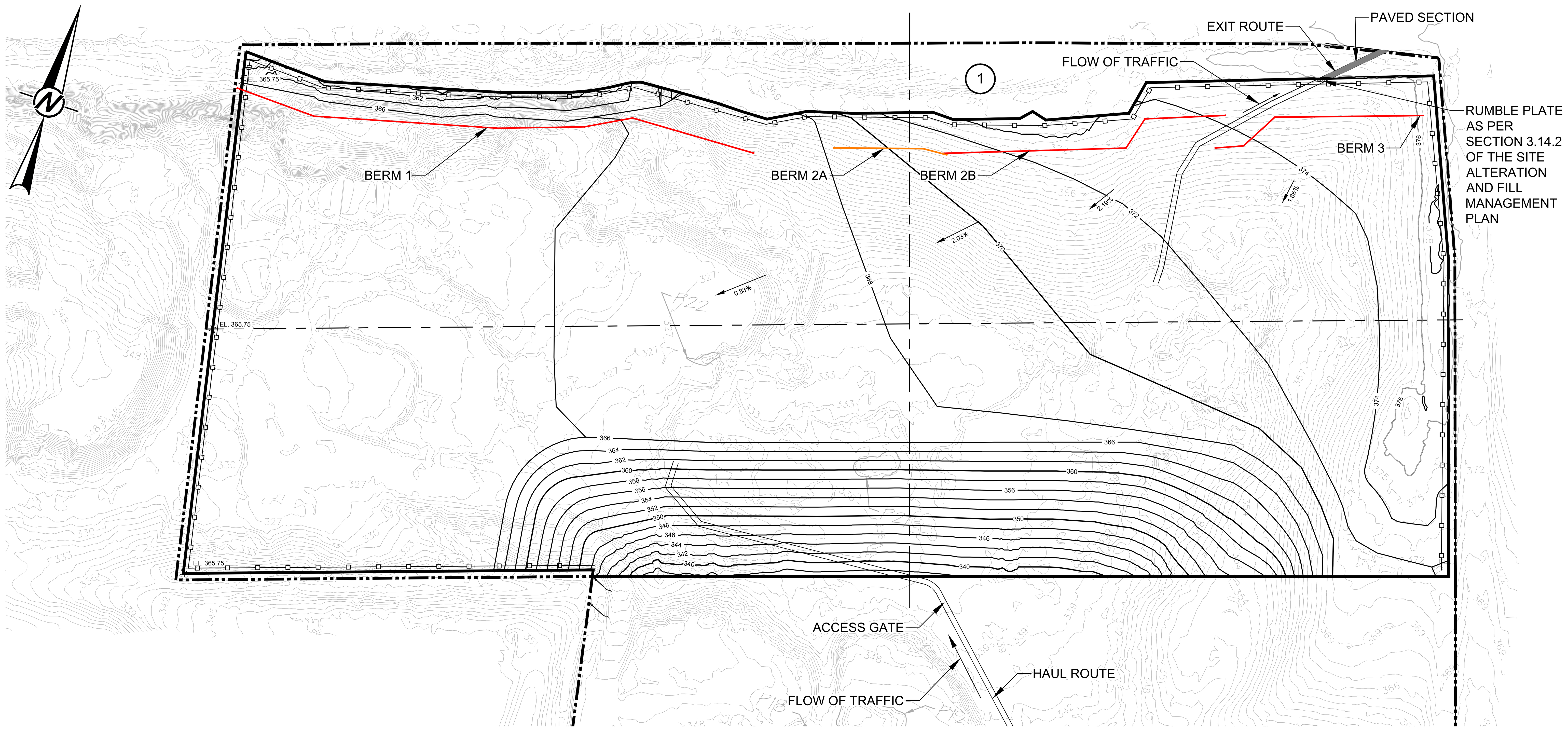
CONSULTANT
GOLDER

YYYY-MM-DD	2020-06-30
DESIGNED	CP
PREPARED	MK
REVIEWED	CP
APPROVED	EH

PROJECT
SITE ALTERATION AND FILL MANAGEMENT PLAN
14204 DURHAM REGIONAL ROAD 30, STOUFFVILLE, ONTARIO

TITLE
EXISTING CONDITIONS

PROJECT NO.	CONTROL	REV.	DRAWING
19115436		----	1



SITE ALTERATION PLAN
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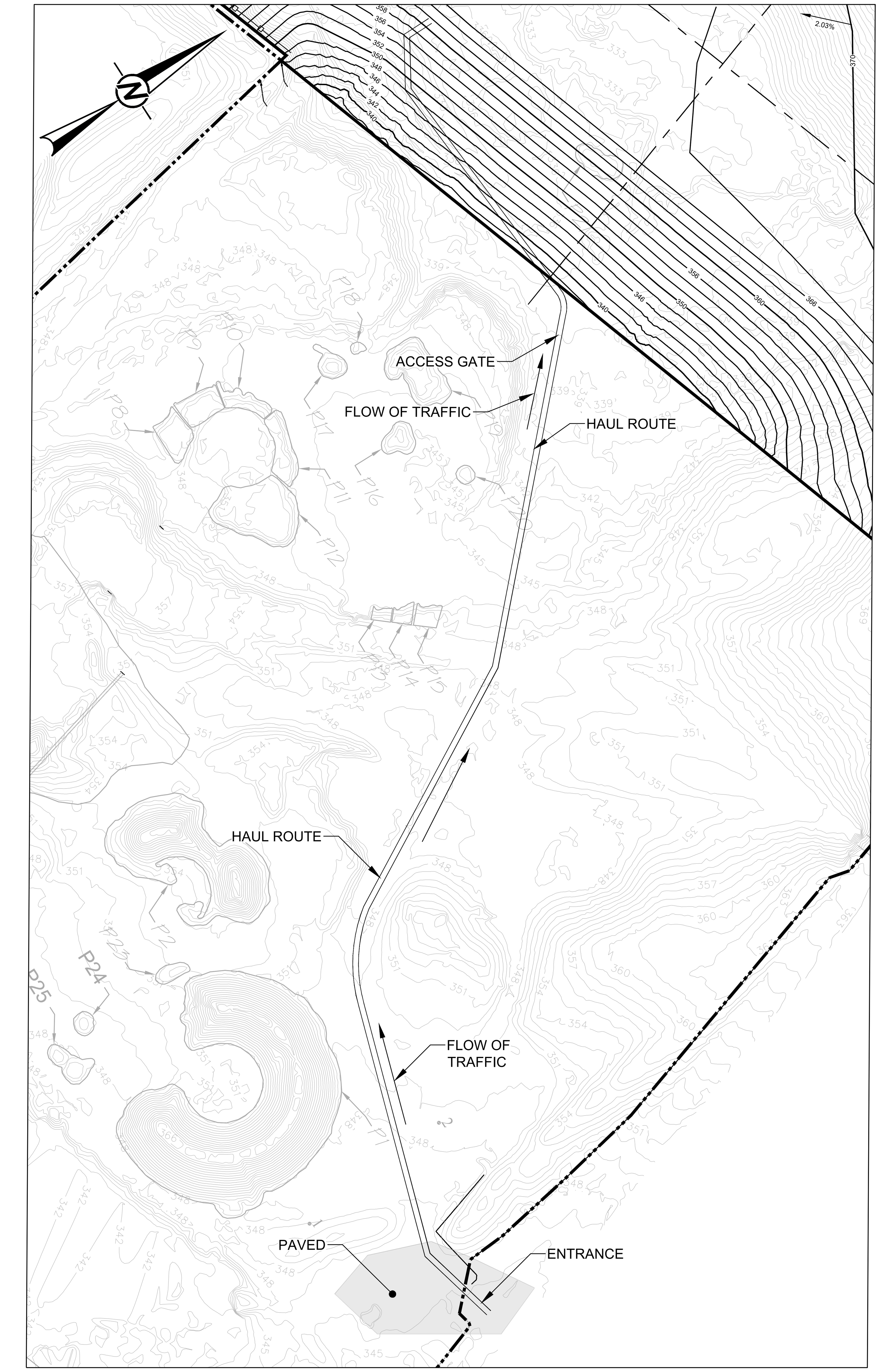

PROPOSED HAUL ROAD
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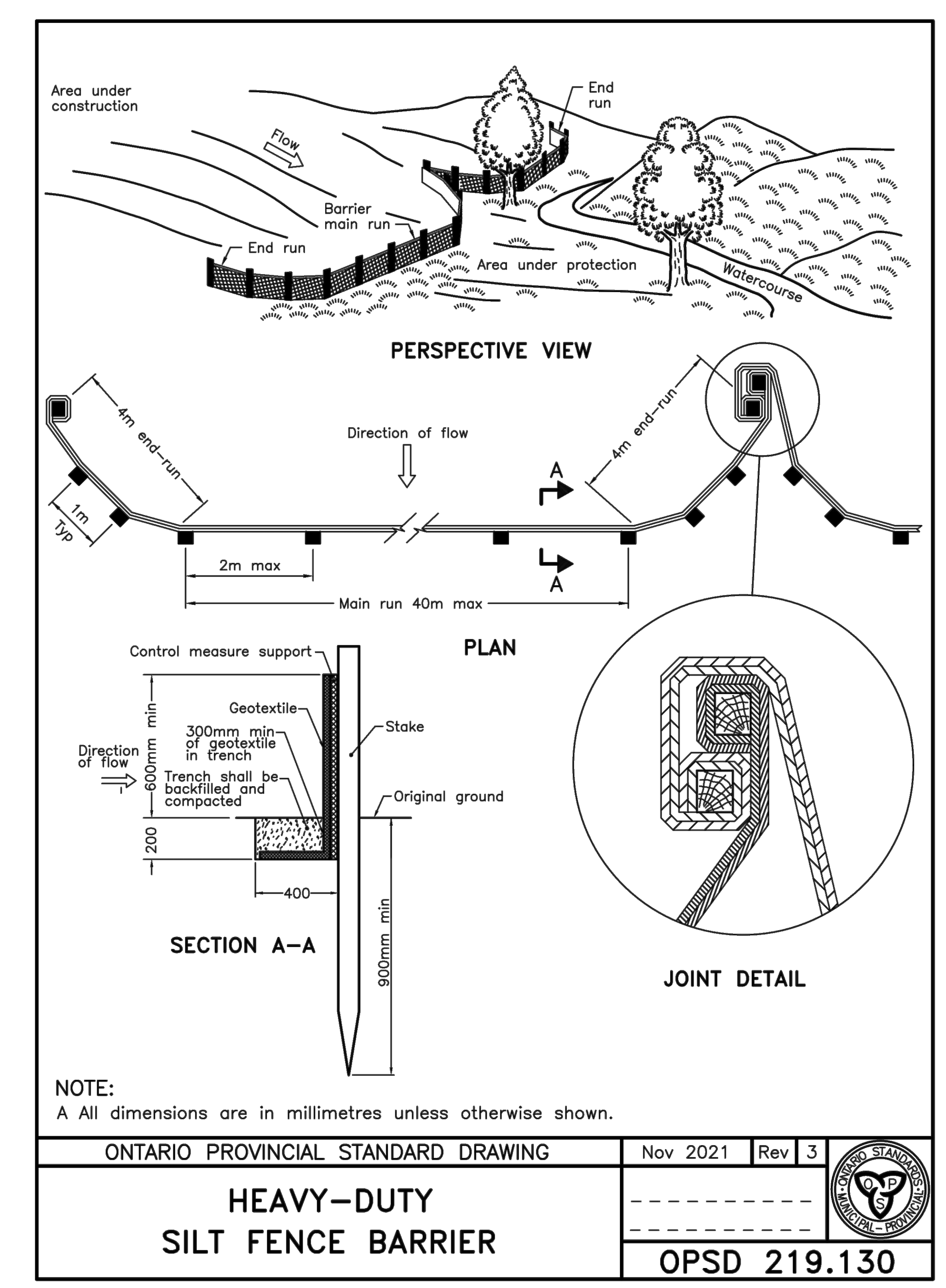

NOT FOR CONSTRUCTION

NOTES

1. CONSTRUCTION SHALL BE IN ACCORDANCE WITH MUNICIPAL STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD AND OPSS), WHERE APPLICABLE. OPSD AND OPSS SHALL APPLY WHERE NO MUNICIPAL STANDARDS ARE AVAILABLE. THE OPERATOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE MUNICIPALITY AND EXTERNAL AGENCIES PRIOR TO ANY SITE ALTERATION ACTIVITY.
2. ALL DISTURBED AREAS ARE TO BE REINSTATED TO EQUAL OR BETTER CONDITION. ALL NEW WORK SHALL BLEND NEATLY INTO EXISTING.
3. THE OPERATOR IS RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL MEASURES IN WORKING CONDITION AT ALL TIMES TO THE SATISFACTION OF THE ENGINEER. THE OPERATOR SHALL INSPECT ALL EROSION AND SEDIMENT CONTROL DEVICES ON A WEEKLY BASIS. THE CONTROL MEASURES SHALL BE PREPARED WITHIN 48 HOURS AFTER ANY DEFICIENCY IS NOTED.
4. THE EROSION AND SEDIMENT CONTROL MEASURES SHOWN ARE CONSIDERED THE MINIMUM PRECAUTIONS. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED.
5. THE OPERATOR SHALL REINSTATE ALL DISTURBED AREAS WITH 100 MILLIMETRES OF TOPSOIL AND SEED AS SOON AS POSSIBLE AFTER FINAL ELEVATIONS ARE ACHIEVED.
6. OPERATOR TO PROTECT MONITORING WELLS FROM DAMAGE FROM CONSTRUCTION EQUIPMENT WITH A 1 METRE SECTION OF 900 MM CORRUGATED STEEL CULVERT OR SIMILAR.
7. OPERATOR TO IMPLEMENT A GROUNDWATER MONITORING PROGRAM IN ACCORDANCE WITH THE REQUIREMENTS OF THE SITE ALTERATION AND FILL MANAGEMENT PLAN.
8. EROSION AND SEDIMENT CONTROL MEASURES THAT ARE DESCRIBED IN THE SITE ALTERATION AND FILL MANAGEMENT PLAN AND DRAWING TO BE IMPLEMENTED AS REQUIRED PRIOR TO THE START OF FILL IMPORTATION.
9. DURING FILL PLACEMENT, OPERATOR TO CONSTRUCT TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES (TO BE APPROVED BY ENGINEER) TO MINIMIZE EROSION AND ROUTE RUNOFF INTO THE UNFILLED AREA OF AGGREGATE EXTRACTION.
10. THE OPERATOR IS RESPONSIBLE FOR MAINTAINING TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES IN WORKING CONDITION AT ALL TIMES TO THE SATISFACTION OF THE ENGINEER. THE OPERATOR SHALL INSPECT ALL EROSION AND SEDIMENT CONTROL DEVICES ON A WEEKLY BASIS. THE OPERATOR SHALL REPAIR THE CONTROL MEASURES WITHIN 48 HOURS AFTER ANY DEFICIENCY IS NOTED.
11. ENGINEER TO INSPECT ALL EROSION AND SEDIMENT CONTROL DEVICES AS REQUIRED IN THE SITE ALTERATION AND FILL MANAGEMENT PLAN.
12. PLACE SILT FENCING AS PER OPSD 219.110 ALONG THE PERIMETER OF THE BUFFER AREAS. SILT FENCING WILL CONSIST OF A NON-WOVEN GEOTEXTILE WITH A MATERIAL DENSITY OF 270R OR GREATER.
13. AVOID DISTURBANCE OR REMOVAL OF VEGETATION DURING THE ACTIVE SEASON FOR BREEDING BIRDS (APRIL 15 - AUGUST 15), UNLESS CONSTRUCTION DISTURBANCE IS PRECEDED BY A NESTING SURVEY CONDUCTED BY A QUALIFIED BIOLOGIST.
14. ENSURE ALL EQUIPMENT IS CLEANED PRIOR TO TRANSPORTATION AND USE ON THE SITE TO AVOID THE SPREAD OR INTRODUCTION OF INVASIVE SPECIES SEED ON THE SITE.
15. DEWATERING OPERATIONS SHALL BE DISCHARGED TO A SEDIMENT TRAP AND NOT DIRECTLY INTO THE ONSITE DRAINAGE DITCH OR EXISTING WATERCOURSES.
16. PLACE APPROVED FILL IN LIFTS GENERALLY NOT EXCEEDING 1.0 METRE IN THICKNESS AND NOMINALLY COMPACTED.
17. OPERATOR TO ROUTE THE INTERNAL ACCESS ROUTE AND INSTALL SIGNS AS NEEDED TO FACILITATE FILL OPERATIONS, AVOIDING CROSSING OF THE ENTRANCE AND EXIT LANES.
18. PLACE APPROVED FILL IN SEQUENTIAL PHASES (STARTING AT THE WEST SIDE, MOVING PROGRESIVELY EASTWARD).
19. RUMBLE PLATES TO BE CONSTRUCTED AS SPECIFIED IN SECTION 3.14.2 OF THE SITE ALTERATION AND FILL MANAGEMENT PLAN PRIOR TO PAVED SECTION OF THE EXIT ROUTE.

LEGEND

- PROPERTY BOUNDARY
- SITE AREA
- EXISTING CONTOURS
- (1) DECIDUOUS FOREST
- PROPOSED CONTOURS
- PROPOSED SILT FENCE

REFERENCE(S)

1. BASE PLAN PROVIDED BY LAFARGE, IN AN E-MAIL DATED FEBRUARY 11, 2019.

CLIENT
LAFARGE CANADA INC.

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-07-05
DESIGNED	CP
PREPARED	MK/WS
REVIEWED	CP
APPROVED	EH

PROJECT
SITE ALTERATION AND FILL MANAGEMENT PLAN
14204 DURHAM REGIONAL ROAD 30,
WHITCHURCH-STOUFFVILLE

TITLE
SITE ALTERATION PLAN

PROJECT NO.	CONTROL	REV.	DRAWING
19115436	0006	D	2

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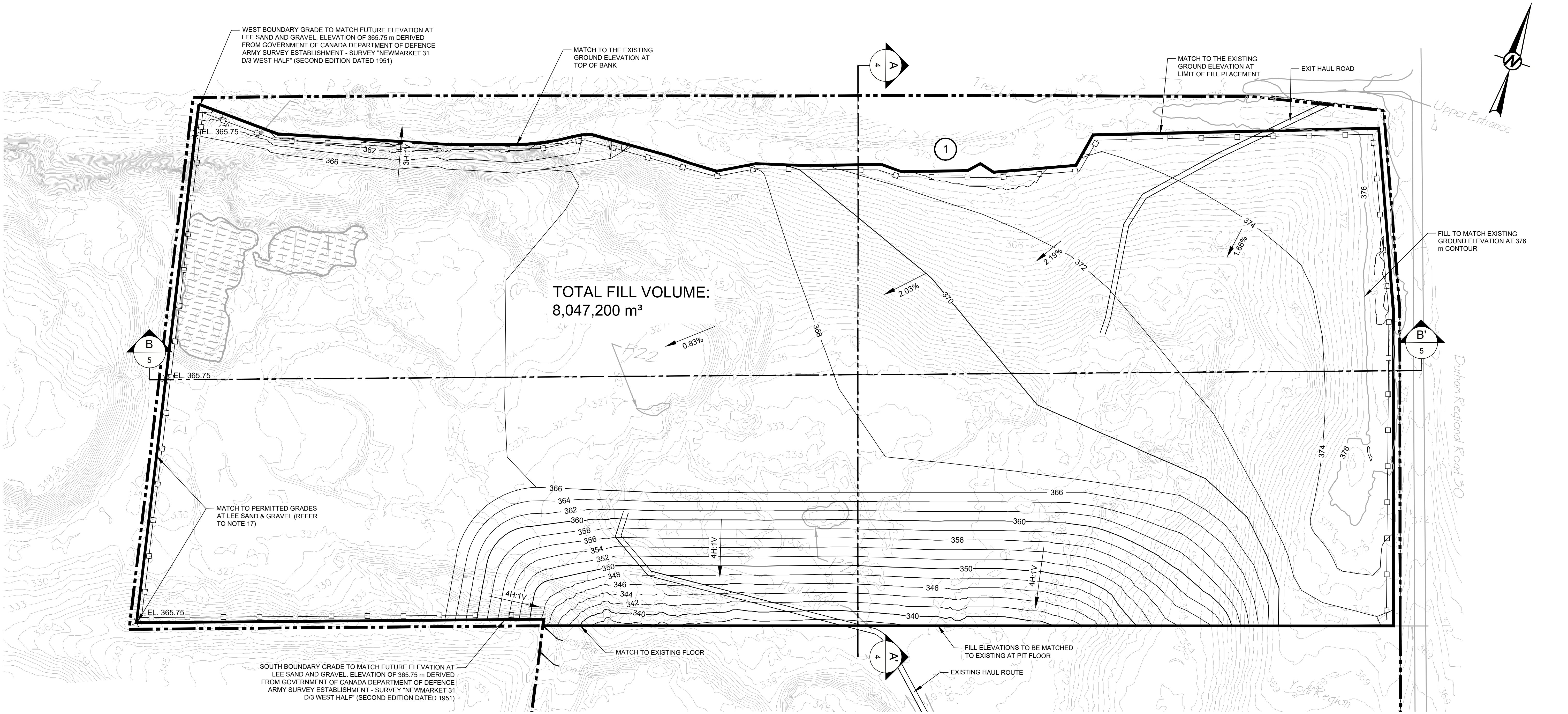

NOTES

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4. THE EROSION AND SEDIMENT CONTROL MEASURES SHOWN ARE CONSIDERED THE MINIMUM PRECAUTIONS. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED.
5. THE OPERATOR SHALL REINSTATE ALL DISTURBED AREAS WITH 100 MILLIMETRES OF TOPSOIL AND SEED AS SOON AS POSSIBLE AFTER FINAL ELEVATIONS ARE ACHIEVED.
6. OPERATOR TO PROTECT MONITORING WELLS FROM DAMAGE FROM CONSTRUCTION EQUIPMENT WITH A 1 METRE SECTION OF 900 MM CORRUGATED STEEL CULVERT OR SIMILAR.
7. OPERATOR TO IMPLEMENT A GROUNDWATER MONITORING PROGRAM IN ACCORDANCE WITH THE REQUIREMENTS OF THE SITE ALTERATION AND FILL MANAGEMENT PLAN.
8. EROSION AND SEDIMENT CONTROL MEASURES THAT ARE DESCRIBED IN THE SITE ALTERATION AND FILL MANAGEMENT PLAN AND DRAWING TO BE IMPLEMENTED AS REQUIRED PRIOR TO THE START OF FILL IMPORTATION.
9. DURING FILL PLACEMENT, OPERATOR TO CONSTRUCT TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES (TO BE APPROVED BY ENGINEER) TO MINIMIZE EROSION AND ROUTE RUNOFF INTO THE UNFILLED AREA OF AGGREGATE EXTRACTION.
10. ENGINEER TO INSPECT ALL EROSION AND SEDIMENT CONTROL DEVICES AS REQUIRED IN THE SITE ALTERATION AND FILL MANAGEMENT PLAN.
11. PLACE SILT FENCING AS PER OPSD 219.110 ALONG THE PERIMETER OF THE BUFFER AREAS. SILT FENCING WILL CONSIST OF A NON-WOVEN GEOTEXTILE WITH A MATERIAL DENSITY OF 270R OR GREATER.
12. AVOID DISTURBANCE OR REMOVAL OF VEGETATION DURING THE ACTIVE SEASON FOR BREEDING BIRDS (APRIL 15 - AUGUST 15), UNLESS CONSTRUCTION DISTURBANCE IS PRECEDED BY A NESTING SURVEY CONDUCTED BY A QUALIFIED BIOLOGIST.
13. ENSURE ALL EQUIPMENT IS CLEANED PRIOR TO TRANSPORTATION AND USE ON THE SITE TO AVOID THE SPREAD OR INTRODUCTION OF INVASIVE SPECIES SEED ON THE SITE.
14. PLACE APPROVED FILL IN LIFTS GENERALLY NOT EXCEEDING 1.0 METRE IN THICKNESS AND NOMINALLY COMPACTED.
15. OPERATOR TO ROUTE THE INTERNAL ACCESS ROUTE AND INSTALL SIGNS AS NEEDED TO FACILITATE FILL OPERATIONS, AVOIDING CROSSING OF THE ENTRANCE AND EXIT LANES.
16. PLACE APPROVED FILL IN SEQUENTIAL PHASES (STARTING AT THE WEST SIDE, MOVING PROGRESSIVELY EASTWARD).
17. SOURCE OF 365.75 m CONTOUR IS FROM THE LEE SAND & GRAVEL PIT REHABILITATION SITE ALTERATION GRADING PLAN PREPARED BY SCS CONSULTING GROUP LTD. DATED AUGUST 2014.

LEGEND

SITE BOUNDARY
LIMIT OF FILL PLACEMENT
EXISTING CONTOUR
360 PROPOSED CONTOUR
1 DECIDUOUS FOREST BUFFER
EL. 365.75 PROPOSED SURFACE ELEVATION
PROPOSED SILT FENCE

REFERENCE

1. BASE PLAN PROVIDED BY LAFARGE, IN AN E-MAIL DATED FEBRUARY 11, 2019.

NOT FOR CONSTRUCTION

0 50 100
1:3,000 METRES

CLIENT
LAFARGE CANADA INC.

CONSULTANT
WSP GOLDER

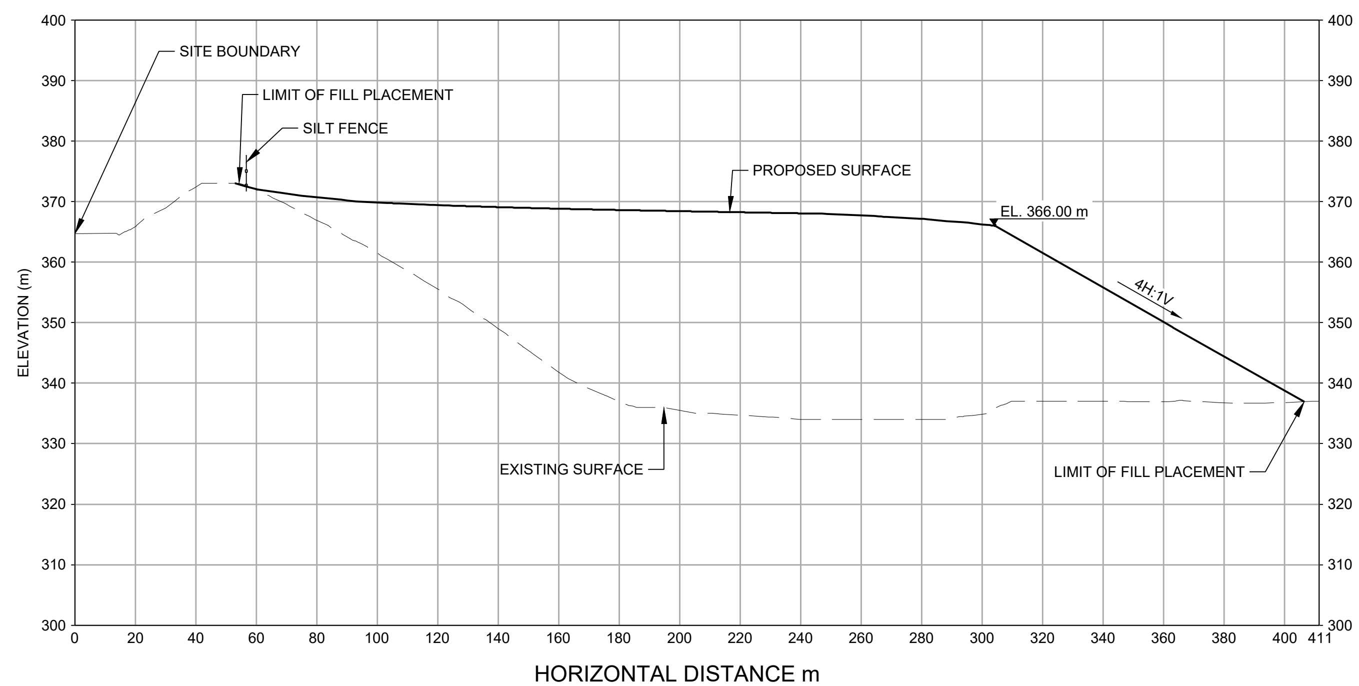
YYYY-MM-DD	2022-03-10
DESIGNED	CP
PREPARED	WS
REVIEWED	CP
APPROVED	EH

PROJECT
SITE ALTERATION AND FILL MANAGEMENT PLAN
14204 DURHAM REGIONAL ROAD 30,
WHITCHURCH-STOUFFVILLE

TITLE
GRADING PLAN

PROJECT NO.	CONTROL	REV.	DRAWING
19115436	0006	B	3

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



SCALE 1:2,500 m
VERT. SCALE 1:1,250 m

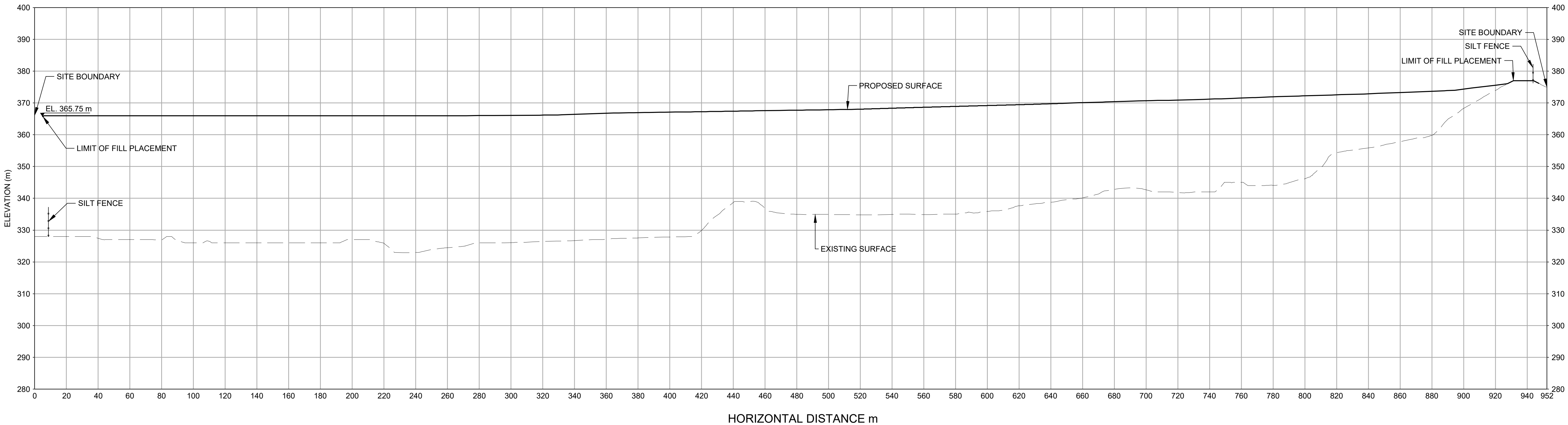
A
3

CROSS SECTION A-A'

NOT FOR CONSTRUCTION

0 50 100
1:2,500 METRES

CLIENT LAFARGE CANADA INC.			PROJECT SITE ALTERATION AND FILL MANAGEMENT PLAN 14204 DURHAM REGIONAL ROAD 30, WHITCHURCH
CONSULTANT WSP GOLDER	YYYY-MM-DD	2022-03-10	TITLE **CROSS SECTION A-A'**
	DESIGNED	CP	
	PREPARED	WS	
	REVIEWED	CP	PROJECT NO. 19115436 / CONTROL 0006 / REV. C / DRAWING 4
	APPROVED	EH	



SCALE 1:2,500 m | B | CROSS SECTION B-B'

VERT. SCALE 1:1,250 m | 3

NOT FOR CONSTRUCTION

0 50 100

1:2,500 METRES

CLIENT
LAFARGE CANADA INC.

PROJECT
SITE ALTERATION AND FILL MANAGEMENT PLAN
14204 DURHAM REGIONAL ROAD 30, WHITCHURCH

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2022-03-10
DESIGNED	CP
PREPARED	WS
REVIEWED	CP
APPROVED	EH

TITLE
CROSS SECTION B-B'

PROJECT NO.	CONTROL	REV.	DRAWING
19115436	0006	C	5

APPENDIX A

Factual Geotechnical Report

REPORT

GEOTECHNICAL INVESTIGATION REPORT

Site Alteration/Fill Permit

14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario

Submitted to:

Lafarge Canada Inc.

6509 Airport Road
Mississauga, Ontario
L4V 1S7
Attn: Chris Galway, Senior Land Manager, East Central Ontario

Submitted by:

Golder Associates Ltd.

100 Scotia Court,
Whitby, Ontario, L1N 8Y6, Canada
+1 905 723 2727

19115436 (1000)

July 13, 2021

Distribution List

1 e-copy - Lafarge Canada Inc.

1 e-copy - Golder Associates Ltd

Table of Contents

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation carried out at the northeast corner of the property located at 14204 Durham Regional Road 30, in the Town of Whitchurch-Stouffville, Ontario (the "Site"), as shown on the Borehole Location Plan, Figure 1. The purpose of the investigation was to obtain information on the general subsurface soil and groundwater conditions at the Site by means of a limited number of boreholes. Based on our interpretation of the borehole data, this report provides factual subsurface soil and groundwater information in support of a site alteration permit application for agricultural use of the Site with the Town of Whitchurch-Stouffville. Golder understands that the purpose of the site alteration is to accept suitable excess fill from construction projects in the surrounding area and to restore the Site to match the surrounding area. Fill will be placed such that the final topographic contours at the Site will be visually consistent with the elevations of the surrounding lands. Following the completion of the proposed alteration, there is no intention to construct buildings or other settlement sensitive structures on the Site and the Site will be used for agricultural purposes.

The factual data contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, Golder Associates Ltd. ("Golder") should be given an opportunity to confirm that the information is still valid. In addition, this report should be read in conjunction with the attached "Important Information and Limitations of This Report", included in Appendix A. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

2.0 SITE AND PROJECT DESCRIPTION

The Site is situated at the northeast corner of 14204 Durham Regional Road 30, in the Town of Whitchurch-Stouffville, Ontario. It is our understanding that the Site is currently used for commercial aggregate extraction. The former extraction activities resulted in relatively large elevation changes up to the order of 50 m in some areas. The Site is 37.49 hectares ("ha") and is within the larger property that is 169.16 ha and under the existing Aggregate Resources Act license. It is understood that the Site will be filled such that the resulting Site grading will generally match the surrounding lands. Following the filling and grading operations, the Site will be utilized strictly for agricultural purposes.

3.0 INVESTIGATION PROCEDURES

The field work for this investigation was carried out between May 1 and 10, 2019 at which time four (4) boreholes (MW19-1 to MW19-4) were advanced at the locations shown on the Borehole Location Plan, Figure 1. The boreholes were drilled using a track-mounted drill rig supplied and operated by Landshark Drilling Inc. of Brantford, Ontario, under Golder's supervision. The soil samples in the boreholes were obtained using a 50 mm outer diameter split-spoon sampler driven by automatic hammer, performed in accordance with Standard Penetration Testing (SPT) (ASTM D1586). The split-spoon samplers used in the investigation limit the maximum particle size that can be sampled and tested to about 40 mm. Therefore, particles or objects that may exist within the soils that are larger than this dimension will not be sampled or represented in the grain size distributions. The results of the in-situ field tests (i.e., SPT 'N'-values) as presented on the Record of Borehole sheets and in subsequent sections of this report are uncorrected.

All of the soil samples obtained during this investigation were brought to our Whitby laboratory for further examination and laboratory testing. Index and classification tests consisting of water content determination and grain size distribution were carried out on selected soil samples.

Groundwater conditions were observed during the drilling operations and are detailed on the Record of Borehole sheets following the text of this report. Monitoring wells, 50 mm diameter, were installed in Boreholes MW19-1 to MW19-3 and a 38 mm diameter monitoring well was installed in Borehole MW19-4 to permit further groundwater level monitoring. The monitoring wells consisted of PVC pipe, with a slotted screen sealed at a selected depth within the borehole. A sand filter pack surrounded the screen, and above the screen and the annulus was backfilled to the surface with bentonite. The monitoring well installation details are presented on the Record of Borehole sheets appended to this report.

The field work for this investigation was directed by members of our engineering staff who also logged the boreholes and took custody of the recovered soil samples. The as-drilled borehole locations and their corresponding ground surface elevations were provided by an Ontario Land Surveyor, J.D. Barnes Ltd. It is understood that the elevations are referenced to geodetic datum.

4.0 SUBSURFACE CONDITIONS

The subsurface soil and groundwater conditions encountered in the boreholes, as well as the results of the field and laboratory testing, are shown in detail on the Record of Borehole sheets and on Figures 2 to 5 following the text of this report. Golder's *"Methods of Soil Classification*", "*Abbreviations and Terms Used on Records of Boreholes and Test Pits"* and *"List of Symbols"* are attached to assist in the interpretation of the borehole records. It should be noted that the boundaries between the soil strata have been inferred from drilling observations and non-continuous samples. They generally represent a transition from one soil type to another and should not be inferred to represent an exact plane of geological change. Further, conditions will vary between and beyond the boreholes.

The following is a summarized account of the subsurface conditions encountered in the boreholes drilled during this investigation, followed by more detailed descriptions of the major soil strata and shallow groundwater conditions.

The ground surface elevations at the borehole locations ranges from about 327 metres above sea level ("masl") at the southwest corner of the Site (vicinity of Borehole MW19-1) to 375 masl at the northeast corner of the Site (i.e., vicinity of Borehole MW19-4). Generally non-cohesive fill or probably fill/disturbed/reworked native material is present across the Site ranging from a surficial thin layer to over 20 m in the northeast corner. The native soils below the fill consist of non-cohesive sand and gravel to sand to silty sand to silt deposits. A localized sandy silty clay till deposit was encountered in one borehole.

Groundwater was encountered in all of the boreholes during drilling. The groundwater levels in the monitoring wells were generally measured between about 320 and 321 masl.

4.1 Topsoil Fill

Surficial topsoil fill with a thickness of 150 mm was encountered in Borehole MW19-4.

4.2 Fill

Fill was encountered at ground surface or below the topsoil fill extending to depths ranging from 1.1 m below existing ground surface (326.0 to 328.3 masl) in Boreholes MW19-1 and MW19-3, to 5.6 m (369.8 masl) in Borehole MW19-4 at the northeast corner. The fill materials consist mainly of sand and gravel, sand, silty sand, or sandy clayey silt and contained trace organics and rootlets in some areas. The SPT 'N'-values measured within the non-cohesive fill ranged from 3 to 17 blows per 0.3 m of penetration, indicating a very loose to compact state of compactness. One SPT ‘N’-value measured on a sample of the cohesive sandy clayey silt fill was 1 blow per 0.3 m of penetration, indicating a very soft consistency. The in-situ water content measured on samples of the fill range from about 3 per cent to 17 per cent.

4.3 Probable Fill or Disturbed/Reworked Native Soil

Probable fill or disturbed/reworked materials was encountered at ground surface in Borehole MW19-2 and below the fill in Borehole MW19-4. The layer extended to depths of about 7.1 m (321.1 masl) in Borehole MW19-2 and 21.6 m below ground surface (353.8 masl) in Borehole MW19-4 at the northeast corner. The recovered “probable fill” split spoon samples appeared to be disturbed or re-worked, which is likely due to previous deep Site excavations for aggregate extraction purposes. The probable fill or disturbed/reworked layer consists of silty sand to silt and sand, and sandy silty clay. SPT ‘N’-values measured within the non-cohesive probable fill or disturbed/reworked ranged from 0 blows (i.e., weight of hammer) to 20 blows per 0.3 m of penetration, indicating a very loose to compact state of compactness. The SPT ‘N’-value measured on a sample of the cohesive sandy silty clay probable fill was 19 blows per 0.3 m of penetration, indicating a very stiff consistency. The in-situ water content measured on samples of the probable fill or disturbed/reworked range from about 8 per cent to 14 per cent. A grain size distribution curve for a sample of silt and sand probable fill or disturbed/reworked soil is shown on Figure 2.

4.4 Sandy Silty Clay (Till)

A deposit of cohesive sandy silty clay till was encountered below the probable fill or disturbed/reworked material in Borehole MW19-4 and extended to a depth of about 23.2 m (352.3 masl). One SPT ‘N’-value of 19 blows per 0.3 m of penetration was measured within the sandy silty clay till, indicating a very stiff consistency. The natural water content measured on a sample of the sandy silty clay till is about 14 per cent.

4.5 Sand and Gravel

A non-cohesive deposit of sand and gravel was encountered below the silty clay till in Borehole MW19-4 and extended to a depth of about 26.2 m (349.3 masl). One SPT ‘N’-value measured within the sand and gravel was greater than 50 blows per 0.3 m of penetration, indicating a very dense state of compactness. The natural water content measured on a sample of the sand and gravel is about 10 per cent.

4.6 Sand

A non-cohesive deposit of sand, trace gravel to gravelly, was encountered in all the boreholes. The deposit extended to depths between about 5.6 m to 8.6 m below ground surface (319.6 to 321.5 masl) in Boreholes MW19-1 to MW19-3 and 39.6 m (335.9 masl) in Borehole MW19-4 at the northeast corner. SPT ‘N’-values measured within the sand deposit ranged from 45 blows per 0.3 m of penetration to greater than 85 blows per 0.23 m of penetration, indicating a dense to very dense state of compactness. The natural water content measured on samples of the sand range from about 2 per cent to 13 per cent with one value of 24 per cent. A grain size distribution curve for two samples of gravelly sand to sand is shown on Figure 3.

4.7 Silty Sand to Silt

A non-cohesive deposit ranging in composition from silty sand to silt was encountered in all the boreholes and extended to the borehole termination depth. The SPT ‘N’-values measured within the silty sand to silt deposit ranged from 46 blows per 0.3 m of penetration to greater than 50 blows per 0.15 m of penetration, with one outlier of 29 blows per 0.3 m of penetration, indicating the deposit is typically in a dense to very dense state of compactness. The natural water content measured on samples of the silty sand to silt range from about 12 per cent to 23 per cent. A grain size distribution curve for one sample of silt is shown on Figure 4 and grain size distribution curves for three samples of silty sand are shown on Figure 5.

4.8 Groundwater

Groundwater was encountered in all the boreholes drilled as a part of this investigation and the measurements are shown in detail on the Record of Borehole sheets following the text of this report. Groundwater levels measured in the monitoring wells installed in the boreholes are summarized in the table below.

Borehole ID		MW19-1	MW19-2	MW19-3	MW19-4
Ground Surface Elevation (m)		327.1	328.2	329.3	375.5
Groundwater Level on May 6, 2019	Depth Below Ground Surface (m)	6.8	7.8	9.0	-
	Elevation (masl)	320.3	320.4	320.3	-
Groundwater Level on May 13/14, 2019	Depth Below Ground Surface (m)	6.5	7.7	9.0	-
	Elevation (masl)	320.6	320.5	320.3	-
Groundwater Level on May 16, 2019	Depth Below Ground Surface (m)	-	-	-	49.5
	Elevation (masl)	-	-	-	326.0
Groundwater Level on May 21, 2019	Depth Below Ground Surface (m)	6.8	7.7	8.9	54.1
	Elevation (masl)	320.3	320.5	320.4	321.3
Groundwater Level on May 24, 2019	Depth Below Ground Surface (m)	6.7	7.7	8.9	-
	Elevation (masl)	320.4	320.5	320.4	-

It should be noted that these observations reflect the groundwater conditions encountered in the boreholes during the time of the investigation (i.e., May 2019) and some seasonal fluctuations should be anticipated.

5.0 CLOSURE

We trust that this report provides sufficient factual geotechnical information to aid in the planning and submission of pertinent applications for the Site Alteration Process. If you have any questions regarding the contents of this report or require additional information, please do not hesitate to contact this office.

Signature Page

Golder Associates Ltd.

Alan Mohammad, P.Eng
Geotechnical Engineer

Sarah E. M. Poot, P.Eng.
Associate, Senior Geotechnical Engineer

YS/AM/SEMP/ljv

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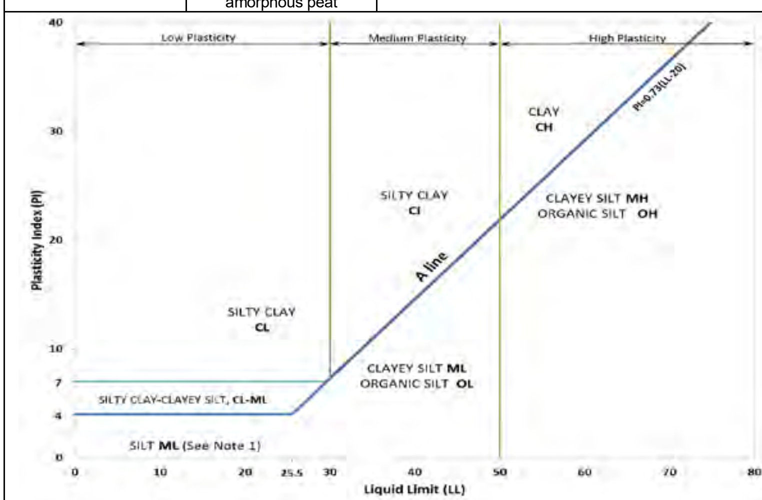
The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10}xD_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil		Laboratory Tests	Field Indicators: Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)	Organic Content	USCS Group Symbol	Primary Name
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS	(Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
					Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
					Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
				Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
					None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS	(PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% **(see Note 2)**	CL	SILTY CLAY
				Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
				Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures								30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat								75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

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.). Values reported are as recorded in the field and are uncorrected.

Cone Penetration Test (CPT)
An electronic cone penetrometer with a 60° conical tip and a project 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 sleeve frictions are recorded electronically at 25 mm penetration intervals.

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 uncased a 50 mm (2 in.) diameter, 60° 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

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DD	Diamond Drilling
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
GS	Grab Sample
MC	Modified California Samples
MS	Modified Shelby (for frozen soil)
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size (Shelby tube)
TP	Thin-walled, piston – note size (Shelby tube)
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (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 (specific gravity, Gs)
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 (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for the effects of overburden pressure.
2. Definition of compactness terms are based on SPT 'N' ranges as provided in Terzaghi, Peck and Mesri (1996). Many factors affect the recorded SPT 'N' value, including hammer efficiency (which may be greater than 60% in automatic trip hammers), overburden pressure, groundwater conditions, and grainsize. As such, the recorded SPT 'N' value(s) should be considered only an approximate guide to the soil compactness. These factors need to be considered when evaluating the results, and the stated compactness terms should not be relied upon for design or construction.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1,2] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

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

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
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma$ - u)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (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_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
NP	non-plastic
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
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 (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, 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, s_u	undrained shear strength (ϕ = 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

RECORD OF BOREHOLE: MW19-1

PROJECT: 19115436 (1000)
LOCATION: See Figure 1
BORING DATE: May 1, 2019
SHEET 1 OF 2
DATUM: Geodetic

BORING METHOD: B57 Track Mount Drill Rig; 210 mm O.D. Hollow Stem Augers

DEPTH SCALE METRES	DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	WATER CONTENT PERCENT (W)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	GROUND SURFACE	327.09						
0	FILL - (SP) SAND, some fines; brown; non-cohesive, moist, very loose	0.00	1	SS	3	~10		50 mm Diameter PVC Monitoring Well (Stickup)
1	(SW) SAND, some gravel to gravelly, trace to some fines; brown; non-cohesive, moist, very dense to dense	326.02 / 1.07	2	SS	50/0.08	~7		
3			3	SS	85/0.23	~6	M	Bentonite
5			4	SS	49	~6		
5.57	(ML) SILT, trace sand to sandy SILT, trace gravel; brown; non-cohesive, wet, very dense to dense	321.52 / 5.57						Silica Sand
6			5	SS	78	~20	MH	Water level May 14, 2019
8								Screen
9			6	SS	46	~22		
9.75	END OF BOREHOLE	317.34 / 9.75						

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 50

GOLDER

LOGGED: AS
CHECKED: AM

PROJECT: 19115436 (1000)

LOCATION: See Figure 1

RECORD OF BOREHOLE: MW19-1

BORING DATE: May 1, 2019

SHEET 2 OF 2

DATUM: Geodetic

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. + 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 (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10		NOTE:									
		1. Water level measured in monitoring well as follows:									
		DATE / Depth (m) / Elev. (m)									
		06-May-19 / 6.8 / 320.3									
		14-May-19 / 6.5 / 320.6									
11		21-May-19 / 6.8 / 320.3									
		24-May-19 / 6.7 / 320.4									
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AS

CHECKED: AM

RECORD OF BOREHOLE: MW19-2

BORING DATE: May 1 & 2, 2019

DATUM: Geodetic

Boring method: B57 Track Mount Drill Rig; 210 mm O.D. Hollow Stem Augers

DEPTH (m)	DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	GROUND SURFACE	328.21					
0	PROBABLE FILL or DISTURBED /REWORKED NATIVE - (SM) SILTY SAND, some gravel to gravelly; brown; non-cohesive, moist to wet below 3.0 m depth, loose to very loose	0.00	1	SS	4		50 mm Diameter PVC Monitoring Well (Stickup)
			2	SS	7		
			3	SS	WH		Bentonite
			4	SS	2		
			5	SS	9		Silica Sand
7	(SW) SAND, trace to some gravel, trace to some fines; brown; non-cohesive, wet, very dense	321.13 / 7.08					Screen
			6	SS	75	M	May 24, 2019 (water level)
8.6	(SM) SILTY SAND, trace to some gravel; brown; non-cohesive, wet, compact	319.61 / 8.60	7	SS	29		
							Blowback

CONTINUED NEXT PAGE

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 10 20 30 40

DEPTH SCALE
1 : 50

GOLDER

LOGGED: AS
CHECKED: AM

PROJECT: 19115436 (1000)

LOCATION: See Figure 1

RECORD OF BOREHOLE: MW19-2

BORING DATE: May 1 & 2, 2019

DATUM: Geodetic

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. + 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 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10		(SM) SILTY SAND, trace to some gravel; brown; non-cohesive, wet, compact		317.54							Blowback
		END OF BOREHOLE		10.67							
11		NOTE:									
12											
13											
14											
15											
16											
17											
18											
19											
20											

1. Water level measured in monitoring well as follows:

DATE	Depth (m)	Elev. (m)
06-May-19	7.8	320.4
14-May-19	7.7	320.5
21-May-19	7.7	320.5
24-May19	7.7	320.5

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AS

CHECKED: AM

PROJECT: 19115436 (1000)

LOCATION: See Figure 1

RECORD OF BOREHOLE: MW19-3

BORING DATE: May 2, 2019

DATUM: Geodetic

BORING METHOD: B57 Track Mount Drill Rig; 210 mm O.D. Hollow Stem Augers

DEPTH SCALE METRES	DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	GROUND SURFACE	329.34					
0	FILL - (ML) sandy CLAYEY SILT, some gravel; trace rootlets, dark brown; cohesive, w~PL, very soft	0.00	1	SS	1		50 mm Diameter PVC Monitoring Well (Stickup)
1	(SW) gravelly SAND, some fines; brown; non-cohesive; moist, dense	328.27 / 1.07	2	SS	45		
2	(ML) SILT and SAND, trace to some gravel; brown; non-cohesive, moist, very dense	326.75 / 2.59	3	SS	77/ 0.28		Bentonite
4	(SM) SILTY SAND, brown; non-cohesive, moist, very dense	325.30 / 4.04	4	SS	76	MH	
5	(SP) SAND, some fines, brown; non-cohesive, moist, very dense	323.78 / 5.56	5	SS	76		Silica Sand
8	(SM) SILTY SAND, brown; non-cohesive, moist to wet, very dense	320.81 / 8.53	6	SS	52	MH	May 24, 2019; Screen
10							

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 ; 10 20 30 40

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 50

GOLDER

LOGGED: AS

CHECKED: AM

GTA-BHS 001 S:\CLIENTS\LAFARGEHOLCIM\ON_STOUFFVILLE\02_DATA\GINT\STOUFFVILLE_PIT.GPJ GAL-MIS.GDT 19-8-21

PROJECT: 19115436 (1000)

LOCATION: See Figure 1

RECORD OF BOREHOLE: MW19-3

BORING DATE: May 2, 2019

DATUM: Geodetic

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. + 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 (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	B57 Track Mount Drill Rig; 210 mm O.D. Hollow Stem Augers	(SM) SILTY SAND, brown; non-cohesive, moist to wet, very dense		317.76							
11											Blowback
		END OF BOREHOLE		11.58							
12		NOTE:									
		1. Water level measured in monitoring well as follows:									
13											
14											
15											
16											
17											
18											
19											
20											

DATE	Depth (m)	Elev. (m)
06-May-19	9.0	320.3
13-May-19	9.0	320.3
21-May-19	8.9	320.4
24-May19	8.9	320.4

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AS

CHECKED: AM

PROJECT: 19115436 (1000)

LOCATION: See Figure 1

RECORD OF BOREHOLE: MW19-4

BORING DATE: May 3, 6, 7, & 10, 2019

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH Cu, kPa	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		375.47							
0	B57 Track Mount Drill Rig; 210 mm O.D. Hollow Stem Augers	Topsoil - FILL		0.00							38 mm Diameter PVC Monitoring Well (Stickup)
		FILL - (SM) SILTY SAND, trace to some gravel; brown, trace organics; non-cohesive, moist, compact		0.15	1	SS	17				
2					2	SS	12				
		FILL - (SW) SAND and GRAVEL, trace fines, brown; non-cohesive, moist, loose		372.88 / 2.59	3	SS	7				
		FILL - (SM) SILTY SAND, trace to some gravel, trace organics; brown; non-cohesive, wet, loose		371.20 / 4.27	4	SS	5				Bentonite
	B57 Track Mount Drill Rig; 140 mm O.D. Casing / Tri-cone	PROBABLE FILL or DISTURBED/ REWORKED NATIVE - (SM) gravelly SILTY SAND; brown; non-cohesive, moist, loose to very loose		369.83 / 5.64	5	SS	6				
					6	SS	2				
10											

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AM / AS

CHECKED: AM

PROJECT: 19115436 (1000)

LOCATION: See Figure 1

RECORD OF BOREHOLE: MW19-4

BORING DATE: May 3, 6, 7, & 10, 2019

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	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 (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	B57 Track Mount Drill Rig; 140 mm O.D. Casing / Tri-cone	PROBABLE FILL or DISTURBED/ REWORKED NATIVE - (ML/SM) SILT and SAND to SILTY SAND, trace to some gravel; brown; non-cohesive, moist, compact to loose		365.34 10.13							
11											
12					7	SS	17		○	MH	
13											
14											
15											Bentonite
					8	SS	8		○		
16											
17											
18					9	SS	20				
19											
				355.66 19.81							
20											

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AM / AS

CHECKED: AM

PROJECT: 19115436 (1000)

LOCATION: See Figure 1

RECORD OF BOREHOLE: MW19-4

BORING DATE: May 3, 6, 7, & 10, 2019

DATUM: Geodetic

BORING METHOD: B57 Track Mount Drill Rig; 140 mm O.D. Casing / Tri-cone

--- CONTINUED FROM PREVIOUS PAGE ---

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION
20	PROBABLE FILL or DISTURBED/ REWORKED NATIVE - (CL) sandy SILTY CLAY, trace gravel; brown to dark brown, organic inclusions; cohesive, W~PL, very stiff					Bentonite
21.64	(CL) sandy SILTY CLAY, trace gravel; grey, (TILL); cohesive, W<PL, very stiff	353.83 / 21.64	10	SS	19	
23.16	(SP) SAND and GRAVEL, some fines; brown; non-cohesive, moist, very dense	352.31 / 23.16	11	SS	50/ 0.05	
26.21	(SM) gravelly SILTY SAND, brown; non-cohesive, wet, very dense	349.26 / 26.21	12	SS	90	

Note: Water content (O) plotted at approximately 14% (sample 10), 10% (sample 11), and 18% (sample 12).

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 50

GOLDER

LOGGED: AM / AS

CHECKED: AM

RECORD OF BOREHOLE: MW19-4

BORING DATE: May 3, 6, 7, & 10, 2019

DATUM: Geodetic

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: 10 20 30 40

--- CONTINUED FROM PREVIOUS PAGE ---

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
30	B57 Track Mount Drill Rig; 140 mm O.D. Casing / Tri-cone	(SM) gravelly SILTY SAND, brown; non-cohesive, wet, very dense						
				13	SS	94		
32		(SW) SAND, some gravel, some fines; brown; non-cohesive, wet, very dense	343.16 32.31					
				14	SS	79		
35								Bentonite
				15	SS	92		
39		(SM) SILTY SAND, brown; non-cohesive, moist, very dense	335.85 39.62					
40								

CONTINUED NEXT PAGE

RECORD OF BOREHOLE: MW19-4

BORING DATE: May 3, 6, 7, & 10, 2019

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH Cu, kPa	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
40	B57 Track Mount Drill Rig; 140 mm O.D. Casing / Tri-cone	(SM) SILTY SAND, brown; non-cohesive, moist, very dense									
43					16	SS	83/ 0.15				
45											Bentonite
46		(ML) sandy SILT, brown; non-cohesive, moist to wet, very dense		329.27 46.20							
49					17	SS	53/ 0.15				
50											

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 50

GOLDER

LOGGED: AM / AS
CHECKED: AM

RECORD OF BOREHOLE: MW19-4

BORING DATE: May 3, 6, 7, & 10, 2019

DATUM: Geodetic

BORING METHOD: B57 Track Mount Drill Rig; 140 mm O.D. Casing / Tri-cone

DEPTH SCALE METRES	DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	WATER CONTENT	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	--- CONTINUED FROM PREVIOUS PAGE ---							
50	(ML) sandy SILT, brown; non-cohesive, moist to wet, very dense							May 16, 2019 (water level)
52	(SM) SILTY SAND; non-cohesive, brown; wet, very dense	323.35 / 52.12						Bentonite
54								May 21, 2019 (water level); Silica Sand
55			18	SS	50/ 0.15	○	MH	
56								Screen
58	END OF BOREHOLE	317.56 / 57.91						

NOTE:

1. Water level measured in monitoring well as follows:

DATE	Depth (m)	Elev. (m)
16-May-19	49.5	326.0
21-May-19	54.1	321.3

Chart headings: 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 (10, 20, 30, 40)

LEGEND

- BOREHOLE LOCATION
- PROPERTY BOUNDARY
- SITE BOUNDARY
- WATERBODY
- WETLAND

0 200 400

1:5,000 METRES

REFERENCE(S)

BASE DATA - MNR LIO, OBTAINED 2019. MECP OBTAINED 2017.
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2019
BASE IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
LAFARGE CANADA INC.

PROJECT
GEOTECHNICAL INVESTIGATION REPORT
SITE ALTERATION/FILL PERMIT
14204 DURHAM REGIONAL ROAD 30, TOWN OF WHITCHURCH-STOUFFVILLE, ONTARIO

TITLE
BOREHOLE LOCATION PLAN

CONSULTANT
GOLDER MEMBER OF WSP

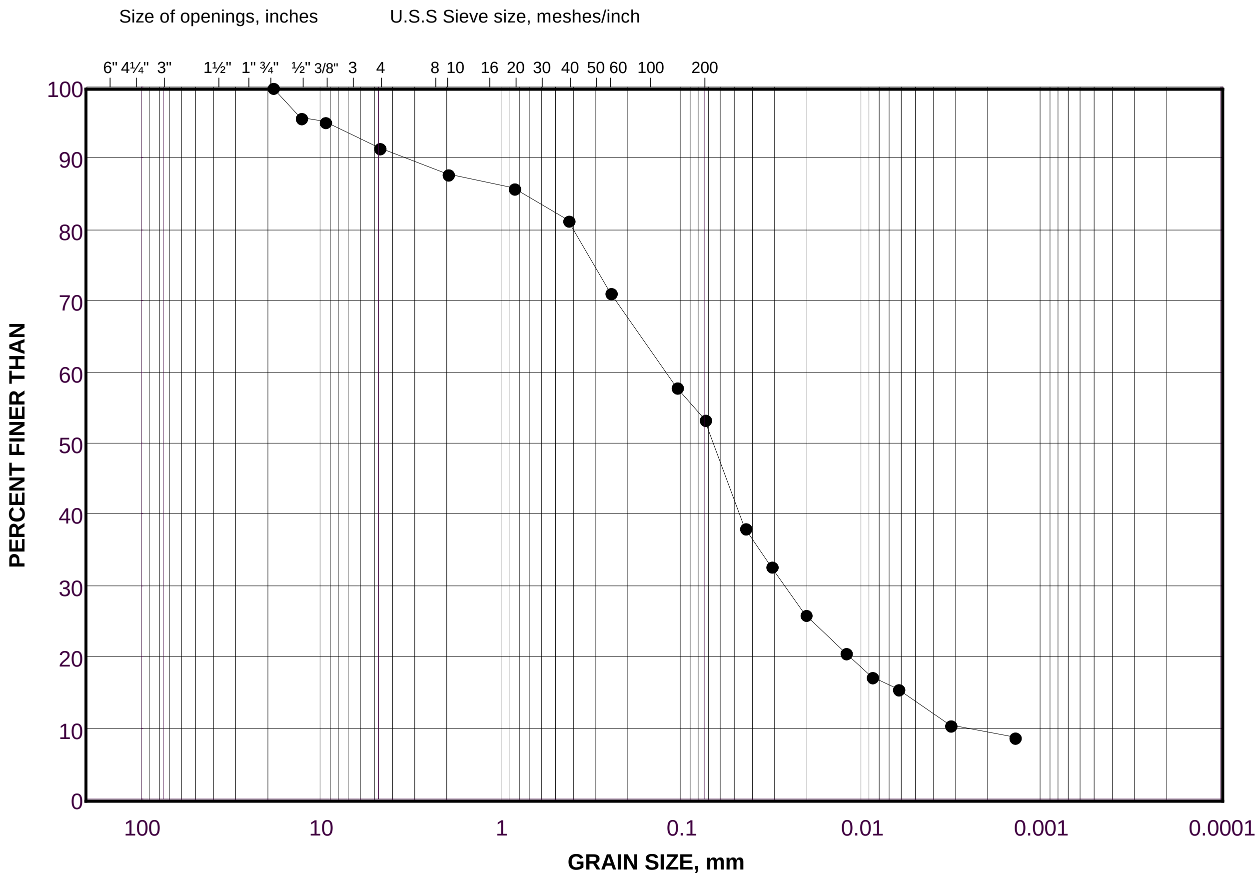
YYYY-MM-DD	2019-07-25
DESIGNED	JT
PREPARED	JT
REVIEWED	YS
APPROVED	SEMP

PROJECT NO.	CONTROL	REV.	FIGURE
19115436 (1000)	0003	A	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
25mm

GRAIN SIZE DISTRIBUTION
(ML) SILT and SAND
(PROBABLE FILL or DISTURBED/REWORKED NATIVE)

FIGURE 2



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
SIZE	GRAVEL SIZE		SAND SIZE			FINE GRAINED

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	MW 19-4	7	12.19 - 12.80

Project Number: 19115436 (1000)

Checked By: SEMP

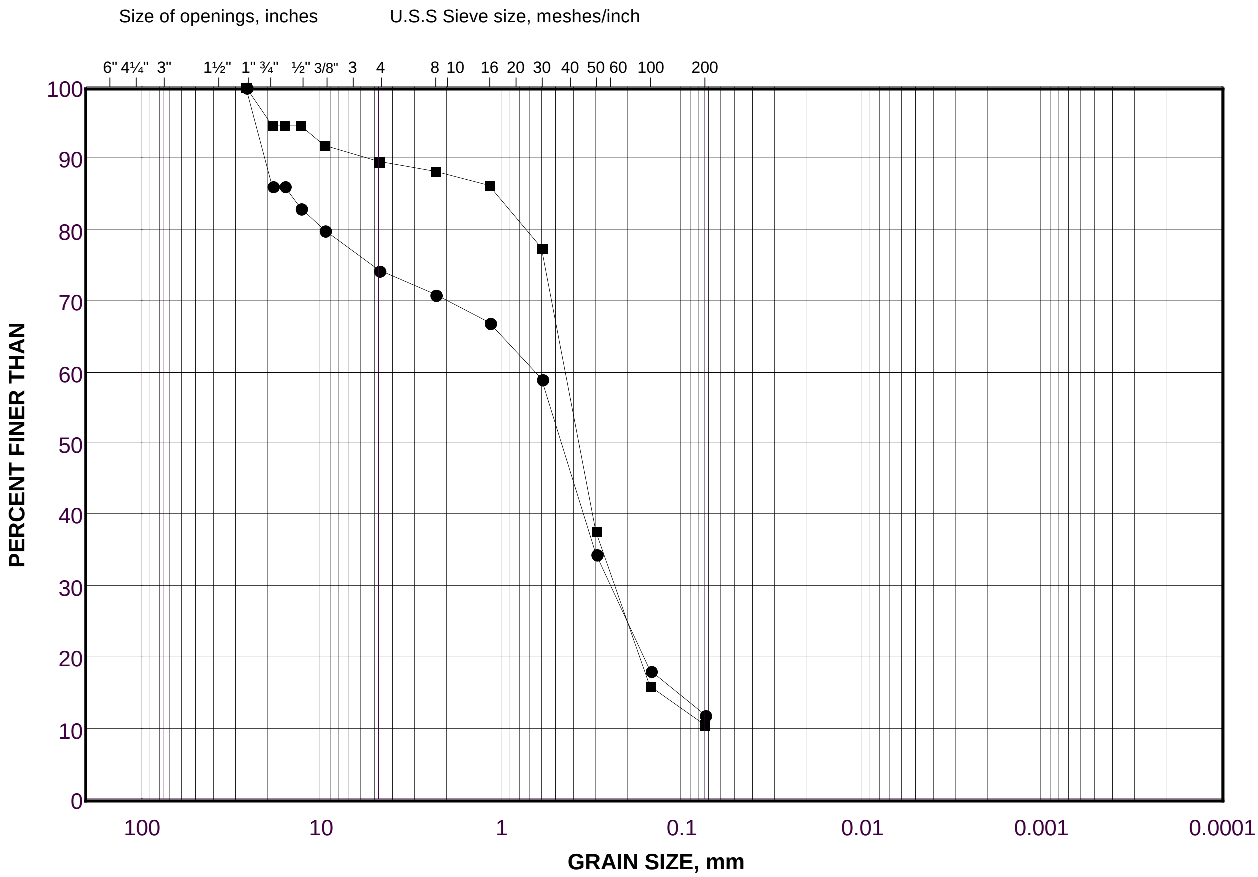
Golder Associates

Date: 22-Jun-19

GRAIN SIZE DISTRIBUTION

(SW) gravelly SAND to SAND

FIGURE 3



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
SIZE	GRAVEL SIZE		SAND SIZE			FINE GRAINED

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	MW 19-1	3	3.05 - 3.43
■	MW 19-2	6	7.62 - 8.23

Project Number: 19115436 (1000)

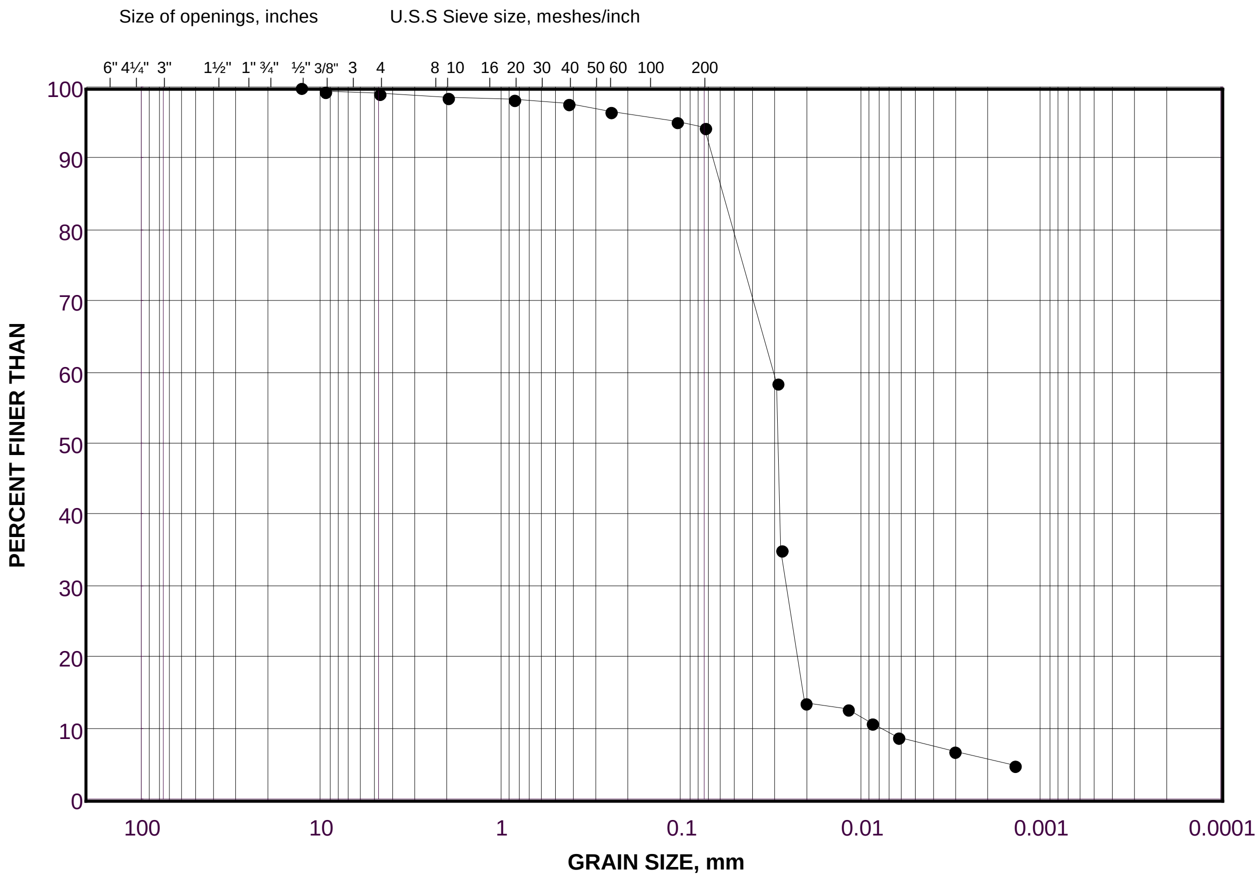
Checked By: SEMP

Golder Associates

Date: 22-Jun-19

GRAIN SIZE DISTRIBUTION
(ML) SILT

FIGURE 4



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
SIZE	GRAVEL SIZE		SAND SIZE			FINE GRAINED

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	MW 19-1	5	6.10 - 6.71

Project Number: 19115436 (1000)

Checked By: SEMP

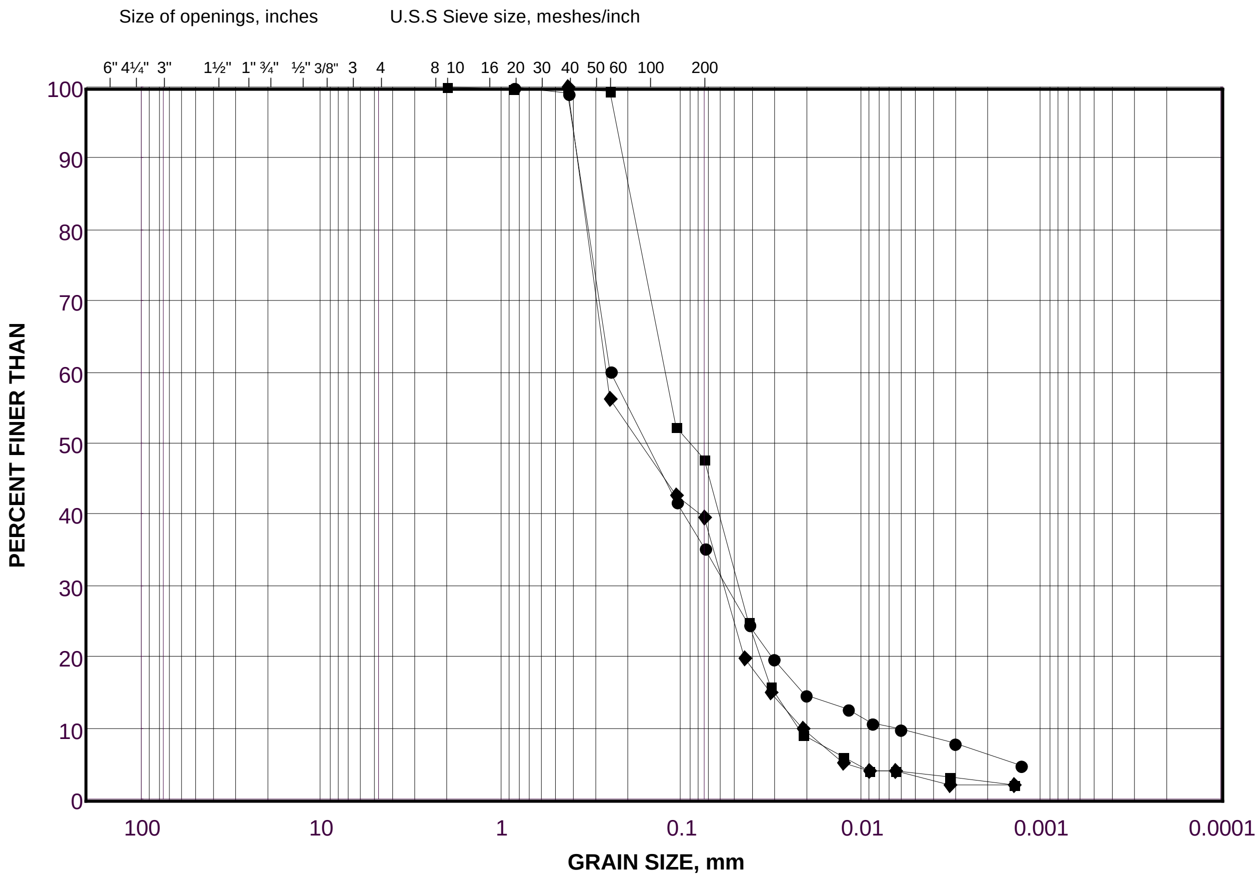
Golder Associates

Date: 22-Jun-19

GRAIN SIZE DISTRIBUTION

(SM) SILTY SAND

FIGURE 5



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
SIZE	GRAVEL SIZE		SAND SIZE			FINE GRAINED

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	MW 19-4	18	54.86 - 55.47
■	MW 19-3	4	4.57 - 5.03
◆	MW 19-3	6	9.14 - 9.75

Project Number: 19115436 (1000)

Checked By: SEMP

Golder Associates

Date: 22-Jun-19

APPENDIX A

Important Information and Limitations of This Report

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder cannot be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client can not rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Ground Water Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

GOLDER
MEMBER OF WSP

golder.com

APPENDIX B

Hydrogeological Investigation and Baseline Monitoring Report

GOLDER
MEMBER OF WSP

REPORT

Hydrogeological Assessment

14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario

Submitted to:

Mr. Chris Galway, Senior Land Manager, East Central Ontario
Lafarge Canada Inc.
6509 Airport Road
Mississauga, Ontario
L4V 1S7

Submitted by:

Golder Associates Ltd.
100 Scotia Court,
Whitby, Ontario, L1N 8Y6, Canada
+1 905 723 2727

19115436 (2000)

April 2022

Distribution List

1 copy (.pdf) - Lafarge Canada Inc.

1 copy (.pdf) - Golder Associates Ltd.

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 BACKGROUND

Golder Associates Ltd. ("Golder") is pleased to provide Lafarge Canada Inc. ("Lafarge") with our hydrogeological assessment completed for 37.49 hectares in the northeast corner of the property located at 14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario (the "Site"). The Site location is presented on Figure 1.

Golder understands that Lafarge intends to import fill to the northeast corner of the Lafarge Stouffville Pit (the "Site") to raise the grade to match the surrounding area. The Site was formerly used as an aggregate extraction operation and is. The proposed fill importation will restore the Site to its original grade. To complete the fill importation, Lafarge requires a site alteration permit from the Town of Whitchurch-Stouffville (the "Town"). The objective of the hydrogeological assessment is to satisfy the Town's requirements for the submission of a site alteration permit application and to ensure groundwater resources will be protected.

2.0 OBJECTIVE AND SCOPE OF WORK

The objective of the hydrogeological assessment was to assess the hydrogeological conditions and characterize the existing groundwater quality within the proposed Fill Area. It is understood that only the northeast corner of the Site will become the Fill Area.

Schedule A of the Town's By-law No. 2019-068-RE (the site alteration bylaw) specifies the installation of monitoring wells that are downgradient of the Site and located as close as possible to the established Site without interfering with fill operations, to a maximum of one half the distance between the edge of the Site boundary. In addition, a minimum of one monitoring well must be completed at the property line downgradient of the Site. Shallow groundwater flow is inferred to be southwest; accordingly, Golder installed two monitoring wells along the southwest portion of the Site, one well in the central portion, and one monitoring well at the northeast corner of the Site.

3.0 REVIEW OF PUBLISHED INFORMATION

3.1 Regional Geologic Setting

The surficial geology surrounding the Site mainly consists of silty to clayey silt glacial till (Halton Till) between three and 15 metres. Underlying the Halton Till is the Oak Ridges Moraine Aquifer Complex ("ORAC") which is a stratified granular deposit consisting predominantly of ice-contact stratified deposits of silty fine sands to coarse sand and gravel. In the vicinity of the Site the ORAC extends to depths between 20 and 65 metres below ground surface ("mbgs"). The ORAC is underlain by the Newmarket Till aquitard at an approximate elevation of 300 metres above sea level ("masl"). The Newmarket Till is underlain by the confined Thorncliffe Aquifer.

Bedrock in the vicinity of the Site consists of Upper Ordovician shale, limestone, dolostone and siltstone (Ontario Geological Survey, 1991, *Bedrock Geology of Ontario, Southern Sheet*; Ontario Geological Survey, Map 2544, Scale 1:1,000,000).

3.2 Water Well Records

Water well records were obtained from the Ontario Ministry of Environment, Conservation and Parks ("MECP"). A total of 31 water wells were reported within 500 metres ("m") of the Site at the locations shown on Figure 1 in Appendix A. Geologic cross sections obtained from the stratigraphy observed from select wells are presented in Figures 2 and 3 in Appendix A. Water well records 6923928, 6925548, 6925052, and YRK3582 are reported to be within the Site and water well records 7195578, 7237830, and 6914269 are reported to be within the Lafarge

Stouffville Pit south of the Site. A total of 24 water well records are within a 500 m radius of the Site and are outside the boundaries of the Lafarge property. In general, these wells were constructed between 1960 and 2015 and were listed with the following purposes:

- Ten wells identified as water supply with nine wells installed at elevations between 285.6 and 317.3 masl within the ORAC and one well installed at an elevation of 245.4 masl in the underlying confined Thorncliffe Aquifer;
- 13 wells identified as either test holes, observation wells, or monitoring wells; and,
- One well with no use recorded.

The reported soil conditions on the well records were variable but generally consistent with the soil encountered during drilling at the Site. Soil generally consisted of a layer or layers of clay to clayey sand fill (Halton Till) overlying sand and gravel deposits (ORAC). The water well records within 500 m of the Site are included in Appendix A.

3.3 Source Water Protection

Based on a review of the MECP Source Water Protection interactive map, the Site is not located within a wellhead protection area ("WHPA"); however, is located within a highly vulnerable aquifer and a significant groundwater recharge area.

4.0 SUBSURFACE INVESTIGATION

4.1 Borehole Advancement and Monitoring Well Installation

Initial borehole drilling and monitoring well installation was completed between May 1 and May 13, 2019. Each of the four boreholes were completed as monitoring wells at the northeast corner, southwest portion, and central portion of the Site (MW19-1, MW19-2, MW19-3, and MW19-4). Monitoring well locations are presented on Figure 2. Drilling was conducted by Landshark Drilling ("Landshark") under Golder's supervision using a B57 track mounted drill rig with 210 millimetre ("mm") outer diameter ("OD") hollow stem augers at MW19-1, MW19-2 and MW19-3 and using 140 mm OD casing and 127 mm tri-cone at MW19-4. Boreholes located within the former aggregate pit were advanced to depths ranging from 9.8 to 11.6 mbgs and the borehole advanced outside the extraction area was drilled to a depth of 57.9 mbgs.

During drilling, soil samples were obtained at regular depth intervals (i.e., 0.76 m between surface and 4.6 m and 1.5 m greater than 4.6 m) and were logged in the field noting subsurface conditions including soil type, colour and texture, moisture content and visual evidence of contamination (if any). Staining and/or odours were not observed in any of the soil samples obtained. Details of the conditions encountered in the boreholes are presented on the Record of Borehole sheets included in Appendix B.

4.2 Groundwater Monitoring and Sampling

Depth to groundwater was measured at the four monitoring wells on May 6 and May 13, 2019 using an electronic water level meter. Horizontal and vertical coordinates for monitoring wells MW19-1 to MW19-4 were collected by J.D. Barnes Limited, on May 27, 2019. Elevations were determined relative to a geodetic elevation.

Monitoring wells MW19-1 through MW19-4 were developed on May 14, 16, and 21, 2019. Development of MW19-1 was completed at four well volumes due to low yield and development of MW19-4 completed at approximately three well volumes due to low yield. Development of MW19-2 and MW19-3 was completed by purging ten well volumes of water or until the water quality parameters had stabilized. Well development was completed using dedicated Waterra® inertial samplers was used to develop, purge, and sample the groundwater contained within the wells. Field parameters (temperature, pH, and electrical conductivity) were measured throughout well development.

Monitoring wells MW19-1 through MW19-3 were sampled on May 21, 2019, following purging of the wells using the abovementioned Waterra® inertial samplers. Monitoring well MW19-4 was sampled directly using a bailer on May 24, 2019. Groundwater samples were collected into pre-cleaned laboratory-supplied sample containers. Groundwater samples were stored on ice in a cooler until delivered to the analytical laboratory, ALS Environmental ("ALS") of Waterloo for analysis. Groundwater samples were submitted for analysis of benzene, toluene, ethylbenzene and xylenes ("BTEX"), petroleum hydrocarbons ("PHCs"), volatile organic compounds ("VOCs"), metals, hydride-forming metals, and other regulated parameters.

4.3 Hydraulic Conductivity

Single-well response tests were carried out at monitoring wells MW19-1, MW19-2, and MW19-3 on May 24, 2019 to estimate the hydraulic conductivity of native soil at the well screens. A description of the test methods is provided in Appendix C.

5.0 SUBSURFACE CONDITIONS

5.1 Generalized Site Subsurface Conditions

Details of the conditions encountered in the boreholes are presented on the Borehole Logs included in Appendix B. It should be noted that subsurface conditions encountered are specific to the borehole locations and will vary between and beyond borehole and sampling locations.

The boreholes were advanced to depths ranging from 9.8 to 57.9 mbgs. In general, fill materials were encountered at MW19-1, MW19-3, and MW19-4 from depths ranging from ground surface, or below the topsoil fill at MW19-4, to 1.1 to 5.6 mbgs. Fill materials consisted of sand and gravel, sand, silty sand, or sandy clayey silt and contained trace organics and rootlets in some areas. Possible fill or disturbed material was encountered at ground surface at MW19-2 and below the fill materials at MW19-4. The layer of disturbed material extended to depths of 7.1 and 21.6 m; respectively. Underlying the fill and disturbed materials, the native subsurface soil conditions generally consist of non-cohesive sand, sand and gravel, and silty sand to silt. A deposit of cohesive sandy silt clay till was encountered below the disturbed material at borehole MW19-4 between 21.6 and 23.2 m. Groundwater was encountered in all boreholes during drilling. A representative geological cross section is presented in Figure 3.

5.2 Hydrogeology

Groundwater levels observed in the boreholes at the time of drilling and during subsequent monitoring events are provided on the Record of Borehole sheets in Appendix B. Water level data are presented in Table 1 and in Figure 2.

Water level elevations were generally consistent between the four monitoring events. The highest elevation was reported at MW19-4 with an elevation of 321.52 meters above sea level ("masl") (40.01 mbgs). The lowest elevations were reported at MW19-1 which ranged between 320.44 and 320.76 masl (6.64 to 6.32 mbgs). Based on the observed groundwater elevation data, the inferred direction of shallow groundwater flow is southwesterly.

Over the monitoring period, groundwater elevations have remained relatively consistent indicating that water levels appear to represent static conditions with the exception of MW19-4 where a significantly higher water level was observed following installation due using mud rotary drilling techniques and should be interpreted as an anomalous reading. The groundwater elevations represent the conditions on the dates they were measured, and seasonal and annual fluctuations should be anticipated.

Table 1: Water Level Measurements

Well ID	Ground Surface (masl)	Top of Pipe (masl)	Top of Screen (masl)	Groundwater Levels (2019)					
				May 6	May 13	May 14	May 16	May 21	May 24
MW19-1	327.09	328.13	320.55	7.68 mbtop (320.45 masl)	-	7.36 mbtop (320.77 masl)	-	7.67 mbtop (320.46 masl)	7.61 mbtop (320.52 masl)
MW19-2	328.218	329.30	320.66	8.77 mbtop (320.53 masl)	-	8.75 mbtop (320.55 masl)	-	8.73 mbtop (320.57 masl)	8.72 mbtop (320.58 masl)
MW19-3	329.40	330.46	321.05	9.85 mbtop (320.61 masl)	9.83 mbtop (320.63 masl)	-	-	9.81 mbtop (320.65 masl)	9.80 mbtop (320.66 masl)
MW19-4	375.47	376.28	320.79	-	-	40.82 mbtop (335.46 masl)	50.08 mbtop (326.20 masl)	54.76 mbtop (321.52 masl)	-

Notes
Elevations were surveyed by J.D. Barnes Limited, Ontario Land Surveyors on May 27, 2019
Depth to water determined relative to top of well pipe
mbtop metres below top of pipe
masl metres above sea level

It is noted that the water table elevations at MW19-1, MW19-2, and MW19-3 were below the top of the well screen. Monitoring well MW19-4 was up to 0.73 metres above the well screen as measured on May 21, 2019.

The analysis of the data collected during single-well hydraulic testing is presented in Appendix C. The reported hydraulic conductivity at each monitoring well is presented in Table 2.

Table 2: Hydraulic Conductivity

Well ID	Soil Description	Hydraulic Conductivity (m/s)
MW19-1	SILT to sandy SILT, trace gravel	4×10^{-6}
MW19-2	SAND, trace to some gravel, some fines and SILTY SAND, trace to some gravel	5×10^{-6}
MW19-3	SILTY SAND	6×10^{-6}

The reported hydraulic conductivity results are within the reported range of hydraulic conductivity for silty sands and fine sands (HydroSOLVE Inc., 2016), which is consistent with the soil types at each monitoring well screen that were observed during borehole advancement. Using the calculated horizontal gradient of 0.002 m/m and the geometric mean hydraulic conductivity of 4.9×10^{-6} m/s, the groundwater velocity is 1.0 metres per year.

Accordingly, the existing groundwater monitoring network is suitable for detecting potential groundwater impacts within several years of their occurrence.

Surface water infiltration rates within the Site will depend upon the nature of fill materials imported and the method(s) by which they are placed. It is noted that any approved soils require detailed testing to ensure the imported material meets required standards to protect groundwater resources; however, should contaminants be introduced by fill importation (should such an event occur) the time required for any contaminants to reach the water table and impact groundwater quality will vary depending upon the nature of the contaminants, degree of impact, permeability of the surrounding fill materials and the location of placement relative to the groundwater table.

The rate of migration of a given contaminant in the subsurface depend, advection, dispersion, adsorption, and other natural attenuation processes. Some constituents may migrate at a similar rate to the average linear groundwater velocity, while others will tend to migrate at lower rates. A groundwater management plan ("GMP") has been developed, as a separate report, that recommends the Site includes continued monitoring of groundwater to confirm that groundwater is not being adversely impacted as a result of soil importation.

6.0 CHEMICAL ANALYSIS

6.1 Site Condition Standards

The analytical results for the groundwater samples analysed for this baseline groundwater monitoring and sampling program were compared to the Table 2 site condition standards ("SCS") presented in the MECP document "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*", dated April 15, 2011. Based on observed soil conditions at the Site and as a conservative approach, the standards for coarse textured soils were selected.

6.2 Groundwater Analysis

Summaries of the sample analytical results and their respective Table 2 SCS are provided on the Certificates of Analysis in Appendix D. The reported concentrations in groundwater for all parameters were below their respective Table 2 criteria.

6.3 Observations during Sampling and Comparison to Non-Numerical Site Condition Standards

In addition to numerical standards, the MECP sets out aesthetic standards relating to the presence of free phase product and hydrocarbon sheen. Specifically, a property does not meet the site condition standards if there is evidence of free product, including but not limited to visible petroleum hydrocarbon film or sheen present on groundwater, surface water or in any groundwater or surface water samples.

No evidence of free product was encountered during purging and sampling of the monitoring wells.

7.0 SUMMARY OF FINDINGS

The following provides a summary of the key findings of this report:

- There are 24 potential wells records located within 500 m of the Site. Seven records apply to water well records located within the larger Lafarge lands including the Site. Ten records represent water supply wells in the surrounding area. The remaining records represent test holes, observation wells, monitoring wells and wells with no specified use;

- The Site is not located within a wellhead protection area but is located within a vulnerable aquifer and significant recharge area;
- The inferred direction of groundwater flow is southwesterly;
- The calculated groundwater velocity is 1.0 metres per year based on a horizontal gradient of 0.002 m/m and geometric mean hydraulic conductivity of 4.9×10^{-6} m/s; and,
- The reported concentrations of BTEX, PHC, VOC, metals, hydride-forming metals, and other regulated parameters in all groundwater samples collected as part of the baseline monitoring program were below the Table 2 SCS (agricultural use, coarse soil texture).

This report was prepared for the exclusion use of Lafarge and based on data and information collected during the baseline groundwater monitoring and sampling program carried out between May 1 and May 27, 2019. This report should be read in conjunction with the attached Limitations included as Appendix A.

8.0 CLOSURE

We trust this is satisfactory for your current requirements. Should you have any questions or require any additional information, please feel free to contact us.

Signature Page

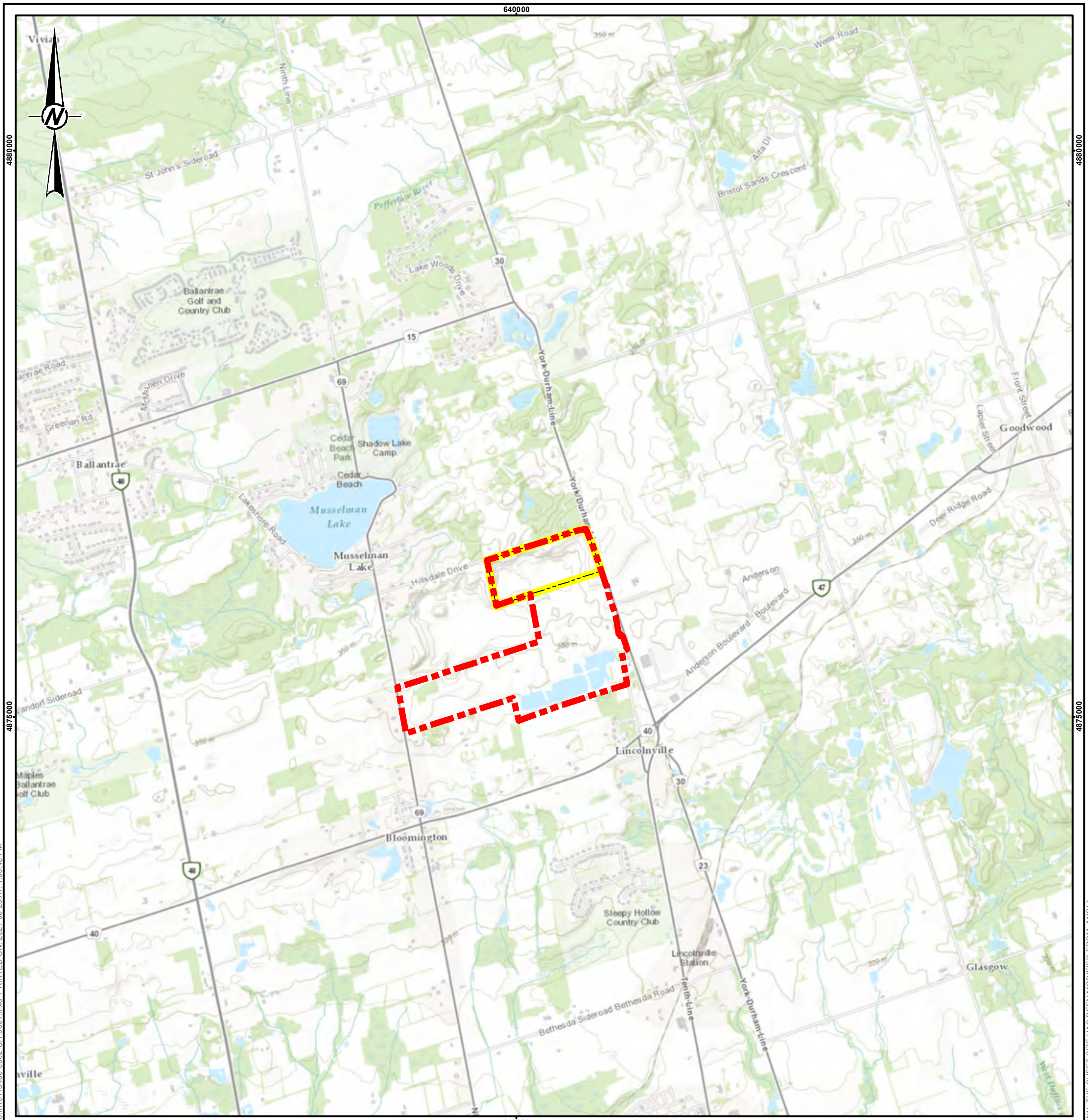
Golder Associates Ltd.

Chris Pons, BSc	Eric Hood, PhD, PEng
Environmental Scientist	*Associate, Senior Engineer*

GL/CP/EH/lb

https://golderassociates.sharepoint.com/sites/102618/deliverables/fill management plan/2. revision 1 - april 2022/app b - hydrog/19115436-r-rev1-hydrog assessment-april 11, 2022.docx

Figures



LEGEND

LAFARGE PROPERTY BOUNDARY

PROPOSED SITE AREA

0 1,000 2,000

1:50,000 METRES

REFERENCE(S)

BASE MAP SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

LAFARGE CANADA INC.

PROJECT

HYDROGEOLOGICAL ASSESSMENT

14204 DURHAM REGIONAL ROAD 30, WHITCHURCH-STOUFFVILLE, ONTARIO

CONSULTANT

GOLDER

MEMBER OF WSP

YYYY-MM-DD	2019-07-24
DESIGNED	JT
PREPARED	JT
REVIEWED	GL
APPROVED	

TITLE

KEY PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
19115436 (2000)	0002	A	1

LEGEND

- MONITORING WELL LOCATION
- CROSS SECTION LINE
- INFERRED GROUNDWATER FLOW DIRECTION
- LAFARGE PROPERTY BOUNDARY
- PROPOSED SITE AREA
- WATERBODY
- WETLAND
- GROUNDWATER CONTOUR (M)
- (320.51) GROUNDWATER ELEVATION, (MASL), MEASURED MAY 21, 2019

0 200 400
1:5,000 METRES

NOTE(S)
1. MASL = METRES ABOVE SEA LEVEL

REFERENCE(S)
BASE DATA - MNR LIO, OBTAINED 2019. MECP OBTAINED 2017.
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2019
BASE IMAGERY SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
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PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
LAFARGE CANADA INC.

PROJECT
HYDROGEOLOGICAL ASSESSMENT
14204 DURHAM REGIONAL ROAD 30, WHITCHURCH-STOUFFVILLE, ONTARIO

TITLE
GROUNDWATER ELEVATIONS AND FLOW DIRECTION

CONSULTANT
GOLDER MEMBER OF WSP

YYYY-MM-DD	2019-12-03
DESIGNED	GL
PREPARED	JT
REVIEWED	CP
APPROVED	EH

PROJECT NO.	CONTROL	REV.	FIGURE
19115436	(2000) 0002	---	2

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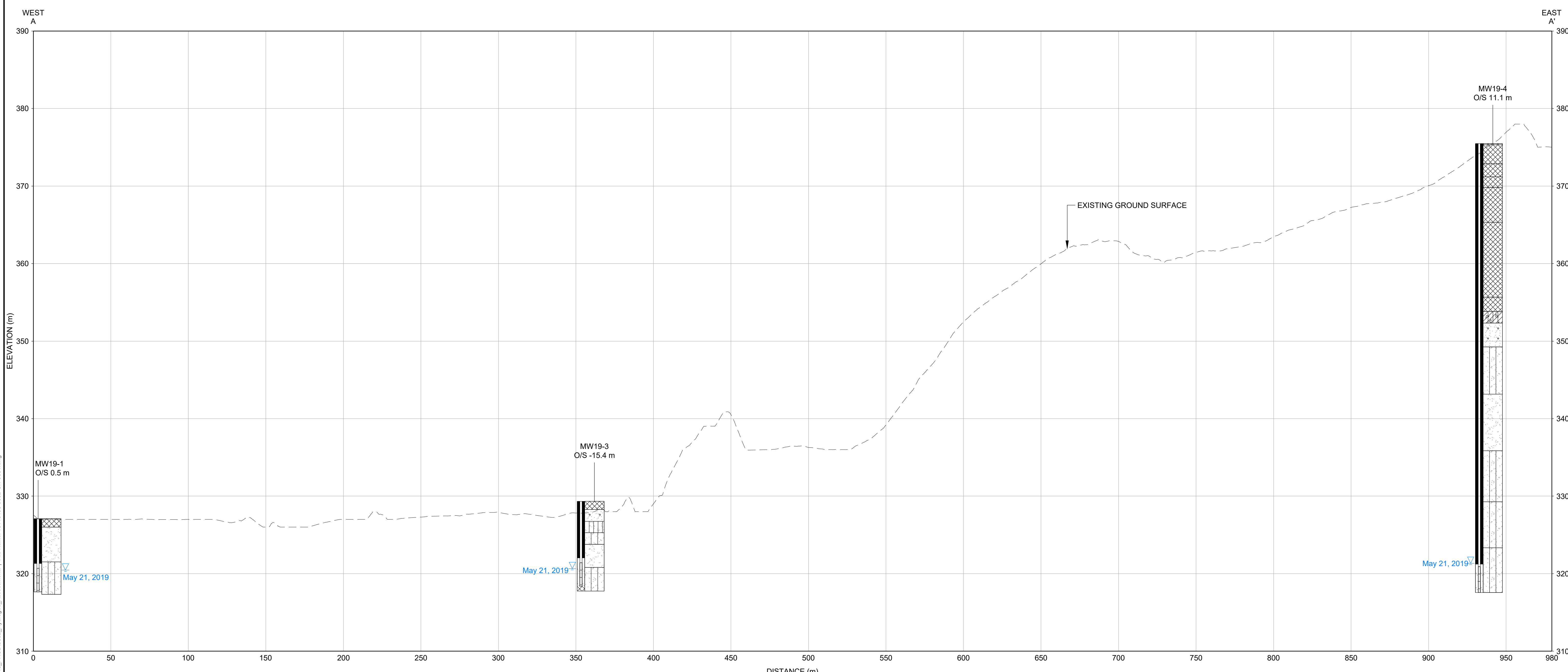
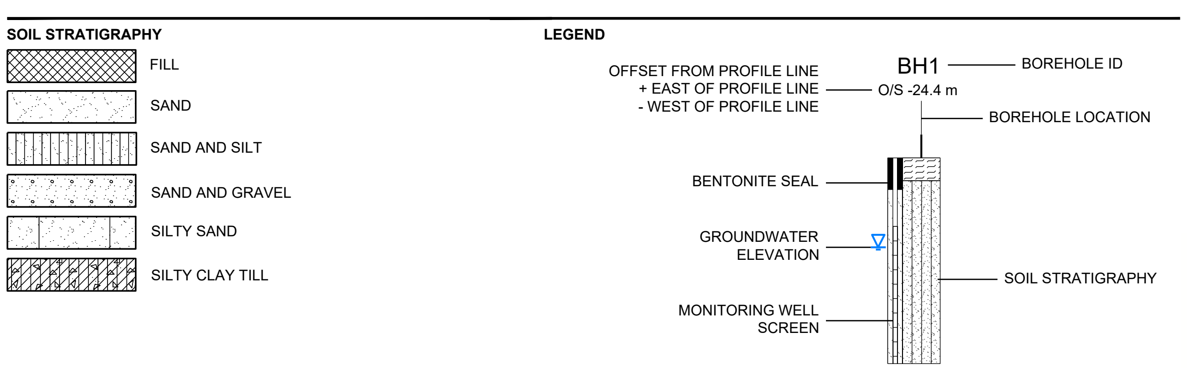




0	10	20
1:500 VERTICAL SCALE		METRES

0	50	100
1:2,500 HORIZONTAL SCALE		METRES

CLIENT
LAFARGE CANADA INC.

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-03-14
DESIGNED	
PREPARED	MK
REVIEWED	CP
APPROVED	EH

PROJECT
HYDROGEOLOGICAL ASSESSMENT
14204 DURHAM REGIONAL ROAD 30
WHITCHURCH-STOUFFVILLE, ONTARIO

TITLE
CROSS SECTION A-A'

PROJECT NO.	CONTROL	REV.	FIGURE
19115436		----	3

APPENDIX A

Limitations

LIMITATIONS

This report was prepared for the exclusive use of Lafarge. The report is based on data and information collected during the baseline groundwater monitoring and sampling program conducted by Golder Associates Ltd. personnel and is based solely on the Site conditions encountered at the time of the fieldwork carried out between May 1 and May 27, 2019.

In preparing this Site assessment, Golder evaluated only conditions at a limited number of test locations. Only limited chemical analyses of groundwater samples were carried out. It should be noted that the results of an investigation of this nature should, in no way, be construed as a warranty that the Site is free from any and all contamination from past or current practices.

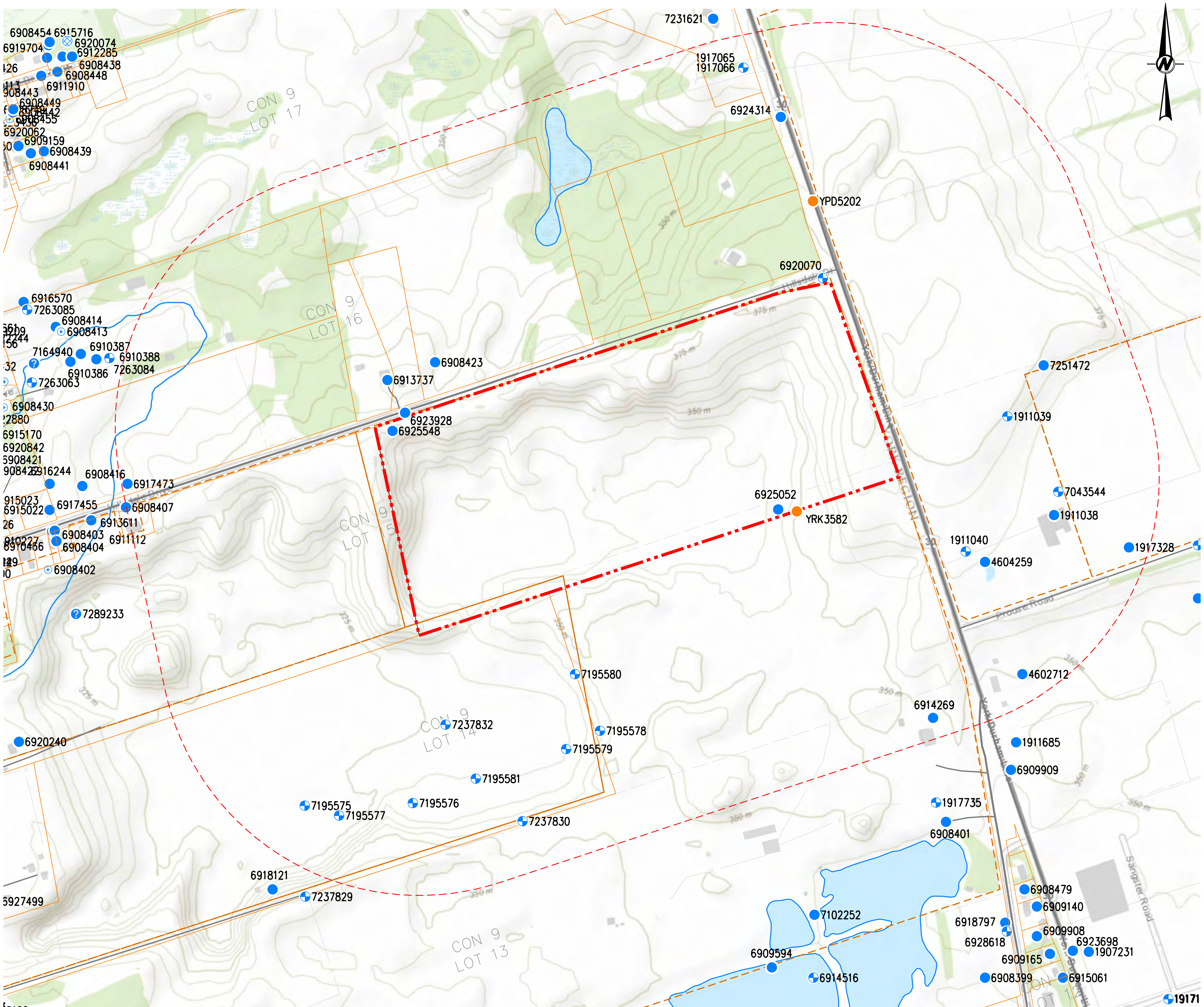
If additional information is obtained during future work at the Site, including excavations, borings, or other studies, and/or if conditions exposed during construction are different from those encountered in this assessment, Golder Associates should be requested to re-evaluate the conclusions presented in this report and provide amendments as required.

This document provides a professional opinion and, therefore, no warranty is either expressed, implied, or made as to the conclusions, advice and recommendations offered in this document. This document does not provide a legal opinion regarding compliance with applicable laws. With respect to regulatory compliance issues, it should be noted that regulatory statutes and the interpretation of regulatory statutes are subject to change.

Further, this report has investigated the current environmental quality of groundwater at the Site only, as per specific parameters set out by the Client. Golder's professional services for this assignment addressed only the geo-environmental (chemical) aspects of the subsurface conditions at a limited number of locations. The potential environmental impact of Site development or local biological, hydrological, and hydrogeological functions and the like is not addressed herein. The geotechnical (physical) aspects, including engineering recommendations for the design and construction of building foundations, pavements, underground servicing, and the like are outside the terms of reference for this letter report and are addressed under separate cover.

APPENDIX B

MECP Water Well Records



PLAN LEGEND

- Site Boundary with 500 m Offset
- Shallow Dug or Bored <10 m
- Sandpoint
- Deep Bored Well >10 m
- Drilled Overburden Well
- Test or Observation Well
- Drilled Bedrock Well
- Record of Abandonment
- Information Unrecorded

REFERENCES & DISCLAIMERS

Ministry of Environment Water Well Information System, Queen's Printer.
Location and elevations of mapped wells are subject to revision based on drill record or field verification.

Boundaries between soil strata have been determined only at well and test well locations. Between the wells and test wells, boundaries are not proven but are assumed from geological evidence.

Alignment of orthographic imagery is approximated to select features on Datum. Away from points of alignment the orthographic image may be dimensionally skewed or projected off the map Datum plane.

0 150 300 450 m

1:7500

Plotted 11x17" Tabloid

Projection is UTM NAD 83 Zone 17

CLIENT
LAFARGE CANADA INC.

PROJECT
HYDROGEOLOGICAL ASSESSMENT
14204 DURHAM REGIONAL ROAD 30, WHITCHURCH

TITLE
RECORDED WELLS

CONSULTANT

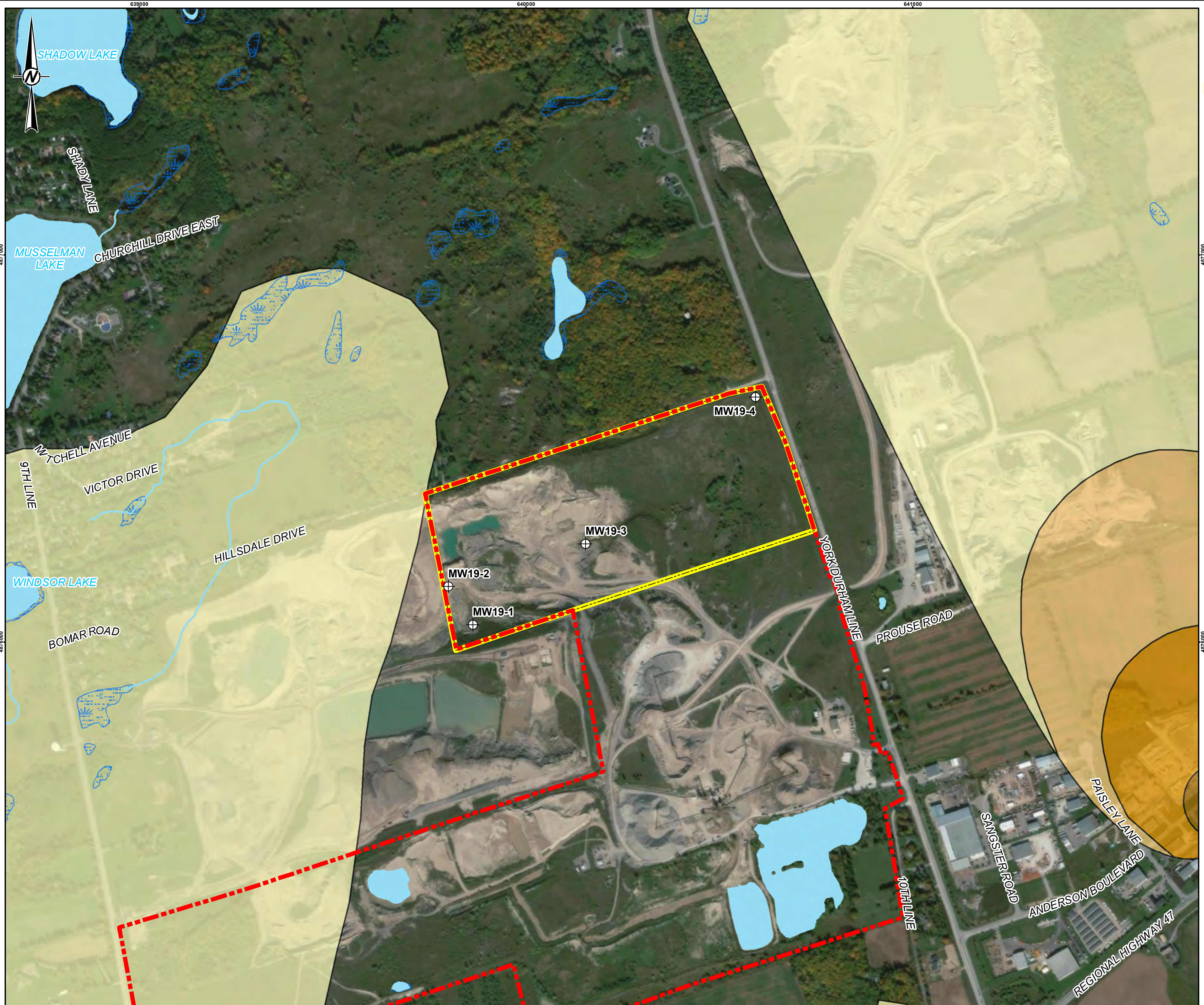
GOLDER

YYYY-MM-DD	2019-08-21
DESIGNED	----
PREPARED	JPR
REVIEWED	GL
APPROVED	CP

PROJECT NO.	CONTROL	REV.	FIGURE
19115436	0002	----	1

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

25 mm



LEGEND

- MONITORING WELL LOCATION
- WATERCOURSE
- LAFARGE PROPERTY BOUNDARY
- PROPOSED SITE AREA
- WATERBODY
- WETLAND

WELLHEAD PROTECTION AREAS

- A
- B
- C
- C1
- D

0 200 400
1:10,000 METRES

REFERENCE(S)
BASE DATA - MNR LIO, OBTAINED 2019. MECP OBTAINED 2017.
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2019
BASE IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
LAFARGE CANADA INC.

PROJECT
HYDROGEOLOGICAL ASSESSMENT
14204 DURHAM REGIONAL ROAD 30, WHITCHURCH-STOUFFVILLE, ONTARIO

TITLE
MONITORING WELL LOCATION PLAN

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2019-07-24
DESIGNED	JT
PREPARED	JT
REVIEWED	GL
APPROVED	CP

PROJECT NO.	CONTROL	REV.	FIGURE
19115436 (2000)	0002	A	2

PATH: S:\Clients\LafargeHolcim\ON_Stouffville\99_PROJ\19115436-0002-CH-0002.mxd PRINTED ON: 2021-06-25 AT: 1:08:23 PM

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR FND mbgl Qu	SCR TOP LEN mbgl m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
1911038	1	Mar-91	641045	361.8	39.6 Fr	60.0 -2.4	39.6	273	240	62.5	3108	WS	**MOE# 1911038**
	16		4876212								RC	CO	0.0 BRWN SAND STNS GRVL 1.2 BRWN SAND GRVL 10.4 BRWN SAND MSND 13.7 BRWN CLAY SAND GRVL 25.3 BRWN SAND MSND 39.6 GREY SAND DKCL MSND 63.1 BLUE CLAY GRVL 67.1
1911039	1	Mar-91	640955	367.6		33.2 -3.0	NR				3108	OW	**MOE# 1911039**
	16		4876402								RC	NU	0.0 BRWN CLAY 0.6 BRWN CLAY SAND GRVL 2.1 GRVL 3.7 BRWN CLAY SAND 19.2 BRWN SAND 36.3
1911040	1	Nov-11	640875	364.5		32.9 -3.0	NR				3108	OW	**MOE# 1911040**
	16		4876142								RC	NU	0.0 GRVL STNS 1.8 SAND GRVL 10.4 BRWN SAND 26.2 BRWN CLAY 31.4 BRWN SAND 36.0
1911685	1	Feb-93	640972	347.2	26.8 Fr	35.1 -0.9	27.4	91	75	27.4	4738	WS	**MOE# 1911685**
	15		4875775								RC	DO	0.0 BRWN CLAY SAND SOFT 7.0 BRWN SAND LOOS 8.5 BRWN SAND CLAY PCKD 16.8 BRWN SAND LOOS FSND 26.8 BRWN GRVL LOOS 29.6 BRWN SAND CLAY 33.5 BRWN SAND MSND LOOS 36.0
1917065		Mar-04	640447	359.7		62.5 -1.5	NR				1508	OW	**MOE# 1917065 TAG#A000387**
	20		4877073								OTH	NU	0.0 BRWN TPSL SAND GRVL 0.9 GREY SAND LOOS PORS 65.5
1917066	1	Mar-04	640447	359.7		43.6 -1.5	NR				1508	OW	**MOE# 1917066 TAG#A000387**
	20		4877073								OTH	NU	0.0 BRWN TPSL SAND GRVL 0.9 GREY SAND GRVL LOOS 46.6
1917328	1	Oct-04	641189	362.4	57.0 Fr	58.5 -1.5	40.5	82	60	43.3	1663	WS	**MOE# 1917328 TAG#A013015**
	16		4876150								RC	IN	0.0 BRWN SAND GRVL 10.4 BRWN CLAY 11.6 BRWN SAND CLAY LYRD 16.2 BRWN MSND FSND 41.5 BRWN CSND 48.2 BRWN MSND GRVL 57.6 BRWN MSND 60.4 BRWN FSND SILT CLAY 61.9
4602712	1	Mar-63	640984	349.9	39.6 Fr	38.4 -1.2	29.9	45	240	36.6	3414	WS	**MOE# 4602712**
	15		4875906								CT	ST	0.0 MSND GRVL 29.9 CSND GRVL 39.6
4604259	1	Sep-68	640912	363.9	57.0 Fr	57.0 -4.9	34.1	950	2880	36.0	2104	WS	**MOE# 4604259**
	16		4876122								CT	IN	0.0 TPSL 0.3 FSND 51.8 CSND 61.9
6908407	9	Sep-67	639259	340.8	36.6 Fr	36.6 -1.2	25.9	27	360	35.1	4508	WS	**MOE# 6908407**
	15		4876227								CT	DO	0.0 CLAY MSND TPSL 3.7 BRWN MSND 10.7 GRVL 15.8 BRWN MSND 33.5 BRWN FSND 37.8
6908423	9	Dec-60	639854	348.4	42.7 Fr		35.7	45	180	38.1	1413	WS	**MOE# 6908423**
	16		4876506								CT	ST	0.0 BRWN CLAY STNS 5.5 CLAY GRVL 9.1 GRVL 42.7
6913737	9	Aug-76	639762	352.7	67.7 Fr	66.4 -2.1	53.9	23	120	61.0	2214	WS	**MOE# 6913737**
	16		4876472								CT	DO	0.0 TPSL 0.3 BRWN CLAY GRVL LYRD 41.5 BRWN SAND 53.6 BRWN SAND CLAY 67.7 BRWN SAND 68.6
6914269	9	Oct-77	640812	349.9	30.5 Fr	41.1 -0.9	30.5	91	60	31.1	4743	WS	**MOE# 6914269**
	14		4875822								CT	DO	0.0 BRWN SAND 12.2 BRWN CLAY SNDY 15.2 BRWN CLAY GRVL SAND 22.9 BRWN SAND 26.5 GREY GRVL DRY 29.0 BRWN SAND 30.5 BRWN FSND 39.9 BRWN CSND 42.1

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR FND mbgl	Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
6917473	9 15	Jan-84	639262 4876272	339.9	27.4	Fr	33.2	-0.9	16.5	45		32.0	5459 CT	WS DO	**MOE# 6917473** 0.0 PRDG 2.4 BRWN SAND CLAY 5.8 BRWN SAND 12.2 BRWN GRVL 14.6 BRWN SAND CLAY SOFT 17.4 BRWN SAND 25.6 BRWN CLAY SOFT 26.5 BRWN FSND 34.1
6918121	9 14	May-86	639541 4875492	361.8	50.3	Fr	51.8	-2.7	42.1	45	120	43.0	3108 RC	WS IN	**MOE# 6918121** 0.0 BRWN SAND 47.2 BRWN CLAY SAND 50.3 BRWN SAND 55.2
6920070	9 15	Oct-87	640600 4876668	375.8					NR				2801 RC	OW NU	**MOE# 6920070** 0.0 CLAY GRVL 7.0 GRVL 11.6 BLDR 12.5 SAND GRVL PCKD 34.1 CLAY GRVL 36.0 SAND GRVL 45.1 SAND 64.6 SAND GRVL CLAY 73.2 SAND PCKD 75.3 GRVL SAND PCKD 84.7 CLAY GRVL 114.6 GRVL CLAY 122.8
6923928	9 26	Jun-97	639796 4876409	354.8	109.4	Fr	109.4	-1.8	56.7	295	120	111.3	5459 RC	WS DO	**MOE# 6923928** 0.0 BRWN CLAY SAND STNS 6.7 GREY CLAY 7.9 BRWN CLAY SAND 15.8 BRWN SAND STNS 41.5 BRWN CLAY SAND 57.3 GREY CLAY STNS 73.2 WHTE CLAY SAND STNS 74.7 GREY CLAY STNS 87.8 WHTE CLAY SAND STNS 88.4 GREY CLAY STNS SAND 109.4 WHTE CLAY SAND STNS 111.6
6924314	9 17	Feb-98	640519 4876978	358.4	72.8	Fr	72.8	-1.8	40.2				5459 RC	WS DO	**MOE# 6924314** 0.0 BRWN CLAY SNDY 4.9 BRWN CLAY SLTY 17.1 BRWN SAND STNY 49.7 BRWN CLAY SNDY STNS 66.1 BRWN SILT SAND 67.4 GREY CLAY SAND STNS 72.5 GREY SAND CLN 74.7
6925052	10 166	Apr-99	640514 4876223	367.0					NR				1663 OTH	AB NU	**MOE# 6925052** 0.0 BRWN CLAY SAND FILL 1.8 YLLW UNKN 6.1 BRWN CLAY SNDY 19.8 YLLW UNKN 24.4
6925548	9 16	Sep-00	639772 4876374	359.7	43.3	Fr	42.4	-0.9	37.2	68	80	39.6	1350 CT	WS DO	**MOE# 6925548** 0.0 YLLW CLAY GRVL BLDR 4.9 YLLW GRVL CLAY 10.1 BRWN GRVL SAND 42.4 BRWN GRVL 43.3
7043544		Apr-07	641053 4876257	363.3			5.5	-3.0	NR				7215 OTH	OW -	**MOE# 7043544 TAG#A055277** 0.0
7195575		Jul-12	639603 4875653	363.3			3.7	-0.9	NR				7472 BR	OW MO	**MOE# 7195575 TAG#A143332** 0.0 SAND GRVL 4.6
7195576		Jul-12	639811 4875658	365.2			12.5	-0.9	NR				7472 BR	OW MO	**MOE# 7195576 TAG#A143331** 0.0 SAND GRVL 4.6 SAND 9.1 SAND SILT 13.4
7195577		Jul-12	639669 4875634	363.0			10.7	-0.9	NR				7472 BR	OW MO	**MOE# 7195577 TAG#A143330** 0.0 SAND GRVL 4.6 SAND 9.1 SAND SILT 11.6
7195578		Jul-12	640171 4875797	372.5			11.0	-0.9	NR				7472 BR	OW MO	**MOE# 7195578 TAG#A143329** 0.0 SAND GRVL 4.6 SAND 9.1 SAND SILT 11.9
7195579		Jul-12	640106 4875762	371.6			10.1	-0.9	NR				7472 BR	OW MO	**MOE# 7195579 TAG#A143328** 0.0 SAND GRVL 4.6 SAND 9.1 SAND SILT 11.0
7195580		Jul-12	640123 4875906	371.6			12.8	-0.9	NR				7472 BR	OW MO	**MOE# 7195580 TAG#A143327** 0.0 SAND GRVL 4.6 SAND 9.1 SAND SILT 13.7
7195581		Jul-12	639932 4875705	368.2			12.5	-0.9	NR				7472 BR	OW MO	**MOE# 7195581 TAG#A143326** 0.0 SAND GRVL 4.6 SAND 9.1 SAND SILT 13.4

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR FND mbgl Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
7237829	9 13	Dec-14	639604 4875478	365.2		36.6	-3.0	NR				7472 RC	OW MO	**MOE# 7237829 TAG#A172565** 0.0 BRWN FILL FSND LOOS 4.6 BRWN MSND GRVL PCKD 35.1 BRWN CSND GRVL PCKD 39.6
7237830		Dec-14	640022 4875623	370.6		36.6	-3.0	NR				7472 RC	OW MO	**MOE# 7237830 TAG#A172564** 0.0 BRWN FILL FSND LOOS 4.6 BRWN MSND GRVL PCKD 35.1 BRWN CSND GRVL PCKD 39.6
7237832		Dec-14	639874 4875809	367.6		12.2	-3.0	NR				7472 RC	OW MO	**MOE# 7237832 TAG#A172563** 0.0 BRWN FILL SHLE LOOS 3.0 BRWN MSND LOOS 7.6 BRWN CSND PCKD 15.2
7251472		Oct-15	641025 4876500	373.1	63.1 Un	56.4 53.6	-2.1 -2.7	37.2	1182	60	41.8	5459 RA	WS IN	**MOE# 7251472 TAG#A063104** 0.0 BRWN FSND SILT STNS 25.0 GREY FSND SILT PCKD 29.9 BRWN FSND SILT PCKD 36.6 BRWN MSND LOOS 48.8 BRWN CSND GRVL MSND 65.5 GREY FSND MSND LOOS 69.5 GREY CLAY STNS SILT 69.8
7263084		Feb-16	639227 4876514	337.4		4.6	-3.0	NR				7383 BR	- TH	**MOE# 7263084 TAG#A206403** 0.0
YPD5202		Jan-01	640581 4876816	374.9				NR				 -	- -	**MOE# YPD5202** 0.0 TILL CLAY SILT 6.7 GRVL SAND 12.5 GRVL SAND 34.1 TILL CLAY SILT 36.6 GRVL SAND 42.7 SAND SILT 67.1 GRVL SAND 78.9 GRVL SAND 85.0 TILL SILT SAND 91.4 TILL SILT SAND 114.6 TILL CLAY SILT 122.8
YRK3582		Jan-01	640550 4876219	367.6				NR				 -	- -	**MOE# YRK3582** 0.0 GRVL 1.5 SAND 7.6 SAND 14.9 SILT 15.2 SAND 25.0 SAND 35.1 SAND 39.6 SAND 49.4 TILL SNDY SLTY 63.1 TILL CLAY LYRD 68.0 TILL SNDY SLTY 80.8 SAND TILL GRVL 84.1 TILL SLTY CLYY 89.9 SAND SILT 90.5

QUALITY:		TYPE:		USE:				METHOD :	
Fr	Fresh	WS	Water Supply	CO	Comercial	NU	Not Used	CT	Cable Tool
Mn	Mineral	AQ	Abandoned Quality	DO	Domestic	IR	Irrigation	JT	Jetting
Sa	Salty	AS	Abandoned Supply	MU	Municipal	AL	Alteration	RC	Rotary Conventional
Su	Sulphur	AB	Abandonment Record	PU	Public	MO	Monitoring	RA	Rotary Air
--	Unrecorded	TH	Test Hole or Observation	ST	Stock	-	Not Recorded	BR	Boring

Easting and Northings UTM NAD 83 Zone 17, Translated from Recorded UTM NAD, subject to Field Verified Location or Improved Location Accuracy.

APPENDIX C

Record of Borehole Logs

RECORD OF BOREHOLE: MW19-1

PROJECT: 19115436
LOCATION: N 4876044.20; E 639862.67
BORING DATE: May 1, 2019
SHEET 1 OF 2
DATUM: Geodetic

BORING METHOD: B57 Track Mount Drill Rig; 210 mm O.D. Hollow Stem Augers

DEPTH SCALE METRES	SOIL PROFILE DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	WATER CONTENT PERCENT (W)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	GROUND SURFACE	327.09						
0	FILL - SAND, some fines; brown; non-cohesive, moist, very loose	0.00	1	SS	3	~10		50 mm Diameter PVC Monitoring Well (Stickup)
1	(SW) SAND, some gravel to gravelly, trace to some fines; brown; non-cohesive, moist, very dense to dense	326.02 / 1.07	2	SS	50/0.08	~5		
3			3	SS	85/0.23	~3	M	Bentonite
5			4	SS	49	~3		
5.57	(ML) SILT to sandy SILT, trace gravel; brown; non-cohesive, wet, very dense to dense	321.52 / 5.57	5	SS	78	~20	MH	Silica Sand; water level May 14, 2019
8								Screen
9.5			6	SS	46	~23		
	END OF BOREHOLE	317.34 / 9.75						

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 50
GOLDER
LOGGED: AS
CHECKED: AM

PROJECT: 19115436

LOCATION: N 4876044.20; E 639862.67

RECORD OF BOREHOLE: MW19-1

BORING DATE: May 1, 2019

DATUM: Geodetic

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. + 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 (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10		NOTE:									

1. Water level measured in monitoring well as follows:

DATE	Depth (m)	Elev. (m)
06-May-19	6.8	320.3
14-May-19	6.5	320.6
21-May-19	6.8	320.3
24-May-19	6.7	320.4

11

12

13

14

15

16

17

18

19

20

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AS

CHECKED: AM

PROJECT: 19115436

LOCATION: N 4876143.35; E 639799.33

RECORD OF BOREHOLE: MW19-2

BORING DATE: May 1 & 2, 2019

DATUM: Geodetic

BORING METHOD: B57 Track Mount Drill Rig; 210 mm O.D. Hollow Stem Augers

SOIL PROFILE – DESCRIPTION	ELEV. / DEPTH (m)
GROUND SURFACE	328.21
PROBABLE FILL or DISTURBED /REWORKED NATIVE - (SM) SILTY SAND, some gravel to gravelly; brown; non-cohesive, moist to wet below 3.0 m depth, loose to very loose	0.00
(SW) SAND, trace to some gravel, some fines; brown; non-cohesive, wet, very dense	321.13 / 7.08
(SM) SILTY SAND, trace to some gravel; brown; non-cohesive, moist to wet, compact	319.61 / 8.60

SAMPLE NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING
1	SS	4	
2	SS	7	
3	SS	0	
4	SS	2	
5	SS	9	
6	SS	75	M
7	SS	29	

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 ; 10 20 30 40

PIEZOMETER OR STANDPIPE INSTALLATION:

- 50 mm Diameter PVC Monitoring Well (Stickup)
- Bentonite
- Silica Sand
- Screen
- May 24, 2019
- Blowback

DEPTH SCALE METRES: 0 1 2 3 4 5 6 7 8 9 10

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 50

GOLDER

LOGGED: AS

CHECKED: AM

RECORD OF BOREHOLE: MW19-2

PROJECT: 19115436

LOCATION: N 4876143.35; E 639799.33

BORING DATE: May 1 & 2, 2019

SHEET 2 OF 2

DATUM: Geodetic

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. + 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 (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10		(SM) SILTY SAND, trace to some gravel; brown; non-cohesive, moist to wet, compact		317.54							Blowback
		END OF BOREHOLE		10.67							
11		NOTE:									
		1. Water level measured in monitoring well as follows:									
12											
13											
14											
15											
16											
17											
18											
19											
20											

DATE	Depth (m)	Elev. (m)
06-May-19	7.8	320.5
14-May-19	7.7	320.5
21-May-19	7.7	320.5
24-May19	7.7	320.5

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AS

CHECKED: AM

RECORD OF BOREHOLE: MW19-3

PROJECT: 19115436
LOCATION: N 4876253.64; E 640154.47
BORING DATE: May 2, 2019
SHEET 1 OF 2
DATUM: Geodetic

BORING METHOD: B57 Track Mount Drill Rig; 210 mm O.D. Hollow Stem Augers

DEPTH SCALE METRES	DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	GROUND SURFACE	329.34					
0	FILL - (ML) sandy CLAYEY SILT, some gravel; trace rootlets, dark brown; cohesive, w~PL, very soft	0.00	1	SS	1		50 mm Diameter PVC Monitoring Well (Stickup)
1	(SW) gravelly SAND, some fines; brown; non-cohesive; moist, dense	328.27 / 1.07	2	SS	45		
2.59	(ML) SILT and SAND, trace to some gravel; brown; non-cohesive, moist, very dense	326.75 / 2.59	3	SS	77/0.28		Bentonite
4	(SM) SILTY SAND, brown; non-cohesive, moist, very dense	325.30 / 4.04	4	SS	76	M	
5.56	(SP) SAND, some fines, brown; non-cohesive, moist, very dense	323.78 / 5.56	5	SS	76		Silica Sand
8.53	(SM) SILTY SAND, brown; non-cohesive, moist to wet, very dense	320.81 / 8.53	6	SS	52	MH	Screen; water level May 24, 2019
10	*CONTINUED NEXT PAGE*						

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 ; 10 20 30 40

DEPTH SCALE
1 : 50

GOLDER

LOGGED: AS
CHECKED: AM

PROJECT: 19115436

LOCATION: N 4876253.64; E 640154.47

RECORD OF BOREHOLE: MW19-3

BORING DATE: May 2, 2019

DATUM: Geodetic

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. + 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 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	B57 Track Mount Drill Rig; 210 mm O.D. Hollow Stem Augers	(SM) SILTY SAND, brown; non-cohesive, moist to wet, very dense		317.76							
11											Blowback
		END OF BOREHOLE		11.58							
12											
13											
14											
15											
16											
17											
18											
19											
20											

NOTE:

1. Water level measured in monitoring well as follows:

DATE	Depth (m)	Elev. (m)
06-May-19	9.0	320.4
13-May-19	9.0	320.4
21-May-19	8.9	320.4
24-May19	8.9	320.4

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AS

CHECKED: AM

RECORD OF BOREHOLE: MW19-4

PROJECT: 19115436
LOCATION: N 4876632.76; E 640593.49
BORING DATE: May 3, 6, 7, & 10, 2019
DATUM: Geodetic

BORING METHOD: B57 Track Mount Drill Rig; 210 mm O.D. Hollow Stem Augers (0 to ~5.2 m); 140 mm O.D. Casing / Tri-cone (~5.2 to 10 m)

DEPTH SCALE METRES	DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION
	GROUND SURFACE	375.47				
0	Topsoil - FILL	0.00				38 mm Diameter PVC Monitoring Well (Stickup)
	FILL - (SM) SILTY SAND, trace to some gravel; brown, trace organics; non-cohesive, moist, compact	0.15	1	SS	17	
			2	SS	12	
	FILL - (SW) SAND and GRAVEL, trace fines, brown; non-cohesive, moist, loose	372.88 / 2.59	3	SS	7	
	FILL - (SM) SILTY SAND, trace to some gravel, trace organics; brown; non-cohesive, wet, loose	371.20 / 4.27	4	SS	5	Bentonite
	PROBABLE FILL or DISTURBED/ REWORKED NATIVE - (SM) gravelly SILTY SAND; brown; non-cohesive, moist to wet, loose to very loose	369.83 / 5.64	5	SS	6	
			6	SS	2	
10						

CONTINUED NEXT PAGE

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 ; 10 20 30 40
ADDITIONAL LAB. TESTING

DEPTH SCALE 1 : 50

GOLDER

LOGGED: AM / AS
CHECKED: AM

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RECORD OF BOREHOLE: MW19-4

BORING DATE: May 3, 6, 7, & 10, 2019

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---							
10	B57 Track Mount Drill Rig; 140 mm O.D. Casing / Tri-cone		365.34						
		PROBABLE FILL or DISTURBED/ REWORKED NATIVE - (ML/SM) SILT and SAND to SILTY SAND, trace to some gravel; brown; non-cohesive, moist to wet, compact to loose	10.13						
11									
12				7	SS	17	○	MH	
13									
14									
15									Bentonite
				8	SS	8	○		
16									
17									
18				9	SS	20			
19			355.66						
			19.81						
20									

Chart headers: 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 (10, 20, 30, 40)

CONTINUED NEXT PAGE

PROJECT: 19115436
LOCATION: N 4876632.76; E 640593.49

RECORD OF BOREHOLE: MW19-4

BORING DATE: May 3, 6, 7, & 10, 2019

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	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 (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20	B57 Track Mount Drill Rig; 140 mm O.D. Casing / Tri-cone	PROBABLE FILL or DISTURBED/ REWORKED NATIVE - (CL) sandy SILTY CLAY, trace gravel; brown to dark brown, organic inclusions; cohesive, W~PL, very stiff									
21											
		(CL) sandy SILTY CLAY, trace gravel; grey, (TILL); cohesive, W<PL, very stiff		353.83 21.64	10	SS	19		○		
22											
23		(SP) SAND and GRAVEL, some fines; brown; non-cohesive, wet, very dense		352.31 23.16							
24					11	SS	50/ 0.05		○		
25											Bentonite
26		(SM) gravelly SILTY SAND, some fines; brown; non-cohesive, wet, very dense		349.26 26.21							
27					12	SS	90		○		
28											
29											
30											

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DEPTH SCALE
1 : 50

GOLDER

LOGGED: AM / AS
CHECKED: AM

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. + 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 (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- *CONTINUED FROM PREVIOUS PAGE* ---									
30	B57 Track Mount Drill Rig; 140 mm O.D. Casing / Tri-cone	(SM) gravelly SILTY SAND, some fines; brown; non-cohesive, wet, very dense									
					13	SS	94		○ (approx. 20)		
31											
32				343.16							
		(SW) SAND, some gravel, some fines; brown; non-cohesive, wet, very dense		32.31							
33											
					14	SS	79		○ (approx. 23)		
34											
35											Bentonite
36											
					15	SS	92		○ (approx. 13)		
37											
38											
39				335.85							
		(SM) SILTY SAND, brown; moist, very dense		39.62							
40											
		CONTINUED NEXT PAGE									

CONTINUED NEXT PAGE

PROJECT: 19115436

LOCATION: N 4876632.76; E 640593.49

RECORD OF BOREHOLE: MW19-4

BORING DATE: May 3, 6, 7, & 10, 2019

DATUM: Geodetic

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. + 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 (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
40	B57 Track Mount Drill Rig; 140 mm O.D. Casing / Tri-cone	(SM) SILTY SAND, brown; moist, very dense									
43					16	SS	83/ 0.15		○ (approx. 18)		
44.50		(ML) sandy SILT, brown; non-cohesive, moist to wet, very dense		330.97 / 44.50							
45											Bentonite
49					17	SS	53/ 0.15		○ (approx. 21)		
50		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AM / AS

CHECKED: AM

PROJECT: 19115436

LOCATION: N 4876632.76; E 640593.49

RECORD OF BOREHOLE: MW19-4

BORING DATE: May 3, 6, 7, & 10, 2019

DATUM: Geodetic

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. + 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 (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
50	B57 Track Mount Drill Rig; 140 mm O.D. Casing / Tri-cone	(ML) sandy SILT, brown; non-cohesive, moist to wet, very dense									May 16, 2019
52		(SM) SILTY SAND; brown; wet, very dense		323.35 52.12							Bentonite
54											Silica Sand
55					18	SS	50/ 0.15		○ (W ≈ 22)	MH	
56											Screen
58		END OF BOREHOLE		317.56 57.91							

NOTE:

1. Groundwater level in monitoring well measured at a depth of 49.5 m below ground surface, May 16, 2019.

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AM / AS

CHECKED: AM

APPENDIX D

Single Well Response Test Data

GOLDER

MEMORANDUM

DATE August 20, 2019 **Project No.** 19115436 (2000)

TO Eric Hood, PhD, PEng
Golder Associates Ltd.

CC Chris Pons, BSc

FROM Gene Lee, BASc, EIT **EMAIL gene_lee@golder.com**

RESULTS OF SINGLE WELL HYDRAULIC TESTING AT 14204 DURHAM REGIONAL ROAD 30, TOWN OF WHITCHURCH-STOUFFVILLE, ONTARIO

Single well hydraulic tests were conducted within the proposed fill area located in the northeast corner of the property at 14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario on May 24, 2019. Monitoring wells MW19-2 and MW19-3 were screened in sand to silty sand; whereas, monitoring well MW19-1 was screened in silt to sandy silt. The well installations, as reported on the field borehole logs, are summarized in Table 1.

Each hydraulic test was initiated by recording the static water level, pumping water from the well to rapidly drop the water level and then monitoring the water level recovery (i.e., rising head test). The wells were pumped using a Waterra® inertial pump. Upon recovery of at least 95% of the initial static water level, the test was stopped and repeated for verification. Water levels during testing were recorded at 30 second intervals for the first five minutes, one minute intervals for the next five minutes, two minute intervals for the next 10 minutes, and 5 minute intervals for the remainder of the test. Water levels were measured using an electronic water level meter.

Water level data from each hydraulic test were analyzed with the Bouwer and Rice (1976) method for unconfined aquifers. A summary of the calculated hydraulic conductivity at each location is provided in Table 1.

Table 1: Summary of Hydraulic Conductivity Results

Monitoring Well	Screen Interval (mbgs)	Geology at Screen Interval	Hydraulic Conductivity (m/s)
MW19-1	6.40 – 9.45	SILT to sandy SILT, trace sand, trace gravel	3.68×10^{-6}
MW19-2	6.40 – 9.45	SAND to SILTY SAND, trace to some gravel	5.28×10^{-6}
MW19-3	7.92 – 10.97	SAND to SILTY SAND	6.12×10^{-6}

Notes:
mbgs metres below ground surface
m/s metres per second

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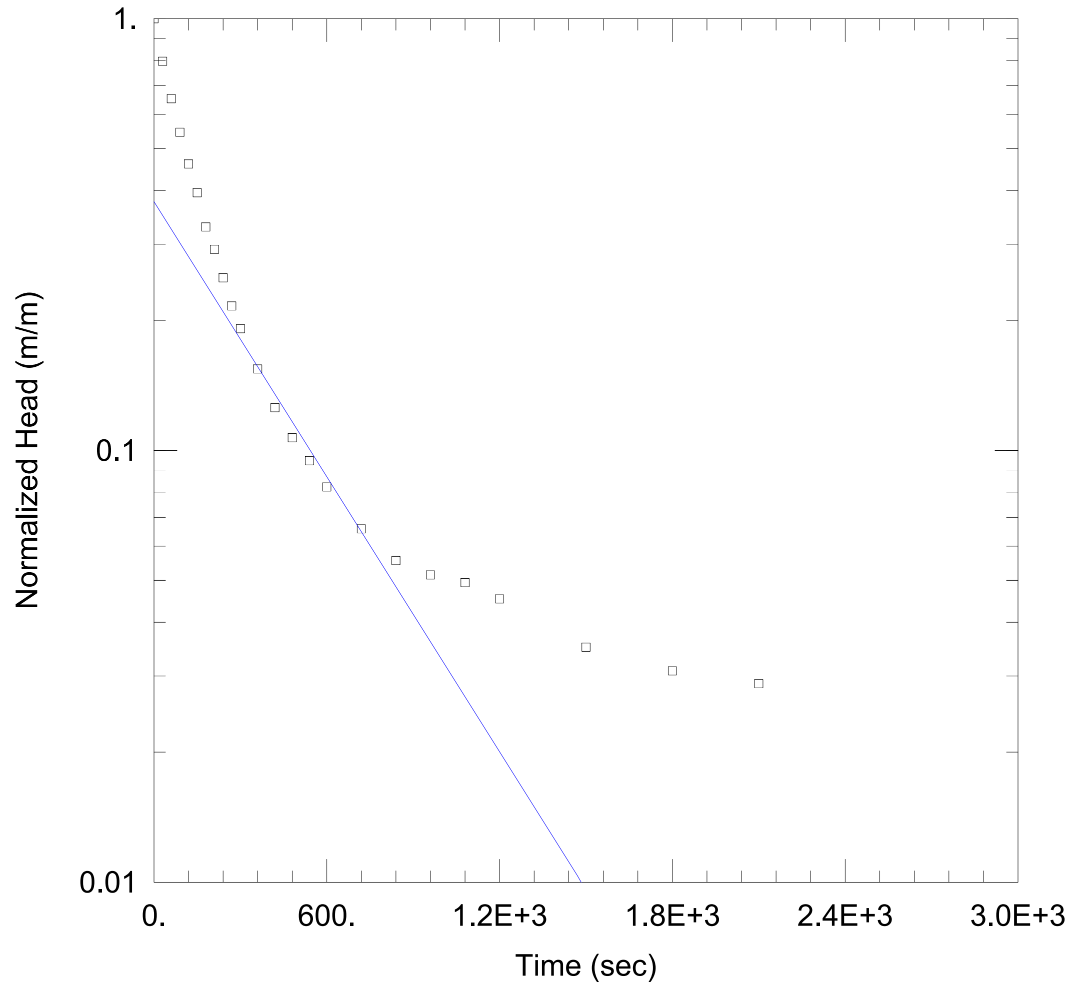


SINGLE WELL RESPONSE TEST

Data Set: C:\Users\cpons\Desktop\MW19-1_RHT.aqt
Date: 08/16/19 Time: 12:50:08

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: Lafarge Canada Inc.
Project: 19115436
Location: 14204 Durham RR 30
Test Well: MW19-1
Test Date: 24-May-19

AQUIFER DATA

Saturated Thickness: 3.178 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW19-1)

Initial Displacement: -0.486 m
Total Well Penetration Depth: 2.873 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.873 m
Screen Length: 2.873 m
Well Radius: 0.1048 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.679E-6 m/sec
y0 = -0.1831 m

Data Set: C:\Users\cpons\Desktop\MW19-1_RHT.aqt
Title: Single Well Response Test
Date: 08/16/19
Time: 12:50:24

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: Lafarge Canada Inc.
Project: 19115436
Location: 14204 Durham RR 30
Test Date: 24-May-19
Test Well: MW19-1

AQUIFER DATA

Saturated Thickness: 3.178 m
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW19-1

X Location: 0. m
Y Location: 0. m

Initial Displacement: -0.486 m
Static Water Column Height: 2.873 m
Casing Radius: 0.0254 m
Well Radius: 0.1048 m
Well Skin Radius: 0.1048 m
Screen Length: 2.873 m
Total Well Penetration Depth: 2.873 m
Corrected Casing Radius (Bouwer-Rice Method): 0.06121 m
Gravel Pack Porosity: 0.3

No. of Observations: 24

Observation Data

Time (sec)	Displacement (m)	Time (sec)	Displacement (m)
0.	-0.486	420.	-0.061
30.	-0.387	480.	-0.052
60.	-0.317	540.	-0.046
90.	-0.265	600.	-0.04
120.	-0.224	720.	-0.032
150.	-0.192	840.	-0.027
180.	-0.16	960.	-0.025
210.	-0.142	1080.	-0.024
240.	-0.122	1200.	-0.022
270.	-0.105	1500.	-0.017
300.	-0.093	1800.	-0.015
360.	-0.075	2100.	-0.014

SOLUTION

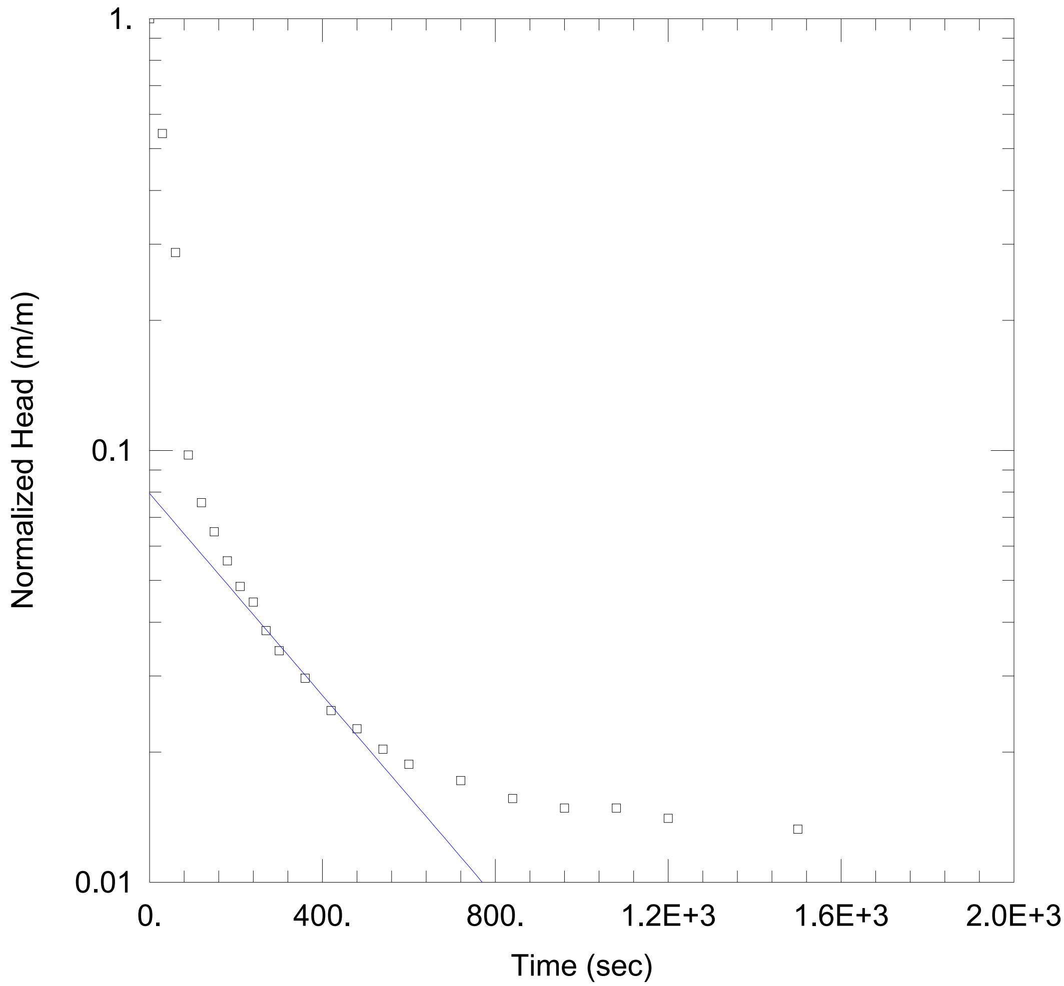
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.307

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	3.679E-6	m/sec
y0	-0.1831	m

K = 0.0003679 cm/sec
T = K*b = 1.169E-5 m^2/sec (0.1169 sq. cm/sec)



SINGLE WELL RESPONSE TEST

Data Set: C:\Users\cpons\Desktop\MW19-2_RHT.aqt
Date: 08/16/19 Time: 12:28:57

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: Lafarge Canada Inc.
Project: 19115436
Location: 14204 Durham RR 30
Test Well: MW19-2
Test Date: 24-May-19

AQUIFER DATA

Saturated Thickness: 2.126 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW19-2)

Initial Displacement: -1.281 m
Total Well Penetration Depth: 1.821 m
Casing Radius: 0.0254 m
Static Water Column Height: 1.821 m
Screen Length: 1.821 m
Well Radius: 0.1048 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.278E-6 m/sec
y0 = -0.1018 m

Data Set: C:\Users\cpons\Desktop\MW19-2_RHT.aqt
Title: Single Well Response Test
Date: 08/16/19
Time: 12:29:35

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: Lafarge Canada Inc.
Project: 19115436
Location: 14204 Durham RR 30
Test Date: 24-May-19
Test Well: MW19-2

AQUIFER DATA

Saturated Thickness: 2.126 m
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW19-2

X Location: 0. m
Y Location: 0. m

Initial Displacement: -1.281 m
Static Water Column Height: 1.821 m
Casing Radius: 0.0254 m
Well Radius: 0.1048 m
Well Skin Radius: 0.1048 m
Screen Length: 1.821 m
Total Well Penetration Depth: 1.821 m
Corrected Casing Radius (Bouwer-Rice Method): 0.06121 m
Gravel Pack Porosity: 0.3

No. of Observations: 22

Observation Data

Time (sec)	Displacement (m)	Time (sec)	Displacement (m)
0.	-1.281	360.	-0.038
30.	-0.694	420.	-0.032
60.	-0.368	480.	-0.029
90.	-0.125	540.	-0.026
120.	-0.097	600.	-0.024
150.	-0.083	720.	-0.022
180.	-0.071	840.	-0.02
210.	-0.062	960.	-0.019
240.	-0.057	1080.	-0.019
270.	-0.049	1200.	-0.018
300.	-0.044	1500.	-0.017

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.906

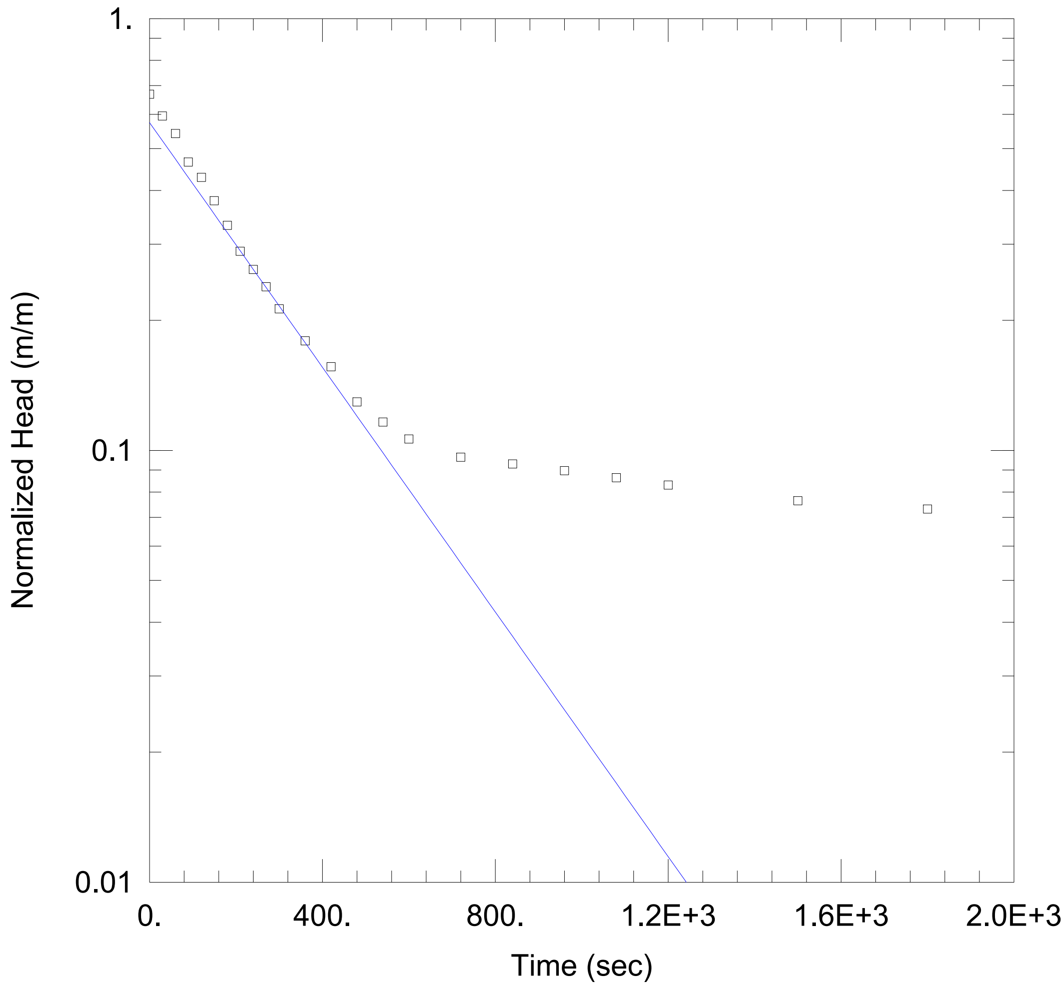
VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate

K	5.278E-6	m/sec
y0	-0.1018	m

K = 0.0005278 cm/sec
T = K*b = 1.122E-5 m²/sec (0.1122 sq. cm/sec)



SINGLE WELL RESPONSE TEST

Data Set: C:\Users\cpons\Desktop\MW19-3_RHT.aqt
Date: 08/16/19 Time: 12:41:32

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: Lafarge Canada Inc.
Project: 19115436
Location: 14204 Durham RR 30
Test Well: MW19-3
Test Date: 24-May-19

AQUIFER DATA

Saturated Thickness: 2.294 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW19-3)

Initial Displacement: -0.301 m
Total Well Penetration Depth: 2.294 m
Casing Radius: 0.0254 m

Static Water Column Height: 2.294 m
Screen Length: 2.294 m
Well Radius: 0.1048 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 6.125E-6 m/sec
y0 = -0.1729 m

Data Set: C:\Users\cpons\Desktop\MW19-3_RHT.aqt
Title: Single Well Response Test
Date: 08/16/19
Time: 12:41:51

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: Lafarge Canada Inc.
Project: 19115436
Location: 14204 Durham RR 30
Test Date: 24-May-19
Test Well: MW19-3

AQUIFER DATA

Saturated Thickness: 2.294 m
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW19-3

X Location: 0. m
Y Location: 0. m

Initial Displacement: -0.301 m
Static Water Column Height: 2.294 m
Casing Radius: 0.0254 m
Well Radius: 0.1048 m
Well Skin Radius: 0.1048 m
Screen Length: 2.294 m
Total Well Penetration Depth: 2.294 m
Corrected Casing Radius (Bouwer-Rice Method): 0.06121 m
Gravel Pack Porosity: 0.3

No. of Observations: 23

Observation Data

Time (sec)	Displacement (m)	Time (sec)	Displacement (m)
0.	-0.201	420.	-0.047
30.	-0.179	480.	-0.039
60.	-0.163	540.	-0.035
90.	-0.14	600.	-0.032
120.	-0.129	720.	-0.029
150.	-0.114	840.	-0.028
180.	-0.1	960.	-0.027
210.	-0.087	1080.	-0.026
240.	-0.079	1200.	-0.025
270.	-0.072	1500.	-0.023
300.	-0.064	1800.	-0.022
360.	-0.054		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.299

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	6.125E-6	m/sec
y0	-0.1729	m

K = 0.0006125 cm/sec
T = K*b = 1.405E-5 m²/sec (0.1405 sq. cm/sec)

APPENDIX E

Certificates of Analysis

GOLDER ASSOCIATES LTD. (Markham)
ATTN: Chris Pons
215 Shields Court. Unit 1
Markham ON L3R 8V2

Date Received: 03-JUN-19
Report Date: 04-JUN-19 14:57 (MT)
Version: FINAL

Client Phone: 905-475-5591

Certificate of Analysis

Lab Work Order #: L2284210

Project P.O. #: NOT SUBMITTED
Job Reference: 19115436
C of C Numbers: 17-733186
Legal Site Desc:

Amanda Fazekas

Amanda Fazekas
Account Manager

ANALYTICAL REPORT

Summary of Guideline Exceedances

Guideline ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit

Ontario Regulation 153/04 - April 15, 2011 Standards - T2-Ground Water (Coarse Soil)-All Types of Property Use

(No parameter exceedances)

Ontario Regulation 153/04 - April 15, 2011 Standards - T2-Ground Water (Fine Soil)-All Types of Property Use

(No parameter exceedances)

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	L2284210-1	L2284210-2	L2284210-3
Sample Date				21-MAY-19	21-MAY-19	21-MAY-19
Sample ID				MW1	MW2	MW3
Conductivity	mS/cm	-	-	0.564	0.938	0.232
pH	pH units	-	-	7.65 PEHR	7.58 PEHR	8.01 PEHR

Guide Limit #1: T2-Ground Water (Coarse Soil)-All Types of Property Use
Guide Limit #2: T2-Ground Water (Fine Soil)-All Types of Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Anions and Nutrients - WATER

			Lab ID	L2284210-1	L2284210-2	L2284210-3
			Sample Date	21-MAY-19	21-MAY-19	21-MAY-19
			Sample ID	MW1	MW2	MW3
		Guide Limits				
Analyte	Unit	#1	#2			
Chloride (Cl)	mg/L	790	790	1.49	13.9	0.97

Guide Limit #1: T2-Ground Water (Coarse Soil)-All Types of Property Use
Guide Limit #2: T2-Ground Water (Fine Soil)-All Types of Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ALS Environmental

ANALYTICAL REPORT

Cyanides - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	L2284210-1	L2284210-2	L2284210-3
Lab ID				L2284210-1	L2284210-2	L2284210-3
Sample Date				21-MAY-19	21-MAY-19	21-MAY-19
Sample ID				MW1	MW2	MW3
Cyanide, Weak Acid Diss	ug/L	66	66	<2.0	<2.0	<2.0

Guide Limit #1: T2-Ground Water (Coarse Soil)-All Types of Property Use
Guide Limit #2: T2-Ground Water (Fine Soil)-All Types of Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ALS Environmental

ANALYTICAL REPORT

Dissolved Metals - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	L2284210-1	L2284210-2	L2284210-3
			Sample Date	21-MAY-19	21-MAY-19	21-MAY-19
			Sample ID	MW1	MW2	MW3
Dissolved Mercury Filtration Location		-	-	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location		-	-	FIELD	FIELD	FIELD
Antimony (Sb)-Dissolved	ug/L	6	6	0.51	<0.10	<0.10
Arsenic (As)-Dissolved	ug/L	25	25	2.97	0.56	0.58
Barium (Ba)-Dissolved	ug/L	1000	1000	52.9	65.6	26.7
Beryllium (Be)-Dissolved	ug/L	4	4	<0.10	<0.10	<0.10
Boron (B)-Dissolved	ug/L	5000	5000	50	20	<10
Cadmium (Cd)-Dissolved	ug/L	2.7	2.7	<0.010	<0.010	<0.010
Chromium (Cr)-Dissolved	ug/L	50	50	<0.50	0.85	<0.50
Cobalt (Co)-Dissolved	ug/L	3.8	3.8	0.11	0.18	<0.10
Copper (Cu)-Dissolved	ug/L	87	87	0.56	0.96	0.72
Lead (Pb)-Dissolved	ug/L	10	10	<0.050	<0.050	0.059
Mercury (Hg)-Dissolved	ug/L	0.29	1	<0.010	<0.010	<0.010
Molybdenum (Mo)-Dissolved	ug/L	70	70	30.3	2.48	2.25
Nickel (Ni)-Dissolved	ug/L	100	100	1.04	0.55	<0.50
Selenium (Se)-Dissolved	ug/L	10	10	0.470	0.234	0.060
Silver (Ag)-Dissolved	ug/L	1.5	1.5	<0.050	<0.050	<0.050
Sodium (Na)-Dissolved	ug/L	490000	490000	20100	11300	1420
Thallium (Tl)-Dissolved	ug/L	2	2	<0.010	0.011	<0.010
Uranium (U)-Dissolved	ug/L	20	20	1.60	2.53	0.261
Vanadium (V)-Dissolved	ug/L	6.2	6.2	0.54	<0.50	0.68
Zinc (Zn)-Dissolved	ug/L	1100	1100	2.0	2.1	1.6

Guide Limit #1: T2-Ground Water (Coarse Soil)-All Types of Property Use
Guide Limit #2: T2-Ground Water (Fine Soil)-All Types of Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Speciated Metals - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	L2284210-1	L2284210-2	L2284210-3
Sample Date				21-MAY-19	21-MAY-19	21-MAY-19
Sample ID				MW1	MW2	MW3
Chromium, Hexavalent	ug/L	25	25	<0.50	0.81	<0.50

Guide Limit #1: T2-Ground Water (Coarse Soil)-All Types of Property Use
Guide Limit #2: T2-Ground Water (Fine Soil)-All Types of Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ALS Environmental

ANALYTICAL REPORT

Volatile Organic Compounds - WATER

			Lab ID	L2284210-1	L2284210-2	L2284210-3	L2284210-4
			Sample Date	21-MAY-19	21-MAY-19	21-MAY-19	21-MAY-19
			Sample ID	MW1	MW2	MW3	TRIP BLANK
		Guide Limits					
Analyte	Unit	#1	#2				
Acetone	ug/L	2700	2700	<30	<30	<30	<30
Benzene	ug/L	5	5	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	ug/L	16	16	<2.0	<2.0	<2.0	<2.0
Bromoform	ug/L	25	25	<5.0	<5.0	<5.0	<5.0
Bromomethane	ug/L	0.89	0.89	<0.50	<0.50	<0.50	<0.50
Carbon tetrachloride	ug/L	0.79	5	<0.20	<0.20	<0.20	<0.20
Chlorobenzene	ug/L	30	30	<0.50	<0.50	<0.50	<0.50
Dibromochloromethane	ug/L	25	25	<2.0	<2.0	<2.0	<2.0
Chloroform	ug/L	2.4	22	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	ug/L	0.2	0.2	<0.20	<0.20	<0.20	<0.20
1,2-Dichlorobenzene	ug/L	3	3	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	ug/L	59	59	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	ug/L	1	1	<0.50	<0.50	<0.50	<0.50
Dichlorodifluoromethane	ug/L	590	590	<2.0	<2.0	<2.0	<2.0
1,1-Dichloroethane	ug/L	5	5	<0.50	<0.50	<0.50	<0.50
1,2-Dichloroethane	ug/L	1.6	5	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	ug/L	1.6	14	<0.50	<0.50	<0.50	<0.50
cis-1,2-Dichloroethylene	ug/L	1.6	17	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethylene	ug/L	1.6	17	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	ug/L	50	50	<5.0	<5.0	<5.0	<5.0
1,2-Dichloropropane	ug/L	5	5	<0.50	<0.50	<0.50	<0.50
cis-1,3-Dichloropropene	ug/L	-	-	<0.30	<0.30	<0.30	<0.30
trans-1,3-Dichloropropene	ug/L	-	-	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (cis & trans)	ug/L	0.5	0.5	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	ug/L	2.4	2.4	<0.50	<0.50	<0.50	<0.50
n-Hexane	ug/L	51	520	<0.50	<0.50	<0.50	<0.50
Methyl Ethyl Ketone	ug/L	1800	1800	<20	39	<20	<20
Methyl Isobutyl Ketone	ug/L	640	640	<20	<20	<20	<20
MTBE	ug/L	15	15	<2.0	<2.0	<2.0	<2.0
Styrene	ug/L	5.4	5.4	<0.50	<0.50	<0.50	<0.50

Guide Limit #1: T2-Ground Water (Coarse Soil)-All Types of Property Use
Guide Limit #2: T2-Ground Water (Fine Soil)-All Types of Property Use

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ALS Environmental

ANALYTICAL REPORT

Volatile Organic Compounds - WATER

			Lab ID	L2284210-1	L2284210-2	L2284210-3	L2284210-4
			Sample Date	21-MAY-19	21-MAY-19	21-MAY-19	21-MAY-19
			Sample ID	MW1	MW2	MW3	TRIP BLANK
		Guide Limits					
Analyte	Unit	#1	#2				
1,1,1,2-Tetrachloroethane	ug/L	1.1	1.1	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	ug/L	1	1	<0.50	<0.50	<0.50	<0.50
Tetrachloroethylene	ug/L	1.6	17	<0.50	<0.50	<0.50	<0.50
Toluene	ug/L	24	24	<0.50	<0.50	<0.50	<0.50
1,1,1-Trichloroethane	ug/L	200	200	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	ug/L	4.7	5	<0.50	<0.50	<0.50	<0.50
Trichloroethylene	ug/L	1.6	5	<0.50	<0.50	<0.50	<0.50
Trichlorofluoromethane	ug/L	150	150	<5.0	<5.0	<5.0	<5.0
Vinyl chloride	ug/L	0.5	1.7	<0.50	<0.50	<0.50	<0.50
o-Xylene	ug/L	-	-	<0.30	<0.30	<0.30	<0.30
m+p-Xylenes	ug/L	-	-	<0.40	<0.40	<0.40	<0.40
Xylenes (Total)	ug/L	300	300	<0.50	<0.50	<0.50	<0.50
Surrogate: 4-Bromofluorobenzene	%	-	-	103.0	103.0	103.3	102.2
Surrogate: 1,4-Difluorobenzene	%	-	-	103.2	101.6	102.0	103.5

Guide Limit #1: T2-Ground Water (Coarse Soil)-All Types of Property Use
Guide Limit #2: T2-Ground Water (Fine Soil)-All Types of Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ALS Environmental

ANALYTICAL REPORT

Hydrocarbons - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID L2284210-1 Sample Date 21-MAY-19 Sample ID MW1	Lab ID L2284210-2 Sample Date 21-MAY-19 Sample ID MW2	Lab ID L2284210-3 Sample Date 21-MAY-19 Sample ID MW3
F1 (C6-C10)	ug/L	750	750	<25	<25	<25
F1-BTEX	ug/L	750	750	<25	<25	<25
F2 (C10-C16)	ug/L	150	150	<100 OWP	<100 OWP	<100
F2-Naphth	ug/L	-	-	<100	<100	<100
F3 (C16-C34)	ug/L	500	500	<250 OWP	<250 OWP	<250
F3-PAH	ug/L	-	-	<250	<250	<250
F4 (C34-C50)	ug/L	500	500	<250 OWP	<250 OWP	<250
Total Hydrocarbons (C6-C50)	ug/L	-	-	<370	<370	<370
Chrom. to baseline at nC50		-	-	YES	YES	YES
Surrogate: 2-Bromobenzotrifluoride	%	-	-	93.7	94.1	63.4
Surrogate: 3,4-Dichlorotoluene	%	-	-	90.7	104.2	98.6

Guide Limit #1: T2-Ground Water (Coarse Soil)-All Types of Property Use
Guide Limit #2: T2-Ground Water (Fine Soil)-All Types of Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ALS Environmental

ANALYTICAL REPORT

Polycyclic Aromatic Hydrocarbons - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	L2284210-1	L2284210-2	L2284210-3
Sample Date				21-MAY-19	21-MAY-19	21-MAY-19
Sample ID				MW1	MW2	MW3
Acenaphthene	ug/L	4.1	4.1	<0.020	<0.020	<0.020
Acenaphthylene	ug/L	1	1	<0.020	<0.020	<0.020
Anthracene	ug/L	2.4	2.4	<0.020	<0.020	<0.020
Benzo(a)anthracene	ug/L	1	1	<0.020	<0.020	<0.020
Benzo(a)pyrene	ug/L	0.01	0.01	<0.010	<0.010	<0.010
Benzo(b)fluoranthene	ug/L	0.1	0.1	<0.020	<0.020	<0.020
Benzo(g,h,i)perylene	ug/L	0.2	0.2	<0.020	<0.020	<0.020
Benzo(k)fluoranthene	ug/L	0.1	0.1	<0.020	<0.020	<0.020
Chrysene	ug/L	0.1	0.1	<0.020	<0.020	<0.020
Dibenzo(ah)anthracene	ug/L	0.2	0.2	<0.020	<0.020	<0.020
Fluoranthene	ug/L	0.41	0.41	<0.020	<0.020	0.022
Fluorene	ug/L	120	120	<0.020	<0.020	<0.020
Indeno(1,2,3-cd)pyrene	ug/L	0.2	0.2	<0.020	<0.020	<0.020
1+2-Methylnaphthalenes	ug/L	3.2	3.2	<0.028	<0.028	<0.028
1-Methylnaphthalene	ug/L	3.2	3.2	<0.020	<0.020	<0.020
2-Methylnaphthalene	ug/L	3.2	3.2	0.026	<0.020	<0.020
Naphthalene	ug/L	11	11	<0.050	<0.050	<0.050
Phenanthrene	ug/L	1	1	<0.020	<0.020	0.020
Pyrene	ug/L	4.1	4.1	<0.020	<0.020	0.043
Surrogate: d10-Acenaphthene	%	-	-	107.3	97.2	87.9
Surrogate: d12-Chrysene	%	-	-	139.8	102.6	72.4
Surrogate: d8-Naphthalene	%	-	-	124.3	124.7	86.1
Surrogate: d10-Phenanthrene	%	-	-	118.7	91.0	83.9

Guide Limit #1: T2-Ground Water (Coarse Soil)-All Types of Property Use
Guide Limit #2: T2-Ground Water (Fine Soil)-All Types of Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.
OWP	Organic water sample contained visible sediment (must be included as part of analysis). Measured concentrations of organic substances in water can be biased high due to presence of

sediment.

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CN-WAD-R511-WT	Water	Cyanide (WAD)-O.Reg 153/04	APHA 4500CN I-Weak acid Dist Colorimet

Weak acid dissociable cyanide (WAD) is determined by undergoing a distillation procedure. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-R511-WT	Water	Hex Chrom-O.Reg 153/04 (July 2011)	EPA 7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Chromium (III) is calculated as the difference between the total chromium and the chromium (VI) results.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-R511-WT	Water	Conductivity-O.Reg 153/04 (July 2011)	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

F1-F4-511-CALC-WT	Water	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Water	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Water	F2-F4-O.Reg 153/04 (July 2011)	EPA 3511/CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from water using a hexane micro-extraction technique. Instrumental analysis is by GC-FID, as per the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Tier 1 Method, CCME, 2001.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

HG-D-UG/L-CVAA-WT	Water	Diss. Mercury in Water by CVAAS (ug/L)	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-UG/L-MS-WT	Water	Diss. Metals in Water by ICPMS (ug/L)	EPA 200.8

The metal constituents of a non-acidified sample that pass through a membrane filter prior to ICP/MS analysis.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

METHYLNAPS-CALC-WT	Water	PAH-Calculated Parameters	SW846 8270
PAH-511-WT	Water	PAH-O. Reg 153/04 (July 2011)	SW846 3510/8270

Aqueous samples, fortified with surrogates, are extracted using liquid/liquid extraction technique. The sample extracts are concentrated and then analyzed using GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

VOC-1,3-DCP-CALC-WT	Water	Regulation 153 VOCs	SW8260B/SW8270C
VOC-511-HS-WT	Water	VOC by GCMS HS O.Reg 153/04 (July 2011)	SW846 8260

Liquid samples are analyzed by headspace GC/MSD.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

17-733186

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2284210 Report Date: 04-JUN-19

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
Markham ON L3R 8V2
Contact: Chris Pons

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-N-WT	**Water**							
Batch R4656429								
WG3065947-19 DUP		**WG3065947-18**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	03-JUN-19
WG3065947-17 LCS								
Chloride (Cl)			101.6		%		90-110	03-JUN-19
WG3065947-16 MB								
Chloride (Cl)			<0.50		mg/L		0.5	03-JUN-19
WG3065947-20 MS		**WG3065947-18**						
Chloride (Cl)			99.96		%		75-125	03-JUN-19
CN-WAD-R511-WT	**Water**							
Batch R4656152								
WG3066547-3 DUP		**L2284210-1**						
Cyanide, Weak Acid Diss		<2.0	<2.0	RPD-NA	ug/L	N/A	20	04-JUN-19
WG3066547-2 LCS								
Cyanide, Weak Acid Diss			96.4		%		80-120	04-JUN-19
WG3066547-1 MB								
Cyanide, Weak Acid Diss			<2.0		ug/L		2	04-JUN-19
WG3066547-4 MS		**L2284210-1**						
Cyanide, Weak Acid Diss			90.2		%		75-125	04-JUN-19
CR-CR6-IC-R511-WT	**Water**							
Batch R4655078								
WG3066161-10 DUP		**WG3066161-8**						
Chromium, Hexavalent		<0.50	<0.50	RPD-NA	ug/L	N/A	20	03-JUN-19
WG3066161-7 LCS								
Chromium, Hexavalent			96.4		%		80-120	03-JUN-19
WG3066161-6 MB								
Chromium, Hexavalent			<0.50		ug/L		0.5	03-JUN-19
WG3066161-9 MS		**WG3066161-8**						
Chromium, Hexavalent			106.3		%		70-130	03-JUN-19
EC-R511-WT	**Water**							
Batch R4655946								
WG3066716-4 DUP		**WG3066716-3**						
Conductivity		0.564	0.564		mS/cm	0.0	10	04-JUN-19
WG3066716-2 LCS								
Conductivity			99.4		%		90-110	04-JUN-19
WG3066716-1 MB								
Conductivity			<0.0030		mS/cm		0.003	04-JUN-19
F1-HS-511-WT	**Water**							

Quality Control Report

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
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Contact: Chris Pons

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Water**							
Batch R4656168								
WG3062943-4 DUP		**WG3062943-3**						
F1 (C6-C10)		141	133		ug/L	6.1	30	04-JUN-19
WG3062943-1 LCS								
F1 (C6-C10)			99.6		%		80-120	04-JUN-19
WG3062943-2 MB								
F1 (C6-C10)			<25		ug/L		25	04-JUN-19
Surrogate: 3,4-Dichlorotoluene			110.5		%		60-140	04-JUN-19
WG3062943-5 MS		**WG3062943-3**						
F1 (C6-C10)			87.0		%		60-140	04-JUN-19
F2-F4-511-WT	**Water**							
Batch R4655689								
WG3066355-2 LCS								
F2 (C10-C16)			100.7		%		70-130	04-JUN-19
F3 (C16-C34)			104.5		%		70-130	04-JUN-19
F4 (C34-C50)			105.1		%		70-130	04-JUN-19
WG3066355-1 MB								
F2 (C10-C16)			<100		ug/L		100	04-JUN-19
F3 (C16-C34)			<250		ug/L		250	04-JUN-19
F4 (C34-C50)			<250		ug/L		250	04-JUN-19
Surrogate: 2-Bromobenzotrifluoride			94.5		%		60-140	04-JUN-19
HG-D-UG/L-CVAA-WT	**Water**							
Batch R4655509								
WG3066541-3 DUP		**L2284210-1**						
Mercury (Hg)-Dissolved		<0.010	<0.010	RPD-NA	ug/L	N/A	20	04-JUN-19
WG3066541-2 LCS								
Mercury (Hg)-Dissolved			99.0		%		80-120	04-JUN-19
WG3066541-1 MB								
Mercury (Hg)-Dissolved			<0.010		ug/L		0.01	04-JUN-19
WG3066541-4 MS		**L2284210-2**						
Mercury (Hg)-Dissolved			92.6		%		70-130	04-JUN-19
MET-D-UG/L-MS-WT	**Water**							
Batch R4655162								
WG3066412-4 DUP		**WG3066412-3**						
Antimony (Sb)-Dissolved		<1.0	<1.0	RPD-NA	ug/L	N/A	20	04-JUN-19
Arsenic (As)-Dissolved		2.5	2.4		ug/L	4.1	20	04-JUN-19
Barium (Ba)-Dissolved		118	118		ug/L	0.2	20	04-JUN-19

Quality Control Report

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
Markham ON L3R 8V2
Contact: Chris Pons

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-UG/L-MS-WT	**Water**							
Batch R4655162								
WG3066412-4 DUP		**WG3066412-3**						
Beryllium (Be)-Dissolved		<1.0	<1.0	RPD-NA	ug/L	N/A	20	04-JUN-19
Boron (B)-Dissolved		<100	<100	RPD-NA	ug/L	N/A	20	04-JUN-19
Cadmium (Cd)-Dissolved		<0.050	<0.050	RPD-NA	ug/L	N/A	20	04-JUN-19
Chromium (Cr)-Dissolved		<5.0	<5.0	RPD-NA	ug/L	N/A	20	04-JUN-19
Cobalt (Co)-Dissolved		2.4	2.4		ug/L	0.2	20	04-JUN-19
Copper (Cu)-Dissolved		<2.0	<2.0	RPD-NA	ug/L	N/A	20	04-JUN-19
Lead (Pb)-Dissolved		<0.50	<0.50	RPD-NA	ug/L	N/A	20	04-JUN-19
Molybdenum (Mo)-Dissolved		1.80	1.75		ug/L	3.2	20	04-JUN-19
Nickel (Ni)-Dissolved		5.7	5.7		ug/L	0.3	20	04-JUN-19
Selenium (Se)-Dissolved		<0.50	<0.50	RPD-NA	ug/L	N/A	20	04-JUN-19
Silver (Ag)-Dissolved		<0.50	<0.50	RPD-NA	ug/L	N/A	20	04-JUN-19
Sodium (Na)-Dissolved		220000	221000		ug/L	0.3	20	04-JUN-19
Thallium (Tl)-Dissolved		<0.10	<0.10	RPD-NA	ug/L	N/A	20	04-JUN-19
Uranium (U)-Dissolved		1.80	1.85		ug/L	2.6	20	04-JUN-19
Vanadium (V)-Dissolved		<5.0	<5.0	RPD-NA	ug/L	N/A	20	04-JUN-19
Zinc (Zn)-Dissolved		<10	<10	RPD-NA	ug/L	N/A	20	04-JUN-19
WG3066412-2 LCS								
Antimony (Sb)-Dissolved			96.6		%		80-120	04-JUN-19
Arsenic (As)-Dissolved			100.1		%		80-120	04-JUN-19
Barium (Ba)-Dissolved			99.3		%		80-120	04-JUN-19
Beryllium (Be)-Dissolved			99.98		%		80-120	04-JUN-19
Boron (B)-Dissolved			96.6		%		80-120	04-JUN-19
Cadmium (Cd)-Dissolved			98.9		%		80-120	04-JUN-19
Chromium (Cr)-Dissolved			99.4		%		80-120	04-JUN-19
Cobalt (Co)-Dissolved			98.4		%		80-120	04-JUN-19
Copper (Cu)-Dissolved			97.6		%		80-120	04-JUN-19
Lead (Pb)-Dissolved			102.1		%		80-120	04-JUN-19
Molybdenum (Mo)-Dissolved			101.3		%		80-120	04-JUN-19
Nickel (Ni)-Dissolved			97.3		%		80-120	04-JUN-19
Selenium (Se)-Dissolved			99.6		%		80-120	04-JUN-19
Silver (Ag)-Dissolved			100.9		%		80-120	04-JUN-19
Sodium (Na)-Dissolved			104.6		%		80-120	04-JUN-19
Thallium (Tl)-Dissolved			100.7		%		80-120	04-JUN-19

Quality Control Report

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
Markham ON L3R 8V2

Contact: Chris Pons

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-UG/L-MS-WT	**Water**							
Batch R4655162								
WG3066412-2 LCS								
Uranium (U)-Dissolved			94.4		%		80-120	04-JUN-19
Vanadium (V)-Dissolved			102.0		%		80-120	04-JUN-19
Zinc (Zn)-Dissolved			98.0		%		80-120	04-JUN-19
WG3066412-1 MB								
Antimony (Sb)-Dissolved			<0.10		ug/L		0.1	04-JUN-19
Arsenic (As)-Dissolved			<0.10		ug/L		0.1	04-JUN-19
Barium (Ba)-Dissolved			<0.10		ug/L		0.1	04-JUN-19
Beryllium (Be)-Dissolved			<0.10		ug/L		0.1	04-JUN-19
Boron (B)-Dissolved			<10		ug/L		10	04-JUN-19
Cadmium (Cd)-Dissolved			<0.0050		ug/L		0.005	04-JUN-19
Chromium (Cr)-Dissolved			<0.50		ug/L		0.5	04-JUN-19
Cobalt (Co)-Dissolved			<0.10		ug/L		0.1	04-JUN-19
Copper (Cu)-Dissolved			<0.20		ug/L		0.2	04-JUN-19
Lead (Pb)-Dissolved			<0.050		ug/L		0.05	04-JUN-19
Molybdenum (Mo)-Dissolved			<0.050		ug/L		0.05	04-JUN-19
Nickel (Ni)-Dissolved			<0.50		ug/L		0.5	04-JUN-19
Selenium (Se)-Dissolved			<0.050		ug/L		0.05	04-JUN-19
Silver (Ag)-Dissolved			<0.050		ug/L		0.05	04-JUN-19
Sodium (Na)-Dissolved			<50		ug/L		50	04-JUN-19
Thallium (Tl)-Dissolved			<0.010		ug/L		0.01	04-JUN-19
Uranium (U)-Dissolved			<0.010		ug/L		0.01	04-JUN-19
Vanadium (V)-Dissolved			<0.50		ug/L		0.5	04-JUN-19
Zinc (Zn)-Dissolved			<1.0		ug/L		1	04-JUN-19
WG3066412-5 MS		**WG3066412-6**						
Antimony (Sb)-Dissolved			100.2		%		70-130	04-JUN-19
Arsenic (As)-Dissolved			106.5		%		70-130	04-JUN-19
Barium (Ba)-Dissolved			N/A	MS-B	%		-	04-JUN-19
Beryllium (Be)-Dissolved			103.8		%		70-130	04-JUN-19
Boron (B)-Dissolved			96.9		%		70-130	04-JUN-19
Cadmium (Cd)-Dissolved			98.3		%		70-130	04-JUN-19
Chromium (Cr)-Dissolved			97.8		%		70-130	04-JUN-19
Cobalt (Co)-Dissolved			94.5		%		70-130	04-JUN-19
Copper (Cu)-Dissolved			92.1		%		70-130	04-JUN-19
Lead (Pb)-Dissolved			94.9		%		70-130	04-JUN-19

Quality Control Report

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
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Contact: Chris Pons

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-UG/L-MS-WT	**Water**							
Batch R4655162								
WG3066412-5 MS		**WG3066412-6**						
Molybdenum (Mo)-Dissolved			102.6		%		70-130	04-JUN-19
Nickel (Ni)-Dissolved			92.1		%		70-130	04-JUN-19
Selenium (Se)-Dissolved			117.5		%		70-130	04-JUN-19
Silver (Ag)-Dissolved			96.7		%		70-130	04-JUN-19
Sodium (Na)-Dissolved			N/A	MS-B	%		-	04-JUN-19
Thallium (Tl)-Dissolved			98.3		%		70-130	04-JUN-19
Uranium (U)-Dissolved			N/A	MS-B	%		-	04-JUN-19
Vanadium (V)-Dissolved			102.3		%		70-130	04-JUN-19
Zinc (Zn)-Dissolved			96.3		%		70-130	04-JUN-19
PAH-511-WT	**Water**							
Batch R4656448								
WG3066355-2 LCS								
1-Methylnaphthalene			99.5		%		50-140	04-JUN-19
2-Methylnaphthalene			94.5		%		50-140	04-JUN-19
Acenaphthene			108.2		%		50-140	04-JUN-19
Acenaphthylene			110.8		%		50-140	04-JUN-19
Anthracene			115.8		%		50-140	04-JUN-19
Benzo(a)anthracene			132.6		%		50-140	04-JUN-19
Benzo(a)pyrene			112.5		%		50-140	04-JUN-19
Benzo(b)fluoranthene			106.2		%		50-140	04-JUN-19
Benzo(g,h,i)perylene			108.6		%		50-140	04-JUN-19
Benzo(k)fluoranthene			106.9		%		50-140	04-JUN-19
Chrysene			126.3		%		50-140	04-JUN-19
Dibenzo(ah)anthracene			117.2		%		50-140	04-JUN-19
Fluoranthene			115.8		%		50-140	04-JUN-19
Fluorene			111.3		%		50-140	04-JUN-19
Indeno(1,2,3-cd)pyrene			128.2		%		50-140	04-JUN-19
Naphthalene			105.3		%		50-140	04-JUN-19
Phenanthrene			123.0		%		50-140	04-JUN-19
Pyrene			119.1		%		50-140	04-JUN-19
WG3066355-1 MB								
1-Methylnaphthalene			<0.020		ug/L		0.02	04-JUN-19
2-Methylnaphthalene			<0.020		ug/L		0.02	04-JUN-19
Acenaphthene			<0.020		ug/L		0.02	04-JUN-19

Quality Control Report

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
Markham ON L3R 8V2
Contact: Chris Pons

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Water**							
Batch R4656448								
WG3066355-1 MB								
Acenaphthylene			<0.020		ug/L		0.02	04-JUN-19
Anthracene			<0.020		ug/L		0.02	04-JUN-19
Benzo(a)anthracene			<0.020		ug/L		0.02	04-JUN-19
Benzo(a)pyrene			<0.010		ug/L		0.01	04-JUN-19
Benzo(b)fluoranthene			<0.020		ug/L		0.02	04-JUN-19
Benzo(g,h,i)perylene			<0.020		ug/L		0.02	04-JUN-19
Benzo(k)fluoranthene			<0.020		ug/L		0.02	04-JUN-19
Chrysene			<0.020		ug/L		0.02	04-JUN-19
Dibenzo(ah)anthracene			<0.020		ug/L		0.02	04-JUN-19
Fluoranthene			<0.020		ug/L		0.02	04-JUN-19
Fluorene			<0.020		ug/L		0.02	04-JUN-19
Indeno(1,2,3-cd)pyrene			<0.020		ug/L		0.02	04-JUN-19
Naphthalene			<0.050		ug/L		0.05	04-JUN-19
Phenanthrene			<0.020		ug/L		0.02	04-JUN-19
Pyrene			<0.020		ug/L		0.02	04-JUN-19
Surrogate: d8-Naphthalene			125.6		%		60-140	04-JUN-19
Surrogate: d10-Phenanthrene			127.1		%		60-140	04-JUN-19
Surrogate: d12-Chrysene			114.4		%		60-140	04-JUN-19
Surrogate: d10-Acenaphthene			114.8		%		60-140	04-JUN-19
PH-WT	**Water**							
Batch R4655946								
WG3066716-4 DUP		**WG3066716-3**						
pH		7.65	7.65	J	pH units	0.00	0.2	04-JUN-19
WG3066716-2 LCS								
pH			7.04		pH units		6.9-7.1	04-JUN-19
VOC-511-HS-WT	**Water**							
Batch R4654969								
WG3065603-4 DUP		**WG3065603-3**						
1,1,1,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
1,1,1-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
1,1,2-Trichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
1,1-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
1,1-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19

Quality Control Report

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
Markham ON L3R 8V2
Contact: Chris Pons

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Water**							
Batch R4654969								
WG3065603-4 DUP		**WG3065603-3**						
1,2-Dibromoethane		<0.20	<0.20	RPD-NA	ug/L	N/A	30	04-JUN-19
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
1,2-Dichloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
1,2-Dichloropropane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
1,3-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
Acetone		<30	<30	RPD-NA	ug/L	N/A	30	04-JUN-19
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
Bromodichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	04-JUN-19
Bromoform		<5.0	<5.0	RPD-NA	ug/L	N/A	30	04-JUN-19
Bromomethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
Carbon tetrachloride		<0.20	<0.20	RPD-NA	ug/L	N/A	30	04-JUN-19
Chlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	04-JUN-19
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
cis-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	04-JUN-19
Dibromochloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	04-JUN-19
Dichlorodifluoromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	04-JUN-19
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
n-Hexane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
m+p-Xylenes		<0.40	<0.40	RPD-NA	ug/L	N/A	30	04-JUN-19
Methyl Ethyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	04-JUN-19
Methyl Isobutyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	04-JUN-19
Methylene Chloride		<5.0	<5.0	RPD-NA	ug/L	N/A	30	04-JUN-19
MTBE		<2.0	<2.0	RPD-NA	ug/L	N/A	30	04-JUN-19
o-Xylene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	04-JUN-19
Styrene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
Toluene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
trans-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
trans-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	04-JUN-19
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
Trichlorofluoromethane		<5.0	<5.0		ug/L			04-JUN-19

Quality Control Report

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
Markham ON L3R 8V2
Contact: Chris Pons

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Water**							
Batch R4654969								
WG3065603-4 DUP		**WG3065603-3**						
Trichlorofluoromethane		<5.0	<5.0	RPD-NA	ug/L	N/A	30	04-JUN-19
Vinyl chloride		<0.50	<0.50	RPD-NA	ug/L	N/A	30	04-JUN-19
WG3065603-1 LCS								
1,1,1,2-Tetrachloroethane			98.1		%		70-130	04-JUN-19
1,1,2,2-Tetrachloroethane			90.5		%		70-130	04-JUN-19
1,1,1-Trichloroethane			100.4		%		70-130	04-JUN-19
1,1,2-Trichloroethane			91.6		%		70-130	04-JUN-19
1,1-Dichloroethane			93.3		%		70-130	04-JUN-19
1,1-Dichloroethylene			97.8		%		70-130	04-JUN-19
1,2-Dibromoethane			90.8		%		70-130	04-JUN-19
1,2-Dichlorobenzene			98.6		%		70-130	04-JUN-19
1,2-Dichloroethane			86.9		%		70-130	04-JUN-19
1,2-Dichloropropane			90.2		%		70-130	04-JUN-19
1,3-Dichlorobenzene			97.8		%		70-130	04-JUN-19
1,4-Dichlorobenzene			96.9		%		70-130	04-JUN-19
Acetone			89.5		%		60-140	04-JUN-19
Benzene			93.4		%		70-130	04-JUN-19
Bromodichloromethane			89.2		%		70-130	04-JUN-19
Bromoform			92.3		%		70-130	04-JUN-19
Bromomethane			101.8		%		60-140	04-JUN-19
Carbon tetrachloride			99.97		%		70-130	04-JUN-19
Chlorobenzene			93.8		%		70-130	04-JUN-19
Chloroform			90.9		%		70-130	04-JUN-19
cis-1,2-Dichloroethylene			89.8		%		70-130	04-JUN-19
cis-1,3-Dichloropropene			85.6		%		70-130	04-JUN-19
Dibromochloromethane			96.6		%		70-130	04-JUN-19
Dichlorodifluoromethane			78.3		%		50-140	04-JUN-19
Ethylbenzene			98.0		%		70-130	04-JUN-19
n-Hexane			96.2		%		70-130	04-JUN-19
m+p-Xylenes			98.5		%		70-130	04-JUN-19
Methyl Ethyl Ketone			82.1		%		60-140	04-JUN-19
Methyl Isobutyl Ketone			84.3		%		60-140	04-JUN-19
Methylene Chloride			89.7		%		70-130	04-JUN-19
MTBE			99.3		%		70-130	04-JUN-19

Quality Control Report

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
Markham ON L3R 8V2
Contact: Chris Pons

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Water**							
Batch R4654969								
WG3065603-1 LCS								
o-Xylene			96.4		%		70-130	04-JUN-19
Styrene			101.8		%		70-130	04-JUN-19
Tetrachloroethylene			99.8		%		70-130	04-JUN-19
Toluene			99.4		%		70-130	04-JUN-19
trans-1,2-Dichloroethylene			99.5		%		70-130	04-JUN-19
trans-1,3-Dichloropropene			92.3		%		70-130	04-JUN-19
Trichloroethylene			101.5		%		70-130	04-JUN-19
Trichlorofluoromethane			98.5		%		60-140	04-JUN-19
Vinyl chloride			82.9		%		60-140	04-JUN-19
WG3065603-2 MB								
1,1,1,2-Tetrachloroethane			<0.50		ug/L		0.5	04-JUN-19
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	04-JUN-19
1,1,1-Trichloroethane			<0.50		ug/L		0.5	04-JUN-19
1,1,2-Trichloroethane			<0.50		ug/L		0.5	04-JUN-19
1,1-Dichloroethane			<0.50		ug/L		0.5	04-JUN-19
1,1-Dichloroethylene			<0.50		ug/L		0.5	04-JUN-19
1,2-Dibromoethane			<0.20		ug/L		0.2	04-JUN-19
1,2-Dichlorobenzene			<0.50		ug/L		0.5	04-JUN-19
1,2-Dichloroethane			<0.50		ug/L		0.5	04-JUN-19
1,2-Dichloropropane			<0.50		ug/L		0.5	04-JUN-19
1,3-Dichlorobenzene			<0.50		ug/L		0.5	04-JUN-19
1,4-Dichlorobenzene			<0.50		ug/L		0.5	04-JUN-19
Acetone			<30		ug/L		30	04-JUN-19
Benzene			<0.50		ug/L		0.5	04-JUN-19
Bromodichloromethane			<2.0		ug/L		2	04-JUN-19
Bromoform			<5.0		ug/L		5	04-JUN-19
Bromomethane			<0.50		ug/L		0.5	04-JUN-19
Carbon tetrachloride			<0.20		ug/L		0.2	04-JUN-19
Chlorobenzene			<0.50		ug/L		0.5	04-JUN-19
Chloroform			<1.0		ug/L		1	04-JUN-19
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	04-JUN-19
cis-1,3-Dichloropropene			<0.30		ug/L		0.3	04-JUN-19
Dibromochloromethane			<2.0		ug/L		2	04-JUN-19
Dichlorodifluoromethane			<2.0		ug/L		2	04-JUN-19

Quality Control Report

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
Markham ON L3R 8V2
Contact: Chris Pons

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Water**							
Batch R4654969								
WG3065603-2 MB								
Ethylbenzene			<0.50		ug/L		0.5	04-JUN-19
n-Hexane			<0.50		ug/L		0.5	04-JUN-19
m+p-Xylenes			<0.40		ug/L		0.4	04-JUN-19
Methyl Ethyl Ketone			<20		ug/L		20	04-JUN-19
Methyl Isobutyl Ketone			<20		ug/L		20	04-JUN-19
Methylene Chloride			<5.0		ug/L		5	04-JUN-19
MTBE			<2.0		ug/L		2	04-JUN-19
o-Xylene			<0.30		ug/L		0.3	04-JUN-19
Styrene			<0.50		ug/L		0.5	04-JUN-19
Tetrachloroethylene			<0.50		ug/L		0.5	04-JUN-19
Toluene			<0.50		ug/L		0.5	04-JUN-19
trans-1,2-Dichloroethylene			<0.50		ug/L		0.5	04-JUN-19
trans-1,3-Dichloropropene			<0.30		ug/L		0.3	04-JUN-19
Trichloroethylene			<0.50		ug/L		0.5	04-JUN-19
Trichlorofluoromethane			<5.0		ug/L		5	04-JUN-19
Vinyl chloride			<0.50		ug/L		0.5	04-JUN-19
Surrogate: 1,4-Difluorobenzene			102.1		%		70-130	04-JUN-19
Surrogate: 4-Bromofluorobenzene			100.2		%		70-130	04-JUN-19
WG3065603-5 MS		**WG3065603-3**						
1,1,1,2-Tetrachloroethane			96.6		%		50-140	04-JUN-19
1,1,2,2-Tetrachloroethane			94.5		%		50-140	04-JUN-19
1,1,1-Trichloroethane			96.3		%		50-140	04-JUN-19
1,1,2-Trichloroethane			92.8		%		50-140	04-JUN-19
1,1-Dichloroethane			91.0		%		50-140	04-JUN-19
1,1-Dichloroethylene			91.1		%		50-140	04-JUN-19
1,2-Dibromoethane			92.2		%		50-140	04-JUN-19
1,2-Dichlorobenzene			98.8		%		50-140	04-JUN-19
1,2-Dichloroethane			88.2		%		50-140	04-JUN-19
1,2-Dichloropropane			90.8		%		50-140	04-JUN-19
1,3-Dichlorobenzene			98.0		%		50-140	04-JUN-19
1,4-Dichlorobenzene			98.4		%		50-140	04-JUN-19
Acetone			88.5		%		50-140	04-JUN-19
Benzene			92.2		%		50-140	04-JUN-19
Bromodichloromethane			90.5		%		50-140	04-JUN-19

Quality Control Report

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
Markham ON L3R 8V2

Contact: Chris Pons

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Water**							
Batch R4654969								
WG3065603-5 MS		**WG3065603-3**						
Bromoform			94.2		%		50-140	04-JUN-19
Bromomethane			91.9		%		50-140	04-JUN-19
Carbon tetrachloride			95.4		%		50-140	04-JUN-19
Chlorobenzene			93.7		%		50-140	04-JUN-19
Chloroform			90.1		%		50-140	04-JUN-19
cis-1,2-Dichloroethylene			89.8		%		50-140	04-JUN-19
cis-1,3-Dichloropropene			89.3		%		50-140	04-JUN-19
Dibromochloromethane			97.1		%		50-140	04-JUN-19
Dichlorodifluoromethane			60.3		%		50-140	04-JUN-19
Ethylbenzene			95.2		%		50-140	04-JUN-19
n-Hexane			89.6		%		50-140	04-JUN-19
m+p-Xylenes			97.0		%		50-140	04-JUN-19
Methyl Ethyl Ketone			81.7		%		50-140	04-JUN-19
Methyl Isobutyl Ketone			88.6		%		50-140	04-JUN-19
Methylene Chloride			88.6		%		50-140	04-JUN-19
MTBE			99.98		%		50-140	04-JUN-19
o-Xylene			94.5		%		50-140	04-JUN-19
Styrene			101.7		%		50-140	04-JUN-19
Tetrachloroethylene			97.7		%		50-140	04-JUN-19
Toluene			96.7		%		50-140	04-JUN-19
trans-1,2-Dichloroethylene			98.7		%		50-140	04-JUN-19
trans-1,3-Dichloropropene			94.3		%		50-140	04-JUN-19
Trichloroethylene			101.5		%		50-140	04-JUN-19
Trichlorofluoromethane			88.8		%		50-140	04-JUN-19
Vinyl chloride			71.6		%		50-140	04-JUN-19

Client:	GOLDER ASSOCIATES LTD. (Markham) 215 Shields Court. Unit 1 Markham ON L3R 8V2
Contact:	Chris Pons

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L2284210 Report Date: 04-JUN-19

Client: GOLDER ASSOCIATES LTD. (Markham)
215 Shields Court. Unit 1
Markham ON L3R 8V2

Contact: Chris Pons

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	21-MAY-19 12:15	04-JUN-19 13:00	4	14	days	EHTR
	2	21-MAY-19 11:45	04-JUN-19 13:00	4	14	days	EHTR
	3	21-MAY-19 14:15	04-JUN-19 13:00	4	14	days	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2284210 were received on 03-JUN-19 19:45.

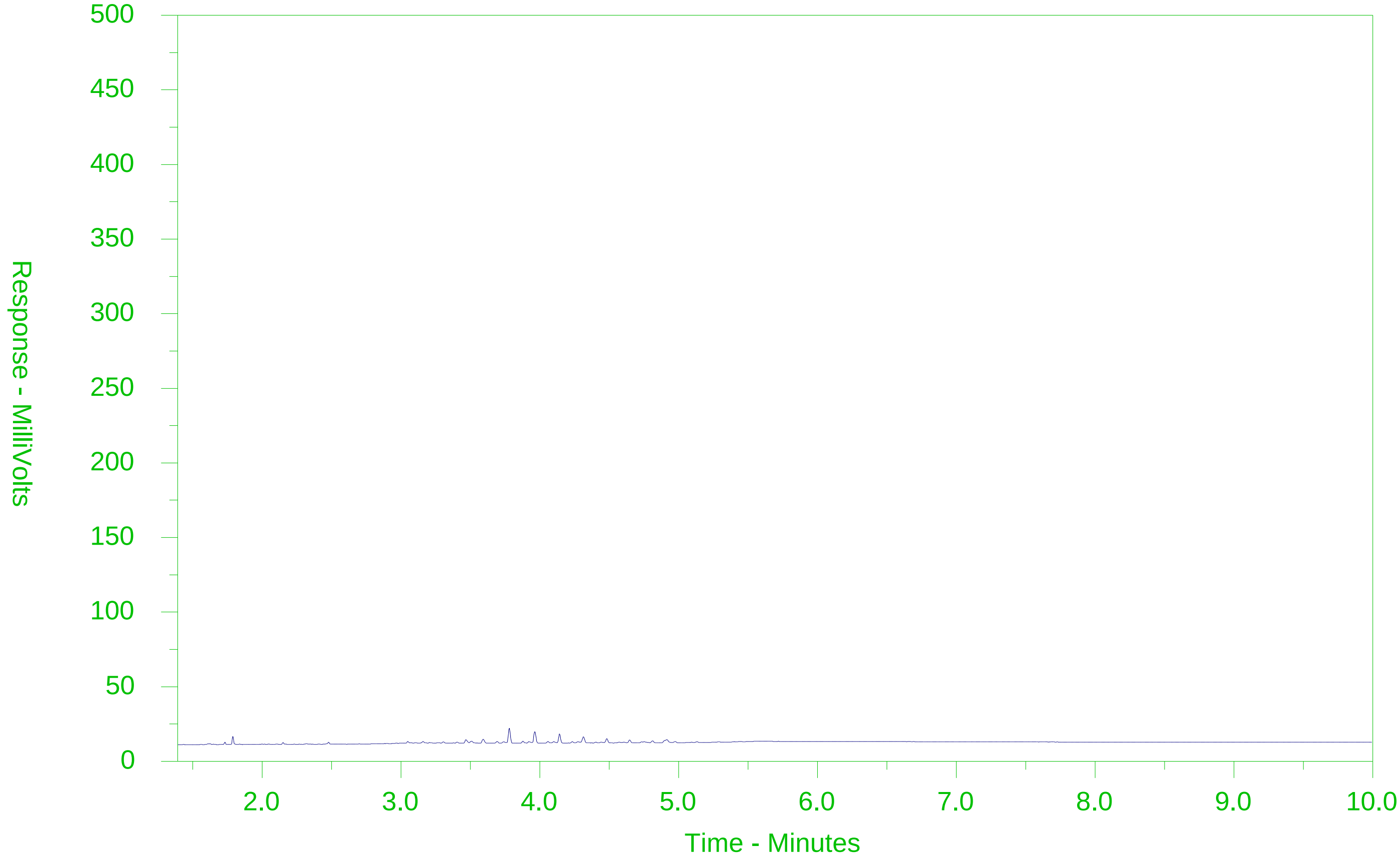
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2284210-1
Client Sample ID: MW1



←F2→	←F3→		←F4→
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

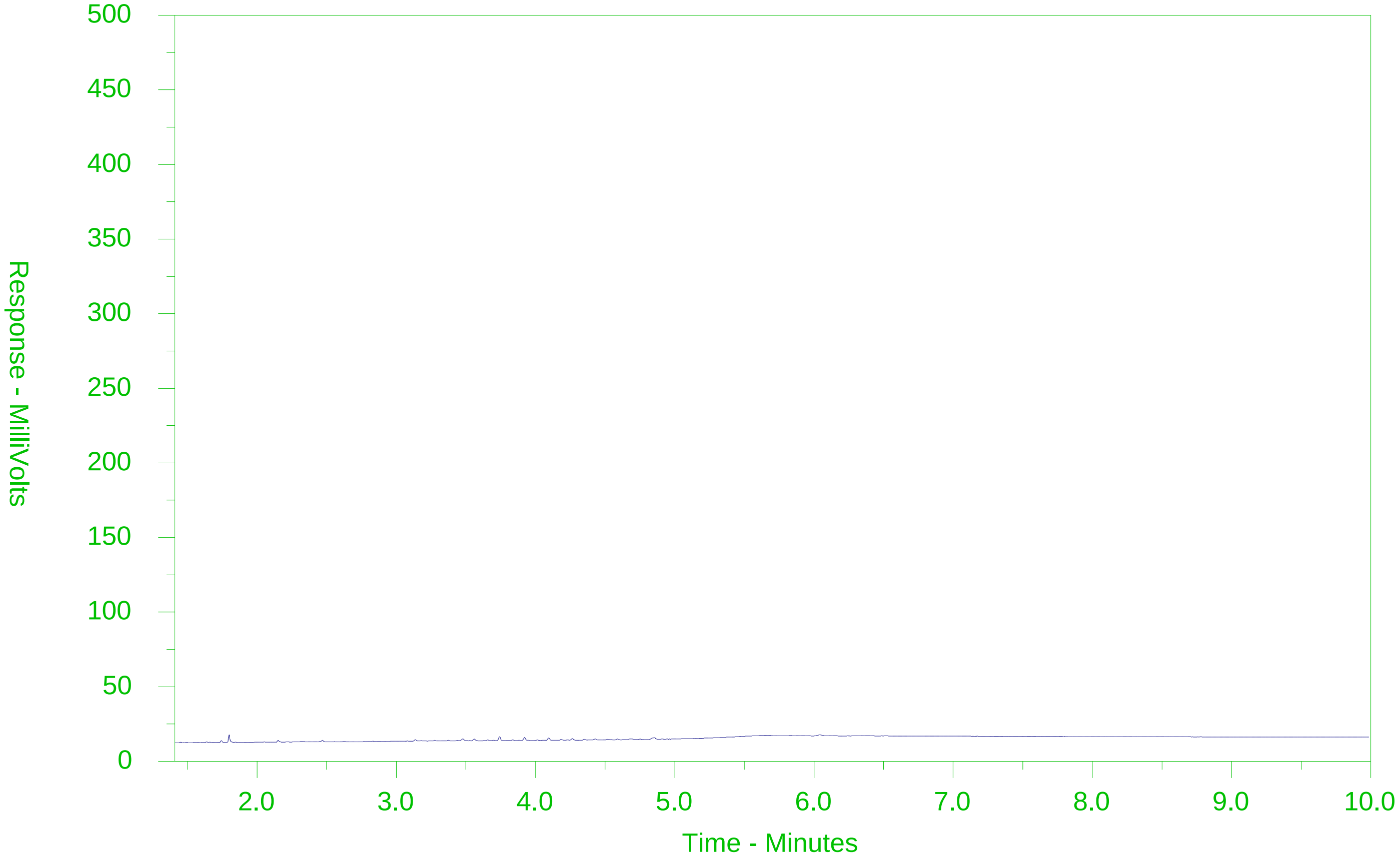
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2284210-2
Client Sample ID: MW2



←F2→	←	F3→	←F4→
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

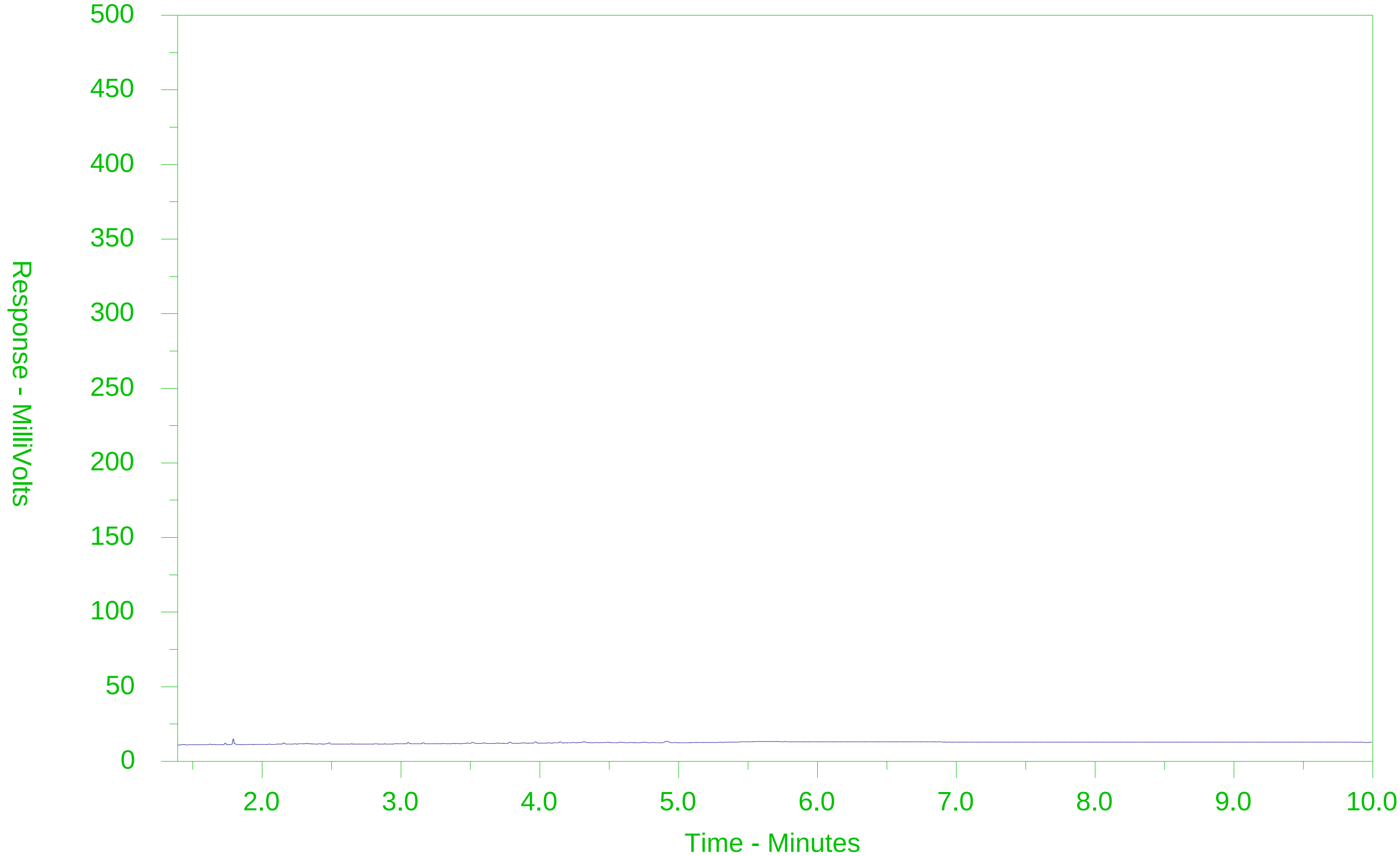
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2284210-3
Client Sample ID: MW3



←F2→	←	F3→	←F4→
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease	→
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2284210-COFC

COC Number: 17 - 733186

Page of

Report To	Contact and company name below will appear on the final report
Company:	Golder Associates
Contact:	Chris Pons
Phone:	905 431 3118
	Company address below will appear on the final report
Street:	#1 215 Shields Court
City/Province:	Markham, ON
Postal Code:	L3R 8V2
Invoice To	Same as Report To [X] YES [ ] NO
	Copy of Invoice with Report [ ] YES [ ] NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: [X] PDF [ ] EXCEL [ ] EDD (DIGITAL)

Quality Control (QC) Report with Report [ ] YES [ ] NO

[X] Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: [X] EMAIL [ ] MAIL [ ] FAX

Email 1 or Fax: chris_pons@golder.com

Email 2: gene_lee@golder.com

Email 3:

Invoice Distribution

Select Invoice Distribution: [X] EMAIL [ ] MAIL [ ] FAX

Email 1 or Fax:

Email 2:

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] [X] Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] [ ]; 3 day [P3-25%] [ ]; 2 day [P2-50%] [ ]

EMERGENCY: 1 Business day [E-100%] [ ]; Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)] [ ]

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:

Job #: 19115436

PO / AFE:

LSD:

ALS Lab Work Order # (lab use only):

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Contact: Sampler:

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX/F1/F2-F4	CN	Cr6 (field filter)	EC/Cl/pH	Hg (filtered)	Metals (filtered)	PAH	VOC	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	MW1	21-MAY-19	12:15	GW	✓	✓	✓	✓	✓	✓	✓	✓			
	MW2	21-MAY-19	11:45	GW	✓	✓	✓	✓	✓	✓	✓	✓			
	MW3	21-MAY-19	14:15	GW	✓	✓	✓	✓	✓	✓	✓	✓			
	TRIP BLANK	—	—	—								✓			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? [ ] YES [ ] NO

Are samples for human consumption/ use? [ ] YES [ ] NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

· Table 2 standards

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen [ ] SIF Observations Yes [ ] No [ ]

Ice Packs [ ] Ice Cubes [ ] Custody seal intact Yes [ ] No [ ]

Cooling Initiated [ ]

INITIAL COOLER TEMPERATURES °C:

FINAL COOLER TEMPERATURES °C: 12.9

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Gene Lee	Date: May 21 2019	Time: 4:48	Received by:	Date:	Time:	Received by: [signature]	Date: 3-6-19	Time: 19:4?

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

GOLDER
MEMBER OF WSP

golder.com

APPENDIX C

Natural Heritage Evaluation Report

REPORT

Environmental Impact Assessment

14204 Durham Regional Road 30, Whitchurch-Stouffville, Ontario

Submitted to:

Mr. Chris Galway, Senior Land Manager, East Central Ontario

Lafarge Canada Inc.
6509 Airport Road
Mississauga, Ontario
L4V 1S7

Submitted by:

Golder Associates Ltd.

6925 Century Avenue, Suite #100, Mississauga, Ontario, L5N 7K2, Canada

+1 905 567 4444

19115436

June 2021

Distribution List

PDF - Lafarge Canada Inc.

PDF - Golder Associates Ltd.

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by Lafarge Canada Inc. (Lafarge) to complete a natural environment study to accompany a Site alteration permit application (the Project) for the northeast corner of the property located at 14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario (the Site; Figure 1).

Golder understands that the purpose of the Site alteration is to accept suitable excess fill from construction projects in the surrounding area and to restore the Site to its original grade to match the topography of the surrounding area. Fill will be placed such that the final topographic contours at the will be visually consistent with the elevations of the surrounding lands. Following the completion of the proposed alteration, the proposed future use of the Site is for agricultural crop production.

The fill area is a former aggregate extraction pit where the aggregate resources is depleted and is undergoing rehabilitation in accordance with requirements under the *Aggregate Resources Act* and Ministry of Natural Resources and Forestry (MNRF) licence. Concurrent with this application Lafarge has applied to the MNRF to amend the rehabilitation plan and surrender the portion of the licence subject to the Site alteration permit.

This report specifically addresses the requirements of an Environmental Impact Assessment (EIA), which is required to be completed where a Site is located on or adjacent to an area of Significant Natural Heritage, as per the Town's *Guidelines for Application of a Site Alteration and Fill Permit as per By-Law 2019-068-RE,* dated June 4, 2019. The report also addresses the requirements of natural heritage evaluation (NHE) under the Oak Ridges Moraine Conservation Plan (ORMCP) (2017). According to Section 22(3) of the ORMCP, an NHE is required for any development or Site alteration proposed adjacent to natural heritage features and the related vegetation protection zone.

The purpose of this report is to assess potential environmental impacts of the proposed Site alteration (i.e., importation of fill and regrading) on environmental features and functions on the Site and in the study area; and recommend appropriate mitigation measures to avoid or minimize impacts, where possible.

For the purposes of this report, the study area is defined as 120 m around the Fill Area boundary.

1.1 Site and Study Area Description

The Site is located on the east side of York Durham Line and the south side of Hillsdale Drive and the Fill Area is approximately 37.49 hectares (ha) in size. The western half of the Fill Area is characterized by open disturbed land and anthropogenic ponds associated with aggregate extraction. The ponds are temporary features created through below water extraction and will be filled with onsite material as part of the rehabilitation plan. The eastern half of the Fill Area is characterized by disturbed cultural meadow and cultural thicket. In the northern portion of the Fill Area, there is a small portion of deciduous woodland that extends onto the Fill Area from the northern portion of the Site. There are no structures or buildings in the Fill Area.

There are areas of aggregate extraction to the west and south of the Site, as well as cultural meadow to the south. There are areas of deciduous forest, cultural meadow, and residential properties to the north of the Site and Fill Area, on the north side of Hillsdale Drive. There is a cultural meadow to the east of the Site, on the east side of York Durham Line (Figure 1).

1.2 Proposed Development

It is understood that fill materials will be imported, and the Fill Area will be filled such that the resulting grade will generally match the topography of the surrounding lands. Following the filling and grading operations, the proposed future use of the Site is agricultural, as shown on the approved ARA final rehabilitation plan. No buildings or other structures are proposed to be constructed in the Fill Area.

2.0 ENVIRONMENTAL POLICY CONTEXT

2.1 Provincial Policy Context

The PPS was issued under Section 3 of *The Planning Act*. The natural heritage policies of the PPS (MMAH 2020) indicate that:

- 2.1.1 Natural features and areas shall be protected for the long-term.
- 2.1.2 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.
- 2.1.3 Natural heritage systems shall be identified in Ecoregions 6E and 7E, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas.
- 2.1.4 Development and Site alteration shall not be permitted in:
  - a) significant wetlands in Ecoregions 5E, 6E, and 7E
  - b) significant coastal wetlands
- 2.1.5 Unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, development and Site alteration shall not be permitted in:
  - a) significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E, and 7E
  - b) significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)
  - c) significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)
  - d) significant wildlife habitat
  - e) significant areas of natural and scientific interest
  - f) coastal wetlands in Ecoregions 5E, 6E, and 7E that are not subject to policy 2.1.4(b)
- 2.1.6 Development and Site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.
- 2.1.7 Development and Site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.
- 2.1.8 Development and Site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the ecological function of the adjacent

lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

2.2 Migratory Birds Convention Act

The *Migratory Birds Convention Act* (MBCA) (Canada 1994) prohibits the killing or capturing of migratory birds, as well as any damage, destruction, removal or disturbance of active nests. It also allows the Canadian government to pass and enforce regulations to protect various species of migratory birds, as well as their habitats. While Environment and Climate Change Canada (ECCC) can issue permits allowing the destruction of nests for scientific or agricultural purposes, or to prevent damage being caused by birds, it does not typically allow for permits in the case of industrial or construction activities.

2.3 Fisheries Act

The purpose of the *Fisheries Act* (Canada 1985) is to maintain healthy, sustainable, and productive Canadian fisheries through the prevention of pollution and the protection of fish and their habitat. All projects undertaking work in or near-water must comply with the provisions of the *Fisheries Act*.

Measures to protect fish habitat include avoiding in-water work (i.e., below the high-water mark) and work on the banks or shoreline of watercourse/waterbody, as well maintaining riparian vegetation. Any project that is unable to avoid impacts to fish or fish habitat will require a project review (DFO 2019). If it is determined through the Fisheries and Oceans Canada (DFO) review process that the project will result in death of fish or the harmful alteration, disruption, or destruction of fish habitat (HADD), an authorization under the *Fisheries Act* is required. This includes Projects that have the potential to obstruct fish passage or impacts flows.

Proponents of projects requiring a *Fisheries Act* Authorization are required to also submit a Habitat Offsetting Plan, which provides details of how the death of fish and/or HADD to fish habitat will be offset, as well as outlining associated costs and monitoring commitments. Proponents also have a duty to notify DFO of any unforeseen activities that cause harm to fish and outline the steps taken to address them.

2.4 Species at Risk

2.4.1 Species at Risk Act

At a federal level, species at risk (SAR) designations for species occurring in Canada are initially determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If approved by the federal Minister of the Environment and Climate Change, species are added to the federal Species at Risk Public Registry (Canada 2002). Species that are included on Schedule 1 as endangered or threatened are afforded protection of critical habitat on federal lands under the *Species at Risk Act* (SARA). On private or provincially-owned lands, only aquatic species listed as endangered, threatened or extirpated and migratory birds are protected under SARA, unless ordered by the Governor in Council.

2.4.2 Endangered Species Act

SAR designations for species in Ontario are initially determined by the Committee on the Status of Species at Risk in Ontario (COSSARO), and if approved by the provincial Minister of Environment, Conservation and Parks, species are added to the provincial *Endangered Species Act* (ESA) which came into effect June 30, 2008 (Ontario 2007). The legislation prohibits the killing or harming of species identified as endangered or threatened in the various schedules to the Act. As of June 30, 2008, the Species at Risk in Ontario (SARO) List is contained in Ontario Regulation (O. Reg.) 230/08.

Subsection 9(1) of the ESA prohibits the killing, harming, or harassing of species identified as ‘endangered’ or ‘threatened’ in the various schedules to the Act. Subsection 10(1) (a) of the ESA states that *“No person shall damage or destroy the habitat of a species that is listed on the SARO list as an endangered or threatened species”*.

General habitat protection is provided, by the ESA, to all threatened and endangered species. Species-specific habitat protection is only afforded to those species for which a habitat regulation has been prepared and passed into law as a regulation of the ESA. The ESA has a permitting process where alterations to the habitat of protected species may be considered.

2.5 Oak Ridges Moraine Conservation Plan

The Oak Ridges Moraine (ORM) is a terrain feature that stretches from the northeast corner of Peel Region to the central townships of Northumberland County and represents the height of land across this area (Chapman and Putnam 1984). Most of the watercourses that drain to Lake Ontario in this region have their headwaters in the ORM. Similarly, many of the watercourses that drain north to the Kawartha Lakes and the Trent-Severn Waterway have their origins in the moraine. Many significant natural features are present on the moraine. To protect the natural environment features and qualities of the ORM, the provincial government has designated the moraine a special land use planning area and has formulated the Oak Ridges Moraine Conservation Plan (ORMCP) to identify the land use designations for the lands within the ORM planning area and to establish the various policies that attend proposed development within this area (MMAH 2017).

The entire Site and the majority of the study area is within the Oak Ridges Moraine Countryside Area, which provides an agricultural and rural transition and buffer between Natural Core Areas and Natural Linkage Areas and the urbanized Settlement Areas (MMAH 2017). Off-Site, the north portion of the study area is within the Natural Linkage Area which protects critical natural and open space linkages between Natural Core Areas and along rivers and streams.

Development and Site alteration are generally prohibited within and adjacent to key natural heritage features (KNHF) and key hydrologic features (KHFs). KNHFs include wetlands, fish habitat, life science Areas of Natural and Scientific Interest (ANSI), significant valleylands, significant woodlands, significant wildlife habitat (SWH), rare plant communities (i.e., sand barrens, savannahs, tallgrass prairies, alvars), and habitat of endangered or threatened species. KHFs include permanent and intermittent streams, lakes, seepage areas and springs and wetlands. These policies have been incorporated into the Town’s Official Plan (OP) (Whitchurch-Stouffville 2017) and are discussed where relevant in Section 5.0.

In general, the ORMCP takes precedence over municipal OPs. In addition, the ORMCP prohibits municipal policies for mineral aggregate operations, wayside pits, and agricultural uses that are more restrictive than those in the ORMCP.

During rehabilitation of mineral aggregate operations, the quality of fill received and the placement of fill at the Site cannot cause an adverse effect to the natural environment.

2.6 Regional Municipality of York Official Plan

All development or Site alteration proposed within the ORM plan area of the Region’s boundary are subject to the ORMCP. Where a Site is located within the ORM plan area, environmental impact studies are required to meet the specifications of the ORMCP (York 2010).

Immediately north of the Site, there is an Earth Science ANSI known as the Musselman Lake Kettle Complex, according to Map 3 of the Region's OP (York 2010). In addition, the deciduous forests in the northern portions of the Site and study area are mapped as woodlands on Map 5 of the Region's OP (York 2010).

2.7 Town of Whitchurch-Stouffville

The Town's OP (2017) has been amended to conform to the policies of the ORMCP. All development or Site alteration proposed within the ORM plan area of the Town's boundary are subject to the ORMCP.

According to Schedule H of the Town's OP (Whitchurch-Stouffville 2017), the two deciduous forests in the north portion of the Site and study area (Figure 1) are designated KNHF: significant woodlands.

2.8 Toronto Region Conservation Authority

The Site is within the jurisdiction of the Toronto Region Conservation Authority (TRCA). Any development or activities proposed within the regulation limit as governed by O. Reg. 166/06 under the *Conservation Authorities Act* (Ontario 2011) may require a permit. According to available mapping (TRCA 2019), the Site and study area are not within any TRCA regulated areas.

3.0 METHODS

3.1 Background Review

The investigation of existing conditions for the Fill Area and in the study area included a desktop background information search and literature review to gather data about the local area and provide context for the evaluation of the natural features, including:

- Natural Heritage Information Centre (NHIC) database maintained by the MNRF (NHIC 2019)
- Land Information Ontario (LIO) geospatial data (MNRF 2019a)
- Species at Risk Public Registry (ECCC 2019)
- Species at Risk in Ontario (SARO) List (MNRF 2019b)
- Breeding Bird Atlas of Ontario (OBBA) (Cadman et al. 2007)
- Atlas of the Mammals of Ontario (Dobbyn 1994)
- Ontario's Reptile and Amphibian Atlas (Ontario Nature 2019)
- Bat Conservation International (BCI) range maps (BCI 2019)
- Ontario Butterfly Atlas (Jones et al. 2019)
- eBird species maps (eBird 2019)
- DFO Aquatic SAR Mapping (DFO 2019)
- Township of Whitchurch-Stouffville Official Plan (2017)
- Regional Municipality of York Official Plan (2010)

- East Holland River Subwatershed Plan (LSRCA 2010)
- State of the Watershed Report – East Holland River (LSRCA 2000)
- TRCA Open Data Portal (TRCA 2018)
- Ballantrae-Musselman Lake and Environs Environmental Management Strategy (NRSI 2012)
- Aerial imagery

To develop an understanding of the ecological communities and potential natural heritage features that may be affected by the proposed Site alteration, MNRF LIO data were used to create base layer mapping for the study area. A geographic query of the NHIC database was conducted to identify element occurrences of any natural heritage features, including wetlands and PSW, ANSI, life science sites, rare vegetation communities, rare, threatened or endangered species, including species ranked S1-S3 (NHIC), and other natural heritage features within 1 km of the study area. An information request was also submitted to the MNRF, Ministry of Environment, Conservation and Parks (MECP), and TRCA on October 9, 2019. No information was provided by the MNRF or MECP, and no information beyond the data found on the TRCA Open Data Portal (TRCA 2018) was provided by TRCA.

3.2 SAR Screening

SAR considered for this report include those species listed in the ESA and SARA. An assessment was conducted to determine which SAR had potential habitat in the study area**.** A screening of all SAR which have the potential to be found in the vicinity of the study area was conducted first as a desktop exercise using the sources listed in Section 3.1. Species with ranges overlapping the study area, or recent occurrence records in the vicinity, were screened by comparing their habitat requirements to habitat conditions in the study area.

The potential for the species to occur was determined through a probability of occurrence. A ranking of low indicates no suitable habitat availability for that species in the study area and no specimens identified. Moderate probability indicates more potential for the species to occur, as suitable habitat appeared to be present in the study area, but no occurrence of the species has been recorded. Alternatively, a moderate probability could indicate an observation of a species, but there is no suitable habitat in the study area. High potential indicates a known species record in the study area (including during the field surveys or background data review) and good quality habitat is present.

Searches were conducted during all field surveys for suitable habitats and signs of all SAR identified through the desktop screening. If the potential for the species to occur in the study area was moderate or high, the screening was refined based on the results of the field surveys. Any habitat identified during the field surveys with potential to provide suitable conditions for additional SAR not already identified through the desktop screening was also assessed and recorded. All probability ratings were updated based on the results of the field surveys.

3.3 Field Surveys

The habitats and communities on the Site were characterized through field surveys. The following sections outline the methods used for each of the field surveys. During all surveys, area searches were conducted, and additional incidental wildlife, plant, and habitat observations were recorded. Searches were also conducted to document the presence or absence of suitable habitat, based on habitat preferences, for those species identified in the desktop SAR screening described above. The dates when all surveys were conducted are included in Table 1.

Table 1: Summary of Field Surveys Conducted on the Site in 2019

Date	Type of Survey
April 17, 2019	Anuran Call Count (ACC) Survey #1, General Wildlife Survey
May 15, 2019	ACC #2, General Wildlife Survey
June 4, 2019	Breeding Bird Survey (BBS) #1, General Wildlife Survey
June 6, 2019	ACC #3, General Wildlife Survey
June 27, 2019	BBS #2, General Wildlife Survey
August 14, 2019	Ecological Land Classification (ELC), Botanical Inventory, Aquatic Habitat Survey, General Wildlife Survey

3.3.1 Plant Community Surveys and Botanical Inventory

Plant communities were first delineated at a desktop level using high-resolution aerial imagery, then ground-truthed in the field (where accessible) using the Ecological Land Classification (ELC) system for southern Ontario (Lee et al. 1998). These inventories were carried out by systematically traversing the Site for a thorough survey of species and communities. Information on dominant plant species and plant community structure and composition was recorded in order to better define and refine the plant community polygons.

The botanical inventory included area searches in all naturally-occurring habitats. The searches were conducted by systematically walking through all habitats in a meandering fashion, generally paralleling the principal (long) axis of a natural area, where feasible, and examining the full width of the area. Lists of all plant species identified during all the field surveys were compiled.

3.3.2 Anuran Call Count Survey

Anuran (frog and toad) call count surveys were conducted at five stations (Figure 1). Surveys followed protocols from the Marsh Monitoring Program method for vocalizing frog surveys (BSC 2008). This method involves collection of call data from fixed stations over three survey periods during the spring and early summer (April to early July), with an interval of at least 15 days between surveys. Surveys began one half-hour after sunset and ended by midnight during evenings with appropriate weather conditions (i.e., little wind and a minimum air temperature of 5˚C, 10˚C, and 17˚C for each respective survey period).

Each station consisted of a semi-circle with a 100 m radius from the centre point (where the observer stands), and each survey was three minutes in duration. All frogs and toads seen or heard were noted on pre-printed datasheets. Frogs and toads heard or seen outside of the 100 m radius were also noted, including estimated distance (where possible).

3.3.3 Breeding Bird Survey

Breeding bird point count surveys for songbirds and other diurnal birds were conducted at two stations (Figure 1). Surveys followed protocols from the Canadian Breeding Bird Survey (Downes and Collins 2003), and the OBBA (Cadman et al. 2007). Point count stations were established in representative habitats on the Site and were spaced a minimum of 250 m apart. Surveys were conducted between 30 minutes before sunrise and 10:00 am to encompass the period of maximum bird song.

Each station consisted of a circle with a 100 m radius from the centre point (where the observer stands), and each point count was 10 minutes in duration, and was separated into survey windows of 0-3, 3-5, and 5-10 minutes. All birds seen or heard were noted on pre-printed datasheets and observations were made regarding sex, age and notable behaviour, when possible. Birds heard or seen outside of the 100 m radius were also noted using methods from the OBBA, including estimated distance (where possible).

3.3.4 General Wildlife Survey

General wildlife surveys included track and sign surveys, area searches, and incidental observations, concurrent with other field surveys. The full range of habitats were searched, with special attention paid to edge habitats and other areas where mammals might be active. Areas of exposed substrate such as sand or mud were located and examined for any visible tracks. Any wildlife (including mammals, birds, butterflies, and dragonflies) seen and identified were recorded. When encountered, tracks and other signs (e.g., tracks, scats, hair, tree scrapes, etc.) were identified to a species, if possible, and recorded. Observations of wildlife species or signs during all field surveys were recorded.

Visual encounter surveys for reptiles and amphibians, as well as reptile and amphibian habitat (with a focus on SAR) were also conducted on the Site. All suitable habitats for reptiles and amphibians were searched (e.g., flipping logs and other types of cover objects, observations in piles of rocks) and all reptiles and amphibians observed were identified and recorded.

3.4 Analysis of Significance and Sensitivity and Impact Assessment

An assessment was conducted to determine if any significant environmental features or SAR exist, or have moderate or high potential to exist, in the study area and assess whether the proposed Site alteration would negatively impact surrounding significant natural heritage features or SAR.

4.0 EXISTING CONDITIONS

4.1 Ecosystem Setting and Regional Context

The study area is located in Ecoregion 6E (Lake Simcoe – Rideau), which covers just over 6% of southern Ontario (Crins et al. 2009). Ecoregion 6E is underlain by bedrock of dolomite and limestone and is characterized by gently rolling surface terrain interspersed by drumlin fields and moraines. Soils are primarily mineral-based and dominated by Gray Brown Luvisols and Melanic Brunisols. The majority of the region is covered by cropland or pasture (57%), with 16% covered by forest and 4% covered by water (Crins et al. 2009).

The study area is located in the Oak Ridges Moraine physiographic region (Chapman and Putnam 1984). The region is characterized by hills composed of sand and gravel, and occasionally till. The northern edge of the moraine contains numerous swampy-floored valleys. The Oak Ridges Moraine is the headwater region for numerous streams. Agriculture is common on gentler hillsides and in the sandy outwash areas, and are often used for cattle farming, potatoes and rye. Kettle lakes are also a common feature of this physiographic region (Chapman and Putnam 1984).

The study area is in the Duffins Creek watershed and the West Duffins Creek subwatershed. The Duffins Creek watershed drains approximately 283 km^2 of southern Ontario. Duffins Creek travels from the headwaters in the Oak Ridges Moraine to the confluence with Duffins Creek Marsh and Lake Ontario. The majority of the watershed is occupied by rural agricultural areas (54%) and natural areas (37%). Only 7% of the watershed is urbanized (TRCA 2003).

4.2 Vegetation

4.2.1 Regional Setting

The study area is located within the Deciduous Forest Region of Ontario where it transitions into the Great Lakes-St. Lawrence Forest. Dominant tree species of the Deciduous Forest Region include white pine (*Pinus strobus*), red pine (*Pinus resinosa*), eastern hemlock (*Tsuga americana*), white cedar (*Thuja occidentalis*), yellow birch (*Betula alleghaniensis*), sugar and red maples (*Acer saccharum* and *A. rubrum*), basswood (*Tilia americana*) and red oak (*Quercus rubra*). However, species with more southern affinities can also be found in this region, including black walnut (*Juglans nigra*), butternut (*Juglans cinerea*), tulip tree (*Liriodendron tulipifera*), black gum (*Nyssa sylvatica*), many types of oaks, hickories, and sassafras (Rowe 1972).

4.2.2 Plant Communities

There are three ELC community types on the Site and in the study area, including cultural meadow and forest, in addition to anthropogenic communities such as agriculture. The ELC communities are shown on Figure 1 and are briefly described in Table 2.

Table 2: Plant Communities on the Site and in the Study Area

ELC Community	Field Description	SRANK[a]
CULTURAL (CU)		
CUM Cultural Meadow	A disturbed cultural meadow in the eastern and southwestern portions of the Site associated with aggregate extraction. The vegetation community was dominated by goldenrod sp. (*Solidago* sp.), wild carrot (*Daucus carota*), and cow-vetch (*Vicia cracca*). Trees including white willow (*Salix alba*), black locust (*Robinia pseudoacacia*), black walnut (*Juglans nigra*), eastern cottonwood (*Populus deltoides*), and Manitoba maple (*Acer negundo*) were scattered in low abundance throughout the eastern portion of the meadow.	N/A
CUT Cultural Thicket	A cultural thicket in the eastern portion of the Site dominated by willow sp. (Salix sp.), black locust, and Manitoba maple.	N/A
FOREST (FO)		
FOD5 Dry-Fresh Sugar Maple Deciduous Forest	A deciduous forest dominated by sugar maple (*Acer saccharum*), basswood (*Tilia americana*), beech (*Fagus grandifolia*), and Manitoba maple in the north portion of the Site and study area, and off-Site in the northwestern portion of the study area. Both areas of forest were bordered by shrubs including alternate-leaved dogwood (*Cornus alternifolia*), chokecherry (*Prunus virginiana*), staghorn sumac (*Rhus typhina*), and tartarian honeysuckle (*Lonicera tatarica*).	N/A
ANTHROPOGENIC		
OD Open Disturbed	Disturbed area in the western portion of the Site and study area, and off-Site, in the western and southwestern portions of the study area, associated with aggregate extraction. Patches of regenerating vegetation of species found in the cultural meadow (CUM) community were observed throughout the area, particularly in the southern portion. Ephemeral ponds were observed throughout the area in the spring.	N/A
OW Open Water	Two large temporary ponds in the western portion of the Site associated with aggregate extraction.	N/A
RES Residential	A residential property off-Site, in the northern portion of the study area, north of Hillsdale Drive.	N/A

[a] An SRank is a provincial –level rank indicating the conservation status of a species or plant community and is assigned by the NHIC in Ontario (NHIC 2018). SRanks are not legal designations but are used to prioritize protection efforts in the Province. SRanks for plant communities in Ontario are defined in the Significant Wildlife Habitat Technical Guide (MNRF 2000). Ranks 1-3 are considered extremely rare to uncommon in Ontario; Ranks 4 and 5 are considered to be common and widespread. n/a indicates a community that has not been ranked, which often applies to anthropogenic, culturally-influenced or high-level ELC communities (i.e., FOM).

4.2.3 Vascular Plants

A total of 49 vascular plant species were identified on the Site during the botanical, or other, surveys (Appendix A). Of these, 53% are native species, and 43% are exotic species. The remaining 4% (two plants) were unable to be identified to the species level due to plant condition or seasonal timing (i.e., not flowering). The high proportion of exotic or introduced species is typical of a former aggregate pit where there is a high level of disturbance and limited natural habitat.

Significant and Sensitive Species

All of the plant species identified through the botanical, or other, surveys are secure and common, widespread and abundant in Ontario and globally (S4 or S5; G5) or are unranked alien species (SNA; GNR). None of the plant species identified in the desktop SAR screening as having ranges which overlap the study area (Appendix B) were found during the botanical, or other, field surveys.

4.3 Wildlife

4.3.1 Amphibians

A total of two amphibian species were observed on the Site during anuran call count, or other, field surveys (Appendix C): American toad (*Anaxyrus americanus*) and gray treefrog (*Hyla versicolor*).

Two of the anuran call count survey stations targeted the two temporary ponds (OW) (Figure 1) in the western portion of the former extraction area. These features were highly turbid and surrounded by sand and other fine substrates. A total of six American toads were observed at these stations during field surveys. Distant grey treefrog calls were heard to the north of the Site, likely outside of the study area.

Three survey stations targeted ephemeral ponds in the former extraction area (Figure 1), which were characterized as temporary breeding habitat. A total of eight American toads were observed at these stations during all field surveys combined.

Significant and Sensitive Species

Both amphibian species observed during field surveys are secure and common in Ontario and globally (S5; G5) (Appendix C). None of the amphibian species identified in the desktop SAR screening as having ranges which overlap the Site and study area (Appendix B) were found during the field surveys.

4.3.2 Breeding Birds

A total of 19 bird species were observed on the Site during breeding bird, or other field surveys (Appendix C). Savannah sparrow (*Passerculus sandwichensis*), song sparrow (*Melospiza melodia*), and indigo bunting (*Passerina cyanea*) were the most common bird species observed during the surveys. Savannah sparrow is a grassland bird that breeds in meadows, pastures, while song sparrow and indigo bunting breed in open woodlands (Cornell 2015).

Significant and Sensitive Species

All of the bird species observed during field surveys are secure and common in Ontario and globally (S4, S5, or SNA; G5) (Appendix C). None of the bird species identified in the desktop SAR screening as having ranges which overlap the Site and study area (Appendix B) were found during the field surveys.

4.3.3 Other Wildlife

One mammal was observed off-Site, in the north portion of the study area during field surveys (Appendix C): coyote (*Canis latrans*).

Significant and Sensitive Species

Coyote is secure and common in Ontario and globally (S5; G5) (Appendix C). None of the other wildlife species identified in the desktop SAR screening as having ranges which overlap the Site and study area (Appendix B) were found during the field surveys.

Based on field surveys, it was determined that there is low potential for SAR bat habitat on the Site. No large-diameter trees, cavity trees, or snags that could provide potential habitat for little brown myotis (*Myotis lucifugus*) or northern myotis (*Myotis septentrionalis*) were observed on the Site. No leaf clumps, hanging moss, or squirrel nests were observed that could provide potential roosting habitat for tri-colored bat (*Perimyotis subflavus*), and no rock piles were observed that could provide potential roosting habitat for eastern small-footed myotis (*Myotis leibii*). Off-Site, within the study area, the areas of deciduous forest (FOD5) in the northern and northwestern portions of the study area may contain large-diameter cavity or snag trees, or a large concentration of leaf clumps, to support little brown myotis, northern myotis or tri-colored bat.

4.4 Aquatic Features and Fish Habitat

There are two isolated bodies of water formed as a result of aggregate extraction in the western portion of the Fill Area (Figure 1). Neither waterbody is hydrologically connected to any other surface water features off-Site, and no fish were observed in either waterbody during the field surveys.

5.0 SIGNIFICANT NATURAL HERITAGE FEATURES

This section assesses the natural heritage features and functions (as outlined in Section 2.0) located within the study area. Note that although the headings may be different, all significant natural heritage features in all legislation (e.g., Significant Natural Heritage Features under the PPS, Key Natural Heritage Features under the ORMCP, etc.) are included in this section. The following sources were used during the assessment of features:

- Natural Heritage Reference Manual (NHRM; MNR 2010);
- Significant Wildlife Habitat Technical Guide (SWHTG; MNR 2000);
- Significant Wildlife Habitat Mitigation Support Tool (SWHMiST; MNRF 2014); and,
- Significant Wildlife Habitat Criteria Schedule for Ecoregion 6E (MNRF 2015).

5.1 Habitat of Endangered or Threatened Species

General habitat protection is provided by the ESA to all threatened and endangered species. General habitat is defined as the area on which a species depends directly or indirectly to carry out life processes, including reproduction, rearing, hibernation, migration or feeding. Species-specific habitat protection is only afforded to those species for which a habitat regulation has been prepared and passed into law as a regulation of the ESA. A habitat regulation outlines specific habitat features and associated buffers that are protected, and also specifies the geographic area(s) of the province where the habitat regulation applies. In some cases, a General Habitat

Description (GHD) may also be prepared to help define and refine the area of protected habitat in advance of a habitat regulation.

As discussed in Section 4.3, the areas of deciduous forest (FOD5) off-Site, within the northern and northwestern portions of the study area, may contain suitable maternity roosting habitat to support three bat species designated endangered under the ESA: little brown myotis, northern myotis and tri-colored bat. There are no habitat regulations or GHDs for these bat species. As such, the extent of the ELC community that may provide habitat is defined as the area of protected habitat.

The off-Site portions of deciduous forest may also provide suitable habitat for two other species: chimney swift (*Chaetura pelagica*), designated threatened under the ESA and butternut (*Juglans cinerea*), designated endangered under the ESA.

Chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007). There are no chimney structures on the Site to provide anthropogenic nesting/roosting habitat, nor were any suitable large diameter trees identified on the Site to provide natural nesting/roosting sites. There are residential properties off-Site in the northern portion of the study area that may have suitable chimney structures. The off-Site portions of deciduous forest (FOD5) may also contain large-diameter cavity trees. According to the GHD for chimney swift (MNRF 2013), habitat is defined as the human-made nest/roost, or natural nest/roost cavity and the area within 90 m of the natural cavity.

Butternut is a shade-intolerant species found along stream banks, on wooded valley slopes, and in openings of deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils (Farrar 1995). No individuals were observed on the Site during field surveys. The off-Site portions of deciduous forest (FOD5) in the northern and northwestern portions of the study area may provide suitable growing habitat for butternut. The area of protected habitat for butternut is defined as the area within 50 m of the trunk. However, this excludes areas including impervious surfaces (e.g., roads) and areas of permanent water.

No other species designated threatened or endangered under the ESA were assessed to have a moderate or high potential to occur on the Site or in the study area based on the results of the field surveys and SAR screening (Appendix B). Because there is potential suitable habitat for little brown myotis, northern myotis, tri-colored bat, chimney swift and butternut off-Site, within the study area, these species are carried forward to the impact assessment (Section 6.1).

5.2 Fish Habitat

The waterbodies in the west portion of the Site are anthropogenic in origin and not hydrologically connected to any fish-bearing watercourses or waterbodies (MNRF 2019a). Therefore, these features are not considered fish habitat under the *Fisheries Act.* If fish exist in the temporary ponds on the Site, a fish collection permit will be obtained from the MNRF and fish will be salvaged and relocated to a nearby surface water feature, if necessary. Further analysis is not warranted.

5.3 Significant Wetlands

Significant wetlands are areas identified as provincially significant by the MNRF using evaluation procedures established by the Province, as amended from time to time (MMAH 2014). Wetlands are assessed based on a range of criteria, including biology, hydrology, societal value, and special features (MNRF 2019c).

There are no PSWs or other evaluated or unevaluated wetlands on the Site or in the study area based on mapping (MNRF 2019a) or identified through the field surveys. Further analysis is not warranted.

5.4 Significant Woodlands

Woodlands can vary in their level of significance at the local, regional, and provincial levels. Significant woodlands are an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to Site quality, species composition, or past management history (MMAH 2014). Where local municipalities have not defined or mapped significant woodlands, these features are to be identified using criteria established by the MNRF as included in the Natural Heritage Reference Manual (NHRM) for Policy 2.3 of the PPS (MNR 2010).

According to Schedule H of the Town's OP (Whitchurch-Stouffville 2017), the two sugar maple deciduous forests (FOD5) (Figure 1) in the north portion of the Site and study area are designated as significant woodlands.

The Region's OP (York 2010) defers to the ORMCP (MMAH 2017) for evaluation of woodland significance. The two sugar maple deciduous forests (FOD5) (Figure 1) are considered significant under ORCMP criteria (MMAH 2017) based on size (i.e., greater than 0.5 ha). In addition, these two forests meet the following NHRM (MNR 2010) criteria to be considered significant by the province:

- Size (i.e., greater than 20 ha);
- Proximity to other habitats (i.e., associated with the Musselman Lake Kettle Complex ANSI in the northern portion of the study area and East Musselman PSW located 230 m north of the Site);
- Linkages (i.e., within the Natural Linkage Area of the Oak Ridges Moraine [MMAH 2017]); and,
- Water protection (i.e., associated with the East Musselman PSW 230 m north of the Site).

Significant woodlands are considered KNHFs within the ORMCP (MMAH 2017). Development is prohibited within significant woodlands and their associated vegetation protection zone (a minimum of 30 m). Development may be permitted adjacent to vegetation protection zones where it is demonstrated that there will be no adverse impacts on the feature on its function (MMAH 2017). Because there is a portion of a significant woodland (FOD5) on the Site, and a significant woodland off-Site, within the study area, it is carried forward to the impact analysis (Section 6.1).

5.5 Significant Valleylands

Significant valleylands should be defined and designated by the planning authority. General guidelines for determining significance of these features are presented in the Natural Heritage Reference Manual (NHRM) for Policy 2.3 of the PPS (MNR 2010). Recommended criteria for designating significant valleylands under the PPS include prominence as a distinctive landform, degree of naturalness, importance of its ecological functions, restoration potential, and historical and cultural values.

There are no valleylands on the Site or in the study area based on mapping (MNRF 2019a) or identified through the field surveys. Further analysis is not warranted.

5.6 Significant Areas of Natural and Scientific Interest

Significant ANSIs are areas identified as provincially significant by the MNRF using evaluation procedures established by the Province, as amended from time to time.

Immediately north of the Site, within the study area, on the north side of Hillsdale Drive, there is a provincially significant Earth Science ANSI known as the Musselman Lake Kettle Complex (Figure 1). This ANSI occupies an area of 258 ha and is "very significant" as it is used for the interpretation of ice lobes formed during the Port Huron Stadial (NRSI 2012). According to the ORMCP (MMAH 2017), development or Site alteration within an Earth Science ANSI or the related minimum area of influence (i.e., 50 m) requires an earth science heritage evaluation that ensures the protection of its geological or geomorphological attributes. Because there is an ANSI immediately adjacent to the Site, it is carried forward to the impact analysis (Section 6.3).

5.7 Significant Wildlife Habitat

Significant wildlife habitat (SWH) is one of the more complicated natural heritage features to identify and evaluate. The NHRM includes criteria and guidelines for designating SWH. There are two other documents, the Significant Wildlife Habitat Technical Guide (SWHTG) and the Significant Wildlife Habitat Mitigation Support Tool (SWHMiST) (MNR 2000 and MNRF 2014), that can be used to help decide what areas and features should be considered significant wildlife habitat.

For areas on the Oak Ridges Moraine, Schedule 1 of the ORMCP Technical Guide 2 (Significant Wildlife Habitat) specifies which wildlife habitats identified in the SWHTG may qualify as significant (MMAH no date). This document was used as reference material for this study. There are four general types of significant wildlife habitat on the ORM: seasonal concentration areas, rare or specialized habitats (including rare plant communities), habitat for species of conservation concern, and animal movement corridors. The specific habitats considered in this report are evaluated based on the criteria outlined in the ORMCP Technical Guide 2 (Significant Wildlife Habitat) (MMAH no date).

SWH is considered a KNHF under the ORMCP (MMAH 2017). Development and Site alteration within a KNHF and the related vegetation protection zone is prohibited, with some exceptions for conservation, infrastructure, recreational uses, agricultural and forest, fish or wildlife management.

5.7.1 Habitat for Species of Conservation Concern

Habitat for species of conservation concern (SOCC) includes habitat for three groups of species:

- Species that are rare, those whose populations are significantly declining, or have a high percentage of their global population in Ontario;
- Species listed as special concern under the ESA; and,
- Species listed as threatened or endangered under SARA.

Rare species are considered at five levels: globally rare, nationally rare, provincially rare, regionally rare, and locally rare (i.e., in the municipality). This is also the order of priority that should be attached to the importance of maintaining species. Some species have been identified as being susceptible to certain practices, and their presence may result in an area being designated significant wildlife habitat. Examples include species vulnerable to forest fragmentation and species such as woodland raptors that may be vulnerable to forest management or human disturbance. The final group of species of conservation concern includes species that have a high proportion of their global population in Ontario. Although they may be common in Ontario, they are found in low numbers in other jurisdictions.

The SWHTG (MNR 2000) and Ecoregion 6E Criterion Schedule (MNRF 2015) defines five specialized habitats that may be considered SWH. They are:

- marsh bird breeding habitat;
- open country bird breeding habitat;
- shrub/early successional bird breeding habitat;
- terrestrial crayfish; and,
- special concern and rare wildlife species.

No marsh, open country, or shrub/early successional bird breeding habitat was identified on the Site or in the study area during field surveys. No habitat for terrestrial crayfish was identified on the Site or in the study area during field surveys.

Three special concern or rare species were assessed to have moderate potential to occur on the Site or in the study area based on the availability of suitable habitat (Appendix B): common nighthawk (*Chordeiles minor*), monarch (*Danaus plexippus*) and yellow-banded bumblebee (*Bombus terricola*).

Common nighthawk, designated special concern under the ESA and threatened under the SARA, is an aerial forager that requires areas with large open habitat, such as farmland, open woodlands, clearcuts, rock outcrops, alvars, wetlands, prairies, gravel pits and gravel rooftops in cities (Sandilands 2007). The open cultural meadow (CUM) and disturbed areas (OD) (Figure 1) on Site may support nesting habitat. Off-Site, in the northeast corner of the study area, the cultural meadow (CUM) (Figure 1) may provide suitable nesting habitat for this species.

Monarch, designated special concern under the ESA and SARA, is found wherever there are milkweed plants (*Asclepius* spp.) for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks (COSEWIC 2010). The cultural meadow on Site and in the study area, in addition to roadside ditches within the Study Area, may provide suitable foraging habitat for this species. In addition, common milkweed was observed on the Site during field surveys and may support monarch reproduction. However, areas of suitable habitat on the Site are small and isolated, and unlikely to support a large concentration of monarch individuals.

Yellow-banded bumble bee, designated special concern under the ESA and SARA, is a forage and habitat generalist. Mixed woodlands are commonly used for nesting and overwintering, but it also occupies various open habitats including native grasslands, farmlands and urban areas. Nest sites are mostly abandoned rodent burrows (COSEWIC 2015). The cultural meadow in the Fill Area and in the study area may provide suitable foraging habitat. No mammal burrows were observed on the Site during field surveys that may provide nesting sites.

The area of cultural meadow (CUM) on the Site and in the study area was assessed to provide potential habitat for three special concern species: monarch, yellow-banded bumble bee and common nighthawk. No individuals were observed during the field surveys.

Although some progressive rehabilitation has commenced in this area of the Site, further work is needed to meet the Site plan requirements for final rehabilitation. Final rehabilitation of the Site is a requirement under the policies of the ARA licence, and has been approved by the MNRF under that process. Works associated with final rehabilitation of the Site will include re-grading the area to eliminate rills and gullies and ensure all slopes are minimum 3:1, as well as topsoil and seeding disturbed areas. As such, any potential habitat for these special concern species is considered temporary based on the interim condition of the cultural meadow. There is abundant similar habitat in the surrounding landscape and any loss of minimal, temporary habitat in the area is not expected to impact the regional population of these three species. As a result, this area is not considered SWH.

6.0 SITEIMPACT ANALYSIS

6.1 Habitat for Threatened or Endangered Species

The off-Site portions of deciduous forest (FOD5) in the northern and northwestern portions of the study area may provide potential suitable habitat for one threatened (chimney swift) and four endangered (little brown myotis, northern myotis, tri-colored bat, butternut) species.

The extent of the ELC community (i.e., FOD5) represents protected habitat for the three bat species.
The woodland off-Site, in the northwestern portion of the study area (FOD5) (Figure 1) is located approximately 35 m from the Site and will not be directly impacted by filling and grading activities. On the Site, the proposed filling and grading activities will be limited to the disturbed excavation areas (OD, CUM, CUT) (Figure 1) and no direct impacts to the deciduous forest (FOD5) feature north of the Site is expected. The setback recommended below for significant woodlands (Section 6.2) will also help to avoid or minimize potential adverse impacts (e.g., erosion) on the forest.

No chimney swift nesting or roost sites and no butternut individuals were identified off-Site within the study area. However, the area of deciduous forest off-Site was not thoroughly surveyed due to access restrictions. Therefore, the extent of the ELC community (i.e., FOD5) should be considered the area of protected habitat for both chimney swift and butternut. As discussed above, there are no direct impacts to areas of deciduous forest on the Site or within the study area expected, and implementation of the significant woodland setback is expected to minimize or avoid potential indirect adverse impacts.

No permitting or authorizations under the ESA are required for any of these five species.

6.2 Significant Woodlands

The deciduous forest in the northern portion of the Site and study area (FOD5), and off-Site in the northwestern portion of the study area (FOD5) (Figure 1) were assessed to be significant woodlands (see Section 5.4).

The woodland off-Site, in the northwestern portion of the study area (FOD5) (Figure 1) is located approximately 35 m from the Site and will not be directly impacted by filling and grading activities. The proposed filling and grading activities will be limited to the disturbed excavation areas on the Site (OD, CUM, CUT) (Figure 1), and no removal of significant woodland areas are proposed.

A setback from the deciduous forest in the northern portion of the Site and study area (FOD5) (Figure 1) is recommended to prevent indirect disturbance during fill and grading operations to the significant woodland feature. The minimum vegetation protection zone for significant woodlands required by the ORMCP (MMAH 2017) is 30 m (Figure 1).

It is further recommended that this setback be demarcated with a physical barrier (e.g., silt fencing) to prevent encroachment during the proposed Site alteration activities.

Mitigation measures to protect significant woodlands from indirect disturbance, such as the introduction of invasive species, are provided in Section 7.0. Provided that these best management practices are followed, no adverse impacts to significant woodlands are expected.

6.3 Significant Areas of Natural and Scientific Interest

The provincially significant Musselman Lake Kettle Complex Earth Science ANSI is located off-Site, immediately to the north of the Site boundary (Figure 1).

Because the ANSI is off-Site, no direct impacts to the feature are expected. The proposed Site alteration is intended to restore the Site to pre-extraction grade conditions and restore the ORM topography of the local landscape, resulting in an ecological net benefit to the feature. With implementation of the significant woodland setback described above, and general best management practices (Section 7.0), no indirect adverse impacts are expected on the ANSI.

7.0 MITIGATION

Standard Best Management Practices (BMPs) to be followed during Site alteration to mitigate damage to the adjacent natural features include the following:

- Clearly demarcate and maintain Site alteration boundaries;
- Maintain recommended setbacks (30 m) from the Site significant woodland (FOD5) (Figure 1) in the northern portion of the Fill Area and study area;
- Install silt fencing (or similar) along the significant woodland setback to prevent encroachment into the setback area and to prevent indirect effects of the infilling on the woodland. Following completion of the fill and grading activities on the Site, the fencing shall be removed;
- To be in compliance with the MBCA, all vegetation clearing and Site preparation activities (e.g., grading) which will involve removal of vegetation should occur outside of the breeding bird season (April 10 – August 15). If this is not possible, construction disturbance must be preceded by a nesting survey conducted by a qualified biologist. If any active nests are found during the nesting survey, a buffer will be installed around the nest to protect against disturbance. Vegetation within the protection buffer cannot be removed until the young have fledged the nest;
- Ensure all equipment is cleaned prior to transportation and use on the Site to avoid the spread or introduction of invasive species seed on the Site; and,
- Implement standard construction BMPs, including sediment, dust and erosion controls, and spill prevention, during Site alteration activities.

8.0 RECOMMENDATIONS AND CONCLUSIONS

The proposed Site alteration for the property located at 14204 Durham Regional Road 30, Whitchurch-Stouffville, Ontario, has been assessed for ecological implications under the ORMCP (Section 2.5), the PPS (Section 2.1), the policies of the Town of Whitchurch-Stouffville (Section 2.7) and Region of York (Section 2.6) OPs, as well as other relevant legislation, including the *Fisheries Act* (Section 2.3), *Conservation Authorities Act* (Section 2.8) and the ESA (Section 2.4).

The entire proposed Site alteration will occur within the disturbed areas associated with the exiting aggregate pit on the Site, including the open disturbed areas (OD), anthropogenic ponds (OW), cultural meadow (CUM), and cultural thicket (CUT) (Figure 1) as per the approved final rehabilitation plan for the Site. Based on the analyses in this report and implementation of recommended BMPs (Section 7.0), no adverse impacts to the significant natural features and functions in the study area are expected.

9.0 LIMITATIONS

The results of this report are based on information available to Golder at the time of the review, and the status of species listed in the noted Acts and Regulations effective as of the date of this technical memorandum. The review may be subject to limitations associated with base mapping and other publicly available information used. Additional surveys may be required to confirm habitat use and/or delineate feature boundaries for setback measurements.

10.0 CLOSURE

We trust this report meets your current needs. If you have any further questions regarding this report, please contact the undersigned.

Signature Page

Golder Associates Ltd.

Amber Sabourin, HBsc (Env)
Ecologist

Heather Melcher, MSc
Principal, Senior Ecologist

DR/AS/HM/mp

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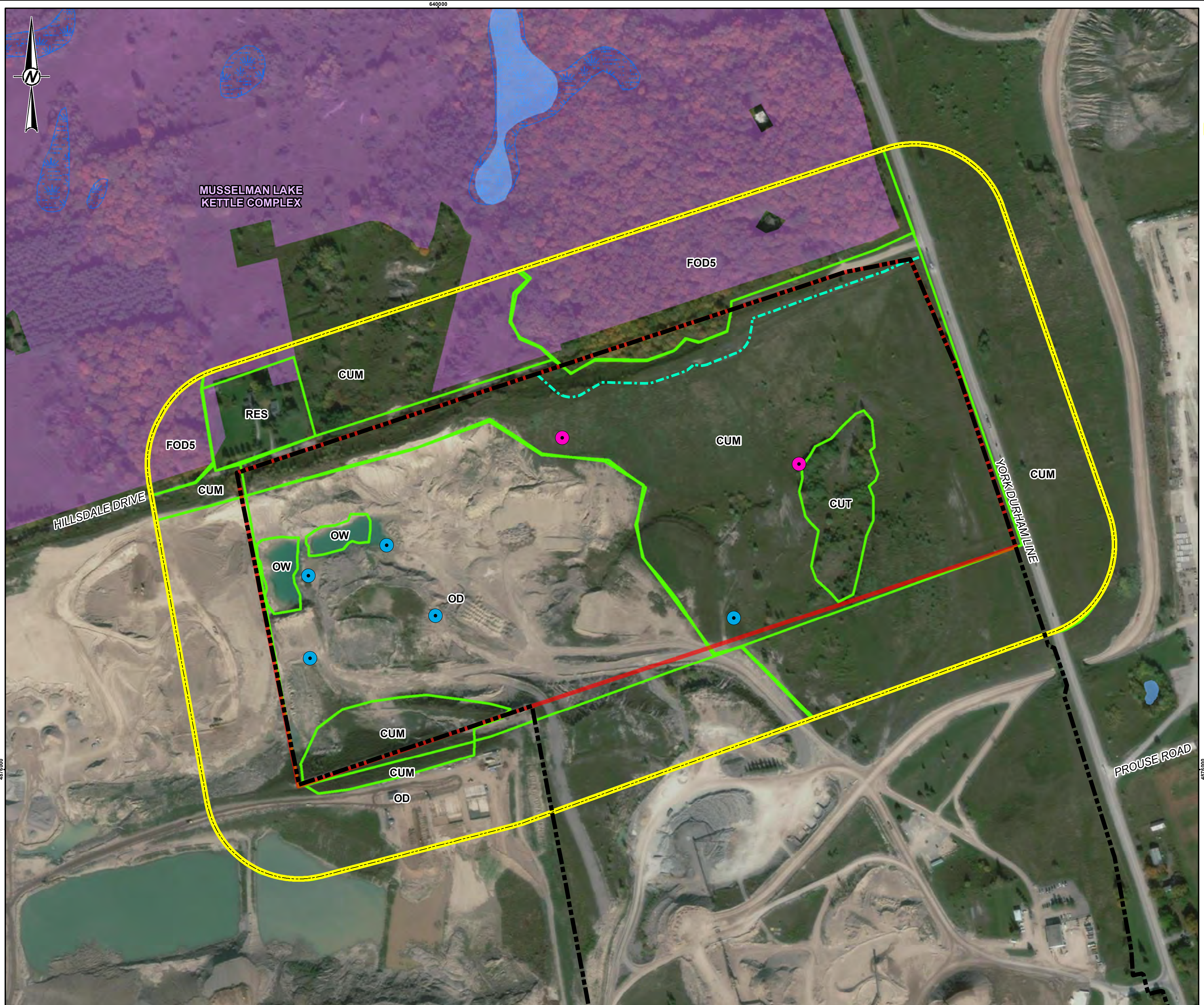
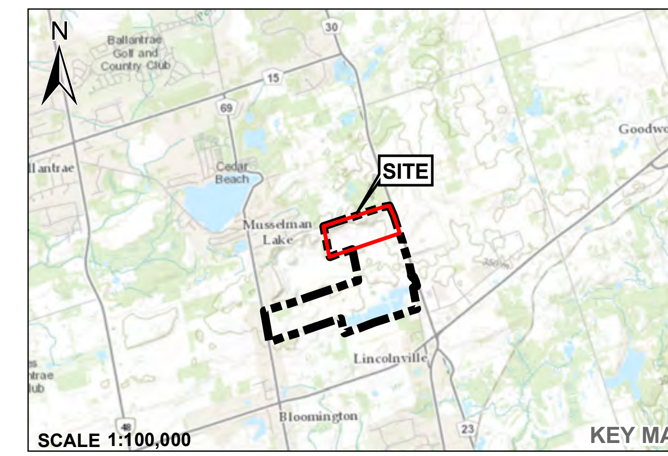
FIGURE



LEGEND

- ANURAN CALL COUNT SURVEY LOCATION
- BREEDING BIRD SURVEY LOCATION
- 30 M SIGNIFICANT WOODLAND SETBACK
- ELC
- SITE AREA BOUNDARY
- STUDY AREA
- PROPERTY BOUNDARY
- WATERBODY
- WETLAND
- ANSI, EARTH SCIENCE

FOD5	Dry-Fresh Sugar Maple Deciduous Forest
CUT	Cultural Thicket
CUM	Cultural Meadow
RES	Residential
OD	Open Disturbed
OW	Open Water



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SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
LAFARGE CANADA INC.

PROJECT
SCOPED ENVIRONMENTAL IMPACT STUDY
14204 DURHAM REGIONAL ROAD 30,
WHITCHURCH-STOUFFVILLE, ONTARIO

TITLE
ELC AND NATURAL HERITAGE CONSTRAINTS

CONSULTANT
GOLDER MEMBER OF WSP

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APPENDIX A

Plant List

Appendix A
Vascular Plant List for the Lafarge Stouffville Pit Fill Area

Scientific Name	Common Name	Origin[a]	S Rank[b]	G Rank[b]	ESA[c]
Trees (14 taxa)					
Acer negundo	Manitoba maple	N	S5	G5	—
Fagus grandifolia	Beech	N	S4	G5	—
Fraxinus americana	White ash	N	S5	G5	—
Juglans nigra	Black walnut	N	S4?	G5	—
Malus pumila	Apple	I	SNA	G5	—
Pinus strobus	White pine	N	S5	G5	—
Populus balsamifera	Balsam poplar	N	S5	G5	—
Populus deltoides	Eastern cottonwood	N	S5	G5	—
Populus nigra	Black poplar	I	SNA	G5	—
Populus tremuloides	Trembling aspen	N	S5	G5	—
Robinia pseudoacacia	Black locust	I	SNA	G5	—
Salix alba	White willow	I	SU	G5TNR	—
Tilia americana	Basswood	N	S5	G5	—
Tsuga canadensis	Eastern hemlock	N	S5	G4G5	—
Small trees, shrubs and woody vines (6 taxa)					
Cornus alternifolia	Alternate-leaved dogwood	N	S5	G5	—
Lonicera tatarica	Tartarian Honeysuckle	I	SNA	GNR	—
Prunus virginiana	Choke cherry	N	S5	G5	—
Rhus typhina	Staghorn sumac	N	S5	G5	—
Salix sp.	Willow sp.	—	—	—	—
Vitis riparia	Riverbank Grape	N	S5	G5	—
Graminoids (6 taxa)					
Calamagrostis canadensis	Canada blue-joint	N	S5	G5	—
Phalaris arundinacea	Reed Canary Grass	N	S5	G5	—
Phleum pratense	Timothy	I	SNA	GNR	—
Phragmites australis	Common reed	I	SNA	GNR	—
Poa pratensis	Kentucky Bluegrass	N	S5	G5	—
Typha latifolia	Common cattail	N	S5	G5	—
Forbs (23 taxa)					
Achillea millefolium	Yarrow	I	SNA	G5	—
Ambrosia artemisiifolia	Common Ragweed	N	S5	G5	—
Asclepias syriaca	Common Milkweed	N	S5	G5	—
Cichorium intybus	Chicory	I	SNA	GNR	—
Cirsium arvense	Canada thistle	I	SNA	GNR	—
Conyza canadensis	Horseweed	N	S5	G5	—
Coronilla varia	Crown vetch	I	SNA	GNR	—
Daucus carota	Wild Carrot	I	SNA	GNR	—
Echium vulgare	Viper's bugloss	I	SNA	GNR	—
Erigeron annuus	Daisy Fleabane	N	S5	G5	—
Euthamia graminifolia	Grass-leaved goldenrod	N	S5	G5	—
Lotus corniculatus	Bird's-foot trefoil	I	SNA	GNR	—
Melilotus alba	White sweet clover	I	SNA	G5	—
Persicaria lapathifolia	Pale smartweed	N	S5	G5	—
Persicaria pensylvanica	Pennsylvania smartweed	N	S5	G5	—
Silene vulgaris	Bladder campion	I	SNA	GNR	—
Sisymbrium altissimum	Tall hedge-mustard	I	SNA	GNR	—
Solidago sp.	Goldenrod sp.	—	—	—	—
Sonchus arvensis	Common sow-thistle	I	SNA	GNR	—
Trifolium pratense	Red clover	I	SNA	GNR	—
Tripleurosperma inodorum	Scentless mayweed	I	SNA	GNR	—
Vicia cracca	Cow-vetch	I	SNA	GNR	—
Xanthium strumarium	Cocklebur	N	S5	G5	—

[a] Origin: N = Native; I = Introduced.

[b] Ranks based upon determinations made by the Natural Heritage Information Centre (2019).
G = Global; S = Provincial; Ranks 1-3 are considered imperiled or rare; Ranks 4 and 5 are considered secure.
NA = Not applicable [used mainly for abundance of non-natives; NR = Not ranked [used mainly for non-natives];

[c] *Endangered Species Act* (ESA), 2007 (O.Reg 242/08 last amended 29 June 2020 as O.Reg 328/20). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 1 Aug 2018 as O. Reg 404/18, s. 1.)
END= Endangered; SC = Special Concern; THR = Threatened.

[d] Locations: A - Pond Area; B - Hedgerows

APPENDIX B

Species at Risk Screening

Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Western chorus frog - Great Lakes St. Lawrence / Canadian Shield population	*Pseudacris triseriata*	—	THR	THR	S3	In Ontario, habitat of this amphibian species typically consists of marshes or wooded wetlands, particularly those with dense shrub layers and grasses, as this species is a poor climber. They will breed in almost any fishless pond including roadside ditches, gravel pits and flooded swales in meadows. This species hibernates in terrestrial habitats under rocks, dead trees or leaves, in loose soil or in animal burrows. During hibernation, this species is tolerant of flooding (Environment Canada 2015).	Low	Although there are ponds on the site that may provide suitable habitat, no individuals were observed during field surveys.
Monarch	*Danaus plexippus*	SC	SC	END	S2N, S4B	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (*Asclepias* spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010).	Moderate	Regenerating meadows in the east portion of the site and study area may provide suitable foraging and breeding habitat for this species and its host plant.
Yellow-banded bumble bee	*Bombus terricola*	SC	SC	SC	S2	This species is a forage and habitat generalist. Mixed woodlands are commonly used for nesting and overwintering, but it also occupies various open habitats including native grasslands, farmlands and urban areas. It is an early emerging species, making it likely an important pollinator of early blooming wild flowering plants (e.g. wild blueberry) and agricultural crops (e.g., apple). Nest sites are mostly abandoned rodent burrows (COSEWIC 2015).	Moderate	Regenerating meadows in the east portion of the site and study area may provide suitable foraging habitat for this species. There does not appear to be mixed woodlands to provide nesting and overwintering habitat on the site or off-site in the study area.
Bank swallow	*Riparia riparia*	THR	THR	THR	S4B	In Ontario, bank swallow breeds in a variety of natural and anthropogenic habitats, including lake bluffs, stream and river banks, sand and gravel pits, and roadcuts. Nests are generally built in a vertical or near-vertical bank. Breeding sites are typically located near open foraging sites such as rivers, lakes, grasslands, agricultural fields, wetlands and riparian woods. Forested areas are generally avoided (Garrison 1999).	Low	Although stockpiles in the active aggregate pit may provide suitable nesting habitat, no individuals were observed during field surveys.
Barn swallow	*Hirundo rustica*	THR	THR	THR	S4B	In Ontario, barn swallow breeds in areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures including barns, buildings, sheds, bridges, and culverts. Preferred foraging habitat includes grassy fields, pastures, agricultural cropland, lake and river shorelines, cleared right-of-ways, and wetlands (COSEWIC 2011). Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused (Brown and Brown 1999).	Low	There does not appear to be suitable structures (e.g. barns, culverts) on the site or in the study area to provide suitable nesting habitat.
Bobolink	*Dolichonyx oryzivorus*	THR	THR	THR	S4B	In Ontario, bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation (Gabhauer 2007). Bobolink prefers grassland habitat with a forb component and a moderate litter layer. They have low tolerance for presence of woody vegetation and are sensitive to frequent mowing within the breeding season. They are most abundant in established, but regularly maintained, hayfields, but also breed in lightly grazed pastures, old or fallow fields, cultural meadows and newly planted hayfields. Their nest is woven from grasses and forbs. It is built on the ground, in dense vegetation, usually under the cover of one or more forbs (Renfrew et al. 2015).	Low	The cultural meadow on the site is too small to support this grassland breeding species. In addition, no individuals were observed during field surveys.

Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Canada warbler	*Cardellina canadensis*	SC	THR	THR	S4B	In Ontario, breeding habitat for Canada warbler consists of moist mixed forests with a well-developed shrubby understory. This includes low-lying areas such as cedar and alder swamps, and riparian thickets (McLaren 2007). It is also found in densely vegetated regenerating forest openings. Suitable habitat often contains a developed moss layer and an uneven forest floor. Nests are well concealed on or near the ground in dense shrub or fern cover, often in stumps, fallen logs, overhanging stream banks or mossy hummocks (Reitsma et al. 2010).	Low	There are no swamps or riparian thickets to provide suitable nesting habitat on the site or in the study area.
Cerulean warbler	*Setophaga cerulea*	THR	END	END	S3B	In Ontario, breeding habitat of cerulean warbler consists of second-growth or mature deciduous forest with a tall canopy of uneven vertical structure and a sparse understory. This habitat occurs in both wet bottomland forests and upland areas, and often contains large hickory and oak trees. This species may be attracted to gaps or openings in the upper canopy. The cerulean warbler is associated with large forest tracks, but may occur in woodlots as small as 10 ha (COSEWIC 2010). Nests are usually built on a horizontal limb in the mid-story or canopy of a large deciduous tree (Buehler et al. 2013).	Low	There is no suitable forest habitat on the site. Although the deciduous forest in the north portion of the study area may provide suitable habitat, no individuals were observed during field surveys.
Chimney swift	*Chaetura pelagica*	THR	THR	THR	S4B, S4N	In Ontario, chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. They are most commonly associated with towns and cities with large concentrations of chimneys. Preferred nesting sites are dark, sheltered spots with a vertical surface to which the bird can grip. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007).	Moderate	There are no buildings or large trees on the site to provide suitable anthropogenic or natural nesting habitat. Off-site, in the north portion of the study area, the deciduous forest may provide suitable natural nesting habitat.
Common nighthawk	*Chordeiles minor*	SC	THR	SC	S4B	In Ontario, these aerial foragers require areas with large open habitat. This includes farmland, open woodlands, clearcuts, burns, rock outcrops, alvars, bogs, fens, prairies, gravel pits and gravel rooftops in cities (Sandilands 2007).	Moderate	The large open aggregate pit and regenerating meadows on the site and off-site throughout the west, south, and east portions of the study area may provide suitable nesting habitat.
Eastern meadowlark	*Sturnella magna*	THR	THR	THR	S4B	In Ontario, eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlark prefers moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component (Hull 2003). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970).	Low	The cultural meadow on the site is too small to support this grassland breeding species. In addition, no individuals were observed during field surveys.
Eastern whip-poor-will	*Antrostomus vociferus*	THR	THR	THR	S4B	In Ontario, whip-poor-will breeds in semi-open forests with little ground cover. Breeding habitat is dependent on forest structure rather than species composition, and is found on rock and sand barrens, open conifer plantations and post-disturbance regenerating forest. Territory size ranges from 3 to 11 ha (COSEWIC 2009). No nest is constructed and eggs are laid directly on the leaf litter (Mills 2007).	Low	There is no suitable forest habitat on the site or in the study area.

Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Eastern wood-pewee	*Contopus virens*	SC	SC	SC	S4B	In Ontario, eastern wood-pewee inhabits a wide variety of wooded upland and lowland habitats, including deciduous, coniferous, or mixed forests. It occurs most frequently in forests with some degree of openness. Intermediate-aged forests with a relatively sparse midstory are preferred. In younger forests with a relatively dense midstory, it tends to inhabit the edges. Also occurs in anthropogenic habitats providing an open forested aspect such as parks and suburban neighborhoods. Nest is constructed atop a horizontal branch, 1-2 m above the ground, in a wide variety of deciduous and coniferous trees (COSEWIC 2012).	Low	Although the deciduous forest in the north portion of the site and study area may provide suitable habitat, no individuals were observed during field surveys.
Golden-winged warbler	*Vermivora chrysoptera*	SC	THR	THR	S4B	In Ontario, golden-winged warbler breeds in regenerating scrub habitat with dense ground cover and a patchwork of shrubs, usually surrounded by forest. Their preferred habitat is characteristic of a successional landscape associated with natural or anthropogenic disturbance such as rights-of-way, and field edges or openings resulting from logging or burning. The nest of the golden-winged warbler is built on the ground at the base of a shrub or leafy plant, often at the shaded edge of the forest or at the edge of a forest opening (Confer et al. 2011).	Low	The cultural thicket on the site is too small to provide suitable habitat. In addition, no individuals were observed during field surveys.
Grasshopper sparrow *pratensis* subspecies	*Ammodramus savannarum* (pratensis subspecies)	SC	SC	SC	S4B	In Ontario, grasshopper sparrow is found in medium to large grasslands with low herbaceous cover and few shrubs. It also uses a wide variety of agricultural fields, including cereal crops and pastures. Close-grazed pastures and limestone plains (e.g. Carden and Napanee Plains) support highest density of this bird in the province (COSEWIC 2013).	Low	The cultural meadow on the site is too small to support this grassland breeding species. In addition, no individuals were observed during field surveys.
Least bittern	*Ixobrychus exilis*	THR	THR	THR	S4B	In Ontario, least bittern breeds in marshes, usually greater than 5 ha, with emergent vegetation, relatively stable water levels and areas of open water. Preferred habitat has water less than 1 m deep (usually 10 – 50 cm). Nests are built in tall stands of dense emergent or woody vegetation (Woodliffe 2007). Clarity of water is important as siltation, turbidity, or excessive eutrophication hinders foraging efficiency (COSEWIC 2009).	Low	There are no large marshes on the site or in the study area to provide suitable habitat.
Loggerhead shrike	*Lanius ludovicianus (migrans subsp)*	END	END	END	S2B	In Ontario, loggerhead shrike breeds in open country habitat characterized by short grasses with scattered shrubs or low trees. Unimproved pasture containing scattered hawthorns (Crataegus spp.) on shallow soils over limestone bedrock is the preferred habitat. Preferred nest sites include isolated hawthorns or red cedar. Males defend large territories of approximately 50 ha (Chabot 2007).	Low	The cultural meadow on the site is too small to support this grassland breeding species. In addition, no individuals were observed during field surveys.
Red-headed woodpecker	*Melanerpes erythrocephalus*	SC	END	END	S4B	In Ontario, red-headed woodpecker breeds in open, deciduous woodlands or woodland edges and are often found in parks, cemeteries, golf courses, orchards and savannahs (Woodliffe 2007). They may also breed in forest clearings or open agricultural areas provided that large trees are available for nesting. They prefer forests with little or no understory vegetation. They are often associated with beech or oak forests, beaver ponds and swamp forests where snags are numerous. Nests are excavated in the trunks of large dead trees (Smith et al. 2000).	Low	Although the deciduous forest in the north portion of the site and study area may provide suitable habitat, no individuals were observed during field surveys.

Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Wood thrush	*Hylocichla mustelina*	SC	THR	THR	S4B	In Ontario, wood thrush breeds in moist, deciduous hardwood or mixed stands that are often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. This species selects nesting sites with the following characteristics: lower elevations with trees less than 16 m in height, a closed canopy cover (>70 %), a high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter (COSEWIC 2012).	Low	Although the deciduous forest in the north portion of the site and study area may provide suitable habitat, no individuals were observed during field surveys.
Yellow-breasted chat	*Icteria virens virens*	END	END	END	S2B	In Ontario, yellow-breasted chat breeds in early successional, shrub-thicket habitats including woodland edges, regenerating old fields, railway and hydro right-of-ways, young coniferous reforestations, and wet thickets bordering wetlands. Tangles of grape (*Vitis* spp.) and raspberry (*Rubus* spp.) vines are features of most breeding sites. There is some evidence that the yellow-breasted chat is an area sensitive species. Nests are located in dense shrubbery near to the ground (COSEWIC 2011).	Low	The cultural thicket on the site is too small to provide suitable habitat. In addition, no individuals were observed during field surveys.
Eastern small-footed myotis	*Myotis leibii*	END	—	—	S2S3	This species is not known to roost within trees, but there is very little known about its roosting habits. The species generally roosts on the ground under rocks, in rock crevices, talus slopes and rock piles. It occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used for hibernaculum, where the conditions are drafty with low humidity, and may be subfreezing (Humphrey 2017)	Low	There are no suitable rock pile roosting habitat on the site or in the study area. There is no known hibernacula on the site or in the study area.
Gray fox	*Urocyon cinereoargenteus*	THR	THR	THR	S1	While the Ontario range of this species extends across much of southern and southeastern Ontario, the only known population in the province is on Pelee Island, with very rare sightings elsewhere in the province at points close to the border with the United States. This species inhabits deciduous forests and marshes, and will den in a variety of features including rock outcroppings, hollow trees, burrows or brush piles, usually where dense brush provides cover and in close proximity to water. This species is considered a habitat generalist (COSEWIC 2015).	Low	The only known population in the province is on Pelee Island.
Little brown myotis	*Myotis lucifugus*	END	END	END	S3	In Ontario, this specie's range is extensive and covers much of the province. It will roost in both natural and man-made structures. Roosting colonies require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas. May form nursery colonies in the attics of buildings within 1 km of water. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (Environment Canada 2015).	Moderate	There are no suitable snag or cavity trees on the site to provide suitable roosting habitat. Off-site, the deciduous forest in the north portion of the study area may provide suitable roosting habitat. There is no known hibernacula on the site or in the study area.
Northern myotis	*Myotis septentrionalis*	END	END	END	S3	In Ontario, this species' range is extensive and covers much of the province. It will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (Environment Canada 2015).	Moderate	There are no suitable snag or cavity trees on the site to provide suitable roosting habitat.. Off-site, the deciduous forest in the north portion of the study area may provide suitable roosting habitat. There is no known hibernacula on the site or in the study area.

Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Tri-colored bat	*Perimyotis subflavus*	END	END	END	S3?	In Ontario, tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada. They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures. These bats have strong roost fidelity to their winter hibernation sites and may choose the exact same spot in a cave or mine from year to year (Environment Canada 2015).	Moderate	There are no suitable snag or cavity trees on the site to provide suitable roosting habitat.. Off-site, the deciduous forest in the north portion of the study area may provide suitable roosting habitat. There is no known hibernacula on the site or in the study area.
Blanding's turtle - Great Lakes / St.Lawrence population	*Emydoidea blandingii*	THR	THR	END	S3	In Ontario, Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing or slow-moving water, rich nutrient levels, organic substrates and abundant aquatic vegetation. They will use rivers, but prefer slow-moving currents and are likely only transients in this type of habitat. This species is known to travel great distances over land in the spring in order to reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel and cobble. They hibernate underwater and infrequently under debris close to water bodies (COSEWIC 2016).	Low	The anthropogenic ponds throughout the site and in the west portion of the study area do not provide suitable aquatic habitat due to a lack of aquatic vegetation.
Eastern ribbonsnake - Great Lakes population	*Thamnophis sauritius*	SC	SC	SC	S4	In Ontario, eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds (COSEWIC 2012).	Low	There is no suitable wetland habitat on the site or in the study area to provide suitable habitat.
Milksnake	*Lampropeltis triangulum*	NAR	SC	SC	S4	In Ontario, milksnake uses a wide range of habitats including prairies, pastures, hayfields, wetlands and various forest types, and is well-known in rural areas where it frequents older buildings. Proximity to water and cover enhances habitat suitability. Hibernation takes place in mammal burrows, hollow logs, gravel or soil banks, and old foundations (COSEWIC 2014).	Moderate	Regenerating meadows throughout the east portion of the site and study area may provide suitable habitat.
Snapping turtle	*Chelydra serpentina*	SC	SC	SC	S4	In Ontario, snapping turtle uses a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008).	Low	The anthropogenic ponds throughout the site and in the west portion of the study area do not provide suitable aquatic habitat due to a lack of aquatic vegetation.
American ginseng	*Panax quinquefolius*	END	END	END	S2	In Ontario, American ginseng is found in moist, undisturbed and relatively mature deciduous woods often dominated by sugar maple. It is commonly found on well-drained, south-facing slopes. American ginseng grows under closed canopies in well-drained soils of glaciary origin that have a neutral pH (ECCC 2018).	Low	There is no suitable undisturbed deciduous forest habitat on the site or in the study area.
Butternut	*Juglans cinerea*	END	END	END	S2?	In Ontario, butternut is found along stream banks, on wooded valley slopes, and in deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant (Farrar 1995).	Moderate	The portion of deciduous forest off-site, within the study area, may provide suitable habitat. However, no individuals were observed on the site.

[1] *Endangered Species Act* (ESA), 2007 (O.Reg 242/08 last amended 29 June 2020 as O.Reg 328/20). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 1 Aug 2018 as O. Reg 404/18, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

[2] *Species at Risk Act* (SARA), 2002. Schedule 1 (Last amended 23 April 2021); Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern)

[3] Committee on the Status of Endangered Wildlife in Canada (COSEWIC) http://www.cosewic.gc.ca

[4] Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the Natural Heritage Information Centre (NHIC). These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly Extirpated - Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not Applicable), S#S# (Range Rank), S? (Not ranked yet), SAB (Breeding Accident), SAN (Non-breeding Accident), SX (Apparently Extirpated). Last assessed November 2019.

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APPENDIX C

Wildlife List

Appendix C
Wildlife List for the Lafarge Stouffville Pit Fill Area

Common Name	Scientific Name	SRANK[a]	GRANK[a]	Status[b]
Amphibians				
American Toad	*Anaxyrus americanus*	S5	G5	—
Gray treefrog	*Hyla versicolor*	S5	G5	—
Birds				
American goldfinch	*Carduelis tristis*	S5B	G5	—
American woodcock	*Scolopax minor*	S4B	G5	—
Canada goose	*Branta canadensis*	S5	G5	—
Chipping sparrow	*Spizella passerina*	S5B	G5	—
Common grackle	*Quiscalus quiscula*	S5B	G5	—
Field sparrow	*Spizella pusilla*	S4B	G5	—
Great blue heron	*Ardea herodias*	S4	G5	—
Indigo bunting	*Passerina cyanea*	S4B	G5	—
Killdeer	*Charadrius vociferus*	S5B,S5N	G5	—
Mallard	*Anas platyrhynchos*	S5	G5	—
Mourning dove	*Zenaida macroura*	S5	G5	—
Osprey	*Pandion haliaetus*	S5B	G5	—
Red-eyed vireo	*Vireo olivaceus*	S5B	G6	—
Red-winged blackbird	*Agelaius phoeniceus*	S4	G5	—
Rock pigeon	*Columba livia*	SNA	G5	—
Savannah sparrow	*Passerculus sandwichensis*	S4B	G5	—
Song sparrow	*Melospiza melodia*	S5B	G5	—
Spotted sandpiper	*Actitis macularius*	S5	G5	—
Willow flycatcher	*Empidonax traillii*	S5B	G5	—
Mammals				
Coyote	*Canis latrans*	S5	G5	—

[a] Ranks based upon determinations made by the Ontario Natural Heritage Information Centre
G = Global; S = Provincial; Ranks 1-3 are considered imperiled or rare; Ranks 4 and 5 are considered secure.
SNA = Not applicable for Ontario Ranking (e.g. Exotic species)

[b] Status: *Endangered Species Act* , 2007
END= Endangered; SC = Special Concern; THR = Threatened; UN = Undetermined.

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APPENDIX D

Stage 1 Archaeological Assessment

ORIGINAL REPORT

Stage 1 Archaeological Assessment

14204 Durham Regional Road 30, Part of Lot 15, Concession 9, Geographic Township of Whitchurch, County of York, now town of Whitchurch-Stouffville, Regional Municipality of York, Ontario

Submitted to:

Mr. Chris Galway, Senior Land Manager, East Central Ontario

Lafarge Canada Inc.
6509 Airport Road
Mississauga, ON, L4V 1S7

Submitted by:

Golder Associates Ltd.

100 Scotia Court, Whitby, Ontario, L1N 8Y6, Canada

+1 905 723 2727

Licensee: Kendra Patton, MA

PIF: P453-0003-2019

19115436-3000-R00

9 July 2019

Distribution List

1 PDF Copy - Lafarge Canada Inc.

1 PDF Copy - Ministry of Tourism, Culture, and Sport

1 PDF Copy - Golder Associates Ltd.

Executive Summary

The Executive Summary highlights key points from the report only; for complete information and findings, as well as the limitations, the reader should examine the complete report.

This site is located on the Treaty 20 Michi Saagiig territory and in the traditional territory of the Michi Saagiig and Chippewa Nations, collectively known as the Williams Treaties First Nations, which include: Curve Lake, Hiawatha, Alderville, Scugog Island, Rama, Beausoleil, and Georgina Island First Nations. It is respectfully acknowledged that the Williams Treaties First Nations are the stewards and caretakers of these lands and waters in perpetuity, as they have been for thousands of years, and that they continue to maintain this responsibility to ensure their health and integrity for generations to come.

A Stage 1 archaeological assessment was conducted on behalf of Lafarge Canada Inc. (the Client) by Golder Associates Ltd. (Golder) in support of a proposed site alteration permit application under the Aggregate Resources Act for the property at 14204 Durham Regional Road 30 in the Town of Whitchurch-Stouffville. The plan for the study area, approximately 41 hectares in size and currently in use as a sand and gravel pit, is to use fill material from offsite sources to return the property to grade in accordance with a plan to re-establish the original Oak Ridges Moraine topography in the area. The study area is located within a portion of Lot 15, Concession 9 in Whitchurch Township in the historic County of York, now the Regional Municipality of York, Ontario (Map 1).

The objective of the Stage 1 assessment was to compile all available information about the known and potential archaeological resources within the study area and to provide direction for the protection, management and/or recovery of these resources, consistent with Ministry of Tourism, Culture and Sport (MTCS) guidelines (MTCS 2011). Given the extensive disturbance associated with the quarrying activities it was determined that there was no potential to exist within the study area for the recovery of pre-contact and historic Indigenous and Euro-Canadian archaeological resources (Map 4). Given the findings of the Stage 1 archaeological assessment the following recommendation is made:

The entire study area was found to be disturbed: exhibiting slope (greater than 20%) or previous construction of grading activities. No further archaeological assessment is recommended for the study area at 14204 Durham Regional Road 30, Whitchurch-Stouffville, Ontario.

The MTCS is asked to review the results and recommendations presented herein and accept this report into the Provincial Register of archaeological reports. The MTCS is also asked to provide a letter concurring with the results presented herein.

Study Limitations

Golder has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the archaeological profession currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty expressed or implied is made.

This report has been prepared for the specific site, design objective, developments and purpose described to Golder by Lafarge Canada Inc. (the Client). The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the Client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of Golder's report or other work products.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project.

Special risks occur whenever archaeological investigations are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain archaeological resources. The sampling strategies incorporated in this study comply with those identified in the Ministry of Tourism, Culture and Sport's 2011 *Standards and Guidelines for Consultant Archaeologists.*

Personnel

Project Director	Eric Hood, PhD, Associate, Senior Engineer
Project Manager	Chris Pons, BSc, Environmental Scientist
Archaeology Task Lead	Kendra Patton, MA (P453), Archaeologist
Licensed Archaeologist	Kendra Patton, MA
Report Production	Kendra Patton, MA
GIS	Sofia Tomic, BSc, GIS Technician
Senior Review	Hugh Daechsel, MA (P031), Principal, Senior Archaeologist

Acknowledgments

Proponent Contacts	Chris Galway, Lafarge Canada Inc.
	Andrew Bucking, Lafarge Canada Inc.

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APPENDIX A
Development Map

1.0 PROJECT CONTEXT

1.1 Development Context

A Stage 1 archaeological assessment was conducted on behalf of Lafarge Canada Inc. (the Client), by Golder Associates Ltd. (Golder), in support of a proposed site alteration permit application under the *Aggregate Resources Act* for the property at 14204 Durham Regional Road 30, Whitchurch-Stouffville. The plan for the study area, approximately 41 hectares in size and currently in use as a sand and gravel pit, is to use fill material from offsite sources to return the property to grade in accordance with a plan to re-establish the original Oak Ridges Moraine topography in the area (Appendix A). The study area is located within a portion of Lot 15, Concession 9 in Whitchurch Township in the historic County of York, now the Regional Municipality of York, Ontario (Map 1).

The objective of the Stage 1 archaeological assessment was to compile available information about the known and potential archaeological resources within the study area and to determine if a field survey (Stage 2) is required, as well as the recommended Stage 2 strategy. In compliance with the provincial standards and guidelines set out in the *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011), the objectives of the Stage 1 archaeological assessment are as follows:

- To provide information about the study area's geography, history, previous archaeological fieldwork and current land conditions;
- To evaluate in detail the study area's archaeological potential which will support recommendations for Stage 2 survey for all or parts of the property; and,
- To recommend appropriate strategies for Stage 2 survey.

To meet these objectives Golder archaeologists employed the following research strategies:

- A review of relevant archaeological, historic and environmental literature pertaining to the study area;
- A review of the land use history, including pertinent historic maps;
- An examination of the Ontario Archaeological Sites Database (OASD) to determine the presence of known archaeological sites in and around the project area; and
- An inquiry with the MTCS to determine previous archaeological assessments conducted in close proximity to the study area.

The Stage 1 archaeological assessment was conducted under archaeological consulting licence P453, issued to Kendra Patton of Golder by the MTCs (PIF P453-0003-2019). Permission to enter the property for the purposes of archaeological assessment was provided by Mr. Chris Galway of Lafarge Canada Inc. on April 22, 2019.

1.2 Historical Context

1.2.1 General Overview of the Pre-Contact Period in Southern Ontario

The culture history of south-central Ontario, based on Ellis and Ferris (1990), is summarised in Table 1.

Table 1: Pre-contact cultural chronology for south-central Ontario

Period	Characteristics	Time Period	Comments
Early Paleo	Fluted Projectiles	ca. 11000 – 8400 B.C.	spruce parkland/caribou hunters
Late Paleo	Hi-Lo Projectiles	ca. 8400 – 8000 B.C.	smaller but more numerous sites
Early Archaic	Kirk and Bifurcate Base Points	ca. 8000 – 6000 B.C.	slow population growth
Middle Archaic	Brewerton-like points	ca. 6000 – 2500 B.C.	environment similar to present
Late Archaic	Lamoka (narrow points)	ca. 2500 – 1800 B.C.	increasing site size
	Broadpoints	ca. 1800 – 1500 B.C.	large chipped lithic tools
	Small Points	ca. 1500 – 1100 B.C.	introduction of bow hunting
Terminal Archaic	Hind Points	ca. 1100 – 950 B.C.	emergence of true cemeteries
Early Woodland	Meadowood Points	ca. 950 – 400 B.C.	introduction of pottery
Middle Woodland	Dentate/Pseudo-Scallop Pottery	ca. 400 B.C. – A.D. 500	increased sedentism
Transitional Woodland	Princess Point	ca. A.D. 500 – 1050	introduction of corn
Late Woodland	Early Late Woodland	ca. A.D. 900 – 1300	emergence of agricultural villages
	Middle Late Woodland	ca. A.D. 1300 – 1400	long longhouses (100m +)
	Late Woodland	ca. A.D. 1400 – 1650	tribal warfare and displacement

1.2.1.1 Paleo Period

The first human occupation of south-central Ontario begins just after the end of the Wisconsin Glacial Period. Although there were a complex series of ice retreats and advances which played a large role in shaping the local topography, south-central Ontario was finally ice free by 12,500 years ago.

The first human settlement can be traced back 11,000 years, when this area was settled by Indigenous groups that had been living south of the Great Lakes. The period of these early Indigenous inhabitants is known as the Paleo Period (Ellis and Deller 1990).

Our current understanding of settlement patterns of Early Paleo peoples suggests that small bands, consisting of probably no more than 25-35 individuals, followed a pattern of seasonal mobility extending over large territories (Ellis and Deller 1990). Early Paleo sites tend to be located in elevated locations on well-drained loamy soils. Many of the known sites were located on former beach ridges associated with glacial lakes. There are a few extremely large Early Paleo sites, such as one located close to Parkhill, Ontario, which covered as much as six hectares. It appears that these sites were formed when the same general locations were occupied for short periods of time over the course of many years. Given their placement in locations conducive to the interception of migratory mammals such as caribou, it has been suggested that they may represent communal hunting camps. There are also smaller Early Paleo camps scattered throughout the interior of southwestern and south-central Ontario, usually situated adjacent to wetlands.

Research suggests that population densities were very low during the Early Paleo Period (Ellis and Deller 1990:54). Archaeological examples of Early Paleo sites are rare.

The Late Paleo Period (8400 – 8000 B.C.) has been less researched and is consequently more poorly understood. By this time the environment of south-central Ontario was coming to be dominated by closed coniferous forests with some minor deciduous elements. It seems that many of the large game species that had been hunted in the early part of the Paleo Period had either moved further north, or as in the case of the mastodons and mammoths, become extinct.

Like the Early Paleo peoples, Late Paleo peoples covered large territories as they moved about in response to seasonal resource fluctuations. On a province wide basis Late Paleo projectile points are far more common than Early Paleo materials, suggesting a relative increase in population.

The end of the Late Paleo Period was heralded by numerous technological and cultural innovations that appeared throughout the Archaic Period. These innovations may be best explained in relation to the dynamic nature of the post-glacial environment and region-wide population increases.

1.2.1.2 Archaic Period

During the Early Archaic Period (8000 – 6000 B.C.), the jack and red pine forests that characterized the Late Paleo environment were replaced by forests dominated by white pine with some associated deciduous trees (Ellis et al. 1990:68-69). One of the more notable changes in the Early Archaic Period is the appearance of side and corner-notched projectile points. Other significant innovations include the introduction of ground stone tools such as celts and axes, suggesting the beginnings of a simple woodworking industry. The presence of these often large and not easily portable tools suggests there may have been some reduction in the degree of seasonal movement, although it is still suspected that population densities were quite low, and band territories large.

During the Middle Archaic Period (6000 – 2500 B.C.) the trend to more diverse toolkits continued, as the presence of netsinkers suggest that fishing was becoming an important aspect of the subsistence economy. It was also at this time that "bannerstones" were first manufactured.

Bannerstones are carefully crafted ground stone devices that served as a counterbalance for *atlatls* or spear-throwers. Another characteristic of the Middle Archaic Period is an increased reliance on local, often poorer quality, chert resources for the manufacturing of projectile points and other stone tools. It seems that during earlier periods, when groups occupied large territories, it was possible for them to visit a primary outcrop of high-quality chert at least once during their seasonal round. However, during the Middle Archaic Period, groups inhabited smaller territories that often did not encompass a source of high-quality raw material. In these instances, lower quality materials which had been deposited by the glaciers in the local till and river gravels were utilized.

This reduction in territory size was probably the result of gradual region-wide population growth which led to the infilling of the landscape. This process forced a reorganization of Indigenous subsistence practices, as more people had to be supported from the resources of a smaller area. During the latter part of the Middle Archaic Period, technological innovations such as fish weirs have been documented as well as stone tools especially designed for the preparation of wild plant foods.

It is also during the latter part of the Middle Archaic Period that long-distance trade routes began to develop, spanning the northeastern part of the continent. In particular, native copper tools manufactured from a source located northwest of Lake Superior were being widely traded (Ellis et al. 1990:66). By 3500 B.C. the local environment had stabilized and began to reflect the more modern landscape (Ellis et al. 1990:69).

During the Late Archaic Period (2500 – 950 B.C.) the trend towards decreased territory size and a broadening subsistence strategy continued. Late Archaic sites are far more numerous than either Early or Middle Archaic sites, and it seems that the local population had expanded. It is during the Late Archaic Period that the first true cemeteries appear. Before this time individuals were interred close to the location where they died. During the Late Archaic Period, if an individual died while his or her group happened to be at some distance from their group cemetery, the bones would be kept until they could be placed in the cemetery. Consequently, it is not unusual to find disarticulated skeletons, or even skeletons lacking minor elements such as fingers, toes or ribs, in Late Archaic burial pits.

The appearance of cemeteries during the Late Archaic Period has been interpreted as a response to increased population densities and competition between local groups for access to resources. It is argued that cemeteries would have provided strong symbolic claims over a local territory and its resources. These cemeteries are often located on heights of well-drained sandy/gravel soils adjacent to major watercourses.

This suggestion of increased territoriality is also consistent with the regionalized variation present in Late Archaic Period projectile point styles. It was during the Late Archaic Period that distinct local styles of projectile points appear. Also, it was during the Late Archaic Period that trade networks which had been established during the Middle Archaic Period continued to flourish. Native copper from northern Ontario and marine shell artifacts from as far away as the Mid-Atlantic coast are frequently encountered as grave goods at Southern Ontario sites. Other artifacts such as polished stone pipes and banded slate gorgets also appear on Late Archaic sites in Southern Ontario. One of the more unusual and interesting of the Late Archaic Period artifacts is the birdstone, which are small, bird-like effigies usually manufactured from green banded slate.

1.2.1.3 Woodland Period

The Early Woodland Period (950 – 400 B.C.) is distinguished from the Late Archaic Period primarily by the addition of ceramic technology. While the introduction of pottery provides a useful demarcation point for archaeologists, it may have made less difference in the lives of the Early Woodland peoples. The first pots were very crudely constructed, thick walled, and friable. It has been suggested that they were used in the processing of nut oils by boiling crushed nut fragments in water and skimming off the oil. These vessels were not easily portable, and individual pots likely did not have a long use life. There have also been numerous Early Woodland sites located at which no pottery was found, suggesting that these poorly constructed undecorated vessels had yet to assume a central position in the day-to-day lives of Early Woodland peoples.

Other than the introduction of this limited ceramic technology, the lifeways of Early Woodland peoples show a great deal of continuity with the preceding Late Archaic Period. For instance, birdstones continue to be manufactured, although the Early Woodland varieties have "pop-eyes" which protrude from the sides of their heads.

Likewise, the thin, well-made projectile points which were produced during the terminal part of the Archaic Period continue in use. However, the Early Woodland Period variants were side-notched rather than corner-notched, giving them a slightly altered and distinctive appearance.

The trade networks which were established in the Middle and Late Archaic Periods also continued to function, although there does not appear to have been as much trade in marine shell during the Early Woodland Period. During the last 200 years of the Early Woodland Period, projectile points manufactured from high quality raw materials from the American Midwest begin to appear on sites in southwestern Ontario.

In terms of settlement and subsistence patterns, the Middle Woodland Period (400 B.C. – 500 A.D.) provides a major point of departure from the Archaic and Early Woodland Periods. While Middle Woodland peoples still relied on hunting and gathering to meet their subsistence requirements, fish were becoming an even more important part of the diet.

In addition, Middle Woodland peoples relied much more extensively on ceramic technology. Middle Woodland vessels are often heavily decorated with hastily impressed designs covering the entire exterior surface and upper portion of the vessel interior. Consequently, even very small fragments of Middle Woodland vessels are easily identifiable.

It is also at the beginning of the Middle Woodland Period that rich, densely occupied sites appear along the margins of major rivers and lakes. While these areas had been utilized by earlier peoples, Middle Woodland sites are significantly different in that the same location was occupied off and on for as long as several hundred years and large deposits of artifacts often accumulated. Unlike earlier seasonally utilized locations, these Middle Woodland sites appear to have functioned as base camps, occupied off and on over the course of the year. There are also numerous small upland Middle Woodland sites, many of which can be interpreted as special purpose camps from which localized resource patches were exploited. This shift towards a greater degree of sedentism continues the trend witnessed from at least Middle Archaic times and provides a prelude to the developments that follow during the Late Woodland Period.

The Late Woodland Period began with a shift in settlement and subsistence patterns involving an increasing reliance on corn horticulture (Fox 1990:185; Smith 1990; Williamson 1990:312). Corn may have been introduced into southwestern Ontario from the American Midwest as early as 600 A.D. or a few centuries before. Corn did not become a dietary staple, however, until at least three to four hundred years later, when the cultivation of corn gradually spread into south-central and southeastern Ontario.

During the early Late Woodland Period, particularly within the Princess Point Complex (*circa* A.D. 500-1050), a number of archaeological material changes have been noted including the appearance of triangular projectile point styles, first seen during this period beginning with the Levanna form; cord-wrapped stick decorated ceramics using the paddle and anvil forming technique evolving from the mainly coil-manufactured and dentate stamped and pseudo-scallop shell impressed ceramics; and if not appearance, increasing use of maize (*Zea mays*) as a food source (e.g., Bursey 1995; Crawford et al. 1997; Ferris and Spence 1995:103; Martin 2004 [2007]; Ritchie 1971:31-32; Spence et al. 1990; Williamson 1990:299).

The Late Woodland Period is widely accepted as the beginning of agricultural life ways in south-central Ontario. Researchers have suggested that a warming trend during this time may have encouraged the spread of maize into southern Ontario, providing a greater number of frost-free days (Stothers and Yarnell 1977).

By approximately 600 A.D., a significant shift in settlement patterns was occurring throughout the area. People began to move from the seasonally occupied waterway-oriented campsites to more permanent village sites predominately situation on higher ground, often on well-drained sandy soils. These settlements, generally only a few acres in size, were often surrounded by palisade walls where the traditional “longhouse” structure was introduced (MCR 1981).

These early longhouse-type structures were actually not all that large, averaging only 12.4 metres in length (Dodd et al. 1990:349; Williamson 1990:304-305). It is also quite common to find the outlines of overlapping house structures, suggesting that these villages were occupied long enough to necessitate re-building.

The Jesuits reported that the Huron moved their villages once every 10 – 15 years, when the nearby soils had been depleted by farming and conveniently collected firewood grew scarce (Pearce 2010). It seems likely that Early Late Woodland villages were inhabited for considerably longer, as the populations relied less heavily on corn than did later groups, and their villages were much smaller, placing less demand on nearby resources.

Judging by the presence of carbonized corn kernels and cob fragments recovered from sub-floor storage pits, agriculture was becoming a vital part of the Early Late Woodland economy. However, it had not reached the level of importance it would in the Middle and Late-Late Woodland Periods. There is ample evidence to suggest that more traditional resources continued to be exploited and comprised a large part of the subsistence economy. Seasonally occupied special purpose sites relating to deer procurement, nut collection, and fishing activities, have all been identified. While beans are known to have been cultivated later in the Late Woodland Period, they have yet to be identified on Early Late Woodland sites.

The Middle Late Woodland Period (1300 – 1400 A.D.) witnessed several interesting developments in terms of settlement patterns and artifact assemblages. Changes in ceramic styles have been carefully documented, allowing the placement of sites in the first or second half of this 100-year period. Moreover, villages, which averaged approximately 0.6 hectares in extent during the Early Late Woodland Period, now consistently range between one and two hectares in size.

House lengths also change dramatically, more than doubling to an average of 30 metres, while houses of up to 45 metres have been documented. This increase in longhouse length has been variously interpreted.
The simplest possibility is that increased house length is the result of a gradual, natural increase in population (Dodd et al. 1990:323, 350, 357; Smith 1990). However, this does not account for the sudden shift in longhouse lengths around 1300 A.D. Other possible explanations involve changes in economic and socio-political organization (Dodd et al. 1990:357). One suggestion is that during the Middle Late Woodland Period small villages were amalgamating to form larger communities for mutual defence (Dodd et al. 1990:357). If this was the case, the more successful military leaders may have been able to absorb some of the smaller family groups into their households, thereby requiring longer structures. This hypothesis draws support from the fact that some sites had up to seven rows of palisades, indicating at least an occasional need for strong defensive measures.

There are, however, other Middle Late Woodland villages which had no palisades present (Dodd et al. 1990). More research is required to evaluate these competing interpretations.

The lay-out of houses within villages also changes dramatically by 1300 A.D. During the Early Late Woodland Period villages were haphazardly planned, with houses oriented in various directions. During the Middle Late Woodland Period villages are organized into two or more discrete groups of tightly spaced, parallel aligned, longhouses. It has been suggested that this change in village organization may indicate the initial development of the clans which were a characteristic of the historically known Iroquoian peoples (Dodd et al. 1990:358).

1.2.2 Post-Contact Indigenous Occupation of Southern Ontario

The post-contact Indigenous occupation of southern Ontario was heavily influenced by the dispersal of various Iroquoian-speaking peoples by the New York State Iroquois and the subsequent return of Algonkian-speaking groups from northern Ontario at the end of the 17th century and beginning of the 18th century (Schmalz 1991).

Following the introduction of Europeans to North America, the nature of Indigenous settlement size, population distribution, and material culture shifted as settlers began to colonize the land. Despite this shift in Indigenous life ways, Indigenous peoples of southern Ontario have left behind archaeologically significant resources throughout southern Ontario which show continuity with past peoples, even if this connection has not been recorded in historical Euro-Canadian documentation.

The Project Area is situated within the former Geographic Township of Whitchurch, County of York, Ontario. The Project Area is within lands that were part of the Williams Treaties made between the Crown and the 'Chippewa Indians of Christian Island, Georgina Island, and Rama' on October 31, 1923 and the 'Mississauga Indians of Rice Lake, Mud Lake, Scugog Lake and Alderville' on November 15, 1923. As detailed in the below passage, the Williams Treaties include:

> *Parts of the Counties of Northumberland, Durham, Ontario and York...[c]ommencing at the point where the easterly limit of that portion of the lands said to have been ceded...[as part of Treaty Number 13] intersects the northerly shore of Lake Ontario; thence northerly along the said easterly and northerly limits of the confirmed tract to the Holland River; thence northerly along the Holland River and along the westerly shore of Lake Simcoe and Kempenfeldt Bay to the narrows between Lake Couchiching and Lake Simcoe; thence south easterly along the shores of Lake Simcoe to the Talbot River; thence easterly along the Talbot River to the boundary between the Counties of Victoria and Ontario; thence southerly along that boundary to the north west angle of the Township of Darlington; thence along the northern boundary of the Township of Darlington, Clarke, Hope and Hamilton to Rice Lake; thence along the southern shore of said Lake to River Trent, and along the River Trent to Bay of Quinte; thence westerly and southerly along the shore of the Bay of Quinte to the road leading to Carrying Place and Wellers Bay; then westerly along the northern shore of Lake Ontario to the place of beginning.*

Morris 1943:62

1.2.3 Euro-Canadian Settlement

1.2.3.1 York County

Prior to the signing of the Williams Treaty European settlement was rapidly expanding in this part of southern Ontario. York County existed between 1792 and 1971. During that period the county boundaries changed extensively both internally and externally. The following review documents the major changes in municipal designations and boundaries of the County of York.

From 1763, the land that would later be occupied by York County was part of the Montreal District in the Province of Quebec. On July 24, 1788, Western Canada, a division of the Province of Quebec, was divided into four Districts: Lunenberg, Mecklenburg, Nassau and Hesse. The land that would become York County was located in the Nassau District which stretched from the head of the river Trent, on the Bay of Quinte on the eastern end of Lake Ontario, west to Long Point on the eastern end of Lake Erie. Shortly thereafter, in 1791, the Constitutional Act was passed by the Imperial Parliament and Canada (the Province of Quebec) was divided into two provinces: the Province of Upper Canada and the Province of Lower Canada (Mulvaney and Adam 1885 Part II:8). This provincial division was necessitated in no small part by the fairly rapid settlement of around 12,000 English speaking Protestants along the north shore of Lake Ontario following the end of the America Revolutionary War in 1783. These settlers demanded English Law and local representation in government (Mulvaney and Adam 1885:108).

The four Districts created in 1788 were re-named in 1792 by an Act (32 Geo. III C. 8) passed during the first sitting of the First Parliament of Upper Canada to the Eastern, Midland, Home and Western Districts with Nassau District assuming the name Home District (Mulvaney and Adam 1885 Part II:14). In the same year, the Province of Upper Canada was ordered divided into nineteen counties by Lieutenant Governor Simcoe; the fourteenth of these counties from the east was York County (Nickalls et al. 1831:26). When it was originally created, York County contained an East Riding and a West Riding, separated by land belonging to the Mississauga.

In 1793 Simcoe needed a new provincial capital because Newark (now Niagara-on-the-Lake), the existing capital, was shortly to be under the guns of the American occupied Fort Niagara on the eastern side of the Niagara River. Simcoe decided upon Toronto as the capital in large part due to its natural harbour. Simcoe chose to change the name of Toronto to York, likely during an initial visit to the territory in May 1793. The new name of York was officially recognized for the harbour and nascent town in August 1793 when Simcoe administered a General Order to celebrate the Duke of York's victory in Flanders over the French. The Provincial capital remained in Newark (now Niagara-on-the-Lake) until 1797 when it met at York for the first time.

The citing of the provincial capital at York (a.k.a. Toronto) had a decisive impact on the development of York County. As the seat of provincial power, the Town of York attracted much money and attention. The population did not expand rapidly during the first quarter of the nineteenth century. In 1830 the population of the Town of York was 2,860 and there were 287 buildings registered (Canniff 1878:X). The Town of York was incorporated as the City of Toronto in 1834, with William Lyon McKenzie being elected as the first mayor, making him by default the first elected mayor in Upper Canada. Subsequent to incorporation, the limits of the municipality were expanded, and the population increased in tandem. By 1836 the population of Toronto was approximately 10,000. The road network radiating out of York, especially Yonge Street and Dundas Street, was constructed early by government troops, adding much value to the county lands. In spring of 1794, Augustus Jones, the deputy provincial surveyor, began the survey of Yonge Street from Holland Landing south to York. In May of 1794, after the line had been surveyed, Alexander Aitken and a crew of Queen's Rangers began the difficult task of opening the road and laying out lots on either side (Berchem 1996:21). The Rangers were pulled off of all civic duty and dedicated to military activity by the summer of 1794 to deal with American military movements near Detroit. Opening the road then fell to settlers in the area, in particular those associated with William Berczy who brought some of the first settlers to Markham Township.

In 1798 an Act was passed by Provincial Parliament (38 Geo. III C. 5) that the East Riding of York would contain the townships of Whitby, Pickering, Scarborough, York, Etobicoke, Markham, Vaughan King, Whitchurch, Uxbridge and Gwillimbury as well as all of the land between Durham County and Lake Simcoe.

Throughout the early 1800s the population of Upper Canada continued to grow. The population of Upper Canada was approximately 30,000 in 1796 (Mulvaney and Adam 1885:117). A decade later, in 1806, the population had increased to 50,000 (Mulvaney and Adam 1885:118). In 1822, the population of Upper Canada was 120,000 (Mulvaney and Adam 1885: 140). By 1831, the population of Upper Canada reached 250,000 (Mulvaney and Adam 1885:144).

In the mid-1800s the County of York underwent several administrative boundary adjustments. In 1845 the County Divisions Act (8 Vic. C. 7) confirmed the division of York County into four ridings: North, South, East and West. The North Riding included the following townships: Brock, North Gwillimbury, East Gwillimbury, Georgina, Mara, Reach, Rama, Scott, Thora, Uxbridge and Whitchurch (Scobie 1853:132).

The passing of the Municipal Corporations Act, 1849, fundamentally changed the way municipalities were organized and governed in Upper Canada (Scobie 1853). Largely influenced by Robert Baldwin’s work (and often referred to as the Baldwin Act), the 1849 Municipal Corporations Act (12 Vic. C. 81) abolished the existing District system and allowed for the incorporation of villages, towns and cities and the election of associated councils (Cross and Fraser 2003). The judicial and other powers of the former Home District were transferred to York County (Scobie 1853:90). The province of Ontario re-introduced the district system in Northern Ontario for administrative purposes beginning in 1858 with Algoma and Nipissing on the northern shore of Lake Superior. The new district system differed from the pre-1850 system in that the new districts are not incorporated have no representative council.

In 1851, the municipal divisions of the 1849 Act were amended through the Territorial Divisions Alterations Act (14 and 15 Vic. C. 5) whereby the County of York was to consist of the following townships: Etobicoke, Vaughan, Markham, Scarborough, York, King, Whitchurch, East Gwillimbury and North Gwillimbury (Scobie 1853:292). In 1851 The Township of Georgina was affiliated with the County of Ontario. This Act reduced the size of the County of York and transferred the allegiance of numerous townships to neighbouring counties.

In 1859 the County of York consisted of the same townships as in 1851 with the addition of Georgina Township. The City of Toronto and the villages of Newmarket and Yorkville are also specifically mentioned as being within the County of York (Derbishire and Desbarats 1859:12).

The Statutes of the Province of Canada and Dominion of Canada (Notman 1876) summarizes the organizational structure of the County of York in 1875. At the time, York County was made up of three Ridings, North, East and West. The North Riding was made up of the following townships: King, Whitchurch, Georgina, East Gwillimbury and North Gwillimbury. The East Riding was made up of Markham and Scarborough Townships and that portion of the Township of York lying east of Yonge Street and the Village of Yorkville. The West Riding was made up of Etobicoke and Vaughan Townships and that portion of the Township of York lying west of Yonge Street (Notman 1876:38).

In 1887, the Revised Statutes of Ontario indicates that the County of York divisions were the same as those in 1875 except for the official recognition of several towns and villages for administrative and electoral purposes. The North Riding of York consisted of King, Whitchurch, Georgina, East Gwillimbury and North Gwillimbury as well as the Town of Newmarket, the Villages of Aurora and Holland Landing and that part of the Village of Souffville which formerly formed part of the Township of Whitchurch. The East Riding of York consisted of Markham and Scarborough Townships and that portion of the Township of York lying east of Yonge Street, as well as the Villages of Markham and Richmond Hill and that part of the Village of Stouffville that formerly formed part of the Township of Markham. The West Riding of York consisted of Etobicoke and Vaughan Townships and that portion of York Township that lies west of Yonge Street as well as the Villages of Etobicoke and Woodbridge R.S.O. 1887, c. 7 s. 15 (56-58).

Small areas of York County continued to be whittled from its jurisdiction through the growth of villages, towns and cities that annexed county lands into their boundaries throughout the twentieth century. The external boundaries of York County did not change during the first half of the twentieth century, however, internal divisions were numerous. The most recent change was in 1998 when the Municipality of Metropolitan Toronto was abolished and replaced by the new City of Toronto which was an amalgamation of the Cities of York, North York, Etobicoke, Scarborough and Toronto as well as the Borough of East York.

1.2.3.2 Township of Whitchurch/Community of Musselman's Lake

The historical Township of Whitchurch was first surveyed in 1800 by John Stegmann and then further lands were included in an update and later survey by Samuel Wilmot (Mulvaney and Adam 1885). Settlement of the township had begun prior to the first survey, with settlers arriving in 1795 and squatting on property which they later applied for the official patent to. Early settlers were primarily of German descent especially of persecuted religious minorities such as the Quakers, Mennonites, and Tunkers as well as Hessian soldiers who served for the British as mercenaries in the American War of Independence. Musselman's Lake was so named because the land along the west side of the lake was settled in 1807 by the Musselman family; Mennonites from Pennsylvania (MLRA 2017). The north shore of the lake was purchased by George Davies in the early 20th century and he developed the land into Cedar Beach Park with a renowned dance pavilion and then later a focus on a campground which is still a popular summer vacation spot (Young 2002).

The very nearby Town of Stouffville was founded by Abraham Stouffer. He purchased land in 1804; 200 acres on the north side of what is now Main Street in town. He also purchased land in 1808; 100 acres in Markham Township (which in those days was just on the south side of what is now Main Street) (WSHS 1995, 2003). The town itself wasn't surveyed into lots until 1826 when David Gibson created the plan for Stoufferville (now Stouffville) (WSHS 2003). In 1846 Smith's Gazetteer describes the Village of Stouffville as home to approximately 70 people including a physician and surgeon. The local businesses include several stores, taverns, mills, blacksmith, waggon maker, tailor and shoemaker (Smith 1846). By 1871 the population had grown to 700 individuals and later in 1877 the village was incorporated which finally put an end the township straddling and firmly placed Stouffville within the bounds of Whitchurch Township (MSHS 1995).

1.2.3.3 Lot 15, Concession 9, Whitchurch Township

The study area was originally part of Lot 15, Concession 9, in the former Township of Whitchurch.

In the 1860 Tremaine map it is apparent that Lot 15 had been subdivided in previous years; the western half is owned by John Hill and the eastern half is split between James M. Patterson and Richard Barnes (Map 2). Lot 15 remains divided into three parcels on the 1878 map as well. The Miles & Co. 1878 map illustrates that the western

100 acres is owned by Mrs. Hill, the mid-50 acres are owned by Rueben Shell, and the easternmost 40 acres are owned by Richard Barnes. A structure is illustrated on the northern edge of the lot (on what is now Hillsdale Drive) on Mrs. Hill’s property, beyond the study area boundary (Map 3).

Recorded in both the 1861 personal and agricultural census Richard Barnes is listed as the owner of 53.5 acres on Lot 15 and Lot 1. Approximately half of his land is listed as wild/forested conditions; the remaining 30 acres are being used as follows: 5 in cultivation, 14 in crop, 10 as pasture, and 1 as garden/orchard. The farm is listed as being worth $3,000 which is quite a good valuation as many neighbouring farms with at least twice as much land are appraised at the same value. Richard Barnes (aged 51) was originally from England, as was his wife Charity (50) and first daughter Jane (22) but the remainder of his family seems to have been Canadian born: Fanny (20), Eliza (17), and Emmaline (12). The census also noted that Richard was a carpenter by trade and the family lived in a one-and-a-half storey frame house.

In 1871 the census clarifies that the Barnes family is living on a smaller 3-acre portion of Lot 1, Concession 9. Hannah Hill (widow) owns the 100 acres on the western side of Lot 15 and a further two 47-acre portions of Lot 15 are listed as being occupied by tenants.

Joseph Johnson (42) and his wife Rosa (29) and their three daughters: Sarah (4), Harriet (2), and Christine (8mo) live as tenant farmers with 40 of the 47 acres noted as improved in the 1871 Census Schedule 4. The agricultural schedules show that eight of the improved acres are in pasture, one as orchard (which produces 30 bushels of apples and 10 bushels of other fruits). The family also owns livestock including: two horses, two milk cows, one cattle, five sheep, and two pig. The farm has also produced 120 bushels of wheat, 100 bushels each of barley and oats, 30 bushels of peas, 60 bushels of potatoes, 100 pounds of butter and 20 yards of flannel. The farm also employed George Godfrey as a labourer.

Thomas Howard (30) and his wife Angeline (nee Caster; 33) and their two daughters: Sarah (9) and Emeline (6) live as tenant farmers with 45 of the 47 acres noted as improved in the 1871 Census Schedule 4. The agricultural schedules show that four of the improved acres are in pasture and that the property produces 70 pounds of maple sugar annually. The family also owns livestock including: four horses, two milk cows, two cattle, one sheep, and nine pig. The farm has also produced 80 bushels of wheat, 300 bushels of barley, 200 bushels of oats, 50 bushels of peas, 30 bushels of potatoes, 100 pounds of butter and 10 yards of flannel. The farm also employed Robert Mason as a labourer.

1.3 Archaeological Context

1.3.1 The Natural Environment

The study area is situated within the Oak Ridges Moraine physiographic region (Chapman and Putnam 1984: 166-169):

> *Its general altitude is about 1,000 feet a.s.l. and it extends from the Niagara Escarpment to the Trent River, forming the height of land dividing the streams of the Lake Ontario drainage basin from those flowing into Georgian Bay and the Trent River. … The surface is hilly with a knob-and-basin relief typical of end moraine. … While for the most part, these hills are composed of sandy or gravelly materials,…[some] are formed of till which protrudes above the sands.*

Chapman and Putnam 1984:166-167

The soils of the study area consist of Pontypool sand, with several gravel pit concentrations illustrated in the surrounding area. This type of soil can be found in irregular and steeply sloping areas; deposited by glacio-fluvial action these types of soils exhibit good natural drainage (Hoffman and Richards 1955). Overall the Pontypool sand and nearby soil types likely would have been suitable for pre-contact Indigenous agricultural practices. Musselman Lake lies approximately 1080 metres to the northwest of the study area and a local tributary (approximately 1275 metres to the south) feeds into Duffins Creek (Map 1).

1.3.2 Previously Identified Archaeological Sites and Surveys

A search of the OASD and within Golder's corporate library indicated there are no archaeological sites currently registered within one kilometre of the study area (MTCS 2019). To the best of our knowledge, only one archaeological assessment has been conducted within 50 metres of the study area: a Stage 1 archaeological assessment of the North York Sand and Gravel pit at 14395 Ninth Line, Town of Whitchurch-Stouffville (Golder 2017). The Stage 1 assessment was completed by Golder in 2017 and found only marginal areas of archaeological potential that were recommended for Stage 2 assessment; the majority of the property was found to be disturbed.

2.0 FIELD METHODS

2.1 Existing Conditions

The study area is currently occupied by the Lafarge Canada Inc. Sand and Gravel extraction pit and a portion of the study area remains active (Image 1, Map 4). The eastern edge that fronts onto Durham Regional Road 30 and the first 150 metres along Hillsdale Drive are bordered by large berms where previous excavations and a current gravel road exist on the property (Images 2 – 5). To the south of the gravel road is the current edge of the open excavation (Image 6). To the north of the gravel road is a steep manufactured berm slope that lies in front of a section of forest (Images 7 – 10). The forest lot is defined by variable slope throughout (Images 11 – 12) as well as a small area of low-lying marsh land that straddles the northern property fence line. The edge of the forest lot was also assessed by walking the unopened road allowance for Hillsdale Drive (part of the Oak Ridges Moraine Trail) where the characteristic variable slope of the forest, manufactured berm, ROW road cut, and previously noted low-lying marsh area could all be viewed (Images 13 – 15).

2.2 Field Survey Methods

Although a Stage 1 property inspection is not a mandatory component of Stage 1 investigations, a random spot-check methodology was employed to provide relevant photos and impression within the Study Area (MTCS 2011 Section 1.2, Standard 1). The Stage 1 property inspection of the study area was conducted on 16 May 2019, under archaeological consulting licence P453, issued to Kendra Patton of Golder. Weather conditions at the time of inspection were overcast and cool. Lighting conditions were excellent, and at no time were field conditions found to be detrimental to the identification of archaeological resources or landscapes. The property inspection of the study area was conducted on foot, coverage of the study area was considered to be good (Map 5).

Table 2 provides an inventory of the documentary record generated in the field.

Table 2: Inventory of Documentary Record

Document Type	Current Location of Document	*Additional Comments*
Field Notes	Golder office in Whitby	2 pages stored to Golder server
Hand Drawn Maps	Golder office in Whitby	1 hand drawn map and stored to Golder server
Maps Provided by Client	Golder office in Whitby	1 map stored to Golder server
Digital Photographs	Golder office in Whitby	41 photographs stored to Golder server

3.0 ANALYSIS AND CONCLUSIONS

3.1 Assessing Archaeological Potential

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. In accordance with the MTCS's 2011 *Standards and Guidelines for Consultant Archaeologists* the following are features or characteristics that indicate archaeological potential:

- Previously identified archaeological sites;
- Water sources:
  - Primary water sources (lakes, rivers, streams, creeks);
  - Secondary water sources (intermittent streams and creeks; springs; marshes; swamps);
  - Features indicating past water sources (e.g. glacial lake shorelines indicated by the presence of raised gravel, sand, or beach ridges; relic river or stream channels indicated by clear dip or swale in the topography; shorelines of drained lakes or marshes; and cobble beaches);
  - Accessible or inaccessible shoreline (e.g. high bluffs, swamps or marsh fields by the edge of a lake; sandbars stretching into marsh);
- Elevated topography (eskers, drumlins, large knolls, plateaux);
- Pockets of well drained sandy soil, especially near areas of heavy soil or rocky ground; Distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases (there may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings);
- Resource areas including:
  - Food or medicinal plants;
  - Scarce raw minerals (e.g. quartz, copper, ochre or outcrops of chert);
  - Early Euro-Canadian industry (fur trade, mining, logging);
- Areas of Euro-Canadian settlement; and,
- Early historical transportation routes.

In recommending a Stage 2 property survey based on determining archaeological potential for a study area, MTCS stipulates the following:

- No areas within 300 metres of a previously identified site; water sources; areas of early Euro-Canadian Settlement; or locations identified through local knowledge or informants can be recommended for exemption from further assessment;
- No areas within 100 metres of early transportation routes can be recommended for exemption from further assessment; and,
- No areas within the property containing an elevated topography; pockets of well-drained sandy soil; distinctive land formations; or resource areas can be recommended for exemption from further assessment.

3.1.1 Archaeological Integrity

A negative indicator of archaeological potential is extensive land disturbance. This includes widespread earth movement activities that would have eradicated or relocated any cultural material to such a degree that the information potential and cultural heritage value or interest has been lost.

Section 1.3.2 of the MTCS' 2011 Standards and Guidelines for Consultant Archaeologists states that:

> *Archaeological potential can be determined not to be present for either the entire property or a part(s) of it when the area under consideration has been subject to extensive and deep land alterations that have severely damaged the integrity of any archaeological resources.*
>
> MTCS 2011:18

The types of disturbance referred to above includes, but is not restricted to, quarrying, sewage and infrastructure development, building footprints and major landscaping involving grading below topsoil.

This level of disturbance is noted throughout the study area south of the forest lot where extensive ground disturbance has occurred (as shown in Map 4).

3.1.2 Potential for Pre-contact and Historical Indigenous Archaeological Resources

Following the criteria outlined above in Section 3.1 to determine pre-contact and historic Indigenous archaeological potential, a number of factors can be highlighted. The soils of the study area would have been suitable for pre-contact Indigenous practices. The closest water source to the study area is beyond the 300 metres that are an archaeological potential indicator according to the Standards and Guidelines (MTCS 2011).

When the above noted archaeological potential criteria were applied to the study area, the study area exhibits archaeological potential for pre-contact and post-contact Indigenous sites. However, areas of previous disturbance eradicate the potential for the recovery of archaeological resources (Section 3.1.1), and as such the extended use as a sand and gravel pit has removed the archaeological potential for the majority of study area. Map 5 illustrates the results of the Stage 1 archaeological assessment.

3.1.3 Potential for Euro-Canadian Archaeological Resources

Following the criteria outlined above in Section 3.1 to determine Euro-Canadian archaeological potential, a number of factors can be highlighted including the occupation of the surrounding area from the early 19th century as evidenced by historical mapping and land records.

When the above noted archaeological potential criteria were applied to the study area, the study area exhibits archaeological potential for historical Euro-Canadian sites. However, areas of previous disturbance eradicate the potential for the recovery of archaeological resources (Section 3.1.1), and as such the extended use as a sand and gravel pit has removed the archaeological potential for the majority of study area. Map 5 illustrates the results of the Stage 1 archaeological assessment.

4.0 RECOMMENDATIONS

Given the findings of the Stage 1 archaeological assessment of the study area, the following recommendations are made:

1) The entirety of the study area was identified as disturbed: exhibiting slope (greater than 20%) or previous construction or grading activities, as illustrated in Map 5, and does not exhibit archaeological potential and no further archaeological assessment of this study area is required.

Despite best efforts and all due diligence, no archaeological assessment can necessarily account for all potential archaeological resources. Should deeply buried archaeological resources be identified during ground disturbance activity associated with future development of the study area, ground disturbance activities should be immediately halted and the Archaeology Division of the Culture Programs Unit of the MTCS notified.

The MTCS is asked to review the results and recommendations presented herein and accept this report into the Provincial Register of archaeological reports. The MTCS is also asked to provide a letter concurring with the results presented herein.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c O.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport, a letter will be issue by the ministry stating that there are no further concerns with regards to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licenced archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licenced archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be representative of a new archaeological site or sites and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33, requires that any person discovering or having knowledge of a burial site shall immediately notify the police or coroner. It is recommended that the Registrar of Cemeteries at the Ministry of Consumer Services is also immediately notified.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.

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7.0 IMAGES

Image 1: Durham Regional Road 30 entrance to Lafarge Canada Inc. property, view northwest.

Image 2: Intersection of Durham Regional Road 30 and Hillsdale Drive, view south.

Image 3: Manufactured berm slope along northern fence line of property, view north-east.

Image 4: Manufactured berm, gravel road, and slope of previously excavated area, view east.

Image 5: Manufactured berm and slope of previously excavated area, view southeast.

Image 6: View of open excavation from gravel road along berm, view southwest.

Image 7: North edge of berm, steep manufactured slope, view northwest.

Image 8: Edge of manufactured berm with steep slope, view northeast.

Image 9: Northern property fence line, visible slope south from fence line as well as steep berm slope, view northeast.

Image 10: View of steep slope from mid-point of manufactured berm, view south-southeast.

Image 11: Slope within forest lot at north section of the property, view northwest.

Image 12: Slope at edge of forest lot at north section of the property, edge of manufactured berm visible, view northeast.

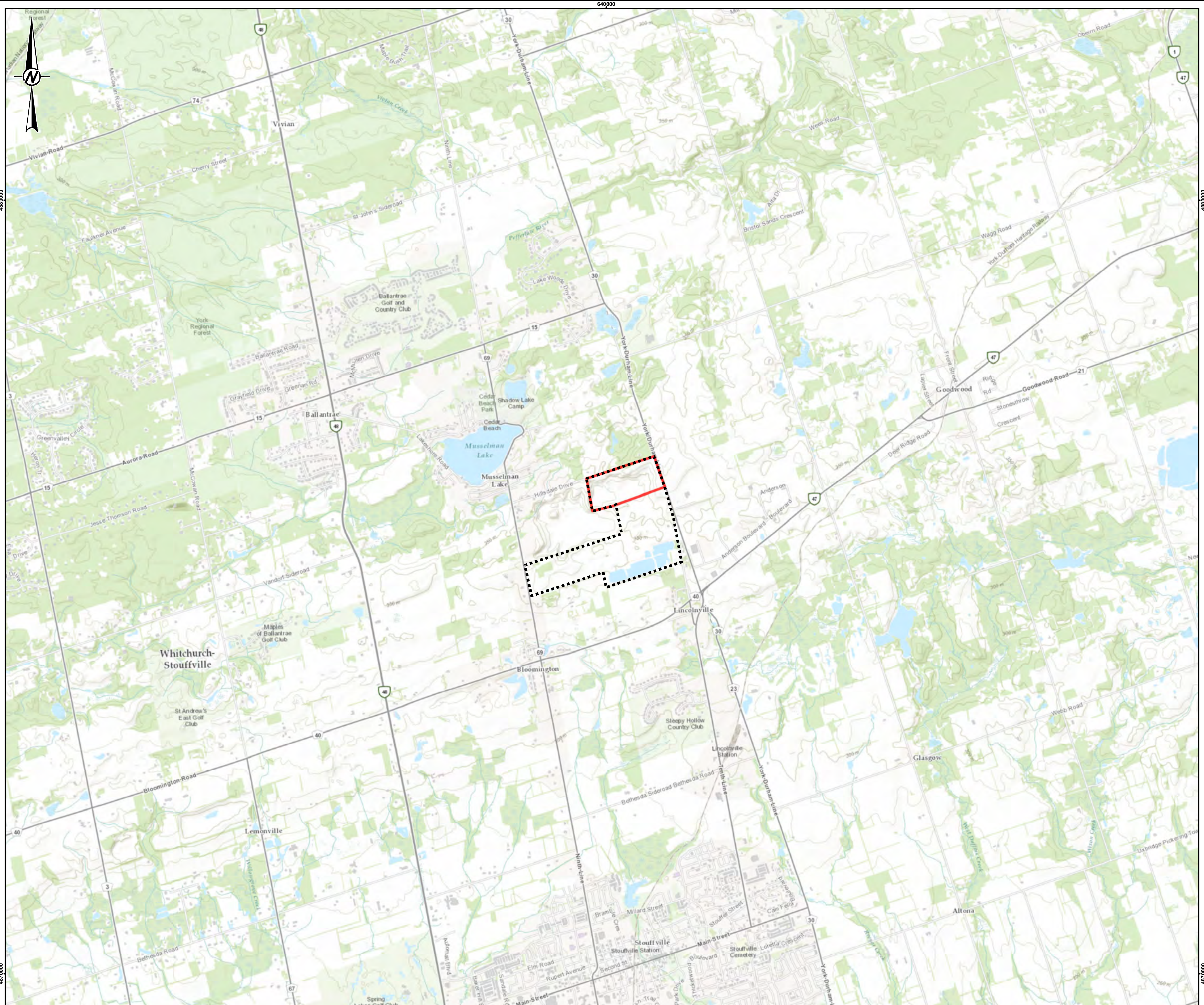
Image 13: Hillsdale Drive road Right-of-Way (Oak Ridges Moraine Trail), manufactured berm slope along property fence line, view west-southwest.

Image 14: Area of low-lying, permanently wet, land along northern property fence line, view southeast.

Image 15: Hillsdale Drive road Right-of-Way (Oak Ridges Moraine Trail), steep slope within forest lot, view northeast.

8.0 MAPS

All maps follow on succeeding pages.

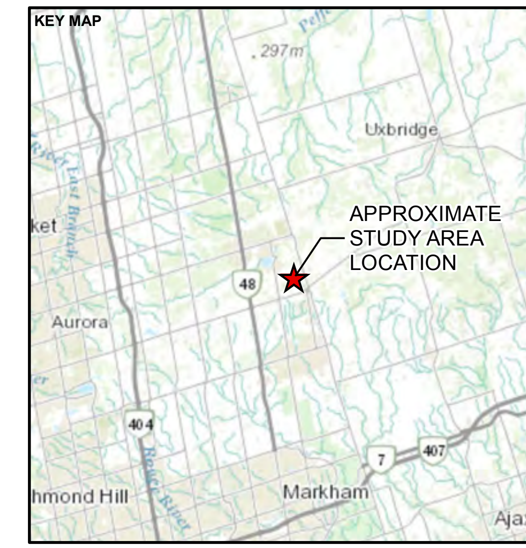


LEGEND

Study Area

Property Limit

KEY MAP



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NOTE(S)

REFERENCE(S)

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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
LAFARGE CANADA INC

PROJECT
STAGE 1 ARCHEOLOGICAL ASSESSMENT
14204 DURHAM REGIONAL ROAD 30,
TOWN OF WHITCHURCH-STOUFFVILLE, ON

TITLE
STUDY AREA

CONSULTANT

GOLDER

YYYY-MM-DD	2019-07-08
DESIGNED	ST
PREPARED	ST
REVIEWED	KP
APPROVED	HD

PROJECT NO.	CONTROL	REV.	FIGURE
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Study Area

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NOTE(S)

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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
LAFARGE CANADA INC.

PROJECT
STAGE 1 ARCHEOLOGICAL ASSESSMENT
14204 DURHAM REGIONAL ROAD 30,
TOWN OF WHITCHURCH-STOUFFVILLE, ON

TITLE
A PORTION OF THE 1860 TREMAINE MAP OF YORK COUNTY

CONSULTANT

GOLDER

YYYY-MM-DD	2019-07-08
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PROJECT NO.	CONTROL	REV.	FIGURE
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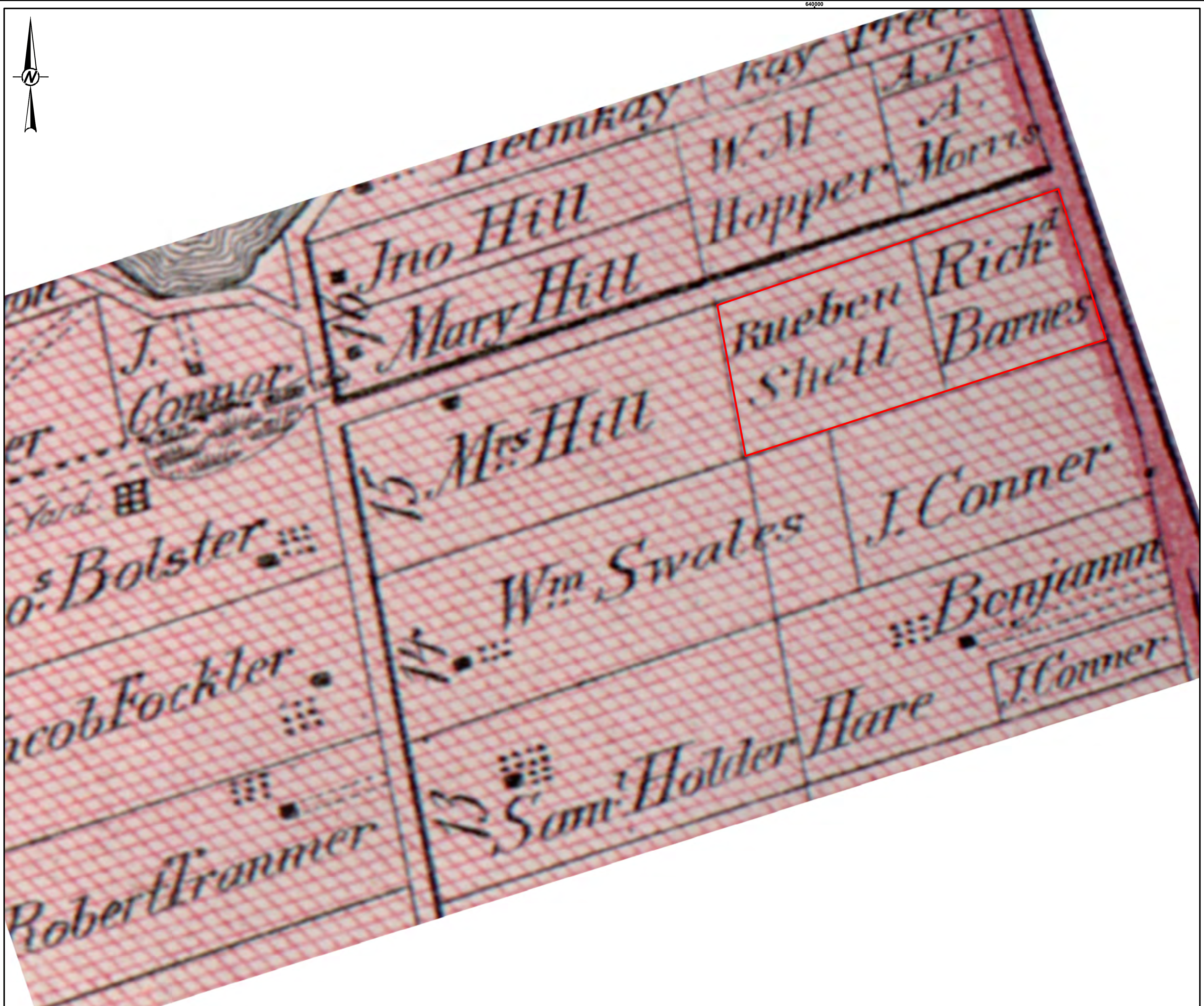

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Study Area

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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

LAFARGE CANADA INC.

PROJECT

STAGE 1 ARCHEOLOGICAL ASSESSMENT
14204 DURHAM REGIONAL ROAD 30,
TOWN OF WHITCHURCH-STOUFFVILLE, ON

TITLE

A PORTION OF THE 1878 COUNTY ATLAS OF YORK COUNTY

CONSULTANT

GOLDER

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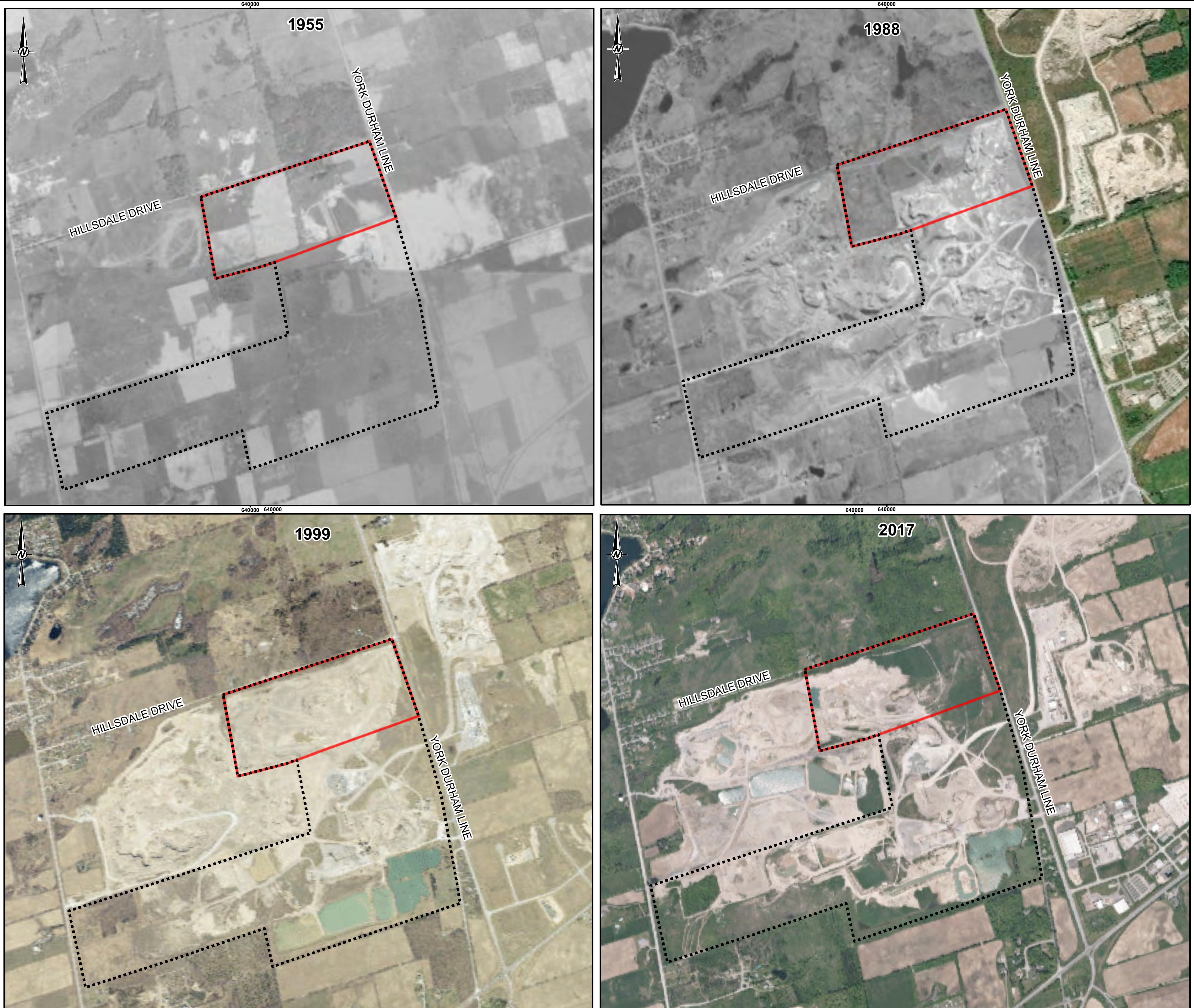

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Study Area

Property Limit

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NOTE(S)

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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE

CLIENT
LAFARGE CANADA INC.

PROJECT
STAGE 1 ARCHEOLOGICAL ASSESSMENT
14204 DURHAM REGIONAL ROAD 30,
TOWN OF WHITCHURCH-STOUFFVILLE, ON

TITLE
HISTORIC AERIAL IMAGERY OF STUDY AREA

CONSULTANT

GOLDER

YYYY-MM-DD	2019-07-08
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LEGEND

Photograph Location and Direction

Study Area

Area of Previous Disturbance, No Archaeological Potential, No Further Archaeological Assessment Recommended

Property Limit

0 200 400

1:5,000 METRES

REFERENCE(S)

1. HISTORIC MAP: MILES AND CO.1878 ILLUSTRATED HISTORICAL ATLAS OF THE COUNTY OF YORK AND THE TOWNSHIP OF WEST GWILLIMBURY & TOWN OF BRADFORD IN THE COUNTY OF SIMCOE, ONT.
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CLIENT
LAFARGE CANADA INC.

PROJECT
STAGE 1 ARCHEOLOGICAL ASSESSMENT
14204 DURHAM REGIONAL ROAD 30,
TOWN OF WHITCHURCH-STOUFFVILLE, ON

TITLE
STAGE 1 ARCHAEOLOGICAL POTENTIAL AND PHOTOGRAPHIC LOCATIONS

CONSULTANT
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APPROVED	HD

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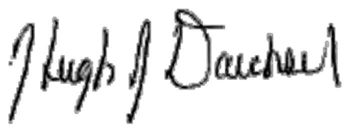
Signature Page

Golder Associates Ltd.



Kendra Patton, MA
Project Archaeologist

Hugh Daechsel, MA
Senior Archaeologist, Principal

KP/HD/ly

https://golderassociates.sharepoint.com/sites/102618/deliverables/archaeology/final report/p453-0003-2019_19115436-3000_re_stage 1 archaeology_july9,2019.docx

APPENDIX A

Development Map

Musselman Lake
Musselmans Lake
AREA TO BE FILLED TO GRADE
Ninth Line

GOLDER

golder.com

APPENDIX E

Risk Management Matrix

APPENDIX I
RISK MANAGEMENT MATRIX
14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario

Risk	Preventative Measure	Recommended Migitation	Required Follow Up (Notification)
A groundwater sample is found to to contain a target parameter concentration that is above the Table 2 site condition standard	All potential source sites to be approved based on the source site acceptance protocol described in Section 4.2. Gatekeepr is responsible for inspecting the waybill for each vehicle that enters the property. Only vehicles with fill material from a pre-screened and approved source site will be allowed entry.	Qualified Person will review the Site operating records to determine whether there are any known circumstances that could have potentially contributed to the the reported groundwater impacts and will identify any short-term response actions that can be immediately implemented by the Owner to either mitigate the groundwater impact and/or the potential for further groundwater impact to occur.	Within 30 days of the Owner's receipt of the sample data, the Owner will submit an incident report to the Town that is prepared by a Qualified Person. The incident report will include: 1) a summary of the relevant groundwater results with comparisions to relevant quality criteria; 2) the relevant findings of the review of the Site operating records; 3) descriptions of the short-term actions (if any) that were implemented by the Owner; and, 4) recommendations for any further response actions, including a work plan with an implementation schedule, for review by the Town.
Audit sampling of fill material demonstrates that fill quality does not meet the Table 2 site condition standards	All potential source sites to be approved based on the Source Site Acceptance Protocol described in Section 4.2. Gatekeeper to inspect the waybill for each vehicle that enters the property. Only vehicles with fill material from a pre-screened and approved source site will be allowed entry.	The Owner will suspend further shipments from the source that generated the impacted soils. Source site will be informed to stop sending trucks until an investigation by a Qualified Person retained by the Owner is completed.	Owner will ensure that all unacceptable fill has been removed for off-Site disposal or returned to the source site.
		Complete an assessment of fill quality in the area of the unacceptable audit sample and determine the need for further mitigating actions to prevent a potential adverse effect. Remove any unacceptable fill materials from the Site.	Complete an incident report. Re-assess the suitability of the source site material if the source site provides additional documentation that is considered sastisfactory to the Qualified Person and the Town confirming that unacceptable fill has been removed from the source site and the remaining fill is acceptable.
Evidence of potential contamination	Gatekeeper to inspect each vehicle that enters the property. Should there be evidence of potential contamination the gatekeeper will refuse access to the Site.	Should suspect material be placed in the fill area, the material will be marked and the material segregated and removed from the Site.	Conduct confirmatory soil testing in the area of the suspect fill materials to confirm that the remain fill meets the Table 2 site condition standards. Complete an incident report.
Vehicle arrives with improper documentation	Gatekeeper to inspect each vehicle that enters the property.	Refuse access to the Site.	An incident report will be completed any time a vehicle is refused access to the Site.
Vehicle traffic queuing on Durham Regional Road 30	Vehicle inspection location is 600 metres from the entrance. Should there be delays at the inspection or fill areas the Owner will ensure that trucks queue along the internal access road.	If truck queuing extends onto Durham Regional Road 30, the Owner will direct the source site to delay additional truck loads.	None
Unstable ground condition during fill placement	Approved fill material will be placed in lifts no greater than one metre in thickness and nominally compacted. Any ponded water will be filled from the sides.	Should unstable slopes be created during fill placement the Owner will halt fill placement and retain the services of a geotechical engineer to review the ground conditions. If soil becomes oversaturated the fill material will be allowed to dry or settle into the ponded area and filling will be moved to other designated areas of the approved fill area.	Daily inspections shall be completed to record the quantity and location of fill placement. Inspections will be included in the monthly operations report. Inspections will include relevant observations of the ground conditions, where necessary.
Damage to the significant woodland	A 30 metre setback, presented on Drawing 2, will be applied to the north Site boundary which will provide an adequate buffer to the significant woodland.	Post signage along the internal haul route to avoid any vehicles from straying off the road into the restricted areas.	Not applicable
	A five metre setback is also applied from the limits of the propety boundary as per the Town's requirement for fill permit applications where there can be no disturbance within five metres of neighbouring properties.		
Traffic and/or noise compliants	Not applicable	Owner to investigate cause of complaint through review daily inspection log and waybills	Owner will respond directly to the member of public as per Section 3.17.
Mud tracking on Durham Regional Road 30	Owner to utilize the paved access road extending 100 metres from the entrance followed by 650 metres of a gravel access road.	Conduct regular inspections of the internal haul route and Durham Regional Road 30. Maintain a power sweeper and water truck at the Site to wash the internal haul route and Durham Regional Road 30 as needed. If excessive mud tracking on Durham Regional Road 30 occurs, truck traffic will be temporarily halted until further reactive mitigation measures can be implemented.	Monthly operations report that includies daily inspections of the condition of the internal haul road and Durham Regional Road 30 documenting any reactive measures undertaken to minimize mud tracking.
Dust complaints	Preventative measures are described in Section 3.12..	Owner to investigate cause of complaint through review daily inspection log and waybills. Water will be applied as a dust suppressant during non-freezing conditions. Any soil stockpiles will be positioned in designated areas with windbreaks. Water will be used as a dust suppressant during high windspeed conditions. Signage will be displayed to avoid vehicle traffic from straying off the maintained haul route and a speed limit of 25 kilometres per hour ("km/h") will be posted to minimize dust.	Daily inspections of the internal haul road and documentation of any reactive measures undertaken to address excessive dust emissions. Inspections to be included in the monthly operations report.

APPENDIX F

Groundwater Monitoring Plan

REPORT

Groundwater Monitoring and Protection Program

14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario

Submitted to:

Mr. Chris Galway, Senior Land Manager, East Central Ontario
Lafarge Canada Inc.
6509 Airport Road
Mississauga, Ontario
L4V 1S7

Submitted by:

Golder Associates Ltd.
100 Scotia Court,
Whitby, Ontario, L1N 8Y6, Canada
+1 905 723 2727

19115436

July 2021

Distribution List

1 copy (.pdf) - Lafarge Canada Inc.

1 copy (.pdf) - Golder Associates Ltd.

Table of Contents

FIGURES

1.0 INTRODUCTION

Golder Associates Ltd. ("Golder") is pleased to provide Lafarge Canada Inc. ("Lafarge") with this groundwater monitoring program ("GMP") for the proposed site alteration in a 37.49 hectares ("ha") portion of the Lafarge Stouffville Pit located located at 14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario (the "Site"). The Site location is presented in Figure 1.

Golder understands that Lafarge intends to import fill materials to restore the Site to match the surrounding surface grade. The proposed Site was formerly used as an aggregate extraction operation and the proposed fill importation will restore that area of Site to its original grade. To complete the fill importation Lafarge requires a site alteration permit from the Town of Whitchurch-Stouffville (the "Town"). The purpose of the groundwater monitoring program is to satisfy the Town's requirements for the submission of a site alteration permit application.

Based on a review of the Regional Municipality of York's (the "Region") Source Water Protection interactive map, the Site is not located within a wellhead protection area ("WHPA") but is within a highly vulnerable aquifer area and a significant groundwater recharge area.

1.1 Groundwater Monitoring Requirements

The overall objective of the GMP is to assess the impact (if any) of fill importation on groundwater quality. The remainder of the Lafarge property will continue to operate as an aggregate extraction operation.

The analytical results from the groundwater samples collected as part of the GMP will be compared to the Table 2 generic site condition standards (agricultural property use, coarse textured soil) presented in the Ministry of Environment, Conservation and Parks ("MECP") document "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*", dated April 15, 2011 ("Table 2 Standards").

The GMP was developed considering the following requirements:

- To establish a regular groundwater monitoring program for monitoring wells MW19-1, MW19-2, MW19-3, and MW19-4, including the identification of contaminants of concern for drinking water sources under the *Clean Water Act;*
- To assess potential impacts to groundwater quality resulting from the proposed site alteration by monitoring groundwater quality relative to baseline groundwater quality data collected prior to fill placement (see Section 4.1), and in the context of the Table 2 Standards, while following established quality assurance/quality control practices;
- To establish protocols to identify statistically significant increases in target parameter concentrations that may exceed the Table 2 Standards; and,
- To document the monitoring results though a regular reporting program.

2.0 SITE CONDITIONS

2.1 Site Location and Setting

The property is situated at 14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario, located on the west side of Durham Regional Road 30, and approximately 1.45 kkm north of Bloomington Road East. The Site was formerly used for the commercial production of aggregates.

2.2 Hydrogeological Conditions

Golder prepared a hydrogeological assessment report entitled *"Hydrogeological Assessment, 14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, Ontario",* for Lafarge, dated December 2019. The key findings of this report include:

- There are 31 water well records located within 500 metres of the Site of which ten are water supply wells and the remaining records represent test holes or observation wells;
- The Site is not located within a WHPA; however, it is located adjacent to WHPA D. The Site is located within a highly vulnerable aquifer and significant groundwater recharge area;
- The inferred direction of groundwater flow is southwesterly with a horizontal gradient of 0.002 m/m. The interpreted groundwater flow direction is presented in Figure 2;
- The hydraulic conductivity of the soil within the screened interval of the monitoring wells ranges from 4.0×10^{-6} to 6.0×10^{-6} metres per second ("m/s"), with a geometric mean hydraulic conductivity of 4.9×10^{-6} m/s;
- The groundwater velocity is 1.0 metres per year; and,
- The reported concentrations in all groundwater samples collected as part of the baseline monitoring program were below the Table 2 Standards for the contaminants of potential concern including petroleum hydrocarbons, volatile organic compounds, metals, inorganics, and polycyclic aromatic hydrocarbons.

3.0 GROUNDWATER MONITORING PROGRAM

Groundwater sampling and analysis will include the following activities:

- Depths to water will be determined using an electric water level meter;
- The headspace combustible vapour concentrations in the monitoring well will be determined using a combustible gas detector calibrated with hexane gas and operated in the methane elimination mode;
- At least three well volumes of groundwater will be purged from each monitoring well using either dedicated Waterra® inertial samplers or a submersible pump. Groundwater samples will be collected into pre-cleaned laboratory-supplied sample containers. Field parameters (i.e., temperature, pH and electrical conductivity) will be measured at the time of sample collection. One duplicate sample and one trip blank will be collected for quality assurance purposes;
- Any olfactory and visual indicators of the potential presence of free phase product (i.e. presence of any sheen or odour) will be noted at the time of sample collection;
- Groundwater samples will be submitted to an accredited analytical laboratory under chain-of-custody procedures for the analysis for petroleum hydrocarbons (including benzene, toluene, ethylbenzene and xylenes), polycyclic aromatic hydrocarbons, volatile organic compounds ("VOCs"), metals, hydride-forming metals, and other regulated parameters (i.e., chloride, free cyanide, hexavalent chromium, and mercury). Samples for metals and hexavalent chromium analysis will be field filtered prior to sample collection using a 0.45 micron in-line filter;

- Reasonable measures will be taken to minimize the risk of cross contamination of samples from other monitoring wells or from other samples such as using dedicated sampling equipment, disposable nitrile gloves and/or implementing decontamination procedures;
- Purge water will be discharged to ground surface if the groundwater is observed to be free of sheen, odour, or other evidence of impact (and provided that groundwater impacts have not previously been documented at that location); and,
- The groundwater samples will be stored on ice in a cooler until delivery to the analytical laboratory.

Groundwater monitoring and sampling will be completed in general accordance with the investigation requirements of Ontario Regulation 153/04 (as amended) to allow the data to be useful for the future submission of a Record of Site Condition.

3.1 Schedule and Frequency

The monitoring period will be initiated as soon as the fill permit is issued, necessary approvals are in place, and upon acceptance of this GMP by the Town and Region. Groundwater monitoring will be conducted semi-annually (spring and fall).

All four monitoring wells will be included in the monitoring program (two downgradient locations, one central location, and one up-gradient location). The intent of the initial up-gradient monitoring well will to provide a broader baseline against which future data can be compared (i.e., due to a shift in groundwater flow direction or in the event that impacts are identified at a downgradient location).

The monitoring program will continue following the completion of fill operations and will be terminated two years following the completion of filling. As part of the annual reporting process, the monitoring frequency and range of parameters tested will be re-evaluated considering the results obtained to date. Any recommendations for amendments to the monitoring program will be included in the annual monitoring report. Monitoring wells will be decommissioned as per Ontario Regulation 903 (as amended) when the wells are no longer in use. Copies of the decommissioning records will be provided to the Town and Region.

The collection and interpretation of water level data from the on-Site data logger will be monitored on a semi-annual basis and used to supplement our overall understanding of seasonal effects on groundwater levels and aid in identifying any long-term trends.

3.2 Regular Maintenance Activities

As filling progresses the monitoring well casings will require additional lengths of 50-millimetre (“mm”) diameter polyvinyl chloride (“PVC”) riser piping to be added so that the top of pipe remains above the top of fill elevation. Certified well technicians (as defined in *Ontario Regulation 903*) will be employed to complete this work. Top of pipe elevations will be re-established accordingly as needed.

Each monitoring well is currently completed with an aboveground protective casing with the riser pipe sealed with J-plug.

4.0 GROUNDWATER CONDITIONS

4.1 Groundwater Quality

The analytical results for the groundwater samples collected as part of the GMP will be compared to the baseline sampling results and the Table 2 Standards. In addition to numerical standards, the MECP sets out non-numerical (aesthetic) standards relating to the presence of free phase product and hydrocarbon sheen. Specifically, a property does not meet the site condition standards if there is evidence of free product, including but not limited to visible petroleum hydrocarbon film or sheen present on groundwater, surface water or in any groundwater or surface water samples.

As part of the GMP, evidence of free product (if any) encountered during purging and sampling of the monitoring wells on-Site will trigger a contingency plan (refer to Section 5.2). While it is unlikely that free phase product or hydrocarbon sheen will be encountered, given that there are strict requirements for screening potential fill material (i.e., source site assessments, audit sampling, etc.), monitoring for the presence of petroleum hydrocarbon product is a standard practice.

5.0 TRIGGERS AND ACTION ITEMS

Groundwater will be monitored by a Qualified Person as described within this GMP. Observed changes to the groundwater flow direction, quality, or other conditions will be assessed by a Qualified Person and actioned by Lafarge as follows.

5.1 Flow Direction

Long-term fluctuations in the groundwater elevations in the on-Site monitoring wells will be monitored by a Qualified Person through the regularly scheduled monitoring events. The collection and interpretation of the data retrieved will be completed on a semi-annual basis. Should the inferred groundwater flow direction change from the current direction of southwesterly, additional monitoring wells may be required to ensure that groundwater quality downgradient of the Site is adequately assessed.

Groundwater flow in the area is generally influenced by a regional hydraulic gradient and the restoration of the Site to the surrounding grade is not expected to affect the regional hydraulic gradient.

5.2 On-Going Groundwater Quality Assessment

The analytical results will be compared to the Table 2 Standards. In the event that a groundwater sample is found to contain a target parameter(s) concentration that is above the Table 2 Standard or should the groundwater exhibit aesthetic potential impacts (i.e., the presence of free phase product or hydrocarbon sheen), the monitoring well(s) will be re-sampled within ten days from Lafarge's receipt of the analytical results. Should the groundwater from the affected monitoring well meet the Table 2 Standards for the parameter(s) which previously exceeded upon re-sampling, no further action is required.

Should groundwater quality at the affected monitoring well continue to exceed the Table 2 Standards, Lafarge will develop a response report and corrective action plan. As part of plan development, a Qualified Person will review the Site operating records to determine whether there are any known circumstances that could potentially contribute to the reported groundwater impacts and identify any short-term response actions that can be immediately implemented to either mitigate the reported groundwater impact and/or mitigate the potential for further groundwater impact to occur. Within 30 days of Lafarge's receipt of the resampling results, Lafarge will submit an incident report to the Town and the Region that is prepared by a Qualified Person. The incident report will include: 1) a summary of the relevant groundwater monitoring results with comparisons to relevant quality criteria; 2) the relevant findings of the review of the Site operating records; 3) descriptions of the short-term actions (if any) that were implemented by Lafarge; and 4) recommendations for any further response actions, including a work plan with an implementation schedule, for review by the Town. The corrective action and response plan will be conducted in accordance to the nature of the exceedance, human health risk to downgradient residential receptors, and the potential for the exceedance to impair the quality of the municipal water supply. Examples of the types of response actions that may be recommended in the incident report include:

- Further data evaluation of to confirm if there is other evidence to confirm the potential impact (e.g., statistical evaluation, geochemical evaluation);
- Implement additional quality assurance protocols to minimize potential positive sample bias occurring during groundwater sample collection;
- Further assess the quality of recently imported fill materials in proximity to the affected monitoring well;
- Revise the groundwater monitoring program to include increased monitoring frequency at the affected monitoring well;
- Review fill quality controls in the fill management plan and update as necessary;
- Remove fill material that is believed to have resulted in groundwater impacts;
- Completion of a risk assessment to further evaluate potential human health impacts;
- Hydrogeological modelling to evaluate potential impacts on groundwater quality at the municipal supply wells;
- Further assessment of groundwater quality through the installation of additional monitoring wells; and/or,
- Implementation of engineering controls to reduce infiltration through the fill materials or reduce migration of impacted groundwater.

6.0 REPORTING

The annual report will provide a summary of the results of the groundwater monitoring and sampling activities, analytical results (included tabulated historical data), and will include an assessment of the results relative to the Table 2 Standards and the UCLs. A summary of relevant changes to the Site and monitoring wells, impact forecasts based on trends (if any) as currently outlined in the GMP, and recommendations will also be included. The recommendations will outline any proposed revisions to the GMP, and recommended adjustments to the Site Alteration and Fill Management Plan (if applicable) to address the findings of the GMP report. Reporting will continue for the duration of the monitoring and sampling program. The annual report will be provided to Lafarge prior to the permit renewal date as part of the Site Alteration and Fill Management Plan reporting for the Site.

As part of the annual report, statistical analysis will be completed to identify any increases in parameter concentrations related to the fill operations. The baseline analyte (i.e., 2019) concentrations from all monitoring wells will be used to calculate an upper confidence limit ("UCL") for each analyte, representing the Site-wide variability in analyte concentration (i.e., background groundwater quality). Time-series concentration plots will be prepared in comparison to applicable Table 2 Standard and the UCL, placing the results of the monitoring program in a context that appropriately considers the inherent variability of analyte concentrations in groundwater, the background analyte concentrations, and the relevant site condition standards.

7.0 CLOSURE

We trust that this report meets your requirements. If you have any questions regarding the content of this program, please do not hesitate to contact this office.

Signature Page

Golder Associates Ltd.

LICENSED PROFESSIONAL ENGINEER
14/7/2021
E.D. HOOD
90481516
PROVINCE OF ONTARIO

Chris Pons, BSc
Environmental Scientist

Eric Hood, PhD, PEng
Associate, Senior Engineer

GL/CP/EH/lb

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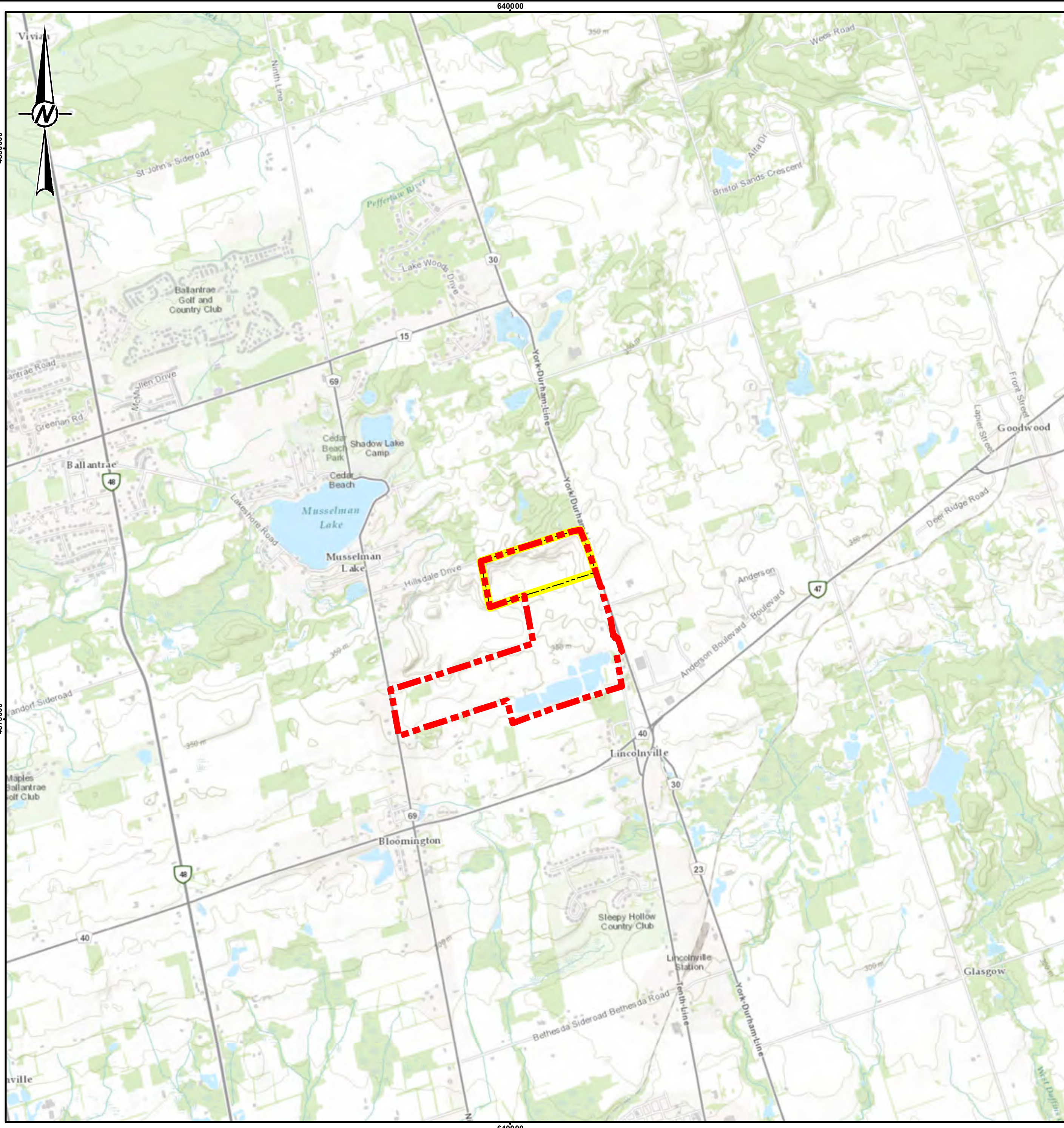
https://golderassociates.sharepoint.com/sites/102618/deliverables/gw monitoring program/final/19115436 rep 14jul2021 gw monitoring program lafarge stouffville final.docx

Figures



LEGEND

LAFARGE PROPERTY BOUNDARY

PROPOSED SITE AREA

0 1,000 2,000

1:50,000 METRES

REFERENCE(S)
BASE MAP SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
LAFARGE CANADA INC.

PROJECT
HYDROGEOLOGICAL ASSESSMENT
14204 DURHAM REGIONAL ROAD 30, WHITCHURCH-STOUFFVILLE, ONTARIO

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2019-07-24
DESIGNED	JT
PREPARED	JT
REVIEWED	GL
APPROVED	

TITLE
KEY PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
19115436 (2000)	0002	A	1

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

LEGEND

- MONITORING WELL LOCATION
- INFERRED GROUNDWATER FLOW DIRECTION
- LAFARGE PROPERTY BOUNDARY
- PROPOSED SITE AREA
- WATERBODY
- WETLAND
- GROUNDWATER CONTOUR (M)
- (320.51) GROUNDWATER ELEVATION, (MASL), MEASURED MAY 21, 2019

0 200 400

1:5,000 METRES

NOTE(S)

1. MASL = METRES ABOVE SEA LEVEL

REFERENCE(S)

BASE DATA - MNR LIO, OBTAINED 2019. MECP OBTAINED 2017.
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2019
BASE IMAGERY SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
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PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
LAFARGE CANADA INC.

PROJECT
HYDROGEOLOGICAL ASSESSMENT
14204 DURHAM REGIONAL ROAD 30, WHITCHURCH-STOUFFVILLE, ONTARIO

TITLE
GROUNDWATER ELEVATIONS AND FLOW DIRECTION

CONSULTANT

GOLDER MEMBER OF WSP

YYYY-MM-DD	2019-12-03
DESIGNED	GL
PREPARED	JT
REVIEWED	CP
APPROVED	EH

PROJECT NO.	CONTROL	REV.	FIGURE
19115436 (2000)	0002	---	2

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APPENDIX G

Traffic Assessment

UPDATED TRANSPORTATION IMPACT STUDY

LAFARGE STOUFFVILLE PIT – SITE ALTERATION AND FILL PERMIT

FINAL ▪ JULY 2022

REPORT PREPARED FOR

Lafarge Canada
6509 Airport Road
Mississauga, ON
L4V 1S7

REPORT PREPARED BY

THE MUNICIPAL INFRASTRUCTURE GROUP LTD.
A T.Y. LIN INTERNATIONAL COMPANY
8800 DUFFERIN STREET, SUITE 200
VAUGHAN, ON
L4K 0C5
(905) 738-5700

TMIG PROJECT NUMBER 19199

EXECUTIVE SUMMARY

The Municipal Infrastructure Group Ltd., a T.Y. Lin International Company (TMIG) was retained by Lafarge Canada (Lafarge) to prepare a Transportation Impact Study (TIS) in support of the site alteration application to infill a portion of Lafarge's Stouffville Pit. The site is located at 14204 Durham Regional Road 30, bounded by Hillsdale Drive to the north, farmland to the south, York-Durham Line to the east and by other fill sites and Ninth Line to the west, in the Town of Whitchurch-Stouffville, Region of York.

Stouffville Pit site has an unlimited annual tonnage license and currently ships approximately 1,000,000 tonnes of aggregate per year in conjunction with importing material to the site for blending. It is intended to fill-in a portion of the site to bring the area back up to the original grade. The infill area has an approximate volume of 8,000,000 m^3. The application is to allow for a total of 1,000 fill loads per day in support of this endeavor (i.e., 1,000 tri-axle trucks with a capacity of 10 m^3 to access the lands every day in order to proceed with filling), which are proposed to exit the site via Hillsdale Drive. This TIS was completed in support of this development application in order to estimate the impacts of the additional fill trucks on the boundary road network.

For the purpose of this study, TMC data was collected in August 2021 (i.e., the peak operating month for the Pit). The surveyed traffic data was increased to account for missing volumes at certain intersections (as detailed in the report). The resulting traffic volumes were then grown to 2022 to derive existing traffic conditions. Similarly, 2028 and 2033 future background volumes were derived by growing the derived 2022 existing conditions volumes to the appropriate horizon years and adding traffic generated by the study area background development. Finally, the 2028 and 2033 future total volumes were derived by adding the site trips associated with the increased fill activity to the future background volumes.

As part of the survey data collected, a total of 149 fill trucks were documented accessing the site. Accordingly, as per the development proposal, the hourly trip generation associated with a total of 851 additional fill trucks per day would need to be added to our traffic forecast in order to account for the 1,000 daily fill trucks application (with reassignment of the surveyed fill trips to exit via Hillsdale Drive). However, for the purpose of conservative analysis in this study, TMIG added the full 1,000 fill truck trip generation to the road network (to enter via York-Durham Line and exit via Hillsdale Drive). This technically double counts the surveyed 149 fill truck trip generation detailed in the above table within the roadway network but allows for a more conservative review of the study intersections and accesses for the Pit. As such, the full trip generation for the 1,000 fill trucks (equivalent to 240 trips in the AM (120 inbound and 120 outbound) and 44 trips in the PM (22 inbound and 22 outbound)) was added onto the roadway in this study.

Review of existing, future background and future total conditions for all study years confirms that the increased fill truck activity can be accommodated by the boundary road network. Delays and volume-to-capacity ratios at all turning movements are deemed acceptable, along with projected queuing. The following recommendations were derived, to be applied to the 2028 future background conditions:

- Provide a northbound left-turn lane, southbound left-turn lane, and southbound right-turn lane at the intersection of York-Durham Line at Regional Highway 47 and optimize the signal timing splits.
- Optimize the signal timing splits at the intersection of Goodwood Road at Regional Highway 47.

TMIG recommends that the intersection of York-Durham Line at Aurora Road be monitored by the Region to identify when operations will become critical during the AM peak hour and worsen during the PM peak hour in order to provide remedial measures under future conditions. A sensitivity analysis under the 2028 future total scenario shows that the extension of the westbound left turn lane and addition of a right-turn lane result in minimal improvement to peak hour operations.

Based on the MTO warrant analysis, TMIG recommends that a northbound left-turn lane be provided at the intersection of the Stouffville Pit Site Access (Inbound) and York-Durham Line under 2028 future total conditions. The lane is recommended to be designed with a 50m storage, a 135m deceleration length and 140m taper length.

Similarly, per the above, the recommended northbound left-turn lane at the York-Durham Line and Highway 47 intersection is recommended with a 50m storage, while the southbound left and right-turn lanes at the York-Durham Line and Highway 47 intersection are recommended with a 70m storage, in order to accommodate the projected queues.

In addition to traffic analysis along the boundary road network, TMIG confirmed that there would no projected queuing concerns for the increased fill trucks internally to the site should the appropriate queueing mitigation measures be implemented.

Finally, TMIG completed a review of the available sightlines at the Hillsdale Drive intersection to York-Durham Line and confirmed no projected concerns. TMIG also completed a review of truck circulation at all site accesses and confirmed no projected concerns. The Hillsdale Drive outbound trucks will utilize part of the shoulder to enter onto York-Durham Line in order to limit any encroachment onto the northbound lane, which would be deemed acceptable in a rural setting.

Overall, based on findings of the study, it is TMIG's opinion that the proposed development application would be acceptable with limited impact to the boundary road network traffic operations, subject to the recommended improvements along the roadway being implemented under future background conditions and any additional recommendation detailed within this report.

CONTENTS

APPENDICES

FIGURES

TABLES

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1 INTRODUCTION

The Municipal Infrastructure Group Ltd., a T.Y. Lin International Company (TMIG) was retained by Lafarge Canada (Lafarge) to prepare a Transportation Impact Study (TIS) in support of the site alteration application to infill a portion of Lafarge's Stouffville Pit. The site is located at 14204 Durham Regional Road 30, bounded by Hillsdale Drive to the north, farmland to the south, York-Durham Line to the east and by other fill sites and Ninth Line to the west, in the Town of Whitchurch-Stouffville, Region of York.

Stouffville Pit site has an unlimited annual tonnage license and currently ships approximately 1,000,000 tonnes of aggregate per year in conjunction with importing material to the site for blending. It is intended to fill-in a portion of the site to bring the area back up to the original grade. The infill area has an approximate volume of 8,000,000 m^3. Based on fluctuations in the market and availability of fill material throughout the years, there is no exact timeline for the completion of this filling endeavour. Input from the project team details a timeline for completion between 8-to-16 years to account for any changes in material availability as a conservative estimate. The application is to allow for a total of 1,000 fill loads per day (i.e., 1,000 tri-axle trucks with a capacity of 10 m^3 to access the lands every day in order to proceed with filling), which are proposed to exit the site via Hillsdale Drive. A TIS was completed in support of this development application in order to estimate the impacts of the additional fill trucks on the boundary road network. The TIS was completed by TMIG and submitted in August 2021.

Subsequent to the TIS submission, the project team received comments from both the municipality (via a peer review process) as well as the Region of York. These comments have been included in **Appendix A** in the form of a matrix, along with an associated response detailing how the reviewing agencies' concerns with the TIS were addressed. In an effort to address these comments, this updated TIS was completed for submission in support of the development application. All updated analyses and findings have been detailed in this document.

The hours of operations for the Pit consist of 6:00 AM to 5:00 PM. For sites outside of the immediate study area, the primary haul routes for trucks destined to/from the Stouffville Pit include Highway 404, Bloomington Road (RR 40) / Regional Highway 47, and York-Durham Line. Access to the subject site is currently via the existing inbound and outbound driveways on York-Durham Line. As part of this application, fill trucks are proposed to continue entering the site via the inbound access onto York-Durham Line but are proposed to exit the lands via Hillsdale Drive. Note that the Stouffville Pit has no relations with the adjacent fill sites to the west, nor does it have any accesses onto Ninth Line.

This traffic impact assessment analyzed two horizon years for the future conditions of the pit. Increased fill activity for the Pit is planned to take place as soon as approval is granted from the reviewing agencies (anticipated to be in 2022 based on input from the project team). For the purpose of this analysis, a conservative 2023 year was considered as the "build-out" for the increased fill activity. As such, this TIS adopted future background and total traffic conditions with horizon years to 2028 (5-years past implementation of increased fill-activity) and 2033 (10-years past implementation).

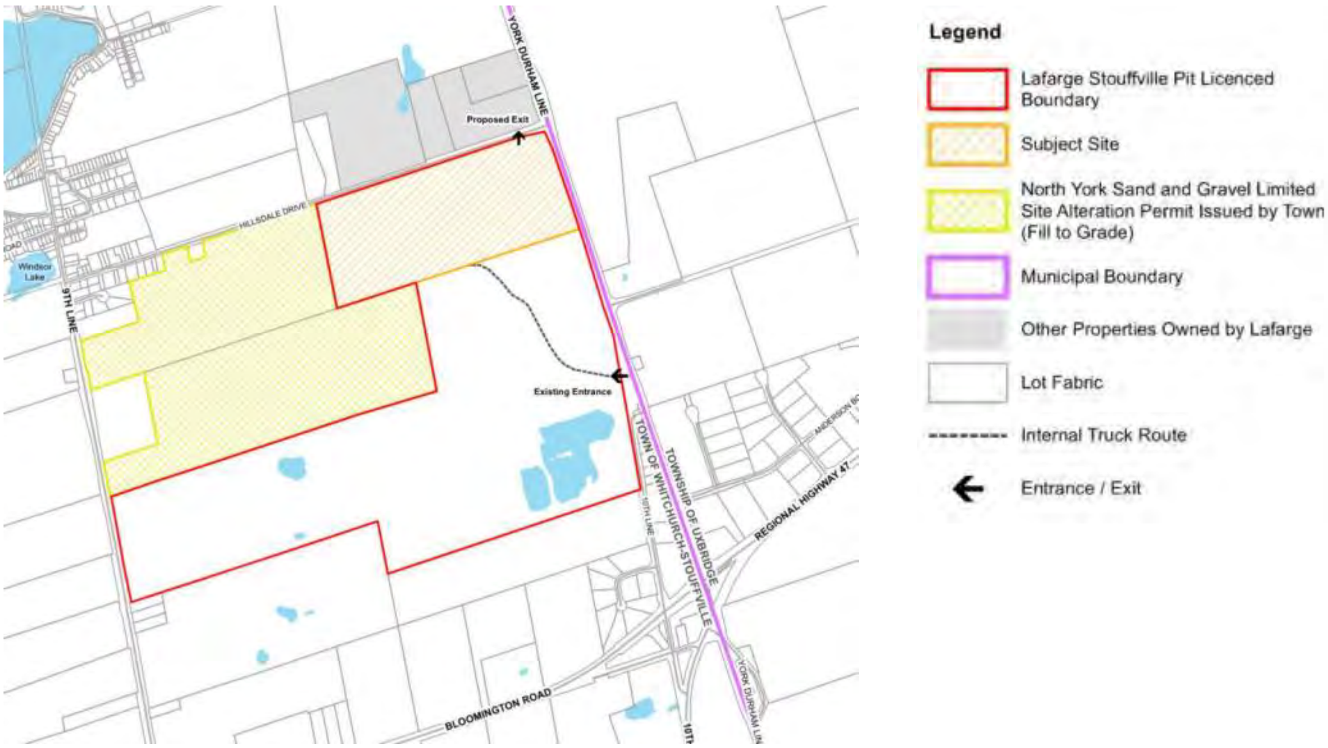
1.1 Retainer and Objective

The objectives of this study are to:

- Establish baseline traffic conditions for the study area and review the existing traffic conditions;
- Derive the future background operating conditions for the study intersections based on a 2028 and 2033 planning horizon;
- Derive the trip generation associated with the increased fill activity for the site and establish 2028 and 2033 future total traffic volumes;
- Analyse future total operating conditions for the study intersections; and
- Determine what, if any, traffic impacts there are on the study area haul routes from the infill pit operations.

Please refer to **Figure 1-1** for the existing site boundary and refer to **Appendix B** for the existing features plan and the operations and rehabilitation plans of the Pit.

Figure 1-1 Stouffville Pit - Site Location



Source: Drawing prepared by MHBC

2 BASELINE TRAFFIC CONDITIONS

This section summarizes the surrounding road network, the data collection program and presents the existing traffic volume conditions on the proximate study area roadways to assess the current operating conditions at the intersections. These 'baseline conditions' form the foundation for future background traffic projections and the incremental site-impact analyses investigated later herein.

2.1 Study Intersections

The haul route analyses include the following intersections, as requested during pre-consultation with the review agencies:

- The existing inbound and outbound site driveways on York-Durham Line;
- York-Durham Line and Aurora Road (Regional Road 15);
- York-Durham Line and Wagg Road /Yake Crescent;
- York-Durham Line and Hillsdale Drive;
- York-Durham Line and Bloomington Road (Regional Road 40 / Regional Highway 47);
- Goodwood Road (Regional Road 21) and Regional Highway 47;
- Front Street (Concession Road 3) and Regional Highway 47;
- Brock Road (Regional Road 1) and Regional Highway 47; and
- Goodwood Pit Site Access and Regional Highway 47.

Please refer to **Figure 2-1** for an illustration of the existing lane configuration at the above noted intersections.

2.2 Site Statistics

Stouffville Pit site has an unlimited annual tonnage license and currently ships approximately 1,000,000 tonnes of aggregate per year in conjunction with importing material to the site for blending. It is intended to fill-in a portion of the site to bring the area back up to the original grade. The infill area has an approximate volume of 8,000,000 m^3.

As mentioned in the introduction, the development application is to allow a maximum total of 1,000 tri-axle trucks to access the site daily in order to fill-in a portion of the Pit. Based on fluctuations in the market and availability of fill material throughout the years, there is no exact timeline for the completion of this filling endeavour. Input from the project team details a timeline for completion between 8-to-16 years to account for any changes in material availability as a conservative estimate. The application proposes that fill trucks would continue to enter the site via the inbound access onto York-Durham Line but would no longer exit the site via the outbound access onto York-Durham Line (as under existing conditions), but rather exit the site via an access onto Hillsdale Drive.

As mentioned as part of the Peer Review comments from the Town, there is an existing heavy truck restriction on Hillsdale Drive, possibility due to the existence of the single-family home on that street. Based on input from the project team, TMIG can confirm that the single-family detached home located on Hillsdale Drive is property of Lafarge, and traffic generated by the dwelling unit would be the only other traffic volumes to share Hillsdale Drive with the outbound fill truck traffic proposed. Accordingly, as Lafarge does not have an objection to this arrangement and considering the proposed route via Hillsdale would be for outbound trucks only, it is TMIG's opinion that the route would be acceptable.

2.3 Routing Plans

As the study intersections include the site accesses (Stouffville Pit) as well as the access to the Goodwood Pit onto Regional Highway 47, the existing routing plans for the Stouffville and Goodwood Pit operations are shown in **Figure 2-2 to Figure 2-6.** Note that a portion of the material from the Goodwood Pit is destined to the Stouffville Pit (this transfer route was considered as part of the study). These routing plans are currently in operation and are proposed to remain the same for the future operations, except for the fill trucks proposed to exit the site via Hillsdale Drive under future conditions.

Figure 2-2 shows the Goodwood Pit to Stouffville Pit Transfer route. **Figure 2-3** shows the Stouffville Pit Aggregate Haul Route (Inbound). **Figure 2-4** shows the Stouffville Pit Aggregate Haul Route (Outbound). **Figure 2-5** shows the Stouffville Pit Fill Haul Route (Inbound). **Figure 2-6** shows the Stouffville Pit Fill Haul Route (Outbound). The anticipated routing of vehicles beyond the study area network based on engineering judgment is provided in **Figure 2-7**.

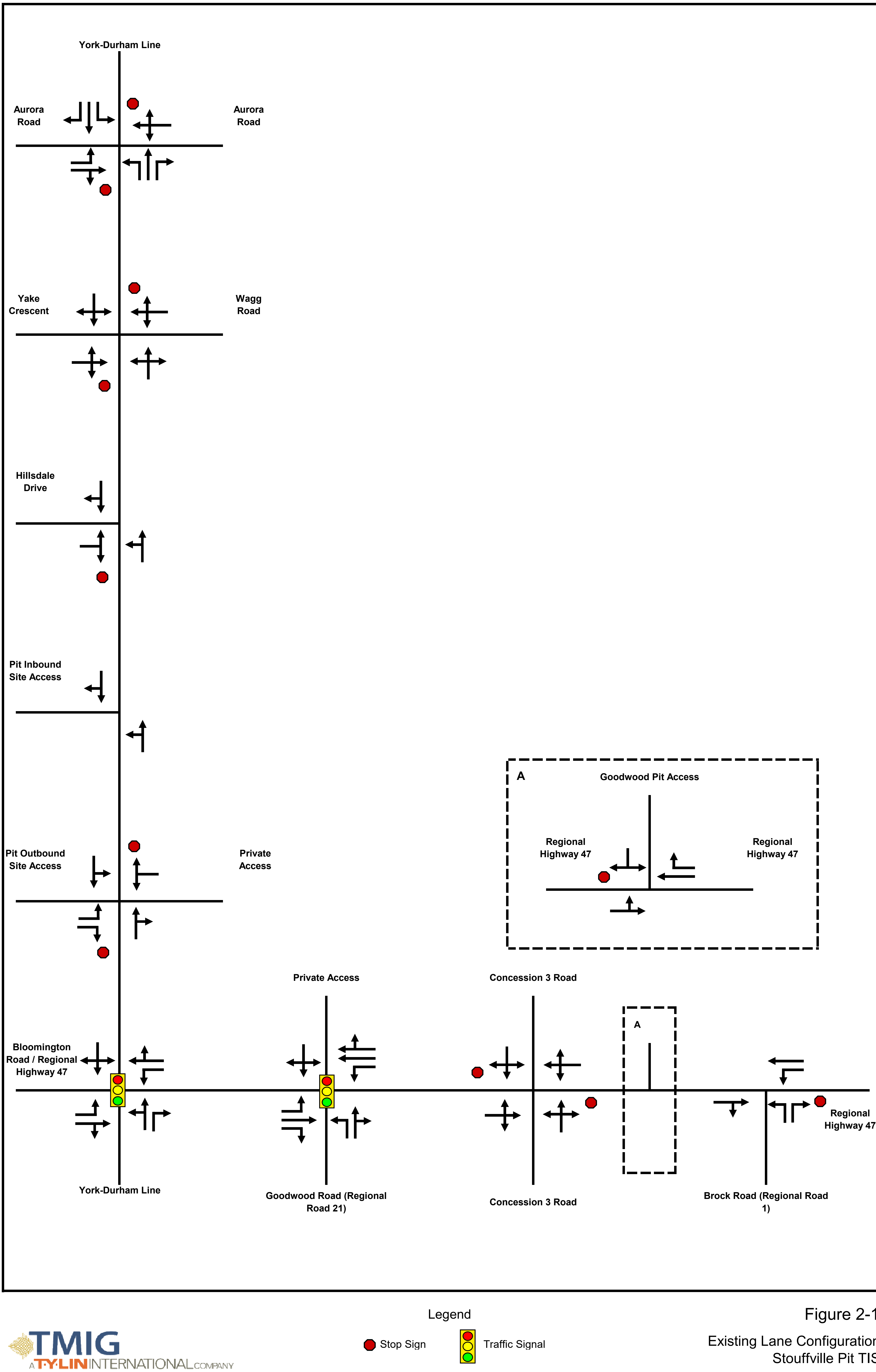


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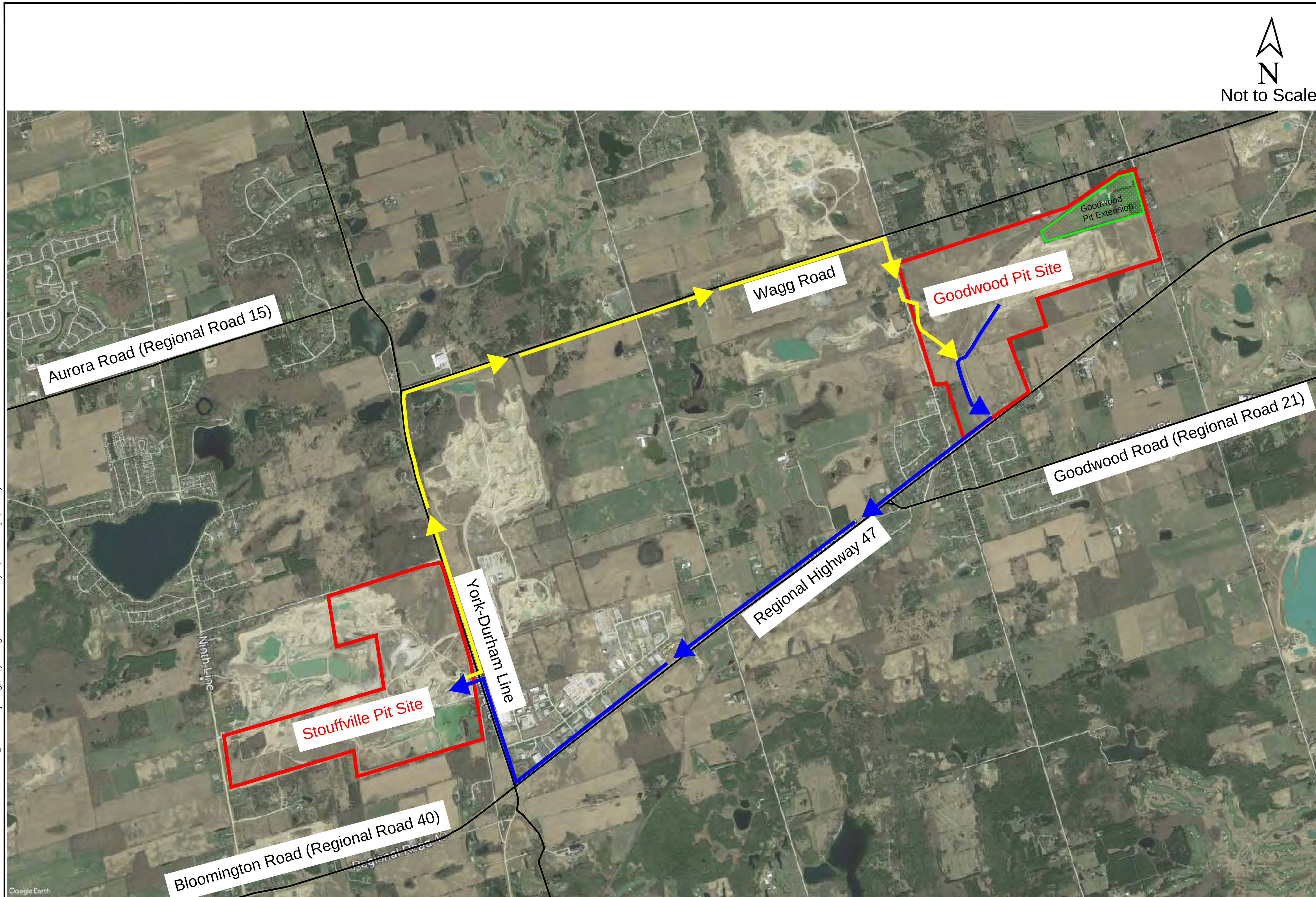
Figure 2-1

Existing Lane Configuration
Stouffville Pit TIS



TMIG
A TYLIN INTERNATIONAL COMPANY
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700
f: 905.738.0065

Transfer Route
Lafarge Stouffville Pit - Site Alteration and Fill Permit
Transportation Impact Study

DATE:	PROJECT No.
March 2022	19199
SCALE: N.T.S	DRAWING No. Figure 2-2

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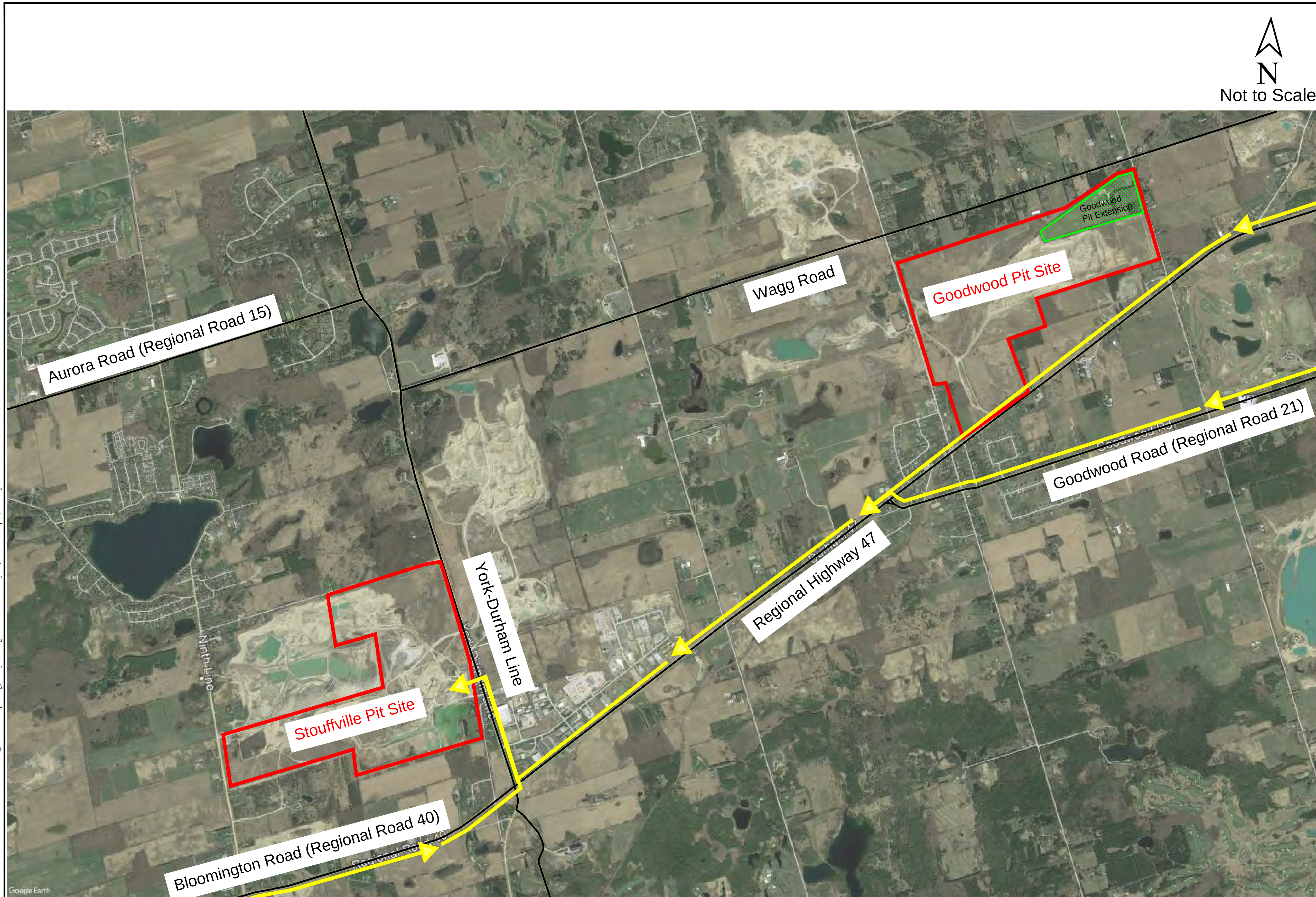

TMIG
A T.Y.LIN INTERNATIONAL COMPANY
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700
f: 905.738.0065

Aggregate Haul Route - Inbound
Lafarge Stouffville Pit - Site Alteration and Fill Permit
Transportation Impact Study

DATE: March 2022	PROJECT No. 19199
SCALE: N.T.S	DRAWING No. Figure 2-3

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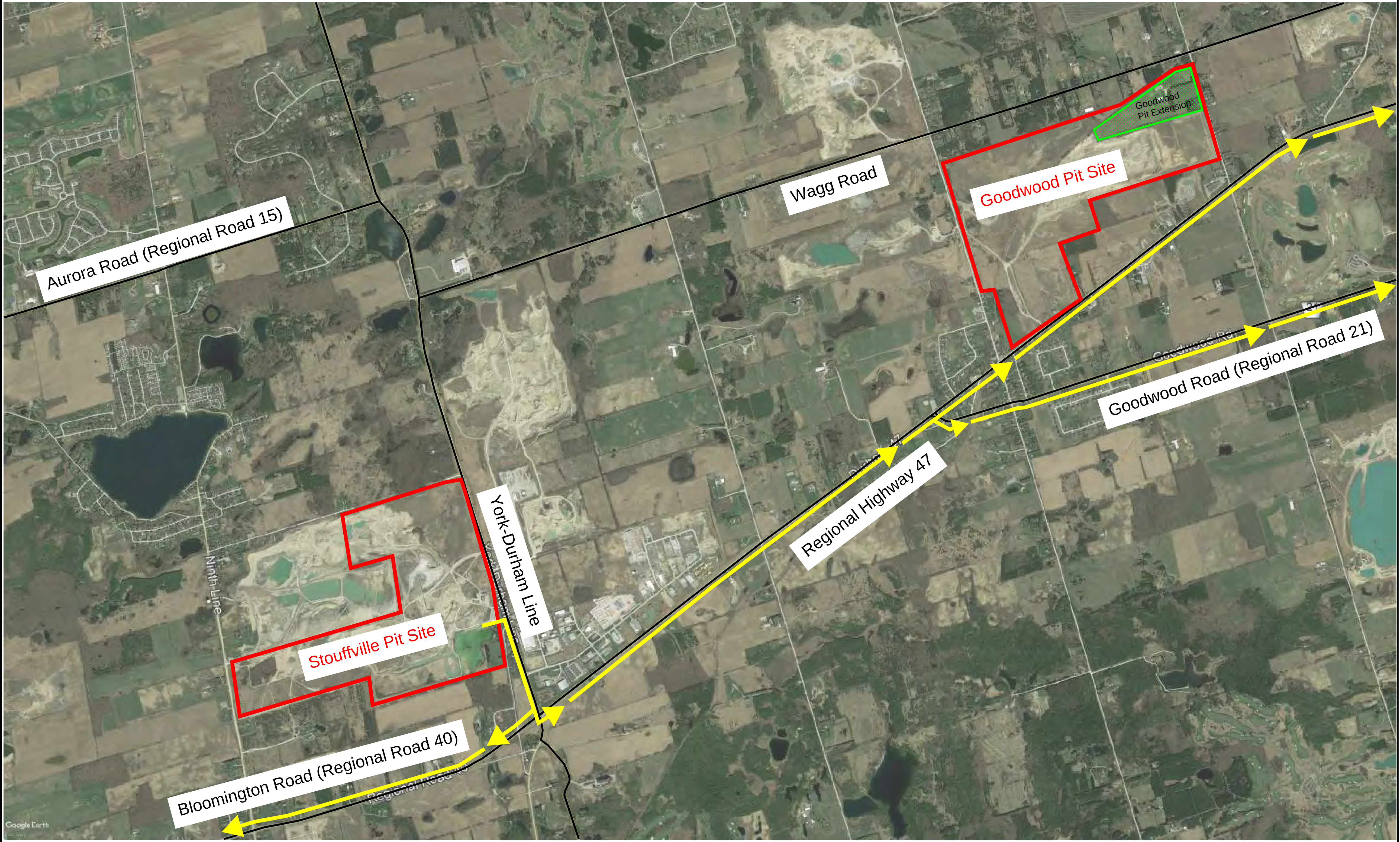
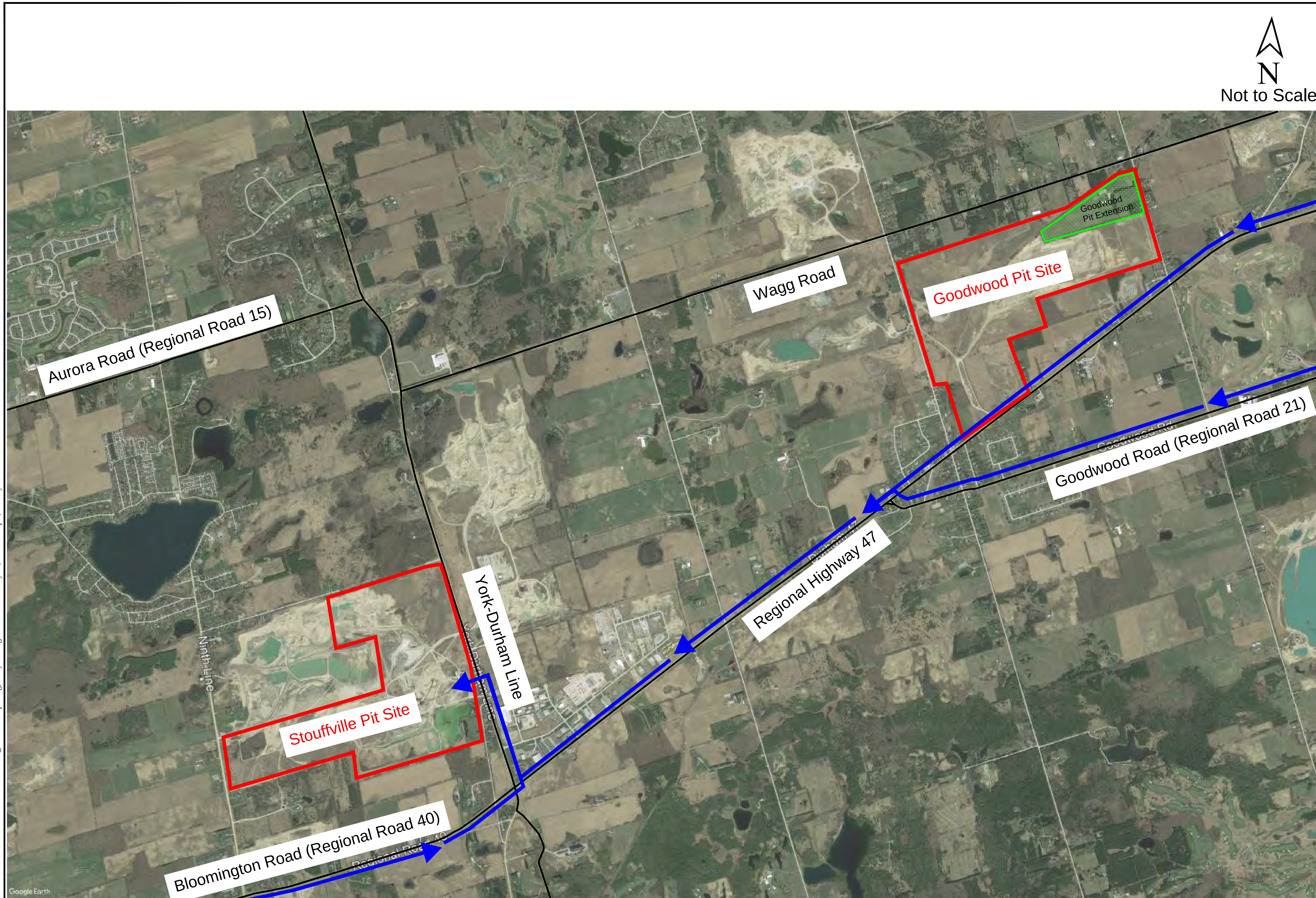


TMIG
A TYLIN INTERNATIONAL COMPANY
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700
f: 905.738.0065

Aggregate Haul Route - Outbound
Lafarge Stouffville Pit - Site Alteration and Fill Permit
Transportation Impact Study

DATE:	PROJECT No.
March 2022	19199
SCALE: N.T.S	DRAWING No. Figure 2-4



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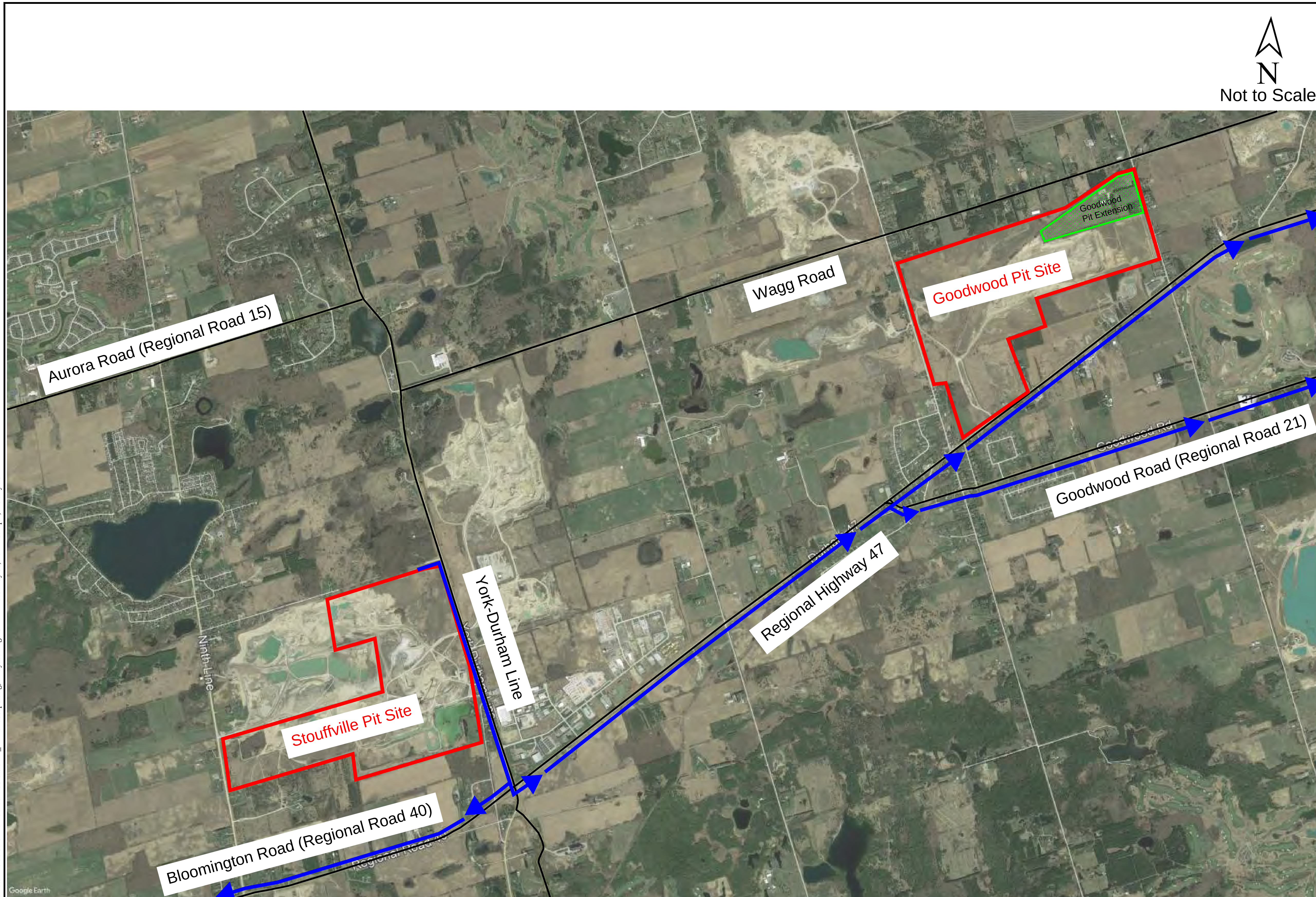
Vaughan, ON
L4K 0C5
p: 905.738.5700
f: 905.738.0065

Fill Trucks Haul Route - Inbound
Lafarge Stouffville Pit - Site Alteration and Fill Permit
Transportation Impact Study

DATE:	PROJECT No.
March 2022	19199
SCALE: N.T.S	DRAWING No. Figure 2-5



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A TYLIN INTERNATIONAL COMPANY
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700
f: 905.738.0065

Fill Trucks Haul Route - Outbound
Lafarge Stouffville Pit - Site Alteration and Fill Permit
Transportation Impact Study

DATE:	PROJECT No.
March 2022	19199
SCALE: N.T.S	DRAWING No. Figure 2-6

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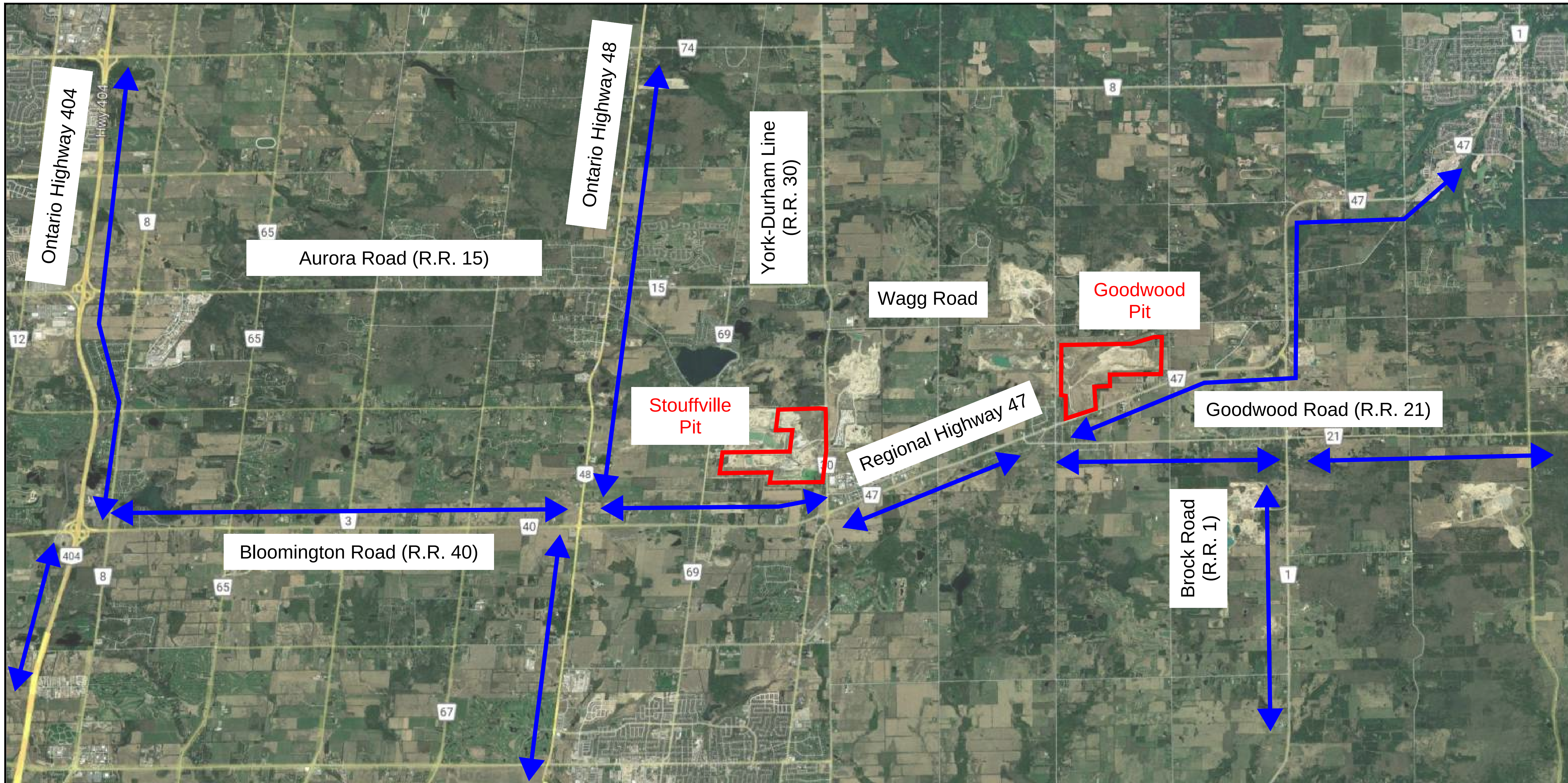

Westbound traffic **to (inbound)** Stouffville Pit is expected to arrive from the west via Bloomington Road after travelling on Highway 48 or Highway 404 from the north/south.	Eastbound traffic **to (inbound)** Stouffville Pit is expected to arrive from Regional Highway 47 via Uxbridge to the east or from Goodwood Road. Traffic from Goodwood Road may arrive from either Brock Road to the south or further from the east along Goodwood Road.
Westbound traffic **from (outbound)** Stouffville Pit is expected to continue west on Bloomington Road to either Highway 48 or Highway 404 to further travel north/south. Traffic to the south will continue to Highway 407 ETR or Highway 401 to travel east/west.	Eastbound traffic **from (outbound)** Stouffville Pit is expected to continue east on Regional Highway 47 to serve construction in Uxbridge, or branch off to Goodwood Road. From Goodwood Road, traffic may either continue eastward or travel south on Brock Road and continue to Highway 407 ETR or Highway 401 to travel east/west.

TMIG
A T.Y.LIN INTERNATIONAL COMPANY
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700
f: 905.738.0065

Existing Haul Route - External Routing
Lafarge Stouffville Pit - Site Alteration and Fill Permit
Transportation Impact Study

DATE:	PROJECT No.
July 2022	19199
SCALE: N.T.S	DRAWING No. Figure 2-7

2.4 Haul Route Roadways

The abutting roadways are appropriate to be used as haul routes to transport material from the pit to key market areas. These existing haul route roadways include:

- **York-Durham Line** is a north/south Type B arterial roadway located east of the subject site. It has a rural two-lane cross-section, one lane for each direction of travel, and a posted speed limit of 80 km/h. The roadway is under the jurisdiction of the Region of Durham and York Region.
- **Regional Highway 47** is an east/west Type A arterial roadway located south of the subject site. It has a rural two-lane cross-section, one lane for each direction of travel, and a posted speed limit of 80 km/h. The roadway is under the jurisdiction of the Region of Durham.
- **Wagg Road** is an east/west local rural roadway located north of the subject site. It has a rural two-lane cross-section, one lane for each direction of travel, and a posted speed limit of 80 km/h. The roadway is under the jurisdiction of the Town of Uxbridge and is signed as a permitted truck route between York Durham Line and Concession 3 Road.
- **Hillsdale Drive** is an east/west local rural roadway located north of the subject site. It has a rural two-lane cross section, one lane for each direction of travel, and a posted speed limit of 40 km/h. The road is discontinuous and terminates in dead ends 1.1 km from the west via Ninth Line and 0.1 km from the east from York-Durham Line. The segment connected to York-Durham Line is primarily unpaved, while the segment from Ninth Line is paved for approximate 550 metres, with the remainder unpaved. The roadway is under the jurisdiction of Whitchurch-Stouffville but is unassumed and does not permit trucks to enter.

As per the Peer Review comments, TMIG confirmed with the project team that operations also take place between the lands located on the east and west side of York-Durham Line via an underpass. Lafarge operates aggregate operations on two licenced pits separated by York-Durham Line. These two pits are connected via an underpass that allows for aggregate material to be transported from the east pit (Uxbridge Side) to the processing plant on the west pit (Stouffville Side) utilizing off-highway trucks. This underpass eliminates the need to use the roadway network when travelling between the two pits and there is no truck access from the Lafarge Uxbridge Side (east) pit into the roadway network. Any highway truck accessing the roadway network must utilize the current entrance and egress from the Stouffville Side (west) pit onto York Durham Line. The presence of the underpass allows both site portions to operate as one and contain all traffic between the two off the municipal road network, which is deemed acceptable. As part of this development application there are no proposed changes to the operations between these two sites.

2.5 Baseline (2022) Traffic Volumes

As part of this TIS update, new turning movement counts were commissioned and collected on August 24, 2021, for all study intersections. The TMC data has been included in **Appendix C** and includes peak operational traffic for the Stouffville Pit as the counts were completed in August (i.e., the peak operating month for the Pit). Note that only the intersection of York-Durham Line and Aurora Road (Regional Road 15) was surveyed on August 26 as there was a minor incident at the intersection which compromised the counts collected on August 24. As well, no survey was completed at the Hillsdale intersection as it only provides access to one dwelling unit under existing conditions. Therefore, traffic volumes along York-Durham Line at the Hillsdale Drive intersection were balanced with the counts collected at the Wagg Road intersection.

No COVID-19 adjustment was deemed necessary for the volumes as a review of historical TMC data has confirmed that overall volumes (particularly at the intersection of York-Durham Line and Highway 47) were higher than in 2019. Furthermore, given the relatively small amount of residential use in the surrounding area, it was predicted that home-based work and home-based school trips (which were the most common type of trip to be affected by the pandemic) would be less impacted than in more urbanized areas. Finally, it was noted that the counts were collected during Step 3 of the Ontario pandemic response, in which capacity limits were increased relative to previous stages, and as such, counts would have been more representative of pre-pandemic conditions than in previous pandemic response stages.

Traffic volumes surveyed during the peak hours for each intersection were utilized as part of this TIS for the purpose of conservative analysis. The peak hours of each intersection during the AM and PM peak periods have been detailed in **Table 2-1** below. The surveyed 2021 existing traffic volumes have been illustrated in **Figure 2-8**.

Table 2-1 – Surveyed Peak Hours at Study Intersections

Intersection	AM Peak Hour Start	AM Peak Hour End	PM Peak Hour Start	PM Peak Hour End
York-Durham Line and Aurora Road (Regional Road 15)	7:15	8:15	16:15	17:15
York-Durham Line and Wagg Road/Yake Crescent	7:15	8:15	16:30	17:30
York-Durham Line and Inbound (N) Stouffville Pit Site Access	7:45	8:45	15:15	16:15
York-Durham Line and Outbound (S) Stouffville Pit Site Access	7:30	8:30	15:15	16:15
York-Durham Line and Bloomington Road (Regional Road 40 / Regional Highway 47)	8:00	9:00	16:30	17:30
Goodwood Road (Regional Road 21) and Regional Highway 47	7:30	8:30	16:30	17:30
Front Street (Concession Road 3) and Regional Highway 47	7:15	8:15	16:30	17:30
Goodwood Pit Site Access and Regional Highway 47	6:45	7:45	16:30	17:30
Brock Road (Regional Road 1) and Regional Highway 47	7:15	8:15	16:30	17:30
York-Durham Line and Hillsdale Drive (Same peak hours as the Wagg Road intersection)	7:15	8:15	16:15	17:15

As with the previous TIS submission, and as detailed above, the intersection of the Goodwood Pit Access at Regional Highway 47 is included as part of this review (based on the material transfer from the Goodwood Pit to the Stouffville Pit). It should be noted that traffic surveyed at the Goodwood Pit accesses were almost nil as part of the August 24, 2021, data. Accordingly, for the purpose of conservative analysis, TMIG derived the trip generation associated with the Goodwood Pit employees, aggregate shipment activity and material transfer activity (between the Goodwood and Stouffville pits), which was then added to the surveyed TMC data in order to derive baseline conditions more conservatively. The trip generation details have been documented below.

2.5.1 Existing Goodwood Pit Trip Generation

As stated above, TMIG derived all existing traffic generated by the Goodwood Pit and added these volumes to the surveyed 2021 existing traffic data in order to derive conservative volumes along the roadway network (as survey data at the Goodwood Pit accesses was very low for the peak periods).

The following Goodwood Pit traffic was generated and added to the network as part of this exercise:

- The Goodwood pit employee trips;
- The transfer route traffic between Stouffville and Goodwood pits; and
- The Goodwood pit aggregate route truck traffic.

As per correspondence with Durham Region, left-turn restrictions are currently in place for trucks in and out of the Goodwood Pit Access to Regional Highway 47. Note that this restriction only applies to trucks as passenger vehicles are permitted to make left-turn movements at the intersection.

The above restrictions were considered when deriving the aggregate truck traffic to/from the Goodwood Pit. All trucks exiting the Goodwood Pit access at Regional Highway 47 must make a southbound right turn. Trucks exiting the Goodwood Pit destined to the east travel along Regional Highway 47 and turn left onto Goodwood Road (Regional Road 21) to continue traveling east along the roadway to their destination (exiting trucks destined to the west of the Goodwood Pit may continue along Regional Highway 47 as required). Trucks entering the pit from the west along Regional Highway 47 turn right onto Goodwood Road (Regional Road 21) and proceed along the roadway, then turn left onto Brock Road (Regional Road 1) and then turn left onto Regional Highway 47 to access the site via a right-turn (trucks destined to the pit from east along Regional Highway 47 may complete a right-turn into the site). As previously stated, these routes were applied to the aggregate truck traffic to/form the Goodwood Pit as confirmed with the project team.

2.5.1.1 Goodwood Pit Employee Trips

Currently, the standard employee day shifts are from 6:00 AM to 6:00 PM and night shifts are from 5:00 PM to 4:00 AM There are 4 full-time employees that work at the Goodwood site. As employees coming in for the day shift would arrive prior to or at 6:00 AM, these trips were not included in the generation to add to existing conditions. However, a total of 4 outbound tips and 4 inbound trips were generated for the employees during the PM peak hour to be added to the existing surveyed traffic data, for the purpose of conservative analysis.

The trip distribution for the Goodwood employees was based on existing traffic patterns due to the accessibility to the study area primarily via Highway 47, which leads to north-south connector roadways at both the east and west ends of our study area. Accordingly, existing traffic patterns at the intersection of the Goodwood access to Regional Highway 47 were derived for the AM and PM peak hours and the employee trips were assigned accordingly along Highway 47. Please refer to **Figure 2-9** for the Goodwood employee trip assignment.

2.5.1.2 Transfer Truck Route Pit Daily Trips

Based on input from the project team, the annual tonnage limit for the Goodwood pit is 1,177,000, out of which 500,00 are transferred to the Stouffville pit and the remaining 677,000 are shipped out. Based on a truck capacity of 40 tonnes, and a total of 155 days of operation (from April to mid-November, based on input from the project team), the transfer truck trip generation (per the 500,000 tonnes per year) is equivalent to a total of 81 trucks per days. The hourly distribution for these trucks is detailed in Section 2.5.1.4 below.

2.5.1.3 Goodwood Pit Aggregate Daily Trips

Based on input from the project team, the annual tonnage limit for the Goodwood pit is 1,177,000, out of which 500,000 are transferred to the Stouffville pit and the remaining 677,000 are shipped out. Based on a truck capacity of 40 tonnes, and a total of 155 days of operation (from April to mid-November, based on input from the project team), the aggregate truck trip generation (per the 677,000 tonnes per year) is equivalent to a total of 109 trucks per days. The hourly distribution for these trucks is detailed in Section 2.5.1.4 below.

2.5.1.4 Truck Hourly Distribution

The project team provided TMIG with detailed hourly breakdowns of the aggregate truck generation for the Stouffville Pit surveyed in July, August and September of 2020. This survey data took place during the high season for the Pit, and the project team advised TMIG that the surveyed average hourly breakdown distribution would be applicable to all truck routes (including Transfer, Fill and Aggregate trucks) for both pits. The survey data shows hours of operations starting at 6:00 AM and ending at 5:00 PM (i.e., the hour between 4:00 and 5:00 PM) as trucks typically do not operate as frequently during the roadway PM peak hour due to its increase in traffic, in order to reduce delay to their route. The hourly distribution for all surveys is shown in **Table 2-2** below.

Table 2-2 – Average Hourly Aggregate Truck Counts for Top 10 Volume Days

Date	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 AM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	All Day
August 21, 2020	25	24	35	33	32	28	39	32	32	21	2	-	303
August 28, 2020	25	24	39	30	27	36	27	34	27	19	3	-	291
August 31, 2020	20	16	35	27	34	33	26	30	26	18	9	-	274
August 25, 2020	22	16	33	21	27	20	32	21	25	18	8	-	243
September 02, 2020	26	16	19	26	24	22	24	30	23	10	5	-	225
September 17, 2020	17	12	25	18	27	26	24	21	21	23	10	-	224
August 20, 2020	21	26	25	22	18	23	25	22	19	14	7	-	222
August 24, 2020	24	23	30	20	24	18	20	21	17	20	3	-	220
July 24, 2020	20	15	23	18	24	18	28	24	23	19	5	-	217
August 19, 2020	21	15	29	17	24	21	30	21	26	12	1	-	217
Average Surveyed Trips	22	19	29	23	26	25	28	26	24	17	5	-	244
Hourly Distribution	9%	8%	12%	9%	11%	10%	11%	11%	10%	7%	2%	-	100%

Accordingly, the above hourly distribution was applied to all truck trip generation in order to derive the peak hour volumes, identified as 8:00-9:00 AM (as it was surveyed with a 12% distribution, for the purpose of conservative analysis), and 4:00-5:00 PM (as it is the closest to the roadway peak hour).

2.5.1.5 Goodwood Pit Aggregate and Transfer Truck Hourly Trips

Based on the above sections, the trip generation for the Goodwood Pit transfer and aggregate trucks was derived for the weekday AM and PM peak hours. Note that the hourly truck distribution identifies the number of trucks accessing the site, accordingly that number was doubled to account for both the inbound and outbound truck generation. The detailed hourly Goodwood truck trip generation added to the existing surveyed traffic volumes has been included in **Table 2-3** below.

Table 2-3 – Goodwood Pit Site Trip Generation

Site Trip Generation	AM Peak Hour			PM Peak Hour		
	Inbound	Outbound	Total	Inbound	Outbound	Total
Goodwood Transfer Truck Trips	10	10	20	2	2	4
Goodwood Aggregate Truck Trips	13	13	26	2	2	4

The transfer truck trip distribution has been illustrated in **Figure 2-2** while the aggregate trip distribution has been provided by the project team and detailed in **Table 2-4** below.

Table 2-4 – Aggregate Truck Trip Distribution

Trip Orientation	Distribution
North	5%
South	5%
East	20%
West	70%

The trip assignment for both transfer trucks (between the Goodwood and Stouffville pits) and the aggregate trucks from the Goodwood pit have been illustrated in **Figure 2-10** and **Figure 2-11**, respectively.

2.5.2 Applicable Boundary Road Growth Rates

TMIG derived 2021 existing traffic data by adding the trip generation associated with the Goodwood pit (transfer trucks, employees and aggregate trucks) to the surveyed August 2021 traffic data as detailed above. Following this conservative adjustment, TMIG grew the resulting volumes from 2021 conditions to 2022 conditions by applying growth rates along the resulting boundary road network volumes.

The growth rates used as part of this study have been detailed below and are based on a review of AADT data as well as input from the reviewing agencies:

- 1% growth rate for through movements along Regional Highway 47;
- 1% growth rate for through movements along York-Durham Line;
- 2% growth rate for movements to and from Aurora Road; and
- 2% growth rate on all turning movements at the York-Durham Line and Bloomington Road/Regional Highway 47 intersection.

2.5.3 Derived 2022 Existing Traffic Volumes

As detailed in the above section, the 2022 existing traffic volumes used as part of this study were derived by adding the trip generation associated with the Goodwood pit (transfer trucks, employees and aggregate trucks) to the surveyed August 2021 traffic data and growing the resulting volumes to 2022 conditions. The derived 2022 existing traffic volumes have been illustrated in **Figure 2-12**. Note that heavy vehicle percentages at the study intersection turning movements were updated to account for the additional truck trips from the Goodwood Pit.

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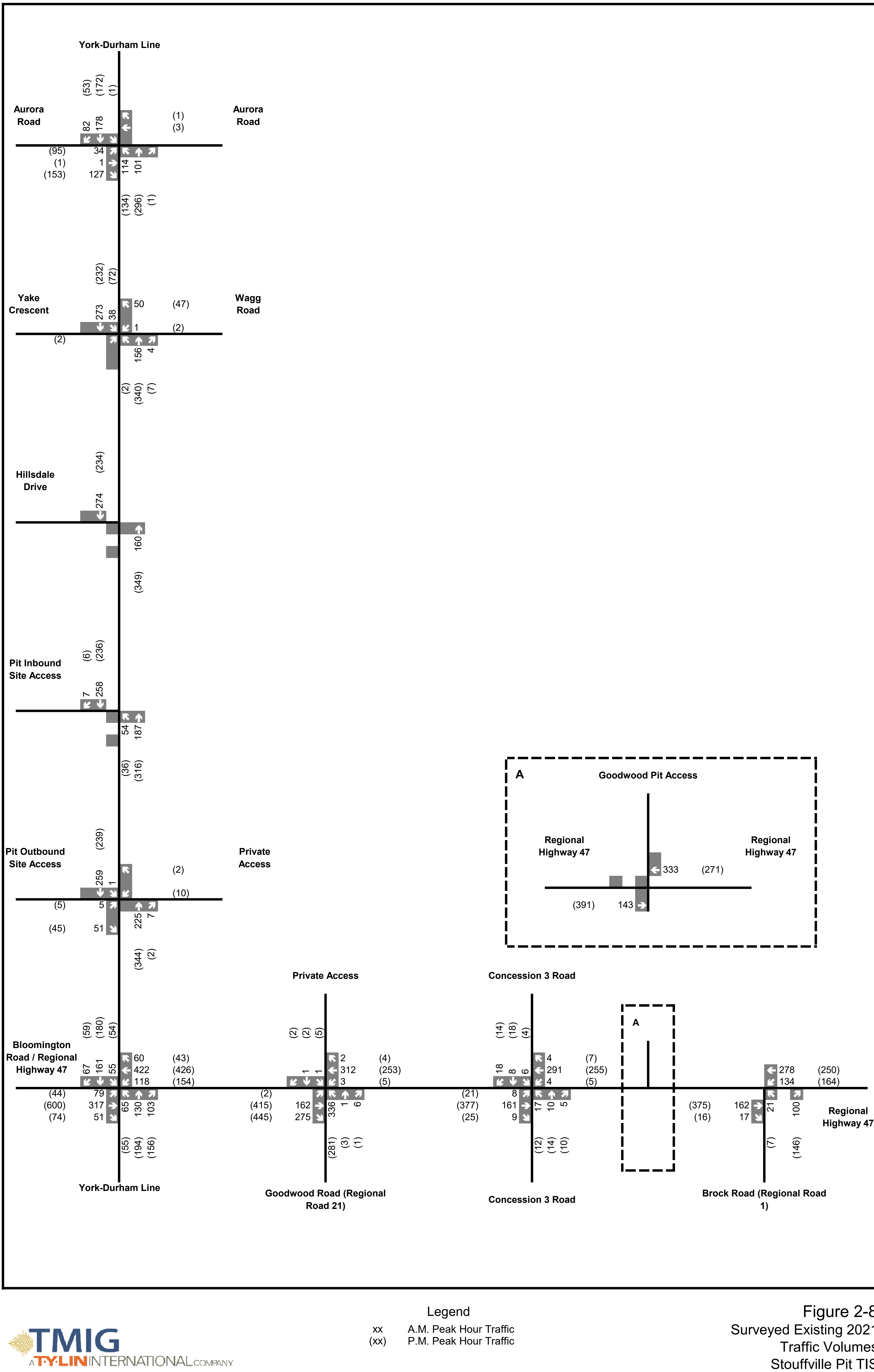
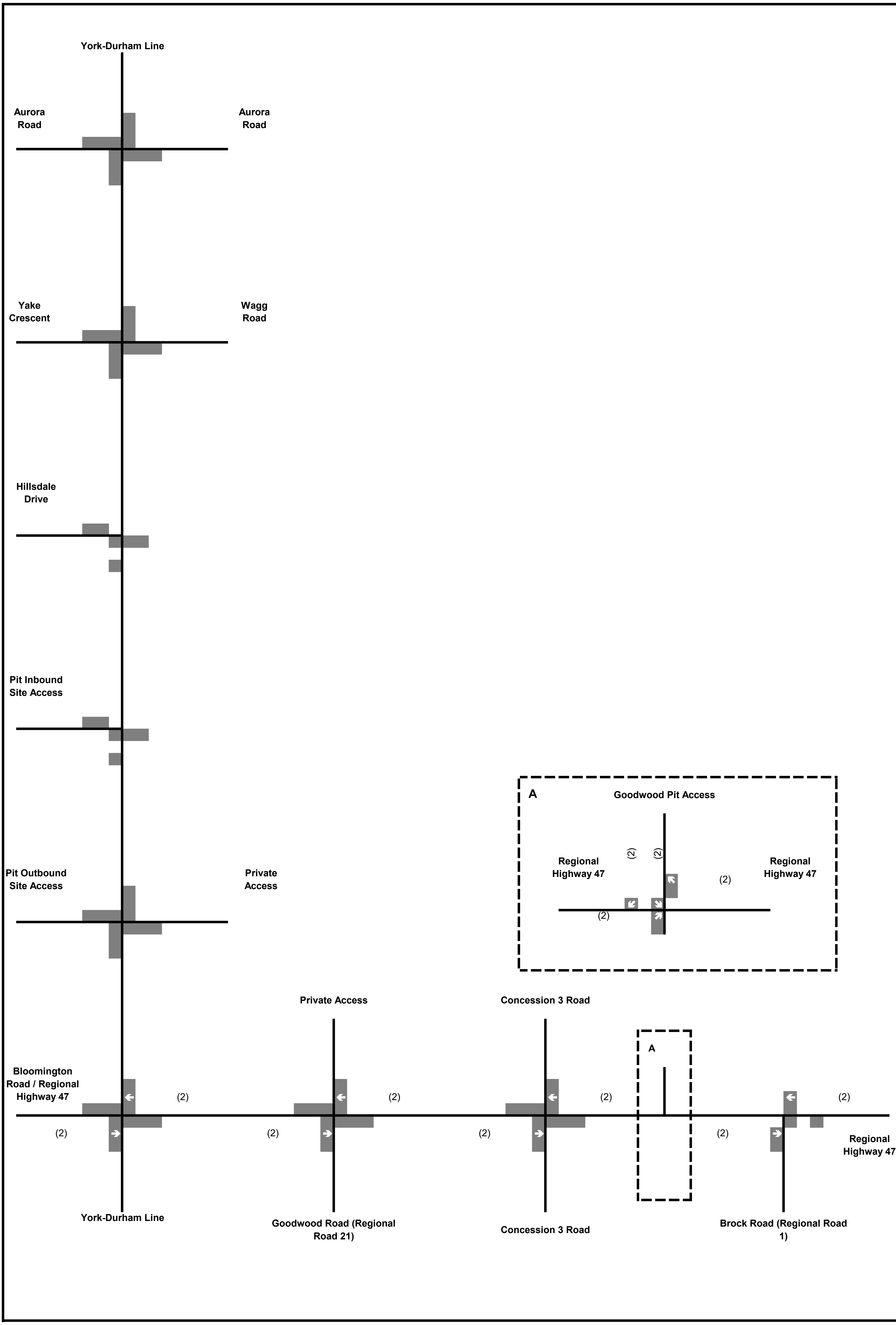


Figure 2-8
Surveyed Existing 2021
Traffic Volumes
Stouffville Pit TIS



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xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

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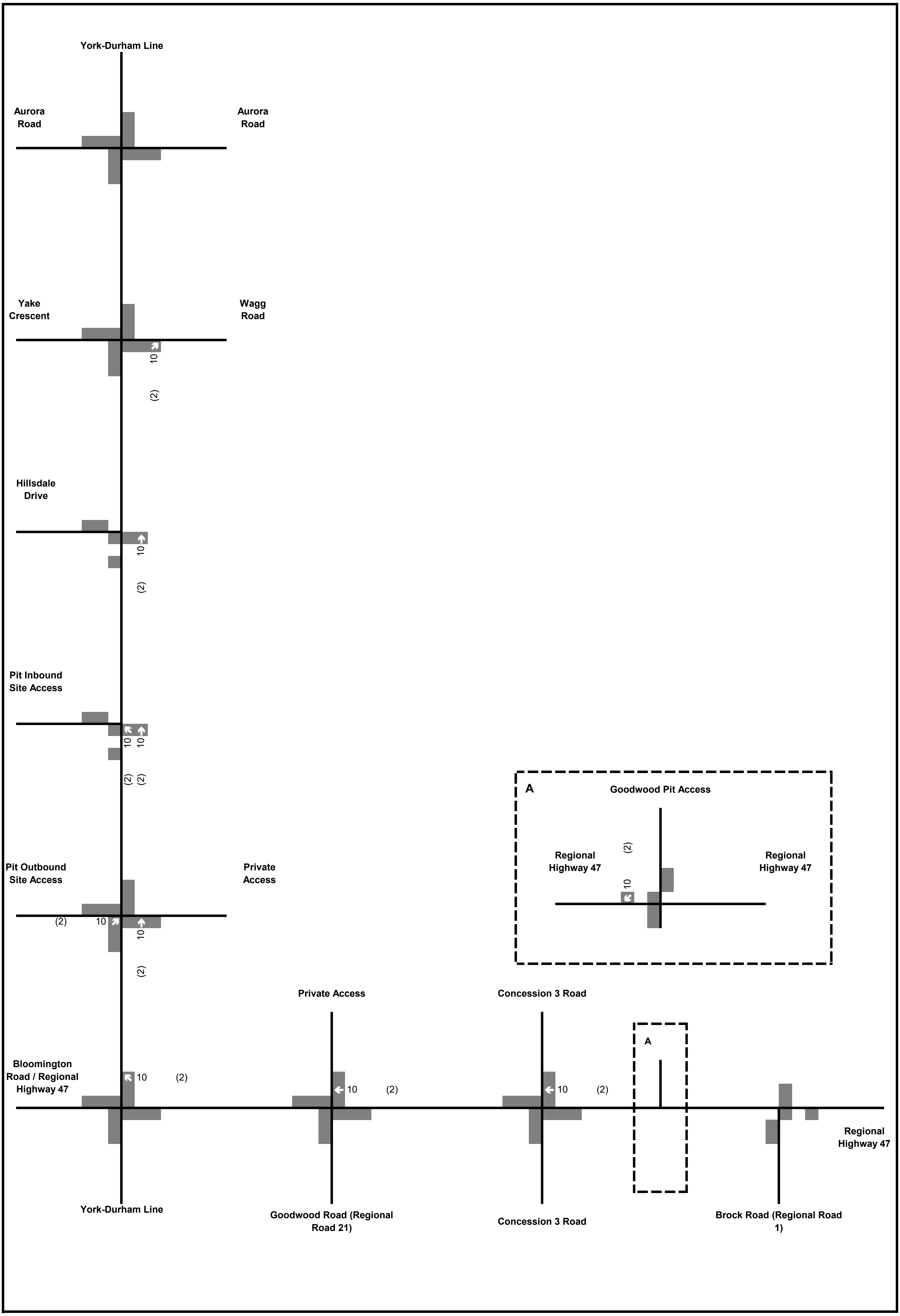
Figure 2-9
Goodwood Pit
Employee Trips
Stouffville Pit TIS



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xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

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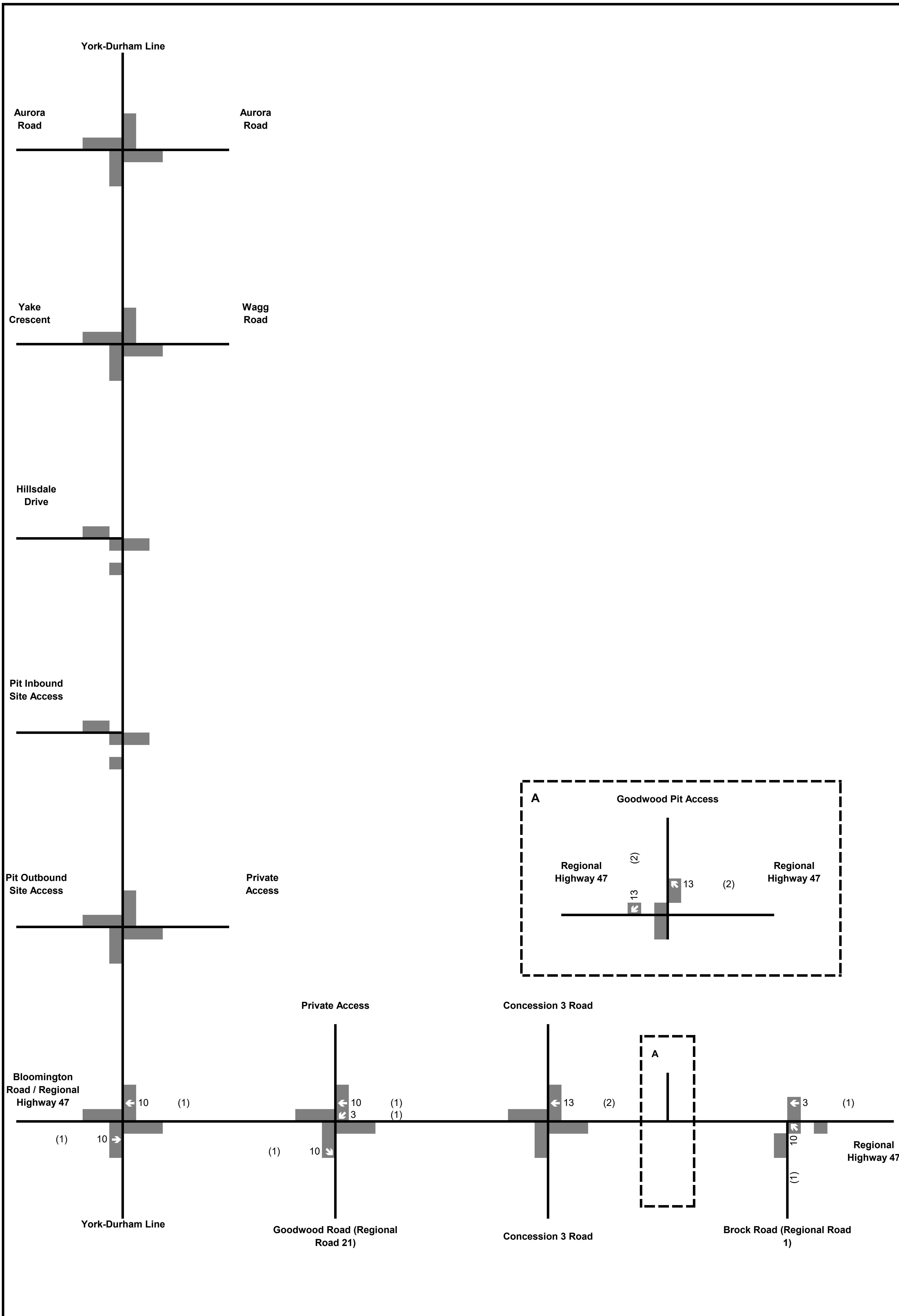
Figure 2-10
Goodwood Pit
Transfer Trips
Stouffville Pit TIS



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xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

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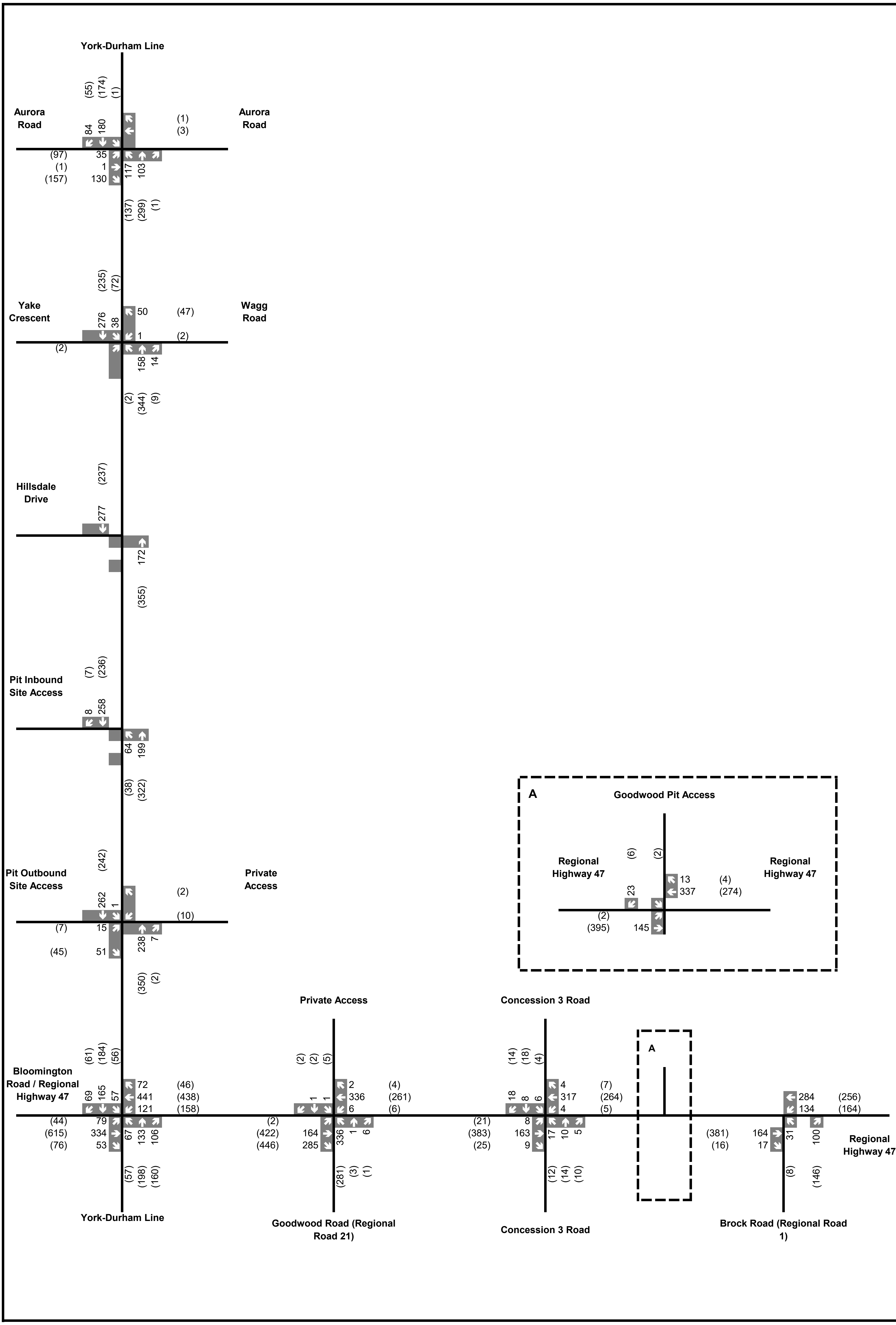
Figure 2-11
Goodwood Pit
Aggregate Trips
Stouffville Pit TIS



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xx A.M. Peak Hour Traffic

(xx) P.M. Peak Hour Traffic

Figure 2-12

Derived 2022

Existing Volumes

Stouffville Pit TIS

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3 FUTURE BACKGROUND CONDITIONS

3.1 Study Horizon Years

This traffic impact assessment analyzed two horizon years for the future conditions of the pit. Increased fill activity for the Pit is planned to take place as soon as approval is granted from the reviewing agencies (anticipated to be in 2022 based on input from the project team). For the purpose of this analysis, a conservative 2023 year was considered as the “build-out” for the increased fill activity. As such, this TIS adopted future background and total traffic conditions with horizon years to 2028 (5-years past implementation of increased fill-activity) and 2033 (10-years past implementation).

3.2 Study Area Road Network Improvements

The Region of Durham is planning to widen Regional Highway 47 to four lanes between York Durham Line and Goodwood Road, with construction currently proposed in 2027 (subject to change through future capital program forecasts). This road widening includes intersection improvements at the Regional Highway 47/Goodwood Road intersection.

The Environmental Assessment Study for the Regional Highway 47 widening is currently forecast to start in 2023. As such, the Region does not have any firm plans regarding the future configurations of the intersections at Goodwood Road and York-Durham Line at this time.

York Region has long-term plans to widen Bloomington Road west of York-Durham Line, but there currently is no timeline for that project.

Based on the above, the widening of Regional Highway 47 was considered as part of the 2033 study horizon year as implementation would not be completed by the 2028 horizon year for the purpose of conservative analysis. As part of the widening, the following was applied based on input from Durham Region staff:

- The additional eastbound lane between York-Durham Line and Goodwood Road would be added to the network as a continuation of the channelized northbound right-turn lane at York Durham Line, which would then be forced off via the existing channelized eastbound right-turn lane at Goodwood Road.
- The additional westbound lane between York-Durham Line and Goodwood Road is already in place directly west of Goodwood Road and would continue along the roadway, to be forced off via a planned westbound right-turn lane at York-Durham Line.

3.3 Background Development Traffic

A residential development of 69-unit single detached dwellings located at Bloomington Road and 9th Line was considered as a background development for this study as agreed with the Region of York and Durham staff. The trip generation and assignment for this development, applied to the study intersections, was based on the Access Review Report completed for the application by Mark Engineering, dated May 2014.

Additionally, traffic associated with the fill operations for the 14395 Ninth Line Pit (located adjacent to the site), was also considered as part of our background developments. Note that the trip generation for this application was based on the 2012 study completed by BA Group (provided to TMIG by the project team), which is conservative as it considers a total of 800 fill trucks per day that since then reduced to 600 (as detailed in a subsequent 2017 submission by BA Group for the lands).

Future trips generated by the background development were assigned to the study area road network for weekday AM and PM peak hours, considered for both study horizons. Please refer to **Figure 3-1** for the overall background development traffic. All study excerpts used to derive the background development trip assignments onto our roadway networks have been included in **Appendix D**.

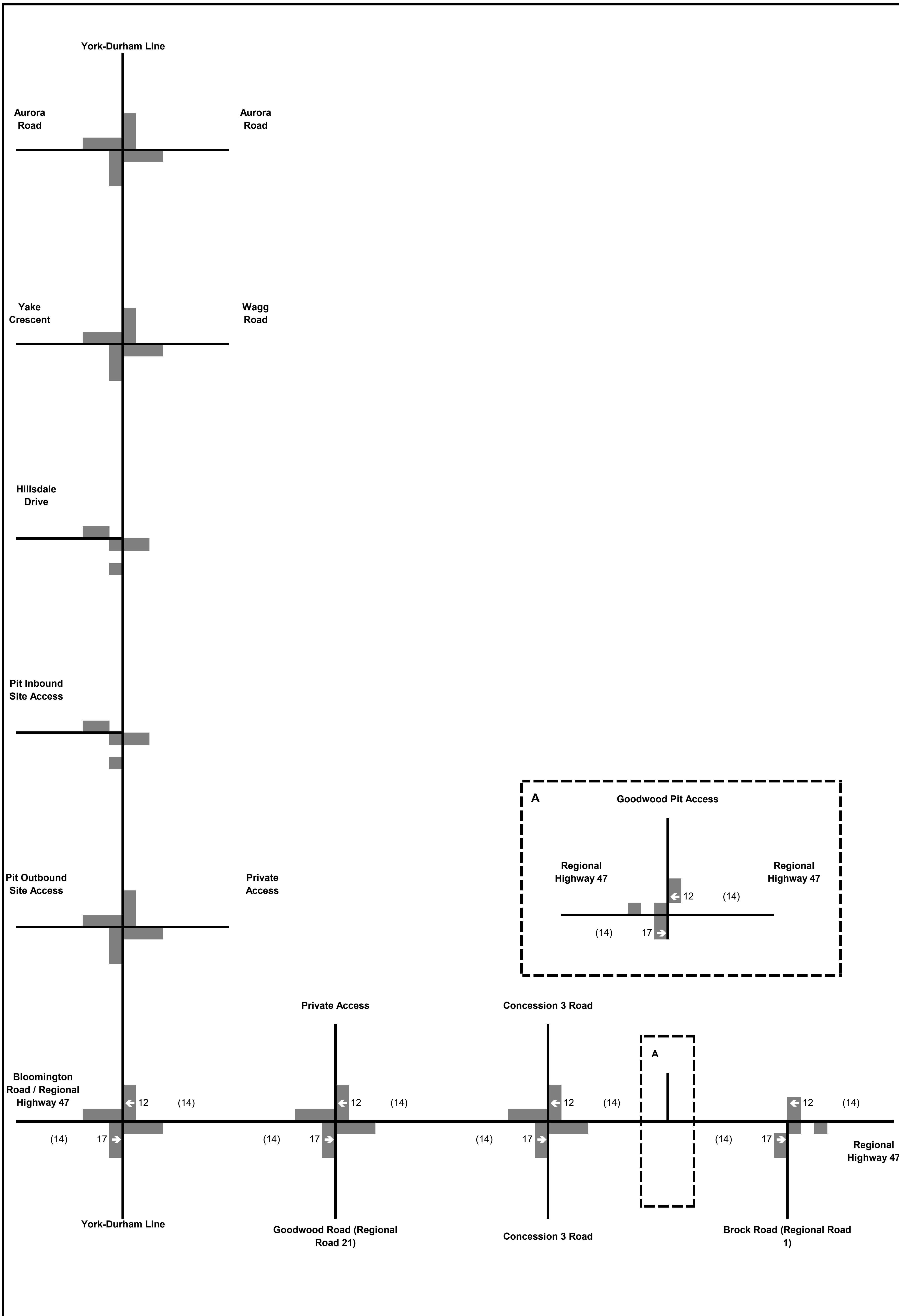
3.4 Future Background Growth

As with existing conditions, traffic along the boundary road network was grown to future conditions using the following growth rates:

- 1% growth rate for through movements along Regional Highway 47;
- 1% growth rate for through movements along York-Durham Line;
- 2% growth rate for movements to and from Aurora Road; and
- 2% growth rate on all turning movements at the York-Durham Line and Bloomington Road/Regional Highway 47 intersection.

3.5 Future Background Traffic Volumes

The derived 2022 existing traffic volumes were grown to future conditions and combined with the projected trips from the background developments in order to derive future background conditions. The 2028 and 2033 future background traffic volumes have been illustrated in **Figure 3-2** and **Figure 3-3**, respectively.



Legend

xx A.M. Peak Hour Traffic

(xx) P.M. Peak Hour Traffic

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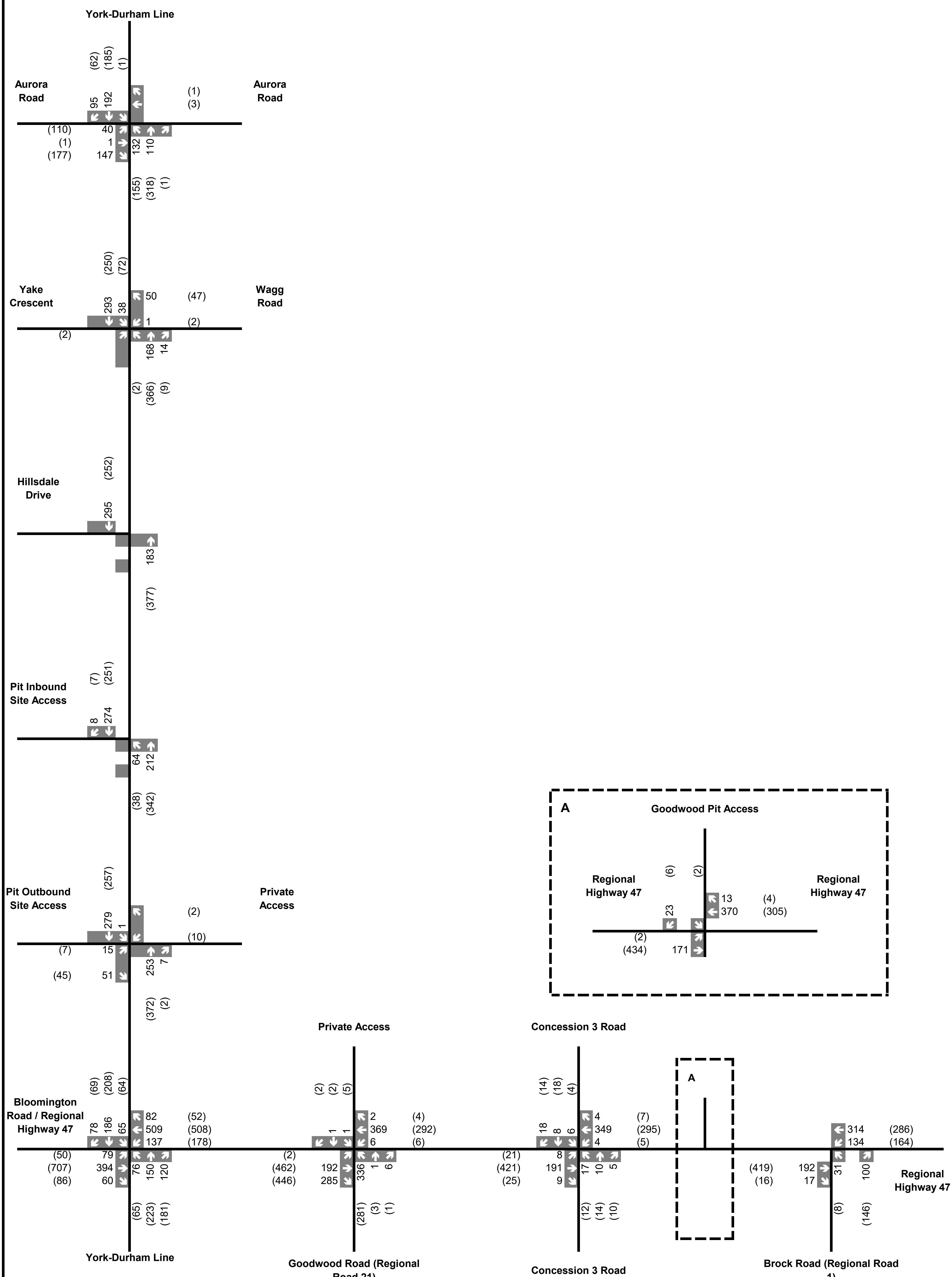
Figure 3-1
Background Development
Traffic Volumes
Stouffville Pit TIS



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xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

Figure 3-2
2028 Future Background
Traffic Volumes
Stouffville Pit TIS

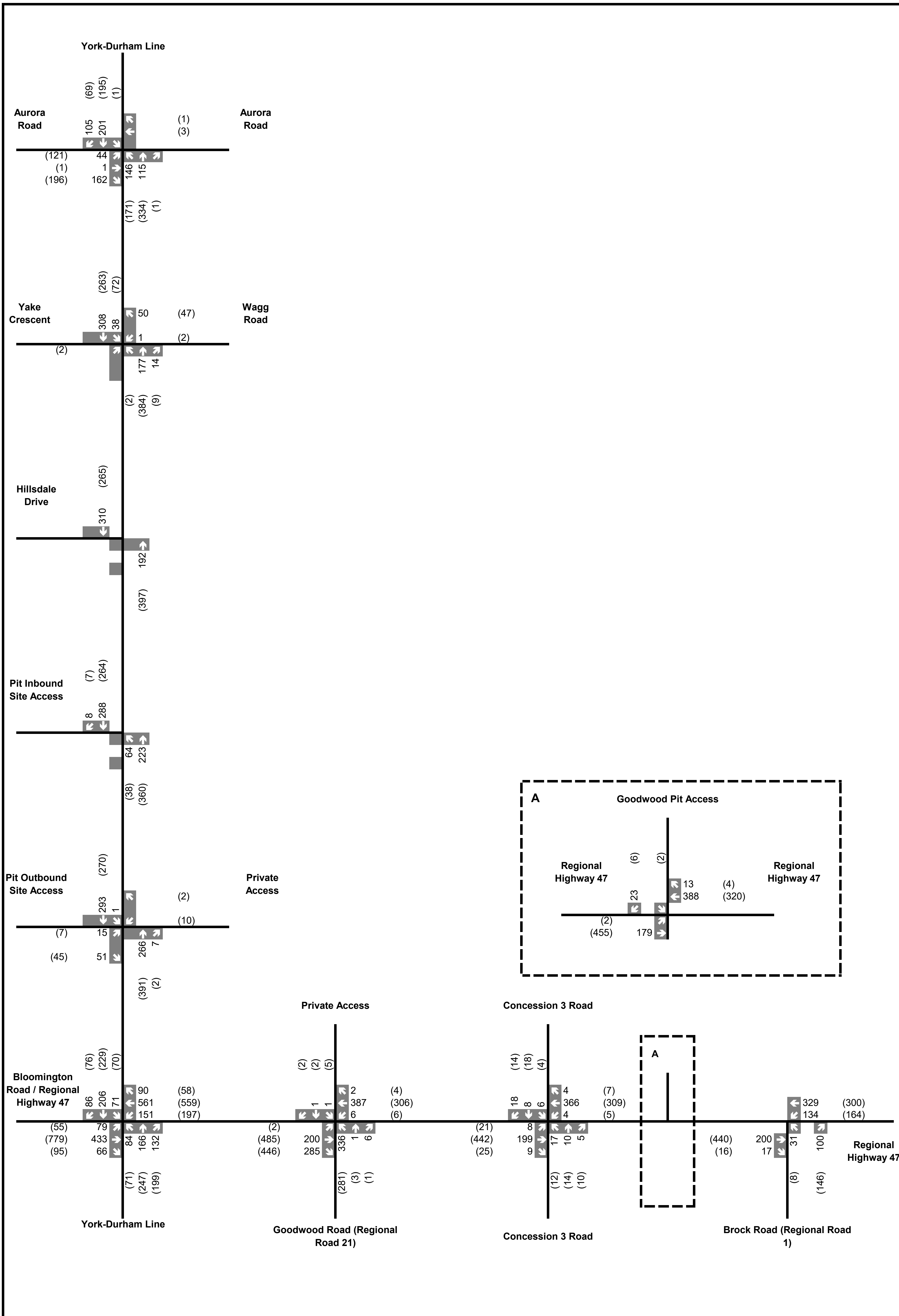

Figure 3-3
2033 Future Background Traffic Volumes
Stouffville Pit TIS

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4 SITE GENERATED TRAFFIC

4.1 New Site Trip Generation

Stouffville Pit is intended to fill-in a portion of the site to bring the area back up to the original grade. The infill area has an approximate volume of 8,000,000 m^3. Based on fluctuations in the market and availability of fill material throughout the years, there is no exact timeline for the completion of this filling endeavour. Input from the project team details a timeline for completion between 8-to-16 years to account for any changes in material availability as a conservative estimate. The application is to allow for a total of 1,000 fill loads per day (i.e., 1,000 tri-axle trucks with a capacity of 10 m^3 to access the lands every day in order to proceed with filling), which are proposed to exit the site via Hillsdale Drive.

It should be noted that on August 24, 2021, i.e., the survey date for the turning movement counts used as part of this study, a total of 149 fill trucks were documented accessing the site (for which outbound vehicles were exiting via the existing outbound access onto York-Durham Line). Accordingly, as per the development proposal, the hourly trip generation associated with a total of 851 additional fill trucks per day would need to be added to our traffic forecast in order to account for the 1,000 daily fill trucks application, with the existing outbound trip generation for the 149 fill trucks simply relocated from the York-Durham Line outbound access to Hillsdale Drive intersection (where the new proposed 851 daily trucks would also exit).

The trip generation for the fill trucks was completed in a similar fashion as for the transfer trips (between the Goodwood and Stouffville pits) and the aggregate trips from Goodwood. Accordingly, an 11-hour shipping timeframe from 6:00 AM to 5:00 PM was applied along with the hourly distribution detailed in **Table 2-2**. This was confirmed with the project team as being applicable to the fill trucks. The distribution of truck loads throughout the day is shown in **Table 4-1**. The number of trucks represents both the inbound and outbound number of trips as each truck must enter the site with fill and then exit once emptied.

Table 4-1 – Hourly Fill Truck Distribution

Starting Hour	Expected Number of Trucks (Inbound and outbound)
6:00	91
7:00	77
8:00	120
9:00	95
10:00	107
11:00	101
12:00	113
13:00	105
14:00	98
15:00	71
16:00	22
Total	**1000**

The trip generation for existing 149 fill truck trips has been detailed in **Table 4-2**, along with the trip generation for the newly proposed 851 fill truck trips.

Table 4-2 –Stouffville Pit Fill Truck Trip Generation

New Site Trip Generation	AM Peak Hour			PM Peak Hour		
	Inbound	Outbound	Total	Inbound	Outbound	Total
Existing Surveyed Fill Truck Trips (149 Trucks on the day of the TMC data)	18	18	36	3	3	6
New Additional Fill Truck Trips (851 Trucks per day, based on the proposed 1,000 trucks minus the 149 surveyed trucks under existing conditions)	102	102	204	19	19	38
Total Future Conditions Fill Truck Trips (based on the 1,000 trucks per day)	120	120	240	22	22	44

As previously mentioned, the only difference between the existing fill trucks and the new proposed fill trucks is the point of egress from the site. The existing fill trucks use the outbound access onto York-Durham Line while all fill trucks are proposed to exit via Hillsdale Drive under future conditions.

Accordingly, under future conditions, the existing 18 outbound trucks in the AM peak hour and 3 outbound trucks in the PM peak hour would need to be relocated to the Hillsdale Drive intersection (and subtracted from the Stouffville Pit outbound access onto York-Durham Line). These volumes would be reassigned to exit via Hillsdale Drive and travel through the Stouffville Pit inbound access intersection along York-Durham Line, with no further changes to their assignment (as they would then share the same route as within the survey data). Following this reassignment, the trip generation for the new 851 trucks would be added to the road network, in order to derive the full fill truck trip assignment onto the roadway.

However, for the purpose of conservative analysis in this study, TMIG did not apply any reassignment of existing trips but rather simply added the full 1,000 fill truck trip generation to the road network (to enter via York-Durham Line and exit via Hillsdale Drive). This technically double counts the surveyed 149 fill truck trip generation detailed in the above table within the roadway network but allows for a more conservative review of the study intersections and accesses for the Pit. As such, the full trip generation for the 1,000 fill trucks (equivalent to 240 trips in the AM (120 inbound and 120 outbound) and 44 trips in the PM (22 inbound and 22 outbound)) was added onto the roadway in this study.

4.2 Traffic Distribution and Assignment

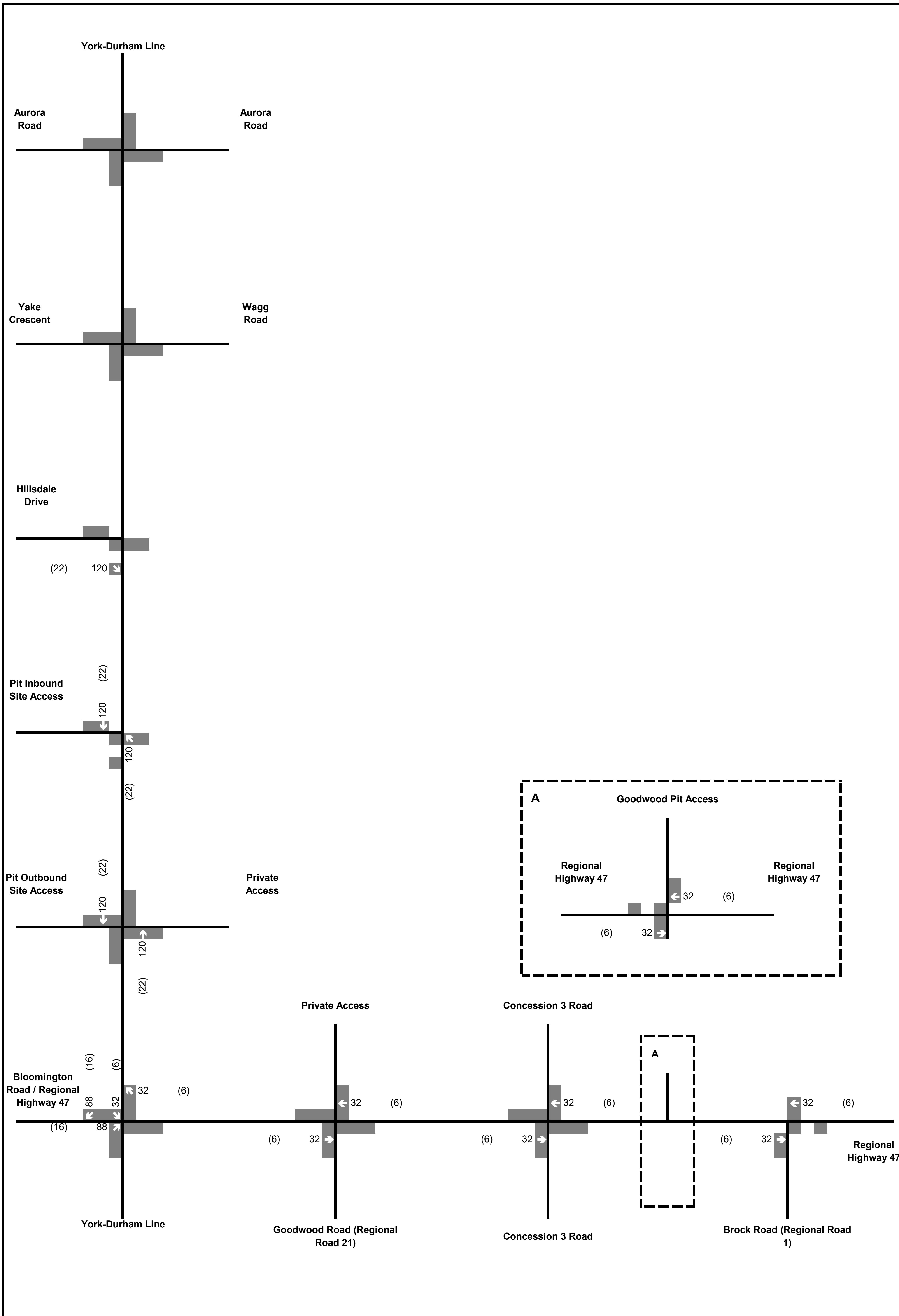
The trip distribution for the fill trucks was provided by the project team (with assignment within the study area illustrated in **Figure 2-5** and **Figure 2-6**), and has been detailed in **Table 4-3**.

Table 4-3 – Fill Truck Trip Distribution

Trip Orientation	Distribution
North	5%
South	30%
East	30%
West	35%

Note that the above represents the trip distribution for the site and does not represent the trip assignment within the study area. Accordingly, the above table shows a 5% distribution to the north whereas **Figure 2-5** and **Figure 2-6** do not show any fill trucks travelling northbound on York-Durham Line. That is because the assignment is applied to the southbound direction of travel on York-Durham Line, however these trucks will then exit our study area and travel onto Highway 404, Highway 48, or Regional Highway 47 to travel north of the site.

Please refer to **Figure 4-1** for the site generated trips associated with the full additional 1,000 fill trucks per day (a conservative measure as detailed previously).



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xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

Figure 4-1
Proposed New Stouffville Pit Trips
Stouffville Pit TIS

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5 FUTURE TOTAL TRAFFIC CONDITIONS

5.1 Future Total Traffic Volumes

Future total traffic volumes were derived by adding the trip generation associated with the conservative full 1,000 fill trucks (per day) to the future background traffic volumes for both the 2028 and 2033 horizon years.

Figure 5-1 and **Figure 5-2** illustrate the future total traffic volumes for the 2028 and 2033 planning horizons, respectively.

5.2 Left-Turn Lane Requirements

The intersection of the Stouffville Pit Site Access (Inbound) and York-Durham Line was analyzed to determine if the traffic volumes warrant the need for an auxiliary left-turn lane on the main line approach. The warrant for left-turn lanes follows the requirements in the MTO's Geometric Design Standards Manual.

A design speed of 100 km/h has been utilized based on the posted speed limit of 80 km/h.

The percentages of left-turning vehicles in the approaching volume were rounded to the nearest 5 percent, as nomographs are provided for 5 percent increments. The analysis utilized the projected future total traffic volumes under both 2028 and 2033 conditions (for both AM and PM peak hours). The left-turn lane warrant nomographs have been included in **Appendix E**.

Based on the warrant analysis, a northbound left-turn lane with a storage of 30m is required. Additionally, TMIG considered the impacts of the heavy truck percentage at the intersection and derived a requirement for an additional 15m storage based on the MTO guidelines Table E9-3, totaling a 45m storage length. Note that based on SimTraffic analysis completed as part of this study, the maximum 95th percentile queue at the northbound left-turn movement is 46m. Accordingly, the lane is recommended to be designed with a 50m storage to account for all queues.

Finally, based on the Durham Region standard drawing S-300.040, the lane is to be designed with a 135m deceleration length and 140m taper. A conceptual design of the northbound left-turn lane has been illustrated in **Figure 5-3**.

Given no site trips are to enter the site via Hillsdale Drive, a review for a possible northbound auxiliary left-turn lane was not undertaken.

5.3 Right-Turn Lane Requirements

Based on the routing plan, all proposed fill truck traffic is projected to approach the proposed pit access from the south (northbound) along York-Durham Line with little to no southbound right-turns into Stouffville Pit. Therefore, the requirements for a right-turn lane were not reviewed as part of this study.

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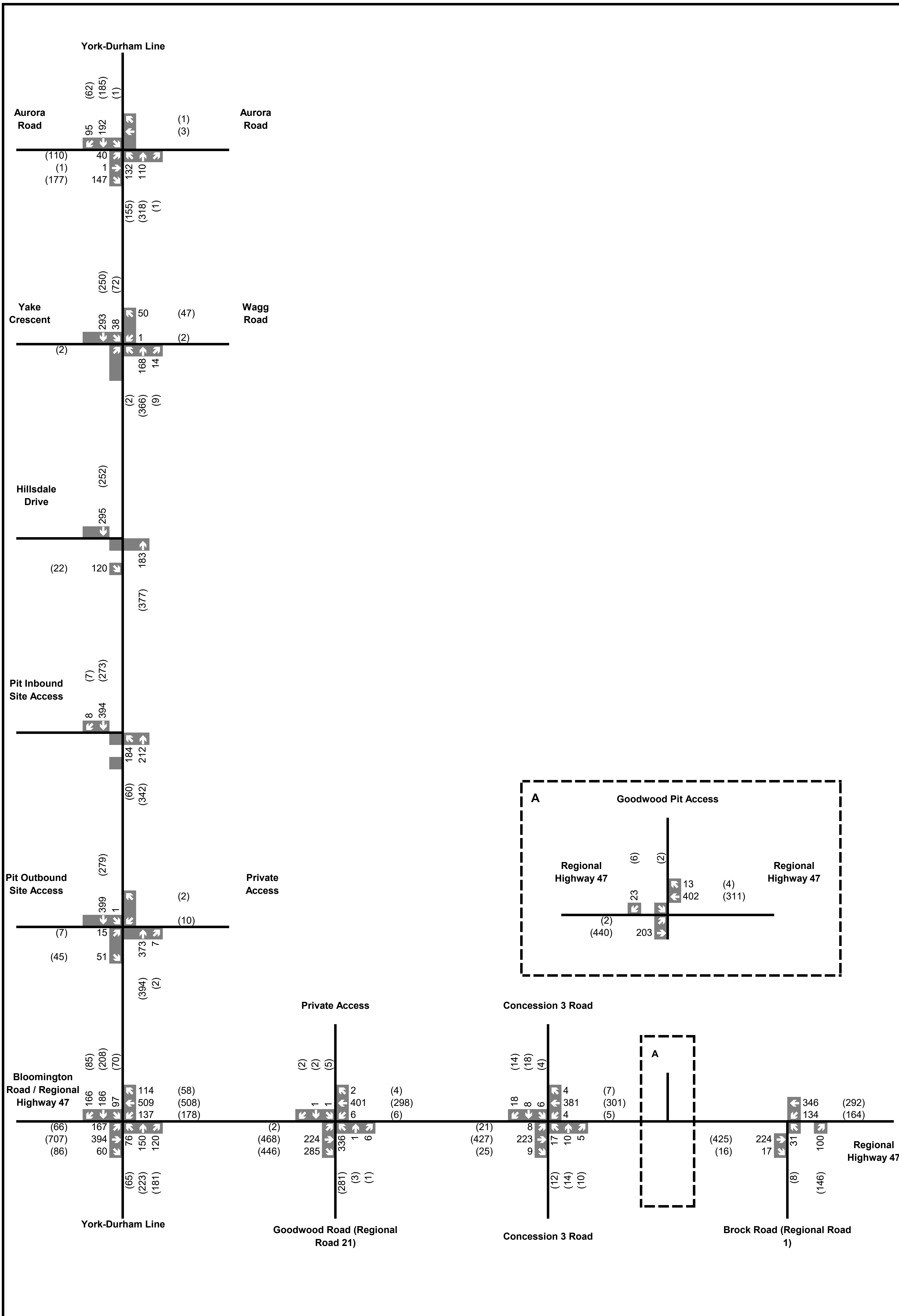

Legend

xx A.M. Peak Hour Traffic

(xx) P.M. Peak Hour Traffic

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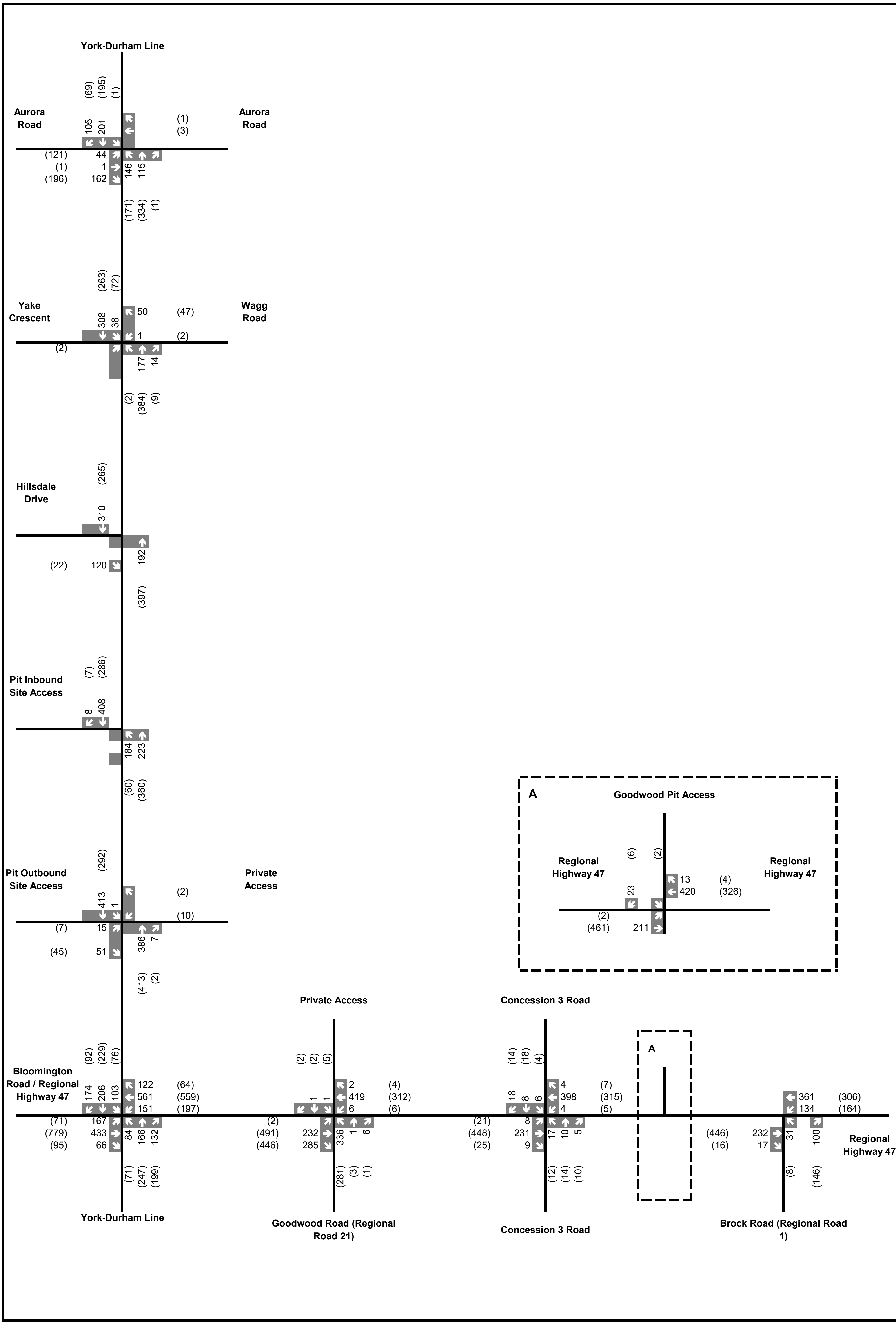
Figure 5-1

2028 Future Total Traffic Volumes

Stouffville Pit TIS



Legend

xx A.M. Peak Hour Traffic
(xx) P.M. Peak Hour Traffic

TMIG A T·Y·LIN INTERNATIONAL COMPANY

Figure 5-2
2033 Future Total Traffic Volumes
Stouffville Pit TIS

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TMIG A T.Y.LIN INTERNATIONAL COMPANY 8800 Dufferin Street, Suite 200 Vaughan, ON L4K 0C5 p: 905.738.5700 f: 905.738.0065	Stouffville Pit Reclamation Updated Transportation Impact Study Functional Design of Northbound Left-turn Lane on York-Durham Line	DATE: July 2022	PROJECT No. 19199
		SCALE: 1:1300	DRAWING No. Figure 5-3

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6 CAPACITY ANALYSIS

The capacity analysis identifies how well the intersections and access driveways are operating and how they are expected to operate in the future. The analysis contained in this report utilized the Highway Capacity Manual (HCM) 2000 techniques within the Synchro/SimTraffic Software package. The reported intersection volume-to-capacity ratios (v/c) are a measure of the saturation volume for each turning movement, while the levels-of-service (LOS) are a measure of the average delay for each turning movement.

As part of this analysis, TMIG detailed only the critical movements at each intersection within the report. The traffic operations for all remaining movements have been detailed in the Synchro reports included in **Appendix F**. 'Critical' intersections and movements are classified as detailed below, as per the Durham Region and York Region Traffic Impact Study Guidelines/Mobility Plan Guidelines for <u>a rural condition</u>:

- Overall intersection operations, through movements or shared through/turning movements with a LOS 'D' or worse; and
- V/C ratios for movements increased to 0.70 or above.

The following parameters were reflected in the existing Synchro analysis:

- Lane configurations, link speeds, storage lengths, and taper lengths, were applied to reflect existing conditions using aerial imagery;
- Saturation flow rates were set to 1,900 and 2,000 vehicles per hour per lane as per Durham and York Region guidelines, respectively;
- Signal timings for signalized intersections were taken directly from York and Durham Region signal timing plans Appendix C);
- Vehicular volumes, heavy vehicle percentages, and pedestrian volumes were adjusted to reflect turning movement count data (and any addition to the survey data); and
- Peak hour factors were calculated based on peak hour traffic counts.

6.1 Existing 2022 Capacity Analysis

Table 6-1 summarizes the Synchro/HCM capacity results for the study intersections during the weekday AM and PM peak hours under the derived 2022 existing traffic conditions, while **Appendix F** contains the detailed intersection capacity sheets. As previously stated, only critical turning movements were detailed below.

Table 6-1 - Existing 2022 Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Signalized							
York-Durham Line & Regional Highway 47 / Bloomington Road	***Overall***	***0.74***	***33***	***C***	***0.87***	***38***	***D***
	EBTR	-	-	-	0.85	36	D
	WBL	-	-	-	0.74	31	C
	WBTR	0.71	28	C	-	-	-
	NBLT	0.62	40	D	0.68	43	D
	SBLTR	0.89	65	E	0.94	73	E
Goodwood Road (Regional Road 21) / Private Access & Regional Highway 47	***Overall***	***0.53***	***29***	***C***	***0.58***	***18***	***B***
	NBL	0.97	68	E	0.85	47	D
Unsignalized							
York-Durham Line & Aurora Road (Regional Road 15)	EBL	-	-	-	0.50	35	E

Under 2022 existing conditions, all turning movements operate below capacity with LOS E or better. The highest delay experienced at a signalized intersection is 73 seconds for the southbound approach of the York Durham Line at Regional Highway 47 / Bloomington Road intersection in the PM, while at unsignalized intersections it is 35 seconds for the eastbound left-turn movement at the York-Durham Line at Aurora Road intersection. Accordingly, delays experienced under existing conditions are acceptable, showing capacity for increased traffic and potential for road network improvements as needed under future conditions.

Note that all turning movements not listed in the above table, for both signalized and stop-controlled intersections, operate with LOS C or better and a v/c of 0.69 or below, showing good operations.

6.2 Future Background 2028 Capacity Analysis

Table 6-2 summarizes the Synchro/HCM capacity results for the critical movements during the weekday AM and PM peak hours under 2028 future background traffic conditions, while **Appendix F** contains the detailed intersection capacity sheets. The analysis uses the road network, lane configurations, and Synchro analysis parameters from the 2022 existing conditions scenario.

Table 6-2 – Future Background 2028 Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Signalized							
York-Durham Line & Regional Highway 47 / Bloomington Road	***Overall***	***0.86***	***41***	***D***	***1.12***	***63***	***E***
	EBTR	-	-	-	1.03	72	E
	WBL	-	-	-	1.18	159	F
	WBTR	0.85	40	D	0.76	33	C
	NBLT	0.66	41	D	0.69	41	D
	SBLTR	0.97	80	F	0.98	83	F
Goodwood Road (Regional Road 21) / Private Access & Regional Highway 47	***Overall***	***0.53***	***28***	***C***	***0.60***	***18***	***B***
	NBL	0.97	68	E	0.85	47	D
Unsignalized							
York-Durham Line & Aurora Road (Regional Road 15)	EBL	-	-	-	0.66	52	F

As seen in the table above, the critical movements are similar to those identified under 2022 existing traffic conditions. With the increase in traffic volumes associated with background corridor growth and the addition of background developments, all turning movements are projected to operate at LOS F or better and the intersection of York-Durham Line at Regional Highway 47 is projected to operate over capacity during the PM peak hour. The eastbound shared through/right-turn movement and westbound left-turn movement are projected to operate over capacity at the intersection during the PM peak hour, while the southbound approach is projected to operate at LOS F and close to capacity during both study periods.

The intersection of Goodwood Road at Regional Highway 47 is projected to operate below capacity overall, with its northbound left-turn movement at LOS E and close to capacity during the AM peak hour.

Finally, the intersection of York-Durham Line at Aurora Road is projected to operate with the eastbound left-turn movement at LOS F during the PM peak hour.

All turning movements not listed in the above table, for both signalized and stop-controlled intersections, are projected to operate with LOS C or better and a v/c of 0.69 or below, showing good operations.

In order to improve traffic operations for the above critical movements, TMIG recommends the following to be applied under 2028 future background conditions:

- Provide a northbound left-turn lane, southbound left-turn lane, and southbound right-turn lane at the intersection of York-Durham Line at Regional Highway 47 and optimize the signal timing splits.
- Optimize the signal timing splits at the intersection of Goodwood Road at Regional Highway 47.
- Finally, as the intersection of York-Durham Line at Aurora Road is projected to operate with the eastbound left-turn movement at LOS F only under the PM peak hour (with a delay of approximately a minute per vehicle), showing no critical movements under the AM peak hour, it is TMIG's opinion that the Region monitor the intersection to identify when operations will become critical during the AM peak hour and worse during the PM peak hour in order to provide remedial measures.

Table 6-3 shows the optimized 2028 future background scenario for both signalized intersections.

Table 6-3 – Future Background (Optimized) 2028 Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Signalized							
York-Durham Line & Regional Highway 47 / Bloomington Road	***Overall***	***0.65***	***25***	***C***	***0.80***	***32***	***C***
	EBTR	-	-	-	0.87	33	C
	WBTR	0.70	21	C	-	-	-
	NBL	0.45	41	D	0.43	44	D
	NBT	0.48	40	D	0.66	48	D
	NBR	0.06	35	D	0.13	38	D
	SBL	0.42	41	D	0.52	48	D
	SBT	0.62	44	D	0.65	48	D
	SBR	0.08	35	D	0.05	38	D
Goodwood Road (Regional Road 21) / Private Access & Regional Highway 47	***Overall***	***0.54***	***19***	***B***	***0.61***	***17***	***B***
	NBL	0.83	33	C	0.80	38	D

With signal optimizations and roadway improvements, all movements are shown to be operating with reserve capacity and acceptable delays. No movements are over capacity with the highest v/c ratio being that of the eastbound through-right movement at the York-Durham Line intersection in the PM peak hour.

6.3 Future Background 2033 Capacity Analysis

Table 6-4 summarizes the Synchro/HCM capacity results for the critical movements during the weekday AM and PM peak hours under future background 2033 traffic conditions, while **Appendix F** contains the detailed intersection capacity sheets. Note that all recommendations applied under the 2028 future background conditions were maintained. In addition to the recommendation, the widening of Regional Highway 47 to four lanes between York Durham Line and Goodwood Road was implemented within the model for the 2033 conditions (with changes to the road network as detailed in Section 3.2).

Table 6-4 – Future Background 2033 Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Signalized							
York-Durham Line & Regional Highway 47 / Bloomington Road	***Overall***	***0.62***	***25***	***C***	***0.90***	***42***	***D***
	EBTR	-	-	-	0.97	49	D
	WBL	-	-	-	0.92	74	E
	NBL	0.51	43	D	0.49	46	D
	NBT	0.50	40	D	0.70	50	D
	NBR	-	-	-	0.19	39	D
	SBL	0.46	42	D	0.61	54	D
	SBT	0.65	45	D	0.69	49	D
	SBR	0.09	35	D	0.06	37	D
Goodwood Road (Regional Road 21) / Private Access & Regional Highway 47	***Overall***	***0.55***	***19***	***B***	***0.63***	***17***	***B***
	NBL	0.83	33	C	0.80	38	D
Unsignalized							
York-Durham Line & Aurora Road (Regional Road 15)	EBL	-	-	-	0.82	81	F

As seen in the table above, the traffic operations are projected to be similar to the 2028 future background conditions with all critical movements below capacity with acceptable delays. All turning movements at the signalized intersections are projected to operate with LOS D or better, with the exception of the westbound left-turn movement at the York-Durham Line intersection projected at LOS E during the PM peak hour. As said movement is projected to operate below capacity with a delay of 74 seconds, it is TMIG's opinion that this operation is deemed acceptable as it is an auxiliary left-turn lane at a large intersection.

The eastbound left-turn movement is projected to remain at LOS F at the York-Durham Line and Aurora Road intersection, with no critical movements during the AM peak hour.

Finally, all turning movements not listed in the above table, for both signalized and stop-controlled intersections, are projected to operate with LOS C or better and a v/c of 0.69 or below, showing good operations.

6.4 Future Total 2028 Capacity Analysis

Table 6-5 summarizes the Synchro/HCM capacity results for the critical movements during the weekday AM and PM peak hours under future total 2028 traffic conditions, which takes into consideration the road improvements recommended in the 2028 future background traffic scenario. A northbound left-turn lane was also included at the Stouffville Pit inbound access as part of the Future Total analysis based on results from the warrant analysis (see Section 5.2). **Appendix F** contains the detailed intersection capacity sheets. Note that the intersection of Hillsdale Drive at York-Durham Line was also included in the below table (though not critical) to identify the delay for fill trucks entering the roadway.

Table 6-5 – Future Total 2028 Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Signalized							
York-Durham Line & Regional Highway 47 / Bloomington Road	***Overall***	***0.78***	***31***	***C***	***0.80***	***32***	***C***
	EBTR	-	-	-	0.87	33	C
	WBTR	0.87	36	D	-	-	-
	NBL	0.93	39	D	0.43	44	D
	NBT	0.43	38	D	0.66	48	D
	NBR	-	-	-	0.13	38	D
	SBL	0.64	50	D	0.60	53	D
	SBT	0.55	41	D	0.65	48	D
	SBR	0.19	36	D	0.07	38	D
Goodwood Road (Regional Road 21) / Private Access & Regional Highway 47	***Overall***	***0.59***	***20***	***B***	***0.62***	***17***	***B***
	NBL	0.83	33	C	0.80	38	D
Unsignalized							
York-Durham Line & Aurora Road (Regional Road 15)	EBL	-	-	-	0.66	52	F
Stouffville Pit Outbound Access at York-Durham Line	EBL	0.08	25	D	-	-	-
Hillsdale Drive at York-Durham Line	EBLR	0.24	14	B	0.04	12	B

All movements are projected to operate with reserve capacity and acceptable delays under 2028 future total conditions. At signalized intersections, all movements are projected below capacity with LOS D or better, with the highest v/c ratio being that of the northbound left-turn movement at the York-Durham Line intersection in the AM peak hour. The addition of site traffic is projected to increase overall intersection delay by 6 seconds in the AM at the York-Durham Line intersection, which is acceptable.

The intersection of York-Durham Line at Aurora Road is projected to operate with the eastbound left-turn movement at LOS F during the PM peak hour (as under background conditions). As the delay is projected to be below 1 minute per vehicle, and as there are no critical movements during the AM peak hour, TMIG does not recommend any changes to the intersection at this time.

Finally, all turning movements not listed in the above table, for both signalized and stop-controlled intersections, are projected to operate with LOS C or better and a v/c of 0.69 or below, showing good operations.

Based on the above and the minor impact of site traffic on the boundary road network, it is TMIG's opinion that the traffic generated by the proposed fill application can be accommodated. Delays for fill trucks entering the roadway are projected at 14 seconds or below during the study periods, with LOS B, which shows acceptable operations.

A sensitivity analysis considering interim improvements to the intersection of York-Durham Line at Regional Highway 47 was conducted. Potential improvements included extending the existing westbound left-turn lane to 120 metres with an 80 metre taper (within the existing painted median) and providing a 50 metre right-turn lane with 80 metre taper. The results of the sensitivity analysis for the intersection are shown in **Table 6-6**.

Table 6-6 – Future Total 2028 Sensitivity Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Signalized							
York-Durham Line & Regional Highway 47 / Bloomington Road	***Overall***	***0.63***	***26***	***C***	***0.80***	***32***	***C***
	EBTR	-	-	-	0.87	33	C
	WBT	0.64	23	C	-	-	-
	WBR	0.12	14	B	-	-	-
	NBL	0.39	39	D	0.43	44	D
	NBT	0.43	38	D	0.66	48	D
	NBR	-	-	-	0.13	38	D
	SBL	0.64	50	D	0.60	53	D
	SBT	0.55	41	D	0.65	48	D
	SBR	0.19	36	D	0.07	38	D

According to the sensitivity analysis, the extension of the westbound left-turn lane and the addition of the westbound right turn resulted in a larger improvement in the AM peak hour than in the PM peak hour. In the AM peak hour, the overall v/c ratio improves from 0.78 to 0.63, while in the PM peak hour, the v/c ratio remains at 0.80. Both scenarios remain at LOS 'C'. Additionally, the westbound through and westbound right delays improve from LOS 'D' with the single westbound shared through-right to LOS 'C' and 'B', respectively. Overall, the addition of the interim measures improves the capacity of the intersection in the AM peak hour, with less impact in the PM peak hour. Further review of the queueing impacts with the considered interim measures is presented in Section 7.

6.5 Future Total 2033 Capacity Analysis

Table 6-7 summarizes the Synchro/HCM capacity results for the critical movements during the weekday AM and PM peak hours under future total 2033 traffic conditions, which takes into consideration the road improvements planned and recommended in the 2033 future background traffic scenario (and the aforementioned northbound left-turn lane into the pit inbound access). **Appendix F** contains the detailed intersection capacity sheets. Note that the intersection of Hillsdale Drive at York-Durham Line was also included in the below table (though not critical) to identify the delay for fill trucks entering the roadway.

Table 6-7 – Future Total 2033 Capacity Analysis Summary

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Signalized							
York-Durham Line & Regional Highway 47 / Bloomington Road	***Overall***	***0.69***	***28***	***C***	***0.90***	***42***	***D***
	EBTR	-	-	-	0.97	49	D
	WBL	-	-	-	0.92	74	E
	WBT	0.71	26	C	-	-	-
	NBL	0.45	40	D	0.49	46	D
	NBT	0.45	38	D	0.70	50	D
	NBR	-	-	-	0.19	39	D
	SBL	0.68	53	D	0.71	65	E

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
	SBT	0.59	41	D	0.69	49	D
	SBR	0.20	36	D	0.08	38	D
Goodwood Road (Regional Road 21) / Private Access & Regional Highway 47	***Overall***	***0.60***	***20***	***B***	***0.64***	***17***	***B***
	NBL	0.83	33	C	0.80	38	D
Unsignalized							
York-Durham Line & Aurora Road (Regional Road 15)	EBL	-	-	-	0.82	81	F
Stouffville Pit Outbound Access at York-Durham Line	EBL	0.09	27	D	-	-	-
Hillsdale Drive at York-Durham Line	EBLR	0.24	14	B	0.04	12	B

All movements are projected to operate with reserve capacity and acceptable delays under 2033 future total conditions. At signalized intersections, all movements are projected below capacity with LOS D or better, with the exception of the westbound left-turn movement (as under 2033 future background conditions) and the southbound left-turn movement, both projected at LOS E. As said movements are projected to operate below capacity with delays of 74 seconds or below, it is TMIG's opinion that these operations are deemed acceptable as it is for auxiliary left-turn lanes at a large intersection.

The addition of site traffic is projected to increase overall intersection delay by 3 seconds at the York-Durham Line intersection and 1 second at the Goodwood Road intersection in the AM, which is acceptable.

The intersection of York-Durham Line at Aurora Road is projected to operate with the eastbound left-turn movement at LOS F during the PM peak hour (as under background conditions). As the delay is not projected to be very large (approximately 1 minute and 20 seconds per vehicle), and as there are no critical movements during the AM peak hour, TMIG does not recommend any changes to the intersection at this time. TMIG recommends that the Region monitor the intersection to identify when operations will become critical during the AM peak hour and worsen during the PM peak hour in order to provide remedial measures.

Finally, all turning movements not listed in the above table, for both signalized and stop-controlled intersections, are projected to operate with LOS C or better and a v/c of 0.69 or below, showing good operations.

Based on the above and the minor impact of site traffic on the boundary road network, it is TMIG's opinion that the traffic generated by the proposed fill application can be accommodated. Delays for fill trucks entering the roadway are projected at 14 seconds or below during the study periods, with LOS B, which shows acceptable operations.

In all scenarios for all movements, volumes do not exceed the available capacity once appropriate optimizations and roadway improvements have been made. Overall, the intersections in the study network are expected to operate acceptably with the inclusion of the site traffic.

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7 TRAFFIC QUEUING OPERATIONS

7.1 Queueing External to the Site

The 50th (average) and 95th percentile queues for auxiliary turning movements are presented in **Table 7-1, Table 7-2,** and **Table 7-3** for the Existing conditions, 2028 Future conditions, and 2033 Future conditions, respectively. The queuing reports were prepared using SimTraffic micro-simulation software, and the following methodology: 10 minutes seeding time, one-hour recording, and 10 runs. The 95th percentile queue lengths that are bolded are predicted to extend beyond the available storage of a dedicated turn lane. All queues for the remaining turning movements have been detailed in the SimTraffic reports included in **Appendix F**.

Table 7-1 – Queuing Summary – Existing

Intersection	Movement [Proposed Future Movement]	Available Existing [Proposed Future] Storage (m)	Existing			
			2022			
			AM		PM	
			50th	95th	50th	95th
York-Durham Line & Aurora Road (Regional Road 15)	EBL	80	6	13	10	18
	NBL	50	7	19	6	15
	SBL	50	-	-	0	2
	SBR	70	0	2	0	2
York-Durham Line & Regional Highway 47	EBL	55	22	54	16	**58**
	WBL	55	20	**57**	31	**67**
	NBR	40	11	**50**	13	**53**
Goodwood Road (Regional Road 21) /Private Access & Regional Highway 47	EBL	70	-	-	0	2
	WBL	50	0	3	1	4
	WBTR	25	13	**29**	10	24
	NBL	30	**44**	**57**	**38**	**56**
Brock Road (Regional Road 1) & Regional Highway 47	WBL	110	4	13	9	20
	NBL	-	8	20	2	8

Under existing conditions, nearly all 50th percentile queues are contained within the available storage lengths, with the exception of the northbound left movement at Goodwood Road at Regional Highway 47. Several movements have 95th percentile queues exceeding the available storage (at York-Durham Line and Regional Highway 47 as well as Goodwood Road at Regional Highway 47), however as the average queues are contained within the storage for the majority of movements, the operations are deemed acceptable.

Table 7-2 – Queuing Summary – 2028 Future Conditions

Intersection	Movement [Proposed Future Movement]	Available Existing [Proposed Future] Storage (m)	Queues (m)							
			Future Background 2028				Future Total 2028			
			AM		PM		AM		PM	
			50th	95th	50th	95th	50th	95th	50th	95th
York-Durham Line & Aurora Road (Regional Road 15)	EBL	80	6	13	11	20	6	14	12	23
	NBL	50	7	17	7	17	8	18	7	17
	SBL	50	-	-	-	-	-	-	0	1
	SBR	70	0	2	0	2	0	2	0	2
York-Durham Line & Pit Inbound Site Access	NBLT [NBL]	- [50]	-	-	-	-	22	44	7	22
York-Durham Line & Regional Highway 47	EBL	55	24	**57**	19	**59**	**60**	**89**	29	**74**
	WBL	55	28	**74**	30	**62**	53	**116**	33	**67**
	[NBL]	[50]	18	35	16	34	20	40	15	32
	NBR	40	1	12	7	37	1	14	7	38
	[SBL]	[70]	17	37	16	35	33	66	21	44
	[SBR]	[70]	12	30	6	17	30	60	11	27
York-Durham Line & Regional Highway 47 (sensitivity)	EBL	55	-	-	-	-	53	**85**	28	**74**
	[WBL]	[120]	-	-	-	-	16	32	27	51
	[WBR]	[50]	-	-	-	-	21	**62**	6	17
	[NBL]	[50]	-	-	-	-	19	38	15	33
	NBR	40	-	-	-	-	1	10	8	**41**
	[SBL]	[70]	-	-	-	-	35	69	23	51
	[SBR]	[70]	-	-	-	-	31	63	11	25
Goodwood Road (Regional Road 21) /Private Access & Regional Highway 47	EBL	70	-	-	0	3	-	-	0	3
	EBR	50 [-]	-	-	-	11	-	-	-	-
	WBL	50	1	3	0	4	2	8	1	6
	WBTR	25	17	**36**	10	38	19	**38**	11	**27**
	NBL	30	**39**	**56**	**38**	**54**	**39**	**55**	**38**	**55**
Brock Road (Regional Road 1) & Regional Highway 47	WBL	110	5	15	10	22	6	15	10	22
	NBL	-	7	20	2	9	10	25	2	9
	NBR	70	-	-	-	-	-	-	-	-

Under 2028 future conditions (assuming signal optimizations and recommended road improvements in place), most movements are shown to have average queues contained within the available storage length. The average queue for the northbound left-turn movement at Goodwood Road and Regional Highway 47 is projected to exceed the available storage length in both the background and total conditions (as under existing conditions) during the study periods. However, the average queue is only projected to exceed storage by a maximum of 9m (i.e., less than 2 vehicles) under 2028 future total AM, which would not significantly impact traffic along the adjacent lane.

As the average queue is projected to be contained within the available storage at the remaining movements for which the 95th percentile is projected to exceed storage, it is TMIG's opinion that the projected queues are deemed acceptable under 2028 future conditions. The addition of site generated trips is projected to be accommodated by the boundary road network.

As detailed in the table, the northbound left-turn lane at the inbound site access is recommended with a 50m storage, along with the northbound left-turn lane at the York-Durham Line and Highway 47 intersection, while the southbound left and right-turn lanes at the York-Durham Line and Highway 47 intersection are recommended with a 70m storage in order to accommodate the projected queues.

Under the 2028 sensitivity scenario at the York-Durham Line and Highway 47 intersection, the extension of the westbound left-turn lane and the addition of the westbound right turn result in an improvement in the AM peak hour than in the PM peak hour (as noted in the capacity analysis. Improvements to the eastbound left and westbound left queue are anticipated in the AM peak hour, with the eastbound left 95th percentile queue still extending beyond the proposed storage. The westbound left queues in the PM no longer extend beyond the available storage. The increase in the northbound right queue to 41 metres is attributed to simulation difference and is still acceptable as the queue can be accommodated by the taper. As well, although the westbound right 95th percentile queue exceeds the available storage in the AM peak hour, the queue is anticipated to be accommodated by the taper. Overall, the sensitivity analysis shows that the interim improvements considered are likely to improve both capacity and queueing concerns at the intersection until the future widening scenario.

Table 7-3 – Queuing Summary – 2033 Future Conditions

Intersection	Movement [Proposed Future Movement]	Available Existing [Proposed Future] Storage (m)	Queues (m)							
			Future Background 2033				Future Total 2033			
			AM		PM		AM		PM	
			50th	95th	50th	95th	50th	95th	50th	95th
York-Durham Line & Aurora Road (Regional Road 15)	EBL	80	6	14	12	25	7	16	12	24
	NBL	50	9	20	9	19	9	19	8	18
	SBL	50	-	-	0	1	-	-	0	1
	SBR	70	0	3	0	2	0	3	0	2
York-Durham Line & Pit Inbound Site Access	NBLT [NBL]	- [50]	-	-	-	-	23	47	6	20
York-Durham Line & Regional Highway 47	EBL	55	27	**63**	17	**58**	56	**88**	29	**75**
	WBL	55	23	**59**	34	**68**	33	**88**	31	**58**
	[WBR]	-	11	29	5	15	19	42	6	17
	[NBL]	[50]	20	42	20	43	24	47	20	46
	NBR	40	1	15	10	**47**	4	27	11	**48**
	[SBL]	[70]	20	41	20	45	40	**77**	22	48
	[SBR]	[70]	15	35	7	18	38	**75**	12	32
Goodwood Road (Regional Road 21) /Private Access & Regional Highway 47	EBL	70	-	-	0	2	-	-	0	2
	EBR	50 [-]	0	7	-	-	-	-	-	-
	WBL	50	1	7	1	6	2	9	2	8
	WBTR	25	18	**34**	12	**27**	20	**40**	11	**26**
	NBL	30	**40**	**55**	**37**	**55**	**41**	**56**	**38**	**54**
	WBL	110	6	15	11	22	6	15	10	21

Intersection	Movement [Proposed Future Movement]	Available Existing [Proposed Future] Storage (m)	Queues (m)							
			Future Background 2033				Future Total 2033			
			AM		PM		AM		PM	
			50th	95th	50th	95th	50th	95th	50th	95th
Brock Road (Regional Road 1) & Regional Highway 47	NBL	-	10	24	2	10	11	27	2	9
	NBR	70	-	-	-	-	-	-	-	-

Under 2033 future conditions, most movements are shown to have average queues contained within the available storage length. The average queue for the northbound left-turn movement at Goodwood Road and Regional Highway 47 is projected to exceed the available storage length in both the background and total conditions (as under existing and 2028 future conditions) during the study periods. However, the average queue is only projected to exceed storage by a maximum of 10m (i.e., less than 2 vehicles) under 2033 future background AM, which would not significantly impact traffic along the adjacent lane.

As the average queue is projected to be contained within the available storage at the remaining movements for which the 95th percentile is projected to exceed storage, it is TMIG's opinion that the projected queues are deemed acceptable under 2033 future conditions. The addition of site generated trips is projected to be accommodated by the boundary road network.

7.2 Queueing Internal to the Site

In addition to the above, TMIG completed a review of the queueing for the fill-trucks internal to the lands. Per input from the project team, all trucks share a common roadway after entering the site, with a total length of 400m. After having travelled 400m into the site, trucks diverge onto separate paths/internal driveways based on their respective purpose (i.e., fill, or non-fill, such as sand or gravel).

The project team has confirmed that fill trucks are required to travel over an additional length of 350m (i.e. after the initial 400 metre distance to the separation point) before being able to unload the fill carried into the site. Trucks are weighed and inspected at the weigh station located approximately 50 metres beyond the separation point as shown in **Appendix G**. Accordingly, fill trucks travel a total length of 450m after entering the site before the weigh station.

Fill trucks are standard *DESIGNATED TRUCK 3 — 3-AXLE TRUCK PLUS AUXILIARY AXLE* as outlined in O.Reg 413/05, which have a total length of 12.5m. The WB-67 vehicle with a length of approximate 22.4 metres was not considered since these types of vehicles are not permitted to traverse the fill area of the site for safety reasons (the WB-67 was considered for conservative analysis in vehicle maneuvering at the accesses only).

Based on the trip generation for the site, a maximum of 1,000 daily fill trucks are proposed. As noted previously, the total site trip generation for the Stouffville Pit of 1,000 vehicles includes the existing traffic to the site (149 vehicles). For purpose of capacity analysis, the previously surveyed 149 trucks were included in addition to the 1,000 vehicles as a conservative measure. For the internal queueing analysis however, as it is understood the 149 existing trips have been double-counted, the existing trips will **not** be added to the internal queueing analysis, as they are already encompassed and distributed across the 1,000 daily trips. Furthermore, as it is unclear the exact distribution of fill trucks versus aggregate trucks (who do not get included in the fill queue), the assumption that all the existing truck traffic will be included in the fill queue is itself a conservative assumption (i.e there will likely be fewer than 1,000 fill trucks).

Based on operational information from the client, the weigh station is typically able to accommodate 60 vehicles per hour. Given the 11 hours of operation for the site (from 6:00 to 17:00), 660 vehicles can be processed in a single day of operation, indicating that there is not sufficient capacity to accommodate the 1,000 proposed trucks. Based on the hourly truck trip distribution, the projected queues at the end of each hour is shown in **Table 7-4**.

Table 7-4 - Hourly Queuing Analysis - Single Weight Scale

Hour (Start)	Trucks Arriving	Trucks Leaving	Trucks Remaining (Cumulative)
6:00 AM	91	60	31
7:00 AM	77	60	48
8:00 AM	120	60	108
9:00 AM	95	60	143
10:00 AM	107	60	190
11:00 AM	101	60	231
12:00 AM	113	60	284
1:00 PM	105	60	329
2:00 PM	98	60	367
3:00 PM	71	60	378
4:00 PM	22	60	340

As seen above, the maximum queue would be approximately 378 trucks. Based on an approximate total length of 14.5 metres (12.5 metres per fill truck, plus a 2 metre buffer), 378 trucks would result in a single queue of 5,481 metres, well beyond the existing storage length of 450 metres noted. Therefore, based on the existing infrastructure, queues are predicted to extend onto York-Durham Line if mitigation measures are not in place.

It should be emphasised that the proposed 1,000 trucks per day represents an upper limit to infill operations, and is a very conservative estimate for potential future high volume days. The expected number of vehicles per day is anticipated to be less, and so queueing impacts as noted above are not anticipated to be common. However, should operations approach the upper limit as indicated above in the future, several mitigation measures are anticipated to alleviate the effects of queueing.

First, Lafarge is prepared to operate an ‘overflow’ lane and/or add a storage area for queueing trucks, in effect doubling the available storage. This would reduce the queue to approximately 2,740 metres across two lanes, or less if a separate onsite storage area is implemented; however, 2,740 metres still represents a significant queue length that cannot be accommodated on the existing inbound fill truck path. If a second scale is deemed necessary, Lafarge is able to install a second weigh station, effectively doubling the throughput from 60 to 120 vehicles per hour. If a second scale is installed, minimal to no queues are anticipated because the maximum number of trucks per hour will be 120, meaning all trucks should (in theory) be processed.

With the queuing mitigation measures noted above, and acknowledgment that the presented number of truck trips to be generated is a very conservative upper limit, TMIG does not foresee any queueing concerns with the proposed application.

8 ACCESS CIRCULATION REVIEW

8.1 Hillsdale Drive Access Review

8.1.1 Site Visits

A field visit was performed by TMIG staff members on August 16, 2021 and July 2022. Through the field visits, on-site sight distance analysis was conducted to ensure vehicular right-turn egress from Hillsdale Drive onto York-Durham Line. Although Hillsdale Drive allows right-out only onto York-Durham Line, the left-turn from stop sight distances were also observed to ensure adequate sight distances from both northbound and southbound approaches. The data collected from the site visit can be found in **Appendix H**.

8.1.2 Sight Distance Requirements

Following sight distances were observed on site: Stopping Sight Distance (SSD), Intersection Sight Distance (ISD), and Decision Sight Distance (DSD). With the posted speed limit of 80km/h on York-Durham Line, a design speed limit of 100km/h was used as part of the analysis. **Table 8-1** shows the desired design values for both SSD and ISD as well as DSD in accordance with TAC Tables 9.9.4, 9.9.6, and 9.10.1.

Table 8-1 – Design Stopping and Intersection Sight Distances for Passenger Cars

Design Speed (km/hr)	Right-Turn from Stop		Left-Turn from Stop		Decision Sight Distance (m)
	SSD (m)	ISD (m)	SSD (m)	ISD (m)	
100	185	185	185	210	300

As per the TAC manual, sight distances were observed considering the following key variables:

- Driver's eye vertical height of 1.08 metres from the ground;
- Horizontal setback of 4.4 metres from the edge of pavement from York-Durham Line; and
- Height to the top of car bumper of 0.6 metres (conservative approach) and height to the top of the car of 1.3 metres from the ground.

Tools used for the sight distance analysis are shown in **Appendix H.** The field observation confirms that both the right-turn SSD and ISD desired 185 metres distance were met. TMIG staff members were able to observe both the 0.6-metre and 1.3-metre-high object approaching from the north.

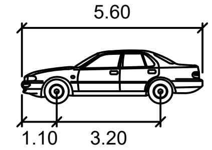
The field observation also confirms both left-turn SSD and ISD desired 185-metre and 210-metre distances, respectively, were met. TMIG staff members were able to observe the 1.3-metre object approaching from the south. Note that the 0.6-metre high object was not observed but as the 1.3-metre high object was observed the sightline is still deemed acceptable as vehicles entering the roadway from Hillsdale Drive will be able to see a vehicle approaching from the south at the desired distance. It should be reminded that left-turns out of Hillsdale Drive will be prohibited for trucks (i.e., the review of left-turning sight distance was only completed as an additional review). Similarly, the field observation confirmed that the DSD 300-metre distance was met with the 1.3-metre high object visible when approaching from the north. As a conservative measure, the sight distance up to 500 metres was confirmed in which the 1.3-metre high object was visible (exceeding even the desirable decision sight distance of 400 metres).

In conclusion, the applicable SSD and ISD requirements for vehicles turning left and right out of Hillsdale Drive onto York-Durham Line (although only right-turns are allowed for the trucks) were assessed as met as part of the site visit. Additionally, the minimum and desirable DSD requirement was also met for vehicles approaching Hillsdale Drive from the north. As part of the previous TIS update, TMIG also completed a desktop review of the horizontal sight distance using aerial imagery of the roadway (with both ISD requirements illustrated as it is the conservative requirement). The sight distance review has been illustrated in **Figure 8-1** and confirms that the sightline requirements are met.

8.2 Truck Circulation Review

In addition to the sightline review, TMIG completed a review of the trucks entering and exiting the site accesses using AutoTURN. The review was based on the truck dimensions provided by the project team, and accounts for the recommended northbound left-turn lane at the inbound access.

The review confirms that the Hillsdale Drive outbound trucks will utilize part of the shoulder to enter onto York-Durham Line in order to limit any encroachment onto the northbound lane, which would be deemed acceptable in a rural setting. The review, illustrated in **Figure 8-2**, shows no projected conflicts for truck circulation at the accesses.



P

	meters
Width	: 2.00
Track	: 2.00
Lock to Lock Time	: 6.0
Steering Angle	: 35.9

Based on a design speed of 100 km/h (per the posted speed limit of 80 km/h along York-Durham Line), Intersection Sight Distance requirements for the Hillsdale Drive intersection are required based on TAC Tables 9.9.4 and 9.9.6 as follows:

- 185m for right-turns from the roadway (looking left).
- 210m for left-turns from the roadway (looking right).

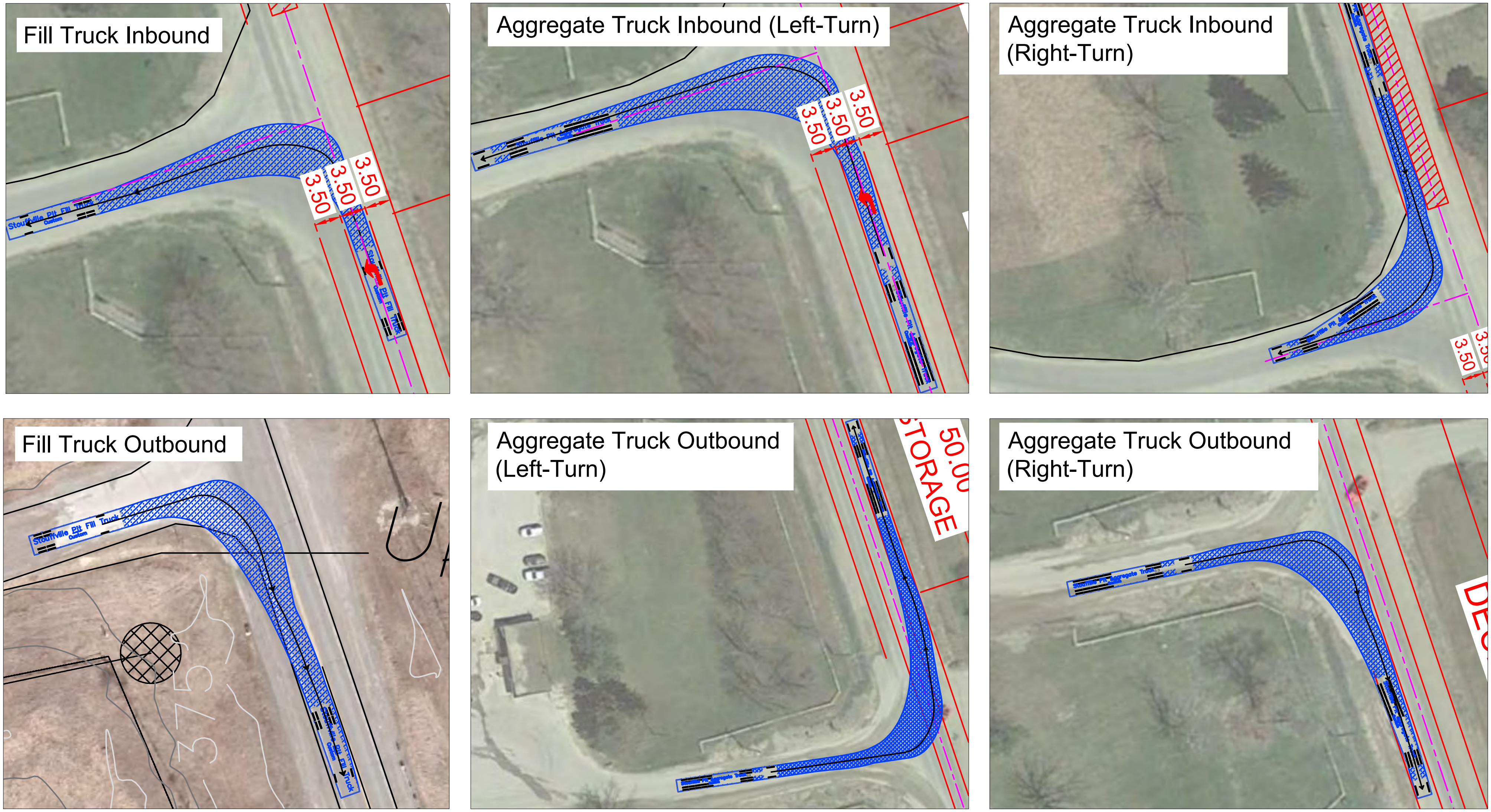
The intersection sight distance has been measured 4.4m from the edge of pavement of the roadway. The review confirms that the requirements are met at the intersection.

TMIG
A T.Y.LIN INTERNATIONAL COMPANY
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700
f: 905.738.0065

Stouffville Pit Reclamation
Updated Transportation Impact Study
Hillsdale Drive at York-Durham Line Intersection Sight Distance Review

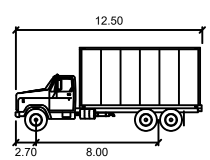
DATE:	PROJECT No.
March 2022	19199
SCALE: N.T.S	DRAWING No. Figure 8-1

File : G:\Projects\2019\19199 - LaFarge Pit Reclamation\Draft 4 - 2022-03-10\03 Site Review & Circulation\20220322\19199_Access Review_20220322.dwg, Layout : Hillsdale ISD Date :Mar 23, 2022 - 4:26pm, Edit By : nawfal.kammah



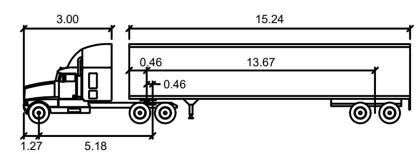
The Tri-Axle Fill truck accessing the site shows no concerns when entering via the access onto York-Durham Line and exiting onto York-Durham Line via Hillsdale Drive. Note that outbound trucks are anticipated to use the shoulder when entering the roadway in order to reduce any potential encroachment onto the northbound lane.

The WB-67 Aggregate Truck accessing the site shows no concerns when entering and exiting via the accesses onto York-Durham Line. Note that the truck includes a total of 8-axles, even though the profile illustration (copied to the right) only shows a total of 5-axles.



Stouffville Pit Fill Truck

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.0



Stouffille Pit Aggregate Truck

	meters		
Tractor Width	: 2.44	Lock to Lock Time	: 6.0
Trailer Width	: 2.44	Steering Angle	: 28.2
Tractor Track	: 2.34	Articulating Angle	: 70.0
Trailer Track	: 2.34		

TMIG
A TYLIN INTERNATIONAL COMPANY
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700
f: 905.738.0065

Stouffville Pit Reclamation
Updated Transportation Impact Study
Truck Circulation Review to/from York-Durham Line

DATE: March 2022	PROJECT No. 19199
SCALE: N.T.S	DRAWING No. Figure 8-2

9 MULTI-MODAL LOS REVIEW

As per the York Region Transportation Mobility Plan Guidelines, TMIG completed a review of the multi-modal level of service (MMLOS) for the study intersections located in the immediate vicinity of the Stouffville Pit along York-Durham Line.

The MMLOS review includes pedestrian, cycling, as well as transit facilities located within the study area (as applicable) under both existing and future conditions.

As part of the Multi-Modal Level of Service (MMLOS) review, the following key documents were reviewed:

- York Region Transportation Master Plan 2022 (draft);
- York Region Transportation Master Plan 2016;
- York Region Official Plan 2010;
- Durham Region Transportation Master Plan 2017; and
- Durham Regional Cycling Plan 2021.

9.1 Transit Level of Service

The transit Level of Service (LOS) was reviewed, with results presented in **Table 9-1** below.

There are no intersections along York Durham Line that currently meet targets for access to transit stops or transit headways. All intersections do meet targets for intersection approach LOS, with the exception of the existing southbound movement at the intersection of York-Durham Line at Highway 47.

The roadway currently falls within the service area for the Durham Region Transit (DRT) Rural On Demand service, which allows customers to book travel between stops in the Rural On Demand zone within Durham Region or connect to DRT or GO transit routes. Access to the Rural On Demand service can be made from designated On Demand bus stop or from the end of rural driveways, with standard transit fares applied. Given the lack of regular headways for this transit on demand service, the LOS remains ‘F’ for intersections along this roadway.

Currently, there are no plans to extend York Region Transit (YRT) service to the area along York-Durham Line. However, according to the Durham Transportation Master Plan, Regional Highway 47 east of York-Durham Line is expected to become part of another transit spine with 20 to 60 minute service headways by 2031. It is anticipated this improvement will improve the transit access LOS at York-Durham Line at Bloomington Road from ‘F’ to ‘E’ as stops would be anticipated to be provided at the intersection for the east-west direction. The distance of the site to the intersection is approximately 750 metres, leading to LOS ‘E’.

Table 9-1 - Transit Level of Service Summary

Intersection	Direction	Existing and 2028 Condition		2033 Condition		Intersection Approach LOS		
		Access to Transit Stops LOS	Transit Headway LOS	Access to Transit Stops LOS	Transit Headway LOS	Existing	2028	2033
York-Durham Line at Aurora Road	Eastbound	F	F	F	F	B	B	B
	Westbound	F	F	F	F	C	C	C
	Northbound	F	F	F	F	A	A	A
	Southbound	F	F	F	F	A	A	A
York-Durham Line at Wagg Road/Yake Crescent	Eastbound	F	F	F	F	C	C	C
	Westbound	F	F	F	F	B	B	B
	Northbound	F	F	F	F	A	A	A
	Southbound	F	F	F	F	A	A	A
York-Durham Line at Hillsdale Drive	Eastbound	F	F	F	F	A	B	B
	Northbound	F	F	F	F	A	A	A
	Southbound	F	F	F	F	A	A	A
York-Durham Line at Inbound (North) Access	Eastbound	F	F	F	F	-	-	-
	Northbound	F	F	F	F	A	A	B
	Southbound	F	F	F	F	A	A	A
York-Durham Line at Outbound (South) Access / Private Access	Eastbound	F	F	F	F	B	B	B
	Westbound	F	F	F	F	C	C	C
	Northbound	F	F	F	F	A	A	A
	Southbound	F	F	F	F	A	A	A
York-Durham Line at Bloomington Road / Regional Highway 47	Eastbound	F	F	E	F	D	C	D
	Westbound	F	F	E	F	C	D	B
	Northbound	F	F	F	F	D	D	D
	Southbound	F	F	F	F	E	D	D

9.2 Pedestrian Level of Service

The pedestrian level of service was reviewed along York-Durham Line with results presented in **Table 9-2** below.

Table 9-2 - Pedestrian Level of Service Summary

Intersection	Direction	Existing and 2028 Condition		2033 Condition	
		Segment LOS	Intersection LOS	Segment LOS	Intersection LOS
York-Durham Line at Aurora Road	Eastbound	E	F	E	F
	Westbound	F	F	F	F
	Northbound	F	F	E	F
	Southbound	F	F	E	F
York-Durham Line at Wagg Road/Yake Crescent	Eastbound	F	F	F	F
	Westbound	F	F	F	F
	Northbound	F	F	E	F
	Southbound	F	F	E	F
York-Durham Line at Hillsdale Drive	Eastbound	F	F	F	F
	Northbound	F	F	E	F
	Southbound	F	F	E	F
York-Durham Line at Inbound (North) Access	Eastbound	F	F	F	F
	Northbound	F	F	E	F
	Southbound	F	F	E	F
York-Durham Line at Outbound (South) Access / Private Access	Eastbound	F	F	F	F
	Westbound	F	F	F	F
	Northbound	F	F	E	F
	Southbound	F	F	E	F
York-Durham Line at Bloomington Road / Regional Highway 47	Eastbound	F	F	F	F
	Westbound	F	F	F	F
	Northbound	F	F	F	F
	Southbound	F	F	F	F

Currently, no segments or intersections along York-Durham Line meet pedestrian LOS targets. As the majority of York-Durham Line in the study area has gravel shoulders, a corresponding LOS of 'F' was assigned, though it is noted that the gravel shoulder still provides an area for pedestrians. While York-Durham Line is under the jurisdiction of York Region, Durham Region plans to include the segment north of Bloomington Road as part of its future Primary Cycling Network (PCN) and anticipates completing a buffered paved shoulder along the roadway. The timing of this improvement is anticipated by 2029. No intersection improvements have been explicitly planned; therefore it has been assumed all intersections will continue operating at pedestrian LOS 'F'.

9.3 Bicycle Level of Service

The bicycle level of service was reviewed along York-Durham Line with results presented in **Table 9-3** below.

Table 9-3 - Bicycle Level of Service Summary

Intersection	Direction	Existing and 2028 Condition		2033 Condition	
		Segment LOS	Intersection LOS	Segment LOS	Intersection LOS
York-Durham Line at Aurora Road	Eastbound	E	F	E	F
	Westbound	F	F	F	F
	Northbound	F	F	E	E
	Southbound	F	F	E	E
York-Durham Line at Wagg Road/Yake Crescent	Eastbound	F	F	E	F
	Westbound	F	F	E	F
	Northbound	F	F	E	E
	Southbound	F	F	E	E
York-Durham Line at Hillsdale Drive	Eastbound	F	F	F	F
	Northbound	F	F	E	E
	Southbound	F	F	E	E
York-Durham Line at Inbound (North) Access	Eastbound	F	F	E	F
	Northbound	F	F	E	E
	Southbound	F	F	E	E
York-Durham Line at Outbound (South) Access / Private Access	Eastbound	F	F	E	F
	Westbound	F	F	E	F
	Northbound	F	F	E	E
	Southbound	F	F	E	E
York-Durham Line at Bloomington Road / Regional Highway 47	Eastbound	F	F	F	F
	Westbound	F	F	F	F
	Northbound	F	F	F	E
	Southbound	F	F	F	F

Currently, no segments or intersections along York-Durham Line meet bicycle LOS targets. As the majority of York-Durham Line in the study area has gravel shoulders, a corresponding LOS of ‘F’ was assigned, though it is noted that the gravel shoulder still provides an area for pedestrians. Durham Region plans to include the segment north of Bloomington Road as part of its future Primary Cycling Network (PCN) and anticipates completing a buffered paved shoulder along the roadway. The timing of this improvement is anticipated by 2029, therefore by 2033 it is expected that all northbound and southbound segments along York-Durham Line will meet cycling LOS ‘E’. Aurora Road, Bloomington Road, and York-Durham Line south of Bloomington Road are proposed as part of the 2051 Regional Road Cycling Network. As no short-term timing has been provided for these particular segments, it has been assumed these segments will not be upgraded to meet LOS targets by 2033. Given that intersection improvements have not been explicitly planned, it has been assumed intersection cycling LOS along the roadway will be at most LOS ‘E’.

Overall, transit, pedestrian, and cycling levels of service along York-Durham Line do not meet targets as outlined by the York Region Transportation Mobility Plan Guidelines. However, given the rural nature of the area, it is understood that the road network has been built to facilitate the efficient movement of goods by trucks and that there is an omission of active transportation and transit facilities in order to reduce conflicts between trucks, pedestrians, and cyclists.

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10 CONCLUSIONS

The Municipal Infrastructure Group Ltd., a T.Y. Lin International Company (TMIG) was retained by Lafarge Canada (Lafarge) to prepare a Transportation Impact Study (TIS) in support of the site alteration application to infill a portion of Lafarge's Stouffville Pit. The site is located at 14204 Durham Regional Road 30, bounded by Hillsdale Drive to the north, farmland to the south, York-Durham Line to the east and by other fill sites and Ninth Line to the west, in the Town of Whitchurch-Stouffville, Region of York.

Stouffville Pit site has an unlimited annual tonnage license and currently ships approximately 1,000,000 tonnes of aggregate per year in conjunction with importing material to the site for blending. It is intended to fill-in a portion of the site to bring the area back up to the original grade. The infill area has an approximate volume of 8,000,000 m^3. The application is to allow for a total of 1,000 fill loads per day in support of this endeavor (i.e., 1,000 tri-axle trucks with a capacity of 10 m^3 to access the lands every day in order to proceed with filling), which are proposed to exit the site via Hillsdale Drive. This TIS was completed in support of this development application in order to estimate the impacts of the additional fill trucks on the boundary road network.

For the purpose of this study, TMC data was collected in August 2021 (i.e., the peak operating month for the Pit). The surveyed traffic data was increased to account for missing volumes at certain intersections (as detailed in the report). The resulting traffic volumes were then grown to 2022 to derive existing traffic conditions. Similarly, 2028 and 2033 future background volumes were derived by growing the derived 2022 existing conditions volumes to the appropriate horizon years and adding traffic generated by the study area background development. Finally, the 2028 and 2033 future total volumes were derived by adding the site trips associated with the increased fill activity to the future background volumes.

As part of the survey data collected, a total of 149 fill trucks were documented accessing the site. Accordingly, as per the development proposal, the hourly trip generation associated with a total of 851 additional fill trucks per day would need to be added to our traffic forecast in order to account for the 1,000 daily fill trucks application (with reassignment of the surveyed fill trips to exit via Hillsdale Drive). However, for the purpose of conservative analysis in this study, simply added the full 1,000 fill truck trip generation to the road network (to enter via York-Durham Line and exit via Hillsdale Drive). This technically double counts the surveyed 149 fill truck trip generation detailed in the above table within the roadway network but allows for a more conservative review of the study intersections and accesses for the Pit. As such, the full trip generation for the 1,000 fill trucks (equivalent to 240 trips in the AM (120 inbound and 120 outbound) and 44 trips in the PM (22 inbound and 22 outbound)) was added onto the roadway in this study.

Review of existing, future background and future total conditions for all study years confirms that the increased fill truck activity can be accommodated by the boundary road network. Delays and volume-to-capacity ratios at all turning movements are deemed acceptable, along with projected queuing. The following recommendations were derived, to be applied to the 2028 future background conditions:

- Provide a northbound left-turn lane, southbound left-turn lane, and southbound right-turn lane at the intersection of York-Durham Line at Regional Highway 47 and optimize the signal timing splits.
- Optimize the signal timing splits at the intersection of Goodwood Road at Regional Highway 47.

TMIG recommends that the intersection of York-Durham Line at Aurora Road be monitored by the Region to identify when operations will become critical during the AM peak hour and worsen during the PM peak hour in order to provide remedial measures under future conditions. A sensitivity analysis under the 2028 future total scenario shows that the extension of the westbound left turn lane and addition of a right-turn lane result in minimal improvement to peak hour operations.

Based on the MTO warrant analysis, TMIG recommends that a northbound left-turn lane be provided at the intersection of the Stouffville Pit Site Access (Inbound) and York-Durham Line under 2028 future total conditions. The lane is recommended to be designed with a 50m storage, a 135m deceleration length and 140m taper length.

Similarly, per the above, the recommended northbound left-turn lane at the York-Durham Line and Highway 47 intersection is recommended with a 50m storage, while the southbound left and right-turn lanes at the York-

Durham Line and Highway 47 intersection are recommended with a 70m storage, in order to accommodate the projected queues.

In addition to traffic analysis along the boundary road network, TMIG confirmed that there would no projected queuing concerns for the increased fill trucks internally to the site should the appropriate queueing mitigation measures be implemented.

Finally, TMIG completed a review of the available sightlines at the Hillsdale Drive intersection to York-Durham Line and confirmed no projected concerns. TMIG also completed a review of truck circulation at all site accesses and confirmed no projected concerns. The Hillsdale Drive outbound trucks will utilize part of the shoulder to enter onto York-Durham Line in order to limit any encroachment onto the northbound lane, which would be deemed acceptable in a rural setting.

Overall, based on findings of the study, it is TMIG's opinion that the proposed development application would be acceptable with limited impact to the boundary road network traffic operations, subject to the recommended improvements along the roadway being implemented under future background conditions and any additional recommendation detailed within this report.

APPENDIX A

Comment-Response Matrix

Project:	**Stouffville Pit Site Alteration Permit Traffic Impact Study**		
TMIG Project #:	**19199**		
Title:	**Responses to Site Alteration Permit Application Submission Comments**		
Jeff Almeida, Supervisor Development Approvals			
The Regional Municipality of Durham Works Department			
17-Dec-21			
#	**Comment**	**Responder**	**Comment Response**
1.	The submission of the Fill Management Plan by Golder Associates is in support of a fill permit application to Whitchurch-Stouffville for the final grading of part of the above site. The Fill Management Plan includes a Traffic Impact Study prepared by TMIG.	Tylin	Acknowledged.
2.	The volume of fill required to restore part of the site is 8,000,000 m3, which equates to approximately 800,000 tri-axle dump truck loads. The proposal is to fill the site at 500-1000 truckloads per day between the hours of 6 a.m. to 6 p.m., which will put the restoration at between 8 and 16 years.	Tylin	Acknowledged. The timeframe has been revised to be between the hours of 6 a.m. to 5 p.m.
3.	The existing aggregate operations are expected to continue on the remaining part of the site, using existing approved haul routes. The haul routes for the fill operations are using Regional Road 30 south of Hillsdale Drive and then either west using Bloomington Road (York Regional Road 40) or east using Regional Highway 47 / Goodwood Road (Regional Road 21).	Tylin	Acknowledged.
4.	The proposal is to utilize the existing pit entrance on Regional Road 30 for fill trucks entering the site and using the unopened ROW at Hillsdale Drive for trucks exiting, with all fill-traffic travelling to and from the south.	Tylin	Acknowledged.
5.	The terms of reference for the Traffic Assessment were agreed with the Region in advance, and we generally agree with the methodology used in the Traffic Assessment, the trip rate assumptions, 2026 and 2031 horizon years and trip distributions used in the report.	Tylin	Acknowledged. It should be noted that the updated TIS considers horizon years of 2028 and 2033 in order to account for a "buildout" year of 2023 for the increased fill activity, in line with the 5- and 10-year horizons outlined in the Terms of Reference.

6.	Figure 2-1 Transfer Route – To minimize safety and noise concerns to the Community of Goodwood, it is recommended that access between the two pits be via Wagg Road and York Durham Line only. Outbound trips from the Goodwood Pit site would exit on Concession Road 3 and travel north to Wagg Road and south on York Durham Line to return to the Stouffville Pit Site. This route appears less developed with residential homes as opposed to travelling through Goodwood and could minimize impact. Intersection control may be required at Wagg Road/York Durham Line if this	Tylin	LaFarge worked collaboratively with the Township of Uxbridge and the Region of Durham in 2015 to develop the current truck route that is used. The initial issue with full trucks using Wagg Road and then travelling south of Durham Regional Road 30 is the steep incline that must be climbed, which is difficult for the filled trucks. The lack of a slow-moving/passing lane results in safety hazard due to the number of cars attempting to pass slow-moving trucks on the hill. Furthermore, there are reports of potential damage to the gravel shoulder due to the use of the suggested route. As such, it is not recommended to adopt the suggested route.
7.	Figure 2-2 to 2-5 – These figures should be expanded to show where the haul routes go beyond the immediate study area to assess possible impacts to other areas.	Tylin	The impact of the haul routes beyond the immediate study areas has been addressed in Section 2.3 of the updated study.
8.	Table 2-3 – Please also include this table in terms of Total Daily Trips. There is a significant difference between average trips per day versus highest trips per day.	Tylin	Surveyed existing volumes for the Stouffville Pit were used in the updated TIS submission as presented in Figure 2-7 of Section 2.5. Since existing counts were used, the existing site trip generation presented originally in Table 2.3 is no longer applicable. Surveyed existing existing volume counts for the Stouffville Pit were used in the TIS Update to derive peak hour volumes.
9.	Section 2.6.1.5 – Existing site trips have been generated to correspond with the AM and PM peak hour of the adjacent roadway. Please confirm inbound/outbound trips based on the peak hour of the site and the corresponding time(s).	Tylin	As noted in the response to Comment 8 above, existing counts were adopted for the TIS update, and the trip generation originally presented in Section 2.6.1.5. of the report is no longer applicable. Surveyed existing existing volume counts for the Stouffville Pit were used inthe TIS update to derive peak hour volumes.
10.	Section 4.1 – Please confirm the distribution of truck loads throughout the day including times and inbound/outbound trips based on the expected 1000 truckloads per day.	Tylin	The distribution of trips throughout the day has been updated and is presented in the respective table.

11.	Section 4.3 of the Traffic Assessment evaluates the available sight distance at Hillsdale Drive based on TAC sight distances for a 100 km/hr design speed. We note that minimum stopping sight distance and Intersection sight distances are considered in the Traffic Assessment, however the Region would typically require Decision Sight Distance (DSD) for new entranceways, which would be 300 m.	Tylin	Acknowledged.
12.	The Traffic Assessment does not clearly state what the available sight distances are as measured in the field. Given the site access at Hillsdale Drive is proposed to act as a right-out only, we would want to be satisfied that DSD can be provided north of the site access. We recognize that DSD would not be achievable south of the site access, however as there are no inbound or left-turn outbound truck maneuvers, there shouldn't be any conflicts for northbound traffic. The consultant should confirm this.	Tylin	A decision sight distance (DSD) review was conducted for Hillsdale Drive north of the site access along York-Durham Line and is summarized in Section 8.12. The DSD review confirms that DSD can be provided.
13.	The proposed access at Hillsdale Drive will need to include traffic signage to advise traffic of the site access (truck turning signs) and signs advising drivers that the access is right turn only. The site access will also need to include paved shoulders to stop tracking of gravel shoulders that has been a long-standing issue for the Region on this section of Regional Road 30. The right-turn out only needs to be a condition of the Fill Management Plan approval.	Tylin	Acknowledged.
14.	The Region will require the applicant to enter into an Entranceway Permit with the Region. The permit will include several standard conditions, which will include the need for a mud mat and wheel-washing facilities at the site exit and a refundable $10,000 deposit.	Tylin	Acknowledged.
15.	We agree with the need to provide a left-turn lane at the site access on Regional Road 30. As per Regional left turn lane guidelines, for a 100 km/hr the required taper is 1:40 (140 m for a 3.5 m turn lane), 135 m deceleration lane and minimum 15 m storage. The Region will need to review a functional design and the implementation of the left-turn lane and associated road widening will need to be a condition of approval. The Region of Durham will be responsible for the approvals and the applicant will be required to enter into a Servicing Agreement with the Region.	Tylin	Acknowledged. The proposed functional design for the northbound left onto the access meets the requirements.

16.	The 2026 and 2031 analysis includes northbound left and southbound left and right turn lanes at the intersection of Regional Road 30 and Regional Highway 47. As noted in the Traffic Assessment the Region is planning to widen Regional Highway 47 to 4 lanes between York Durham Line and Goodwood Road. Construction is not currently proposed until beyond 2026 and the EA has not begun, and the scope of that project (and whether the scope includes turn lanes at the intersection) has yet to be confirmed.	Tylin	Acknowledged.
17.	The Traffic Assessment modelled east and west right-turn lanes at the intersection of Regional Road 30 and Regional Highway 47 for all scenarios. There are no existing right-turn lanes on the east or west legs of the intersection. Please revise the modelling and include recommendations on the need for right-turn lanes on these legs.	Tylin	Acknowledged. The analysis has been revised to remove the lanes.
18.	Additional analysis is required to be carried out in the 2026 scenario to determine what interim measures might be required to accommodate the fill traffic until the intersection is improved.	Tylin	Acknowledged. Based on the updated traffic capacity analysis presented in Section 6.4. for 2028 future total conditions, a northbound left-turn lane, southbound left-turn lane, and southbound right-turn lane at the intersection of York-Durham Line at Regional Highway 47 is recommended, and the signal timing splits are recommended to be optimized at the intersection of York-Durham Line at Regional Highway 47 and at the intersection of Goodwood Road at Regional Highway 47. Monitoring at the intersection of York-Durham Line at Aurora Road is recommended to determine if operations become critical. A sensitivity scenario in which the westbound left turn lane was extended and westbound right turn lane was considered with some imporvement to AM peak hour capacity and queueing.

19.	The Region has concerns over the general impact of the increased truck traffic on our road network as well as ongoing issues with truck speed enforcement through Goodwood on Regional Highway 47 and Regional Road 21. These issues are likely to be exacerbated by the increase in truck traffic associated with the fill operation. We would therefore request an opportunity to discuss with Lafarge implementing remedial measures. Measures for consideration should include: •Automated Speed Enforcement measures within the 50km/hr zone on Regional Highway 47 and Regional Road 21. •Urbanized cross section on Regional Road 21 through Goodwood. •Follow up traffic study in 2-3 years to assess actual truck volumes and review truck routing and remedial measures, including any interim improvements at Regional Road 30 / Regional Highway 47 intersection. •Commitment to pavement condition monitoring and remedial action if required.	Tylin	Acknowledged. Lafarge would be happy to meet with meet with the Region on 3 of the 4 requested remedial measures for consideration. However, regarding the urbanized cross-section on Regional Road 21 through Goodwood, Lafarge should only be responsible for the proportion off the traffic added to existing volumes on the road.
20.	We require a revised Traffic Assessment to address the above comments and request the opportunity to discuss these comments further with the Town of Whitchurch-Stouffville to agree how Regional concerns are addressed.	Tylin	Acknowledged.
Jeff Almeida, Supervisor Development Approvals			
The Regional Municipality of Durham Works Department			
07-Jun-22			
#	**Comment**	**Responder**	**Comment Response**
3.	Our previous comments on Figure 2-1 (now Figure 2-2) Transfer Route with a recommendation that access between the two pits be via Wagg Road and York Durham Line only has not been addressed or commented upon.	Tylin	Please see response above. Please note that TMIG/TYLIN was not in receipt of the Region's comments on the first submission, and was therefore was not able to address the Region's initial comments. LaFarge worked collaboratively with the Township of Uxbridge and the Region of Durham in 2015 to develop the current truck route that is used. The initial issue with full trucks using Wagg Road and then travelling south of Durham Regional Road 30 is the steep incline that must be climbed, which is difficult for the filled trucks. The lack of a slow-moving/passing lane results in safety hazard due to the number of cars attempting to pass slow-moving trucks on the hill.

4.	Figure 2-2 to 2-5 – As previously requested, these figures should be expanded to show where the haul routes go beyond the immediate study area to assess possible impacts to other areas.	Tylin	The impact of the haul routes beyond the immediate study areas has been addressed in Section 2.3 of the updated study.
5.	Section 8 of the Traffic Impact Study evaluates the available sight distance at Hillsdale Drive based on TAC sight distances for a 100 km/hr design speed. As per our previous comments, we noted that minimum stopping sight distance and intersection sight distances are considered in the Traffic Assessment, however the Region would typically require Decision Sight Distance (DSD) for new entranceways, which would be 300m.	Tylin	Acknowledged.
6.	As per our previous comments, the Traffic Impact Study does not clearly state what the available sight distances are as measured in the field. Given the site access at Hillsdale Drive is proposed to act as a right-out only, we would want to be satisfied that DSD can be provided north of the site access. Although the 185 m intersection sight distance is confirmed, we would want to understand what sight distance is available and how close to the DSD can be achieved. We specifically requested in our previous comments that the consultant confirm this.	Tylin	As noted above, a desktop decision sight distance (DSD) review was conducted for Hillsdale Drive north of the site access along York-Durham Line and is summarized in Section 8.12. The DSD review confirms that DSD can be provided.
8.	The revised Traffic Assessment now includes a functional design for the left-turn lane on Regional Road 30, which shows the appropriate approach tapers, deceleration lane and storage lane as per our previous comments. To demonstrate impacts / feasibility, the functional design also needs to show the road widening required for the left-turn lane which will require the widening of the road platform and regrading the boulevard, existing entranceways and ditching as necessary. The design will need to include traffic signage to advise traffic of the site access (truck turning signs). All works required to implement the left-turn lane are to be designed and built to Durham standards at 100% Lafarge’s cost. The Region of Durham will be responsible for the approvals and the applicant will be required to enter into a Servicing Agreement with the Region.	Tylin	Noted. Given the current lack of survey for the immediate roadway, the functional design has been renamed as a conceptual design and the estimated road widenings and required signage added. The updated conceptual design has been included in the TIS. A more comprehensive functional and detailed design will be subject to application approval and would require adequate topographic survey. It is noted that there is an existing 'Trucks Turning" signs posted in advance of the Stouffville Pit entrance for vehicles approaching from the north.

9.	Section 3.2 has expanded the discussion on the study area network. As per the Region's 2022 Capital Road Program, the planned widening of Regional Highway 47 to 4 lanes between York Durham Line and Goodwood Road project is not expected to be constructed until after 2027, but as noted in our previous comments, the EA has not begun and the scope of that project (and whether the scope includes turn lanes at the intersection) has yet to be confirmed.	Tylin	Acknowledged.
10.	As per our previous comments, additional analysis is required to be carried out in the 2026 scenario to determine what interim measures might be required to accommodate the fill traffic until the Regional Road 30 and Regional Highway 47 intersection is improved. In particular, the consideration of the need for a westbound right-turn lane.	Tylin	Acknowledged. As noted above, based on the updated traffic capacity analysis presented in Section 6.4. for 2028 future total conditions, a northbound left-turn lane, southbound left-turn lane, and southbound right-turn lane at the intersection of York-Durham Line at Regional Highway 47 is recommended, and the signal timing splits are recommended to be optimized at the intersection of York-Durham Line at Regional Highway 47 and at the intersection of Goodwood Road at Regional Highway 47. Monitoring at the intersection of York-Durham Line at Aurora Road is recommended to determine if operations become critical. A sensitivity scenario in which the westbound left turn lane was extended and westbound right turn lane was considered with some imporvement to AM peak hour capacity and queueing.
11.	As per our previous comments, the Region has concerns over the general impact of the increased truck traffic on our road network as well as ongoing issues with truck speed enforcement through Goodwood on Regional Highway 47 and Regional Road 21. These issues are likely to be exacerbated by the increase in truck traffic associated with the fill operation, particularly as there is no known truck trip distribution for the fill operations. We would therefore request an opportunity to discuss with Lafarge implementing remedial measures. Measures for consideration should include: a. Automated Speed Enforcement measures within the 50 km/hr zone on Regional Highway 47 and Regional Road 21. b. Urbanized cross section on Regional Road 21 through Goodwood. c. Follow up traffic study in 2-3 years to assess actual truck volumes and review truck routing and remedial measures, including any interim improvements at Regional Road 30 / Regional Highway 47 intersection.	Tylin	Acknowledged. Lafarge would be happy to meet with meet with the Region on 3 of the 4 requested remedial measures for consideration. However, regarding the urbanized cross-section on Regional Road 21 through Goodwood, Lafarge should only be responsible for the proportion off the traffic added to existing volumes on the road.

	d. Commitment to pavement condition monitoring and remedial action if required.		
12.	Appendix A of the Traffic Impact Study now includes a comment – response matrix. It is disappointing that Region of Durham comments have not been included in this matrix and as noted above, a significant number of our comments have not been addressed in this resubmission. We request the opportunity to discuss these comments further with the Town of Whitchurch-Stouffville and Lafarge to agree how Region of Durham concerns are addressed.	Tylin / MHBC	Acknowledged. TMIG/TYLin apologizes for the oversight and have attempted to adequately address the Region's concerns in this submission. Please note that TMIG/TYLin did not intentionally ignore the Region's comments; rather, our team was not in receipt of said comments, and were therefore unable to adequately address the comments in the subsequent submission.
Mayor Iain Lovatt			
Town of Whitchurch-Stouffville			
Monday, November 15, 2021			
#	**Comment**	**Responder**	**Comment Response**
1.	When I spoke to the proponent about their plans earlier this year, I brought up the need to address traffic concerns at the 10th Line & Bloomington/47 intersection. With the increased truck traffic that this application will bring, dedicated left turn lanes in all directions, or a round about must be addressed. This is already a major bottleneck north/south that will need attention. The proponent was amenable to look at contributing to the costs of upgrading the intersection. I have cc'd the Regions Acting Transportation Commissioner Ann-Marie Carroll on this email so she's in the loop that this application is moving forward. Can we ensure that this is not lost as this moves forward?	Tylin / Lafarge	Acknowledged.
Jim Walls			
R.J. Burnside & Associates Limited			
20-May-22			
#	**Comment**	**Responder**	**Comment Response**
Transportation Impact Study (TIS) and Electronic Synchro Files– comments by Cindy Chung, EIT and David Angelakis, C.E.T.			
	No. 2.20 – Re 1.21		
	General Comments		
	a) The Synchro electronic files for all analyses should be provided for review. Addressed. Synchro electronic files were provided. Please see comments on the Synchro files below.		Acknowledged.

20.	b) The Town follows the Region's Transportation Mobility Plan Guideline for Development Applications. Please provide a performance analysis for transit, pedestrian, and cyclist infrastructure under existing and future conditions. Addressed. Performance analysis (MMLOS) for transit, pedestrian and cyclist infrastructure were provided for all conditions. Please see comments on the MMLOS evaluation below.	Tylin	Acknowledged.
	c) Please provide a maneuvering analysis at the site driveways for the largest expected design vehicles. Addressed. Maneuvering analysis was provided at the site driveway for the largest expected design vehicle.		Acknowledged.
	d) An existing Site Plan should be provided. Addressed. An existing Site Plan was provided.		Acknowledged.
	e) As a Site Plan was not provided, the location of the weight station is unclear and there is concern that queuing trucks may spill onto York-Durham Line. A review of potential queuing should also be provided between the weight station and York-Durham Line. In addition, any potential queuing on York-Durham Line should be provided for trucks waiting to enter the site. Should the traffic analysis suggest that truck queuing will impact the operations of York-Durham Line, then the Applicant would be required to revise their Site Plan to relocate the gate and weight station to alleviate any potential queuing issues. Partially addressed. A Site Plan was provided, but the location of the weigh station is unclear and must be shown on the plan to confirm inbound queuing distance. Section 7.2 in the updated TIS describes the length of travel after entering the site before requiring to stop and unload. The queueing review was based on the additional trucks generated. To be conservative, the total trucks entering the site should be considered (i.e., include existing trucks). In addition, the queue length was based on a 12.5 m truck, but based on the maneuvering analysis, the largest vehicle would be a WB-67, which has a length of approximately 20 m. This should be considered to be conservative. Please clarify and update accordingly.		The queueing analysis has been revised based on updated information from the client. The inspection/weigh station location has been illustrated and is now included in Appendix G. The vehicle length was not updated as the fill truck queue will not be using such WB-67 vehicles (shown only for conservative maneuvering purposes). The additional 149 existing vehicles were also excluded for queueing analysis because they are accounted for in 1000 projected daily truck trips (however they remain included in the traffic capacity analysis to be conservative). The revised internal queueing analysis and proposed mitigation measures are outlined in Section 7.2.
	No. 2.21		

21.	Synchro Comments	Tylin	
	a) A northbound shared through-right lane was modelled at the Aurora Road/York Durham Line intersection. Based on Google Maps and Figure No., there is an exclusive northbound right-turn lane. Please update.		Noted. The intersection will be remodelled.
	b) The speed limit modelled in Synchro on Bloomington Road is 80 km/h. The posted limit is 70 km/h west of York Durham Line. Please update accordingly.		Noted. The speed limit will be updated.
	c) The signal timing splits for the existing PM synchro file do not match the existing signal timing plan provided in Appendix C.		The splits noted in the York Region Signal timing plan were deemed inaccurate and do not reflect the actual timings noted for each of the phases. The timings entered for the minimum initial, amber, and all-red phases in the submitted Existing PM was deemed accurate.
22.	No. 2.22	Tylin	
	MMLOS Comments		
	a) The location of the planned transit stop for the Regional Road 47 transit line proposed for 2031 will be approximately 750 m away from the site. This is not equivalent to a level of service A as indicated in Table 9-1. Please update.		Noted. The level of service for the Regional Road 47 transit line stop was revised.
	b) In Table 9-2, under existing and 2028 conditions, northbound and southbound York-Durham Line segments were given a level of service F indicating there are no sidewalks. However, currently, there are paved shoulders on York-Durham Line. Please update accordingly.		A review of aerial imagery indicates that the significant majority of York-Durham Line at the study intersection segments has gravel shoulders or no shoulders at all. Accordingly, TYLin maintains the LOS assigned under existing and 2028 conditions in Table 9-2, the exception being at York-Durham Line at Bloomington Road / Regional Highway 47 where LOS was reduced to 'F' representing the lack of paved shoulders at the intersection segments.
	c) In Tables 9-2 and 9-3, under existing and all future conditions, York-Durham Line/Bloomington Road were given a level of service E indicating paved shoulders. However, there are some segments along Bloomington without paved shoulders. Please update accordingly.		Noted. The level of service for the intersection segments was revised.
	No. 2.23 – Re 1.22		
	Section 1.0		

23.	a) The site location Figure 1-1 appears to include the North York Sand & Gravel (14395 Ninth Line) and Lee Sand and Gravel (14245 Ninth Line) Fill Sites (USM site). Please clarify ownership and if there are any interconnection that would allow access to Ninth Line. Addressed. Clarification has been provided that both sites operate under separate ownership and there is no interconnection between them.	Tylin	Acknowledged.
	b) We note that there is an existing heavy truck restriction on Hillsdale Drive, possibility due to the existence of the single-family home on that street. It is proposed that Hillsdale be utilized as an outbound truck route. Please clarify. Partially addressed. Clarification was provided on the single-family home and the outbound truck route. However, access to what appears to be a residential street would introduce an incompatible use.		It is understood that in order to be able to use Hillsdale Drive, LaFarge is required to own the property on this street (as it currently does). The street is currently only being used by Lafarge. No compatibility issues are anticipated.
	c) It is noted that there is a connection to the quarry on the east side of York-Durham Line via an underpass of the road. Please clarify what interaction occurs between the two sites and how that will impact the subject site and the proposed driveway. Addressed. Clarification was provided on the quarry to the east.		Acknowledged.
	No. 2.24 – Re 1.23		
	Section 2.0		
	a) Please provide a figure illustrating the existing lane configuration for all study intersections. Addressed. A figure illustrating an existing lane configuration was provided and there are no additional comments.		Acknowledged.
	b) The turning movement counts (TMC) at the York-Durham Line/Bloomington Road intersection was not provided in Appendix A. Please provide. Partially addressed. The afternoon peak hour TMC summary at the York-Durham Line/Bloomington Road intersection was provided. However, all AM peak hour TMC summaries were not provided. Please provide.		Peak Hour Summaries for the AM were not available from the vendor, and were therefore processed by TMIG. The AM peak hour summaries have been added to the Appendices.

24.	c) The TMCs' were conducted in either 2018 or 2019. A growth rate should be applied to estimate the current traffic volumes. Since 2022 is less than a month away, the projections should be updated to reflect 2022 conditions. Please update and provide justification for any assumed growth rates. Partially addressed. New TMCs were collected in August 2021 during the COVID-19 pandemic. The pandemic is ongoing, and it is expected that traffic volumes and patterns are impacted. For example, it appears that the southbound through traffic on York-Durham Line is underestimated. Historical counts should be reviewed and compared to the surveyed traffic volumes and adjusted where required. The largest turning movement volumes should be used in the analysis.	Based on a review of historical TMC data for the intersection of York-Durham Line at Bloomington Road from 2019 and 2021, a COVID adjustment was deemed unnecessary. While the surveyed AM southbound through volume is lower in 2021 relative to 2019, the overall southbound traffic in the AM peak hour has increased by 57 trips from 226 to 283 trips. Furthermore, the overall intersection volumes are overall higher in 2021 than in 2019. In general, day-to-day fluctuations in traffic volumes can be expected; however, given the overall increase in the August surveyed data, no adjustment was considered required. Furthermore, given the relatively small amount of residential use in the surrounding area, it was predicted that home-based work and home-based school trips (which were the most common type of trip to be affected by the pandemic, as noted under the pandemic mobility trends provided by ITE) would be less impacted than in more urbanized areas. Finally, it was noted that the counts were collected during Step 3 of the Ontario pandemic response, in which capacity limits were increased relative to previous stages, and as such, counts would have been more representative of pre-pandemic conditions than in previous pandemic response stages. Based on the foregoing, it is TMIG's opnion that the August 2021 counts are acceptable without adjustment.
	d) The assumptions made in Table 2-3 and Table 2-4 are reasonable and in line with the information provided. A reduction of 50% was applied to the estimated trips based on seasonal data. However, the seasonal data does not appear to show that trips are reduced by 50% in any of the months provided. Regardless, the peak month should be examined. In this regard, it is suggested that the projected trips in Tables 2-3 and 2-4 without any reductions be utilized. Addressed. No reduction was applied.	Acknowledged.
	e) Based on the seasonal data provided, it is suggested that the TMCs used should reflect the peak operating month of August. Partially addressed. TMCs were conducted during August to reflect peak operating month. However, minor adjustments may be required as counts were conducted during the COVID-19 pandemic.	Based on a review of historical TMC data, no modification for COVID was deemed necessary, as explained above.

	f) The trip distribution for the employees at the pit will be different than the truck trip distribution. Please provide a separate trip assignment for the employees and provide justification for the assumed distribution. Addressed. A separate trip assignment for employees was included.		Acknowledged.
25.	No. 2.25 – Re 1.24	Tylin	
	Section 3.0		
	a) Based on the information provided in the introduction section of the TIS, it will take approximately 8 to 16 years to complete the fill-in. The horizon year of 2026 and 2031 will be only 4 to 9 years (assuming it starts in 2022). To be conservative, a horizon year of 2038 should be reviewed (2022 plus 16 years). Addressed. Clarification was provided on the expected completion time and the study horizon years reviewed has been updated to 2028 and 2033 which are acceptable.		Acknowledged.
	b) It is unclear how the trips for the background development were determined. Please clarify how the trips for the background development was generated, distributed, and assigned. Partially addressed. Clarification was provided on the how the trips for the background development were determined. Traffic volume figures were provided from their traffic study. However, it is unclear from those figures the amount of site traffic that will be impacting the subject's study intersections. Please provide the relevant background site traffic volume excerpts from their respective studies.		Site traffic volume figures were not available from either background development study. Site traffic volumes were derived from the figures via the traffic entering/exiting the respective sites. Approach turning volume distributions from the extracted figures were used to derive the volumes impacting the study road network. A summary of these calculations has been appended to the background development appendix.
	c) It appears there are other background developments within vicinity of the site that should be included. In particular, we are concerned about the increase truck traffic from the USM site. Please review the Town's development application website and request the most recent transportation studies from the Town. All relevant excerpts for site traffic trip generation, assignment and distribution should be provided for each development.		Please see response to previous comment.

	Partially addressed. The USM site was included as part of the background conditions. As per the comment above, please provide the relevant background site traffic volume excerpts from their respective studies.		
	d) No growth was applied on Aurora Road. Please review historical counts and/or Town's Transportation Master Plan and/or Region's EMME model and provide justification for the assumed growth rate. Addressed. A growth rate was applied on Aurora and justification was provided.		Acknowledged.
	e) It appears no growth was applied to the left and right-turn movements at the York-Durham Line/Bloomington Road/Durham Highway 47 intersection. It is suggested that growth be applied to all movements at this intersection. Addressed. Growth was applied to all movements at the York-Durham Line/Bloomington Road/Durham Highway 47 intersection.		Acknowledged.
27.	No. 2.26 – Re 1.25	Tylin	
	Section 4.0		
	a) The assumed loads arriving on-site should be based on the existing data for arrivals. Please provide clarification on how the assumption of 500 to 1,000 loads per day was determined. Addressed. Clarification was provided on how the assumption of 500 to 1,000 loads per day was determined.		Acknowledged.
	b) Based on 500 to 1,000 loads per day and a requirement of 800,000 truckloads to fill the site. This does not appear to equate to an 8 to 16-year timeline. Please clarify. Addressed. The timeline has clarified by the traffic.		Acknowledged.
	c) It appears the site trips are underestimated based on the existing hourly distribution. Please clarify the assumed inbound and outbound site trips in Table 4-1.		Acknowledged.

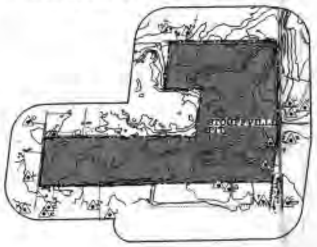
	Addressed. The site trips have been updated.		
	d) Based on Figure 2-4 and Figure 2-5, the distribution to the north for fill trucks should be 0%. The distribution in Figure 4-1 appears to be consistent; however, Table 4-2 indicates 5% will be to/from the north. Please clarify. Addressed. Table 4-2 was updated to indicated 5% will be to/from the north and further clarification was provided on assignment.		Acknowledged.
	e) The required sight distances in Table 4-3 appear to be correct. Please provide an illustration of the existing sight distances on a plan. Addressed. An illustration was provided for the sight distance analysis.		Acknowledged.
28.	No. 2.27 – Re 1.26 Section 6.0		
	a) The operations analysis should be updated based on the comments above. Partially addressed. The operation analysis should be updated as per the new comments above.		Noted.
	b) Based on the Synchro reports in the appendices, it appears that exclusive eastbound right-turn and westbound right-turn lanes are modelled at the York-Durham Line/Regional Highway 47 intersection. However, based on a review of Google Maps, there are no exclusive right-turn lanes at those approaches. Please clarify.		This was noted in the first TIS submission and was corrected in the second TIS submission. We note there is no statement of 'Addressed/Partly addressed' from the reviewer in the letter.
	No. 2.28 – Re 1.27 Section 8.0		

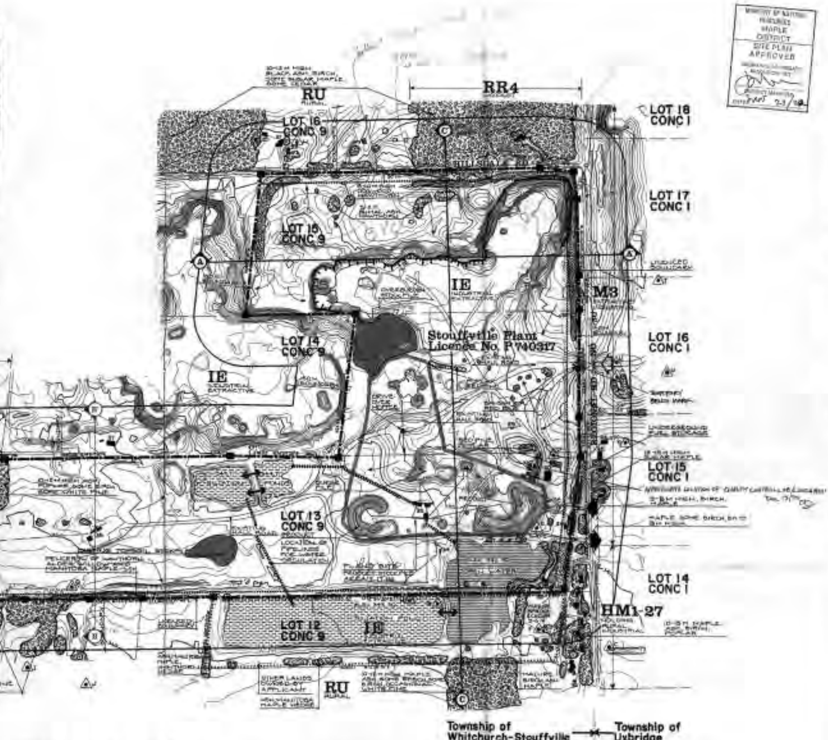
29.	a) Based on the volumes in Figure 5-2, the percentage of northbound lefts at north driveway on York-Durham Line is approximately 30% of all northbound traffic in AM peak hour. The MTO's nomograph provided in Appendix H for AM peak hour was 40%. As well, the volumes marked on the graph did not match the volumes in Figure 5-2. It appears a much shorter left-turn storage length is warranted. Please provide clarification for the left-turn warrant analysis and ensure that the proposed left-turn storage length can accommodate the project queue based on SimTraffic. Addressed. The left-turn warrant analysis was updated and there are no further comments.	Tylin	Acknowledged.
	b) Please provide a preliminary design drawing for the proposed northbound left-turn lane at the north site driveway on York-Durham Line. Addressed. A preliminary design drawing for the proposed northbound left-turn lane at the north site driveway on York-Durham Line was provided. The design is subjected to Durham Region's review.		Acknowledged,

APPENDIX B

Operations Plan

WATER WELL KEY MAP





KEY MAP

WATER WELL INFORMATION

NO.	TOP ELEVATION	STATIC LEVEL	WATER FOUND	BOTTOM	SOURCE
A	375.9	359.5	346.4	311.8	M.O.E. WELL [illegible]
B	347.5	317.6	307.8	307.8	M.O.E. WELL [illegible]
C	358.5	312.7	312.7	307.2	M.O.E. WELL [illegible]
D	347.6	316.5	314.5	308.4	M.O.E. WELL [illegible]
E	[illegible]	316.0	316.0	311.5	M.O.E. WELL [illegible]
F	356.5	307.8	347.5	[illegible]	M.O.E. WELL [illegible]
G	356.3	310.8	310.5	244.4	M.O.E. WELL [illegible]
H	368.5	308.4	[illegible]	279.0	M.O.E. WELL [illegible]
I	355.5	316.1	266.4	280.4	M.O.E. WELL [illegible]
J	358.5	317.5	317.5	287.8	M.O.E. WELL [illegible]
K	354.8	317.0	317.0	304.4	M.O.E. WELL [illegible]
L	350.4	310.5	305.5	303.2	M.O.E. WELL [illegible]
M	[illegible]	304.5	280.2	280.2	M.O.E. WELL [illegible]
N	350.5	314.6	307.8	307.6	M.O.E. WELL #69-8425
O	350.5	307.2	301.1	N/A	M.O.E. WELL [illegible]
P	N/A	N/A	N/A	N/A	M.O.E. WELL [illegible]
Q	342.9	[illegible]	[illegible]	[illegible]	M.O.E. WELL [illegible]
R	[illegible]	[illegible]	[illegible]	[illegible]	M.O.E. WELL [illegible]

SEE "WATER WELL INFO (cont'd)" THIS PAGE

BUILDING LIST

NO.	SIZE	USE
1	1 STOREY	BRICK HOUSE
2	1 STOREY	SIDING HOUSE
3	1 STOREY	SIDING HOUSE
4	1 STOREY	GARAGE
5	2 STOREY	SIDING HOUSE
6	1 STOREY	BRICK HOUSE
7	1 STOREY	FRAME HOUSE
8	1 STOREY	BRICK HOUSE
9		COMMUNICATIONS TOWER + TRAILERS
10	1 STOREY	SIDING HOUSE
11	1 STOREY	SIDING HOUSE
12	1 1/2 STOREY	SIDING HOUSE
13	2 STOREY	BRICK HOUSE + 2 BARNS
14	2 STOREY	HOUSE
15		SCALE HOUSE
16		TRAILER SHOP
17	2 STOREY	[illegible] HOUSE
18	1 STOREY	BARN HOUSE
19	2 STOREY	SIDING HOUSE
20	1 STOREY	SHED & BARN
21	1 STOREY	BRICK HOUSE
22	1 1/2 STOREY	SIDING HOUSE
23	2 STOREY	BRICK HOUSE
24		BARN
25	2 STOREY	BARN
26	2 STOREY	SIDING HOUSE
27	1 STOREY	GARAGE
28	1 STOREY	SIDING HOUSE
29	[illegible]	TRAILER MOBILE
30	50' x 80'	SHOP
31	40' x 60'	OFFICE
32	50' x 60'	COTTAGE
33		MAIN WASH PLANT
34	10' x 16'	PUMPHOUSE
35	MOBILE TRAILER	ENGINEERED TRAINING SCHOOL
36		GARAGE
37		GARAGE (LES SAND & GRAVEL)
38	2 STOREY	QUALITY CONTROL LAB / [illegible]

SITE PLAN OVERRIDE

THE FOLLOWING CONDITIONS ILLUSTRATED ON THESE PLANS VARY FROM THE REQUIREMENTS OF ONTARIO REGULATION 702/89 AS PROVIDED FOR UNDER SECTION 15.

ITEM	SECTION
[illegible]	[illegible]

LEGEND

- BOUNDARY OF LICENSED AREA
- SETBACK LIMIT
- 15 M BOUNDARY
- EXISTING POST & WIRE FENCE
- LOT LINE
- EXISTING CONTOURS (2 M INTERVAL)
- SECTION LINE LOCATION
- WATER WELL
- RU — ZONING
- EXISTING VEGETATION
- EXISTING BUILDING
- EXISTING ENTRANCE/EXIT WITH GATE
- EXISTING UNDERPASS
- SILTATION POND
- OPEN WATER
- OTHER LANDS OWNED BY APPLICANT
- WASH WATER CIRCULATION PIPE LOCATION
- PRODUCT STOCKPILE AREA
- DIRECTION OF SURFACE DRAINAGE
- EXTRACTION FACE
- OVERBURDEN/TOPSOIL STOCKPILE
- EXISTING HAUL ROADS
- LICENCE BOUNDARY POSTS
- WATER OUTLET IN WASH POND SEQUENCE
- BACKFILL MATERIAL
- TEMPORARY BERM

NOTES

1. THIS SITE PLAN IS PREPARED FOR SUBMISSION TO THE MINISTRY OF NATURAL RESOURCES IN CONJUNCTION WITH AN APPLICATION FOR A CLASS "A" LICENCE UNDER THE AGGREGATE RESOURCES ACT AND REGULATIONS. THIS SITE PLAN HAS BEEN PREPARED TO COMPLY WITH THE PROVISIONS OF SECTION [illegible] OF THE AGGREGATE RESOURCES ACT, AND REPLACES THE SITE PLANS ORIGINALLY SUBMITTED AS PART OF A LICENCE APPLICATION UNDER THE PITS AND QUARRIES CONTROL ACT.
2. TOPOGRAPHICAL INFORMATION BY NORTHWAY MAP TECHNOLOGY LIMITED FROM AERIAL PHOTOGRAPHY TAKEN 19-11-90. ELEVATIONS OF EXISTING SURFACE WATER WITHIN THE LICENCED BOUNDARY SUPPLIED BY NORTHWAY MAP TECHNOLOGY NOV 1990 AND VERIFIED IN THE FIELD IN MAY 1991.
3. ALL MEASUREMENTS SHOWN ON THIS SITE PLAN ARE IN METRES.
4. LOT AND CONCESSION LINES TAKEN FROM ONTARIO BASE MAPS # 10 17 6350 48150, 6350 48700, 6400 48700, 6400 48150 DATED 1986.
5. PROPERTY BOUNDARY MEASUREMENTS ARE TAKEN FROM PLAN OF SURVEY NO. 65E-15050 BY DELPH & JENKINS LIMITED ONTARIO LAND SURVEYORS SEPTEMBER 1990. THE FOLLOWING BENCHMARKS WERE USED IN THE SURVEYING OF THE PROPERTY BY DELPH & JENKINS: [illegible] ELEVATION 315.[illegible] M. STEEL ROD WITH BRASS CAP BENCH MARK ON NORTH SIDE OF HWY. 47, [illegible] KM EAST OF JCT. OF HWYS 47 AND 48 AT GOODWOOD [illegible]. BENCH MARK IS LOCATED [illegible] M EAST OF CENTRELINE OF GRAVEL FARM LANE, [illegible] M SOUTH OF NORTH RIGHT-OF-WAY FENCELINE AND [illegible] M WEST OF A BLACK AND YELLOW MARKER POST. TEMPORARY BENCHMARK: ELEVATION [illegible]. THE TOP [illegible] ON THE [illegible] BOLT FROM THE TOP OF THE OUTER RIM AT THE SOUTHWEST CORNER OF THE TUNNEL UNDERPASS LOCATED UNDER REGIONAL ROAD NO. 30. THE UNDERPASS IS LOCATED APPROXIMATELY 1.3 KM NORTH OF THE HIGHWAY NO. 47 AND BLOOMINGTON ROAD INTERSECTION IN STOUFFVILLE.
6. GEOLOGICAL AND HYDROGEOLOGICAL INFORMATION IS DOCUMENTED IN A REPORT BY TROW, DAMES & MOORE, JANUARY 5, 1989. A FINAL ELEVATION OF THE PONDS OF 325.5 M A.S.L. WAS TAKEN FROM THE ORIGINAL SITE PLANS FOR THIS LICENCE PREPARED BY

See NOTES (cont'd) this page.

WATER WELL INFO (cont'd)

NO.	TOP ELEVATION	STATIC LEVEL	WATER FOUND	BOTTOM	SOURCE
S	383.3	356.5	N/A	330.0	M.O.E. WELL [illegible]
T	360.75	N/A	284.4	315.9	B.A. BROWN ASSOCIATES LTD.
U	364.80	N/A	362.2	317.4	B.A. BROWN ASSOCIATES LTD.
V	358.00	N/A	318.8	287.7	B.A. BROWN ASSOCIATES LTD.

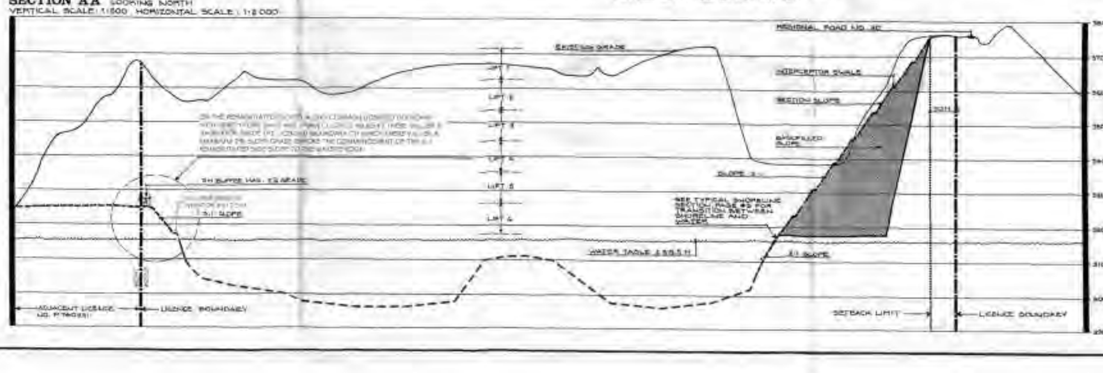
NOTES (cont'd)

J.L. CAYLOE ENGINEERS, JULY 1972 AND CONFIRMED BY A HYDROGEOLOGICAL REPORT BY TROW, DAMES & MOORE, JANUARY 1989, PROJECT # 17747-001 AND THE STATIC LEVELS OF WATER WELLS LISTED ON THIS PAGE. THE WATER TABLE ON THE SITE VARIES CONSIDERABLY AS CAN BE SHOWN BY THE STATIC LEVELS OF THE WATER WELLS.

7. WATER WELL RECORDS FOR WELLS "A" THROUGH "S" SUPPLIED BY M.O.E., FEBRUARY 1991 IN IMPERIAL AND CONVERTED TO METRIC BY HARRINGTON AND HOYLE LTD. WATER WELLS "T", "U" & "V" TAKEN FROM A REPORT BY B.A. BROWN ASSOCIATES LTD. MARCH 1991.
8. ZONING INFORMATION TAKEN FROM ZONING BY-LAW NO. 84-15 OF THE CORPORATION OF THE TOWNSHIP OF UXBRIDGE, JUNE 1990. ZONING INFORMATION ALSO FROM ZONING BY-LAW NO. 88-115 OF THE CORPORATION OF THE TOWN OF WHITCHURCH-STOUFFVILLE, JUNE 1988.
9. TOTAL AREA LICENCED = 146 HA. TOTAL AREA DISTURBED = 70.05 HA.
10. THIS LICENCED OPERATION IS LOCATED WITHIN THE OAK RIDGES MORAINE.

SECTION AA LOOKING NORTH

VERTICAL SCALE 1:500 HORIZONTAL SCALE 1:2 000



Pre-Approval | Site Plan Amendments

Harrington and Hoyle Ltd.

MHBC

PROJECT NAME
STOUFFVILLE PIT
Part of Lots 12, 13 & 15, Concession 8, Township of Whitchurch-Stouffville, Regional Municipality of York.

LAFARGE

Lafarge Canada Inc.

SCALE 1:5000

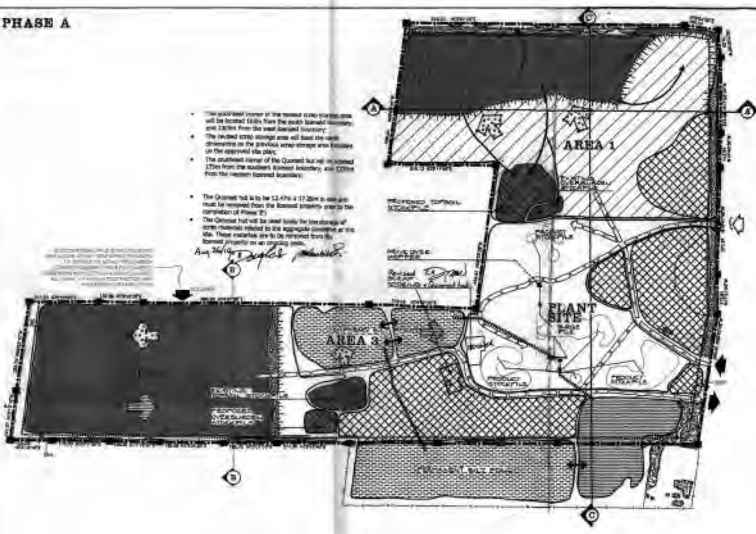
DRAWING STATUS: FINAL

DRAWN BY	CHECKED BY	ISSUE DATE	PROJECT NO.
[illegible]	[illegible]	[illegible]	[illegible]

DRAWING TITLE
EXISTING FEATURES

DRAWING No. 1 of 3

PHASE A



PHASE A

- CONTINUE SEQUENTIAL STRIPPING OF TOPSOIL AND OVERBURDEN FROM REMAINING PORTION OF AREA 1 AND USE TO BUILD BERM ON NORTHERN BOUNDARY AS SHOWN. EXCESS TOPSOIL AND OVERBURDEN WILL BE STOCKPILED SEPARATELY AS SHOWN OR USED TO CREATE 3:1 BACKFILL SLOPES IN NORTHEAST CORNER OF AREA 1.
- CONTINUE DRY EXTRACTION IN AREA 1. [illegible]
- BEGIN SEQUENTIAL STRIPPING OF TOPSOIL AND OVERBURDEN FROM AREA 2 AS SHOWN AND USE TO BEGIN CONSTRUCTION OF BERM ON SOUTH LICENCE BOUNDARY.
- WRITTEN APPROVAL FROM M.N.R. WILL BE OBTAINED PRIOR TO EXCAVATING THE 30 M SETBACK IN THE NORTHEAST CORNER OF THE LICENCED AREA. SHOULD APPROVAL NOT BE GRANTED, THE SETBACK WILL BE REHABILITATED IMMEDIATELY.

MINISTRY OF
NATURAL RESOURCES
AND FORESTRY
AURORA DISTRICT
SITE PLAN APPROVED
Under the Aggregate Resources Act

NOTES (cont'd)

7. WHEN PROCESSING PLANT HAS CEASED TO OPERATE IT SHALL BE DISMANTLED AND ALL SCRAP AND USED MACHINERY SHALL BE REMOVED FROM THE SITE.
8. THIS PLAN DEPICTS A SCHEMATIC OPERATIONS SEQUENCE FOR THE PROPERTY BASED UPON THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION. PHASES SHOWN ARE SCHEMATIC AND MAY VARY SLIGHTLY WITH DEMAND. PHASES DO NOT REPRESENT ANY SPECIFIC OR EQUAL TIME PERIOD. ANY MAJOR DEVIATION FROM THE PHASING ILLUSTRATED WILL REQUIRE WRITTEN APPROVAL FROM M.N.R. [illegible]
9. THE SITE IS PRESENTLY FENCED WITH A 1.2 m HIGH POST AND WIRE FENCE EXCEPT ALONG COMMON BOUNDARY WITH ADJACENT LICENCE AND ALONG A PORTION OF THE SOUTH BOUNDARY THAT IS IDENTIFIED WITH LICENCE BOUNDARY POSTS. FENCES & GATES WILL BE MAINTAINED UNTIL REHABILITATION IS COMPLETE.
10. ALL VEGETATION SHALL BE MAINTAINED IN A HEALTHY VIGOROUS GROWING CONDITION. DEAD TREES WILL BE REPLACED WITHIN 2 YEARS.
11. FOR DESCRIPTION OF VEGETATION WITHIN THE LICENSED BOUNDARY PLEASE REFER TO DRAWING NO. 1 "EXISTING FEATURES".
12. THERE WILL BE NO EXCAVATING WITHIN THE SETBACKS DURING PROGRESSIVE OR FINAL REHABILITATION, EXCEPT TO REMOVE BERMS. PLANTING AND SEEDING WILL OCCUR IN THE SETBACKS AS PART OF PROGRESSIVE AND FINAL REHABILITATION.
13. SCRAP WILL BE STORED ON SITE IN THE SCRAP STORAGE AREA AND REMOVED ON AN ONGOING BASIS.
14. DURING PHASE B, THE ENGINEERFIELD TRAINING SCHOOL BUILDINGS AND ASSOCIATED FACILITIES WILL BE REMOVED.

LEGEND

- BOUNDARY OF LICENSED AREA
- SETBACK
- EXCAVATION FACE
- HAUL ROAD
- MATERIAL MOVEMENT
- EXISTING 1.2 M POST & WIRE FENCE
- EXISTING ENTRANCE/EXIT WITH GATE
- EXISTING UNDERPASS
- EXISTING VEGETATION
- DIRECTION OF MOVEMENT OF ABOVE WATER EXTRACTION
- DIRECTION OF MOVEMENT OF BELOW WATER EXTRACTION
- EXISTING STOCKPILES
- SILTATION PONDS
- OVERBURDEN/TOPSOIL STOCKPILE
- TEMPORARY BERM
- PROPOSED PERMANENT BERM
- EXISTING STRIPPED AREA
- COMPLETED REHABILITATION
- POND
- REHABILITATION IN PROGRESS
- UNDISTURBED AREA
- WASH WATER CIRCULATION PIPE
- WATER OUTLET IN WASH POND SEQUENCE
- UNDERGROUND FUEL STORAGE
- LICENCE BOUNDARY POSTS

NOTES

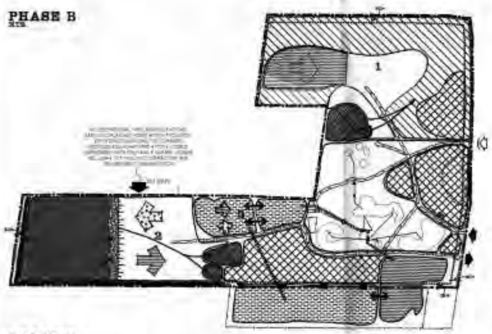
1. TOPSOIL AND OVERBURDEN SHALL BE STRIPPED AND STORED SEPARATELY IN BERMS OR STOCKPILES. BERMS AND STOCKPILES OF TOPSOIL SHALL BE GRADED TO STABLE SLOPES AND SEEDED TO PREVENT EROSION AND MINIMIZE DUST.
2. BERMS SHALL CREATE AN EFFECTIVE VISUAL BARRIER TO A MINIMUM OF 3.5 M ABOVE EXISTING GRADE AND SIDE SLOPES SHALL NOT EXCEED 3:1. SEE BERM CROSS-SECTION ON PAGE 3.
3. FUEL STORAGE SHALL BE IN UNDERGROUND CONTAINERS AND SHALL MEET THE REQUIREMENTS OF THE GASOLINE HANDLING ACT AND REGULATIONS, AS AMENDED. REFUELLING SHALL BE WITHIN A CONTAINMENT PAD AND ANY SPILLS SHALL BE REMOVED AND DISPOSED OF IMMEDIATELY AT AN APPROPRIATE FACILITY.
4. EXTRACTION OF AGGREGATES IS BY FRONT END LOADER AND PORTABLE DRAGLINE AND IS TRANSPORTED TO THE PROCESSING PLANT BY TRUCK FOR CRUSHING, WASHING, SCREENING AND STACKING. PORTABLE EQUIPMENT FOR CRUSHING, SCREENING AND STACKING MAY BE USED AT THE FACE FROM TIME TO TIME. MAXIMUM DEPTH OF DRY EXTRACTION IS [illegible] WHICH WILL BE COMPLETED IN [illegible] LIFTS OF 2.0 m EACH [illegible] (SEE SECTION A-A' DWG. 1, AND SECTIONS B-B' AND C-C' DWG. 5 FOR ELEVATIONS OF INDIVIDUAL LIFTS). EXTRACTION SHALL EXTEND BELOW THE WATER TABLE TO A MAXIMUM DEPTH OF [illegible]. WET EXTRACTION WILL TAKE PLACE IN ONE 18.5 m LIFT (SEE SECTION A-A' DWG. 1 AND SECTIONS B-B' AND C-C' DWG. 5). MAXIMUM HEIGHT OF PRODUCT STOCKPILES WILL BE [illegible].
5. WATER TO FEED THE WASH PLANT IS PUMPED FROM THE OPEN WATER POND WHICH IS SUPPLIED BY A SEQUENCE OF SILTATION PONDS AND SUPPLEMENTED BY DEEP WATER WELL.
6. IN ORDER TO PROVIDE AN APPROPRIATE BLEND, MATERIAL SHALL BE IMPORTED FROM OTHER SITES. TRUCKS WILL DUMP DIRECTLY INTO THE [illegible] AND ALL IMPORTED MATERIALS WILL BE STORED IN THE [illegible] PILE AS SHOWN.

SEE "NOTES (cont'd)" THIS PAGE.

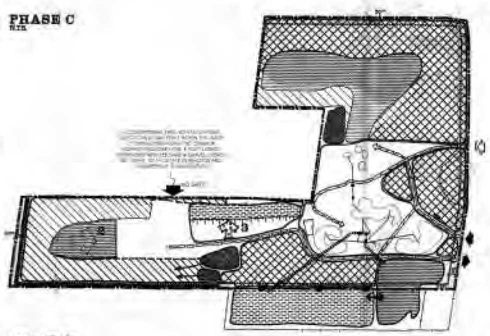
Pre-Approval

Site Plan Amendments

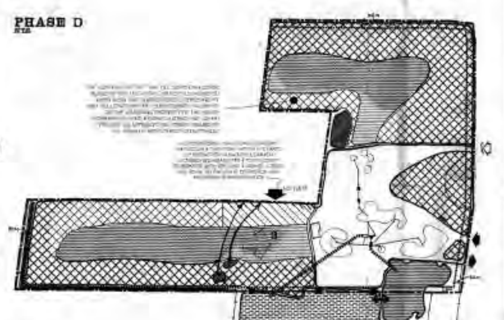
PHASE B



PHASE C



PHASE D



PHASE B

- CONTINUE SEQUENTIAL STRIPPING OF TOPSOIL AND OVERBURDEN IN AREA 2 AND USE TO BUILD BERM ON SOUTH AND WEST LICENCE BOUNDARIES. EXCESS OVERBURDEN AND TOPSOIL WILL BE STOCKPILED SEPARATELY AS SHOWN.
- BEGIN DRY EXTRACTION OF AREA 2 AND PROCESS AT PLANT SITE.
- COMPLETE DRY EXTRACTION OF AREA 1 TO 1.0 m ABOVE WATER TABLE AND CONTINUE REHABILITATION OF SIDE SLOPES USING STOCKPILED OVERBURDEN AND TOPSOIL.
- BEGIN WET EXTRACTION OF AREA 1 IN DIRECTION SHOWN, AND PROCESS AT PLANT SITE.
- CONTINUE DRY EXTRACTION IN AREA 2.

PHASE C

- COMPLETE SIDESLOPE REHABILITATION IN AREA 1. EXCESS OVERBURDEN STOCKPILED ADJACENT TO THE PLANT SITE WILL BE USED DURING PHASE E TO REHABILITATE THE PLANT SITE.
- COMPLETE UNDERWATER EXTRACTION IN AREA 1.
- COMPLETE DRY EXTRACTION OF AREA 2. [illegible]
- COMPLETE UNDERWATER REHABILITATION IN AREA 1.
- BEGIN WET EXTRACTION IN AREA 2 IN DIRECTION SHOWN.
- RELOCATE WASH PLANT PIPING CONFIGURATION IN PREPARATION FOR EXCAVATION OF SILT PONDS IN AREA 3.
- BEGIN BACKFILLING AND REHABILITATION OF SIDESLOPES IN AREA 2 USING STOCKPILED TOPSOIL AND OVERBURDEN.
- REMOVE SILT FROM TEMPORARY SILT PONDS IN AREA 3. THIS MATERIAL SHALL BE BLENDED WITH COARSER MATERIAL FROM WITHIN THE LICENCE BOUNDARY AND/OR OVERBURDEN AND USED IN THE REHABILITATION OF AREAS 2 AND 3.
- BEGIN DRY EXTRACTION OF AREA 3 IN DIRECTION SHOWN.
- CONTINUE WET EXTRACTION IN AREA 2.

PHASE D

- COMPLETE DRY EXTRACTION IN AREA 3. [illegible]
- COMPLETE ABOVE WATER REHABILITATION OF AREA 2 USING STOCKPILED TOPSOIL AND OVERBURDEN.
- REHABILITATE NORTHERN EDGE OF AREA 3 USING REMAINING STOCKPILED TOPSOIL AND OVERBURDEN.
- BEGIN UNDERWATER EXTRACTION OF AREA 3 IN DIRECTION INDICATED.
- COMPLETE UNDERWATER REHABILITATION OF AREA 2.
- COMPLETE UNDERWATER EXTRACTION IN AREA 3.

PHASE E (not illustrated)

- COMPLETE UNDERWATER REHABILITATION OF AREA 3.
- REMOVE ALL STOCKPILES FROM PLANT SITE.
- REHABILITATE SILTATION PONDS AND WASH POND.
- DISMANTLE PROCESSING PLANT AND REMOVE ALL SCRAP AND MACHINERY.
- EXCAVATE PLANT SITE TO ELEVATION INDICATED ON FINAL REHABILITATION PLAN.
- REHABILITATE PLANT SITE USING OVERBURDEN STOCKPILED IN NORTHWEST CORNER OF PLANT SITE.

Harrington and Hoyle Ltd.

MHBC

PROJECT NAME LICENCE NO.

STOUFFVILLE PIT

Part of Lots 13, 14 & 15, Concession 8, Township of Whitchurch-Stouffville, Regional Municipality of York.

LAFARGE

Lafarge Canada Inc.

SCALE

(METRIC)

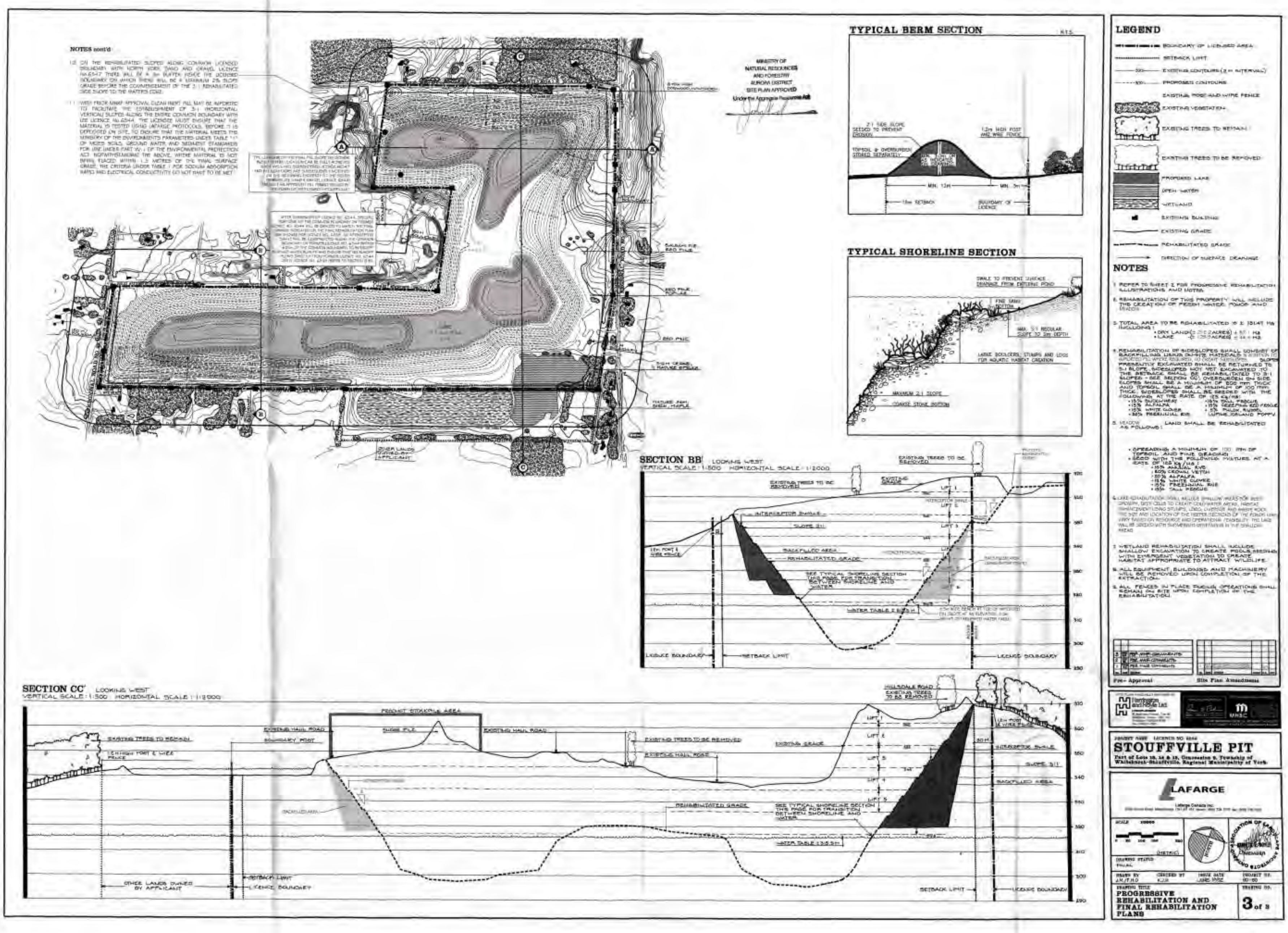
DRAWING STATUS FINAL

DRAWN BY	CHECKED BY	ISSUE DATE	PROJECT NO.
J.H./F.H.D.	[illegible]	JUNE 1992	90-[illegible]

DRAWING TITLE

OPERATIONAL PLAN

DRAWING NO. 2 of [illegible]


NOTES cont'd
MINISTRY OF NATURAL RESOURCES AND FORESTRY AURORA DISTRICT SITE PLAN APPROVED
TYPICAL BERM SECTION
2:1 SIDE SLOPE SEEDED TO PREVENT EROSION
TOPSOIL & OVERBURDEN STORED SEPARATELY
1.2m HIGH POST AND WIRE FENCE
MIN. 12m
MIN. 3m
15m SETBACK
BOUNDARY OF LICENCE
TYPICAL SHORELINE SECTION
SWALE TO PREVENT SURFACE DRAINAGE FROM ENTERING POND
FINE SAND BOTTOM
MAX. 5:1 REGULAR SLOPE TO 2m DEPTH
LARGE BOULDERS, STUMPS AND LOGS FOR AQUATIC HABITAT CREATION
MAXIMUM 2:1 SLOPE
COARSE STONE BOTTOM
SECTION BB' LOOKING WEST
VERTICAL SCALE 1:500 HORIZONTAL SCALE 1:2000
EXISTING TREES TO BE REMOVED
EXISTING GRADE
INTERCEPTOR SWALE
SLOPE 3:1
BACKFILLED AREA
REHABILITATED GRADE
SEE TYPICAL SHORELINE SECTION THIS PAGE FOR TRANSITION BETWEEN SHORELINE AND WATER
WATER TABLE
LICENCE BOUNDARY
SETBACK LIMIT
LICENCE BOUNDARY
SECTION CC' LOOKING WEST
VERTICAL SCALE 1:500 HORIZONTAL SCALE 1:2000
PRODUCT STOCKPILE AREA
EXISTING HAUL ROAD
BOUNDARY POST
EXISTING TREES TO REMAIN
1.2m HIGH POST & WIRE FENCE
EXISTING TREES TO BE REMOVED
EXISTING HAUL ROAD
EXISTING GRADE
HILLSDALE ROAD
EXISTING TREES TO BE REMOVED
INTERCEPTOR SWALE
SLOPE 3:1
BACKFILLED AREA
REHABILITATED GRADE
SEE TYPICAL SHORELINE SECTION THIS PAGE FOR TRANSITION BETWEEN SHORELINE AND WATER
OTHER LANDS OWNED BY APPLICANT
SETBACK LIMIT
LICENCE BOUNDARY
SETBACK LIMIT
LICENCE BOUNDARY
LEGEND
BOUNDARY OF LICENSED AREA
SETBACK LIMIT
EXISTING CONTOURS (2 m INTERVAL)
PROPOSED CONTOURS
EXISTING POST AND WIRE FENCE
EXISTING VEGETATION
EXISTING TREES TO REMAIN
EXISTING TREES TO BE REMOVED
PROPOSED LAKE
OPEN WATER
WETLAND
EXISTING BUILDING
EXISTING GRADE
REHABILITATED GRADE
DIRECTION OF SURFACE DRAINAGE
NOTES
1. REFER TO SHEET 2 FOR PROGRESSIVE REHABILITATION ILLUSTRATIONS AND NOTES.
2. REHABILITATION OF THIS PROPERTY WILL INCLUDE THE CREATION OF FRESH WATER PONDS AND MEADOW
7. WETLAND REHABILITATION SHALL INCLUDE SHALLOW EXCAVATION TO CREATE POOLS, SEEDING WITH EMERGENT VEGETATION TO CREATE HABITAT APPROPRIATE TO ATTRACT WILDLIFE.
8. ALL EQUIPMENT, BUILDINGS AND MACHINERY WILL BE REMOVED UPON COMPLETION OF THE EXTRACTION.
9. ALL FENCES IN PLACE DURING OPERATIONS SHALL REMAIN ON SITE UPON COMPLETION OF THE REHABILITATION.
Pre- Approval
Site Plan Amendments
MNRC
STOUFFVILLE PIT
LAFARGE
Lafarge Canada Inc.
SCALE
(METRIC)
DRAWING STATUS
FINAL
DRAWN BY
J.M./T.H.D
CHECKED BY
DRAWING TITLE
PROGRESSIVE REHABILITATION AND FINAL REHABILITATION PLANS
DRAWING NO.
3 of 3

APPENDIX C

Traffic Data and Signal Timing Plans

Turning Movement Count (3 . YORK-DURHAM LINE & AURORA ROAD)

Start Time	N Approach YORK DURHAM LINE						E Approach AURORA RD						S Approach YORK DURHAM LINE						W Approach AURORA RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	19	26	0	0	0	45	0	0	0	0	0	0	0	6	11	0	0	17	16	0	1	0	0	17	79	
06:15:00	18	45	0	0	0	63	0	0	0	0	0	0	0	18	17	0	0	35	20	2	1	0	0	23	121	
06:30:00	24	39	0	0	0	63	0	0	0	0	0	0	0	17	19	0	0	36	18	0	5	0	0	23	122	
06:45:00	22	48	0	0	0	70	0	0	0	0	0	0	0	20	31	0	0	51	26	0	6	0	0	32	153	475
07:00:00	13	40	1	0	0	54	0	0	0	0	0	0	1	23	14	0	0	38	21	0	8	0	0	29	121	517
07:15:00	21	45	0	0	0	66	0	0	0	0	0	0	0	30	25	0	0	55	32	0	8	0	0	40	161	557
07:30:00	23	45	0	0	0	68	0	0	0	0	0	0	0	19	25	0	0	44	29	0	9	0	0	38	150	585
07:45:00	22	51	0	0	0	73	0	0	0	0	0	0	0	27	39	0	0	66	39	0	6	0	0	45	184	616
08:00:00	16	37	0	0	0	53	0	0	0	0	0	0	0	25	25	0	0	50	27	1	11	0	0	39	142	637
08:15:00	19	37	1	0	0	57	0	0	0	0	0	0	0	21	29	0	0	50	18	2	13	0	0	33	140	616
08:30:00	23	37	0	0	0	60	0	0	0	0	0	0	0	40	19	0	0	59	33	1	9	0	0	43	162	628
08:45:00	11	36	0	0	0	47	0	0	0	0	0	0	0	31	29	0	0	60	27	0	15	0	0	42	149	593
09:00:00	9	26	0	0	0	35	0	0	0	0	0	0	0	34	15	0	0	49	34	1	7	0	0	42	126	577
09:15:00	8	22	0	0	0	30	0	0	0	0	0	0	1	31	14	0	0	46	24	1	11	0	0	36	112	549
09:30:00	14	29	0	0	0	43	0	0	0	0	0	0	0	28	20	0	0	48	27	0	16	0	0	43	134	521
09:45:00	17	37	1	0	0	55	0	0	0	0	0	0	1	32	18	0	0	51	26	0	9	0	0	35	141	513
10:00:00	11	31	1	0	0	43	0	0	1	0	0	1	0	15	15	0	0	30	29	1	12	0	0	42	116	503
10:15:00	9	35	0	0	0	44	0	0	0	0	0	0	1	34	19	0	0	54	28	0	25	0	0	53	151	542
10:30:00	11	35	0	0	0	46	1	0	0	0	0	1	0	36	23	1	0	60	28	1	7	0	0	36	143	551
10:45:00	13	27	0	0	0	40	0	0	0	0	0	0	1	27	21	0	0	49	21	0	8	0	0	29	118	528
11:00:00	7	22	0	0	0	29	0	0	0	0	0	0	0	31	14	0	0	45	17	0	14	0	0	31	105	517
11:15:00	7	23	0	0	0	30	2	0	0	0	0	2	0	38	12	0	0	50	21	1	9	0	0	31	113	479
11:30:00	16	33	0	0	0	49	0	0	1	0	0	1	1	21	21	0	0	43	28	4	11	0	0	43	136	472
11:45:00	12	36	0	0	0	48	1	2	0	0	0	3	2	29	17	0	0	48	22	1	11	0	0	34	133	487
12:00:00	16	21	1	0	0	38	0	0	1	0	0	1	0	27	21	0	0	48	26	4	17	1	0	48	135	517
12:15:00	14	20	0	0	0	34	0	0	0	0	0	0	1	33	19	1	0	54	21	2	9	0	0	32	120	524
12:30:00	9	30	0	0	0	39	0	0	0	0	0	0	0	41	21	0	0	62	30	0	13	0	0	43	144	532
12:45:00	5	27	0	0	0	32	0	0	0	0	0	0	0	32	34	0	0	66	26	1	10	0	0	37	135	534
13:00:00	15	22	0	0	0	37	0	1	0	0	0	1	0	25	18	0	0	43	17	1	15	0	0	33	114	513
13:15:00	9	37	0	0	0	46	0	0	0	0	0	0	1	38	28	0	0	67	23	0	15	0	0	38	151	544
13:30:00	13	33	0	0	0	46	0	1	0	0	0	1	1	25	14	0	0	40	22	0	12	0	0	34	121	521
13:45:00	20	28	0	0	0	48	0	0	0	0	0	0	0	43	39	0	0	82	29	1	19	0	0	49	179	565
14:00:00	14	24	0	0	0	38	0	0	0	0	0	0	0	31	20	0	0	51	35	1	11	0	0	47	136	587
14:15:00	9	31	0	0	0	40	0	1	0	0	0	1	0	27	22	0	0	49	32	1	19	0	0	52	142	578
14:30:00	7	26	0	0	0	33	0	2	0	0	0	2	0	45	26	0	0	71	27	0	17	0	0	44	150	607
14:45:00	9	28	0	0	0	37	0	0	0	0	0	0	0	47	30	0	0	77	27	0	17	0	0	44	158	586
15:00:00	13	32	0	0	0	45	0	2	1	0	0	3	1	57	19	0	0	77	27	0	17	0	0	44	169	619
15:15:00	13	32	0	0	0	45	1	1	0	0	0	2	0	43	25	0	0	68	39	0	17	0	0	56	171	648
15:30:00	5	25	0	0	0	30	0	0	1	0	0	1	0	53	30	0	0	83	30	0	21	0	0	51	165	663
15:45:00	14	29	0	0	0	43	0	2	0	0	0	2	0	57	31	0	0	88	28	0	24	0	0	52	185	690
16:00:00	18	40	0	0	0	58	0	0	0	0	0	0	0	57	28	0	0	85	32	0	24	0	0	56	199	720
16:15:00	13	38	0	0	0	51	0	0	0	0	0	0	0	66	33	0	0	99	46	0	21	0	0	67	217	766
16:30:00	16	43	1	0	0	60	0	0	0	0	0	0	1	93	48	0	0	142	44	0	25	0	0	69	271	872
16:45:00	7	45	0	0	0	52	0	0	0	0	0	0	0	70	26	0	0	96	33	0	30	0	0	63	211	898
17:00:00	17	46	0	0	0	63	1	3	0	0	0	4	0	67	27	0	0	94	30	1	19	0	0	50	211	910

The Municipal Infrastructure Group
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17:15:00	15	37	0	0	0	52	1	2	2	0	0	5	1	52	34	0	0	87	40	0	27	0	0	67	211	904
17:30:00	9	37	0	0	0	46	0	3	0	0	0	3	0	63	30	0	0	93	25	0	23	0	0	48	190	823
17:45:00	7	39	0	0	0	46	1	2	0	0	0	3	0	55	27	0	0	82	24	0	19	0	0	43	174	786
Grand Total	652	1612	6	0	0	2270	8	22	7	0	0	37	14	1780	1142	2	0	2938	1324	28	673	1	0	2026	**7271**	-
Approach%	28.7%	71%	0.3%	0%		-	21.6%	59.5%	18.9%	0%		-	0.5%	60.6%	38.9%	0.1%		-	65.4%	1.4%	33.2%	0%		-	-	-
Totals %	9%	22.2%	0.1%	0%		31.2%	0.1%	0.3%	0.1%	0%		0.5%	0.2%	24.5%	15.7%	0%		40.4%	18.2%	0.4%	9.3%	0%		27.9%	-	-
Heavy	23	152	0	0		-	0	0	0	0		-	0	179	111	1		-	154	0	30	0		-	-	-
Heavy %	3.5%	9.4%	0%	0%		-	0%	0%	0%	0%		-	0%	10.1%	9.7%	50%		-	11.6%	0%	4.5%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:15 PM - 05:15 PM Weather: Broken Clouds (20.75 °C)

Start Time	N Approach YORK DURHAM LINE						E Approach AURORA RD						S Approach YORK DURHAM LINE						W Approach AURORA RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:15:00	13	38	0	0	0	51	0	0	0	0	0	0	0	66	33	0	0	99	46	0	21	0	0	67	217
16:30:00	16	43	1	0	0	60	0	0	0	0	0	0	1	93	48	0	0	142	44	0	25	0	0	69	271
16:45:00	7	45	0	0	0	52	0	0	0	0	0	0	0	70	26	0	0	96	33	0	30	0	0	63	211
17:00:00	17	46	0	0	0	63	1	3	0	0	0	4	0	67	27	0	0	94	30	1	19	0	0	50	211
Grand Total	53	172	1	0	0	226	1	3	0	0	0	4	1	296	134	0	0	431	153	1	95	0	0	249	**910**
Approach%	23.5%	76.1%	0.4%	0%		-	25%	75%	0%	0%		-	0.2%	68.7%	31.1%	0%		-	61.4%	0.4%	38.2%	0%		-	-
Totals %	5.8%	18.9%	0.1%	0%		24.8%	0.1%	0.3%	0%	0%		0.4%	0.1%	32.5%	14.7%	0%		47.4%	16.8%	0.1%	10.4%	0%		27.4%	-
PHF	0.78	0.93	0.25	0		0.9	0.25	0.25	0	0		0.25	0.25	0.8	0.7	0		0.76	0.83	0.25	0.79	0		0.9	-
Heavy	1	7	0	0		8	0	0	0	0		0	0	8	4	0		12	8	0	4	0		12	-
Heavy %	1.9%	4.1%	0%	0%		3.5%	0%	0%	0%	0%		0%	0%	2.7%	3%	0%		2.8%	5.2%	0%	4.2%	0%		4.8%	-
Lights	52	165	1	0		218	1	3	0	0		4	1	288	130	0		419	145	1	91	0		237	-
Lights %	98.1%	95.9%	100%	0%		96.5%	100%	100%	0%	0%		100%	100%	97.3%	97%	0%		97.2%	94.8%	100%	95.8%	0%		95.2%	-
Single-Unit Trucks	1	5	0	0		6	0	0	0	0		0	0	3	2	0		5	3	0	0	0		3	-
Single-Unit Trucks %	1.9%	2.9%	0%	0%		2.7%	0%	0%	0%	0%		0%	0%	1%	1.5%	0%		1.2%	2%	0%	0%	0%		1.2%	-
Buses	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Buses %	0%	0.6%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	3	0	1	0		4	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.2%	2%	0%	1.1%	0%		1.6%	-
Aggregate Trucks	0	1	0	0		1	0	0	0	0		0	0	4	2	0		6	2	0	3	0		5	-
Aggregate Trucks %	0%	0.6%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	1.4%	1.5%	0%		1.4%	1.3%	0%	3.2%	0%		2%	-
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:15 PM - 05:15 PM Weather: Broken Clouds (20.75 °C)

York-Durham Line & Aurora Road - AM Peak Hour Summary (2021-08-26)

		N Approach YORK DURHAM LINE						E Approach AURORA RD						S Approach YORK DURHAM LINE						W Approach AURORA RD						
	START TIME	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	
	07:15:00	0	45	21	0	0	66	0	0	0	0	0	0	25	30	0	0	0	55	8	0	32	0	0	40	161
	07:30:00	0	45	23	0	0	68	0	0	0	0	0	0	25	19	0	0	0	44	9	0	29	0	0	38	150
	07:45:00	0	51	22	0	0	73	0	0	0	0	0	0	39	27	0	0	0	66	6	0	39	0	0	45	184
	08:00:00	0	37	16	0	0	53	0	0	0	0	0	0	25	25	0	0	0	50	11	1	27	0	0	39	142
	Grand Total	0	178	82	0	0	260	0	0	0	0	0	0	114	101	0	0	0	215	34	1	127	0	0	162	637
Lights	07:15:00	0	43	21	0	0	64	0	0	0	0	0	0	23	16	0	0	0	39	8	0	24	0	0	32	135
	07:30:00	0	40	23	0	0	63	0	0	0	0	0	0	24	16	0	0	0	40	9	0	24	0	0	33	136
	07:45:00	0	41	22	0	0	63	0	0	0	0	0	0	37	23	0	0	0	60	5	0	35	0	0	40	163
	08:00:00	0	36	16	0	0	52	0	0	0	0	0	0	21	21	0	0	0	42	8	1	25	0	0	34	128
	Light Total	0	160	82	0	0	242	0	0	0	0	0	0	105	76	0	0	0	181	30	1	108	0	0	139	562
Single Trucks	07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3	0	0	2	0	0	2	5
	07:30:00	0	2	0	0	0	2	0	0	0	0	0	0	1	1	0	0	0	2	0	0	2	0	0	2	6
	07:45:00	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	1	3
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
	Single Truck Total	0	3	0	0	0	3	0	0	0	0	0	0	3	3	0	0	0	6	1	0	5	0	0	6	15
Buses	07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Buses Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Articulated Trucks	07:15:00	0	2	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	3
	07:30:00	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	3
	07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	2
	08:00:00	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Articulated Truck Total	0	4	0	0	0	4	0	0	0	0	0	0	1	3	0	0	0	4	0	0	1	0	0	1	9
Aggregate Trucks	07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	12	0	0	5	0	0	5	17
	07:30:00	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	5
	07:45:00	0	9	0	0	0	9	0	0	0	0	0	0	1	3	0	0	0	4	0	0	2	0	0	2	15
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	8	3	0	1	0	0	4	12
	Aggregate Truck Total	0	11	0	0	0	11	0	0	0	0	0	0	5	19	0	0	0	24	3	0	11	0	0	14	49
Heavies	07:15:00	0	2	0	0	0	2	0	0	0	0	0	0	2	14	0	0	0	16	0	0	7	0	0	7	25
	07:30:00	0	5	0	0	0	5	0	0	0	0	0	0	1	3	0	0	0	4	0	0	5	0	0	5	14
	07:45:00	0	10	0	0	0	10	0	0	0	0	0	0	2	4	0	0	0	6	1	0	4	0	0	5	21
	08:00:00	0	1	0	0	0	1	0	0	0	0	0	0	4	4	0	0	0	8	3	0	2	0	0	5	14
	Heavies Total	0	18	0	0	0	18	0	0	0	0	0	0	9	25	0	0	0	34	4	0	18	0	0	22	74
Bicycles on Road	07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bicycles Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1

Turning Movement Count
Location Name: YORK-DURHAM LINE & WAGG ROAD / YAKES CRESCENT
Date: Tue, Aug 24, 2021 Deployment Lead: David Chu

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Turning Movement Count (4 . YORK-DURHAM LINE & WAGG ROAD / YAKES CRESCENT)

Start Time	N Approach YORK DURHAM LINE						E Approach WAGG RD						S Approach YORK DURHAM LINE						W Approach YAKES CRES						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	0	42	6	0	0	48	4	0	0	0	0	4	1	17	0	0	0	18	0	0	0	0	0	0	70	
06:15:00	0	45	8	0	0	53	15	0	0	0	0	15	3	23	0	0	0	26	0	0	0	0	0	0	94	
06:30:00	0	67	6	0	0	73	12	0	1	0	0	13	1	34	0	0	0	35	0	0	0	0	0	0	121	
06:45:00	0	70	4	0	0	74	9	0	0	0	0	9	1	40	0	0	0	41	1	0	0	0	0	1	125	410
07:00:00	0	45	6	0	0	51	7	0	0	0	0	7	0	31	0	0	0	31	1	0	0	0	0	1	90	430
07:15:00	0	62	9	0	0	71	18	0	1	0	0	19	4	28	0	0	0	32	0	0	0	0	0	0	122	458
07:30:00	0	68	14	0	0	82	9	0	0	0	0	9	0	36	0	0	0	36	0	0	0	0	0	0	127	464
07:45:00	0	79	8	0	0	87	14	0	0	0	0	14	0	31	0	0	0	31	0	0	0	0	0	0	132	471
08:00:00	0	64	7	0	0	71	9	0	0	0	0	9	0	61	0	0	0	61	0	0	0	0	0	0	141	522
08:15:00	0	48	10	0	0	58	15	0	1	0	0	16	1	43	0	0	0	44	0	1	0	0	0	1	119	519
08:30:00	0	66	8	0	0	74	8	0	4	0	0	12	3	39	0	0	0	42	0	0	0	0	0	0	128	520
08:45:00	0	56	7	0	0	63	7	0	1	0	0	8	2	48	0	0	0	50	0	0	0	0	0	0	121	509
09:00:00	0	33	8	0	0	41	10	0	3	0	0	13	2	48	0	0	0	50	0	0	0	0	0	0	104	472
09:15:00	0	43	10	0	0	53	4	0	2	0	0	6	2	43	0	0	0	45	0	0	0	0	0	0	104	457
09:30:00	0	44	9	0	0	53	9	0	1	0	0	10	4	51	0	0	0	55	0	0	0	0	0	0	118	447
09:45:00	0	42	2	0	0	44	7	0	0	0	0	7	2	32	1	0	0	35	0	0	0	0	0	0	86	412
10:00:00	0	46	9	0	0	55	7	0	0	0	0	7	0	50	0	1	0	51	0	0	0	0	0	0	113	421
10:15:00	0	32	6	0	0	38	7	0	1	0	0	8	3	37	1	0	0	41	0	0	0	0	0	0	87	404
10:30:00	0	49	9	0	0	58	8	0	1	0	0	9	2	39	0	0	0	41	0	0	0	0	0	0	108	394
10:45:00	0	58	5	0	0	63	10	0	1	0	0	11	2	38	0	0	0	40	0	0	0	0	0	0	114	422
11:00:00	0	47	8	0	0	55	5	0	4	0	0	9	3	43	0	0	0	46	0	0	0	0	0	0	110	419
11:15:00	0	41	10	0	0	51	11	0	0	0	0	11	1	55	0	0	0	56	0	1	0	0	0	1	119	451
11:30:00	0	46	11	0	0	57	5	0	2	0	0	7	4	35	0	0	0	39	0	0	0	0	0	0	103	446
11:45:00	0	41	9	0	0	50	9	0	2	0	0	11	2	39	0	0	0	41	0	0	0	0	0	0	102	434
12:00:00	0	36	11	0	0	47	6	0	2	0	0	8	2	48	0	0	0	50	1	0	0	0	0	1	106	430
12:15:00	0	46	10	0	0	56	7	0	0	0	0	7	0	54	0	0	0	54	0	0	0	0	0	0	117	428
12:30:00	0	47	15	0	0	62	7	1	2	0	0	10	2	34	0	0	0	36	0	0	0	0	0	0	108	433
12:45:00	0	60	16	0	0	76	12	0	1	0	0	13	0	74	0	0	0	74	0	1	0	0	0	1	164	495
13:00:00	0	48	16	0	0	64	11	0	1	0	0	12	2	47	0	0	0	49	0	0	0	0	0	0	125	514
13:15:00	0	55	7	0	0	62	3	0	2	0	0	5	1	50	0	0	0	51	0	0	0	0	0	0	118	515
13:30:00	0	46	9	0	0	55	7	1	0	0	0	8	4	45	0	0	0	49	0	0	0	0	0	0	112	519
13:45:00	0	47	6	0	0	53	8	0	1	0	0	9	2	42	0	0	0	44	0	0	0	0	0	0	106	461
14:00:00	0	35	11	0	0	46	6	1	1	0	0	8	0	45	0	0	0	45	0	0	0	0	0	0	99	435
14:15:00	1	31	3	0	0	35	12	0	1	0	0	13	3	39	1	0	0	43	1	0	0	0	0	1	92	409
14:30:00	0	56	9	0	0	65	4	0	1	0	0	5	5	57	0	0	0	62	0	0	0	0	0	0	132	429
14:45:00	0	48	12	0	0	60	13	0	2	0	0	15	2	57	0	0	0	59	0	0	0	0	0	0	134	457
15:00:00	0	47	9	0	0	56	6	0	3	0	0	9	3	60	0	0	0	63	0	0	0	0	0	0	128	486
15:15:00	0	64	12	0	0	76	4	0	2	0	0	6	2	54	0	0	0	56	0	0	0	0	0	0	138	532
15:30:00	0	75	12	0	0	87	9	0	3	0	0	12	2	73	0	0	0	75	0	0	0	0	0	0	174	574
15:45:00	0	49	11	0	0	60	11	0	2	0	0	13	3	78	0	0	0	81	0	0	0	0	0	0	154	594
16:00:00	0	50	13	0	0	63	16	0	0	0	0	16	5	90	0	0	0	95	0	0	0	0	0	0	174	640
16:15:00	0	59	18	0	0	77	21	0	2	0	0	23	4	66	0	0	0	70	0	0	0	0	0	0	170	672
16:30:00	0	56	19	0	0	75	16	0	1	0	0	17	4	100	0	0	0	104	0	0	1	0	0	1	197	695
16:45:00	0	42	19	0	0	61	9	0	0	0	0	9	0	73	2	0	0	75	0	0	1	0	0	1	146	687
17:00:00	0	70	21	0	0	91	8	0	0	0	0	8	1	83	0	0	0	84	0	0	0	0	0	0	183	696

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
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17:15:00	0	64	13	0	0	77	14	0	1	0	0	15	2	84	0	0	0	86	0	0	0	0	0	0	178	704
17:30:00	0	60	9	0	0	69	11	0	2	0	0	13	2	83	1	0	0	86	0	0	0	0	0	0	168	675
17:45:00	0	52	12	0	0	64	4	0	2	0	0	6	1	59	0	0	0	60	0	0	0	0	0	0	130	659
Grand Total	1	2477	482	0	0	2960	444	3	57	0	0	504	95	2436	6	1	0	2538	4	3	2	0	0	9	**6011**	-
Approach%	0%	83.7%	16.3%	0%		-	88.1%	0.6%	11.3%	0%		-	3.7%	96%	0.2%	0%		-	44.4%	33.3%	22.2%	0%		-	-	-
Totals %	0%	41.2%	8%	0%		49.2%	7.4%	0%	0.9%	0%		8.4%	1.6%	40.5%	0.1%	0%		42.2%	0.1%	0%	0%	0%		0.1%	-	-
Heavy	0	285	34	0		-	35	0	9	0		-	22	243	0	0		-	0	1	0	0		-	-	-
Heavy %	0%	11.5%	7.1%	0%		-	7.9%	0%	15.8%	0%		-	23.2%	10%	0%	0%		-	0%	33.3%	0%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: YORK-DURHAM LINE & WAGG ROAD / YAKES CRESCENT
Date: Tue, Aug 24, 2021 Deployment Lead: David Chu

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Clear Sky (17.4 °C)

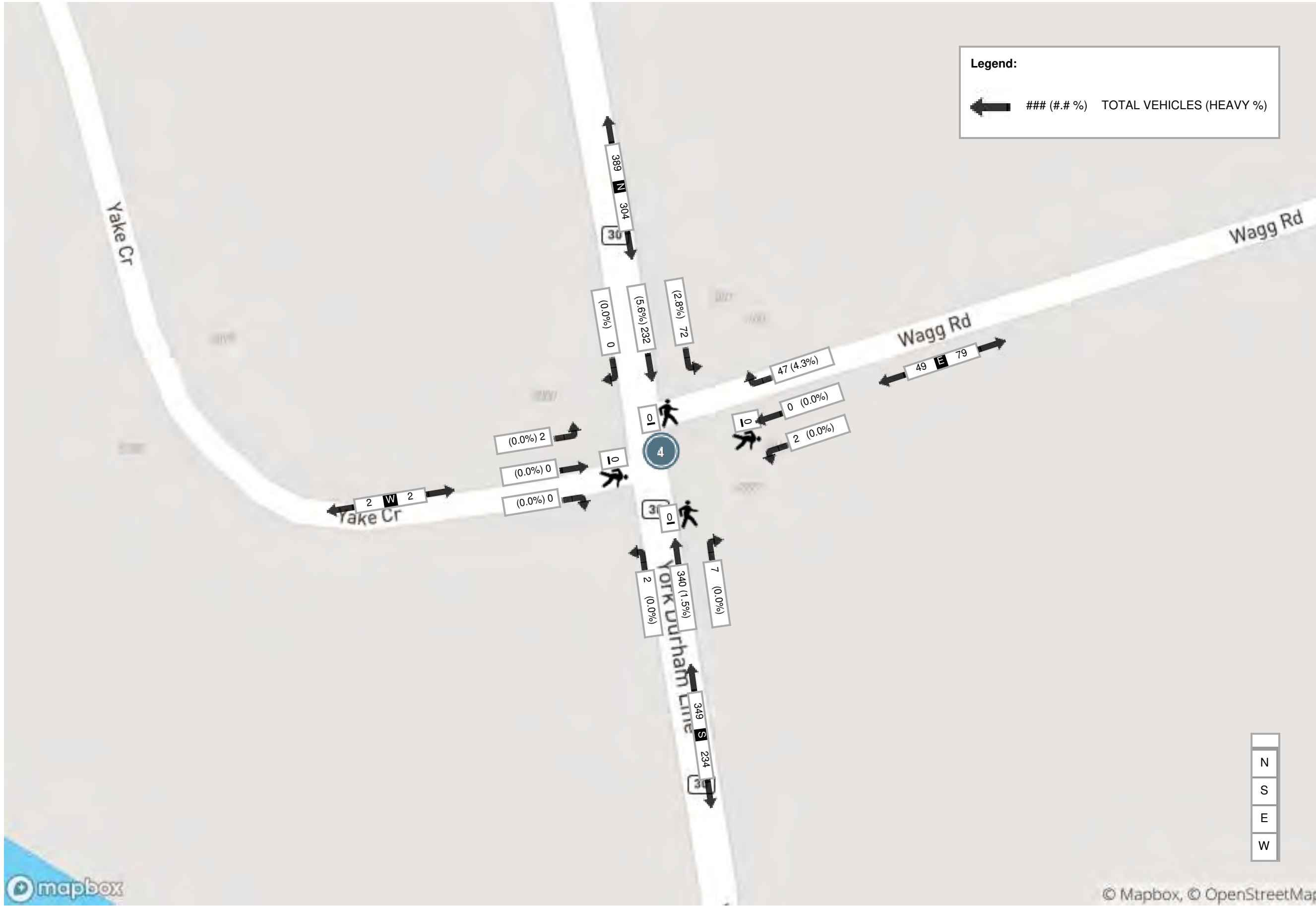
Start Time	N Approach YORK DURHAM LINE						E Approach WAGG RD						S Approach YORK DURHAM LINE						W Approach YAKES CRES						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:30:00	0	56	19	0	0	75	16	0	1	0	0	17	4	100	0	0	0	104	0	0	1	0	0	1	197
16:45:00	0	42	19	0	0	61	9	0	0	0	0	9	0	73	2	0	0	75	0	0	1	0	0	1	146
17:00:00	0	70	21	0	0	91	8	0	0	0	0	8	1	83	0	0	0	84	0	0	0	0	0	0	183
17:15:00	0	64	13	0	0	77	14	0	1	0	0	15	2	84	0	0	0	86	0	0	0	0	0	0	178
Grand Total	0	232	72	0	0	304	47	0	2	0	0	49	7	340	2	0	0	349	0	0	2	0	0	2	**704**
Approach%	0%	76.3%	23.7%	0%		-	95.9%	0%	4.1%	0%		-	2%	97.4%	0.6%	0%		-	0%	0%	100%	0%		-	-
Totals %	0%	33%	10.2%	0%		43.2%	6.7%	0%	0.3%	0%		7%	1%	48.3%	0.3%	0%		49.6%	0%	0%	0.3%	0%		0.3%	-
PHF	0	0.83	0.86	0		0.84	0.73	0	0.5	0		0.72	0.44	0.85	0.25	0		0.84	0	0	0.5	0		0.5	-
Heavy	0	13	2	0		15	2	0	0	0		2	0	5	0	0		5	0	0	0	0		0	-
Heavy %	0%	5.6%	2.8%	0%		4.9%	4.3%	0%	0%	0%		4.1%	0%	1.5%	0%	0%		1.4%	0%	0%	0%	0%		0%	-
Lights	0	219	70	0		289	45	0	2	0		47	7	335	2	0		344	0	0	2	0		2	-
Lights %	0%	94.4%	97.2%	0%		95.1%	95.7%	0%	100%	0%		95.9%	100%	98.5%	100%	0%		98.6%	0%	0%	100%	0%		100%	-
Single-Unit Trucks	0	3	1	0		4	1	0	0	0		1	0	2	0	0		2	0	0	0	0		0	-
Single-Unit Trucks %	0%	1.3%	1.4%	0%		1.3%	2.1%	0%	0%	0%		2%	0%	0.6%	0%	0%		0.6%	0%	0%	0%	0%		0%	-
Buses	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Buses %	0%	0.4%	0%	0%		0.3%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	3	0	0		3	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	1.3%	0%	0%		1%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Aggregate Trucks	0	6	1	0		7	1	0	0	0		1	0	3	0	0		3	0	0	0	0		0	-
Aggregate Trucks %	0%	2.6%	1.4%	0%		2.3%	2.1%	0%	0%	0%		2%	0%	0.9%	0%	0%		0.9%	0%	0%	0%	0%		0%	-
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-

Spectrum

Turning Movement Count
Location Name: YORK-DURHAM LINE & WAGG ROAD / YAKES CRESCENT
Date: Tue, Aug 24, 2021 Deployment Lead: David Chu

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Clear Sky (17.4 °C)



York-Durham Line Wagg Road - Yakes Crescent AM Peak Hour Summary (2021-08-24)

		N Approach YORK DURHAM LINE						E Approach WAGG RD						S Approach YORK DURHAM LINE						W Approach YAKES CRES						
	START TIME	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	
	07:15:00	9	62	0	0	0	71	1	0	18	0	0	19	0	28	4	0	0	32	0	0	0	0	0	0	122
	07:30:00	14	68	0	0	0	82	0	0	9	0	0	9	0	36	0	0	0	36	0	0	0	0	0	0	127
	07:45:00	8	79	0	0	0	87	0	0	14	0	0	14	0	31	0	0	0	31	0	0	0	0	0	0	132
	08:00:00	7	64	0	0	0	71	0	0	9	0	0	9	0	61	0	0	0	61	0	0	0	0	0	0	141
	Grand Total	38	273	0	0	0	311	1	0	50	0	0	51	0	156	4	0	0	160	0	0	0	0	0	0	522
Lights	07:15:00	8	57	0	0	0	65	1	0	16	0	0	17	0	20	3	0	0	23	0	0	0	0	0	0	105
	07:30:00	14	64	0	0	0	78	0	0	9	0	0	9	0	34	0	0	0	34	0	0	0	0	0	0	121
	07:45:00	7	67	0	0	0	74	0	0	14	0	0	14	0	28	0	0	0	28	0	0	0	0	0	0	116
	08:00:00	3	58	0	0	0	61	0	0	9	0	0	9	0	54	0	0	0	54	0	0	0	0	0	0	124
	Light Total	32	246	0	0	0	278	1	0	48	0	0	49	0	136	3	0	0	139	0	0	0	0	0	0	466
Single Trucks	07:15:00	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2
	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	2
	07:45:00	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	4
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
	Single Truck Total	0	3	0	0	0	3	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0	9
Buses	07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:45:00	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Buses Total	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:45:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	08:00:00	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Articulated Truck Total	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Aggregate Trucks	07:15:00	1	4	0	0	0	5	0	0	0	0	0	0	0	7	1	0	0	8	0	0	0	0	0	0	13
	07:30:00	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	07:45:00	0	9	0	0	0	9	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	10
	08:00:00	2	5	0	0	0	7	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0	13
	Aggregate Truck Total	3	22	0	0	0	25	0	0	0	0	0	0	0	14	1	0	0	15	0	0	0	0	0	0	40
Heavies	07:15:00	1	5	0	0	0	6	0	0	0	0	0	0	0	8	1	0	0	9	0	0	0	0	0	0	15
	07:30:00	0	4	0	0	0	4	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	6
	07:45:00	1	12	0	0	0	13	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	16
	08:00:00	2	6	0	0	0	8	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	15
	Heavies Total	4	27	0	0	0	31	0	0	0	0	0	0	0	20	1	0	0	21	0	0	0	0	0	0	52
Bicycles on Road	07:15:00	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:00:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	Bicycles Total	2	0	0	0	0	2	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	4

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Turning Movement Count (1 . YORK-DURHAM LINE & LAFARGE STOUFFVILLE PIT (NORTH))

Start Time	N Approach YORK DURHAM LINE					S Approach YORK DURHAM LINE					W Approach LAFARGE STOUFFVILLE PIT (NORTH)					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	UTurn N:N	Peds N:	Approach Total	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	2	40	0	0	42	21	6	0	0	27	0	0	0	0	0	69	
06:15:00	1	46	0	0	47	29	4	0	0	33	0	0	0	0	0	80	
06:30:00	1	64	0	0	65	39	7	0	0	46	0	0	0	0	0	111	
06:45:00	0	72	0	0	72	37	2	0	0	39	0	0	0	0	0	111	371
07:00:00	1	45	0	0	46	38	5	0	0	43	0	0	0	0	0	89	391
07:15:00	2	64	0	0	66	31	15	0	0	46	0	0	0	0	0	112	423
07:30:00	0	69	0	0	69	41	15	0	0	56	0	0	0	0	0	125	437
07:45:00	3	78	0	0	81	41	15	0	0	56	0	0	0	0	0	137	463
08:00:00	1	59	0	0	60	53	9	0	0	62	0	0	0	0	0	122	496
08:15:00	1	53	0	0	54	47	11	0	0	58	0	0	0	0	0	112	496
08:30:00	2	68	0	0	70	46	19	0	0	65	0	1	0	0	1	136	507
08:45:00	1	59	0	0	60	53	13	0	0	66	0	0	0	0	0	126	496
09:00:00	1	36	0	0	37	52	12	0	0	64	0	0	0	0	0	101	475
09:15:00	2	44	0	0	46	38	5	0	0	43	0	0	0	1	0	89	452
09:30:00	2	42	0	0	44	53	10	0	0	63	0	0	0	0	0	107	423
09:45:00	3	47	0	0	50	37	15	0	0	52	0	0	0	1	0	102	399
10:00:00	3	37	0	0	40	44	16	0	0	60	0	0	0	0	0	100	398
10:15:00	1	38	0	0	39	49	16	0	0	65	0	0	0	0	0	104	413
10:30:00	4	42	0	0	46	41	6	0	0	47	0	0	0	0	0	93	399
10:45:00	4	59	0	0	63	49	8	0	0	57	0	0	0	0	0	120	417
11:00:00	1	55	0	0	56	41	15	0	0	56	0	0	0	0	0	112	429
11:15:00	0	39	0	0	39	60	12	0	0	72	0	0	0	0	0	111	436
11:30:00	1	48	0	0	49	29	13	0	0	42	0	0	0	0	0	91	434
11:45:00	3	40	0	0	43	46	10	0	0	56	0	0	0	0	0	99	413
12:00:00	1	42	0	0	43	53	6	0	0	59	0	0	0	0	0	102	403
12:15:00	1	47	0	0	48	52	7	0	0	59	0	0	0	0	0	107	399
12:30:00	4	43	0	0	47	52	17	0	0	69	0	0	0	0	0	116	424
12:45:00	3	64	0	0	67	60	13	0	0	73	0	0	0	0	0	140	465
13:00:00	2	46	0	0	48	60	10	0	0	70	0	0	0	0	0	118	481
13:15:00	2	58	0	0	60	42	11	0	0	53	0	0	0	0	0	113	487
13:30:00	3	41	0	0	44	41	13	0	0	54	0	0	0	0	0	98	469
13:45:00	2	46	0	0	48	47	17	0	0	64	0	0	0	0	0	112	441
14:00:00	0	38	0	0	38	44	16	0	0	60	0	0	0	0	0	98	421

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14:15:00	0	29	0	0	29	47	11	0	0	58	0	0	0	0	0	87	395
14:30:00	2	55	0	0	57	55	11	0	0	66	0	0	0	0	0	123	420
14:45:00	1	49	0	0	50	50	10	0	0	60	0	0	0	0	0	110	418
15:00:00	0	59	0	0	59	71	16	0	0	87	0	0	0	0	0	146	466
15:15:00	0	70	0	0	70	66	7	0	0	73	0	0	0	0	0	143	522
15:30:00	0	73	0	0	73	77	15	0	0	92	0	0	0	0	0	165	564
15:45:00	2	42	0	0	44	80	6	0	0	86	0	0	0	0	0	130	584
16:00:00	4	51	0	0	55	93	8	0	0	101	0	0	0	0	0	156	594
16:15:00	0	57	0	0	57	79	2	0	0	81	0	0	0	0	0	138	589
16:30:00	0	59	0	0	59	97	0	0	0	97	0	0	0	0	0	156	580
16:45:00	0	42	0	0	42	68	0	0	0	68	1	0	0	0	1	111	561
17:00:00	0	71	0	0	71	95	1	0	0	96	0	0	0	0	0	167	572
17:15:00	0	70	0	0	70	79	0	0	0	79	0	0	0	0	0	149	583
17:30:00	0	65	0	0	65	85	0	0	0	85	0	0	0	0	0	150	577
17:45:00	2	50	0	0	52	60	2	0	0	62	0	0	0	0	0	114	580
Grand Total	69	2511	0	0	2580	2568	458	0	0	3026	1	1	0	2	2	**5608**	-
Approach%	2.7%	97.3%	0%		-	84.9%	15.1%	0%		-	50%	50%	0%		-	-	-
Totals %	1.2%	44.8%	0%		46%	45.8%	8.2%	0%		54%	0%	0%	0%		0%	-	-
Heavy	47	274	0		-	288	441	0		-	0	0	0		-	-	-
Heavy %	68.1%	10.9%	0%		-	11.2%	96.3%	0%		-	0%	0%	0%		-	-	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	-	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	-	-

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Peak Hour: 03:15 PM - 04:15 PM Weather: Clear Sky (17.4 °C)

Start Time	N Approach YORK DURHAM LINE					S Approach YORK DURHAM LINE					W Approach LAFARGE STOUFFVILLE PIT (NORTH)					Int. Total (15 min)
	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	
15:15:00	0	70	0	0	70	66	7	0	0	73	0	0	0	0	0	143
15:30:00	0	73	0	0	73	77	15	0	0	92	0	0	0	0	0	165
15:45:00	2	42	0	0	44	80	6	0	0	86	0	0	0	0	0	130
16:00:00	4	51	0	0	55	93	8	0	0	101	0	0	0	0	0	156
Grand Total	6	236	0	0	242	316	36	0	0	352	0	0	0	0	0	**594**
Approach%	2.5%	97.5%	0%		-	89.8%	10.2%	0%		-	0%	0%	0%		-	-
Totals %	1%	39.7%	0%		40.7%	53.2%	6.1%	0%		59.3%	0%	0%	0%		0%	-
PHF	0.38	0.81	0		0.83	0.85	0.6	0		0.87	0	0	0		0	-
Heavy	5	20	0		25	27	35	0		62	0	0	0		0	-
Heavy %	83.3%	8.5%	0%		10.3%	8.5%	97.2%	0%		17.6%	0%	0%	0%		0%	-
Lights	1	216	0		217	289	1	0		290	0	0	0		0	-
Lights %	16.7%	91.5%	0%		89.7%	91.5%	2.8%	0%		82.4%	0%	0%	0%		0%	-
Single-Unit Trucks	1	9	0		10	13	2	0		15	0	0	0		0	-
Single-Unit Trucks %	16.7%	3.8%	0%		4.1%	4.1%	5.6%	0%		4.3%	0%	0%	0%		0%	-
Buses	0	0	0		0	1	0	0		1	0	0	0		0	-
Buses %	0%	0%	0%		0%	0.3%	0%	0%		0.3%	0%	0%	0%		0%	-
Articulated Trucks	0	2	0		2	2	1	0		3	0	0	0		0	-
Articulated Trucks %	0%	0.8%	0%		0.8%	0.6%	2.8%	0%		0.9%	0%	0%	0%		0%	-
Aggregate Trucks	4	9	0		13	11	32	0		43	0	0	0		0	-
Aggregate Trucks %	66.7%	3.8%	0%		5.4%	3.5%	88.9%	0%		12.2%	0%	0%	0%		0%	-
Bicycles on Road	0	0	0		0	0	0	0		0	0	0	0		0	-
Bicycles on Road %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-

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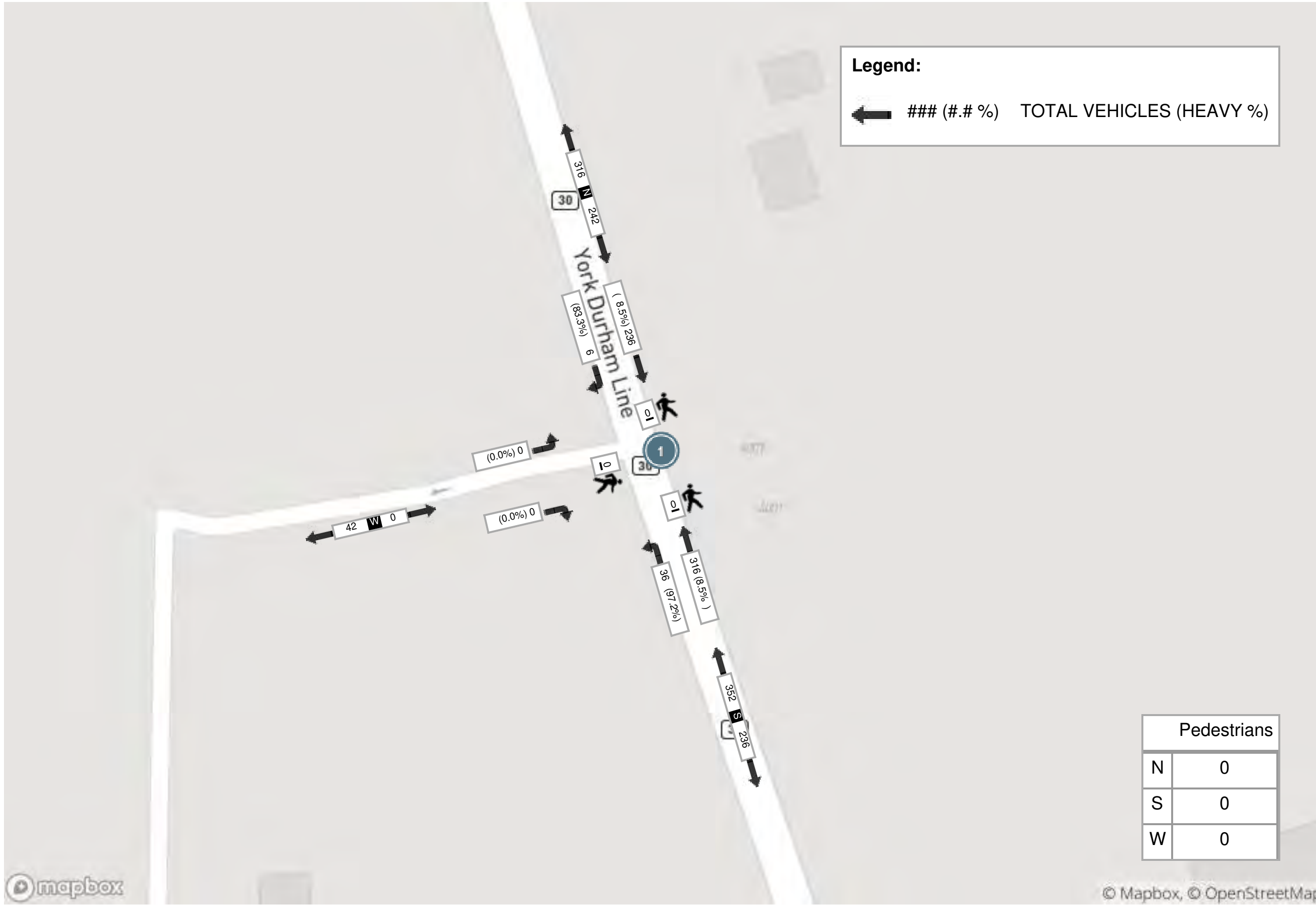
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 03:15 PM - 04:15 PM Weather: Clear Sky (17.4 °C)



	Pedestrians
N	0
S	0
W	0

York-Durham Line at Lafarge Stouffville Pit (North) - AM Peak Hour Summary (2021-08-24)

		N Approach YORK DURHAM LINE					S Approach YORK DURHAM LINE					W Approach LAFARGE STOUFFVILLE PIT (NORTH)					
	START TIME	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	UTurn	Peds	Approach Total	Left	Right	UTurn	Peds	Approach Total	
	07:45:00	78	3	0	0	81	15	41	0	0	56	0	0	0	0	0	137
	08:00:00	59	1	0	0	60	9	53	0	0	62	0	0	0	0	0	122
	08:15:00	53	1	0	0	54	11	47	0	0	58	0	0	0	0	0	112
	08:30:00	68	2	0	0	70	19	46	0	0	65	1	0	0	0	1	136
	Grand Total	258	7	0	0	265	54	187	0	0	241	1	0	0	0	1	507
Lights	07:45:00	66	1	0	0	67	1	40	0	0	41	0	0	0	0	0	108
	08:00:00	53	0	0	0	53	1	45	0	0	46	0	0	0	0	0	99
	08:15:00	49	0	0	0	49	0	43	0	0	43	0	0	0	0	0	92
	08:30:00	62	1	0	0	63	1	37	0	0	38	1	0	0	0	1	102
	Light Total	230	2	0	0	232	3	165	0	0	168	1	0	0	0	1	401
Single Trucks	07:45:00	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:15:00	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
	08:30:00	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	4
	Single Truck Total	6	0	0	0	6	0	3	0	0	3	0	0	0	0	0	9
Buses	07:45:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Buses Total	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Articulated Trucks	07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:00:00	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	3
	08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Articulated Truck Total	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	3
Aggregate Trucks	07:45:00	9	2	0	0	11	14	1	0	0	15	0	0	0	0	0	26
	08:00:00	4	1	0	0	5	8	7	0	0	15	0	0	0	0	0	20
	08:15:00	1	1	0	0	2	11	4	0	0	15	0	0	0	0	0	17
	08:30:00	5	1	0	0	6	18	6	0	0	24	0	0	0	0	0	30
	Aggregate Truck Total	19	5	0	0	24	51	18	0	0	69	0	0	0	0	0	93
Heavies	07:45:00	12	2	0	0	14	14	1	0	0	15	0	0	0	0	0	29
	08:00:00	6	1	0	0	7	8	8	0	0	16	0	0	0	0	0	23
	08:15:00	4	1	0	0	5	11	4	0	0	15	0	0	0	0	0	20
	08:30:00	6	1	0	0	7	18	9	0	0	27	0	0	0	0	0	34
	Heavies Total	28	5	0	0	33	51	22	0	0	73	0	0	0	0	0	106
Bicycles on Road	07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bicycles Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
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Turning Movement Count (2 . YORK-DURHAM LINE & LAFARGE STOUFFVILLE PIT (SOUTH))

Start Time	N Approach YORK DURHAM LINE						E Approach 3759 YORK DURHAM LINE						S Approach YORK DURHAM LINE						W Approach LAFARGE STOUFFVILLE PIT (SOUTH)						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	0	38	1	0	0	39	0	0	0	0	2	0	2	27	0	0	0	29	6	0	0	0	0	6	74	
06:15:00	0	45	0	0	0	45	0	0	0	0	0	0	2	33	0	0	0	35	4	0	0	0	0	4	84	
06:30:00	0	66	0	0	0	66	0	0	0	0	0	0	3	41	0	0	0	44	5	0	2	0	0	7	117	
06:45:00	0	71	0	0	0	71	0	0	0	0	0	0	1	40	0	0	0	41	5	0	1	0	0	6	118	393
07:00:00	0	46	0	0	0	46	0	0	2	0	0	2	0	43	0	0	0	43	4	0	1	0	0	5	96	415
07:15:00	0	63	1	0	0	64	0	0	0	0	0	0	0	45	0	0	0	45	2	0	1	0	0	3	112	443
07:30:00	0	68	0	0	0	68	0	0	0	0	0	0	1	55	0	0	0	56	15	0	0	0	0	15	139	465
07:45:00	0	79	0	0	0	79	0	0	0	0	0	0	1	47	0	0	0	48	14	0	1	0	0	15	142	489
08:00:00	0	60	1	0	0	61	0	0	0	0	0	0	2	69	0	0	0	71	16	0	3	0	0	19	151	544
08:15:00	0	52	0	0	0	52	0	0	0	0	0	0	3	54	0	0	0	57	6	0	1	0	0	7	116	548
08:30:00	0	62	0	0	0	62	0	0	1	0	0	1	2	64	0	0	0	66	9	0	2	0	0	11	140	549
08:45:00	0	65	0	0	0	65	0	0	0	0	0	0	1	66	0	0	0	67	20	0	0	0	0	20	152	559
09:00:00	0	36	0	0	0	36	0	0	0	0	0	0	2	61	0	0	0	63	11	0	2	0	0	13	112	520
09:15:00	0	44	0	0	0	44	0	0	0	0	0	0	0	45	0	0	0	45	8	0	1	0	1	9	98	502
09:30:00	0	42	0	0	0	42	0	0	1	0	2	1	0	58	0	0	0	58	9	0	3	0	0	12	113	475
09:45:00	0	45	0	0	0	45	0	0	1	0	0	1	0	54	0	0	0	54	7	0	0	0	1	7	107	430
10:00:00	0	39	0	0	0	39	0	0	0	0	0	0	0	59	0	0	0	59	15	0	2	0	0	17	115	433
10:15:00	0	38	0	0	0	38	0	0	0	0	0	0	2	64	0	0	0	66	18	0	1	0	0	19	123	458
10:30:00	0	42	0	0	0	42	0	0	1	0	0	1	0	47	0	0	0	47	15	0	2	0	0	17	107	452
10:45:00	0	58	0	0	0	58	0	0	1	0	0	1	1	50	0	0	0	51	9	0	4	0	0	13	123	468
11:00:00	0	55	0	0	0	55	0	0	0	0	0	0	0	57	0	0	0	57	7	0	1	0	0	8	120	473
11:15:00	0	40	0	0	0	40	0	0	0	0	0	0	0	69	0	0	0	69	12	0	3	0	0	15	124	474
11:30:00	0	47	0	0	0	47	0	0	1	0	0	1	1	41	0	0	0	42	15	0	1	0	0	16	106	473
11:45:00	0	41	0	0	0	41	0	0	0	0	0	0	2	53	0	0	0	55	11	0	2	0	0	13	109	459
12:00:00	0	39	0	0	0	39	2	0	0	0	0	2	1	51	0	0	0	52	11	0	2	0	0	13	106	445
12:15:00	0	49	0	0	0	49	0	0	1	0	0	1	0	61	0	0	0	61	8	0	2	0	0	10	121	442
12:30:00	0	44	0	0	0	44	0	0	1	0	0	1	3	66	0	1	0	70	8	0	1	0	0	9	124	460
12:45:00	0	63	0	0	0	63	1	0	1	0	0	2	0	72	0	0	0	72	15	0	2	0	0	17	154	505
13:00:00	0	47	0	0	0	47	0	0	0	0	0	0	2	65	0	0	0	67	11	0	7	0	0	18	132	531
13:15:00	0	56	0	0	0	56	0	0	1	0	0	1	1	46	0	0	0	47	8	0	5	0	0	13	117	527
13:30:00	0	44	0	0	0	44	0	0	2	0	0	2	0	53	0	0	0	53	12	0	1	0	0	13	112	515
13:45:00	0	46	0	0	0	46	0	0	0	0	0	0	0	67	0	0	0	67	12	0	0	0	0	12	125	486
14:00:00	0	36	0	0	0	36	0	0	0	0	0	0	0	57	0	0	0	57	17	0	2	0	0	19	112	466
14:15:00	0	31	0	0	0	31	0	0	0	0	0	0	1	53	0	0	0	54	13	0	5	0	0	18	103	452
14:30:00	0	55	0	0	0	55	0	0	0	0	0	0	1	67	0	0	0	68	12	0	0	0	0	12	135	475
14:45:00	0	48	0	0	0	48	0	0	2	0	0	2	1	60	0	0	0	61	11	0	1	0	0	12	123	473
15:00:00	0	59	0	0	0	59	1	0	0	0	0	1	1	81	0	0	0	82	6	0	5	0	0	11	153	514
15:15:00	0	67	0	0	0	67	0	0	1	0	0	1	1	71	0	0	0	72	18	0	0	0	0	18	158	569
15:30:00	0	73	0	0	0	73	0	0	1	0	0	1	0	93	0	0	0	93	8	0	1	0	0	9	176	610
15:45:00	0	49	0	0	0	49	0	0	1	0	0	1	1	78	0	0	0	79	10	0	2	0	0	12	141	628
16:00:00	0	50	0	0	0	50	2	0	7	0	0	9	0	102	0	0	0	102	9	0	2	0	0	11	172	647
16:15:00	0	58	0	0	0	58	0	0	0	0	0	0	1	77	0	0	0	78	9	0	2	0	0	11	147	636
16:30:00	0	57	0	0	0	57	0	0	1	0	0	1	0	99	0	0	0	99	5	0	4	0	0	9	166	626
16:45:00	0	45	0	0	0	45	0	0	1	0	0	1	1	66	0	0	0	67	2	0	2	0	0	4	117	602
17:00:00	0	72	0	0	0	72	0	0	6	0	0	6	0	95	0	0	0	95	0	0	0	0	0	0	173	603

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17:15:00	0	64	0	0	0	64	0	0	0	0	0	0	0	77	0	0	0	77	0	0	1	0	0	1	142	598
17:30:00	0	66	0	0	0	66	0	0	0	0	0	0	0	87	0	1	0	88	2	0	0	0	0	2	156	588
17:45:00	0	51	0	0	0	51	0	0	0	0	0	0	0	54	0	0	0	54	5	0	1	0	0	6	111	582
Grand Total	0	2511	3	0	0	2514	6	0	34	0	4	40	41	2940	0	2	0	2983	455	0	82	0	2	537	**6074**	-
Approach%	0%	99.9%	0.1%	0%		-	15%	0%	85%	0%		-	1.4%	98.6%	0%	0.1%		-	84.7%	0%	15.3%	0%		-	-	-
Totals %	0%	41.3%	0%	0%		41.4%	0.1%	0%	0.6%	0%		0.7%	0.7%	48.4%	0%	0%		49.1%	7.5%	0%	1.4%	0%		8.8%	-	-
Heavy	0	275	0	0		-	0	0	1	0		-	1	676	0	0		-	435	0	58	0		-	-	-
Heavy %	0%	11%	0%	0%		-	0%	0%	2.9%	0%		-	2.4%	23%	0%	0%		-	95.6%	0%	70.7%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

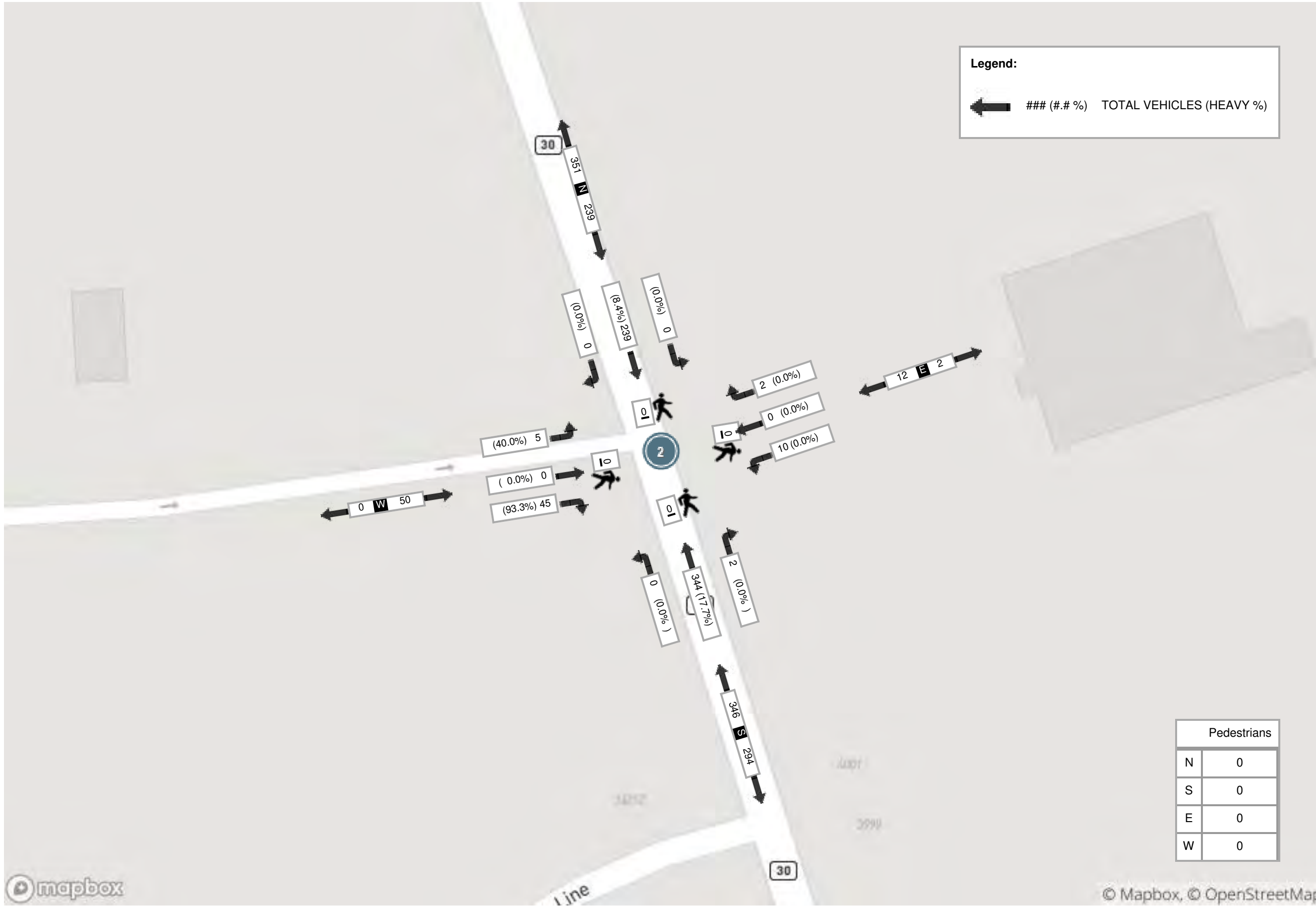
The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 03:15 PM - 04:15 PM Weather: Clear Sky (17.4 °C)

Start Time	N Approach YORK DURHAM LINE						E Approach 3759 YORK DURHAM LINE						S Approach YORK DURHAM LINE						W Approach LAFARGE STOUFFVILLE PIT (SOUTH)						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
15:15:00	0	67	0	0	0	67	0	0	1	0	0	1	1	71	0	0	0	72	18	0	0	0	0	18	158
15:30:00	0	73	0	0	0	73	0	0	1	0	0	1	0	93	0	0	0	93	8	0	1	0	0	9	176
15:45:00	0	49	0	0	0	49	0	0	1	0	0	1	1	78	0	0	0	79	10	0	2	0	0	12	141
16:00:00	0	50	0	0	0	50	2	0	7	0	0	9	0	102	0	0	0	102	9	0	2	0	0	11	172
Grand Total	0	239	0	0	0	239	2	0	10	0	0	12	2	344	0	0	0	346	45	0	5	0	0	50	**647**
Approach%	0%	100%	0%	0%		-	16.7%	0%	83.3%	0%		-	0.6%	99.4%	0%	0%		-	90%	0%	10%	0%		-	-
Totals %	0%	36.9%	0%	0%		36.9%	0.3%	0%	1.5%	0%		1.9%	0.3%	53.2%	0%	0%		53.5%	7%	0%	0.8%	0%		7.7%	-
PHF	0	0.82	0	0		0.82	0.25	0	0.36	0		0.33	0.5	0.84	0	0		0.85	0.63	0	0.63	0		0.69	-
Heavy	0	20	0	0		20	0	0	0	0		0	0	61	0	0		61	42	0	2	0		44	-
Heavy %	0%	8.4%	0%	0%		8.4%	0%	0%	0%	0%		0%	0%	17.7%	0%	0%		17.6%	93.3%	0%	40%	0%		88%	-
Lights	0	218	0	0		218	2	0	10	0		12	2	283	0	0		285	3	0	3	0		6	-
Lights %	0%	91.2%	0%	0%		91.2%	100%	0%	100%	0%		100%	100%	82.3%	0%	0%		82.4%	6.7%	0%	60%	0%		12%	-
Single-Unit Trucks	0	7	0	0		7	0	0	0	0		0	0	13	0	0		13	2	0	0	0		2	-
Single-Unit Trucks %	0%	2.9%	0%	0%		2.9%	0%	0%	0%	0%		0%	0%	3.8%	0%	0%		3.8%	4.4%	0%	0%	0%		4%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.3%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	2	0	0		2	0	0	0	0		0	0	3	0	0		3	1	0	0	0		1	-
Articulated Trucks %	0%	0.8%	0%	0%		0.8%	0%	0%	0%	0%		0%	0%	0.9%	0%	0%		0.9%	2.2%	0%	0%	0%		2%	-
Aggregate Trucks	0	11	0	0		11	0	0	0	0		0	0	44	0	0		44	39	0	2	0		41	-
Aggregate Trucks %	0%	4.6%	0%	0%		4.6%	0%	0%	0%	0%		0%	0%	12.8%	0%	0%		12.7%	86.7%	0%	40%	0%		82%	-
Bicycles on Road	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Bicycles on Road %	0%	0.4%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 03:15 PM - 04:15 PM Weather: Clear Sky (17.4 °C)



York-Durham Line at Lafarge Stouffville Pit (South) - AM Peak Hour Summary (2022-08-24)

		N Approach YORK DURHAM LINE						E Approach 3759 YORK DURHAM LINE						S Approach YORK DURHAM LINE						W Approach LAFARGE STOUFFVILLE PIT (SOUTH)						
	START TIME	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	
	07:30:00	0	68	0	0	0	68	0	0	0	0	0	0	0	55	1	0	0	56	0	0	15	0	0	15	139
	07:45:00	0	79	0	0	0	79	0	0	0	0	0	0	0	47	1	0	0	48	1	0	14	0	0	15	142
	08:00:00	1	60	0	0	0	61	0	0	0	0	0	0	0	69	2	0	0	71	3	0	16	0	0	19	151
	08:15:00	0	52	0	0	0	52	0	0	0	0	0	0	0	54	3	0	0	57	1	0	6	0	0	7	116
	Grand Total	1	259	0	0	0	260	0	0	0	0	0	0	0	225	7	0	0	232	5	0	51	0	0	56	548
Lights	07:30:00	0	64	0	0	0	64	0	0	0	0	0	0	0	33	1	0	0	34	0	0	0	0	0	0	98
	07:45:00	0	67	0	0	0	67	0	0	0	0	0	0	0	31	1	0	0	32	0	0	0	0	0	0	99
	08:00:00	1	54	0	0	0	55	0	0	0	0	0	0	0	56	2	0	0	58	0	0	0	0	0	0	113
	08:15:00	0	49	0	0	0	49	0	0	0	0	0	0	0	42	3	0	0	45	0	0	0	0	0	0	94
	Light Total	1	234	0	0	0	235	0	0	0	0	0	0	0	162	7	0	0	169	0	0	0	0	0	0	404
Single Truc	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	2
	07:45:00	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	3
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
	08:15:00	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	Single Truck Total	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	8
Buses	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:45:00	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Buses Total	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Articulated	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:00:00	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	3
	08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Articulated Truck Total	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	3
Aggregate	07:30:00	0	4	0	0	0	4	0	0	0	0	0	0	0	20	0	0	0	20	0	0	15	0	0	15	39
	07:45:00	0	9	0	0	0	9	0	0	0	0	0	0	0	15	0	0	0	15	1	0	14	0	0	15	39
	08:00:00	0	4	0	0	0	4	0	0	0	0	0	0	0	11	0	0	0	11	3	0	16	0	0	19	34
	08:15:00	0	1	0	0	0	1	0	0	0	0	0	0	0	12	0	0	0	12	1	0	6	0	0	7	20
	Aggregate Truck Total	0	18	0	0	0	18	0	0	0	0	0	0	0	58	0	0	0	58	5	0	51	0	0	56	132
Heavies	07:30:00	0	4	0	0	0	4	0	0	0	0	0	0	0	22	0	0	0	22	0	0	15	0	0	15	41
	07:45:00	0	12	0	0	0	12	0	0	0	0	0	0	0	16	0	0	0	16	1	0	14	0	0	15	43
	08:00:00	0	6	0	0	0	6	0	0	0	0	0	0	0	13	0	0	0	13	3	0	16	0	0	19	38
	08:15:00	0	3	0	0	0	3	0	0	0	0	0	0	0	12	0	0	0	12	1	0	6	0	0	7	22
	Heavies Total	0	25	0	0	0	25	0	0	0	0	0	0	0	63	0	0	0	63	5	0	51	0	0	56	144
Bicycles on	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bicycles Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The Municipal Infrastructure Group
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VAUGHAN ONTARIO, L4K 0C5
CANADA

Turning Movement Count (5 . YORK-DURHAM LINE & BLOOMINGTON ROAD)

Start Time	N Approach YORK DURHAM LINE						E Approach BLOOMINGTON RD						S Approach YORK DURHAM LINE						W Approach BLOOMINGTON RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	8	23	5	0	0	36	3	92	14	0	0	109	9	17	11	0	0	37	10	37	9	0	0	56	238	
06:15:00	11	27	6	0	0	44	11	120	16	0	0	147	11	22	13	0	0	46	10	40	4	0	0	54	291	
06:30:00	11	36	16	0	0	63	16	147	10	0	0	173	11	33	9	0	0	53	7	46	7	0	0	60	349	
06:45:00	10	36	9	0	0	55	9	118	25	0	0	152	22	31	11	0	0	64	14	51	25	0	0	90	361	1239
07:00:00	8	32	5	0	0	45	10	135	23	0	0	168	20	31	14	0	0	65	8	47	8	0	0	63	341	1342
07:15:00	11	42	6	0	0	59	12	97	17	0	0	126	19	29	10	0	0	58	8	86	14	0	0	108	351	1402
07:30:00	14	36	14	0	0	64	14	132	26	0	0	172	29	23	15	0	0	67	16	99	20	0	0	135	438	1491
07:45:00	12	41	13	0	0	66	10	109	21	0	0	140	25	35	14	0	0	74	8	76	20	0	0	104	384	1514
08:00:00	24	46	13	0	0	83	20	105	27	0	0	152	31	27	14	0	0	72	18	72	18	0	0	108	415	1588
08:15:00	9	35	12	0	0	56	14	100	28	0	0	142	26	37	16	0	0	79	9	82	17	0	0	108	385	1622
08:30:00	11	39	13	0	0	63	7	135	27	0	0	169	17	30	18	0	0	65	8	81	26	0	0	115	412	1596
08:45:00	23	41	17	0	0	81	19	82	36	0	0	137	29	36	17	0	0	82	16	82	18	0	0	116	416	1628
09:00:00	15	24	6	0	0	45	20	95	23	0	0	138	20	26	10	0	0	56	7	78	14	0	0	99	338	1551
09:15:00	13	34	5	0	0	52	11	95	16	0	0	122	22	23	7	0	0	52	9	81	8	0	0	98	324	1490
09:30:00	9	30	6	0	0	45	16	89	26	0	0	131	17	35	5	0	0	57	9	70	7	0	0	86	319	1397
09:45:00	12	28	13	0	0	53	5	67	18	0	0	90	14	26	4	0	0	44	11	86	17	0	0	114	301	1282
10:00:00	14	22	13	0	0	49	14	83	25	0	0	122	24	30	6	0	0	60	6	71	20	0	0	97	328	1272
10:15:00	20	21	12	0	0	53	14	81	18	0	0	113	16	38	13	0	0	67	5	71	19	0	0	95	328	1276
10:30:00	19	28	15	0	0	62	9	65	24	0	0	98	23	25	6	0	0	54	10	79	10	0	0	99	313	1270
10:45:00	14	33	18	0	0	65	7	69	18	0	0	94	17	38	5	0	0	60	7	77	9	0	0	93	312	1281
11:00:00	8	32	15	0	0	55	8	83	14	0	0	105	21	28	8	0	0	57	9	94	16	0	0	119	336	1289
11:15:00	20	29	13	0	0	62	15	91	25	0	0	131	17	38	8	0	0	63	5	81	18	0	0	104	360	1321
11:30:00	14	36	12	0	0	62	13	80	23	0	0	116	34	23	9	0	0	66	9	50	11	0	0	70	314	1322
11:45:00	14	29	11	0	0	54	9	64	21	0	0	94	27	25	7	0	0	59	6	78	18	0	0	102	309	1319
12:00:00	11	19	11	0	0	41	10	86	37	0	0	133	28	30	5	0	0	63	20	45	16	0	0	81	318	1301
12:15:00	7	29	19	0	0	55	9	70	26	0	0	105	29	35	8	0	0	72	14	53	11	0	0	78	310	1251
12:30:00	9	33	17	0	0	59	14	51	37	0	0	102	35	38	6	0	0	79	10	50	18	0	0	78	318	1255
12:45:00	11	30	15	0	0	56	20	56	42	0	0	118	39	33	8	0	0	80	6	74	15	0	0	95	349	1295
13:00:00	7	40	15	0	0	62	12	59	28	0	0	99	30	36	11	0	0	77	10	61	12	0	0	83	321	1298
13:15:00	13	32	11	0	0	56	6	59	29	0	0	94	38	29	8	0	0	75	7	114	14	0	0	135	360	1348
13:30:00	19	26	21	0	0	66	11	65	23	0	0	99	31	33	17	0	0	81	12	64	13	0	0	89	335	1365
13:45:00	17	27	14	0	0	58	10	95	27	0	0	132	23	37	16	0	0	76	11	68	18	0	0	97	363	1379
14:00:00	20	23	12	0	0	55	7	80	21	0	0	108	34	33	10	0	0	77	11	68	15	0	0	94	334	1392
14:15:00	12	24	7	0	0	43	10	88	28	0	0	126	25	28	10	0	0	63	10	107	15	0	0	132	364	1396
14:30:00	13	33	15	0	0	61	16	81	18	0	0	115	55	38	11	0	0	104	9	92	15	0	0	116	396	1457
14:45:00	14	35	12	0	0	61	9	78	26	0	0	113	22	40	8	0	0	70	12	125	13	0	0	150	394	1488
15:00:00	12	32	10	0	0	54	16	87	23	0	0	126	30	44	15	0	0	89	13	134	23	0	0	170	439	1593
15:15:00	20	48	15	0	0	83	16	85	16	0	0	117	37	41	6	0	0	84	10	128	10	0	0	148	432	1661
15:30:00	17	50	13	0	0	80	14	89	30	0	0	133	33	49	10	0	0	92	14	155	19	0	0	188	493	1758
15:45:00	13	37	9	0	0	59	16	79	29	0	0	124	46	50	15	0	0	111	11	122	11	0	0	144	438	1802
16:00:00	12	39	12	0	0	63	19	93	37	0	0	149	34	46	13	0	0	93	24	151	21	0	0	196	501	1864
16:15:00	12	39	10	0	0	61	12	82	27	0	0	121	45	48	20	0	0	113	19	128	18	0	0	165	460	1892
16:30:00	20	48	16	0	0	84	7	105	51	0	0	163	47	55	13	0	0	115	19	158	13	0	0	190	552	1951
16:45:00	16	34	10	0	0	60	11	105	29	0	0	145	35	45	17	0	0	97	17	127	8	0	0	152	454	1967
17:00:00	16	39	14	0	0	69	12	107	33	0	0	152	42	47	13	0	0	102	23	174	10	0	0	207	530	1996

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17:15:00	7	59	14	0	0	80	13	109	41	0	0	163	32	47	12	0	0	91	15	141	13	0	0	169	503	2039
17:30:00	21	44	16	0	0	81	11	82	27	0	0	120	47	60	15	0	0	122	14	135	8	0	0	157	480	1967
17:45:00	6	42	12	0	0	60	10	65	28	0	0	103	27	41	15	0	0	83	18	134	6	0	0	158	404	1917
Grand Total	649	1642	588	0	0	2879	577	4290	1234	0	0	6101	1345	1689	532	0	0	3566	554	4323	688	0	0	5565	**18111**	-
Approach%	22.5%	57%	20.4%	0%		-	9.5%	70.3%	20.2%	0%		-	37.7%	47.4%	14.9%	0%		-	10%	77.7%	12.4%	0%		-	-	-
Totals %	3.6%	9.1%	3.2%	0%		15.9%	3.2%	23.7%	6.8%	0%		33.7%	7.4%	9.3%	2.9%	0%		19.7%	3.1%	23.9%	3.8%	0%		30.7%	-	-
Heavy	315	168	192	0		-	213	625	85	0		-	83	167	54	0		-	54	618	305	0		-	-	-
Heavy %	48.5%	10.2%	32.7%	0%		-	36.9%	14.6%	6.9%	0%		-	6.2%	9.9%	10.2%	0%		-	9.7%	14.3%	44.3%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: YORK-DURHAM LINE & BLOOMINGTON ROAD
Date: Tue, Aug 24, 2021 Deployment Lead: David Chu

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

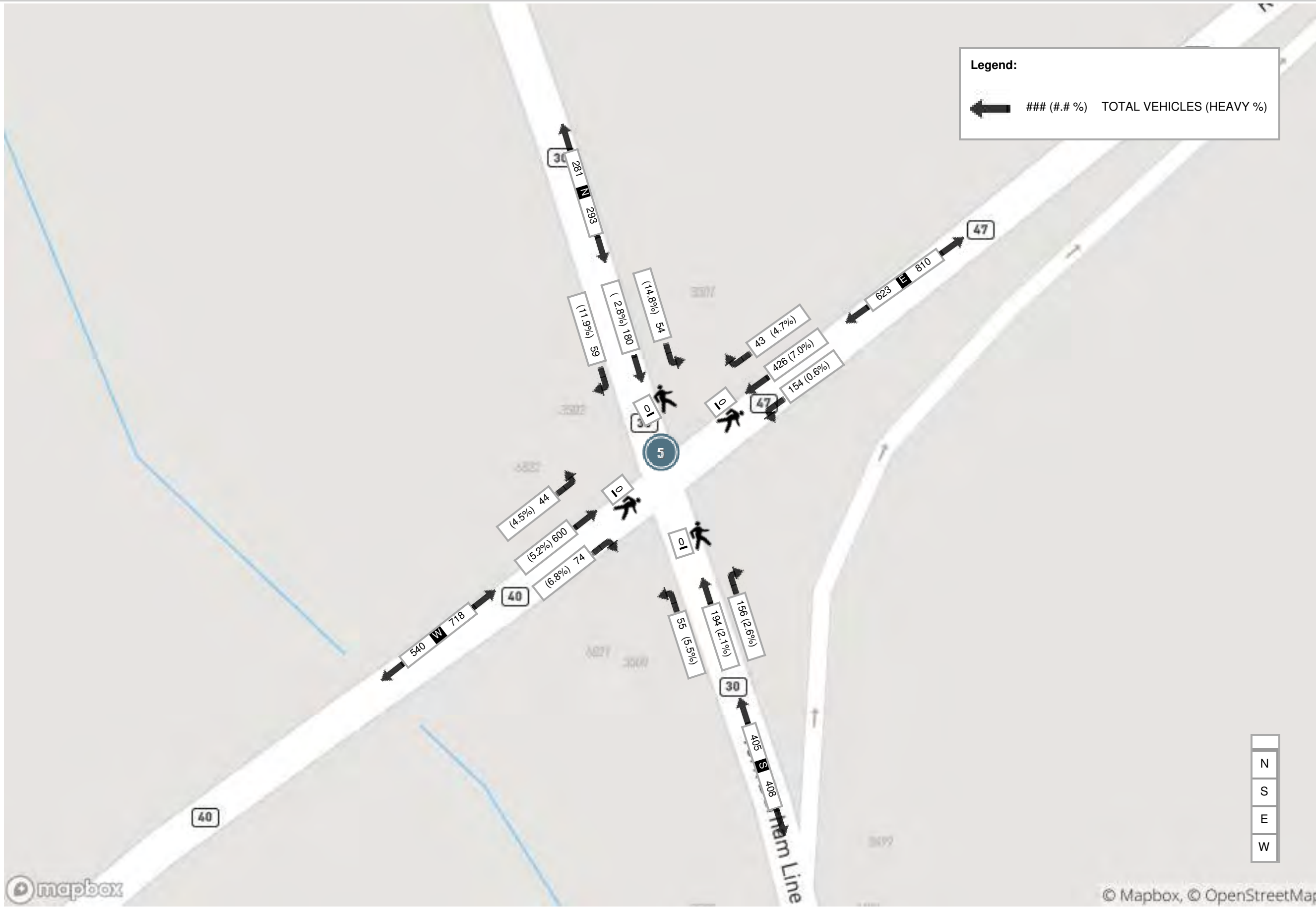
Peak Hour: 04:30 PM - 05:30 PM Weather: Clear Sky (17.4 °C)

Start Time	N Approach YORK DURHAM LINE						E Approach BLOOMINGTON RD						S Approach YORK DURHAM LINE						W Approach BLOOMINGTON RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:30:00	20	48	16	0	0	84	7	105	51	0	0	163	47	55	13	0	0	115	19	158	13	0	0	190	552
16:45:00	16	34	10	0	0	60	11	105	29	0	0	145	35	45	17	0	0	97	17	127	8	0	0	152	454
17:00:00	16	39	14	0	0	69	12	107	33	0	0	152	42	47	13	0	0	102	23	174	10	0	0	207	530
17:15:00	7	59	14	0	0	80	13	109	41	0	0	163	32	47	12	0	0	91	15	141	13	0	0	169	503
Grand Total	59	180	54	0	0	293	43	426	154	0	0	623	156	194	55	0	0	405	74	600	44	0	0	718	**2039**
Approach%	20.1%	61.4%	18.4%	0%		-	6.9%	68.4%	24.7%	0%		-	38.5%	47.9%	13.6%	0%		-	10.3%	83.6%	6.1%	0%		-	-
Totals %	2.9%	8.8%	2.6%	0%		14.4%	2.1%	20.9%	7.6%	0%		30.6%	7.7%	9.5%	2.7%	0%		19.9%	3.6%	29.4%	2.2%	0%		35.2%	-
PHF	0.74	0.76	0.84	0		0.87	0.83	0.98	0.75	0		0.96	0.83	0.88	0.81	0		0.88	0.8	0.86	0.85	0		0.87	-
Heavy	7	5	8	0		20	2	30	1	0		33	4	4	3	0		11	5	31	2	0		38	-
Heavy %	11.9%	2.8%	14.8%	0%		6.8%	4.7%	7%	0.6%	0%		5.3%	2.6%	2.1%	5.5%	0%		2.7%	6.8%	5.2%	4.5%	0%		5.3%	-
Lights	52	175	46	0		273	41	396	153	0		590	152	190	52	0		394	69	569	42	0		680	-
Lights %	88.1%	97.2%	85.2%	0%		93.2%	95.3%	93%	99.4%	0%		94.7%	97.4%	97.9%	94.5%	0%		97.3%	93.2%	94.8%	95.5%	0%		94.7%	-
Single-Unit Trucks	2	1	1	0		4	0	10	0	0		10	2	3	0	0		5	1	17	1	0		19	-
Single-Unit Trucks %	3.4%	0.6%	1.9%	0%		1.4%	0%	2.3%	0%	0%		1.6%	1.3%	1.5%	0%	0%		1.2%	1.4%	2.8%	2.3%	0%		2.6%	-
Buses	1	0	0	0		1	0	2	1	0		3	1	0	0	0		1	0	0	0	0		0	-
Buses %	1.7%	0%	0%	0%		0.3%	0%	0.5%	0.6%	0%		0.5%	0.6%	0%	0%	0%		0.2%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	1	1	0		2	0	5	0	0		5	0	0	2	0		2	4	3	0	0		7	-
Articulated Trucks %	0%	0.6%	1.9%	0%		0.7%	0%	1.2%	0%	0%		0.8%	0%	0%	3.6%	0%		0.5%	5.4%	0.5%	0%	0%		1%	-
Aggregate Trucks	4	3	6	0		13	2	13	0	0		15	1	1	1	0		3	0	11	1	0		12	-
Aggregate Trucks %	6.8%	1.7%	11.1%	0%		4.4%	4.7%	3.1%	0%	0%		2.4%	0.6%	0.5%	1.8%	0%		0.7%	0%	1.8%	2.3%	0%		1.7%	-
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-

Turning Movement Count
Location Name: YORK-DURHAM LINE & BLOOMINGTON ROAD
Date: Tue, Aug 24, 2021 Deployment Lead: David Chu

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Clear Sky (17.4 °C)



York-Durham Line at Bloomington Road - Regional Highway 47 - AM Peak Hour Summary (2021-08-24)

		N Approach YORK DURHAM LINE						E Approach BLOOMINGTON RD						S Approach YORK DURHAM LINE						W Approach BLOOMINGTON RD						
	START TIME	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	
	08:00:00	13	46	24	0	0	83	27	105	20	0	0	152	14	27	31	0	0	72	18	72	18	0	0	108	415
	08:15:00	12	35	9	0	0	56	28	100	14	0	0	142	16	37	26	0	0	79	17	82	9	0	0	108	385
	08:30:00	13	39	11	0	0	63	27	135	7	0	0	169	18	30	17	0	0	65	26	81	8	0	0	115	412
	08:45:00	17	41	23	0	0	81	36	82	19	0	0	137	17	36	29	0	0	82	18	82	16	0	0	116	416
	Grand Total	55	161	67	0	0	283	118	422	60	0	0	600	65	130	103	0	0	298	79	317	51	0	0	447	1628
Lights	08:00:00	7	42	9	0	0	58	26	94	13	0	0	133	10	26	29	0	0	65	10	53	16	0	0	79	335
	08:15:00	10	32	3	0	0	45	28	87	9	0	0	124	13	32	25	0	0	70	13	65	6	0	0	84	323
	08:30:00	6	35	6	0	0	47	24	114	2	0	0	140	15	25	17	0	0	57	11	62	6	0	0	79	323
	08:45:00	9	37	7	0	0	53	32	69	9	0	0	110	16	33	28	0	0	77	8	68	15	0	0	91	331
	Light Total	32	146	25	0	0	203	110	364	33	0	0	507	54	116	99	0	0	269	42	248	43	0	0	333	1312
Single Trucks	08:00:00	0	1	0	0	0	1	0	4	1	0	0	5	1	0	0	0	0	1	0	2	0	0	0	2	9
	08:15:00	0	1	0	0	0	1	0	2	0	0	0	2	2	0	1	0	0	3	0	3	0	0	0	3	9
	08:30:00	1	0	0	0	0	1	2	2	0	0	0	4	1	3	0	0	0	4	0	4	1	0	0	5	14
	08:45:00	2	1	0	0	0	3	3	2	1	0	0	6	0	0	1	0	0	1	3	3	0	0	0	6	16
	Single Truck Total	3	3	0	0	0	6	5	10	2	0	0	17	4	3	2	0	0	9	3	12	1	0	0	16	48
Buses	08:00:00	0	1	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	3
	08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:45:00	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	Buses Total	0	1	0	0	0	1	2	0	0	0	0	2	1	0	0	0	0	1	0	0	0	0	0	0	4
Articulated Trucks	08:00:00	1	0	1	0	0	2	0	1	1	0	0	2	0	0	0	0	0	0	2	6	0	0	0	8	12
	08:15:00	1	1	0	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	5
	08:30:00	1	0	1	0	0	2	0	2	0	0	0	2	0	0	0	0	0	0	0	3	0	0	0	3	7
	08:45:00	0	0	0	0	0	0	0	1	2	0	0	3	1	0	0	0	0	1	0	3	0	0	0	3	7
	Articulated Truck Total	3	1	2	0	0	6	0	5	3	0	0	8	1	0	0	0	0	1	2	14	0	0	0	16	31
Aggregate Trucks	08:00:00	5	2	14	0	0	21	0	6	5	0	0	11	2	1	2	0	0	5	6	11	2	0	0	19	56
	08:15:00	1	1	6	0	0	8	0	10	5	0	0	15	1	5	0	0	0	6	4	12	3	0	0	19	48
	08:30:00	5	4	4	0	0	13	1	17	5	0	0	23	2	2	0	0	0	4	15	12	1	0	0	28	68
	08:45:00	6	3	16	0	0	25	0	10	7	0	0	17	0	3	0	0	0	3	7	8	1	0	0	16	61
	Aggregate Truck Total	17	10	40	0	0	67	1	43	22	0	0	66	5	11	2	0	0	18	32	43	7	0	0	82	233
Heavies	08:00:00	6	4	15	0	0	25	1	11	7	0	0	19	4	1	2	0	0	7	8	19	2	0	0	29	80
	08:15:00	2	3	6	0	0	11	0	13	5	0	0	18	3	5	1	0	0	9	4	17	3	0	0	24	62
	08:30:00	7	4	5	0	0	16	3	21	5	0	0	29	3	5	0	0	0	8	15	19	2	0	0	36	89
	08:45:00	8	4	16	0	0	28	4	13	10	0	0	27	1	3	1	0	0	5	10	14	1	0	0	25	85
	Heavies Total	23	15	42	0	0	80	8	58	27	0	0	93	11	14	4	0	0	29	37	69	8	0	0	114	316
Bicycles on Road	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bicycles Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Turning Movement Count
Location Name: GOODWOOD ROAD & REGIONAL HIGHWAY 47
Date: Tue, Aug 24, 2021 Deployment Lead: David Chu

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Turning Movement Count (6 . GOODWOOD ROAD & REGIONAL HIGHWAY 47)

Start Time	N Approach 268 REGIONAL HWY 47						E Approach REGIONAL HWY 47						S Approach GOODWOOD RD						W Approach REGIONAL HWY 47						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	0	0	0	0	0	0	0	50	0	0	0	50	0	0	80	0	0	80	22	18	0	0	0	40	170	
06:15:00	0	0	0	0	0	0	0	65	1	0	0	66	0	0	86	0	0	86	33	13	0	0	0	46	198	
06:30:00	0	0	0	0	0	0	0	73	0	0	0	73	1	0	108	0	0	109	45	26	0	0	0	71	253	
06:45:00	0	0	0	0	0	0	0	92	0	0	0	92	1	0	94	0	0	95	38	28	1	0	0	67	254	875
07:00:00	0	1	0	0	0	1	0	86	0	0	0	86	3	0	58	0	0	61	33	25	0	0	0	58	206	911
07:15:00	0	0	1	0	0	1	0	75	0	0	0	75	1	0	76	0	0	77	63	45	1	0	0	109	262	975
07:30:00	0	0	0	0	0	0	0	93	0	0	0	93	2	0	81	0	0	83	65	41	0	0	0	106	282	1004
07:45:00	0	1	1	0	0	2	2	83	0	0	0	85	2	0	102	0	0	104	79	41	0	0	0	120	311	1061
08:00:00	0	0	0	0	0	0	0	65	2	0	0	67	0	0	70	0	0	70	58	34	0	0	0	92	229	1084
08:15:00	0	0	0	0	0	0	0	71	1	0	0	72	2	1	83	0	0	86	73	46	0	0	0	119	277	1099
08:30:00	1	0	1	0	0	2	2	70	0	0	0	72	1	1	90	0	0	92	61	35	1	0	0	97	263	1080
08:45:00	0	0	0	0	0	0	0	68	1	0	0	69	0	0	63	0	0	63	55	58	0	0	0	113	245	1014
09:00:00	0	2	0	0	0	2	0	66	0	0	1	66	2	1	71	0	0	74	65	40	0	0	0	105	247	1032
09:15:00	1	0	0	0	0	1	0	54	0	0	0	54	1	0	51	0	0	52	57	47	1	0	0	105	212	967
09:30:00	0	0	0	0	0	0	0	61	0	0	0	61	0	0	65	0	0	65	50	43	0	0	0	93	219	923
09:45:00	0	0	1	0	0	1	0	54	0	0	0	54	1	0	56	0	0	57	62	45	0	0	0	107	219	897
10:00:00	0	0	0	0	0	0	0	61	1	0	0	62	1	0	51	0	0	52	51	47	0	0	0	98	212	862
10:15:00	0	0	0	0	0	0	0	59	0	0	0	59	1	0	53	0	0	54	55	54	1	0	0	110	223	873
10:30:00	2	0	0	0	0	2	1	42	2	0	0	45	0	0	44	0	0	44	57	42	1	0	0	100	191	845
10:45:00	0	1	1	0	0	2	1	38	0	0	0	39	2	0	55	0	0	57	74	53	0	0	0	127	225	851
11:00:00	1	0	0	0	0	1	0	64	0	0	0	64	2	0	50	0	0	52	63	55	1	0	0	119	236	875
11:15:00	1	0	2	0	0	3	1	60	0	0	0	61	1	2	48	0	0	51	65	46	0	0	0	111	226	878
11:30:00	1	1	1	0	0	3	1	58	1	0	0	60	2	1	53	0	0	56	48	56	1	0	0	105	224	911
11:45:00	2	0	2	0	0	4	1	60	2	0	0	63	1	2	48	0	0	51	56	42	2	0	0	100	218	904
12:00:00	3	1	0	0	0	4	2	51	2	0	0	55	0	2	54	0	0	56	54	34	0	0	0	88	203	871
12:15:00	1	0	2	0	0	3	2	36	1	0	0	39	1	1	59	0	0	61	58	43	0	0	0	101	204	849
12:30:00	2	1	1	0	0	4	1	64	2	0	0	67	2	2	41	0	0	45	57	45	0	0	0	102	218	843
12:45:00	0	0	0	0	0	0	0	52	1	0	0	53	0	0	47	0	0	47	58	52	0	0	0	110	210	835
13:00:00	0	2	1	0	0	3	1	52	0	0	0	53	2	2	49	0	0	53	63	51	1	0	0	115	224	856
13:15:00	0	1	2	0	0	3	1	49	0	0	0	50	2	1	37	0	0	40	67	69	0	0	0	136	229	881
13:30:00	0	0	1	0	0	1	2	45	0	0	0	47	6	0	55	0	0	61	71	55	1	0	0	127	236	899
13:45:00	2	0	0	0	0	2	2	64	1	0	0	67	2	0	60	0	0	62	52	48	0	0	0	100	231	920
14:00:00	0	1	0	0	0	1	0	48	0	0	0	48	2	0	56	0	0	58	55	44	0	0	0	99	206	902
14:15:00	1	0	3	0	0	4	4	48	3	0	0	55	1	1	71	0	0	73	74	67	1	0	0	142	274	947
14:30:00	2	0	3	0	1	5	0	54	1	0	1	55	1	2	55	0	0	58	68	73	2	0	0	143	261	972
14:45:00	0	1	1	0	0	2	0	54	1	0	1	55	3	1	60	0	1	64	93	78	0	0	1	171	292	1033
15:00:00	0	1	2	0	0	3	2	49	1	0	0	52	0	1	74	0	0	75	80	83	2	0	0	165	295	1122
15:15:00	0	2	1	0	0	3	0	61	0	0	0	61	2	0	57	0	0	59	89	83	2	0	0	174	297	1145
15:30:00	0	2	4	0	0	6	1	55	1	0	0	57	0	0	64	0	0	64	116	96	2	0	0	214	341	1225
15:45:00	4	0	0	0	0	4	2	59	2	0	0	63	0	1	65	0	0	66	94	89	2	0	0	185	318	1251
16:00:00	0	1	4	0	0	5	2	49	4	0	0	55	2	1	78	0	0	81	116	103	2	0	0	221	362	1318
16:15:00	1	1	0	0	0	2	1	58	2	0	0	61	1	0	69	0	0	70	102	81	0	0	0	183	316	1337
16:30:00	0	1	1	0	0	2	0	67	1	0	0	68	0	1	68	0	2	69	116	100	1	0	0	217	356	1352
16:45:00	1	1	1	0	0	3	2	57	0	0	0	59	0	0	65	0	0	65	97	84	1	0	0	182	309	1343
17:00:00	0	0	2	0	0	2	1	62	1	0	0	64	1	1	69	0	1	71	125	125	0	0	0	250	387	1368

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

17:15:00	1	0	1	0	0	2	1	67	3	0	0	71	0	1	79	0	0	80	107	106	0	0	0	213	366	1418
17:30:00	0	1	1	0	0	2	1	39	1	0	0	41	2	0	62	0	0	64	114	89	1	0	0	204	311	1373
17:45:00	0	1	2	0	0	3	2	43	3	0	0	48	3	0	56	0	0	59	91	82	2	0	0	175	285	1349
Grand Total	27	24	43	0	1	94	39	2851	42	0	3	2932	60	26	3086	0	4	3172	3345	2760	30	0	1	6135	**12333**	-
Approach%	28.7%	25.5%	45.7%	0%		-	1.3%	97.2%	1.4%	0%		-	1.9%	0.8%	97.3%	0%		-	54.5%	45%	0.5%	0%		-	-	-
Totals %	0.2%	0.2%	0.3%	0%		0.8%	0.3%	23.1%	0.3%	0%		23.8%	0.5%	0.2%	25%	0%		25.7%	27.1%	22.4%	0.2%	0%		49.7%	-	-
Heavy	0	0	1	0		-	1	309	1	0		-	2	0	543	0		-	599	266	0	0		-	-	-
Heavy %	0%	0%	2.3%	0%		-	2.6%	10.8%	2.4%	0%		-	3.3%	0%	17.6%	0%		-	17.9%	9.6%	0%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Turning Movement Count
Location Name: GOODWOOD ROAD & REGIONAL HIGHWAY 47
Date: Tue, Aug 24, 2021 Deployment Lead: David Chu

The Municipal Infrastructure Group
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VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Clear Sky (17.4 °C)

Start Time	N Approach 268 REGIONAL HWY 47						E Approach REGIONAL HWY 47						S Approach GOODWOOD RD						W Approach REGIONAL HWY 47						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:30:00	0	1	1	0	0	2	0	67	1	0	0	68	0	1	68	0	2	69	116	100	1	0	0	217	356
16:45:00	1	1	1	0	0	3	2	57	0	0	0	59	0	0	65	0	0	65	97	84	1	0	0	182	309
17:00:00	0	0	2	0	0	2	1	62	1	0	0	64	1	1	69	0	1	71	125	125	0	0	0	250	387
17:15:00	1	0	1	0	0	2	1	67	3	0	0	71	0	1	79	0	0	80	107	106	0	0	0	213	366
Grand Total	2	2	5	0	0	9	4	253	5	0	0	262	1	3	281	0	3	285	445	415	2	0	0	862	**1418**
Approach%	22.2%	22.2%	55.6%	0%		-	1.5%	96.6%	1.9%	0%		-	0.4%	1.1%	98.6%	0%		-	51.6%	48.1%	0.2%	0%		-	-
Totals %	0.1%	0.1%	0.4%	0%		0.6%	0.3%	17.8%	0.4%	0%		18.5%	0.1%	0.2%	19.8%	0%		20.1%	31.4%	29.3%	0.1%	0%		60.8%	-
PHF	0.5	0.5	0.63	0		0.75	0.5	0.94	0.42	0		0.92	0.25	0.75	0.89	0		0.89	0.89	0.83	0.5	0		0.86	-
Heavy	0	0	0	0		0	0	8	0	0		8	0	0	23	0		23	28	10	0	0		38	-
Heavy %	0%	0%	0%	0%		0%	0%	3.2%	0%	0%		3.1%	0%	0%	8.2%	0%		8.1%	6.3%	2.4%	0%	0%		4.4%	-
Lights	2	2	5	0		9	4	245	5	0		254	1	3	258	0		262	417	405	2	0		824	-
Lights %	100%	100%	100%	0%		100%	100%	96.8%	100%	0%		96.9%	100%	100%	91.8%	0%		91.9%	93.7%	97.6%	100%	0%		95.6%	-
Single-Unit Trucks	0	0	0	0		0	0	4	0	0		4	0	0	5	0		5	10	4	0	0		14	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	1.6%	0%	0%		1.5%	0%	0%	1.8%	0%		1.8%	2.2%	1%	0%	0%		1.6%	-
Buses	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	0	1	0	0		1	-
Buses %	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	0.2%	0%	0%		0.1%	-
Articulated Trucks	0	0	0	0		0	0	1	0	0		1	0	0	5	0		5	5	1	0	0		6	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.4%	0%	0%	1.8%	0%		1.8%	1.1%	0.2%	0%	0%		0.7%	-
Aggregate Trucks	0	0	0	0		0	0	2	0	0		2	0	0	13	0		13	13	4	0	0		17	-
Aggregate Trucks %	0%	0%	0%	0%		0%	0%	0.8%	0%	0%		0.8%	0%	0%	4.6%	0%		4.6%	2.9%	1%	0%	0%		2%	-
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	100%		-	-	-	-	0%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

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CANADA

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	Bicycles on Crosswalk	Pedestrians
N	0	0
S	0	3
E	0	0
W	0	0

Goodwood Road at Regional Highway 47 - AM Peak Hour Summary (2021-08-24)

		N Approach 268 REGIONAL HWY 47						E Approach REGIONAL HWY 47						S Approach GOODWOOD RD						W Approach REGIONAL HWY 47						
	START TIME	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	
	07:30:00	0	0	0	0	0	0	0	93	0	0	0	93	81	0	2	0	0	83	0	41	65	0	0	106	282
	07:45:00	1	1	0	0	0	2	0	83	2	0	0	85	102	0	2	0	0	104	0	41	79	0	0	120	311
	08:00:00	0	0	0	0	0	0	2	65	0	0	0	67	70	0	0	0	0	70	0	34	58	0	0	92	229
	08:15:00	0	0	0	0	0	0	1	71	0	0	0	72	83	1	2	0	0	86	0	46	73	0	0	119	277
	Grand Total	1	1	0	0	0	2	3	312	2	0	0	317	336	1	6	0	0	343	0	162	275	0	0	437	1099
Lights	07:30:00	0	0	0	0	0	0	0	88	0	0	0	88	73	0	2	0	0	75	0	37	49	0	0	86	249
	07:45:00	1	1	0	0	0	2	0	75	2	0	0	77	83	0	2	0	0	85	0	36	58	0	0	94	258
	08:00:00	0	0	0	0	0	0	2	61	0	0	0	63	61	0	0	0	0	61	0	25	39	0	0	64	188
	08:15:00	0	0	0	0	0	0	1	64	0	0	0	65	71	1	2	0	0	74	0	40	58	0	0	98	237
	Light Total	1	1	0	0	0	2	3	288	2	0	0	293	288	1	6	0	0	295	0	138	204	0	0	342	932
Single Trucks	07:30:00	0	0	0	0	0	0	0	3	0	0	0	3	1	0	0	0	0	1	0	1	1	0	0	2	6
	07:45:00	0	0	0	0	0	0	0	1	0	0	0	1	3	0	0	0	0	3	0	0	4	0	0	4	8
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	0	1	1	0	0	2	5
	08:15:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	2	0	0	3	4
	Single Truck Total	0	0	0	0	0	0	0	5	0	0	0	5	7	0	0	0	0	7	0	3	8	0	0	11	23
Buses	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:45:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
	08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Buses Total	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	2	3
Articulated Trucks	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	2	1	0	0	3	5
	07:45:00	0	0	0	0	0	0	0	2	0	0	0	2	6	0	0	0	0	6	0	1	1	0	0	2	10
	08:00:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	3	3	0	0	6	7
	08:15:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	3	0	0	4	5
	Articulated Truck Total	0	0	0	0	0	0	0	4	0	0	0	4	8	0	0	0	0	8	0	7	8	0	0	15	27
Aggregate Trucks	07:30:00	0	0	0	0	0	0	0	2	0	0	0	2	5	0	0	0	0	5	0	1	14	0	0	15	22
	07:45:00	0	0	0	0	0	0	0	4	0	0	0	4	10	0	0	0	0	10	0	3	16	0	0	19	33
	08:00:00	0	0	0	0	0	0	0	3	0	0	0	3	6	0	0	0	0	6	0	5	14	0	0	19	28
	08:15:00	0	0	0	0	0	0	0	5	0	0	0	5	12	0	0	0	0	12	0	4	10	0	0	14	31
	Aggregate Truck Total	0	0	0	0	0	0	0	14	0	0	0	14	33	0	0	0	0	33	0	13	54	0	0	67	114
Heavies	07:30:00	0	0	0	0	0	0	0	5	0	0	0	5	8	0	0	0	0	8	0	4	16	0	0	20	33
	07:45:00	0	0	0	0	0	0	0	8	0	0	0	8	19	0	0	0	0	19	0	5	21	0	0	26	53
	08:00:00	0	0	0	0	0	0	0	4	0	0	0	4	9	0	0	0	0	9	0	9	19	0	0	28	41
	08:15:00	0	0	0	0	0	0	0	7	0	0	0	7	12	0	0	0	0	12	0	6	15	0	0	21	40
	Heavies Total	0	0	0	0	0	0	0	24	0	0	0	24	48	0	0	0	0	48	0	24	71	0	0	95	167
Bicycles on Road	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bicycles Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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SUITE 200 8800 DUFFERIN ST
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CANADA

Turning Movement Count (7 . FRONT STREET & REGIONAL HIGHWAY 47)

Start Time	N Approach FRONT ST						E Approach REGIONAL HWY 47						S Approach FRONT ST						W Approach REGIONAL HWY 47						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	0	0	1	0	0	1	1	52	1	0	0	54	0	0	0	0	0	0	0	21	0	0	0	21	76	
06:15:00	3	2	0	0	0	5	1	60	1	0	0	62	1	0	1	0	0	2	1	13	1	0	0	15	84	
06:30:00	2	3	3	0	0	8	0	66	0	0	0	66	1	2	4	0	1	7	1	22	2	0	0	25	106	
06:45:00	6	1	1	0	0	8	0	87	1	0	0	88	0	3	1	0	0	4	1	24	2	0	0	27	127	393
07:00:00	3	1	0	0	0	4	0	77	1	0	0	78	1	1	1	0	1	3	0	25	1	0	0	26	111	428
07:15:00	2	0	1	0	0	3	1	72	1	0	1	74	1	4	3	0	0	8	2	41	2	0	0	45	130	474
07:30:00	6	1	1	0	0	8	1	89	1	0	1	91	2	0	5	0	0	7	1	42	1	0	0	44	150	518
07:45:00	7	5	1	0	0	13	2	72	1	0	0	75	2	2	4	0	0	8	3	43	3	0	0	49	145	536
08:00:00	3	2	3	0	0	8	0	58	1	0	0	59	0	4	5	0	1	9	3	35	2	0	0	40	116	541
08:15:00	2	3	1	0	0	6	3	66	0	0	0	69	4	1	2	0	0	7	2	42	0	0	3	44	126	537
08:30:00	5	7	1	0	0	13	0	70	1	0	0	71	4	6	0	0	0	10	2	35	3	0	0	40	134	521
08:45:00	3	1	1	0	0	5	2	68	2	0	0	72	1	1	2	0	0	4	6	53	2	0	1	61	142	518
09:00:00	6	2	1	0	0	9	3	56	4	0	0	63	2	2	1	0	1	5	5	36	1	0	4	42	119	521
09:15:00	2	1	2	0	0	5	1	50	1	0	0	52	1	3	0	0	0	4	6	43	2	0	0	51	112	507
09:30:00	2	1	1	0	0	4	2	62	0	0	0	64	5	2	3	0	0	10	2	41	4	1	0	48	126	499
09:45:00	4	1	0	0	0	5	0	59	1	0	0	60	0	2	2	0	0	4	3	51	1	0	0	55	124	481
10:00:00	3	1	3	0	0	7	1	51	0	0	0	52	1	3	3	0	0	7	1	45	2	0	0	48	114	476
10:15:00	2	3	4	0	0	9	0	58	2	0	0	60	0	3	4	0	4	7	4	43	4	0	0	51	127	491
10:30:00	3	3	0	0	0	6	3	44	1	0	0	48	1	1	2	0	2	4	4	38	1	0	2	43	101	466
10:45:00	7	2	1	0	0	10	1	29	1	0	2	31	1	2	2	0	2	5	5	47	2	0	2	54	100	442
11:00:00	3	1	2	0	0	6	3	55	2	0	0	60	0	7	5	0	1	12	3	48	1	0	2	52	130	458
11:15:00	6	5	3	0	0	14	1	55	1	0	4	57	1	6	4	0	2	11	4	46	1	0	3	51	133	464
11:30:00	0	3	6	0	0	9	3	55	1	0	0	59	5	3	2	0	0	10	6	50	7	1	4	64	142	505
11:45:00	2	2	2	0	0	6	3	58	1	0	0	62	0	6	2	0	0	8	1	44	2	0	0	47	123	528
12:00:00	4	1	1	0	0	6	2	48	1	0	4	51	2	5	4	0	5	11	3	30	3	0	8	36	104	502
12:15:00	8	2	3	0	0	13	0	32	1	0	0	33	1	2	3	0	0	6	5	40	1	0	0	46	98	467
12:30:00	2	0	2	0	0	4	1	57	2	0	0	60	1	4	5	0	0	10	8	34	5	0	0	47	121	446
12:45:00	2	5	2	0	0	9	0	44	4	0	3	48	1	3	1	0	3	5	0	42	2	0	0	44	106	429
13:00:00	0	2	0	0	0	2	0	43	2	0	0	45	2	4	4	0	0	10	6	49	5	0	0	60	117	442
13:15:00	5	2	1	0	0	8	4	44	1	0	0	49	1	4	0	0	0	5	1	59	1	0	5	61	123	467
13:30:00	5	4	2	0	0	11	4	44	1	0	0	49	0	2	5	0	0	7	8	55	7	0	0	70	137	483
13:45:00	2	2	0	0	0	4	1	59	2	0	0	62	1	2	3	0	2	6	5	52	5	0	4	62	134	511
14:00:00	2	4	2	0	1	8	3	47	0	0	0	50	0	5	5	0	3	10	8	31	2	0	1	41	109	503
14:15:00	4	2	4	0	0	10	2	52	1	0	0	55	1	3	0	0	0	4	2	61	4	0	0	67	136	516
14:30:00	2	2	2	0	0	6	0	51	1	0	0	52	0	1	0	0	0	1	3	70	3	0	0	76	135	514
14:45:00	4	2	5	0	0	11	1	52	0	0	0	53	2	5	6	0	0	13	5	74	3	0	1	82	159	539
15:00:00	3	5	1	0	2	9	3	43	3	0	0	49	2	1	1	0	6	4	0	77	4	0	10	81	143	573
15:15:00	4	8	2	0	9	14	2	57	0	0	0	59	2	2	3	0	0	7	3	81	5	0	5	89	169	606
15:30:00	5	2	1	0	0	8	3	49	0	0	0	52	0	3	1	0	0	4	4	92	4	0	3	100	164	635
15:45:00	4	2	2	0	0	8	1	60	0	0	0	61	2	2	4	0	2	8	3	87	3	0	0	93	170	646
16:00:00	2	4	1	0	0	7	2	49	1	0	0	52	2	2	5	0	0	9	5	90	3	0	0	98	166	669
16:15:00	5	6	1	0	0	12	0	49	2	0	0	51	1	1	5	0	0	7	4	85	3	0	0	92	162	662
16:30:00	4	5	0	0	0	9	0	72	0	0	3	72	4	4	3	0	3	11	5	95	6	0	0	106	198	696
16:45:00	4	4	0	0	0	8	1	53	1	0	0	55	2	7	3	0	1	12	5	85	7	0	0	97	172	698
17:00:00	3	6	1	0	3	10	2	58	1	0	0	61	1	1	3	0	0	5	6	101	4	0	3	111	187	719

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

17:15:00	3	3	3	0	4	9	4	72	3	0	0	79	3	2	3	0	1	8	9	96	4	0	0	109	205	762
17:30:00	3	3	1	0	1	7	2	37	4	0	0	43	3	4	2	0	0	9	3	97	6	0	9	106	165	729
17:45:00	0	1	1	0	3	2	1	44	2	0	0	47	0	7	4	0	2	11	2	83	6	0	2	91	151	708
Grand Total	162	128	77	0	23	367	71	2685	59	0	18	2815	68	140	131	0	43	339	169	2594	143	2	72	2908	**6429**	-
Approach%	44.1%	34.9%	21%	0%		-	2.5%	95.4%	2.1%	0%		-	20.1%	41.3%	38.6%	0%		-	5.8%	89.2%	4.9%	0.1%		-	-	-
Totals %	2.5%	2%	1.2%	0%		5.7%	1.1%	41.8%	0.9%	0%		43.8%	1.1%	2.2%	2%	0%		5.3%	2.6%	40.3%	2.2%	0%		45.2%	-	-
Heavy	6	5	18	0		-	13	302	2	0		-	0	3	3	0		-	1	262	7	0		-	-	-
Heavy %	3.7%	3.9%	23.4%	0%		-	18.3%	11.2%	3.4%	0%		-	0%	2.1%	2.3%	0%		-	0.6%	10.1%	4.9%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Clear Sky (17.4 °C)

Start Time	N Approach FRONT ST						E Approach REGIONAL HWY 47						S Approach FRONT ST						W Approach REGIONAL HWY 47						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:30:00	4	5	0	0	0	9	0	72	0	0	3	72	4	4	3	0	3	11	5	95	6	0	0	106	198
16:45:00	4	4	0	0	0	8	1	53	1	0	0	55	2	7	3	0	1	12	5	85	7	0	0	97	172
17:00:00	3	6	1	0	3	10	2	58	1	0	0	61	1	1	3	0	0	5	6	101	4	0	3	111	187
17:15:00	3	3	3	0	4	9	4	72	3	0	0	79	3	2	3	0	1	8	9	96	4	0	0	109	205
Grand Total	14	18	4	0	7	36	7	255	5	0	3	267	10	14	12	0	5	36	25	377	21	0	3	423	**762**
Approach%	38.9%	50%	11.1%	0%		-	2.6%	95.5%	1.9%	0%		-	27.8%	38.9%	33.3%	0%		-	5.9%	89.1%	5%	0%		-	-
Totals %	1.8%	2.4%	0.5%	0%		4.7%	0.9%	33.5%	0.7%	0%		35%	1.3%	1.8%	1.6%	0%		4.7%	3.3%	49.5%	2.8%	0%		55.5%	-
PHF	0.88	0.75	0.33	0		0.9	0.44	0.89	0.42	0		0.84	0.63	0.5	1	0		0.75	0.69	0.93	0.75	0		0.95	-
Heavy	0	0	0	0		0	0	7	0	0		7	0	1	0	0		1	0	11	0	0		11	-
Heavy %	0%	0%	0%	0%		0%	0%	2.7%	0%	0%		2.6%	0%	7.1%	0%	0%		2.8%	0%	2.9%	0%	0%		2.6%	-
Lights	14	17	4	0		35	7	248	5	0		260	10	11	12	0		33	25	366	21	0		412	-
Lights %	100%	94.4%	100%	0%		97.2%	100%	97.3%	100%	0%		97.4%	100%	78.6%	100%	0%		91.7%	100%	97.1%	100%	0%		97.4%	-
Single-Unit Trucks	0	0	0	0		0	0	3	0	0		3	0	1	0	0		1	0	4	0	0		4	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	1.2%	0%	0%		1.1%	0%	7.1%	0%	0%		2.8%	0%	1.1%	0%	0%		0.9%	-
Buses	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	0	1	0	0		1	-
Buses %	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.2%	-
Articulated Trucks	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	0	2	0	0		2	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.5%	-
Aggregate Trucks	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	0	4	0	0		4	-
Aggregate Trucks %	0%	0%	0%	0%		0%	0%	0.8%	0%	0%		0.7%	0%	0%	0%	0%		0%	0%	1.1%	0%	0%		0.9%	-
Bicycles on Road	0	1	0	0		1	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	-
Bicycles on Road %	0%	5.6%	0%	0%		2.8%	0%	0%	0%	0%		0%	0%	14.3%	0%	0%		5.6%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	7	-	-	-	-	-	3	-	-	-	-	-	5	-	-	-	-	-	3	-	-
Pedestrians%	-	-	-	-	38.9%		-	-	-	-	16.7%		-	-	-	-	27.8%		-	-	-	-	16.7%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Clear Sky (17.4 °C)

	Bicycles on Crosswalk	Pedestrians
N	0	7
S	0	5
E	0	3
W	0	3

Front Street at Regional Highway 47 - AM Peak Hour Summary (2021-08-24)

		N Approach FRONT ST						E Approach REGIONAL HWY 47						S Approach FRONT ST						W Approach REGIONAL HWY 47						
	START TIME	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	
	07:15:00	1	0	2	0	0	3	1	72	1	0	1	74	3	4	1	0	0	8	2	41	2	0	0	45	130
	07:30:00	1	1	6	0	0	8	1	89	1	0	1	91	5	0	2	0	0	7	1	42	1	0	0	44	150
	07:45:00	1	5	7	0	0	13	1	72	2	0	0	75	4	2	2	0	0	8	3	43	3	0	0	49	145
	08:00:00	3	2	3	0	0	8	1	58	0	0	0	59	5	4	0	0	1	9	2	35	3	0	0	40	116
	Grand Total	6	8	18	0	0	32	4	291	4	0	2	299	17	10	5	0	1	32	8	161	9	0	0	178	541
Lights	07:15:00	0	0	2	0	0	2	1	66	1	0	0	68	3	4	1	0	0	8	2	38	2	0	0	42	120
	07:30:00	1	1	6	0	0	8	1	85	1	0	0	87	5	0	2	0	0	7	1	38	1	0	0	40	142
	07:45:00	1	4	7	0	0	12	1	64	2	0	0	67	4	2	2	0	0	8	3	36	3	0	0	42	129
	08:00:00	2	2	3	0	0	7	0	54	0	0	0	54	4	3	0	0	0	7	2	26	3	0	0	31	99
	Light Total	4	7	18	0	0	29	3	269	4	0	0	276	16	9	5	0	0	30	8	138	9	0	0	155	490
Single Trucks	07:15:00	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
	07:30:00	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
	07:45:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
	Single Truck Total	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	2	0	0	0	2	8
Buses	07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
	07:45:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Buses Total	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	3
Articulated Trucks	07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	3
	07:45:00	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	3
	08:00:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	3	4
	Articulated Truck Total	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	7	0	0	0	7	10
Aggregate Trucks	07:15:00	1	0	0	0	0	1	0	4	0	0	0	4	0	0	0	0	0	0	0	3	0	0	0	3	8
	07:30:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	07:45:00	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	8
	08:00:00	1	0	0	0	0	1	1	3	0	0	0	4	0	0	0	0	0	0	0	5	0	0	0	5	10
	Aggregate Truck Total	2	0	0	0	0	2	1	12	0	0	0	13	0	0	0	0	0	0	0	12	0	0	0	12	27
Heavies	07:15:00	1	0	0	0	0	1	0	6	0	0	0	6	0	0	0	0	0	0	0	3	0	0	0	3	10
	07:30:00	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	4	8
	07:45:00	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	7	0	0	0	7	15
	08:00:00	1	0	0	0	0	1	1	4	0	0	0	5	0	0	0	0	0	0	0	9	0	0	0	9	15
	Heavies Total	**2**	**0**	**0**	**0**	**0**	**2**	**1**	**22**	**0**	**0**	**0**	**23**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**23**	**0**	**0**	**0**	**23**	**48**
Bicycles on Road	07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:45:00	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	0	0	0	0	0	0	2
	Bicycles Total	0	1	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	2	0	0	0	0	0	0	3

Turning Movement Count (10 . REGIONAL HIGHWAY 47 & LAFARGE GOODWOOD PIT SITE ACCESS)

Start Time	N Approach LAFARGE GOODWOOD PIT SITE ACCESS					E Approach REGIONAL HWY 47					W Approach REGIONAL HWY 47					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	UTurn E:E	Peds E:	Approach Total	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	0	0	0	0	0	0	53	0	0	53	19	0	0	0	19	72	
06:15:00	0	0	0	0	0	0	63	0	0	63	12	0	0	0	12	75	
06:30:00	0	0	0	0	0	0	67	0	0	67	26	0	0	0	26	93	
06:45:00	0	0	0	0	0	0	94	0	0	94	27	0	0	0	27	121	361
07:00:00	0	0	0	0	0	0	70	0	0	70	27	0	0	0	27	97	386
07:15:00	0	0	0	0	0	0	70	0	0	70	40	0	0	0	40	110	421
07:30:00	0	0	0	0	0	0	99	0	0	99	49	0	0	0	49	148	476
07:45:00	0	0	0	0	0	0	66	0	0	66	45	0	0	0	45	111	466
08:00:00	0	0	0	0	0	0	60	0	0	60	35	0	0	0	35	95	464
08:15:00	0	0	0	0	0	0	68	0	0	68	49	0	0	0	49	117	471
08:30:00	1	0	0	0	1	0	73	0	0	73	43	1	0	0	44	118	441
08:45:00	0	0	0	0	0	0	70	0	0	70	53	0	1	0	54	124	454
09:00:00	0	0	0	0	0	0	56	0	0	56	37	0	0	0	37	93	452
09:15:00	0	0	0	0	0	0	52	0	0	52	45	0	0	0	45	97	432
09:30:00	0	0	0	0	0	0	60	0	0	60	48	0	0	0	48	108	422
09:45:00	0	0	0	0	0	0	60	0	0	60	51	0	0	0	51	111	409
10:00:00	0	0	0	0	0	0	52	0	0	52	49	0	0	0	49	101	417
10:15:00	0	0	0	0	0	0	56	0	0	56	46	0	0	0	46	102	422
10:30:00	0	0	0	0	0	0	42	0	0	42	37	0	0	0	37	79	393
10:45:00	0	0	0	0	0	0	37	0	0	37	46	0	0	0	46	83	365
11:00:00	0	0	0	0	0	0	57	0	0	57	60	0	0	0	60	117	381
11:15:00	0	0	0	0	0	0	57	0	0	57	47	0	0	0	47	104	383
11:30:00	0	0	0	0	0	0	54	0	0	54	62	0	0	0	62	116	420
11:45:00	0	0	0	0	0	0	64	0	0	64	39	0	0	0	39	103	440
12:00:00	0	0	0	0	0	0	47	0	0	47	30	0	0	0	30	77	400
12:15:00	0	0	0	0	0	0	33	0	0	33	45	0	0	0	45	78	374
12:30:00	0	0	0	0	0	0	61	0	0	61	35	0	0	0	35	96	354
12:45:00	0	0	0	0	0	0	51	0	0	51	45	0	0	0	45	96	347
13:00:00	0	0	0	0	0	0	45	0	0	45	52	0	0	0	52	97	367
13:15:00	0	0	0	0	0	0	48	0	0	48	63	0	0	0	63	111	400
13:30:00	0	0	0	0	0	0	51	0	0	51	52	0	0	0	52	103	407
13:45:00	0	0	0	0	0	0	56	0	0	56	52	1	0	0	53	109	420
14:00:00	0	0	0	0	0	0	49	0	0	49	33	0	0	0	33	82	405

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SUITE 200 8800 DUFFERIN ST
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CANADA

14:15:00	1	0	0	0	1	0	53	0	0	53	71	0	0	0	71	125	419
14:30:00	0	0	0	0	0	0	48	0	0	48	72	0	0	0	72	120	436
14:45:00	0	0	0	0	0	1	57	0	0	58	78	0	0	0	78	136	463
15:00:00	0	0	0	0	0	0	50	0	0	50	75	0	0	0	75	125	506
15:15:00	0	0	0	0	0	0	54	0	0	54	86	0	0	0	86	140	521
15:30:00	0	0	0	0	0	0	53	0	0	53	87	0	1	0	88	141	542
15:45:00	1	0	0	0	1	0	59	0	0	59	92	0	0	0	92	152	558
16:00:00	0	0	0	0	0	0	50	0	0	50	92	0	0	0	92	142	575
16:15:00	1	0	0	0	1	1	49	0	0	50	85	0	0	0	85	136	571
16:30:00	0	0	0	0	0	0	79	0	0	79	102	0	0	0	102	181	611
16:45:00	0	0	0	0	0	0	47	0	0	47	84	0	0	0	84	131	590
17:00:00	0	0	0	0	0	0	64	0	0	64	111	0	0	0	111	175	623
17:15:00	0	0	0	0	0	0	81	0	0	81	94	0	0	0	94	175	662
17:30:00	0	0	0	0	0	0	36	0	0	36	103	0	0	0	103	139	620
17:45:00	0	0	0	0	0	0	44	0	0	44	75	0	1	0	76	120	609
Grand Total	4	0	0	0	4	2	2765	0	0	2767	2706	2	3	0	2711	**5482**	-
Approach%	100%	0%	0%		-	0.1%	99.9%	0%		-	99.8%	0.1%	0.1%		-	-	-
Totals %	0.1%	0%	0%		0.1%	0%	50.4%	0%		50.5%	49.4%	0%	0.1%		49.5%	-	-
Heavy	1	0	0		-	0	314	0		-	276	1	0		-	-	-
Heavy %	25%	0%	0%		-	0%	11.4%	0%		-	10.2%	50%	0%		-	-	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	-	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: REGIONAL HIGHWAY 47 & LAFARGE GOODWOOD PIT SITE ACCESS
Date: Tue, Aug 24, 2021 Deployment Lead: David Chu

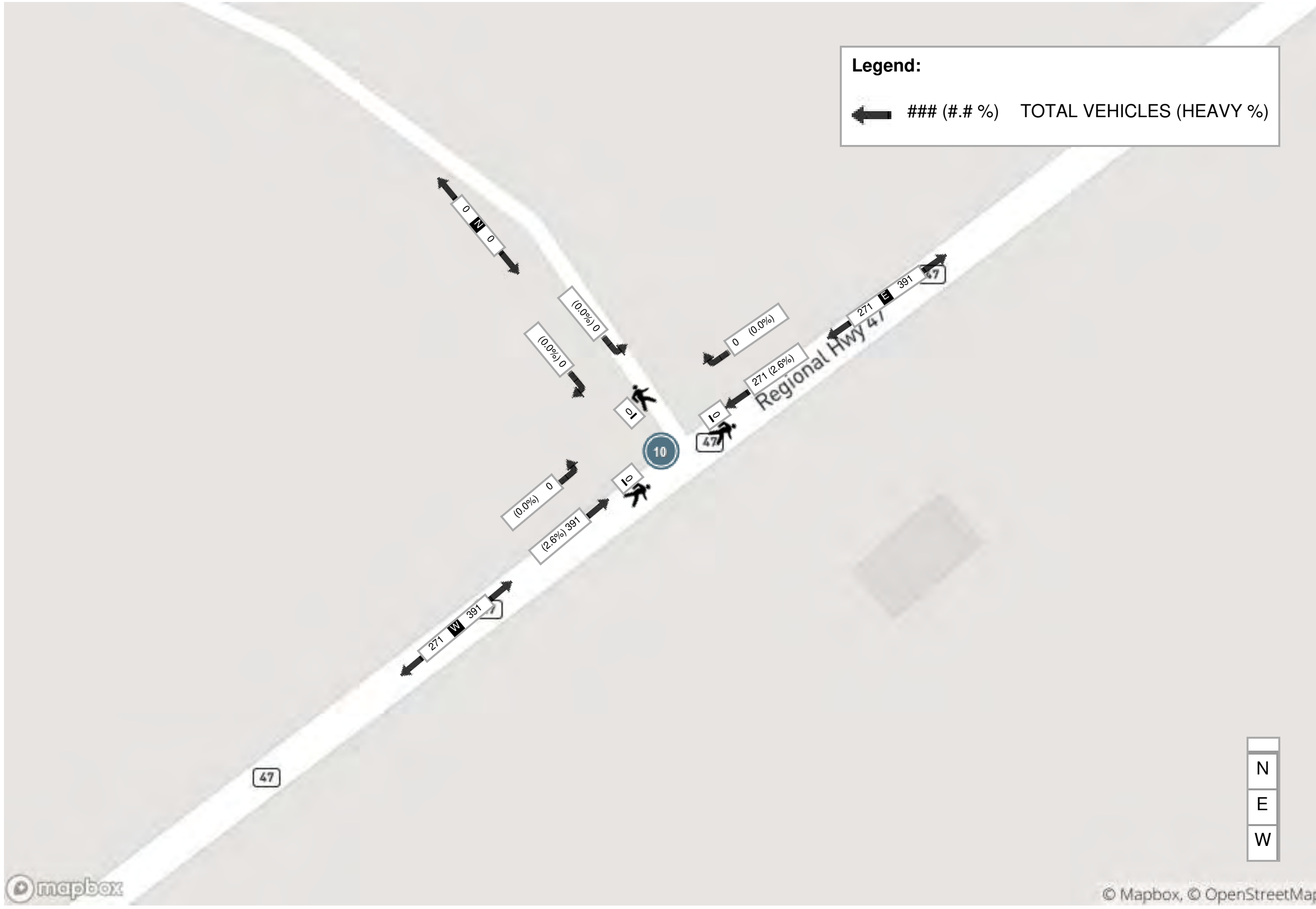
The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Clear Sky (17.4 °C)

Start Time	N Approach LAFARGE GOODWOOD PIT SITE ACCESS					E Approach REGIONAL HWY 47					W Approach REGIONAL HWY 47					Int. Total (15 min)
	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	
16:30:00	0	0	0	0	0	0	79	0	0	79	102	0	0	0	102	181
16:45:00	0	0	0	0	0	0	47	0	0	47	84	0	0	0	84	131
17:00:00	0	0	0	0	0	0	64	0	0	64	111	0	0	0	111	175
17:15:00	0	0	0	0	0	0	81	0	0	81	94	0	0	0	94	175
Grand Total	0	0	0	0	0	0	271	0	0	271	391	0	0	0	391	**662**
Approach%	0%	0%	0%		-	0%	100%	0%		-	100%	0%	0%		-	-
Totals %	0%	0%	0%		0%	0%	40.9%	0%		40.9%	59.1%	0%	0%		59.1%	-
PHF	0	0	0		0	0	0.84	0		0.84	0.88	0	0		0.88	-
Heavy	0	0	0		0	0	7	0		7	10	0	0		10	-
Heavy %	0%	0%	0%		0%	0%	2.6%	0%		2.6%	2.6%	0%	0%		2.6%	-
Lights	0	0	0		0	0	264	0		264	381	0	0		381	-
Lights %	0%	0%	0%		0%	0%	97.4%	0%		97.4%	97.4%	0%	0%		97.4%	-
Single-Unit Trucks	0	0	0		0	0	3	0		3	4	0	0		4	-
Single-Unit Trucks %	0%	0%	0%		0%	0%	1.1%	0%		1.1%	1%	0%	0%		1%	-
Buses	0	0	0		0	0	1	0		1	1	0	0		1	-
Buses %	0%	0%	0%		0%	0%	0.4%	0%		0.4%	0.3%	0%	0%		0.3%	-
Articulated Trucks	0	0	0		0	0	1	0		1	1	0	0		1	-
Articulated Trucks %	0%	0%	0%		0%	0%	0.4%	0%		0.4%	0.3%	0%	0%		0.3%	-
Aggregate Trucks	0	0	0		0	0	2	0		2	4	0	0		4	-
Aggregate Trucks %	0%	0%	0%		0%	0%	0.7%	0%		0.7%	1%	0%	0%		1%	-

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Clear Sky (17.4 °C)



Regional Highway 47 at Lafarge Goodwood Pit Site Access - AM Peak Hour Summary (2021-08-24)

		N Approach LAFARGE GOODWOOD PIT SITE ACCESS					E Approach REGIONAL HWY 47					W Approach REGIONAL HWY 47					
	START TIME	Left	Right	UTurn	Peds	Approach Total	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	UTurn	Peds	Approach Total	
	06:45:00	0	0	0	0	0	94	0	0	0	94	0	27	0	0	27	121
	07:00:00	0	0	0	0	0	70	0	0	0	70	0	27	0	0	27	97
	07:15:00	0	0	0	0	0	70	0	0	0	70	0	40	0	0	40	110
	07:30:00	0	0	0	0	0	99	0	0	0	99	0	49	0	0	49	148
	Grand Total	0	0	0	0	0	333	0	0	0	333	0	143	0	0	143	476
Lights	06:45:00	0	0	0	0	0	84	0	0	0	84	0	23	0	0	23	107
	07:00:00	0	0	0	0	0	64	0	0	0	64	0	18	0	0	18	82
	07:15:00	0	0	0	0	0	66	0	0	0	66	0	36	0	0	36	102
	07:30:00	0	0	0	0	0	91	0	0	0	91	0	44	0	0	44	135
	Light Total	0	0	0	0	0	305	0	0	0	305	0	121	0	0	121	426
Single Trucks	06:45:00	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	3
	07:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:15:00	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
	07:30:00	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	4
	Single Truck Total	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	8
Buses	06:45:00	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
	07:00:00	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
	07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:30:00	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
	Buses Total	0	0	0	0	0	1	0	0	0	1	0	2	0	0	2	3
Articulated Trucks	06:45:00	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
	07:00:00	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	5
	07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07:30:00	0	0	0	0	0	2	0	0	0	2	0	3	0	0	3	5
	Articulated Truck Total	0	0	0	0	0	3	0	0	0	3	0	8	0	0	8	11
Aggregate Trucks	06:45:00	0	0	0	0	0	5	0	0	0	5	0	4	0	0	4	9
	07:00:00	0	0	0	0	0	6	0	0	0	6	0	3	0	0	3	9
	07:15:00	0	0	0	0	0	3	0	0	0	3	0	4	0	0	4	7
	07:30:00	0	0	0	0	0	2	0	0	0	2	0	1	0	0	1	3
	Aggregate Truck Total	0	0	0	0	0	16	0	0	0	16	0	12	0	0	12	28
Heavies	06:45:00	0	0	0	0	0	10	0	0	0	10	0	4	0	0	4	14
	07:00:00	0	0	0	0	0	6	0	0	0	6	0	9	0	0	9	15
	07:15:00	0	0	0	0	0	4	0	0	0	4	0	4	0	0	4	8
	07:30:00	0	0	0	0	0	8	0	0	0	8	0	5	0	0	5	13
	Heavies Total	0	0	0	0	0	28	0	0	0	28	0	22	0	0	22	50

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Turning Movement Count (8 . BROCK ROAD & REGIONAL HIGHWAY 47)

Start Time	E Approach REGIONAL HWY 47					S Approach BROCK RD					W Approach REGIONAL HWY 47					Int. Total (15 min)	Int. Total (1 hr)
	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	UTurn W:W	Peds W:	Approach Total		
06:00:00	59	30	0	0	89	12	5	0	0	17	0	13	0	0	13	119	
06:15:00	59	21	0	0	80	8	2	0	0	10	3	12	0	0	15	105	
06:30:00	66	25	0	0	91	4	2	0	0	6	4	19	0	0	23	120	
06:45:00	82	37	0	0	119	24	4	0	0	28	4	15	0	0	19	166	510
07:00:00	69	38	0	0	107	23	1	0	0	24	4	25	0	0	29	160	551
07:15:00	71	36	0	0	107	22	5	0	0	27	2	35	0	0	37	171	617
07:30:00	86	32	0	0	118	28	6	0	0	34	4	45	0	0	49	201	698
07:45:00	58	35	0	0	93	25	3	0	0	28	8	47	0	0	55	176	708
08:00:00	63	31	0	0	94	25	7	0	0	32	3	35	0	0	38	164	712
08:15:00	69	27	0	0	96	23	1	0	0	24	7	36	0	0	43	163	704
08:30:00	66	29	0	0	95	30	8	0	0	38	2	46	0	0	48	181	684
08:45:00	61	30	0	0	91	18	6	0	0	24	5	51	0	0	56	171	679
09:00:00	48	22	0	0	70	28	5	0	0	33	5	45	0	0	50	153	668
09:15:00	54	28	0	0	82	23	3	0	0	26	3	35	0	0	38	146	651
09:30:00	48	21	0	0	69	26	6	0	0	32	5	34	0	0	39	140	610
09:45:00	56	25	0	0	81	29	8	0	0	37	4	41	0	0	45	163	602
10:00:00	48	28	0	0	76	18	5	0	0	23	7	47	0	0	54	153	602
10:15:00	44	28	0	0	72	21	7	0	0	28	7	40	0	0	47	147	603
10:30:00	37	24	0	0	61	26	3	0	0	29	3	35	0	0	38	128	591
10:45:00	38	24	0	0	62	22	3	0	0	25	6	39	0	0	45	132	560
11:00:00	50	17	0	0	67	27	5	0	0	32	4	49	0	0	53	152	559
11:15:00	58	23	0	0	81	26	2	0	0	28	7	41	0	0	48	157	569
11:30:00	44	29	0	0	73	21	2	0	0	23	5	60	0	0	65	161	602
11:45:00	61	14	0	0	75	26	5	0	0	31	5	34	0	0	39	145	615
12:00:00	41	22	0	0	63	26	4	0	0	30	4	35	0	0	39	132	595
12:15:00	40	29	0	0	69	23	1	0	0	24	2	39	0	0	41	134	572
12:30:00	54	26	0	0	80	32	11	0	0	43	5	39	0	0	44	167	578
12:45:00	42	31	0	0	73	29	1	0	0	30	8	39	0	0	47	150	583
13:00:00	55	36	0	0	91	27	4	0	0	31	7	55	0	0	62	184	635
13:15:00	50	32	0	0	82	31	7	0	0	38	4	49	0	0	53	173	674
13:30:00	38	27	0	0	65	24	3	0	0	27	5	55	0	0	60	152	659
13:45:00	50	23	0	0	73	30	4	0	0	34	4	49	0	0	53	160	669
14:00:00	40	23	0	0	63	27	6	0	0	33	4	34	0	0	38	134	619
14:15:00	51	27	0	0	78	23	6	0	0	29	9	59	0	0	68	175	621

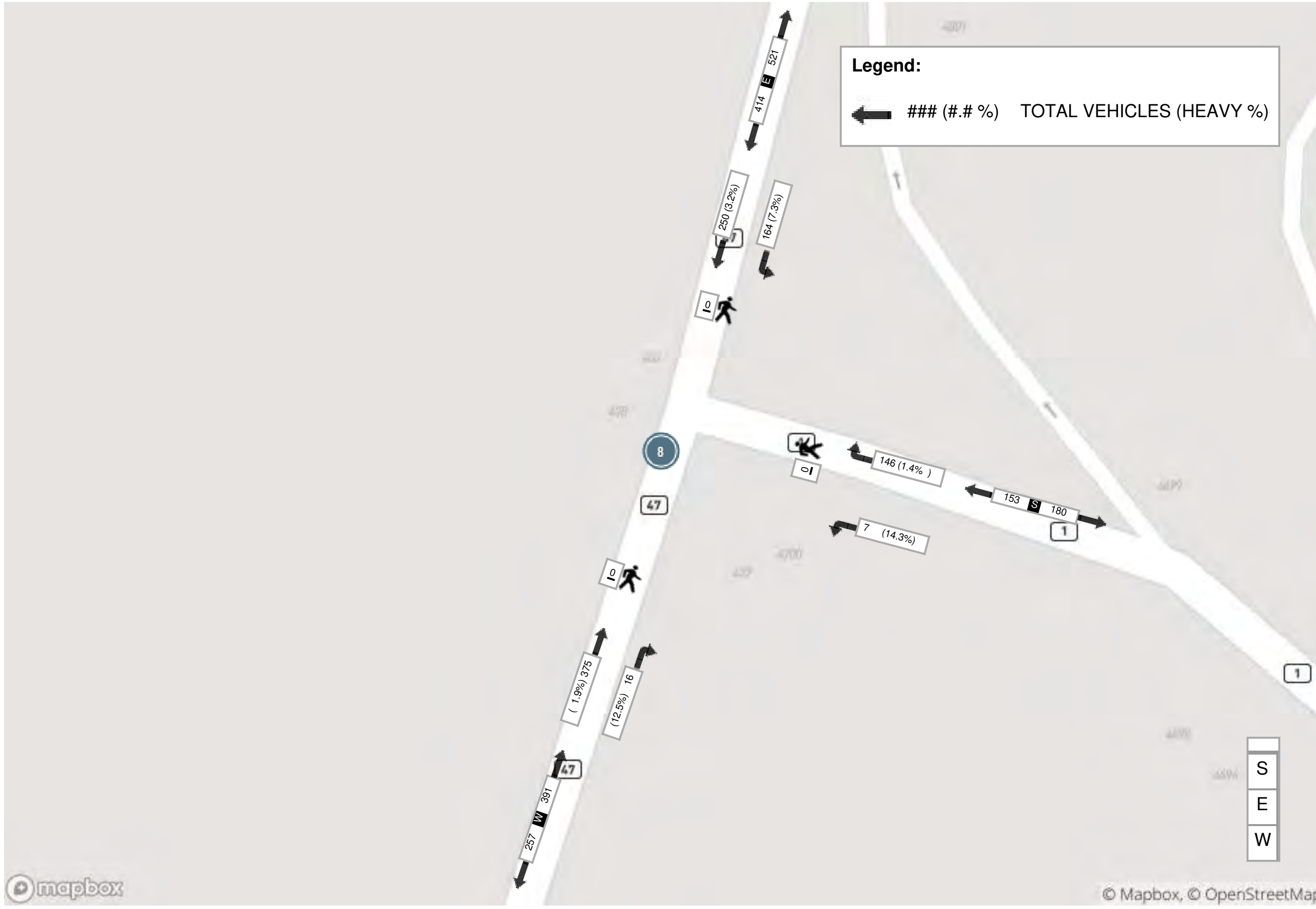
14:30:00	44	18	0	0	62	24	4	0	0	28	6	62	0	0	68	158	627
14:45:00	46	27	0	0	73	33	6	0	0	39	3	72	0	0	75	187	654
15:00:00	57	34	0	0	91	38	7	0	0	45	3	71	0	0	74	210	730
15:15:00	38	24	0	0	62	23	5	0	0	28	8	76	0	0	84	174	729
15:30:00	43	29	0	0	72	40	3	0	0	43	7	75	0	0	82	197	768
15:45:00	57	21	0	0	78	43	2	0	0	45	11	81	0	0	92	215	796
16:00:00	54	32	0	0	86	47	5	0	0	52	6	96	0	0	102	240	826
16:15:00	44	31	0	0	75	49	4	0	0	53	6	82	0	0	88	216	868
16:30:00	75	58	0	0	133	36	2	0	0	38	5	99	0	0	104	275	946
16:45:00	45	37	0	0	82	30	2	0	0	32	5	90	0	0	95	209	940
17:00:00	62	43	0	0	105	36	3	0	0	39	4	97	0	0	101	245	945
17:15:00	68	26	0	0	94	44	0	0	0	44	2	89	0	0	91	229	958
17:30:00	41	28	0	0	69	46	2	0	0	48	1	106	0	0	107	224	907
17:45:00	37	18	0	0	55	38	2	0	0	40	1	75	0	0	76	171	869
Grand Total	2567	1356	0	0	3923	1334	198	0	0	1532	227	2503	0	0	2730	**8185**	-
Approach%	65.4%	34.6%	0%		-	87.1%	12.9%	0%		-	8.3%	91.7%	0%		-	-	-
Totals %	31.4%	16.6%	0%		47.9%	16.3%	2.4%	0%		18.7%	2.8%	30.6%	0%		33.4%	-	-
Heavy	184	98	0		-	78	120	0		-	122	150	0		-	-	-
Heavy %	7.2%	7.2%	0%		-	5.8%	60.6%	0%		-	53.7%	6%	0%		-	-	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	-	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	-	-

Peak Hour: 04:30 PM - 05:30 PM Weather: Clear Sky (17.4 °C)

Start Time	E Approach REGIONAL HWY 47					S Approach BROCK RD					W Approach REGIONAL HWY 47					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
16:30:00	75	58	0	0	133	36	2	0	0	38	5	99	0	0	104	275
16:45:00	45	37	0	0	82	30	2	0	0	32	5	90	0	0	95	209
17:00:00	62	43	0	0	105	36	3	0	0	39	4	97	0	0	101	245
17:15:00	68	26	0	0	94	44	0	0	0	44	2	89	0	0	91	229
Grand Total	250	164	0	0	414	146	7	0	0	153	16	375	0	0	391	**958**
Approach%	60.4%	39.6%	0%		-	95.4%	4.6%	0%		-	4.1%	95.9%	0%		-	-
Totals %	26.1%	17.1%	0%		43.2%	15.2%	0.7%	0%		16%	1.7%	39.1%	0%		40.8%	-
PHF	0.83	0.71	0		0.78	0.83	0.58	0		0.87	0.8	0.95	0		0.94	-
Heavy	8	12	0		20	2	1	0		3	2	7	0		9	-
Heavy %	3.2%	7.3%	0%		4.8%	1.4%	14.3%	0%		2%	12.5%	1.9%	0%		2.3%	-
Lights	242	152	0		394	144	6	0		150	14	368	0		382	-
Lights %	96.8%	92.7%	0%		95.2%	98.6%	85.7%	0%		98%	87.5%	98.1%	0%		97.7%	-
Single-Unit Trucks	3	6	0		9	1	1	0		2	1	2	0		3	-
Single-Unit Trucks %	1.2%	3.7%	0%		2.2%	0.7%	14.3%	0%		1.3%	6.3%	0.5%	0%		0.8%	-
Buses	1	6	0		7	0	0	0		0	0	1	0		1	-
Buses %	0.4%	3.7%	0%		1.7%	0%	0%	0%		0%	0%	0.3%	0%		0.3%	-
Articulated Trucks	1	0	0		1	1	0	0		1	0	1	0		1	-
Articulated Trucks %	0.4%	0%	0%		0.2%	0.7%	0%	0%		0.7%	0%	0.3%	0%		0.3%	-
Aggregate Trucks	3	0	0		3	0	0	0		0	1	3	0		4	-
Aggregate Trucks %	1.2%	0%	0%		0.7%	0%	0%	0%		0%	6.3%	0.8%	0%		1%	-

The Municipal Infrastructure Group
SUITE 200 8800 DUFFERIN ST
VAUGHAN ONTARIO, L4K 0C5
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Clear Sky (17.4 °C)



Brock Road at Regional Highway 47 - AM Peak Hour Summary (2021-08-24)

		E Approach REGIONAL HWY 47					S Approach BROCK RD					W Approach REGIONAL HWY 47					
	START TIME	Left	Thru	UTurn	Peds	Approach Total	Left	Right	UTurn	Peds	Approach Total	Thru	Right	UTurn	Peds	Approach Total	
	07:15:00	36	71	0	0	107	5	22	0	0	27	35	2	0	0	37	171
	07:30:00	32	86	0	0	118	6	28	0	0	34	45	4	0	0	49	201
	07:45:00	35	58	0	0	93	3	25	0	0	28	47	8	0	0	55	176
	08:00:00	31	63	0	0	94	7	25	0	0	32	35	3	0	0	38	164
	Grand Total	134	278	0	0	412	21	100	0	0	121	162	17	0	0	179	712
Lights	07:15:00	33	66	0	0	99	3	18	0	0	21	31	0	0	0	31	151
	07:30:00	32	80	0	0	112	2	26	0	0	28	42	2	0	0	44	184
	07:45:00	32	53	0	0	85	0	23	0	0	23	43	2	0	0	45	153
	08:00:00	28	61	0	0	89	1	25	0	0	26	29	2	0	0	31	146
	Light Total	125	260	0	0	385	6	92	0	0	98	145	6	0	0	151	634
Single Truc	07:15:00	2	0	0	0	2	2	3	0	0	5	0	0	0	0	0	7
	07:30:00	0	3	0	0	3	0	2	0	0	2	0	0	0	0	0	5
	07:45:00	1	2	0	0	3	0	1	0	0	1	1	0	0	0	1	5
	08:00:00	1	1	0	0	2	1	0	0	0	1	1	0	0	0	1	4
	Single Truck Total	4	6	0	0	10	3	6	0	0	9	2	0	0	0	2	21
Buses	07:15:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
	07:30:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
	07:45:00	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	2
	08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Buses Total	0	1	0	0	1	0	0	0	0	0	3	0	0	0	3	4
Articulated	07:15:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
	07:30:00	0	2	0	0	2	0	0	0	0	0	2	0	0	0	2	4
	07:45:00	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	2
	08:00:00	1	0	0	0	1	0	0	0	0	0	4	0	0	0	4	5
	Articulated Truck Total	1	3	0	0	4	1	0	0	0	1	7	0	0	0	7	12
Aggregate	07:15:00	1	5	0	0	6	0	1	0	0	1	2	2	0	0	4	11
	07:30:00	0	1	0	0	1	4	0	0	0	4	0	2	0	0	2	7
	07:45:00	2	1	0	0	3	2	1	0	0	3	2	6	0	0	8	14
	08:00:00	1	1	0	0	2	5	0	0	0	5	1	1	0	0	2	9
	Aggregate Truck Total	4	8	0	0	12	11	2	0	0	13	5	11	0	0	16	41
Heavies	07:15:00	3	5	0	0	8	2	4	0	0	6	4	2	0	0	6	20
	07:30:00	0	6	0	0	6	4	2	0	0	6	3	2	0	0	5	17
	07:45:00	3	5	0	0	8	3	2	0	0	5	4	6	0	0	10	23
	08:00:00	3	2	0	0	5	6	0	0	0	6	6	1	0	0	7	18
	Heavies Total	9	18	0	0	27	15	8	0	0	23	17	11	0	0	28	78

INTERSECTION SIGNAL TIMING REPORT

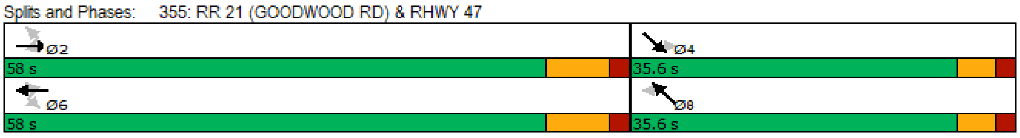
Location	Hwy. 47 and Goodwood Rd. (RR 21)				
Date	September 15/2020	**C&E No.**	33903368	**Prepared by**	C. Maw
Prepared for	The Municipal Infrastructure Group Ltd.				

Runs local at all times.

Phase Number	2	4	6	8
Movement	EBTL	SETL	WBTL	NWTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	58	35.6	58	35.6
Maximum Split (%)	62.0%	38.0%	62.0%	38.0%
Minimum Split (s)	35	25	35	25
Yellow Time (s)	5.9	3.7	5.9	3.7
All-Red Time (s)	2.1	1.9	2.1	1.9
Minimum Initial (s)	25	12	25	12
Vehicle Extension (s)	4.2	3	4.2	3
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	20	14	20	14
Flash Dont Walk (s)	7	5	7	5

Intersection Summary	
Cycle Length	93.6
Control Type	Semi Act-Uncoord
Natural Cycle	70

Splits and Phases: 355: RR 21 (GOODWOOD RD) & RHWY 47



Dynamic max in use for E/W phases. Split time can fluctuate between min and max split times in 5 second intervals based on demand.

**Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.*

LOCATION:	Bloomington Rd (YR 40) & York Durham Line (YR 30)	MUNICIPALITY:	Stouffville
CTCS:	359	COMPUTER SYSTEM:	Centracs
MODE/COMMENT:	SA	CONTROLLER/CABINET TYPE:	Econolite Cobalt / TS2T1
PREPARED/CHECKED BY:	AM	CONFLICT FLASH:	Red & Red
PREPARATION DATE:	July 3, 2020	DESIGN WALK SPEED:	1.0 m/s (FDW based on full crossing at 1.0 m/s)
IMPLEMENTATION DATE:	July 3, 2020	CHANNEL/DROP:	

N

NEMA Phase (York)		PM 16:00-18:00 M-F	Free 18:00 - 16:00 M-F; 24 Hrs Sat & Sun	Phase Mode (Fixe/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 99		
	System Plan	Plan 1	Plan 99		
1. E/B Left Turn Arrow	WLK			Callable/Extendable by Setback Loop	
	FDW				
	MIN 7				
	EXT 3				
	MAX1 10				
	MAX2 0				
	AMB 3				
	ALR 1				
	SPLIT	14			
2. Westbound	WLK			Fixed	NS phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum NSG is served. If ongoing vehicle demand exists on the stopbar loop, the NSG is capable of providing vehicle extensions up to the maximum green split during coordinated operation or MAX1 during Free operation.Unused extension time is given to the EWG.
	FDW				
	MIN 50				
	EXT 0				
	MAX1 50				
	MAX2 0				
	AMB 5.0				
	ALR 3.0				
Bloomington Rd	SPLIT	65	0		
3. NOT USED	WLK				
	FDW				
	MIN				
	EXT				
	MAX1				
	MAX2				
	AMB				
	ALR				
	SPLIT				
4. Southbound	WLK			Callable by stopbar loop Extendable by stopbar loop.	
	FDW				
	MIN 10				
	EXT 5				
	MAX1 35				
	MAX2 0				
	AMB 5.0				
	ALR 3.0				
York Durham Line	SPLIT	41	0		
5. W/B Left Turn Arrow	WLK			Callable/Extendable by Setback Loop	
	FDW				
	MIN 7				
	EXT 3				
	MAX1 10				
	MAX2 0				
	AMB 3				
	ALR 1				
	SPLIT	14			
6. Eastbound	WLK			Fixed	
	FDW				
	MIN 50				
	EXT 0				
	MAX1 50				
	MAX2 0				
	AMB 5.0				
	ALR 3.0				
Bloomington Rd	SPLIT	65	0		
7. NOT USED	WLK				
	FDW				
	MIN				
	EXT				
	MAX1				
	MAX2				
	AMB				
	ALR				
	SPLIT				
8. Northbound	WLK			Callable by stopbar loop Extendable by stopbar loop.	
	FDW				
	MIN 10				
	EXT 5				
	MAX1 35				
	MAX2 0				
	AMB 5				
	ALR 3.0				
York Durham Line	SPLIT	41	0		
	CL	120	0 (FREE)		
	OF	0	0 (FREE)		
	VP	0	0 (FREE)		

LEGEND:

SA - Semi-Actuated signal
WLK - Walk time
FDW - Flashing Don't Walk time
MIN - Minimum green time
EXT - Extension time
MAX1 - Maximum green time 1
MAX2 - Maximum green time 2
AMB - Amber
ALR -All Red
CL - Cycle Length
OF - Offset
VP - Vehicle Permissive
NSWK - North/South Walk
EWWK - East/West Walk
NSG - North/South Green
EWG - East/West Green
NSFD - North/South Flashing Don't Walk
EWFD - East/West Flashing Don't Walk
TSP - Transit Priority
APS - Audible Pedestrian Signal

NOTES:

TMC Tabular Report

York Durham Line (R.R. 30) @ Regional Highway 47

TMC No: 0300400000 **Intersection ID:** 2320 **Count ID:** 35702018103 **Count Date:** 10/03/2019, Thu

AM Peak 07:30

Ped. ⇅ 0 | Ped. ⇄ 0

	↵	↓	↳	↑
PHF	0.88	0.88	0.70	
Trucks %	61%	13%	29%	
Trucks	34	28	8	84
Cars	22	184	20	187

	PHF	Trucks %	Trucks	Cars
←			164	546
↱	0.81	59%	23	16
→	0.86	32%	98	207
↴	0.78	23%	20	67

	Cars	Trucks	Trucks %	PHF
↰	45	33	42%	0.81
←	475	123	21%	0.90
↲	195	42	18%	0.80
→	301	135		

	↓	↰	↑	↱
Cars	446	49	126	74
Trucks	90	7	28	29
Trucks %		13%	18%	28%
PHF		0.78	0.84	0.95

Ped. ⇄ 0 | Ped. ⇅ 0

MD Peak 12:15

Ped. ⇅ 0 | Ped. ⇄ 0

	↵	↓	↳	↑
PHF	0.81	0.89	0.75	
Trucks %	62%	34%	50%	
Trucks	34	36	12	86
Cars	21	71	12	79

	PHF	Trucks %	Trucks	Cars
←			135	222
↱	0.73	73%	30	11
→	0.92	34%	83	161
↴	0.79	36%	8	14

	Cars	Trucks	Trucks %	PHF
↰	16	16	50%	0.89
←	186	90	33%	0.95
↲	76	27	26%	0.95
→	264	136		

	↓	↰	↑	↱
Cars	161	15	52	91
Trucks	71	11	40	41
Trucks %		42%	43%	31%
PHF		0.59	0.79	0.92

Ped. ⇄ 0 | Ped. ⇅ 0

PM Peak 16:30

Ped. ⇅ 0 | Ped. ⇄ 0

	↵	↓	↳	↑
PHF	0.82	0.83	0.80	
Trucks %	27%	8%	25%	
Trucks	13	12	12	58
Cars	36	147	36	298

	PHF	Trucks %	Trucks	Cars
←			81	379
↱	0.75	23%	9	30
→	0.94	13%	85	552
↴	0.90	20%	12	49

	Cars	Trucks	Trucks %	PHF
↰	42	14	25%	0.67
←	297	55	16%	0.94
↲	85	17	17%	0.88
→	788	130		

	↓	↰	↑	↱
Cars	281	46	226	200
Trucks	41	13	35	33
Trucks %		22%	13%	14%
PHF		0.82	0.95	0.95

Ped. ⇄ 0 | Ped. ⇅ 0

Total Count 3 hours*

Ped. ⇅ 0 | Ped. ⇄ 0

	↵	↓	↳	↑
Trucks %	54%	16%	32%	
Trucks	205	181	88	532
Cars	176	961	183	1454

	PHF	Trucks %	Trucks	Cars
←			891	2855
↱		46%	135	161
→		22%	607	2197
↴		21%	76	291

	Cars	Trucks	Trucks %	PHF
↰	267	149	36%	
←	2417	608	20%	
↲	866	204	19%	
→	3288	951		

	↓	↰	↑	↱
Cars	2118	262	1026	908
Trucks	461	78	248	256
Trucks %		23%	19%	22%

Ped. ⇄ 0 | Ped. ⇅ 0

TMC 15 Min Report

York Durham Line (R.R. 30) @ Regional Highway 47

TMC No: 0300400000 **Intersection ID:** 2320 **Count ID:** 35702018103 **Count Date:** 10/03/2019, Thu

Time	NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										Total
	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Period 1																																									
06:00	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
06:15	2	21	1	1	4	7	0	0	0	0	27	132	10	3	4	0	0	0	0	0	4	17	8	5	1	1	0	0	0	0	4	17	4	5	10	1	0	0	0	0	289
06:30	5	29	3	2	1	7	0	0	0	0	32	120	8	2	15	3	0	0	0	0	7	17	13	3	3	2	0	0	0	0	6	21	4	4	12	2	0	0	0	0	321
06:45	5	31	5	0	3	10	0	0	0	0	28	113	16	1	34	2	0	0	0	0	7	22	22	2	1	1	0	0	0	0	5	29	5	6	1	3	0	0	0	0	352
07:00	7	43	2	3	2	8	0	0	0	0	44	123	9	4	19	4	0	0	0	0	7	30	16	2	5	4	0	0	0	0	8	32	9	3	10	2	0	0	0	0	396
07:15	6	51	4	1	5	12	0	0	0	0	43	91	7	7	36	5	0	0	0	0	6	26	13	1	4	6	0	0	0	0	5	31	7	4	14	3	0	0	0	0	388
07:30	**3**	**55**	**7**	**2**	**5**	**5**	**0**	**0**	**0**	**0**	**34**	**121**	**12**	**8**	**35**	**10**	**0**	**0**	**0**	**0**	**8**	**30**	**16**	**3**	**4**	**7**	**0**	**0**	**0**	**0**	**7**	**46**	**15**	**4**	**23**	**5**	**0**	**0**	**0**	**0**	**465**
07:45	**5**	**46**	**3**	**3**	**7**	**13**	**0**	**0**	**0**	**0**	**56**	**133**	**18**	**18**	**24**	**6**	**0**	**0**	**0**	**0**	**15**	**31**	**20**	**1**	**10**	**6**	**0**	**0**	**0**	**0**	**2**	**53**	**10**	**10**	**28**	**4**	**0**	**0**	**0**	**0**	**522**
08:00	**8**	**39**	**6**	**2**	**6**	**9**	**0**	**0**	**0**	**0**	**56**	**130**	**4**	**6**	**36**	**12**	**0**	**0**	**0**	**0**	**10**	**35**	**20**	**1**	**11**	**7**	**0**	**0**	**0**	**0**	**3**	**57**	**23**	**7**	**32**	**5**	**0**	**0**	**0**	**0**	**525**
08:15	**4**	**44**	**6**	**1**	**10**	**7**	**0**	**0**	**0**	**0**	**49**	**91**	**11**	**10**	**28**	**5**	**0**	**0**	**0**	**0**	**16**	**30**	**18**	**2**	**3**	**9**	**0**	**0**	**0**	**0**	**4**	**51**	**19**	**2**	**15**	**6**	**0**	**0**	**0**	**0**	**441**
08:30	4	36	2	2	10	8	0	0	0	0	48	92	13	8	23	8	0	0	0	0	17	36	29	2	9	10	0	0	0	0	3	52	10	4	19	2	0	0	0	0	447
08:45	3	39	4	4	8	5	0	0	0	0	27	83	9	10	21	8	0	0	0	0	10	33	17	1	5	5	0	0	0	0	5	42	18	2	18	3	0	0	0	0	380
09:00	5	33	5	3	12	5	0	0	0	0	45	88	11	13	18	7	0	0	0	0	11	25	18	4	5	6	0	0	0	0	1	47	11	5	13	3	0	0	0	0	394
09:15	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
Period 2																																									
11:30	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
11:45	2	17	4	6	7	12	0	0	0	0	22	59	2	6	21	9	0	0	0	0	4	14	15	0	7	9	0	0	0	0	5	43	2	4	21	0	0	0	0	0	291
12:00	2	21	4	5	5	10	0	0	0	0	20	46	5	7	15	6	0	0	0	0	5	9	20	2	9	5	0	0	0	0	11	47	4	1	23	0	0	0	0	0	282
12:15	**3**	**18**	**7**	**5**	**8**	**9**	**0**	**0**	**0**	**0**	**18**	**40**	**3**	**9**	**26**	**5**	**0**	**0**	**0**	**0**	**3**	**11**	**22**	**2**	**10**	**11**	**0**	**0**	**0**	**0**	**3**	**40**	**3**	**7**	**26**	**3**	**0**	**0**	**0**	**0**	**292**
12:30	**4**	**16**	**5**	**4**	**10**	**12**	**0**	**0**	**0**	**0**	**19**	**48**	**4**	**7**	**23**	**5**	**0**	**0**	**0**	**0**	**6**	**11**	**19**	**5**	**7**	**10**	**0**	**0**	**0**	**0**	**2**	**35**	**4**	**7**	**22**	**1**	**0**	**0**	**0**	**0**	**286**
12:45	**3**	**19**	**3**	**0**	**6**	**8**	**0**	**0**	**0**	**0**	**19**	**46**	**2**	**6**	**20**	**5**	**0**	**0**	**0**	**0**	**5**	**14**	**28**	**1**	**10**	**8**	**0**	**0**	**0**	**0**	**4**	**37**	**3**	**10**	**19**	**1**	**0**	**0**	**0**	**0**	**277**
13:00	**2**	**18**	**6**	**3**	**12**	**5**	**0**	**0**	**0**	**0**	**20**	**52**	**7**	**5**	**21**	**1**	**0**	**0**	**0**	**0**	**1**	**16**	**22**	**3**	**13**	**12**	**0**	**0**	**0**	**0**	**2**	**49**	**4**	**6**	**16**	**3**	**0**	**0**	**0**	**0**	**299**
13:15	2	22	4	1	10	7	0	0	0	0	17	45	2	10	19	2	0	0	0	0	1	12	18	1	8	5	0	0	0	0	1	39	5	2	17	5	0	0	0	0	255
13:30	5	17	2	4	7	6	0	0	0	0	10	51	3	5	22	5	0	0	0	0	9	21	23	3	15	15	0	0	0	0	1	50	5	7	12	1	0	0	0	0	299
Period 3																																									
13:45	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
15:00	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
15:15	4	16	7	2	3	4	0	0	0	0	12	46	6	12	12	2	0	0	0	0	3	29	30	8	8	12	0	0	0	0	5	81	6	7	25	0	0	0	0	0	340
15:30	7	22	4	3	3	4	0	0	0	0	16	32	6	5	16	4	0	0	0	0	5	31	32	5	18	23	0	0	0	0	1	74	10	1	24	2	0	0	0	0	348
15:45	7	27	5	6	7	7	0	0	0	0	22	46	10	8	13	3	0	0	0	0	8	41	34	0	15	20	0	0	0	0	3	90	9	8	31	1	0	0	0	0	421
16:00	8	21	5	4	4	5	0	0	0	0	16	59	11	6	11	9	0	0	0	0	11	33	28	3	15	9	0	0	0	0	8	121	4	5	28	1	0	0	0	0	425
16:15	12	23	8	4	8	6	0	0	0	0	32	52	15	6	16	5	0	0	0	0	8	60	59	3	14	15	0	0	0	0	8	102	14	2	34	4	0	0	0	0	510
16:30	**6**	**19**	**6**	**2**	**5**	**6**	**0**	**0**	**0**	**0**	**22**	**63**	**15**	**7**	**21**	**6**	**0**	**0**	**0**	**0**	**9**	**56**	**44**	**8**	**13**	**17**	**0**	**0**	**0**	**0**	**7**	**116**	**8**	**4**	**30**	**6**	**0**	**0**	**0**	**0**	**496**
16:45	**8**	**38**	**10**	**5**	**2**	**5**	**0**	**0**	**0**	**0**	**21**	**81**	**8**	**5**	**13**	**4**	**0**	**0**	**0**	**0**	**16**	**55**	**55**	**2**	**12**	**6**	**0**	**0**	**0**	**0**	**5**	**146**	**14**	**3**	**16**	**3**	**0**	**0**	**0**	**0**	**533**
17:00	**10**	**44**	**13**	**2**	**4**	**2**	**0**	**0**	**0**	**0**	**19**	**77**	**13**	**2**	**12**	**1**	**0**	**0**	**0**	**0**	**13**	**52**	**52**	**2**	**8**	**8**	**0**	**0**	**0**	**0**	**7**	**138**	**12**	**0**	**22**	**2**	**0**	**0**	**0**	**0**	**515**
17:15	**12**	**46**	**7**	**3**	**1**	**0**	**0**	**0**	**0**	**0**	**23**	**76**	**6**	**3**	**9**	**3**	**0**	**0**	**0**	**0**	**8**	**63**	**49**	**1**	**2**	**2**	**0**	**0**	**0**	**0**	**11**	**152**	**15**	**2**	**17**	**1**	**0**	**0**	**0**	**0**	**512**
17:30	6	39	12	1	3	1	0	0	0	0	21	74	7	1	10	2	0	0	0	0	9	57	44	1	1	4	0	0	0	0	6	134	9	2	12	1	0	0	0	0	457
17:45	13	26	8	2	1	0	0	0	0	0	16	55	6	2	8	0	0	0	0	0	12	54	63	0	2	0	0	0	0	0	10	116	13	1	8	2	0	0	0	0	418
18:00	10	25	8	2	2	0	0	0	0	0	12	52	8	2	7	2	0	0	0	0	8	55	41	1	0	1	0	0	0	0	8	109	12	0	9	0	0	0	0	0	374
18:15	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
18:30	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*

19199 - Stouffville Pit TIS

Turning Movement Count Comparison - York Durham Line at Regional Highway 47

AM

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total
Aug-2021	65	130	103	55	161	67	79	317	51	118	422	60	**1628**
Oct-2019	49	126	74	20	184	22	16	207	67	195	475	45	**1480**
Difference (2021 - 2019)	16	4	29	35	-23	45	63	110	-16	-77	-53	15	
Percent Difference	33%	3%	39%	175%	-13%	205%	394%	53%	-24%	-39%	-11%	33%	

PM

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total
Aug-2021	55	194	156	54	180	59	44	600	74	154	426	43	**2039**
Oct-2019	46	226	200	36	147	36	30	552	49	85	297	42	**1746**
Difference (2021 - 2019)	9	-32	-44	18	33	23	14	48	25	69	129	1	
Percent Difference	20%	-14%	-22%	50%	22%	64%	47%	9%	51%	81%	43%	2%	

APPENDIX D

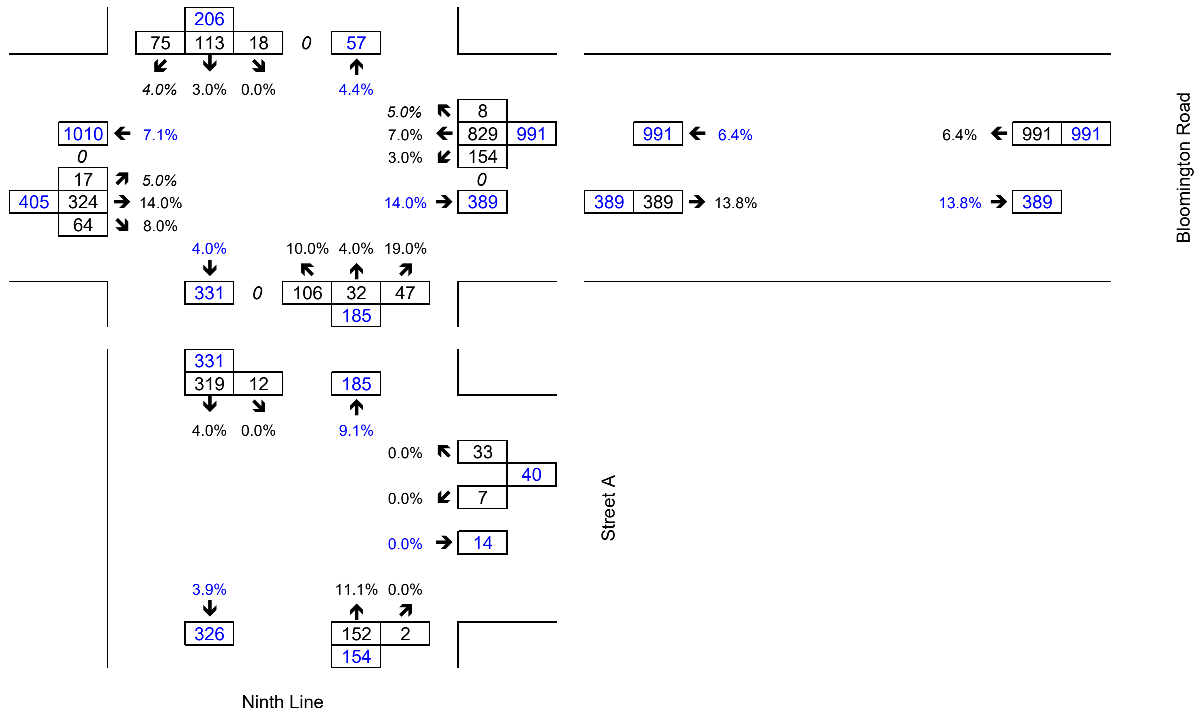
Background Development Volumes

BLOOMINGTON SUBDIVISIONS
19T-86101 & 19T-83015 ACCESS REVIEW
BLOOMINGTON ROAD & NINTH LINE
WHITCHURCH-STOUFFVILLE, ONTARIO

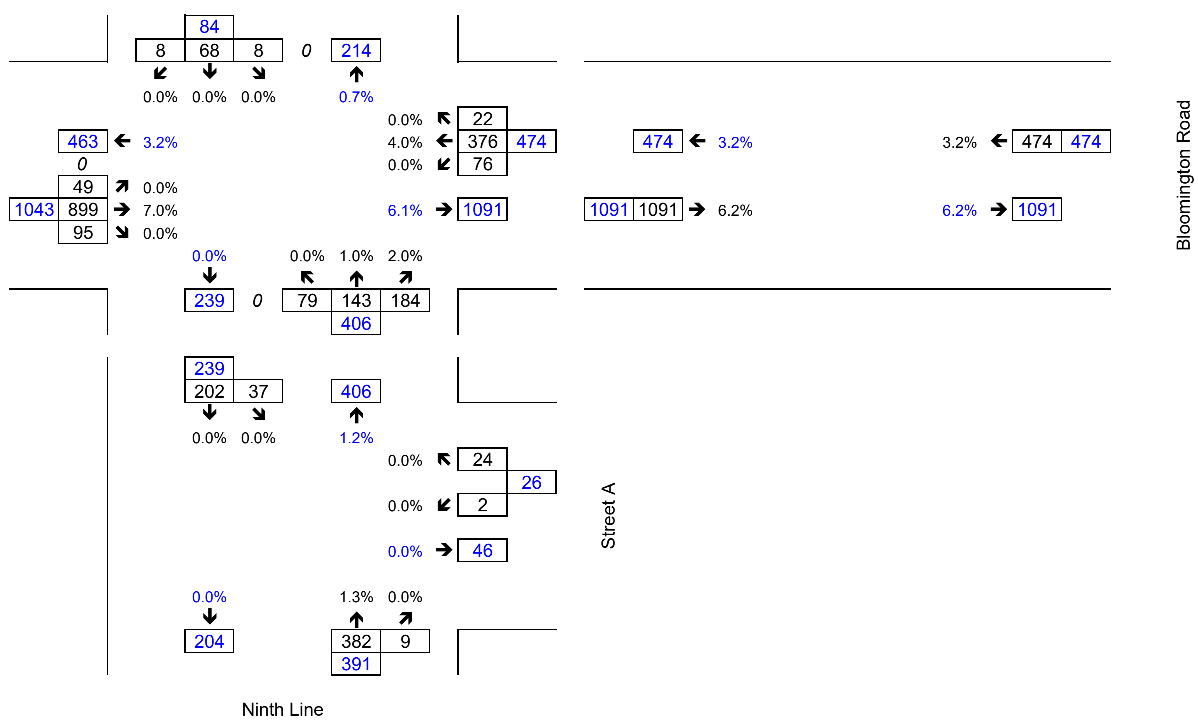
MARK ENGINEERING
MAY 2, 2014

2018 Total Peak Hour Traffic

Morning Peak Hour



Afternoon Peak Hour



BACKGROUND DEVELOPMENT VOLUME CALCULATION SUMMARY

Development: Bloomington Subdivisions

AM Outbound to Bloomington Eastbound			**PM Outbound to Bloomington Eastbound**		
Outbound trips (from Street A)	**33**		Outbound trips (from Street A)	**24**	
Turning Distribution (Outbound to north)			Turning Distribution (Outbound to north)		
	Trips	Percentage		Trips	Percentage
Northbound left volume	106	57.3%	Northbound left volume	79	19.5%
Northbound through volume	32	17.3%	Northbound through volume	143	35.2%
Northbound right volume	47	25.4%	Northbound right volume	184	45.3%
Bloomington Rd EB trips = NBR% * NB trips from Street A			Bloomington Rd EB trips = NBR% * NB trips from Street A		
Bloomington Rd AM EB trips	=33*25.4		Bloomington Rd PM EB trips	=24*45.3%	
	8			**11**	

AM Inbound from Bloomington westbound			**PM Inbound from Bloomington Westbound**		
Inbound trips (from Street A)	**12**	trips	Inbound trips (from Street A)	**37**	trips
Turning Distribution (Inbound from north)			<u>Turning Distribution (Inbound from north)</u>		
	Trips	Percentage		Trips	Percentage
Eastbound right volume	64	19.3%	Eastbound right volume	95	39.7%
Southbound through volume	113	34.1%	Southbound through volume	68	28.5%
Westbound left volume	154	46.5%	Westbound left volume	76	31.8%
Bloomington Rd WB trips = WBL * NB trips from Street A			Bloomington Rd WB trips = WBL * NB trips from Street A		
Bloomington Rd AM WB trips	=12*46.5%		Bloomington Rd PM WB trips	=46.5%*12	
	6			**12**	

UNITED SOILS MANAGEMENT
14245 NINTH LINE
TRAFFIC OPERATIONS ASSESSMENT
BLOOMINGTON ROAD & NINTH LINE
WHITCHURCH-STOUFFVILLE, ONTARIO

BA GROUP
DECEMBER 18, 2012.

2.3 Future Traffic Forecasts

2.3.1 Background Corridor Growth

A ten-year traffic forecast has been requested by staff at the Town of Whitchurch-Stouffville to better understand traffic operations in the future. BA Group reviewed historical growth trends along Ninth Line (south of Bloomington Road) based on several previous counts and determined that there has been a negative growth trend south of Ninth Line.

No historical traffic count information was able to be obtained for Bloomington Road so an assumption of 2% growth per year was made based on BA Group's experience with similar rural routes in York Region.

The proposed growth was applied to all movements at the Bloomington Road / Ninth Line intersection resulting in some carry-over growth on Ninth Line North of the Bloomington Road / Ninth Line intersection in front of the site.

2.3.2 Site Traffic Forecasts

There is currently no forecast available of how truck traffic at the pit will change going forward. However, for the purpose of estimating a ten-year forecast, we have conservatively assumed a potential growth in site traffic of up to 800 vehicles per day. This compares to existing volumes in the order of 175- 235 trips per day – or an assumed increase of over 350%.

The assumed increase in daily traffic was converted into hourly traffic volumes for the purpose of this analysis. Table 2 summaries the forecasted trip generation.

Table 2 Forecasted Peak Traffic Demand
Ninth Line / Bloomington Road

	Hourly Traffic											
	Observed Traffic Site Peak Volumes		Observed Traffic Street Peak Volumes		Forecasted Site Peak Volumes (800 vpd)		Forecasted Street Peak Volumes (800 vpd)		Net-New Hourly Trips (Site Peak)		Net-New Hourly Trips (Street Peak)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
North Driveway	70	39	39	19	320	181	176	88	250	142	137	69
South Driveway	10	1	14	0	44	3	64	0	34	2	50	0
Total Both Driveways	80	40	53	19	364	184	240	88	284	144	187	69
Total Daily Peak Period Traffic	120		72		548		328		428		256	

Net-new site traffic volumes were applied to the road network based on existing traffic patterns.

Project # 7272-02
17/12/2012
United Soils Management
(Lee Sand and Gravel)
10yr Horizon (Intersection Peak) AM

Ninth Line

c	Node			121	52			
					0			
			↓	↘	0			
0	0	116	5	53	↙		53	North Site Driveway
0				0	52	118	123	
					↑	↗		
				169	170			
c	Node			169	170			
					2	↖		
			↓		0			
0	0	169	0	30	↙		32	South Site Driveway
0				0	168	32	32	
					↑	↗		
				199	200			
c	Node			199	200			
					11	↖		
	↙	↓	↘	734	←			
895	101	70	28	172	↙		917	Bloomington Road
580		↗	156	60	33	41	440	
		→	371	↖	↑	↗		
		↘	53					
			294	134				

Project # 7272-02
17/12/2012
United Soils Management
(Lee Sand and Gravel)
10yr Horizon (Intersection Peak) PM

Ninth Line

c	Node		65	164				
				0				
		↓		0				
0	0	65	0	56	↙		56	North Site Driveway
0				0	164	32	32	
					↑	↗		
			121	196				
c	Node		121	196				
				0				
		↓		0				
0	0	121	0	0			0	South Site Driveway
0				0	196	0	0	
					↑			
			121	196				
c	Node		121	196				
				17	↖			
	↙	↓	↘	408	←			
527	66	48	7	66	↙		491	Bloomington Road
1029		↗	77	53	103	139	1039	
		→	893	↖	↑	↗		
		↘	60					
			174	295				

BACKGROUND DEVELOPMENT VOLUME CALCULATION SUMMARY

Development: United Soils Management Site					
AM Total Site Trips			**PM Total Site Trips**		
	Trips	Percentage		Trips	Percentage
AM In Site Trips (both driveways)	155	64.6%	PM In Site Trips (both driveways)	32	36.4%
AM Out Site Trips (both driveways)	85	35.4%	PM Out Site Trips (both driveways)	56	63.6%
AM Two-way Site Trips (both driveways)	240		PM Two-way Site Trips (both driveways)	88	
AM Outbound to Bloomington Eastbound			**PM Outbound to Bloomington eastbound**		
AM Net New Trips (from Table 2)	187		PM Net New Trips (from Table 2)	69	
AM Net New Outbound Trips	66		PM Net New Outbound Trips	44	
Percentage of Inbound Trips from south vs north	97.6%		Percentage of Inbound Trips from south vs north	100.0%	
AM Net New Inbound Trips from South	64		PM Net New Inbound Trips from South	44	
Turning Distribution (Outbound to south)			Turning Distribution (Outbound to south)		
	Trips	Percentage		Trips	Percentage
Southbound left volume	28	14.1%	Southbound left volume	7	5.8%
Southbound through volume	70	35.2%	Southbound through volume	48	39.7%
Southbound right volume	101	50.8%	Southbound right volume	66	54.5%
Bloomington Rd EB trips = SBL * Outbound New New AM Trips from south			Bloomington Rd EB trips = SBL * Outbound New New PM Trips from south		
Bloomington Rd AM EB trips	=64*14.1%		Bloomington Rd PM EB trips	=44*5.8%	
	9			**3**	
AM Inbound from Bloomington westbound			**PM Inbound from Bloomington westtbound**		
AM Net New Trips (from Table 2)	187		PM Net New Trips (from Table 2)	69	
AM Net New Inbound Trips	121		PM Net New Inbound Trips	25	
Percentage of Inbound Trips from south vs north	96.8%		Percentage of Inbound Trips from south vs north	100.0%	
AM Net New Inbound Trips from South	117		PM Net New Inbound Trips from South	25	
Turning Distribution (Inbound from south)			Turning Distribution (Inbound from south)		
	Trips	Percentage		Trips	Percentage
Eastbound left volume	156	78.0%	Eastbound left volume	77	39.1%
Northbound through volume	33	16.5%	Northbound through volume	103	52.3%
Westbound right volume	11	5.5%	Westbound right volume	17	8.6%
Bloomington Rd WB trips = WBR * Inbound Net New AM Trips from south			Bloomington Rd WB trips = WBR * Inbound Net New PM Trips from south		
Bloomington Rd AM WB trips	=117*5.5%		Bloomington Rd PM WB trips	=25*8.6%	
	6			**2**	

APPENDIX E

MTO Left-Turn Lane Warrant Analysis

Left-Turn Lane Warrant Analysis
Based on MTO Geometric Design Standards - Chapter E

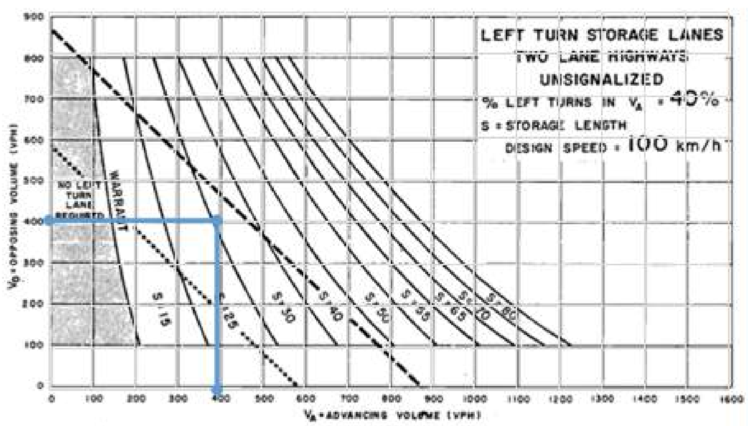
Project: Stouffville Pit Site Alteration Permit TIS
Intersection: York-Durham Line at Inbound Site Access
Approach: Northbound (South leg)
Scenario: Future Total 2028

Left-turn lane warranted: YES

Advancing Volume: 396
Opposing Volume: 403
Storage: 30 metres

Left-Turn Warrant Analysis

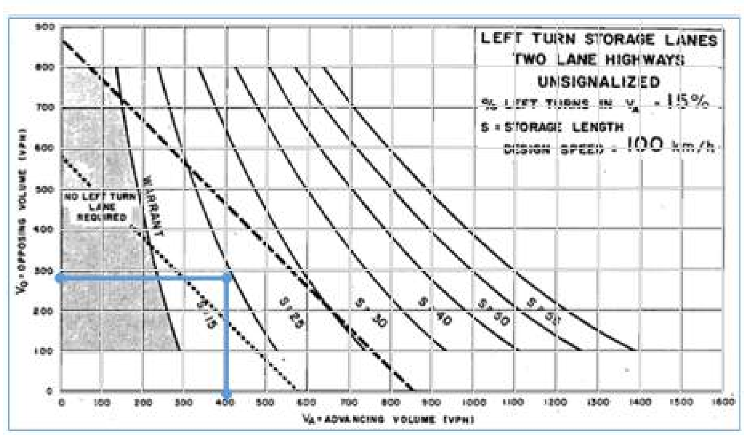
AM Peak Hour



Advancing Volume: 402
Opposing Volume: 280
Storage: 15 metres

Left-Turn Warrant Analysis

PM Peak Hour



Left-Turn Lane Warrant Analysis
Based on MTO Geometric Design Standards - Chapter E

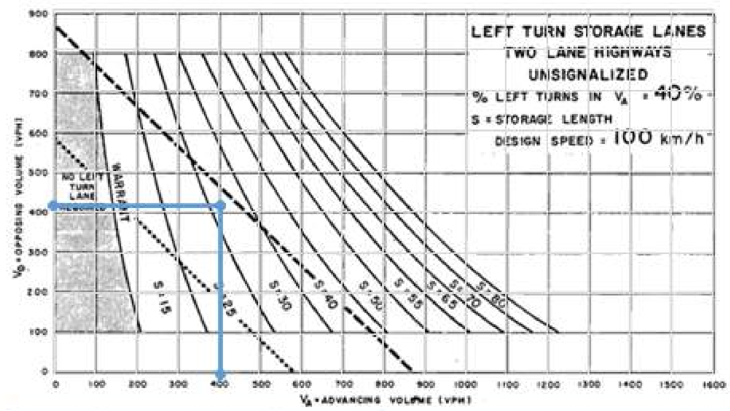
Project: Stouffville Pit Site Alteration Permit TIS
Intersection: York-Durham Line at Inbound Site Access
Approach: Northbound (South leg)
Scenario: Future Total 2033

Left-turn lane warranted: YES

Advancing Volume: 407
Opposing Volume: 416
Storage: 30 metres

Left-Turn Warrant Analysis

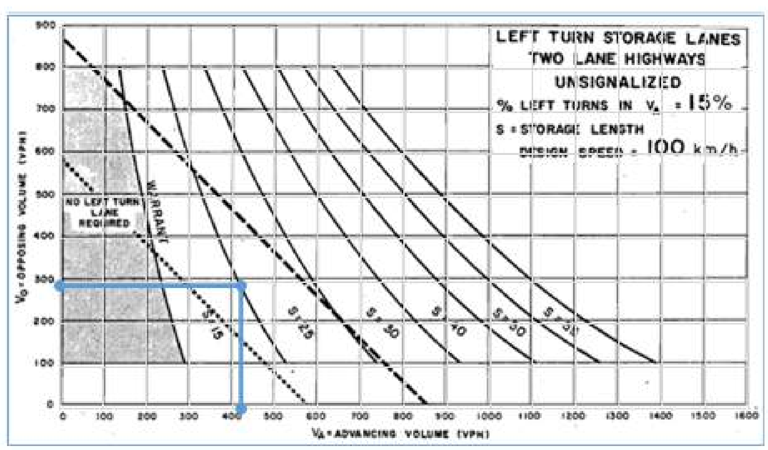
AM Peak Hour



Advancing Volume: 420
Opposing Volume: 293
Storage: 25 metres

Left-Turn Warrant Analysis

PM Peak Hour



APPENDIX F

Synchro Capacity and SimTraffic Queuing Analysis

APPENDIX F-1

Existing Capacity and Queuing Analysis

HCM Unsignalized Intersection Capacity Analysis
1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	1	130	0	0	0	117	103	0	0	180	84
Future Volume (Veh/h)	35	1	130	0	0	0	117	103	0	0	180	84
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	40	1	149	0	0	0	134	118	0	0	207	97
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	593	593	207	742	690	118	304			118		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	593	593	207	742	690	118	304			118		
tC, single (s)	7.2	6.5	6.4	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	89	100	81	100	100	100	89			100		
cM capacity (veh/h)	369	375	802	249	330	939	1223			1483		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	40	150	0	134	118	0	0	207	97
Volume Left	40	0	0	134	0	0	0	0	0
Volume Right	0	149	0	0	0	0	0	0	97
cSH	369	796	1700	1223	1700	1700	1700	1700	1700
Volume to Capacity	0.11	0.19	0.00	0.11	0.07	0.00	0.00	0.12	0.06
Queue Length 95th (m)	2.9	5.5	0.0	2.9	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	15.9	10.6	0.0	8.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	B	A	A					
Approach Delay (s)	11.7		0.0	4.4			0.0		
Approach LOS	B		A						

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: York-Durham Line & Wagg Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	1	0	50	0	158	14	38	276	0
Future Volume (Veh/h)	0	0	0	1	0	50	0	158	14	38	276	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	1	0	54	0	170	15	41	297	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	610	564	297	556	556	178	297			185		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	610	564	297	556	556	178	297			185		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	100	100	100	100	100	94	100			97		
cM capacity (veh/h)	375	424	747	434	428	871	1276			1337		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	55	185	338
Volume Left	0	1	0	41
Volume Right	0	54	15	0
cSH	1700	855	1276	1337
Volume to Capacity	0.00	0.06	0.00	0.03
Queue Length 95th (m)	0.0	1.6	0.0	0.8
Control Delay (s)	0.0	9.5	0.0	1.2
Lane LOS	A	A		A
Approach Delay (s)	0.0	9.5	0.0	1.2
Approach LOS	A	A		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

3: York-Durham Line & Pit Inbound Site Access

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	64	199	258	8
Future Volume (Veh/h)	0	0	64	199	258	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	69	214	277	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	634	282	286			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	634	282	286			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	92			
cM capacity (veh/h)	412	762	886			

Direction, Lane #	NB 1	SB 1
Volume Total	283	286
Volume Left	69	0
Volume Right	0	9
cSH	886	1700
Volume to Capacity	0.08	0.17
Queue Length 95th (m)	2.0	0.0
Control Delay (s)	2.9	0.0
Lane LOS	A	
Approach Delay (s)	2.9	0.0
Approach LOS		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	0	51	0	0	0	0	238	7	1	262	0
Future Volume (Veh/h)	15	0	51	0	0	0	0	238	7	1	262	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	16	0	56	0	0	0	0	262	8	1	288	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	556	560	288	612	556	266	288			270		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	556	560	288	612	556	266	288			270		
tC, single (s)	8.1	6.5	7.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.4	4.0	4.2	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	90	100	100	100	100			100		
cM capacity (veh/h)	323	437	567	365	439	773	1286			1305		

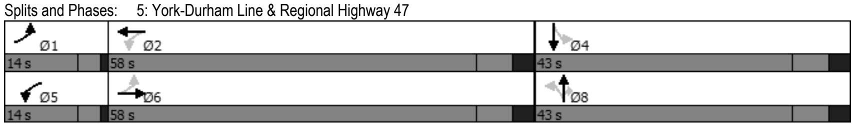
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	16	56	0	270	289
Volume Left	16	0	0	0	1
Volume Right	0	56	0	8	0
cSH	323	567	1700	1700	1305
Volume to Capacity	0.05	0.10	0.00	0.16	0.00
Queue Length 95th (m)	1.2	2.6	0.0	0.0	0.0
Control Delay (s)	16.7	12.0	0.0	0.0	0.0
Lane LOS	C	B	A		A
Approach Delay (s)	13.1		0.0	0.0	0.0
Approach LOS	B		A		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	24.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	79	334	121	441	67	133	106	57	165
Future Volume (vph)	79	334	121	441	67	133	106	57	165
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA
Protected Phases	1	6	5	2		8			4
Permitted Phases	6		2		8		8	4	
Detector Phase	1	6	5	2	8	8	8	4	4
Switch Phase									
Minimum Initial (s)	7.0	50.0	7.0	50.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	14.0	58.0	14.0	58.0	43.0	43.0	43.0	43.0	43.0
Total Split (%)	12.2%	50.4%	12.2%	50.4%	37.4%	37.4%	37.4%	37.4%	37.4%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0		8.0	8.0		8.0
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	Max	None	Max	None	None	None	None	None
Act Effct Green (s)	62.6	50.2	64.1	53.0		29.8	29.8		29.8
Actuated g/C Ratio	0.58	0.46	0.59	0.49		0.27	0.27		0.27
v/c Ratio	0.24	0.54	0.24	0.70		0.62	0.21		0.89
Control Delay	11.8	25.3	11.0	30.4		43.4	6.7		64.4
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	11.8	25.3	11.0	30.4		43.4	6.7		64.4
LOS	B	C	B	C		D	A		E
Approach Delay		23.0		26.7		30.7			64.4
Approach LOS		C		C		C			E

Intersection Summary	
Cycle Length: 115	
Actuated Cycle Length: 108.8	
Natural Cycle: 100	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 32.9	Intersection LOS: C
Intersection Capacity Utilization 97.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 5: York-Durham Line & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	334	53	121	441	72	67	133	106	57	165	69
Future Volume (vph)	79	334	53	121	441	72	67	133	106	57	165	69
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0			8.0	8.0		8.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.98		1.00	0.98			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.99	
Satd. Flow (prot)	1278	1565		1668	1518			1722	1616		1398	
Flt Permitted	0.35	1.00		0.43	1.00			0.69	1.00		0.84	
Satd. Flow (perm)	467	1565		749	1518			1206	1616		1182	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	81	341	54	123	450	73	68	136	108	58	168	70
RTOR Reduction (vph)	0	5	0	0	5	0	0	0	79	0	10	0
Lane Group Flow (vph)	81	390	0	123	518	0	0	204	29	0	286	0
Heavy Vehicles (%)	47%	25%	16%	7%	16%	53%	17%	11%	4%	42%	10%	63%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8		8	4		
Actuated Green, G (s)	58.1	51.2		61.7	53.0			29.8	29.8		29.8	
Effective Green, g (s)	58.1	51.2		61.7	53.0			29.8	29.8		29.8	
Actuated g/C Ratio	0.53	0.47		0.56	0.48			0.27	0.27		0.27	
Clearance Time (s)	4.0	8.0		4.0	8.0			8.0	8.0		8.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2			5.0	5.0		5.0	
Lane Grp Cap (vph)	298	730		494	733			327	438		321	
v/s Ratio Prot	0.02	0.25		c0.02	c0.34							
v/s Ratio Perm	0.13			0.12				0.17	0.02		c0.24	
v/c Ratio	0.27	0.53		0.25	0.71			0.62	0.07		0.89	
Uniform Delay, d1	13.9	20.8		11.9	22.3			35.0	29.6		38.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.5	2.8		0.3	5.7			5.2	0.1		26.4	
Delay (s)	14.4	23.6		12.2	27.9			40.2	29.8		64.7	
Level of Service	B	C		B	C			D	C		E	
Approach Delay (s)		22.0			24.9			36.6			64.7	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	109.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	97.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	174	275	3	336	336	1	1	1
Future Volume (vph)	174	275	3	336	336	1	1	1
Turn Type	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2			6		8		4
Permitted Phases		2	6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	58.0	58.0	58.0	58.0	35.6	35.6	35.6	35.6
Total Split (%)	62.0%	62.0%	62.0%	62.0%	38.0%	38.0%	38.0%	38.0%
Yellow Time (s)	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	50.0	50.0	50.0	50.0	29.9	29.9		29.9
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.32	0.32		0.32
v/c Ratio	0.24	0.38	0.00	0.23	0.97	0.02		0.00
Control Delay	12.6	2.8	10.3	12.0	71.2	13.6		21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	12.6	2.8	10.3	12.0	71.2	13.6		21.5
LOS	B	A	B	B	E	B		C
Approach Delay	6.6			12.0		70.0		21.5
Approach LOS	A			B		E		C

Intersection Summary	
Cycle Length: 93.6	
Actuated Cycle Length: 93.5	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 27.4	Intersection LOS: C
Intersection Capacity Utilization 69.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	174	275	3	336	2	336	1	6	1	1	0
Future Volume (vph)	0	174	275	3	336	2	336	1	6	1	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor		1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.87			1.00	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)		1566	1268	1785	3131		1552	1632			1833	
Flt Permitted		1.00	1.00	0.63	1.00		0.76	1.00			0.96	
Satd. Flow (perm)		1566	1268	1190	3131		1236	1632			1797	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	198	312	3	382	2	382	1	7	1	1	0
RTOR Reduction (vph)	0	0	146	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	198	167	3	384	0	382	3	0	0	2	0
Heavy Vehicles (%)	50%	20%	26%	0%	14%	0%	15%	0%	0%	0%	0%	75%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)		50.0	50.0	50.0	50.0		29.9	29.9			29.9	
Effective Green, g (s)		50.0	50.0	50.0	50.0		29.9	29.9			29.9	
Actuated g/C Ratio		0.53	0.53	0.53	0.53		0.32	0.32			0.32	
Clearance Time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)		4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)		837	678	636	1674		395	521			574	
v/s Ratio Prot		0.13			0.12			0.00				
v/s Ratio Perm			c0.13	0.00			c0.31				0.00	
v/c Ratio		0.24	0.25	0.00	0.23		0.97	0.01			0.00	
Uniform Delay, d1		11.6	11.7	10.1	11.5		31.3	21.7			21.7	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.7	0.9	0.0	0.3		36.3	0.0			0.0	
Delay (s)		12.2	12.5	10.2	11.9		67.6	21.7			21.7	
Level of Service		B	B	B	B		E	C			C	
Approach Delay (s)		12.4			11.8			66.7			21.7	
Approach LOS		B			B			E			C	

Intersection Summary			
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	93.5	Sum of lost time (s)	13.6
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

7: Concession Road 3 & Regional Highway 47

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	173	9	4	314	4	17	10	5	6	8	18
Future Volume (Veh/h)	8	173	9	4	314	4	17	10	5	6	8	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	192	10	4	349	4	19	11	6	7	9	20
Pedestrians					2			1				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.2			1.2				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	353			203			600	577	200	588	580	351
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	353			203			600	577	200	588	580	351
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.4	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.8	4.0	3.3
p0 queue free %	99			100			95	97	99	98	98	97
cM capacity (veh/h)	1217			1242			394	425	844	363	424	697

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	211	357	36	36
Volume Left	9	4	19	7
Volume Right	10	4	6	20
cSH	1217	1242	443	520
Volume to Capacity	0.01	0.00	0.08	0.07
Queue Length 95th (m)	0.2	0.1	2.1	1.8
Control Delay (s)	0.4	0.1	13.8	12.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.4	0.1	13.8	12.4
Approach LOS			B	B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	29.6%	ICU Level of Service	A
Analysis Period (min)	15		

8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	145	337	3	3	20
Future Volume (Veh/h)	10	145	337	3	3	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	12	181	421	4	4	25
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	425				626	421
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	425				626	421
tC, single (s)	5.1				7.4	7.2
tC, 2 stage (s)						
tF (s)	3.1				4.4	4.2
p0 queue free %	98				99	95
cM capacity (veh/h)	759				318	467

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	193	421	4	29
Volume Left	12	0	0	4
Volume Right	0	0	4	25
cSH	759	1700	1700	439
Volume to Capacity	0.02	0.25	0.00	0.07
Queue Length 95th (m)	0.4	0.0	0.0	1.7
Control Delay (s)	0.8	0.0	0.0	13.8
Lane LOS	A			B
Approach Delay (s)	0.8	0.0		13.8
Approach LOS				B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	27.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	167	17	134	284	21	100
Future Volume (Veh/h)	167	17	134	284	21	100
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	188	19	151	319	24	112
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			207		818	198
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			207		818	198
tC, single (s)			4.2		7.1	6.3
tC, 2 stage (s)						
tF (s)			2.3		4.1	3.4
p0 queue free %			89		90	86
cM capacity (veh/h)			1335		236	829

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	207	151	319	136
Volume Left	0	151	0	24
Volume Right	19	0	0	112
cSH	1700	1335	1700	1006
Volume to Capacity	0.12	0.11	0.19	0.14
Queue Length 95th (m)	0.0	3.1	0.0	3.7
Control Delay (s)	0.0	8.0	0.0	12.1
Lane LOS		A		B
Approach Delay (s)	0.0	2.6		12.1
Approach LOS				B

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	172	277	0
Future Volume (Veh/h)	0	0	0	172	277	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	185	298	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	483	298	298			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	483	298	298			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	546	746	1275			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	185	298
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1275	1700
Volume to Capacity	0.00	0.00	0.18
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	17.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	NB	SB
Directions Served	L	TR	L	R
Maximum Queue (m)	20.4	24.2	22.4	3.5
Average Queue (m)	5.5	9.7	6.6	0.1
95th Queue (m)	13.3	18.6	17.1	2.0
Link Distance (m)		574.9		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)	80.0		50.0	70.0
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: York-Durham Line & Wagg Road

Movement	WB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	13.0	20.6
Average Queue (m)	6.3	1.7
95th Queue (m)	11.7	9.4
Link Distance (m)	1653.9	736.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (m)	29.6	0.7
Average Queue (m)	6.6	0.0
95th Queue (m)	21.6	0.7
Link Distance (m)	81.8	986.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB	SB
Directions Served	L	R	LT
Maximum Queue (m)	21.3	35.6	0.5
Average Queue (m)	6.1	13.9	0.0
95th Queue (m)	19.6	28.5	0.5
Link Distance (m)	192.1	192.1	81.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	TR	L	TR	LT	R	LTR
Maximum Queue (m)	72.5	120.5	77.9	160.6	130.2	60.0	146.9
Average Queue (m)	22.4	56.0	20.3	76.5	47.0	11.3	72.4
95th Queue (m)	53.6	100.0	57.2	136.2	100.8	49.8	129.7
Link Distance (m)		1468.4		2731.9	720.3		726.6
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	55.0		55.0			40.0	
Storage Blk Time (%)	0	8		17	19		
Queuing Penalty (veh)	1	7		20	21		

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	B29	WB	WB	WB	NB	NB	SB
Directions Served	T	T	L	T	TR	L	TR	LTR
Maximum Queue (m)	43.5	1093.7	3.9	35.4	34.2	49.8	110.2	5.0
Average Queue (m)	14.0	36.5	0.3	14.5	12.9	43.8	37.8	0.3
95th Queue (m)	34.3	553.9	2.8	30.4	29.0	56.5	102.4	3.0
Link Distance (m)	888.7	2731.9		556.1			328.2	155.7
Upstream Blk Time (%)		0						
Queuing Penalty (veh)		1						
Storage Bay Dist (m)			50.0		25.0	30.0		
Storage Blk Time (%)	0			2	2	32		
Queuing Penalty (veh)	0			3	4	2		

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	15.6	10.5	9.4	14.7
Average Queue (m)	1.0	0.4	4.0	4.7
95th Queue (m)	8.5	5.4	9.0	11.5
Link Distance (m)	556.1	395.4	439.5	409.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	29.7	25.1
Average Queue (m)	2.4	7.5
95th Queue (m)	15.0	20.5
Link Distance (m)	395.4	381.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EB	WB	NB
Directions Served	TR	L	L
Maximum Queue (m)	2.3	18.6	22.8
Average Queue (m)	0.1	4.3	7.5
95th Queue (m)	2.3	13.2	20.1
Link Distance (m)	3705.4		1045.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		110.0	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 58

1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	97	1	157	0	3	1	137	299	1	1	174	55
Future Volume (Veh/h)	97	1	157	0	3	1	137	299	1	1	174	55
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	115	1	187	0	4	1	163	356	1	1	207	65
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	894	892	207	1078	956	356	272			357		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	894	892	207	1078	956	356	272			357		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	50	100	77	100	98	100	87			100		
cM capacity (veh/h)	230	247	823	138	227	693	1286			1213		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	115	188	5	163	356	1	1	207	65
Volume Left	115	0	0	163	0	0	1	0	0
Volume Right	0	187	1	0	0	1	0	0	65
cSH	230	813	262	1286	1700	1700	1213	1700	1700
Volume to Capacity	0.50	0.23	0.02	0.13	0.21	0.00	0.00	0.12	0.04
Queue Length 95th (m)	20.4	7.1	0.5	3.5	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	35.3	10.8	19.0	8.2	0.0	0.0	8.0	0.0	0.0
Lane LOS	E	B	C	A			A		
Approach Delay (s)	20.1		19.0	2.6			0.0		
Approach LOS	C		C						

Intersection Summary				
Average Delay	6.8			
Intersection Capacity Utilization	41.1%	ICU Level of Service		A
Analysis Period (min)	15			

2: York-Durham Line & Wagg Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	0	2	0	47	2	344	9	72	235	0
Future Volume (Veh/h)	2	0	0	2	0	47	2	344	9	72	235	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	0	0	2	0	53	2	387	10	81	264	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	875	827	264	822	822	392	264			397		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	875	827	264	822	822	392	264			397		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	99	100	92	100			93		
cM capacity (veh/h)	236	287	780	279	289	650	1312			1156		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	2	55	399	345
Volume Left	2	2	2	81
Volume Right	0	53	10	0
cSH	236	620	1312	1156
Volume to Capacity	0.01	0.09	0.00	0.07
Queue Length 95th (m)	0.2	2.3	0.0	1.8
Control Delay (s)	20.4	11.4	0.1	2.5
Lane LOS	C	B	A	A
Approach Delay (s)	20.4	11.4	0.1	2.5
Approach LOS	C	B		

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	48.4%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis — Existing 2022 PM
3: York-Durham Line & Pit Inbound Site Access — 07-13-2022

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	38	322	236	7
Future Volume (Veh/h)	0	0	38	322	236	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	42	358	262	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	708	266	270			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	708	266	270			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	95			
cM capacity (veh/h)	385	778	894			

Direction, Lane #	NB 1	SB 1
Volume Total	400	270
Volume Left	42	0
Volume Right	0	8
cSH	894	1700
Volume to Capacity	0.05	0.16
Queue Length 95th (m)	1.2	0.0
Control Delay (s)	1.5	0.0
Lane LOS	A	
Approach Delay (s)	1.5	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis — Existing 2022 PM
4: York-Durham Line & Pit Outbound Site Access/Private Access — 07-13-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	0	45	10	0	2	0	350	2	0	242	0
Future Volume (Veh/h)	7	0	45	10	0	2	0	350	2	0	242	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	49	11	0	2	0	380	2	0	263	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	646	645	263	693	644	381	263			382		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	646	645	263	693	644	381	263			382		
tC, single (s)	7.7	6.5	7.1	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.0	4.0	4.1	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	92	97	100	100	100			100		
cM capacity (veh/h)	316	391	597	331	391	671	1313			1176		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	8	49	13	382	263
Volume Left	8	0	11	0	0
Volume Right	0	49	2	2	0
cSH	316	597	359	1700	1176
Volume to Capacity	0.03	0.08	0.04	0.22	0.00
Queue Length 95th (m)	0.6	2.1	0.9	0.0	0.0
Control Delay (s)	16.7	11.6	15.4	0.0	0.0
Lane LOS	C	B	C		
Approach Delay (s)	12.3		15.4	0.0	0.0
Approach LOS	B		C		

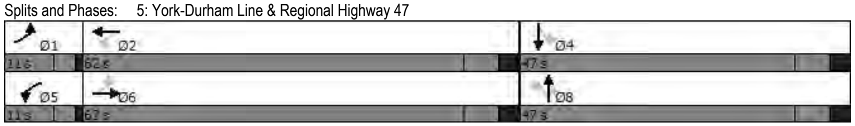
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	44	615	158	438	57	198	160	56	184
Future Volume (vph)	44	615	158	438	57	198	160	56	184
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA
Protected Phases	1	6	5	2		8			4
Permitted Phases	6		2		8		8	4	
Detector Phase	1	6	5	2	8	8	8	4	4
Switch Phase									
Minimum Initial (s)	7.0	50.0	7.0	50.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	11.0	62.0	11.0	62.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	9.2%	51.7%	9.2%	51.7%	39.2%	39.2%	39.2%	39.2%	39.2%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0		8.0	8.0		8.0
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	Max	None	Max	None	None	None	None	None
Act Effct Green (s)	65.2	54.2	66.1	56.6		32.5	32.5		32.5
Actuated g/C Ratio	0.57	0.48	0.58	0.50		0.29	0.29		0.29
v/c Ratio	0.11	0.86	0.71	0.62		0.68	0.30		0.93
Control Delay	11.2	38.9	29.8	26.6		44.6	6.3		71.7
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	11.2	38.9	29.8	26.6		44.6	6.3		71.7
LOS	B	D	C	C		D	A		E
Approach Delay		37.2		27.4		29.8			71.7
Approach LOS		D		C		C			E

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 113.8
Natural Cycle: 100
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 37.7 Intersection LOS: D
Intersection Capacity Utilization 103.1% ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 5: York-Durham Line & Regional Highway 47



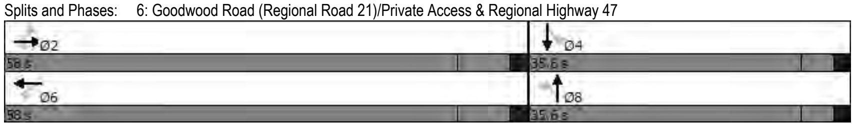
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	615	76	158	438	46	57	198	160	56	184	61
Future Volume (vph)	44	615	76	158	438	46	57	198	160	56	184	61
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0			8.0	8.0		8.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.98		1.00	0.99			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)	1789	1833		1767	1713			1887	1632		1691	
Flt Permitted	0.35	1.00		0.14	1.00			0.75	1.00		0.71	
Satd. Flow (perm)	651	1833		256	1713			1435	1632		1204	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	668	83	172	476	50	62	215	174	61	200	66
RTOR Reduction (vph)	0	4	0	0	3	0	0	0	120	0	8	0
Lane Group Flow (vph)	48	747	0	172	523	0	0	277	54	0	319	0
Heavy Vehicles (%)	5%	6%	7%	1%	8%	9%	6%	3%	3%	15%	3%	12%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8		8	4		
Actuated Green, G (s)	60.6	55.1		63.6	56.6			32.5	32.5		32.5	
Effective Green, g (s)	60.6	55.1		63.6	56.6			32.5	32.5		32.5	
Actuated g/C Ratio	0.53	0.48		0.55	0.49			0.28	0.28		0.28	
Clearance Time (s)	4.0	8.0		4.0	8.0			8.0	8.0		8.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2			5.0	5.0		5.0	
Lane Grp Cap (vph)	398	881		234	846			406	462		341	
v/s Ratio Prot	0.01	c0.41		c0.04	0.31							
v/s Ratio Perm	0.06			0.36				0.19	0.03		c0.27	
v/c Ratio	0.12	0.85		0.74	0.62			0.68	0.12		0.94	
Uniform Delay, d1	14.0	26.1		20.1	21.1			36.5	30.4		40.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.1	10.0		11.3	3.4			6.0	0.2		33.3	
Delay (s)	14.2	36.1		31.4	24.5			42.5	30.6		73.3	
Level of Service	B	D		C	C			D	C		E	
Approach Delay (s)		34.7			26.2			37.9			73.3	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	38.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	114.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	103.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	2	423	445	5	261	281	3	5	2
Future Volume (vph)	2	423	445	5	261	281	3	5	2
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	2	2	2	6	6	8	8	4	4
Switch Phase									
Minimum Initial (s)	25.0	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	58.0	58.0	58.0	58.0	58.0	35.6	35.6	35.6	35.6
Total Split (%)	62.0%	62.0%	62.0%	62.0%	62.0%	38.0%	38.0%	38.0%	38.0%
Yellow Time (s)	5.9	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	50.2	50.2	50.2	50.2	50.2	24.5	24.5		24.5
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57	0.28	0.28		0.28
v/c Ratio	0.00	0.44	0.47	0.01	0.15	0.85	0.01		0.02
Control Delay	10.0	13.7	2.7	10.2	10.0	52.0	20.0		19.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	10.0	13.7	2.7	10.2	10.0	52.0	20.0		19.9
LOS	A	B	A	B	B	D	B		B
Approach Delay		8.1			10.0		51.6		19.9
Approach LOS		A			B		D		B

Intersection Summary	
Cycle Length: 93.6	
Actuated Cycle Length: 88.4	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 17.2	Intersection LOS: B
Intersection Capacity Utilization 76.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	423	445	5	261	4	281	3	1	5	2	2
Future Volume (vph)	2	423	445	5	261	4	281	3	1	5	2	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.96			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1785	1824	1456	1781	3395		1638	1808			1773	
Flt Permitted	0.58	1.00	1.00	0.45	1.00		0.75	1.00			0.92	
Satd. Flow (perm)	1081	1824	1456	839	3395		1296	1808			1684	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	460	484	5	284	4	305	3	1	5	2	2
RTOR Reduction (vph)	0	0	209	0	1	0	0	1	0	0	1	0
Lane Group Flow (vph)	2	460	275	5	287	0	305	3	0	0	8	0
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	3%	7%	0%	5%	0%	9%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	50.2	50.2	50.2	50.2	50.2		24.5	24.5			24.5	
Effective Green, g (s)	50.2	50.2	50.2	50.2	50.2		24.5	24.5			24.5	
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57		0.28	0.28			0.28	
Clearance Time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)	4.2	4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)	614	1036	827	476	1930		359	501			467	
v/s Ratio Prot		c0.25			0.08			0.00				
v/s Ratio Perm	0.00		0.19	0.01			c0.24				0.00	
v/c Ratio	0.00	0.44	0.33	0.01	0.15		0.85	0.01			0.02	
Uniform Delay, d1	8.2	11.0	10.1	8.3	9.0		30.2	23.1			23.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	1.4	1.1	0.0	0.2		16.9	0.0			0.0	
Delay (s)	8.2	12.4	11.2	8.3	9.1		47.0	23.1			23.2	
Level of Service	A	B	B	A	A		D	C			C	
Approach Delay (s)		11.8			9.1			46.7			23.2	
Approach LOS		B			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	13.6
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	384	25	5	263	7	12	14	10	4	18	14
Future Volume (Veh/h)	21	384	25	5	263	7	12	14	10	4	18	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	23	413	27	5	283	8	13	15	11	4	19	15
Pedestrians		3			3			5			7	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	298			445			802	786	434	798	795	297
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	298			445			802	786	434	798	795	297
tC, single (s)	4.1			4.1			7.1	6.6	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.1	3.3	3.5	4.0	3.3
p0 queue free %	98			100			95	95	98	99	94	98
cM capacity (veh/h)	1268			1121			276	307	622	280	312	741

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	463	296	39	38
Volume Left	23	5	13	4
Volume Right	27	8	11	15
cSH	1268	1121	343	399
Volume to Capacity	0.02	0.00	0.11	0.10
Queue Length 95th (m)	0.4	0.1	3.0	2.5
Control Delay (s)	0.6	0.2	16.8	15.0
Lane LOS	A	A	C	B
Approach Delay (s)	0.6	0.2	16.8	15.0
Approach LOS			C	B

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	395	274	3	3	5
Future Volume (Veh/h)	3	395	274	3	3	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	3	434	301	3	3	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	304				741	301
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	304				741	301
tC, single (s)	5.1				7.4	7.2
tC, 2 stage (s)						
tF (s)	3.1				4.4	4.2
p0 queue free %	100				99	99
cM capacity (veh/h)	858				270	557

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	437	301	3	8
Volume Left	3	0	0	3
Volume Right	0	0	3	5
cSH	858	1700	1700	398
Volume to Capacity	0.00	0.18	0.00	0.02
Queue Length 95th (m)	0.1	0.0	0.0	0.5
Control Delay (s)	0.1	0.0	0.0	14.2
Lane LOS	A			B
Approach Delay (s)	0.1	0.0		14.2
Approach LOS				B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	382	16	164	256	7	146
Future Volume (Veh/h)	382	16	164	256	7	146
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	439	18	189	294	8	168
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			457		1120	448
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			457		1120	448
tC, single (s)			4.2		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.3
p0 queue free %			82		95	72
cM capacity (veh/h)			1073		178	611

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	457	189	294	176
Volume Left	0	189	0	8
Volume Right	18	0	0	168
cSH	1700	1073	1700	640
Volume to Capacity	0.27	0.18	0.17	0.28
Queue Length 95th (m)	0.0	5.1	0.0	8.9
Control Delay (s)	0.0	9.1	0.0	13.7
Lane LOS		A		B
Approach Delay (s)	0.0	3.5		13.7
Approach LOS				B

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	355	237	0
Future Volume (Veh/h)	0	0	0	355	237	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	0	0	399	266	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	665	266	266			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	665	266	266			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	428	778	1310			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	399	266
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1310	1700
Volume to Capacity	0.00	0.00	0.16
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	22.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	WB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	L	T	R
Maximum Queue (m)	23.4	18.8	5.1	17.8	2.2	0.6	2.2
Average Queue (m)	9.5	7.9	0.6	5.9	0.1	0.0	0.1
95th Queue (m)	18.0	14.8	3.1	15.0	1.7	0.6	1.9
Link Distance (m)		574.9	230.8			659.9	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	80.0			50.0	50.0		70.0
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: York-Durham Line & Wagg Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.0	15.8	3.6	17.8
Average Queue (m)	0.6	6.4	0.2	4.4
95th Queue (m)	4.2	13.1	2.7	13.5
Link Distance (m)	104.9	1653.9	1318.6	736.1
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (m)	24.1	0.7
Average Queue (m)	3.8	0.0
95th Queue (m)	15.9	0.9
Link Distance (m)	82.0	985.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB	WB
Directions Served	L	R	LTR
Maximum Queue (m)	17.9	29.7	12.0
Average Queue (m)	2.4	13.6	2.9
95th Queue (m)	11.2	26.8	9.6
Link Distance (m)	192.1	192.1	105.1
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	TR	L	TR	LT	R	LTR
Maximum Queue (m)	74.8	238.5	94.7	146.0	122.4	60.0	100.2
Average Queue (m)	15.7	132.8	31.0	60.3	50.1	12.6	52.7
95th Queue (m)	57.7	220.2	67.4	110.8	99.3	52.6	90.0
Link Distance (m)		1468.4		2732.5	720.3		726.3
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	55.0		55.0			40.0	
Storage Blk Time (%)		37	1	11	18	0	
Queuing Penalty (veh)		16	6	17	29	0	

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	EB	B29	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	L	T	TR	L	TR	LTR
Maximum Queue (m)	2.9	68.2	1643.0	7.9	29.8	31.6	49.8	86.5	9.3
Average Queue (m)	0.1	28.9	91.2	0.7	10.5	9.7	38.3	16.5	1.9
95th Queue (m)	1.8	56.7	901.6	4.3	23.2	23.7	55.6	63.8	7.7
Link Distance (m)		888.2	2732.5		556.1			328.2	155.7
Upstream Blk Time (%)			0						
Queuing Penalty (veh)			2						
Storage Bay Dist (m)	70.0			50.0		25.0	30.0		
Storage Blk Time (%)		1			1	1	22	0	
Queuing Penalty (veh)		5			1	1	1	0	

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	31.9	10.9	15.4	14.1
Average Queue (m)	3.4	0.8	4.9	5.1
95th Queue (m)	17.2	6.0	11.1	11.5
Link Distance (m)	556.1	395.4	439.5	409.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	20.8	16.5
Average Queue (m)	0.9	3.9
95th Queue (m)	9.5	14.2
Link Distance (m)	395.4	381.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EB	WB	NB
Directions Served	TR	L	L
Maximum Queue (m)	1.7	26.5	11.7
Average Queue (m)	0.1	9.0	1.8
95th Queue (m)	1.2	19.8	8.0
Link Distance (m)	3705.4		1045.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		110.0	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 79

APPENDIX F-2

2028 Future Background Capacity and Queuing Analysis

HCM Unsignalized Intersection Capacity Analysis — Future Background 2028 AM
1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road — 07-13-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			✥		↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	40	1	147	0	0	0	132	110	0	0	192	95
Future Volume (Veh/h)	40	1	147	0	0	0	132	110	0	0	192	95
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	46	1	169	0	0	0	152	126	0	0	221	109
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	651	651	221	820	760	126	330			126		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	651	651	221	820	760	126	330			126		
tC, single (s)	7.2	6.5	6.4	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	86	100	79	100	100	100	87			100		
cM capacity (veh/h)	332	341	787	209	295	930	1197			1473		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	46	170	0	152	126	0	0	221	109
Volume Left	46	0	0	152	0	0	0	0	0
Volume Right	0	169	0	0	0	0	0	0	109
cSH	332	781	1700	1197	1700	1700	1700	1700	1700
Volume to Capacity	0.14	0.22	0.00	0.13	0.07	0.00	0.00	0.13	0.06
Queue Length 95th (m)	3.8	6.6	0.0	3.5	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	17.6	10.9	0.0	8.4	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	B	A	A					
Approach Delay (s)	12.3		0.0	4.6			0.0		
Approach LOS	B		A						

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis — Future Background 2028 AM
2: York-Durham Line & Wagg Road — 07-13-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (veh/h)	0	0	0	1	0	50	0	168	14	38	293	0
Future Volume (Veh/h)	0	0	0	1	0	50	0	168	14	38	293	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	1	0	54	0	181	15	41	315	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	640	593	315	586	586	188	315			196		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	640	593	315	586	586	188	315			196		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	100	100	100	100	100	94	100			97		
cM capacity (veh/h)	358	408	730	415	412	859	1257			1325		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	55	196	356
Volume Left	0	1	0	41
Volume Right	0	54	15	0
cSH	1700	842	1257	1325
Volume to Capacity	0.00	0.07	0.00	0.03
Queue Length 95th (m)	0.0	1.7	0.0	0.8
Control Delay (s)	0.0	9.6	0.0	1.2
Lane LOS	A	A		A
Approach Delay (s)	0.0	9.6	0.0	1.2
Approach LOS	A	A		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	64	212	258	9
Future Volume (Veh/h)	0	0	64	212	258	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	69	228	277	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	648	282	287			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	648	282	287			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	92			
cM capacity (veh/h)	404	762	885			

Direction, Lane #	NB 1	SB 1
Volume Total	297	287
Volume Left	69	0
Volume Right	0	10
cSH	885	1700
Volume to Capacity	0.08	0.17
Queue Length 95th (m)	2.0	0.0
Control Delay (s)	2.8	0.0
Lane LOS	A	
Approach Delay (s)	2.8	0.0
Approach LOS		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	35.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	0	51	0	0	0	0	253	7	1	279	0
Future Volume (Veh/h)	15	0	51	0	0	0	0	253	7	1	279	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	16	0	56	0	0	0	0	278	8	1	307	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	591	595	307	647	591	282	307			286		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	591	595	307	647	591	282	307			286		
tC, single (s)	8.1	6.5	7.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.4	4.0	4.2	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	90	100	100	100	100			100		
cM capacity (veh/h)	304	417	552	345	419	757	1265			1288		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	16	56	0	286	308
Volume Left	16	0	0	0	1
Volume Right	0	56	0	8	0
cSH	304	552	1700	1700	1288
Volume to Capacity	0.05	0.10	0.00	0.17	0.00
Queue Length 95th (m)	1.3	2.7	0.0	0.0	0.0
Control Delay (s)	17.5	12.3	0.0	0.0	0.0
Lane LOS	C	B	A		A
Approach Delay (s)	13.4		0.0	0.0	0.0
Approach LOS	B		A		

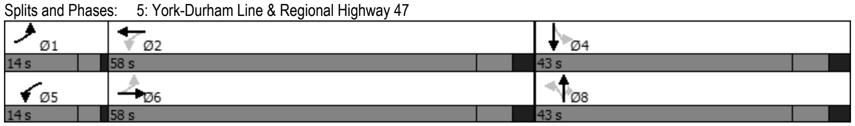
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	25.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	79	394	137	509	76	150	120	65	186
Future Volume (vph)	79	394	137	509	76	150	120	65	186
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA
Protected Phases	1	6	5	2		8			4
Permitted Phases	6		2		8		8	4	
Detector Phase	1	6	5	2	8	8	8	4	4
Switch Phase									
Minimum Initial (s)	7.0	50.0	7.0	50.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	14.0	58.0	14.0	58.0	43.0	43.0	43.0	43.0	43.0
Total Split (%)	12.2%	50.4%	12.2%	50.4%	37.4%	37.4%	37.4%	37.4%	37.4%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0		8.0	8.0		8.0
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	Max	None	Max	None	None	None	None	None
Act Effct Green (s)	62.6	50.0	64.5	52.9		34.4	34.4		34.4
Actuated g/C Ratio	0.55	0.44	0.57	0.47		0.30	0.30		0.30
v/c Ratio	0.31	0.67	0.33	0.85		0.65	0.21		0.96
Control Delay	13.7	30.9	12.7	40.8		44.7	6.2		77.4
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	13.7	30.9	12.7	40.8		44.7	6.2		77.4
LOS	B	C	B	D		D	A		E
Approach Delay		28.3		35.5		31.4			77.4
Approach LOS		C		D		C			E

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 113.6
Natural Cycle: 100
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 39.9 — Intersection LOS: D
Intersection Capacity Utilization 102.2% — ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 5: York-Durham Line & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	394	60	137	509	82	76	150	120	65	186	78
Future Volume (vph)	79	394	60	137	509	82	76	150	120	65	186	78
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0			8.0	8.0		8.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.98		1.00	0.98			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.99	
Satd. Flow (prot)	1278	1566		1668	1518			1721	1616		1397	
Flt Permitted	0.26	1.00		0.35	1.00			0.67	1.00		0.80	
Satd. Flow (perm)	346	1566		606	1518			1169	1616		1124	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	81	402	61	140	519	84	78	153	122	66	190	80
RTOR Reduction (vph)	0	4	0	0	5	0	0	0	85	0	10	0
Lane Group Flow (vph)	81	459	0	140	598	0	0	231	37	0	326	0
Heavy Vehicles (%)	47%	25%	16%	7%	16%	53%	17%	11%	4%	42%	10%	63%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8		8	4		
Actuated Green, G (s)	57.9	50.8		62.1	52.9			34.4	34.4		34.4	
Effective Green, g (s)	57.9	50.8		62.1	52.9			34.4	34.4		34.4	
Actuated g/C Ratio	0.51	0.44		0.54	0.46			0.30	0.30		0.30	
Clearance Time (s)	4.0	8.0		4.0	8.0			8.0	8.0		8.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2			5.0	5.0		5.0	
Lane Grp Cap (vph)	232	695		414	701			351	485		337	
v/s Ratio Prot	0.02	0.29		c0.03	c0.39							
v/s Ratio Perm	0.15			0.16				0.20	0.02		c0.29	
v/c Ratio	0.35	0.66		0.34	0.85			0.66	0.08		0.97	
Uniform Delay, d1	17.1	25.0		14.4	27.3			34.9	28.6		39.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.9	4.9		0.5	12.5			5.9	0.1		40.6	
Delay (s)	18.0	29.9		14.9	39.9			40.8	28.8		80.1	
Level of Service	B	C		B	D			D	C		F	
Approach Delay (s)		28.1			35.2			36.6			80.1	
Approach LOS		C			D			D			F	

Intersection Summary

HCM 2000 Control Delay	41.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	114.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	102.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑	↱	↰	↑↱	↰	↱		✥
Traffic Volume (vph)	202	275	3	369	336	1	1	1
Future Volume (vph)	202	275	3	369	336	1	1	1
Turn Type	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2			6		8		4
Permitted Phases		2	6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	58.0	58.0	58.0	58.0	35.6	35.6	35.6	35.6
Total Split (%)	62.0%	62.0%	62.0%	62.0%	38.0%	38.0%	38.0%	38.0%
Yellow Time (s)	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	50.0	50.0	50.0	50.0	29.9	29.9		29.9
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.32	0.32		0.32
v/c Ratio	0.27	0.38	0.00	0.25	0.97	0.02		0.00
Control Delay	13.0	2.8	10.3	12.2	71.2	13.6		21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	13.0	2.8	10.3	12.2	71.2	13.6		21.5
LOS	B	A	B	B	E	B		C
Approach Delay	7.1			12.2		70.0		21.5
Approach LOS	A			B		E		C

Intersection Summary	
Cycle Length: 93.6	
Actuated Cycle Length: 93.5	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 26.8	Intersection LOS: C
Intersection Capacity Utilization 69.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑↱		↰	↱			✥	
Traffic Volume (vph)	0	202	275	3	369	2	336	1	6	1	1	0
Future Volume (vph)	0	202	275	3	369	2	336	1	6	1	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor		1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.87			1.00	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)		1566	1268	1785	3131		1552	1632			1833	
Flt Permitted		1.00	1.00	0.62	1.00		0.76	1.00			0.96	
Satd. Flow (perm)		1566	1268	1156	3131		1236	1632			1797	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	230	312	3	419	2	382	1	7	1	1	0
RTOR Reduction (vph)	0	0	146	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	230	167	3	421	0	382	3	0	0	2	0
Heavy Vehicles (%)	50%	20%	26%	0%	14%	0%	15%	0%	0%	0%	0%	75%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)		50.0	50.0	50.0	50.0		29.9	29.9			29.9	
Effective Green, g (s)		50.0	50.0	50.0	50.0		29.9	29.9			29.9	
Actuated g/C Ratio		0.53	0.53	0.53	0.53		0.32	0.32			0.32	
Clearance Time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)		4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)		837	678	618	1674		395	521			574	
v/s Ratio Prot		c0.15			0.13			0.00				
v/s Ratio Perm			0.13	0.00			c0.31				0.00	
v/c Ratio		0.27	0.25	0.00	0.25		0.97	0.01			0.00	
Uniform Delay, d1		11.9	11.7	10.1	11.7		31.3	21.7			21.7	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.8	0.9	0.0	0.4		36.3	0.0			0.0	
Delay (s)		12.7	12.5	10.2	12.0		67.6	21.7			21.7	
Level of Service		B	B	B	B		E	C			C	
Approach Delay (s)		12.6			12.0			66.7			21.7	
Approach LOS		B			B			E			C	

Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	93.5	Sum of lost time (s)	13.6
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

7: Concession Road 3 & Regional Highway 47

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	201	9	4	346	4	17	10	5	6	8	18
Future Volume (Veh/h)	8	201	9	4	346	4	17	10	5	6	8	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	223	10	4	384	4	19	11	6	7	9	20
Pedestrians					2			1				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.2			1.2				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	388			234			666	643	231	654	646	386
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	388			234			666	643	231	654	646	386
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.4	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.8	4.0	3.3
p0 queue free %	99			100			95	97	99	98	98	97
cM capacity (veh/h)	1182			1208			355	390	811	326	388	666

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	242	392	36	36
Volume Left	9	4	19	7
Volume Right	10	4	6	20
cSH	1182	1208	404	482
Volume to Capacity	0.01	0.00	0.09	0.07
Queue Length 95th (m)	0.2	0.1	2.3	1.9
Control Delay (s)	0.4	0.1	14.8	13.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.4	0.1	14.8	13.1
Approach LOS			B	B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	171	370	3	3	20
Future Volume (Veh/h)	10	171	370	3	3	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	12	214	462	4	4	25
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	466				700	462
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	466				700	462
tC, single (s)	5.1				7.4	7.2
tC, 2 stage (s)						
tF (s)	3.1				4.4	4.2
p0 queue free %	98				99	94
cM capacity (veh/h)	729				284	440

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	226	462	4	29
Volume Left	12	0	0	4
Volume Right	0	0	4	25
cSH	729	1700	1700	409
Volume to Capacity	0.02	0.27	0.00	0.07
Queue Length 95th (m)	0.4	0.0	0.0	1.8
Control Delay (s)	0.7	0.0	0.0	14.5
Lane LOS	A			B
Approach Delay (s)	0.7	0.0		14.5
Approach LOS				B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		

9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	195	17	134	314	21	100
Future Volume (Veh/h)	195	17	134	314	21	100
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	219	19	151	353	24	112
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			238		884	228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			238		884	228
tC, single (s)			4.2		7.1	6.3
tC, 2 stage (s)						
tF (s)			2.3		4.1	3.4
p0 queue free %			88		89	86
cM capacity (veh/h)			1300		213	796

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	238	151	353	136
Volume Left	0	151	0	24
Volume Right	19	0	0	112
cSH	1700	1300	1700	967
Volume to Capacity	0.14	0.12	0.21	0.14
Queue Length 95th (m)	0.0	3.1	0.0	3.9
Control Delay (s)	0.0	8.1	0.0	12.7
Lane LOS		A		B
Approach Delay (s)	0.0	2.4		12.7
Approach LOS				B

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

10: York-Durham Line & Hillsdale Drive

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	183	295	0
Future Volume (Veh/h)	0	0	0	183	295	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	197	317	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	514	317	317			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	514	317	317			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	524	728	1255			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	197	317
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1255	1700
Volume to Capacity	0.00	0.00	0.19
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	18.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	NB	SB
Directions Served	L	TR	L	R
Maximum Queue (m)	17.7	22.4	20.6	4.2
Average Queue (m)	5.7	9.7	7.2	0.2
95th Queue (m)	13.3	18.5	17.2	2.2
Link Distance (m)		574.9		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)	80.0		50.0	70.0
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: York-Durham Line & Wagg Road

Movement	WB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	12.4	17.0
Average Queue (m)	6.5	1.8
95th Queue (m)	12.1	8.7
Link Distance (m)	1653.9	736.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (m)	37.4	1.4
Average Queue (m)	6.3	0.0
95th Queue (m)	23.3	1.4
Link Distance (m)	81.8	986.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB
Directions Served	L	R
Maximum Queue (m)	22.9	31.4
Average Queue (m)	6.5	15.3
95th Queue (m)	20.3	28.1
Link Distance (m)	192.1	192.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	TR	L	TR	LT	R	LTR
Maximum Queue (m)	71.4	148.1	94.8	198.2	220.0	60.0	217.3
Average Queue (m)	25.5	74.9	31.6	100.3	90.2	22.6	112.1
95th Queue (m)	60.7	129.9	83.1	176.6	214.5	70.1	204.8
Link Distance (m)		1468.4		2731.9	720.3		726.6
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	55.0		55.0			40.0	
Storage Blk Time (%)	0	15	0	24	40	0	
Queuing Penalty (veh)	1	12	0	33	48	0	

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	B29	WB	WB	WB	NB	NB	SB
Directions Served	T	T	L	T	TR	L	TR	LTR
Maximum Queue (m)	54.0	1096.1	4.0	48.6	42.6	49.9	101.4	6.8
Average Queue (m)	17.8	54.7	0.4	15.4	14.9	43.7	34.6	0.5
95th Queue (m)	40.6	686.8	3.2	33.7	33.5	57.3	97.2	3.7
Link Distance (m)	888.7	2731.9		556.1			328.2	155.7
Upstream Blk Time (%)		0						
Queuing Penalty (veh)		1						
Storage Bay Dist (m)			50.0		25.0	30.0		
Storage Blk Time (%)	0			2	3	31	0	
Queuing Penalty (veh)	1			4	5	2	0	

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	17.0	17.6	13.3	15.9
Average Queue (m)	1.1	0.8	4.2	5.1
95th Queue (m)	7.9	8.4	10.0	12.1
Link Distance (m)	556.1	395.4	439.5	409.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	22.8	23.1
Average Queue (m)	1.8	8.0
95th Queue (m)	12.3	20.6
Link Distance (m)	395.4	381.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	WB	NB
Directions Served	L	L
Maximum Queue (m)	20.2	22.9
Average Queue (m)	4.9	6.4
95th Queue (m)	13.9	18.9
Link Distance (m)		1045.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	110.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 108

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			✥		↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	40	1	147	0	0	0	132	110	0	0	192	95
Future Volume (Veh/h)	40	1	147	0	0	0	132	110	0	0	192	95
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	46	1	169	0	0	0	152	126	0	0	221	109
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	651	651	221	820	760	126	330			126		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	651	651	221	820	760	126	330			126		
tC, single (s)	7.2	6.5	6.4	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	86	100	79	100	100	100	87			100		
cM capacity (veh/h)	332	341	787	209	295	930	1197			1473		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	46	170	0	152	126	0	0	221	109
Volume Left	46	0	0	152	0	0	0	0	0
Volume Right	0	169	0	0	0	0	0	0	109
cSH	332	781	1700	1197	1700	1700	1700	1700	1700
Volume to Capacity	0.14	0.22	0.00	0.13	0.07	0.00	0.00	0.13	0.06
Queue Length 95th (m)	3.8	6.6	0.0	3.5	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	17.6	10.9	0.0	8.4	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	B	A	A					
Approach Delay (s)	12.3		0.0	4.6			0.0		
Approach LOS	B		A						

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (veh/h)	0	0	0	1	0	50	0	168	14	38	293	0
Future Volume (Veh/h)	0	0	0	1	0	50	0	168	14	38	293	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	1	0	54	0	181	15	41	315	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	640	593	315	586	586	188	315			196		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	640	593	315	586	586	188	315			196		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	100	100	100	100	100	94	100			97		
cM capacity (veh/h)	358	408	730	415	412	859	1257			1325		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	55	196	356
Volume Left	0	1	0	41
Volume Right	0	54	15	0
cSH	1700	842	1257	1325
Volume to Capacity	0.00	0.07	0.00	0.03
Queue Length 95th (m)	0.0	1.7	0.0	0.8
Control Delay (s)	0.0	9.6	0.0	1.2
Lane LOS	A	A		A
Approach Delay (s)	0.0	9.6	0.0	1.2
Approach LOS	A	A		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	64	212	258	9
Future Volume (Veh/h)	0	0	64	212	258	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	69	228	277	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	648	282	287			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	648	282	287			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	92			
cM capacity (veh/h)	404	762	885			

Direction, Lane #	NB 1	SB 1
Volume Total	297	287
Volume Left	69	0
Volume Right	0	10
cSH	885	1700
Volume to Capacity	0.08	0.17
Queue Length 95th (m)	2.0	0.0
Control Delay (s)	2.8	0.0
Lane LOS	A	
Approach Delay (s)	2.8	0.0
Approach LOS		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	35.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	0	51	0	0	0	0	253	7	1	279	0
Future Volume (Veh/h)	15	0	51	0	0	0	0	253	7	1	279	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	16	0	56	0	0	0	0	278	8	1	307	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	591	595	307	647	591	282	307			286		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	591	595	307	647	591	282	307			286		
tC, single (s)	8.1	6.5	7.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.4	4.0	4.2	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	90	100	100	100	100			100		
cM capacity (veh/h)	304	417	552	345	419	757	1265			1288		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	16	56	0	286	308
Volume Left	16	0	0	0	1
Volume Right	0	56	0	8	0
cSH	304	552	1700	1700	1288
Volume to Capacity	0.05	0.10	0.00	0.17	0.00
Queue Length 95th (m)	1.3	2.7	0.0	0.0	0.0
Control Delay (s)	17.5	12.3	0.0	0.0	0.0
Lane LOS	C	B	A		A
Approach Delay (s)	13.4		0.0	0.0	0.0
Approach LOS	B		A		

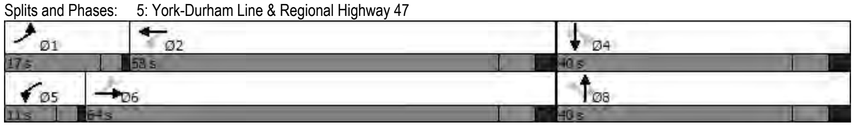
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	25.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	79	394	137	509	76	150	120	65	186	78
Future Volume (vph)	79	394	137	509	76	150	120	65	186	78
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6	5	2		8			4	
Permitted Phases	6		2		8		8	4		4
Detector Phase	1	6	5	2	8	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	7.0	50.0	7.0	50.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	18.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	17.0	64.0	11.0	58.0	40.0	40.0	40.0	40.0	40.0	40.0
Total Split (%)	14.8%	55.7%	9.6%	50.4%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	None	None	None	None	None	None
Act Effct Green (s)	68.1	56.1	67.0	57.5	18.4	18.4	18.4	18.4	18.4	18.4
Actuated g/C Ratio	0.67	0.55	0.66	0.57	0.18	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.22	0.53	0.25	0.70	0.45	0.48	0.31	0.42	0.61	0.29
Control Delay	7.3	17.8	7.1	23.6	45.1	42.0	8.3	44.9	47.0	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.3	17.8	7.1	23.6	45.1	42.0	8.3	44.9	47.0	4.5
LOS	A	B	A	C	D	D	A	D	D	A
Approach Delay		16.2		20.5		31.0			36.5	
Approach LOS		B		C		C			D	

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 101.6
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 23.9 Intersection LOS: C
Intersection Capacity Utilization 90.7% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 5: York-Durham Line & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	394	60	137	509	82	76	150	120	65	186	78
Future Volume (vph)	79	394	60	137	509	82	76	150	120	65	186	78
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1278	1566		1668	1518		1606	1782	1616	1257	1708	980
Flt Permitted	0.33	1.00		0.43	1.00		0.57	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)	442	1566		748	1518		966	1782	1616	873	1708	980
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	81	402	61	140	519	84	78	153	122	66	190	80
RTOR Reduction (vph)	0	4	0	0	4	0	0	0	100	0	0	66
Lane Group Flow (vph)	81	459	0	140	599	0	78	153	22	66	190	14
Heavy Vehicles (%)	47%	25%	16%	7%	16%	53%	17%	11%	4%	42%	10%	63%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8		8	4		4
Actuated Green, G (s)	63.5	57.0		64.5	57.5		18.4	18.4	18.4	18.4	18.4	18.4
Effective Green, g (s)	63.5	57.0		64.5	57.5		18.4	18.4	18.4	18.4	18.4	18.4
Actuated g/C Ratio	0.62	0.56		0.63	0.56		0.18	0.18	0.18	0.18	0.18	0.18
Clearance Time (s)	4.0	8.0		4.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Vehicle Extension (s)	3.0	0.2		3.0	0.2		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	327	871		534	852		173	320	290	156	306	176
v/s Ratio Prot	0.02	0.29		c0.02	c0.39			0.09			c0.11	
v/s Ratio Perm	0.14			0.15			0.08		0.01	0.08		0.01
v/c Ratio	0.25	0.53		0.26	0.70		0.45	0.48	0.08	0.42	0.62	0.08
Uniform Delay, d1	9.0	14.2		8.0	16.3		37.5	37.7	34.9	37.3	38.8	35.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	2.3		0.3	4.8		3.9	2.3	0.2	3.8	5.5	0.4
Delay (s)	9.4	16.5		8.3	21.1		41.4	40.0	35.2	41.1	44.2	35.4
Level of Service	A	B		A	C		D	D	D	D	D	D
Approach Delay (s)		15.5			18.7			38.6			41.5	
Approach LOS		B			B			D			D	

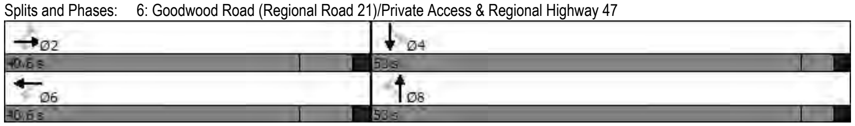
Intersection Summary

HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	102.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	90.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	202	275	3	369	336	1	1	1
Future Volume (vph)	202	275	3	369	336	1	1	1
Turn Type	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2			6		8		4
Permitted Phases		2	6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	40.6	40.6	40.6	40.6	53.0	53.0	53.0	53.0
Total Split (%)	43.4%	43.4%	43.4%	43.4%	56.6%	56.6%	56.6%	56.6%
Yellow Time (s)	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	33.1	33.1	33.1	33.1	27.6	27.6		27.6
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.37	0.37		0.37
v/c Ratio	0.33	0.43	0.01	0.30	0.83	0.01		0.00
Control Delay	17.7	4.4	16.0	15.9	37.2	8.0		12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	17.7	4.4	16.0	15.9	37.2	8.0		12.5
LOS	B	A	B	B	D	A		B
Approach Delay	10.0			15.9		36.6		12.5
Approach LOS	B			B		D		B

Intersection Summary	
Cycle Length: 93.6	
Actuated Cycle Length: 74.5	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 19.5	Intersection LOS: B
Intersection Capacity Utilization 69.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	202	275	3	369	2	336	1	6	1	1	0
Future Volume (vph)	0	202	275	3	369	2	336	1	6	1	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor		1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.87			1.00	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)		1566	1268	1785	3131		1552	1632			1833	
Flt Permitted		1.00	1.00	0.62	1.00		0.76	1.00			0.96	
Satd. Flow (perm)		1566	1268	1156	3131		1236	1632			1795	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	230	312	3	419	2	382	1	7	1	1	0
RTOR Reduction (vph)	0	0	174	0	1	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	230	139	3	420	0	382	4	0	0	2	0
Heavy Vehicles (%)	50%	20%	26%	0%	14%	0%	15%	0%	0%	0%	0%	75%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)		33.1	33.1	33.1	33.1		27.6	27.6			27.6	
Effective Green, g (s)		33.1	33.1	33.1	33.1		27.6	27.6			27.6	
Actuated g/C Ratio		0.45	0.45	0.45	0.45		0.37	0.37			0.37	
Clearance Time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)		4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)		697	564	514	1394		459	606			666	
v/s Ratio Prot		c0.15			0.13			0.00				
v/s Ratio Perm			0.11	0.00			c0.31				0.00	
v/c Ratio		0.33	0.25	0.01	0.30		0.83	0.01			0.00	
Uniform Delay, d1		13.4	12.8	11.5	13.2		21.2	14.7			14.7	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		1.3	1.0	0.0	0.6		12.2	0.0			0.0	
Delay (s)		14.7	13.9	11.5	13.8		33.4	14.7			14.7	
Level of Service		B	B	B	B		C	B			B	
Approach Delay (s)		14.2			13.7			33.1			14.7	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	74.3	Sum of lost time (s)	13.6
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

7: Concession Road 3 & Regional Highway 47

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	201	9	4	346	4	17	10	5	6	8	18
Future Volume (Veh/h)	8	201	9	4	346	4	17	10	5	6	8	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	223	10	4	384	4	19	11	6	7	9	20
Pedestrians					2			1				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.2			1.2				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	388			234			666	643	231	654	646	386
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	388			234			666	643	231	654	646	386
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.4	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.8	4.0	3.3
p0 queue free %	99			100			95	97	99	98	98	97
cM capacity (veh/h)	1182			1208			355	390	811	326	388	666

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	242	392	36	36
Volume Left	9	4	19	7
Volume Right	10	4	6	20
cSH	1182	1208	404	482
Volume to Capacity	0.01	0.00	0.09	0.07
Queue Length 95th (m)	0.2	0.1	2.3	1.9
Control Delay (s)	0.4	0.1	14.8	13.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.4	0.1	14.8	13.1
Approach LOS			B	B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	171	370	3	3	20
Future Volume (Veh/h)	10	171	370	3	3	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	12	214	462	4	4	25
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	466				700	462
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	466				700	462
tC, single (s)	5.1				7.4	7.2
tC, 2 stage (s)						
tF (s)	3.1				4.4	4.2
p0 queue free %	98				99	94
cM capacity (veh/h)	729				284	440

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	226	462	4	29
Volume Left	12	0	0	4
Volume Right	0	0	4	25
cSH	729	1700	1700	409
Volume to Capacity	0.02	0.27	0.00	0.07
Queue Length 95th (m)	0.4	0.0	0.0	1.8
Control Delay (s)	0.7	0.0	0.0	14.5
Lane LOS	A			B
Approach Delay (s)	0.7	0.0		14.5
Approach LOS				B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		

9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	195	17	134	314	21	100
Future Volume (Veh/h)	195	17	134	314	21	100
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	219	19	151	353	24	112
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			238		884	228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			238		884	228
tC, single (s)			4.2		7.1	6.3
tC, 2 stage (s)						
tF (s)			2.3		4.1	3.4
p0 queue free %			88		89	86
cM capacity (veh/h)			1300		213	796

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	238	151	353	136
Volume Left	0	151	0	24
Volume Right	19	0	0	112
cSH	1700	1300	1700	967
Volume to Capacity	0.14	0.12	0.21	0.14
Queue Length 95th (m)	0.0	3.1	0.0	3.9
Control Delay (s)	0.0	8.1	0.0	12.7
Lane LOS		A		B
Approach Delay (s)	0.0	2.4		12.7
Approach LOS				B

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

10: York-Durham Line & Hillsdale Drive

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	183	295	0
Future Volume (Veh/h)	0	0	0	183	295	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	197	317	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	514	317	317			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	514	317	317			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	524	728	1255			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	197	317
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1255	1700
Volume to Capacity	0.00	0.00	0.19
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	18.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	NB	SB
Directions Served	L	TR	L	R
Maximum Queue (m)	15.7	24.9	18.1	3.9
Average Queue (m)	5.7	10.2	6.8	0.2
95th Queue (m)	13.0	19.2	16.5	1.8
Link Distance (m)		574.9		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)	80.0		50.0	70.0
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: York-Durham Line & Wagg Road

Movement	WB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	11.0	15.5
Average Queue (m)	6.2	1.7
95th Queue (m)	11.7	8.4
Link Distance (m)	1653.9	736.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB
Directions Served	LT
Maximum Queue (m)	33.6
Average Queue (m)	7.7
95th Queue (m)	24.0
Link Distance (m)	82.2
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB	SB
Directions Served	L	R	LT
Maximum Queue (m)	22.2	30.5	1.0
Average Queue (m)	6.2	14.9	0.0
95th Queue (m)	19.5	27.5	1.0
Link Distance (m)	190.5	190.5	82.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (m)	72.7	140.1	94.8	194.0	41.8	60.8	17.7	45.1	70.7	41.8
Average Queue (m)	24.2	65.2	27.5	85.9	17.6	25.1	0.8	16.8	32.6	12.1
95th Queue (m)	56.8	118.4	73.6	159.8	35.0	49.0	11.8	36.6	59.8	29.7
Link Distance (m)		1467.0		2730.0		719.9			726.2	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	55.0		55.0		50.0		40.0	50.0		50.0
Storage Blk Time (%)	0	11	0	18	0	2		0	3	0
Queuing Penalty (veh)	0	9	1	25	0	5		1	4	0

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	B29	WB	WB	WB	NB	NB	SB
Directions Served	T	T	L	T	TR	L	TR	LTR
Maximum Queue (m)	56.8	1367.1	5.5	47.4	46.9	49.8	88.4	5.8
Average Queue (m)	19.4	72.8	0.3	17.4	16.7	39.3	14.7	0.4
95th Queue (m)	41.9	799.0	2.8	34.7	35.6	55.8	60.2	3.2
Link Distance (m)	888.7	2730.0		556.1			328.2	155.7
Upstream Blk Time (%)		0						
Queuing Penalty (veh)		1						
Storage Bay Dist (m)			50.0		25.0	30.0		
Storage Blk Time (%)	0			3	3	19	0	
Queuing Penalty (veh)	1			5	5	1	0	

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	15.6	8.1	10.5	16.7
Average Queue (m)	1.0	0.3	4.1	4.7
95th Queue (m)	8.0	4.4	9.4	11.9
Link Distance (m)	556.1	395.4	439.5	409.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	24.3	22.4
Average Queue (m)	2.1	7.2
95th Queue (m)	13.5	19.4
Link Distance (m)	395.4	381.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	WB	NB
Directions Served	L	L
Maximum Queue (m)	19.1	26.1
Average Queue (m)	5.4	6.7
95th Queue (m)	15.0	19.8
Link Distance (m)		1045.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	110.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 58

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	1	177	0	3	1	155	318	1	1	185	62
Future Volume (Veh/h)	110	1	177	0	3	1	155	318	1	1	185	62
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	131	1	211	0	4	1	185	379	1	1	220	74
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	974	972	220	1182	1045	379	294			380		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	974	972	220	1182	1045	379	294			380		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	34	100	74	100	98	100	85			100		
cM capacity (veh/h)	199	217	810	110	197	672	1262			1190		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	131	212	5	185	379	1	1	220	74
Volume Left	131	0	0	185	0	0	1	0	0
Volume Right	0	211	1	0	0	1	0	0	74
cSH	199	799	229	1262	1700	1700	1190	1700	1700
Volume to Capacity	0.66	0.27	0.02	0.15	0.22	0.00	0.00	0.13	0.04
Queue Length 95th (m)	31.6	8.5	0.5	4.1	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	52.3	11.1	21.1	8.3	0.0	0.0	8.0	0.0	0.0
Lane LOS	F	B	C	A			A		
Approach Delay (s)	26.9		21.1	2.7			0.0		
Approach LOS	D		C						

Intersection Summary			
Average Delay	9.0		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	0	2	0	47	2	366	9	72	250	0
Future Volume (Veh/h)	2	0	0	2	0	47	2	366	9	72	250	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	0	0	2	0	53	2	411	10	81	281	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	916	868	281	863	863	416	281			421		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	916	868	281	863	863	416	281			421		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	99	100	92	100			93		
cM capacity (veh/h)	221	271	763	262	273	630	1293			1133		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	2	55	423	362
Volume Left	2	2	2	81
Volume Right	0	53	10	0
cSH	221	599	1293	1133
Volume to Capacity	0.01	0.09	0.00	0.07
Queue Length 95th (m)	0.2	2.4	0.0	1.8
Control Delay (s)	21.5	11.6	0.1	2.4
Lane LOS	C	B	A	A
Approach Delay (s)	21.5	11.6	0.1	2.4
Approach LOS	C	B		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

3: York-Durham Line & Pit Inbound Site Access

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	38	342	251	7
Future Volume (Veh/h)	0	0	38	342	251	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	42	380	279	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	747	283	287			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	747	283	287			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	95			
cM capacity (veh/h)	365	761	879			

Direction, Lane #	NB 1	SB 1
Volume Total	422	287
Volume Left	42	0
Volume Right	0	8
cSH	879	1700
Volume to Capacity	0.05	0.17
Queue Length 95th (m)	1.2	0.0
Control Delay (s)	1.4	0.0
Lane LOS	A	
Approach Delay (s)	1.4	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	0	45	10	0	2	0	372	2	0	257	0
Future Volume (Veh/h)	7	0	45	10	0	2	0	372	2	0	257	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	49	11	0	2	0	404	2	0	279	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	686	685	279	733	684	405	279			406		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	686	685	279	733	684	405	279			406		
tC, single (s)	7.7	6.5	7.1	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.0	4.0	4.1	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	92	96	100	100	100			100		
cM capacity (veh/h)	296	371	584	310	371	650	1295			1153		

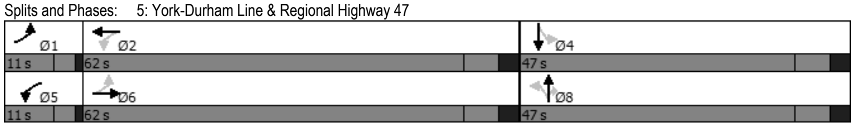
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	8	49	13	406	279
Volume Left	8	0	11	0	0
Volume Right	0	49	2	2	0
cSH	296	584	338	1700	1153
Volume to Capacity	0.03	0.08	0.04	0.24	0.00
Queue Length 95th (m)	0.7	2.2	1.0	0.0	0.0
Control Delay (s)	17.5	11.7	16.1	0.0	0.0
Lane LOS	C	B	C		
Approach Delay (s)	12.5		16.1	0.0	0.0
Approach LOS	B		C		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	33.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	50	707	178	508	65	223	181	64	208
Future Volume (vph)	50	707	178	508	65	223	181	64	208
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA
Protected Phases	1	6	5	2		8			4
Permitted Phases	6		2		8		8	4	
Detector Phase	1	6	5	2	8	8	8	4	4
Switch Phase									
Minimum Initial (s)	7.0	50.0	7.0	50.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	11.0	62.0	11.0	62.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	9.2%	51.7%	9.2%	51.7%	39.2%	39.2%	39.2%	39.2%	39.2%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0		8.0	8.0		8.0
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	Max	None	Max	None	None	None	None	None
Act Effct Green (s)	65.0	54.0	65.8	56.2		38.8	38.8		38.8
Actuated g/C Ratio	0.54	0.45	0.55	0.47		0.32	0.32		0.32
v/c Ratio	0.16	1.04	1.16	0.75		0.69	0.31		0.98
Control Delay	12.5	73.9	143.7	34.1		44.2	8.0		80.5
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	12.5	73.9	143.7	34.1		44.2	8.0		80.5
LOS	B	E	F	C		D	A		F
Approach Delay		70.3		60.4		30.2			80.5
Approach LOS		E		E		C			F

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 119.8	
Natural Cycle: 120	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 1.16	
Intersection Signal Delay: 60.9	Intersection LOS: E
Intersection Capacity Utilization 108.1%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 5: York-Durham Line & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	707	86	178	508	52	65	223	181	64	208	69
Future Volume (vph)	50	707	86	178	508	52	65	223	181	64	208	69
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0			8.0	8.0		8.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.98		1.00	0.99			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)	1789	1834		1767	1714			1886	1632		1691	
Flt Permitted	0.25	1.00		0.07	1.00			0.74	1.00		0.67	
Satd. Flow (perm)	467	1834		132	1714			1411	1632		1152	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	768	93	193	552	57	71	242	197	70	226	75
RTOR Reduction (vph)	0	4	0	0	3	0	0	0	114	0	7	0
Lane Group Flow (vph)	54	857	0	193	606	0	0	313	83	0	364	0
Heavy Vehicles (%)	5%	6%	7%	1%	8%	9%	6%	3%	3%	15%	3%	12%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8		8	4		
Actuated Green, G (s)	60.4	54.8		63.2	56.2			38.8	38.8		38.8	
Effective Green, g (s)	60.4	54.8		63.2	56.2			38.8	38.8		38.8	
Actuated g/C Ratio	0.50	0.45		0.52	0.47			0.32	0.32		0.32	
Clearance Time (s)	4.0	8.0		4.0	8.0			8.0	8.0		8.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2			5.0	5.0		5.0	
Lane Grp Cap (vph)	295	833		164	798			453	525		370	
v/s Ratio Prot	0.01	0.47		c0.07	0.35							
v/s Ratio Perm	0.08			c0.55				0.22	0.05		c0.32	
v/c Ratio	0.18	1.03		1.18	0.76			0.69	0.16		0.98	
Uniform Delay, d1	18.0	32.9		33.1	26.6			35.7	29.2		40.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.3	38.8		125.8	6.7			5.7	0.3		42.2	
Delay (s)	18.3	71.7		158.9	33.3			41.4	29.5		82.7	
Level of Service	B	E		F	C			D	C		F	
Approach Delay (s)		68.6			63.5			36.8			82.7	
Approach LOS		E			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	62.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	120.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	108.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	2	464	445	5	292	281	3	5	2
Future Volume (vph)	2	464	445	5	292	281	3	5	2
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	2	2	2	6	6	8	8	4	4
Switch Phase									
Minimum Initial (s)	25.0	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	58.0	58.0	58.0	58.0	58.0	35.6	35.6	35.6	35.6
Total Split (%)	62.0%	62.0%	62.0%	62.0%	62.0%	38.0%	38.0%	38.0%	38.0%
Yellow Time (s)	5.9	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	50.2	50.2	50.2	50.2	50.2	24.5	24.5		24.5
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57	0.28	0.28		0.28
v/c Ratio	0.00	0.49	0.47	0.01	0.17	0.85	0.01		0.02
Control Delay	10.0	14.4	2.7	10.2	10.1	52.0	20.0		19.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	10.0	14.4	2.7	10.2	10.1	52.0	20.0		19.9
LOS	A	B	A	B	B	D	B		B
Approach Delay		8.7			10.1		51.6		19.9
Approach LOS		A			B		D		B

Intersection Summary	
Cycle Length: 93.6	
Actuated Cycle Length: 88.4	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 17.2	Intersection LOS: B
Intersection Capacity Utilization 76.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	464	445	5	292	4	281	3	1	5	2	2
Future Volume (vph)	2	464	445	5	292	4	281	3	1	5	2	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.96			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1785	1824	1456	1781	3396		1638	1808			1773	
Flt Permitted	0.56	1.00	1.00	0.41	1.00		0.75	1.00			0.92	
Satd. Flow (perm)	1047	1824	1456	775	3396		1296	1808			1684	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	504	484	5	317	4	305	3	1	5	2	2
RTOR Reduction (vph)	0	0	209	0	1	0	0	1	0	0	1	0
Lane Group Flow (vph)	2	504	275	5	320	0	305	3	0	0	8	0
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	3%	7%	0%	5%	0%	9%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	50.2	50.2	50.2	50.2	50.2		24.5	24.5			24.5	
Effective Green, g (s)	50.2	50.2	50.2	50.2	50.2		24.5	24.5			24.5	
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57		0.28	0.28			0.28	
Clearance Time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)	4.2	4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)	595	1036	827	440	1930		359	501			467	
v/s Ratio Prot		c0.28			0.09			0.00				
v/s Ratio Perm	0.00		0.19	0.01			c0.24				0.00	
v/c Ratio	0.00	0.49	0.33	0.01	0.17		0.85	0.01			0.02	
Uniform Delay, d1	8.2	11.4	10.1	8.3	9.1		30.2	23.1			23.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	1.6	1.1	0.0	0.2		16.9	0.0			0.0	
Delay (s)	8.2	13.0	11.2	8.3	9.3		47.0	23.1			23.2	
Level of Service	A	B	B	A	A		D	C			C	
Approach Delay (s)		12.1			9.2			46.7			23.2	
Approach LOS		B			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	13.6
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	422	25	5	294	7	12	14	10	4	18	14
Future Volume (Veh/h)	21	422	25	5	294	7	12	14	10	4	18	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	23	454	27	5	316	8	13	15	11	4	19	15
Pedestrians		3			3			5			7	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	331			486			876	860	476	872	869	330
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	331			486			876	860	476	872	869	330
tC, single (s)	4.1			4.1			7.1	6.6	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.1	3.3	3.5	4.0	3.3
p0 queue free %	98			100			95	95	98	98	93	98
cM capacity (veh/h)	1233			1083			244	278	590	249	283	710

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	504	329	39	38
Volume Left	23	5	13	4
Volume Right	27	8	11	15
cSH	1233	1083	310	364
Volume to Capacity	0.02	0.00	0.13	0.10
Queue Length 95th (m)	0.5	0.1	3.4	2.8
Control Delay (s)	0.6	0.2	18.3	16.0
Lane LOS	A	A	C	C
Approach Delay (s)	0.6	0.2	18.3	16.0
Approach LOS			C	C

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	434	305	3	3	5
Future Volume (Veh/h)	3	434	305	3	3	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	3	477	335	3	3	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	338				818	335
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	338				818	335
tC, single (s)	5.1				7.4	7.2
tC, 2 stage (s)						
tF (s)	3.1				4.4	4.2
p0 queue free %	100				99	99
cM capacity (veh/h)	829				240	530

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	480	335	3	8
Volume Left	3	0	0	3
Volume Right	0	0	3	5
cSH	829	1700	1700	365
Volume to Capacity	0.00	0.20	0.00	0.02
Queue Length 95th (m)	0.1	0.0	0.0	0.5
Control Delay (s)	0.1	0.0	0.0	15.1
Lane LOS	A			C
Approach Delay (s)	0.1	0.0		15.1
Approach LOS				C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	420	16	164	286	7	146
Future Volume (Veh/h)	420	16	164	286	7	146
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	483	18	189	329	8	168
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			501		1199	492
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			501		1199	492
tC, single (s)			4.2		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.3
p0 queue free %			82		95	71
cM capacity (veh/h)			1033		158	577

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	501	189	329	176
Volume Left	0	189	0	8
Volume Right	18	0	0	168
cSH	1700	1033	1700	604
Volume to Capacity	0.29	0.18	0.19	0.29
Queue Length 95th (m)	0.0	5.3	0.0	9.6
Control Delay (s)	0.0	9.3	0.0	14.5
Lane LOS		A		B
Approach Delay (s)	0.0	3.4		14.5
Approach LOS				B

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

10: York-Durham Line & Hillsdale Drive

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	377	252	0
Future Volume (Veh/h)	0	0	0	377	252	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	0	0	424	283	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	707	283	283			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	707	283	283			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	405	761	1291			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	424	283
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1291	1700
Volume to Capacity	0.00	0.00	0.17
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	WB	NB	SB	SB
Directions Served	L	TR	LTR	L	L	R
Maximum Queue (m)	31.7	21.1	5.3	21.1	0.7	2.6
Average Queue (m)	11.3	8.6	0.6	6.4	0.0	0.1
95th Queue (m)	23.8	15.8	3.2	16.2	1.0	1.7
Link Distance (m)		574.9	230.8			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	80.0			50.0	50.0	70.0
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: York-Durham Line & Wagg Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.9	16.5	3.5	23.9
Average Queue (m)	0.6	6.8	0.2	4.5
95th Queue (m)	4.1	13.7	2.8	14.8
Link Distance (m)	104.9	1653.9	1318.6	736.1
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB
Directions Served	LT
Maximum Queue (m)	27.8
Average Queue (m)	4.0
95th Queue (m)	17.7
Link Distance (m)	82.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB	WB
Directions Served	L	R	LTR
Maximum Queue (m)	20.0	28.1	9.5
Average Queue (m)	2.5	13.5	3.3
95th Queue (m)	11.8	26.5	9.9
Link Distance (m)	192.1	192.1	105.1
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	TR	L	TR	LT	R	LTR
Maximum Queue (m)	74.8	810.0	91.2	154.6	249.0	60.0	175.3
Average Queue (m)	20.9	494.9	45.1	78.1	121.3	35.6	84.0
95th Queue (m)	68.0	900.4	90.1	134.8	258.8	83.8	165.4
Link Distance (m)		1468.4		2732.5	720.3		726.3
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	55.0		55.0			40.0	
Storage Blk Time (%)		56	11	16	50	0	
Queuing Penalty (veh)		28	62	29	91	0	

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	EB	B29	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	L	T	TR	L	TR	LTR
Maximum Queue (m)	5.3	63.7	1645.7	8.4	34.6	32.3	49.8	85.5	10.6
Average Queue (m)	0.3	29.5	137.0	0.9	11.4	10.7	39.8	19.6	2.0
95th Queue (m)	2.8	56.2	1122.1	5.0	25.8	26.5	55.1	70.0	7.9
Link Distance (m)		888.2	2732.5		556.1			328.2	155.7
Upstream Blk Time (%)			1						
Queuing Penalty (veh)			7						
Storage Bay Dist (m)	70.0			50.0		25.0	30.0		
Storage Blk Time (%)		1			1	1	24	0	
Queuing Penalty (veh)		5			1	2	1	0	

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	31.0	20.3	15.2	11.3
Average Queue (m)	2.9	1.5	4.4	4.3
95th Queue (m)	16.5	10.5	11.2	10.2
Link Distance (m)	556.1	395.4	439.5	409.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	7.3	17.1
Average Queue (m)	0.2	2.7
95th Queue (m)	3.8	11.9
Link Distance (m)	395.4	381.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EB	WB	NB
Directions Served	TR	L	L
Maximum Queue (m)	1.3	27.2	11.8
Average Queue (m)	0.0	9.1	1.7
95th Queue (m)	0.9	21.1	7.7
Link Distance (m)	3705.4		1045.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		110.0	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 226

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	1	177	0	3	1	155	318	1	1	185	62
Future Volume (Veh/h)	110	1	177	0	3	1	155	318	1	1	185	62
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	131	1	211	0	4	1	185	379	1	1	220	74
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	974	972	220	1182	1045	379	294			380		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	974	972	220	1182	1045	379	294			380		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	34	100	74	100	98	100	85			100		
cM capacity (veh/h)	199	217	810	110	197	672	1262			1190		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	131	212	5	185	379	1	1	220	74
Volume Left	131	0	0	185	0	0	1	0	0
Volume Right	0	211	1	0	0	1	0	0	74
cSH	199	799	229	1262	1700	1700	1190	1700	1700
Volume to Capacity	0.66	0.27	0.02	0.15	0.22	0.00	0.00	0.13	0.04
Queue Length 95th (m)	31.6	8.5	0.5	4.1	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	52.3	11.1	21.1	8.3	0.0	0.0	8.0	0.0	0.0
Lane LOS	F	B	C	A			A		
Approach Delay (s)	26.9		21.1	2.7			0.0		
Approach LOS	D		C						

Intersection Summary			
Average Delay	9.0		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	0	2	0	47	2	366	9	72	250	0
Future Volume (Veh/h)	2	0	0	2	0	47	2	366	9	72	250	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	0	0	2	0	53	2	411	10	81	281	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	916	868	281	863	863	416	281			421		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	916	868	281	863	863	416	281			421		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	99	100	92	100			93		
cM capacity (veh/h)	221	271	763	262	273	630	1293			1133		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	2	55	423	362
Volume Left	2	2	2	81
Volume Right	0	53	10	0
cSH	221	599	1293	1133
Volume to Capacity	0.01	0.09	0.00	0.07
Queue Length 95th (m)	0.2	2.4	0.0	1.8
Control Delay (s)	21.5	11.6	0.1	2.4
Lane LOS	C	B	A	A
Approach Delay (s)	21.5	11.6	0.1	2.4
Approach LOS	C	B		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

3: York-Durham Line & Pit Inbound Site Access

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	38	342	251	7
Future Volume (Veh/h)	0	0	38	342	251	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	42	380	279	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	747	283	287			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	747	283	287			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	95			
cM capacity (veh/h)	365	761	879			

Direction, Lane #	NB 1	SB 1
Volume Total	422	287
Volume Left	42	0
Volume Right	0	8
cSH	879	1700
Volume to Capacity	0.05	0.17
Queue Length 95th (m)	1.2	0.0
Control Delay (s)	1.4	0.0
Lane LOS	A	
Approach Delay (s)	1.4	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	0	45	10	0	2	0	372	2	0	257	0
Future Volume (Veh/h)	7	0	45	10	0	2	0	372	2	0	257	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	49	11	0	2	0	404	2	0	279	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	686	685	279	733	684	405	279			406		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	686	685	279	733	684	405	279			406		
tC, single (s)	7.7	6.5	7.1	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.0	4.0	4.1	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	92	96	100	100	100			100		
cM capacity (veh/h)	296	371	584	310	371	650	1295			1153		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	8	49	13	406	279
Volume Left	8	0	11	0	0
Volume Right	0	49	2	2	0
cSH	296	584	338	1700	1153
Volume to Capacity	0.03	0.08	0.04	0.24	0.00
Queue Length 95th (m)	0.7	2.2	1.0	0.0	0.0
Control Delay (s)	17.5	11.7	16.1	0.0	0.0
Lane LOS	C	B	C		
Approach Delay (s)	12.5		16.1	0.0	0.0
Approach LOS	B		C		

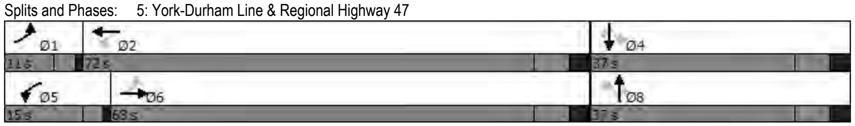
Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	33.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	50	707	178	508	65	223	181	64	208	69
Future Volume (vph)	50	707	178	508	65	223	181	64	208	69
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6	5	2		8			4	
Permitted Phases	6		2		8		8	4		4
Detector Phase	1	6	5	2	8	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	7.0	50.0	7.0	50.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	18.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	11.0	68.0	15.0	72.0	37.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	9.2%	56.7%	12.5%	60.0%	30.8%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	None	None	None	None	None	None
Act Effct Green (s)	71.2	60.2	78.7	66.1	21.6	21.6	21.6	21.6	21.6	21.6
Actuated g/C Ratio	0.63	0.54	0.70	0.59	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.11	0.87	0.66	0.60	0.42	0.66	0.42	0.51	0.65	0.22
Control Delay	7.1	35.4	23.2	19.6	47.7	50.7	8.5	54.6	50.7	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.1	35.4	23.2	19.6	47.7	50.7	8.5	54.6	50.7	8.5
LOS	A	D	C	B	D	D	A	D	D	A
Approach Delay		33.7		20.4		34.0			42.9	
Approach LOS		C		C		C			D	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 112.4
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 31.0 Intersection LOS: C
Intersection Capacity Utilization 94.3% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 5: York-Durham Line & Regional Highway 47



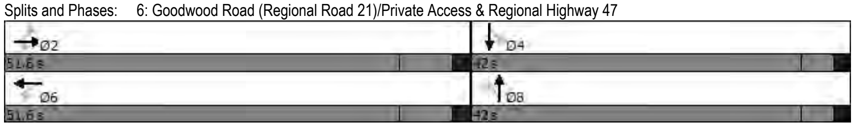
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	707	86	178	508	52	65	223	181	64	208	69
Future Volume (vph)	50	707	86	178	508	52	65	223	181	64	208	69
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	1834		1767	1714		1773	1920	1632	1552	1824	1426
Flt Permitted	0.36	1.00		0.11	1.00		0.47	1.00	1.00	0.43	1.00	1.00
Satd. Flow (perm)	669	1834		209	1714		877	1920	1632	707	1824	1426
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	768	93	193	552	57	71	242	197	70	226	75
RTOR Reduction (vph)	0	3	0	0	3	0	0	0	156	0	0	61
Lane Group Flow (vph)	54	858	0	193	606	0	71	242	41	70	226	14
Heavy Vehicles (%)	5%	6%	7%	1%	8%	9%	6%	3%	3%	15%	3%	12%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8		8	4		4
Actuated Green, G (s)	66.6	61.1		75.6	66.1		21.6	21.6	21.6	21.6	21.6	21.6
Effective Green, g (s)	66.6	61.1		75.6	66.1		21.6	21.6	21.6	21.6	21.6	21.6
Actuated g/C Ratio	0.59	0.54		0.67	0.58		0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	4.0	8.0		4.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Vehicle Extension (s)	3.0	0.2		3.0	0.2		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	448	989		284	1000		167	366	311	134	348	272
v/s Ratio Prot	0.01	c0.47		c0.06	0.35			c0.13			0.12	
v/s Ratio Perm	0.07			0.39			0.08		0.03	0.10		0.01
v/c Ratio	0.12	0.87		0.68	0.61		0.43	0.66	0.13	0.52	0.65	0.05
Uniform Delay, d1	10.5	22.5		19.1	15.2		40.3	42.4	38.0	41.2	42.3	37.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	10.2		6.3	2.7		3.6	5.8	0.4	6.8	5.6	0.2
Delay (s)	10.6	32.7		25.5	17.9		43.9	48.3	38.4	48.0	47.9	37.6
Level of Service	B	C		C	B		D	D	D	D	D	D
Approach Delay (s)		31.4			19.7			43.9			45.9	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	32.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	113.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↑	↱	↰	↑↱	↰	↱		✥
Traffic Volume (vph)	2	464	445	5	292	281	3	5	2
Future Volume (vph)	2	464	445	5	292	281	3	5	2
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	2	2	2	6	6	8	8	4	4
Switch Phase									
Minimum Initial (s)	25.0	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	51.6	51.6	51.6	51.6	51.6	42.0	42.0	42.0	42.0
Total Split (%)	55.1%	55.1%	55.1%	55.1%	55.1%	44.9%	44.9%	44.9%	44.9%
Yellow Time (s)	5.9	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	44.0	44.0	44.0	44.0	44.0	24.0	24.0		24.0
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.29	0.29		0.29
v/c Ratio	0.00	0.51	0.48	0.01	0.18	0.80	0.01		0.02
Control Delay	12.0	16.1	3.2	12.2	11.2	42.5	16.8		16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	12.0	16.1	3.2	12.2	11.2	42.5	16.8		16.8
LOS	B	B	A	B	B	D	B		B
Approach Delay		9.8			11.3		42.2		16.8
Approach LOS		A			B		D		B

Intersection Summary	
Cycle Length: 93.6	
Actuated Cycle Length: 81.7	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 16.2	Intersection LOS: B
Intersection Capacity Utilization 76.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑↱		↰	↱			✥	
Traffic Volume (vph)	2	464	445	5	292	4	281	3	1	5	2	2
Future Volume (vph)	2	464	445	5	292	4	281	3	1	5	2	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.96			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1785	1824	1456	1781	3396		1638	1808			1773	
Flt Permitted	0.56	1.00	1.00	0.41	1.00		0.75	1.00			0.92	
Satd. Flow (perm)	1047	1824	1456	762	3396		1296	1808			1686	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	504	484	5	317	4	305	3	1	5	2	2
RTOR Reduction (vph)	0	0	223	0	1	0	0	1	0	0	1	0
Lane Group Flow (vph)	2	504	261	5	320	0	305	3	0	0	8	0
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	3%	7%	0%	5%	0%	9%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	44.0	44.0	44.0	44.0	44.0		24.0	24.0			24.0	
Effective Green, g (s)	44.0	44.0	44.0	44.0	44.0		24.0	24.0			24.0	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54		0.29	0.29			0.29	
Clearance Time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)	4.2	4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)	564	983	785	410	1831		381	531			495	
v/s Ratio Prot		c0.28			0.09			0.00				
v/s Ratio Perm	0.00		0.18	0.01			c0.24				0.00	
v/c Ratio	0.00	0.51	0.33	0.01	0.17		0.80	0.01			0.02	
Uniform Delay, d1	8.7	12.0	10.6	8.7	9.6		26.6	20.4			20.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	1.9	1.1	0.1	0.2		11.4	0.0			0.0	
Delay (s)	8.7	13.9	11.7	8.8	9.8		38.0	20.4			20.4	
Level of Service	A	B	B	A	A		D	C			C	
Approach Delay (s)		12.8			9.8			37.8			20.4	
Approach LOS		B			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	81.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	422	25	5	294	7	12	14	10	4	18	14
Future Volume (Veh/h)	21	422	25	5	294	7	12	14	10	4	18	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	23	454	27	5	316	8	13	15	11	4	19	15
Pedestrians		3			3			5			7	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	331			486			876	860	476	872	869	330
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	331			486			876	860	476	872	869	330
tC, single (s)	4.1			4.1			7.1	6.6	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.1	3.3	3.5	4.0	3.3
p0 queue free %	98			100			95	95	98	98	93	98
cM capacity (veh/h)	1233			1083			244	278	590	249	283	710

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	504	329	39	38
Volume Left	23	5	13	4
Volume Right	27	8	11	15
cSH	1233	1083	310	364
Volume to Capacity	0.02	0.00	0.13	0.10
Queue Length 95th (m)	0.5	0.1	3.4	2.8
Control Delay (s)	0.6	0.2	18.3	16.0
Lane LOS	A	A	C	C
Approach Delay (s)	0.6	0.2	18.3	16.0
Approach LOS			C	C

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	434	305	3	3	5
Future Volume (Veh/h)	3	434	305	3	3	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	3	477	335	3	3	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	338				818	335
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	338				818	335
tC, single (s)	5.1				7.4	7.2
tC, 2 stage (s)						
tF (s)	3.1				4.4	4.2
p0 queue free %	100				99	99
cM capacity (veh/h)	829				240	530

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	480	335	3	8
Volume Left	3	0	0	3
Volume Right	0	0	3	5
cSH	829	1700	1700	365
Volume to Capacity	0.00	0.20	0.00	0.02
Queue Length 95th (m)	0.1	0.0	0.0	0.5
Control Delay (s)	0.1	0.0	0.0	15.1
Lane LOS	A			C
Approach Delay (s)	0.1	0.0		15.1
Approach LOS				C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	420	16	164	286	7	146
Future Volume (Veh/h)	420	16	164	286	7	146
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	483	18	189	329	8	168
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			501		1199	492
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			501		1199	492
tC, single (s)			4.2		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.3
p0 queue free %			82		95	71
cM capacity (veh/h)			1033		158	577

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	501	189	329	176
Volume Left	0	189	0	8
Volume Right	18	0	0	168
cSH	1700	1033	1700	604
Volume to Capacity	0.29	0.18	0.19	0.29
Queue Length 95th (m)	0.0	5.3	0.0	9.6
Control Delay (s)	0.0	9.3	0.0	14.5
Lane LOS		A		B
Approach Delay (s)	0.0	3.4		14.5
Approach LOS				B

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	377	252	0
Future Volume (Veh/h)	0	0	0	377	252	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	0	0	424	283	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	707	283	283			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	707	283	283			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	405	761	1291			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	424	283
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1291	1700
Volume to Capacity	0.00	0.00	0.17
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	WB	NB	SB
Directions Served	L	TR	LTR	L	R
Maximum Queue (m)	25.2	21.0	5.7	20.9	3.9
Average Queue (m)	10.6	8.5	0.5	6.9	0.1
95th Queue (m)	19.6	15.9	3.1	16.6	1.7
Link Distance (m)		574.9	230.8		
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)	80.0			50.0	70.0
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 2: York-Durham Line & Wagg Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.0	14.7	1.5	19.8
Average Queue (m)	0.7	6.7	0.1	4.9
95th Queue (m)	4.4	13.2	1.5	14.8
Link Distance (m)	104.9	1653.9	1318.6	736.1
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB
Directions Served	LT
Maximum Queue (m)	24.8
Average Queue (m)	3.3
95th Queue (m)	14.9
Link Distance (m)	82.4
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB	WB
Directions Served	L	R	LTR
Maximum Queue (m)	17.5	30.2	8.9
Average Queue (m)	2.5	12.8	2.8
95th Queue (m)	11.3	26.8	9.2
Link Distance (m)	190.5	190.5	103.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (m)	74.7	260.5	88.8	120.8	41.9	78.2	59.9	44.9	68.6	21.5
Average Queue (m)	18.6	149.9	30.3	54.4	15.5	38.5	6.5	16.4	32.8	6.0
95th Queue (m)	58.9	251.4	61.6	96.4	33.5	65.7	37.0	35.0	58.5	16.5
Link Distance (m)		1467.0		2730.7		719.9			725.8	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	55.0		55.0		50.0		40.0	50.0		50.0
Storage Blk Time (%)		36	1	8	0	8		0	3	
Queuing Penalty (veh)		18	8	14	1	19		1	4	

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	EB	EB	B29	WB	WB	WB	NB	NB	SB
Directions Served	L	T	R	T	L	T	TR	L	TR	LTR
Maximum Queue (m)	6.8	72.1	11.2	1093.8	7.1	29.7	28.5	49.8	81.2	12.1
Average Queue (m)	0.3	32.1	0.4	63.8	0.7	10.8	9.5	37.5	12.8	1.8
95th Queue (m)	3.0	59.5	11.1	744.7	4.2	23.8	23.1	54.3	54.9	7.8
Link Distance (m)		888.2		2730.7		556.1			328.2	155.7
Upstream Blk Time (%)				0						
Queuing Penalty (veh)				1						
Storage Bay Dist (m)	70.0		50.0		50.0		25.0	30.0		
Storage Blk Time (%)		1				0	1	18	0	
Queuing Penalty (veh)		6				1	1	1	0	

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	27.1	8.9	13.0	14.4
Average Queue (m)	3.2	0.5	4.6	4.8
95th Queue (m)	15.3	4.1	10.4	11.3
Link Distance (m)	556.1	395.4	439.5	409.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	10.6	18.3
Average Queue (m)	0.4	3.5
95th Queue (m)	6.9	13.9
Link Distance (m)	395.4	381.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EB	WB	NB
Directions Served	TR	L	L
Maximum Queue (m)	1.2	28.4	11.8
Average Queue (m)	0.0	10.1	2.1
95th Queue (m)	1.1	22.3	8.5
Link Distance (m)	3705.4		1045.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		110.0	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 75

APPENDIX F-3

2033 Future Background Capacity and Queuing Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	1	162	0	0	0	146	115	0	0	201	105
Future Volume (Veh/h)	44	1	162	0	0	0	146	115	0	0	201	105
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	51	1	186	0	0	0	168	132	0	0	231	121
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	699	699	231	886	820	132	352			132		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	699	699	231	886	820	132	352			132		
tC, single (s)	7.2	6.5	6.4	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	83	100	76	100	100	100	86			100		
cM capacity (veh/h)	304	314	777	181	267	923	1174			1466		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	51	187	0	168	132	0	0	231	121
Volume Left	51	0	0	168	0	0	0	0	0
Volume Right	0	186	0	0	0	0	0	0	121
cSH	304	771	1700	1174	1700	1700	1700	1700	1700
Volume to Capacity	0.17	0.24	0.00	0.14	0.08	0.00	0.00	0.14	0.07
Queue Length 95th (m)	4.7	7.6	0.0	4.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	19.2	11.2	0.0	8.6	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	B	A	A					
Approach Delay (s)	12.9		0.0	4.8			0.0		
Approach LOS	B		A						

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	1	0	50	0	177	14	38	308	0
Future Volume (Veh/h)	0	0	0	1	0	50	0	177	14	38	308	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	1	0	54	0	190	15	41	331	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	664	618	331	610	610	198	331			205		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	664	618	331	610	610	198	331			205		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	100	100	100	100	100	94	100			97		
cM capacity (veh/h)	344	395	715	399	399	849	1240			1315		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	55	205	372
Volume Left	0	1	0	41
Volume Right	0	54	15	0
cSH	1700	832	1240	1315
Volume to Capacity	0.00	0.07	0.00	0.03
Queue Length 95th (m)	0.0	1.7	0.0	0.8
Control Delay (s)	0.0	9.6	0.0	1.1
Lane LOS	A	A		A
Approach Delay (s)	0.0	9.6	0.0	1.1
Approach LOS	A	A		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	64	223	288	8
Future Volume (Veh/h)	0	0	64	223	288	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	69	240	310	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	692	314	319			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	692	314	319			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	92			
cM capacity (veh/h)	379	731	857			

Direction, Lane #	NB 1	SB 1
Volume Total	309	319
Volume Left	69	0
Volume Right	0	9
cSH	857	1700
Volume to Capacity	0.08	0.19
Queue Length 95th (m)	2.1	0.0
Control Delay (s)	2.8	0.0
Lane LOS	A	
Approach Delay (s)	2.8	0.0
Approach LOS		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	0	51	0	0	0	0	266	7	1	293	0
Future Volume (Veh/h)	15	0	51	0	0	0	0	266	7	1	293	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	16	0	56	0	0	0	0	292	8	1	322	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	620	624	322	676	620	296	322			300		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	620	624	322	676	620	296	322			300		
tC, single (s)	8.1	6.5	7.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.4	4.0	4.2	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	90	100	100	100	100			100		
cM capacity (veh/h)	289	404	540	331	406	748	1249			1273		

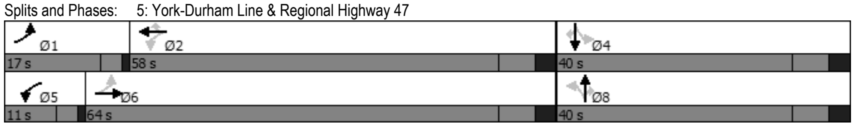
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	16	56	0	300	323
Volume Left	16	0	0	0	1
Volume Right	0	56	0	8	0
cSH	289	540	1700	1700	1273
Volume to Capacity	0.06	0.10	0.00	0.18	0.00
Queue Length 95th (m)	1.4	2.8	0.0	0.0	0.0
Control Delay (s)	18.2	12.4	0.0	0.0	0.0
Lane LOS	C	B	A		A
Approach Delay (s)	13.7		0.0	0.0	0.0
Approach LOS	B		A		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	26.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	79	433	151	561	90	84	166	132	71	206	86
Future Volume (vph)	79	433	151	561	90	84	166	132	71	206	86
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6	5	2			8			4	
Permitted Phases	6		2		2	8		8	4		4
Detector Phase	1	6	5	2	2	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	50.0	7.0	50.0	50.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	58.0	18.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	17.0	64.0	11.0	58.0	58.0	40.0	40.0	40.0	40.0	40.0	40.0
Total Split (%)	14.8%	55.7%	9.6%	50.4%	50.4%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	68.3	56.1	66.9	57.4	57.4	19.8	19.8	19.8	19.8	19.8	19.8
Actuated g/C Ratio	0.66	0.54	0.65	0.56	0.56	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.22	0.59	0.30	0.63	0.14	0.50	0.49	0.32	0.45	0.64	0.31
Control Delay	7.8	20.1	8.1	22.2	1.9	47.4	41.9	8.0	45.8	47.4	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.8	20.1	8.1	22.2	1.9	47.4	41.9	8.0	45.8	47.4	5.3
LOS	A	C	A	C	A	D	D	A	D	D	A
Approach Delay		18.4		17.3			31.3			37.0	
Approach LOS		B		B			C			D	

Intersection Summary	
Cycle Length: 115	
Actuated Cycle Length: 103	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 23.5	Intersection LOS: C
Intersection Capacity Utilization 92.5%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 5: York-Durham Line & Regional Highway 47



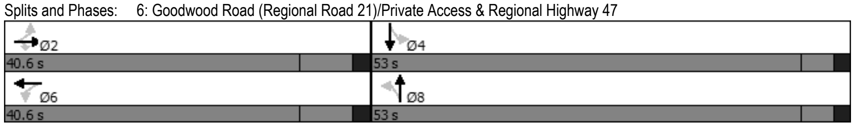
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	433	66	151	561	90	84	166	132	71	206	86
Future Volume (vph)	79	433	66	151	561	90	84	166	132	71	206	86
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1278	1566		1668	1620	1044	1606	1782	1616	1257	1708	980
Flt Permitted	0.35	1.00		0.39	1.00	1.00	0.53	1.00	1.00	0.63	1.00	1.00
Satd. Flow (perm)	464	1566		678	1620	1044	893	1782	1616	830	1708	980
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	81	442	67	154	572	92	86	169	135	72	210	88
RTOR Reduction (vph)	0	4	0	0	0	41	0	0	109	0	0	71
Lane Group Flow (vph)	81	505	0	154	572	51	86	169	26	72	210	17
Heavy Vehicles (%)	47%	25%	16%	7%	16%	53%	17%	11%	4%	42%	10%	63%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2		2	8		8	4		4
Actuated Green, G (s)	63.6	57.0		64.4	57.4	57.4	19.8	19.8	19.8	19.8	19.8	19.8
Effective Green, g (s)	63.6	57.0		64.4	57.4	57.4	19.8	19.8	19.8	19.8	19.8	19.8
Actuated g/C Ratio	0.61	0.55		0.62	0.55	0.55	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Vehicle Extension (s)	3.0	0.2		3.0	0.2	0.2	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	336	859		487	895	577	170	339	308	158	325	186
v/s Ratio Prot	0.02	0.32		c0.02	c0.35			0.09			c0.12	
v/s Ratio Perm	0.13			0.17		0.05	0.10		0.02	0.09		0.02
v/c Ratio	0.24	0.59		0.32	0.64	0.09	0.51	0.50	0.08	0.46	0.65	0.09
Uniform Delay, d1	9.3	15.6		8.9	16.0	10.9	37.6	37.6	34.5	37.2	38.8	34.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	2.9		0.4	3.5	0.3	4.9	2.4	0.2	4.3	5.9	0.4
Delay (s)	9.7	18.5		9.3	19.5	11.2	42.5	40.0	34.8	41.5	44.7	35.0
Level of Service	A	B		A	B	B	D	D	C	D	D	D
Approach Delay (s)		17.3			16.7			38.7			41.8	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	103.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	92.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	200	285	6	387	336	1	1	1
Future Volume (vph)	200	285	6	387	336	1	1	1
Turn Type	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2			6		8		4
Permitted Phases		2	6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	40.6	40.6	40.6	40.6	53.0	53.0	53.0	53.0
Total Split (%)	43.4%	43.4%	43.4%	43.4%	56.6%	56.6%	56.6%	56.6%
Yellow Time (s)	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	33.1	33.1	33.1	33.1	27.6	27.6		27.6
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.37	0.37		0.37
v/c Ratio	0.31	0.44	0.02	0.32	0.83	0.01		0.00
Control Delay	17.3	4.5	16.3	16.0	37.2	8.0		12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	17.3	4.5	16.3	16.0	37.2	8.0		12.5
LOS	B	A	B	B	D	A		B
Approach Delay	9.8			16.0		36.6		12.5
Approach LOS	A			B		D		B

Intersection Summary	
Cycle Length: 93.6	
Actuated Cycle Length: 74.5	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 19.3	Intersection LOS: B
Intersection Capacity Utilization 69.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	200	285	6	387	2	336	1	6	1	1	0
Future Volume (vph)	0	200	285	6	387	2	336	1	6	1	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor		1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.87			1.00	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)		1634	1238	1190	3131		1552	1632			1833	
Flt Permitted		1.00	1.00	0.62	1.00		0.76	1.00			0.96	
Satd. Flow (perm)		1634	1238	773	3131		1236	1632			1795	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	227	324	7	440	2	382	1	7	1	1	0
RTOR Reduction (vph)	0	0	180	0	1	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	227	144	7	441	0	382	4	0	0	2	0
Heavy Vehicles (%)	0%	15%	29%	50%	14%	0%	15%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)		33.1	33.1	33.1	33.1		27.6	27.6			27.6	
Effective Green, g (s)		33.1	33.1	33.1	33.1		27.6	27.6			27.6	
Actuated g/C Ratio		0.45	0.45	0.45	0.45		0.37	0.37			0.37	
Clearance Time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)		4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)		727	551	344	1394		459	606			666	
v/s Ratio Prot		0.14			c0.14			0.00				
v/s Ratio Perm			0.12	0.01			c0.31				0.00	
v/c Ratio		0.31	0.26	0.02	0.32		0.83	0.01			0.00	
Uniform Delay, d1		13.3	12.9	11.5	13.3		21.2	14.7			14.7	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		1.1	1.2	0.1	0.6		12.2	0.0			0.0	
Delay (s)		14.4	14.1	11.6	13.9		33.4	14.7			14.7	
Level of Service		B	B	B	B		C	B			B	
Approach Delay (s)		14.2			13.9			33.1			14.7	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	74.3	Sum of lost time (s)	13.6
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	199	9	4	366	4	17	10	5	6	8	18
Future Volume (Veh/h)	8	199	9	4	366	4	17	10	5	6	8	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	221	10	4	407	4	19	11	6	7	9	20
Pedestrians					2			1				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.2			1.2				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	411			232			686	664	229	674	667	409
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	411			232			686	664	229	674	667	409
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.4	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.8	4.0	3.3
p0 queue free %	99			100			94	97	99	98	98	97
cM capacity (veh/h)	1159			1211			343	379	813	315	378	647

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	240	415	36	36
Volume Left	9	4	19	7
Volume Right	10	4	6	20
cSH	1159	1211	392	468
Volume to Capacity	0.01	0.00	0.09	0.08
Queue Length 95th (m)	0.2	0.1	2.4	2.0
Control Delay (s)	0.4	0.1	15.1	13.3
Lane LOS	A	A	C	B
Approach Delay (s)	0.4	0.1	15.1	13.3
Approach LOS			C	B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	32.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	179	388	13	0	23
Future Volume (Veh/h)	0	179	388	13	0	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	0	224	485	16	0	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	501				709	485
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	501				709	485
tC, single (s)	5.1				7.4	7.2
tC, 2 stage (s)						
tF (s)	3.1				4.4	4.2
p0 queue free %	100				100	93
cM capacity (veh/h)	703				285	425

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	224	485	16	29
Volume Left	0	0	0	0
Volume Right	0	0	16	29
cSH	1700	1700	1700	425
Volume to Capacity	0.13	0.29	0.01	0.07
Queue Length 95th (m)	0.0	0.0	0.0	1.7
Control Delay (s)	0.0	0.0	0.0	14.1
Lane LOS				B
Approach Delay (s)	0.0	0.0		14.1
Approach LOS				B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	200	17	134	329	31	100
Future Volume (Veh/h)	200	17	134	329	31	100
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	225	19	151	370	35	112
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			244		906	234
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			244		906	234
tC, single (s)			4.2		7.2	6.3
tC, 2 stage (s)						
tF (s)			2.3		4.2	3.4
p0 queue free %			88		82	86
cM capacity (veh/h)			1293		199	790

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	244	151	370	147
Volume Left	0	151	0	35
Volume Right	19	0	0	112
cSH	1700	1293	1700	835
Volume to Capacity	0.14	0.12	0.22	0.18
Queue Length 95th (m)	0.0	3.2	0.0	5.1
Control Delay (s)	0.0	8.2	0.0	14.3
Lane LOS		A		B
Approach Delay (s)	0.0	2.4		14.3
Approach LOS				B

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	192	310	0
Future Volume (Veh/h)	0	0	0	192	310	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	206	333	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	539	333	333			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	539	333	333			
tC, single (s)	6.4	7.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	4.2	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	507	531	1238			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	206	333
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1238	1700
Volume to Capacity	0.00	0.00	0.20
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	19.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	14	0	10	31
Future Volume (Veh/h)	0	0	14	0	10	31
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	0	0	17	0	12	38
Pedestrians						1
Lane Width (m)						3.5
Walking Speed (m/s)						1.2
Percent Blockage						0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	79	18			17	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	79	18			17	
tC, single (s)	6.4	6.2			5.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			3.1	
p0 queue free %	100	100			99	
cM capacity (veh/h)	914	1060			1142	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	17	50
Volume Left	0	0	12
Volume Right	0	0	0
cSH	1700	1700	1142
Volume to Capacity	0.00	0.01	0.01
Queue Length 95th (m)	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	2.0
Lane LOS	A		A
Approach Delay (s)	0.0	0.0	2.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	19.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	NB	SB
Directions Served	L	TR	L	R
Maximum Queue (m)	18.0	24.3	26.1	5.6
Average Queue (m)	6.2	10.6	8.8	0.4
95th Queue (m)	14.2	19.7	20.1	2.9
Link Distance (m)		574.9		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)	80.0		50.0	70.0
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: York-Durham Line & Wagg Road

Movement	WB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	12.4	13.1
Average Queue (m)	6.0	1.3
95th Queue (m)	11.7	7.5
Link Distance (m)	1653.9	736.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB
Directions Served	LT
Maximum Queue (m)	36.3
Average Queue (m)	7.8
95th Queue (m)	24.8
Link Distance (m)	82.2
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB	SB
Directions Served	L	R	LT
Maximum Queue (m)	23.2	32.4	3.2
Average Queue (m)	6.6	14.7	0.1
95th Queue (m)	20.5	27.8	2.7
Link Distance (m)	190.5	190.5	82.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	T	R
Maximum Queue (m)	74.8	164.5	89.0	166.2	41.1	50.2	63.5	29.6	50.4	67.9	50.8
Average Queue (m)	27.4	74.6	22.8	71.7	11.1	20.0	27.7	1.2	19.8	33.6	14.6
95th Queue (m)	62.6	134.3	59.2	132.4	29.1	41.5	52.9	14.7	41.1	60.5	35.4
Link Distance (m)		1467.0		3634.3	3634.3		719.9			722.5	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	55.0		55.0			50.0		40.0	50.0		50.0
Storage Blk Time (%)	0	14	0	14		1	3		0	3	0
Queuing Penalty (veh)	0	11	0	20		3	7		1	5	1

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	T	R	L	T	TR	L	TR	LTR
Maximum Queue (m)	55.3	7.1	13.2	39.9	40.6	49.8	87.5	6.7
Average Queue (m)	18.8	0.2	1.2	17.2	17.5	40.0	20.0	0.5
95th Queue (m)	40.2	7.0	7.0	34.0	33.6	55.4	70.1	3.6
Link Distance (m)	3634.3	3634.3		556.1			328.2	155.7
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			50.0		25.0	30.0		
Storage Blk Time (%)	0			2	4	20		
Queuing Penalty (veh)	0			5	7	1		

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	24.2	13.8	10.2	20.4
Average Queue (m)	1.5	0.5	3.9	5.8
95th Queue (m)	12.1	5.7	9.5	14.5
Link Distance (m)	556.1	395.5	439.5	1196.6
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	SB
Directions Served	LR
Maximum Queue (m)	23.2
Average Queue (m)	7.8
95th Queue (m)	20.5
Link Distance (m)	381.3
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EB	WB	NB
Directions Served	TR	L	L
Maximum Queue (m)	1.3	18.9	26.9
Average Queue (m)	0.0	5.7	9.5
95th Queue (m)	0.9	14.7	23.5
Link Distance (m)	3705.4		1045.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		110.0	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: Concession Road 3 & Goodwood Pit Access

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 63

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	1	196	0	3	1	171	334	1	1	195	69
Future Volume (Veh/h)	121	1	196	0	3	1	171	334	1	1	195	69
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	144	1	233	0	4	1	204	398	1	1	232	82
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1043	1041	232	1274	1122	398	314			399		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1043	1041	232	1274	1122	398	314			399		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	18	99	71	100	98	100	84			100		
cM capacity (veh/h)	175	194	797	90	173	656	1241			1171		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	144	234	5	204	398	1	1	232	82
Volume Left	144	0	0	204	0	0	1	0	0
Volume Right	0	233	1	0	0	1	0	0	82
cSH	175	787	203	1241	1700	1700	1171	1700	1700
Volume to Capacity	0.82	0.30	0.02	0.16	0.23	0.00	0.00	0.14	0.05
Queue Length 95th (m)	45.1	10.0	0.6	4.7	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	81.2	11.5	23.2	8.5	0.0	0.0	8.1	0.0	0.0
Lane LOS	F	B	C	A			A		
Approach Delay (s)	38.0		23.2	2.9			0.0		
Approach LOS	E		C						

Intersection Summary				
Average Delay	12.5			
Intersection Capacity Utilization	44.3%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	0	2	0	47	2	384	9	72	263	0
Future Volume (Veh/h)	2	0	0	2	0	47	2	384	9	72	263	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	0	0	2	0	53	2	431	10	81	296	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	951	903	296	898	898	436	296			441		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	951	903	296	898	898	436	296			441		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	99	100	91	100			93		
cM capacity (veh/h)	208	259	748	248	260	614	1277			1114		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	2	55	443	377
Volume Left	2	2	2	81
Volume Right	0	53	10	0
cSH	208	583	1277	1114
Volume to Capacity	0.01	0.09	0.00	0.07
Queue Length 95th (m)	0.2	2.5	0.0	1.9
Control Delay (s)	22.5	11.8	0.1	2.4
Lane LOS	C	B	A	A
Approach Delay (s)	22.5	11.8	0.1	2.4
Approach LOS	C	B		

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	52.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	38	360	264	7
Future Volume (Veh/h)	0	0	38	360	264	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	42	400	293	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	781	297	301			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	781	297	301			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	95			
cM capacity (veh/h)	348	747	866			

Direction, Lane #	NB 1	SB 1
Volume Total	442	301
Volume Left	42	0
Volume Right	0	8
cSH	866	1700
Volume to Capacity	0.05	0.18
Queue Length 95th (m)	1.2	0.0
Control Delay (s)	1.4	0.0
Lane LOS	A	
Approach Delay (s)	1.4	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	0	45	10	0	2	0	391	2	0	270	0
Future Volume (Veh/h)	7	0	45	10	0	2	0	391	2	0	270	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	49	11	0	2	0	425	2	0	293	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	721	720	293	768	719	426	293			427		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	721	720	293	768	719	426	293			427		
tC, single (s)	7.7	6.5	7.1	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.0	4.0	4.1	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	91	96	100	100	100			100		
cM capacity (veh/h)	279	356	572	294	357	633	1280			1143		

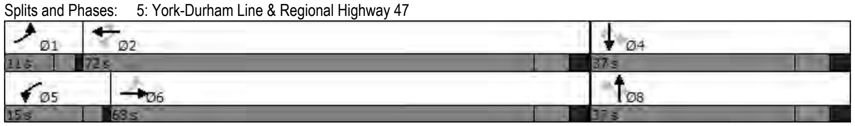
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	8	49	13	427	293
Volume Left	8	0	11	0	0
Volume Right	0	49	2	2	0
cSH	279	572	320	1700	1143
Volume to Capacity	0.03	0.09	0.04	0.25	0.00
Queue Length 95th (m)	0.7	2.2	1.0	0.0	0.0
Control Delay (s)	18.3	11.9	16.7	0.0	0.0
Lane LOS	C	B	C		
Approach Delay (s)	12.8		16.7	0.0	0.0
Approach LOS	B		C		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	55	779	197	559	58	71	247	199	70	229	76
Future Volume (vph)	55	779	197	559	58	71	247	199	70	229	76
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6	5	2			8			4	
Permitted Phases	6		2		2	8		8	4		4
Detector Phase	1	6	5	2	2	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	50.0	7.0	50.0	50.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	58.0	18.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	11.0	68.0	15.0	72.0	72.0	37.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	9.2%	56.7%	12.5%	60.0%	60.0%	30.8%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	71.1	60.1	79.2	66.5	66.5	22.9	22.9	22.9	22.9	22.9	22.9
Actuated g/C Ratio	0.62	0.53	0.69	0.58	0.58	0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.12	0.98	0.90	0.60	0.07	0.48	0.70	0.45	0.60	0.68	0.24
Control Delay	7.4	52.3	65.4	20.2	1.9	50.8	52.2	10.7	62.0	52.0	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.4	52.3	65.4	20.2	1.9	50.8	52.2	10.7	62.0	52.0	9.5
LOS	A	D	E	C	A	D	D	B	E	D	A
Approach Delay		49.6		29.8			36.0			45.2	
Approach LOS		D		C			D			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 114.1	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 40.2	Intersection LOS: D
Intersection Capacity Utilization 99.4%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 5: York-Durham Line & Regional Highway 47



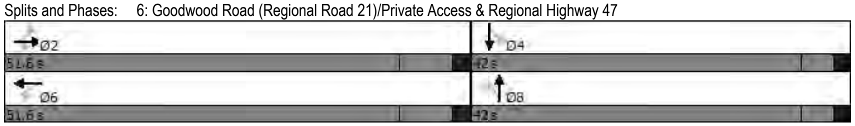
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	779	95	197	559	58	71	247	199	70	229	76
Future Volume (vph)	55	779	95	197	559	58	71	247	199	70	229	76
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	1834		1767	1740	1465	1773	1920	1632	1552	1824	1426
Flt Permitted	0.35	1.00		0.06	1.00	1.00	0.43	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	668	1834		114	1740	1465	795	1920	1632	628	1824	1426
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	847	103	214	608	63	77	268	216	76	249	83
RTOR Reduction (vph)	0	3	0	0	0	27	0	0	153	0	0	66
Lane Group Flow (vph)	60	947	0	214	608	36	77	268	63	76	249	17
Heavy Vehicles (%)	5%	6%	7%	1%	8%	9%	6%	3%	3%	15%	3%	12%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2		2	8		8	4		4
Actuated Green, G (s)	66.5	61.0		76.0	66.5	66.5	22.9	22.9	22.9	22.9	22.9	22.9
Effective Green, g (s)	66.5	61.0		76.0	66.5	66.5	22.9	22.9	22.9	22.9	22.9	22.9
Actuated g/C Ratio	0.58	0.53		0.66	0.58	0.58	0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Vehicle Extension (s)	3.0	0.2		3.0	0.2	0.2	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	440	973		233	1007	847	158	382	325	125	363	284
v/s Ratio Prot	0.01	c0.52		c0.09	0.35			c0.14			0.14	
v/s Ratio Perm	0.07			0.52		0.02	0.10		0.04	0.12		0.01
v/c Ratio	0.14	0.97		0.92	0.60	0.04	0.49	0.70	0.19	0.61	0.69	0.06
Uniform Delay, d1	11.1	26.2		36.7	15.7	10.5	40.8	42.8	38.3	41.9	42.7	37.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	23.0		37.1	2.7	0.1	4.9	7.2	0.6	11.7	6.8	0.2
Delay (s)	11.3	49.2		73.8	18.4	10.5	45.7	50.0	38.9	53.6	49.4	37.4
Level of Service	B	D		E	B	B	D	D	D	D	D	D
Approach Delay (s)		46.9			31.2			45.1			47.8	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	41.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	114.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	99.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	2	485	446	6	306	281	3	5	2
Future Volume (vph)	2	485	446	6	306	281	3	5	2
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	2	2	2	6	6	8	8	4	4
Switch Phase									
Minimum Initial (s)	25.0	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	51.6	51.6	51.6	51.6	51.6	42.0	42.0	42.0	42.0
Total Split (%)	55.1%	55.1%	55.1%	55.1%	55.1%	44.9%	44.9%	44.9%	44.9%
Yellow Time (s)	5.9	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	44.0	44.0	44.0	44.0	44.0	24.0	24.0		24.0
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.29	0.29		0.29
v/c Ratio	0.00	0.54	0.48	0.02	0.18	0.80	0.01		0.02
Control Delay	12.0	16.5	3.2	12.3	11.3	42.5	16.8		16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	12.0	16.5	3.2	12.3	11.3	42.5	16.8		16.8
LOS	B	B	A	B	B	D	B		B
Approach Delay		10.1			11.3		42.2		16.8
Approach LOS		B			B		D		B

Intersection Summary	
Cycle Length: 93.6	
Actuated Cycle Length: 81.7	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 16.3	Intersection LOS: B
Intersection Capacity Utilization 76.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	485	446	6	306	4	281	3	1	5	2	2
Future Volume (vph)	2	485	446	6	306	4	281	3	1	5	2	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.96			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1785	1824	1456	1523	3396		1638	1808			1773	
Flt Permitted	0.55	1.00	1.00	0.39	1.00		0.75	1.00			0.92	
Satd. Flow (perm)	1031	1824	1456	622	3396		1296	1808			1686	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	527	485	7	333	4	305	3	1	5	2	2
RTOR Reduction (vph)	0	0	223	0	1	0	0	1	0	0	1	0
Lane Group Flow (vph)	2	527	262	7	336	0	305	3	0	0	8	0
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	3%	7%	17%	5%	0%	9%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	44.0	44.0	44.0	44.0	44.0		24.0	24.0			24.0	
Effective Green, g (s)	44.0	44.0	44.0	44.0	44.0		24.0	24.0			24.0	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54		0.29	0.29			0.29	
Clearance Time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)	4.2	4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)	555	983	785	335	1831		381	531			495	
v/s Ratio Prot		c0.29			0.10			0.00				
v/s Ratio Perm	0.00		0.18	0.01			c0.24				0.00	
v/c Ratio	0.00	0.54	0.33	0.02	0.18		0.80	0.01			0.02	
Uniform Delay, d1	8.7	12.2	10.6	8.8	9.6		26.6	20.4			20.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	2.1	1.1	0.1	0.2		11.4	0.0			0.0	
Delay (s)	8.7	14.3	11.7	8.9	9.8		38.0	20.4			20.4	
Level of Service	A	B	B	A	A		D	C			C	
Approach Delay (s)		13.0			9.8			37.8			20.4	
Approach LOS		B			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	81.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

7: Concession Road 3 & Regional Highway 47

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	442	25	5	309	7	12	14	10	4	18	14
Future Volume (Veh/h)	21	442	25	5	309	7	12	14	10	4	18	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	23	475	27	5	332	8	13	15	11	4	19	15
Pedestrians		3			3			5			7	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	347			507			913	896	496	909	906	346
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	347			507			913	896	496	909	906	346
tC, single (s)	4.1			4.1			7.1	6.6	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.1	3.3	3.5	4.0	3.3
p0 queue free %	98			100			94	94	98	98	93	98
cM capacity (veh/h)	1216			1064			230	264	574	234	269	696

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	525	345	39	38
Volume Left	23	5	13	4
Volume Right	27	8	11	15
cSH	1216	1064	294	348
Volume to Capacity	0.02	0.00	0.13	0.11
Queue Length 95th (m)	0.5	0.1	3.6	2.9
Control Delay (s)	0.6	0.2	19.1	16.6
Lane LOS	A	A	C	C
Approach Delay (s)	0.6	0.2	19.1	16.6
Approach LOS			C	C

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	455	320	4	2	6
Future Volume (Veh/h)	2	455	320	4	2	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	2	500	352	4	2	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	356				856	352
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	356				856	352
tC, single (s)	5.1				7.4	7.2
tC, 2 stage (s)						
tF (s)	3.1				4.4	4.2
p0 queue free %	100				99	99
cM capacity (veh/h)	814				227	517

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	502	352	4	9
Volume Left	2	0	0	2
Volume Right	0	0	4	7
cSH	814	1700	1700	402
Volume to Capacity	0.00	0.21	0.00	0.02
Queue Length 95th (m)	0.1	0.0	0.0	0.5
Control Delay (s)	0.1	0.0	0.0	14.2
Lane LOS	A			B
Approach Delay (s)	0.1	0.0		14.2
Approach LOS				B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	35.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	440	16	164	300	8	146
Future Volume (Veh/h)	440	16	164	300	8	146
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	506	18	189	345	9	168
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			524		1238	515
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			524		1238	515
tC, single (s)			4.2		6.6	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.7	3.3
p0 queue free %			81		94	70
cM capacity (veh/h)			1013		142	560

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	524	189	345	177
Volume Left	0	189	0	9
Volume Right	18	0	0	168
cSH	1700	1013	1700	590
Volume to Capacity	0.31	0.19	0.20	0.30
Queue Length 95th (m)	0.0	5.5	0.0	10.0
Control Delay (s)	0.0	9.4	0.0	15.1
Lane LOS		A		C
Approach Delay (s)	0.0	3.3		15.1
Approach LOS				C

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	397	265	0
Future Volume (Veh/h)	0	0	0	397	265	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	0	0	446	298	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	744	298	298			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	744	298	298			
tC, single (s)	6.4	7.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	4.2	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	385	559	1275			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	446	298
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1275	1700
Volume to Capacity	0.00	0.00	0.18
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	24.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	40	0	2	21
Future Volume (Veh/h)	0	0	40	0	2	21
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	42	0	2	22
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	68	42			42	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	68	42			42	
tC, single (s)	6.4	6.2			5.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			3.1	
p0 queue free %	100	100			100	
cM capacity (veh/h)	935	1029			1114	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	42	24
Volume Left	0	0	2
Volume Right	0	0	0
cSH	1700	1700	1114
Volume to Capacity	0.00	0.02	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.7
Lane LOS	A		A
Approach Delay (s)	0.0	0.0	0.7
Approach LOS	A		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	WB	NB	SB	SB
Directions Served	L	TR	LTR	L	L	R
Maximum Queue (m)	33.6	24.4	5.0	23.1	1.5	4.3
Average Queue (m)	12.2	10.0	0.6	8.9	0.0	0.2
95th Queue (m)	24.8	18.8	2.9	18.8	1.0	2.1
Link Distance (m)		574.9	230.8			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	80.0			50.0	50.0	70.0
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: York-Durham Line & Wagg Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.9	17.2	2.2	27.1
Average Queue (m)	0.6	6.8	0.1	6.3
95th Queue (m)	4.3	13.4	1.3	19.1
Link Distance (m)	104.9	1653.9	1318.6	736.1
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (m)	31.7	1.8
Average Queue (m)	4.7	0.1
95th Queue (m)	19.8	1.8
Link Distance (m)	82.4	985.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB	WB
Directions Served	L	R	LTR
Maximum Queue (m)	17.7	29.4	9.6
Average Queue (m)	2.4	13.4	2.5
95th Queue (m)	11.4	26.3	8.7
Link Distance (m)	190.5	190.5	103.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	T	R
Maximum Queue (m)	74.8	818.8	94.8	135.8	20.2	60.6	106.0	60.0	55.8	82.2	26.3
Average Queue (m)	17.4	481.0	34.1	57.5	5.0	20.1	44.5	10.1	20.4	39.1	6.7
95th Queue (m)	57.7	966.6	68.3	107.8	14.5	42.9	82.1	46.8	44.8	68.2	18.3
Link Distance (m)		1467.0		3634.3	3634.3		719.9			722.0	
Upstream Blk Time (%)		1									
Queuing Penalty (veh)		0									
Storage Bay Dist (m)	55.0		55.0			50.0		40.0	50.0		50.0
Storage Blk Time (%)		49	2	8		1	13		3	6	
Queuing Penalty (veh)		27	9	16		2	36		8	9	

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	L	T	TR	L	TR	LTR
Maximum Queue (m)	5.0	75.7	11.4	33.9	34.3	49.7	73.7	9.7
Average Queue (m)	0.2	33.7	1.0	11.4	11.8	36.9	12.7	1.7
95th Queue (m)	2.0	63.8	5.9	26.3	27.4	54.5	55.2	7.2
Link Distance (m)		3634.3		556.1			328.2	155.7
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	70.0		50.0		25.0	30.0		
Storage Blk Time (%)		0		1	2	17		
Queuing Penalty (veh)		0		1	2	1		

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	27.4	25.2	16.0	14.1
Average Queue (m)	3.1	1.6	5.2	5.2
95th Queue (m)	15.3	11.6	11.9	11.8
Link Distance (m)	556.1	395.5	439.5	1197.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	9.2	19.0
Average Queue (m)	0.3	3.9
95th Queue (m)	4.3	14.5
Link Distance (m)	395.5	381.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EB	WB	NB
Directions Served	TR	L	L
Maximum Queue (m)	3.3	27.3	16.8
Average Queue (m)	0.1	10.7	2.3
95th Queue (m)	2.1	22.1	10.1
Link Distance (m)	3705.4		1045.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		110.0	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: Concession Road 3 & Goodwood Pit Access

Movement	SB
Directions Served	LT
Maximum Queue (m)	4.8
Average Queue (m)	0.2
95th Queue (m)	3.4
Link Distance (m)	395.5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 112

APPENDIX F-4

2028 Future Total Capacity and Queuing Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			✣		↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	40	1	147	0	0	0	132	110	0	0	192	95
Future Volume (Veh/h)	40	1	147	0	0	0	132	110	0	0	192	95
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	46	1	169	0	0	0	152	126	0	0	221	109
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	651	651	221	820	760	126	330			126		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	651	651	221	820	760	126	330			126		
tC, single (s)	7.2	6.5	6.4	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	86	100	79	100	100	100	87			100		
cM capacity (veh/h)	331	341	787	209	295	930	1197			1473		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	46	170	0	152	126	0	0	221	109
Volume Left	46	0	0	152	0	0	0	0	0
Volume Right	0	169	0	0	0	0	0	0	109
cSH	331	781	1700	1197	1700	1700	1700	1700	1700
Volume to Capacity	0.14	0.22	0.00	0.13	0.07	0.00	0.00	0.13	0.06
Queue Length 95th (m)	3.8	6.6	0.0	3.5	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	17.6	10.9	0.0	8.4	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	B	A	A					
Approach Delay (s)	12.3		0.0	4.6			0.0		
Approach LOS	B		A						

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	0	0	0	1	0	50	0	168	14	38	293	0
Future Volume (Veh/h)	0	0	0	1	0	50	0	168	14	38	293	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	1	0	54	0	181	15	41	315	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	640	593	315	586	586	188	315			196		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	640	593	315	586	586	188	315			196		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	100	100	100	100	100	94	100			97		
cM capacity (veh/h)	358	408	730	415	412	859	1257			1325		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	55	196	356
Volume Left	0	1	0	41
Volume Right	0	54	15	0
cSH	1700	842	1257	1325
Volume to Capacity	0.00	0.07	0.00	0.03
Queue Length 95th (m)	0.0	1.7	0.0	0.8
Control Delay (s)	0.0	9.6	0.0	1.2
Lane LOS	A	A		A
Approach Delay (s)	0.0	9.6	0.0	1.2
Approach LOS	A	A		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	184	212	394	8
Future Volume (Veh/h)	0	0	184	212	394	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	198	228	424	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1052	428	433			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1052	428	433			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	74			
cM capacity (veh/h)	187	631	759			

Direction, Lane #	NB 1	NB 2	SB 1
Volume Total	198	228	433
Volume Left	198	0	0
Volume Right	0	0	9
cSH	759	1700	1700
Volume to Capacity	0.26	0.13	0.25
Queue Length 95th (m)	8.3	0.0	0.0
Control Delay (s)	11.4	0.0	0.0
Lane LOS	B		
Approach Delay (s)	5.3		0.0
Approach LOS			

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	0	51	0	0	0	0	373	7	1	399	0
Future Volume (Veh/h)	15	0	51	0	0	0	0	373	7	1	399	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	16	0	56	0	0	0	0	410	8	1	438	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	854	858	438	910	854	414	438			418		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	854	858	438	910	854	414	438			418		
tC, single (s)	8.1	6.5	7.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.4	4.0	4.2	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	88	100	100	100	100			100		
cM capacity (veh/h)	193	296	456	226	298	643	1133			1152		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	16	56	0	418	439
Volume Left	16	0	0	0	1
Volume Right	0	56	0	8	0
cSH	193	456	1700	1700	1152
Volume to Capacity	0.08	0.12	0.00	0.25	0.00
Queue Length 95th (m)	2.1	3.3	0.0	0.0	0.0
Control Delay (s)	25.4	14.0	0.0	0.0	0.0
Lane LOS	D	B	A		A
Approach Delay (s)	16.5		0.0	0.0	0.0
Approach LOS	C		A		

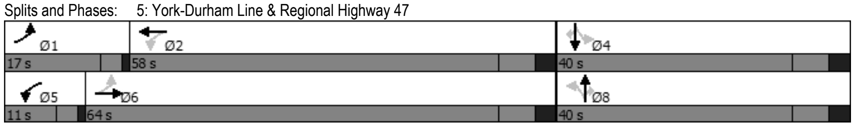
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	167	394	137	509	76	150	120	97	186	166
Future Volume (vph)	167	394	137	509	76	150	120	97	186	166
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6	5	2		8			4	
Permitted Phases	6		2		8		8	4		4
Detector Phase	1	6	5	2	8	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	7.0	50.0	7.0	50.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	18.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	17.0	64.0	11.0	58.0	40.0	40.0	40.0	40.0	40.0	40.0
Total Split (%)	14.8%	55.7%	9.6%	50.4%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	None	None	None	None	None	None
Act Effct Green (s)	70.7	56.3	62.8	51.7	21.0	21.0	21.0	21.0	21.0	21.0
Actuated g/C Ratio	0.68	0.54	0.60	0.50	0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.63	0.55	0.26	0.87	0.39	0.43	0.29	0.64	0.55	0.55
Control Delay	19.0	19.8	8.7	39.7	41.4	39.4	7.5	56.8	43.2	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	19.8	8.7	39.7	41.4	39.4	7.5	56.8	43.2	12.2
LOS	B	B	A	D	D	D	A	E	D	B
Approach Delay		19.6		34.1		28.8			34.7	
Approach LOS		B		C		C			C	

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 104.4
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 29.2 Intersection LOS: C
Intersection Capacity Utilization 91.9% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 5: York-Durham Line & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	167	394	60	137	509	114	76	150	120	97	186	166
Future Volume (vph)	167	394	60	137	509	114	76	150	120	97	186	166
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1074	1564		1668	1460		1606	1782	1616	1109	1708	873
Flt Permitted	0.24	1.00		0.46	1.00		0.58	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)	267	1564		805	1460		984	1782	1616	770	1708	873
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	170	402	61	140	519	116	78	153	122	99	190	169
RTOR Reduction (vph)	0	4	0	0	6	0	0	0	97	0	0	135
Lane Group Flow (vph)	170	459	0	140	629	0	78	153	25	99	190	34
Heavy Vehicles (%)	75%	25%	17%	7%	16%	66%	17%	11%	4%	61%	10%	83%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8		8	4		4
Actuated Green, G (s)	67.3	56.3		58.7	51.7		21.0	21.0	21.0	21.0	21.0	21.0
Effective Green, g (s)	67.3	56.3		58.7	51.7		21.0	21.0	21.0	21.0	21.0	21.0
Actuated g/C Ratio	0.65	0.54		0.56	0.50		0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	4.0	8.0		4.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Vehicle Extension (s)	3.0	0.2		3.0	0.2		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	262	844		510	723		198	358	325	155	343	175
v/s Ratio Prot	c0.07	0.29		0.02	c0.43			0.09			0.11	
v/s Ratio Perm	0.35			0.14			0.08		0.02	c0.13		0.04
v/c Ratio	0.65	0.54		0.27	0.87		0.39	0.43	0.08	0.64	0.55	0.19
Uniform Delay, d1	12.3	15.6		11.0	23.3		36.1	36.4	33.8	38.2	37.4	34.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.4	2.5		0.3	13.5		2.7	1.7	0.2	11.4	3.3	1.1
Delay (s)	17.8	18.1		11.3	36.8		38.8	38.1	34.0	49.6	40.7	35.8
Level of Service	B	B		B	D		D	D	C	D	D	D
Approach Delay (s)		18.0			32.2			36.8			40.8	
Approach LOS		B			C			D			D	

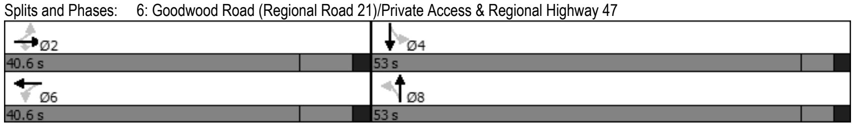
Intersection Summary

HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	104.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	224	285	6	401	336	1	1	1
Future Volume (vph)	224	285	6	401	336	1	1	1
Turn Type	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2			6		8		4
Permitted Phases		2	6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	40.6	40.6	40.6	40.6	53.0	53.0	53.0	53.0
Total Split (%)	43.4%	43.4%	43.4%	43.4%	56.6%	56.6%	56.6%	56.6%
Yellow Time (s)	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	33.1	33.1	33.1	33.1	27.6	27.6		27.6
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.37	0.37		0.37
v/c Ratio	0.39	0.44	0.02	0.35	0.83	0.01		0.00
Control Delay	18.6	4.5	16.3	16.5	37.2	8.0		12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	18.6	4.5	16.3	16.5	37.2	8.0		12.5
LOS	B	A	B	B	D	A		B
Approach Delay	10.7			16.5		36.6		12.5
Approach LOS	B			B		D		B

Intersection Summary	
Cycle Length: 93.6	
Actuated Cycle Length: 74.5	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 19.6	Intersection LOS: B
Intersection Capacity Utilization 69.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	224	285	6	401	2	336	1	6	1	1	0
Future Volume (vph)	0	224	285	6	401	2	336	1	6	1	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor		1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.87			1.00	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)		1479	1238	1190	2951		1552	1632			1833	
Flt Permitted		1.00	1.00	0.60	1.00		0.76	1.00			0.96	
Satd. Flow (perm)		1479	1238	753	2951		1236	1632			1795	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	255	324	7	456	2	382	1	7	1	1	0
RTOR Reduction (vph)	0	0	180	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	255	144	7	458	0	382	4	0	0	2	0
Heavy Vehicles (%)	0%	27%	29%	50%	21%	0%	15%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)		33.1	33.1	33.1	33.1		27.6	27.6			27.6	
Effective Green, g (s)		33.1	33.1	33.1	33.1		27.6	27.6			27.6	
Actuated g/C Ratio		0.45	0.45	0.45	0.45		0.37	0.37			0.37	
Clearance Time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)		4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)		658	551	335	1314		459	606			666	
v/s Ratio Prot		c0.17			0.16			0.00				
v/s Ratio Perm			0.12	0.01			c0.31				0.00	
v/c Ratio		0.39	0.26	0.02	0.35		0.83	0.01			0.00	
Uniform Delay, d1		13.8	12.9	11.5	13.5		21.2	14.7			14.7	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		1.7	1.2	0.1	0.7		12.2	0.0			0.0	
Delay (s)		15.5	14.1	11.6	14.3		33.4	14.7			14.7	
Level of Service		B	B	B	B		C	B			B	
Approach Delay (s)		14.7			14.2			33.1			14.7	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	74.3	Sum of lost time (s)	13.6
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	223	9	4	381	4	17	10	5	6	8	18
Future Volume (Veh/h)	8	223	9	4	381	4	17	10	5	6	8	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	248	10	4	423	4	19	11	6	7	9	20
Pedestrians					2			1				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.2			1.2				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	427			259			730	707	256	718	710	425
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	427			259			730	707	256	718	710	425
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.4	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.8	4.0	3.3
p0 queue free %	99			100			94	97	99	98	97	97
cM capacity (veh/h)	1143			1182			320	358	786	295	357	634

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	267	431	36	36
Volume Left	9	4	19	7
Volume Right	10	4	6	20
cSH	1143	1182	369	447
Volume to Capacity	0.01	0.00	0.10	0.08
Queue Length 95th (m)	0.2	0.1	2.6	2.1
Control Delay (s)	0.3	0.1	15.8	13.8
Lane LOS	A	A	C	B
Approach Delay (s)	0.3	0.1	15.8	13.8
Approach LOS			C	B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	203	402	13	0	23
Future Volume (Veh/h)	0	203	402	13	0	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	0	254	502	16	0	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	518				756	502
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	518				756	502
tC, single (s)	4.1				6.4	7.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	4.2
p0 queue free %	100				100	93
cM capacity (veh/h)	1058				379	415

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	254	502	16	29
Volume Left	0	0	0	0
Volume Right	0	0	16	29
cSH	1700	1700	1700	415
Volume to Capacity	0.15	0.30	0.01	0.07
Queue Length 95th (m)	0.0	0.0	0.0	1.8
Control Delay (s)	0.0	0.0	0.0	14.3
Lane LOS				B
Approach Delay (s)	0.0	0.0		14.3
Approach LOS				B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	31.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	224	17	134	346	31	100
Future Volume (Veh/h)	224	17	134	346	31	100
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	252	19	151	389	35	112
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			271		952	262
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			271		952	262
tC, single (s)			4.2		7.2	6.3
tC, 2 stage (s)						
tF (s)			2.3		4.2	3.4
p0 queue free %			88		81	85
cM capacity (veh/h)			1264		185	763

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	271	151	389	147
Volume Left	0	151	0	35
Volume Right	19	0	0	112
cSH	1700	1264	1700	776
Volume to Capacity	0.16	0.12	0.23	0.19
Queue Length 95th (m)	0.0	3.2	0.0	5.6
Control Delay (s)	0.0	8.2	0.0	14.9
Lane LOS		A		B
Approach Delay (s)	0.0	2.3		14.9
Approach LOS				B

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	120	0	183	295	0
Future Volume (Veh/h)	0	120	0	183	295	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	129	0	197	317	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	514	317	317			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	514	317	317			
tC, single (s)	6.4	7.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	4.2	2.2			
p0 queue free %	100	76	100			
cM capacity (veh/h)	524	544	1255			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	129	197	317
Volume Left	0	0	0
Volume Right	129	0	0
cSH	544	1255	1700
Volume to Capacity	0.24	0.00	0.19
Queue Length 95th (m)	7.3	0.0	0.0
Control Delay (s)	13.7	0.0	0.0
Lane LOS	B		
Approach Delay (s)	13.7	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	29.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	14	0	10	31
Future Volume (Veh/h)	0	0	14	0	10	31
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	0	0	17	0	12	38
Pedestrians						1
Lane Width (m)						3.5
Walking Speed (m/s)						1.2
Percent Blockage						0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	79	18			17	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	79	18			17	
tC, single (s)	6.4	6.2			5.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			3.1	
p0 queue free %	100	100			99	
cM capacity (veh/h)	919	1065			1142	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	17	50
Volume Left	0	0	12
Volume Right	0	0	0
cSH	1700	1700	1142
Volume to Capacity	0.00	0.01	0.01
Queue Length 95th (m)	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	2.0
Lane LOS	A		A
Approach Delay (s)	0.0	0.0	2.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	19.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	NB	SB
Directions Served	L	TR	L	R
Maximum Queue (m)	20.3	22.8	23.2	2.0
Average Queue (m)	5.9	10.1	7.5	0.2
95th Queue (m)	14.3	18.5	18.4	1.8
Link Distance (m)		574.9		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)	80.0		50.0	70.0
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: York-Durham Line & Wagg Road

Movement	WB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	11.8	17.3
Average Queue (m)	6.3	1.7
95th Queue (m)	11.7	8.6
Link Distance (m)	1653.9	736.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB	NB	SB
Directions Served	L	T	TR
Maximum Queue (m)	52.7	10.4	5.9
Average Queue (m)	22.5	0.4	0.3
95th Queue (m)	43.5	8.0	3.1
Link Distance (m)		82.2	986.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)	70.0		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB	SB
Directions Served	L	R	LT
Maximum Queue (m)	27.2	30.8	4.0
Average Queue (m)	6.5	14.5	0.2
95th Queue (m)	21.2	27.4	2.9
Link Distance (m)	190.3	190.3	82.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (m)	74.9	282.9	94.9	440.9	50.9	64.4	18.0	75.8	92.3	74.4
Average Queue (m)	60.0	106.0	53.1	258.3	19.7	25.4	1.0	32.9	35.4	29.5
95th Queue (m)	88.8	222.3	115.8	532.5	39.6	50.7	13.6	65.5	70.0	60.1
Link Distance (m)		1467.0		2730.0		719.9			726.2	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	55.0		55.0		50.0		40.0	50.0		50.0
Storage Blk Time (%)	24	11	0	48	1	2		6	3	2
Queuing Penalty (veh)	110	18	1	65	3	5		20	8	7

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	WB	WB	WB	NB	NB	SB
Directions Served	T	L	T	TR	L	TR	LTR
Maximum Queue (m)	56.7	14.9	51.7	46.7	49.8	93.8	6.8
Average Queue (m)	22.7	1.6	20.0	18.8	38.8	17.2	0.4
95th Queue (m)	44.7	8.3	39.7	38.3	55.4	67.4	3.2
Link Distance (m)	888.7		556.1			328.2	155.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)		50.0		25.0	30.0		
Storage Blk Time (%)	0		3	4	17	0	
Queuing Penalty (veh)	1		7	8	1	0	

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	21.0	19.1	12.0	18.1
Average Queue (m)	1.3	1.0	4.3	5.5
95th Queue (m)	9.7	9.6	10.0	13.2
Link Distance (m)	556.1	395.4	439.5	1196.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	SB
Directions Served	LR
Maximum Queue (m)	23.9
Average Queue (m)	7.7
95th Queue (m)	20.7
Link Distance (m)	381.3
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	WB	NB
Directions Served	L	L
Maximum Queue (m)	20.9	27.4
Average Queue (m)	5.7	10.1
95th Queue (m)	14.5	24.8
Link Distance (m)		1045.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	110.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement	EB
Directions Served	LR
Maximum Queue (m)	47.9
Average Queue (m)	23.1
95th Queue (m)	38.5
Link Distance (m)	141.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: Concession Road 3 & Goodwood Pit Site Access

Movement	SB
Directions Served	LT
Maximum Queue (m)	3.2
Average Queue (m)	0.1
95th Queue (m)	2.2
Link Distance (m)	394.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 254

HCM Unsignalized Intersection Capacity Analysis

1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

07-15-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	1	177	0	3	1	155	318	1	1	185	62
Future Volume (Veh/h)	110	1	177	0	3	1	155	318	1	1	185	62
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	131	1	211	0	4	1	185	379	1	1	220	74
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	974	972	220	1182	1045	379	294			380		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	974	972	220	1182	1045	379	294			380		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	34	100	74	100	98	100	85			100		
cM capacity (veh/h)	199	217	810	110	197	672	1262			1190		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	131	212	5	185	379	1	1	220	74
Volume Left	131	0	0	185	0	0	1	0	0
Volume Right	0	211	1	0	0	1	0	0	74
cSH	199	799	229	1262	1700	1700	1190	1700	1700
Volume to Capacity	0.66	0.27	0.02	0.15	0.22	0.00	0.00	0.13	0.04
Queue Length 95th (m)	31.6	8.5	0.5	4.1	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	52.3	11.1	21.1	8.3	0.0	0.0	8.0	0.0	0.0
Lane LOS	F	B	C	A			A		
Approach Delay (s)	26.9		21.1	2.7			0.0		
Approach LOS	D		C						

Intersection Summary				
Average Delay	9.0			
Intersection Capacity Utilization	42.8%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis

2: York-Durham Line & Wagg Road

07-15-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	0	2	0	47	2	366	9	72	250	0
Future Volume (Veh/h)	2	0	0	2	0	47	2	366	9	72	250	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	0	0	2	0	53	2	411	10	81	281	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	916	868	281	863	863	416	281			421		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	916	868	281	863	863	416	281			421		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	99	100	92	100			93		
cM capacity (veh/h)	221	271	763	262	273	632	1293			1133		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	2	55	423	362
Volume Left	2	2	2	81
Volume Right	0	53	10	0
cSH	221	601	1293	1133
Volume to Capacity	0.01	0.09	0.00	0.07
Queue Length 95th (m)	0.2	2.4	0.0	1.8
Control Delay (s)	21.5	11.6	0.1	2.4
Lane LOS	C	B	A	A
Approach Delay (s)	21.5	11.6	0.1	2.4
Approach LOS	C	B		

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	50.4%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	60	342	273	7
Future Volume (Veh/h)	0	0	60	342	273	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	67	380	303	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	821	307	311			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	821	307	311			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	92			
cM capacity (veh/h)	320	738	858			

Direction, Lane #	NB 1	NB 2	SB 1
Volume Total	67	380	311
Volume Left	67	0	0
Volume Right	0	0	8
cSH	858	1700	1700
Volume to Capacity	0.08	0.22	0.18
Queue Length 95th (m)	2.0	0.0	0.0
Control Delay (s)	9.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	1.4		0.0
Approach LOS			

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	24.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	0	45	10	0	2	0	394	2	0	279	0
Future Volume (Veh/h)	7	0	45	10	0	2	0	394	2	0	279	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	49	11	0	2	0	428	2	0	303	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	734	733	303	781	732	429	303			430		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	734	733	303	781	732	429	303			430		
tC, single (s)	7.7	6.5	7.1	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.0	4.0	4.1	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	91	96	100	100	100			100		
cM capacity (veh/h)	274	350	565	287	351	630	1269			1140		

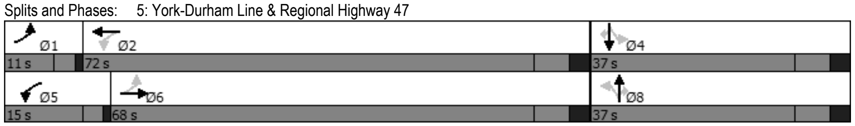
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	8	49	13	430	303
Volume Left	8	0	11	0	0
Volume Right	0	49	2	2	0
cSH	274	565	314	1700	1140
Volume to Capacity	0.03	0.09	0.04	0.25	0.00
Queue Length 95th (m)	0.7	2.3	1.0	0.0	0.0
Control Delay (s)	18.5	12.0	17.0	0.0	0.0
Lane LOS	C	B	C		
Approach Delay (s)	12.9		17.0	0.0	0.0
Approach LOS	B		C		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	66	707	178	508	65	223	181	70	208	85
Future Volume (vph)	66	707	178	508	65	223	181	70	208	85
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6	5	2		8			4	
Permitted Phases	6		2		8		8	4		4
Detector Phase	1	6	5	2	8	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	7.0	50.0	7.0	50.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	18.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	11.0	68.0	15.0	72.0	37.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	9.2%	56.7%	12.5%	60.0%	30.8%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	None	None	None	None	None	None
Act Effct Green (s)	71.2	60.2	78.7	66.1	21.6	21.6	21.6	21.6	21.6	21.6
Actuated g/C Ratio	0.63	0.54	0.70	0.59	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.18	0.87	0.66	0.61	0.42	0.66	0.42	0.60	0.65	0.29
Control Delay	7.7	35.4	23.2	20.0	47.7	50.7	8.5	61.5	50.7	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.7	35.4	23.2	20.0	47.7	50.7	8.5	61.5	50.7	10.0
LOS	A	D	C	B	D	D	A	E	D	B
Approach Delay		33.2		20.7		34.0			43.3	
Approach LOS		C		C		C			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 112.4	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 31.1	Intersection LOS: C
Intersection Capacity Utilization 94.3%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 5: York-Durham Line & Regional Highway 47



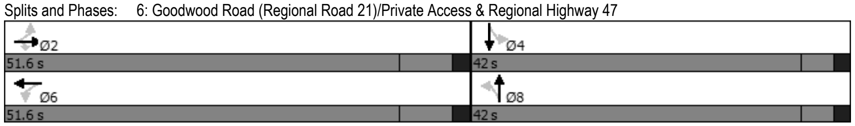
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	707	86	178	508	58	65	223	181	70	208	85
Future Volume (vph)	66	707	86	178	508	58	65	223	181	70	208	85
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1457	1834		1767	1695		1773	1920	1632	1451	1824	1248
Flt Permitted	0.35	1.00		0.11	1.00		0.47	1.00	1.00	0.43	1.00	1.00
Satd. Flow (perm)	538	1834		209	1695		877	1920	1632	661	1824	1248
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	72	768	93	193	552	63	71	242	197	76	226	92
RTOR Reduction (vph)	0	3	0	0	3	0	0	0	156	0	0	74
Lane Group Flow (vph)	72	858	0	193	612	0	71	242	41	76	226	18
Heavy Vehicles (%)	29%	6%	7%	1%	8%	19%	6%	3%	3%	23%	3%	28%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8		8	4		4
Actuated Green, G (s)	66.6	61.1		75.6	66.1		21.6	21.6	21.6	21.6	21.6	21.6
Effective Green, g (s)	66.6	61.1		75.6	66.1		21.6	21.6	21.6	21.6	21.6	21.6
Actuated g/C Ratio	0.59	0.54		0.67	0.58		0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	4.0	8.0		4.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Vehicle Extension (s)	3.0	0.2		3.0	0.2		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	361	989		284	989		167	366	311	126	348	238
v/s Ratio Prot	0.01	c0.47		c0.06	0.36			c0.13			0.12	
v/s Ratio Perm	0.11			0.39			0.08		0.03	0.11		0.01
v/c Ratio	0.20	0.87		0.68	0.62		0.43	0.66	0.13	0.60	0.65	0.07
Uniform Delay, d1	10.7	22.5		19.1	15.3		40.3	42.4	38.0	41.9	42.3	37.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	10.2		6.3	2.9		3.6	5.8	0.4	11.4	5.6	0.3
Delay (s)	11.0	32.7		25.5	18.2		43.9	48.3	38.4	53.3	47.9	37.9
Level of Service	B	C		C	B		D	D	D	D	D	D
Approach Delay (s)		31.0			20.0			43.9			46.6	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	32.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	113.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	2	468	446	6	298	281	3	5	2
Future Volume (vph)	2	468	446	6	298	281	3	5	2
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	2	2	2	6	6	8	8	4	4
Switch Phase									
Minimum Initial (s)	25.0	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	51.6	51.6	51.6	51.6	51.6	42.0	42.0	42.0	42.0
Total Split (%)	55.1%	55.1%	55.1%	55.1%	55.1%	44.9%	44.9%	44.9%	44.9%
Yellow Time (s)	5.9	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	44.0	44.0	44.0	44.0	44.0	24.0	24.0		24.0
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.29	0.29		0.29
v/c Ratio	0.00	0.52	0.48	0.02	0.18	0.80	0.01		0.02
Control Delay	12.0	16.3	3.2	12.3	11.3	42.5	16.8		16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	12.0	16.3	3.2	12.3	11.3	42.5	16.8		16.8
LOS	B	B	A	B	B	D	B		B
Approach Delay		9.9			11.3		42.2		16.8
Approach LOS		A			B		D		B

Intersection Summary	
Cycle Length: 93.6	
Actuated Cycle Length: 81.7	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 16.3	Intersection LOS: B
Intersection Capacity Utilization 76.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	468	446	6	298	4	281	3	1	5	2	2
Future Volume (vph)	2	468	446	6	298	4	281	3	1	5	2	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.96			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1785	1807	1456	1523	3333		1638	1808			1773	
Flt Permitted	0.55	1.00	1.00	0.40	1.00		0.75	1.00			0.92	
Satd. Flow (perm)	1040	1807	1456	645	3333		1296	1808			1686	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	509	485	7	324	4	305	3	1	5	2	2
RTOR Reduction (vph)	0	0	223	0	1	0	0	1	0	0	1	0
Lane Group Flow (vph)	2	509	262	7	327	0	305	3	0	0	8	0
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	4%	7%	17%	7%	0%	9%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	44.0	44.0	44.0	44.0	44.0		24.0	24.0			24.0	
Effective Green, g (s)	44.0	44.0	44.0	44.0	44.0		24.0	24.0			24.0	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54		0.29	0.29			0.29	
Clearance Time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)	4.2	4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)	560	974	785	347	1797		381	531			495	
v/s Ratio Prot		c0.28			0.10			0.00				
v/s Ratio Perm	0.00		0.18	0.01			c0.24				0.00	
v/c Ratio	0.00	0.52	0.33	0.02	0.18		0.80	0.01			0.02	
Uniform Delay, d1	8.7	12.1	10.6	8.8	9.6		26.6	20.4			20.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	2.0	1.1	0.1	0.2		11.4	0.0			0.0	
Delay (s)	8.7	14.1	11.7	8.9	9.8		38.0	20.4			20.4	
Level of Service	A	B	B	A	A		D	C			C	
Approach Delay (s)		12.9			9.8			37.8			20.4	
Approach LOS		B			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	81.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

7: Concession Road 3 & Regional Highway 47

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	427	25	5	301	7	12	14	10	4	18	14
Future Volume (Veh/h)	21	427	25	5	301	7	12	14	10	4	18	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	23	459	27	5	324	8	13	15	11	4	19	15
Pedestrians		3			3			5			7	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	339			491			889	872	480	885	882	338
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	339			491			889	872	480	885	882	338
tC, single (s)	4.1			4.1			7.1	6.6	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.1	3.3	3.5	4.0	3.3
p0 queue free %	98			100			95	95	98	98	93	98
cM capacity (veh/h)	1224			1078			239	274	586	244	278	703

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	509	337	39	38
Volume Left	23	5	13	4
Volume Right	27	8	11	15
cSH	1224	1078	305	358
Volume to Capacity	0.02	0.00	0.13	0.11
Queue Length 95th (m)	0.5	0.1	3.5	2.8
Control Delay (s)	0.6	0.2	18.5	16.2
Lane LOS	A	A	C	C
Approach Delay (s)	0.6	0.2	18.5	16.2
Approach LOS			C	C

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	440	311	4	2	6
Future Volume (Veh/h)	2	440	311	4	2	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	2	484	342	4	2	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	346				830	342
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	346				830	342
tC, single (s)	4.1				6.4	7.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	4.2
p0 queue free %	100				99	99
cM capacity (veh/h)	1224				342	525

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	486	342	4	9
Volume Left	2	0	0	2
Volume Right	0	0	4	7
cSH	1224	1700	1700	469
Volume to Capacity	0.00	0.20	0.00	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.5
Control Delay (s)	0.1	0.0	0.0	12.8
Lane LOS	A			B
Approach Delay (s)	0.1	0.0		12.8
Approach LOS				B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	425	16	164	292	8	146
Future Volume (Veh/h)	425	16	164	292	8	146
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	489	18	189	336	9	168
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			507		1212	498
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			507		1212	498
tC, single (s)			4.2		6.6	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.7	3.3
p0 queue free %			82		94	71
cM capacity (veh/h)			1028		148	572

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	507	189	336	177
Volume Left	0	189	0	9
Volume Right	18	0	0	168
cSH	1700	1028	1700	603
Volume to Capacity	0.30	0.18	0.20	0.29
Queue Length 95th (m)	0.0	5.4	0.0	9.8
Control Delay (s)	0.0	9.3	0.0	14.8
Lane LOS		A		B
Approach Delay (s)	0.0	3.3		14.8
Approach LOS				B

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	45.8%	ICU Level of Service	A
Analysis Period (min)	15		

10: York-Durham Line & Hillsdale Drive

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	22	0	377	252	0
Future Volume (Veh/h)	0	22	0	377	252	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	25	0	424	283	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	707	283	283			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	707	283	283			
tC, single (s)	6.4	7.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	4.2	2.2			
p0 queue free %	100	96	100			
cM capacity (veh/h)	405	571	1291			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	25	424	283
Volume Left	0	0	0
Volume Right	25	0	0
cSH	571	1291	1700
Volume to Capacity	0.04	0.00	0.17
Queue Length 95th (m)	1.1	0.0	0.0
Control Delay (s)	11.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.6	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	40	0	2	21
Future Volume (Veh/h)	0	0	40	0	2	21
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	42	0	2	22
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	68	42			42	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	68	42			42	
tC, single (s)	6.4	6.2			5.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			3.1	
p0 queue free %	100	100			100	
cM capacity (veh/h)	940	1034			1114	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	42	24
Volume Left	0	0	2
Volume Right	0	0	0
cSH	1700	1700	1114
Volume to Capacity	0.00	0.02	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.7
Lane LOS	A		A
Approach Delay (s)	0.0	0.0	0.7
Approach LOS	A		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	WB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	L	T	R
Maximum Queue (m)	29.8	21.4	4.9	21.9	1.4	0.6	2.7
Average Queue (m)	11.6	9.1	0.5	7.1	0.0	0.0	0.2
95th Queue (m)	22.8	17.2	2.8	16.8	1.0	0.6	2.1
Link Distance (m)		574.9	230.8			659.9	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	80.0			50.0	50.0		70.0
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: York-Durham Line & Wagg Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	6.2	16.8	3.0	22.6
Average Queue (m)	0.4	6.7	0.1	5.1
95th Queue (m)	3.3	13.8	1.5	15.6
Link Distance (m)	104.9	1653.9	1318.6	736.1
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB	SB
Directions Served	L	TR
Maximum Queue (m)	26.6	2.5
Average Queue (m)	7.3	0.1
95th Queue (m)	21.9	1.5
Link Distance (m)		985.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	70.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB	WB
Directions Served	L	R	LTR
Maximum Queue (m)	20.0	32.0	9.5
Average Queue (m)	2.2	14.0	2.3
95th Queue (m)	11.4	28.4	8.3
Link Distance (m)	190.3	190.3	103.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (m)	74.9	353.0	92.3	133.1	39.2	76.0	59.7	54.8	76.0	35.4
Average Queue (m)	28.7	190.7	33.0	60.0	15.3	37.0	6.9	20.6	37.3	10.6
95th Queue (m)	73.8	350.9	67.1	112.8	32.1	64.2	38.0	43.6	63.1	26.5
Link Distance (m)		1467.0		2730.7		719.9			725.8	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	55.0		55.0		50.0		40.0	50.0		50.0
Storage Blk Time (%)		39	1	10	0	7		1	4	0
Queuing Penalty (veh)		26	6	18	1	18		2	6	0

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	EB	B29	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	L	T	TR	L	TR	LTR
Maximum Queue (m)	6.0	73.8	1639.4	10.5	39.3	36.6	49.7	83.1	10.5
Average Queue (m)	0.4	31.0	72.8	1.1	12.0	10.5	37.8	14.4	1.7
95th Queue (m)	3.1	58.7	798.9	5.9	28.5	26.7	55.3	60.1	7.2
Link Distance (m)		888.2	2730.7		556.1			328.2	155.7
Upstream Blk Time (%)			0						
Queuing Penalty (veh)			1						
Storage Bay Dist (m)	70.0			50.0		25.0	30.0		
Storage Blk Time (%)		1			1	1	20		
Queuing Penalty (veh)		6			2	2	1		

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	29.8	25.1	12.9	17.8
Average Queue (m)	3.0	1.9	5.0	4.9
95th Queue (m)	14.8	12.0	10.7	12.2
Link Distance (m)	556.1	395.3	439.5	1198.1
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	5.0	18.8
Average Queue (m)	0.2	3.1
95th Queue (m)	3.0	12.8
Link Distance (m)	395.3	381.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EB	WB	NB
Directions Served	TR	L	L
Maximum Queue (m)	2.8	29.3	14.3
Average Queue (m)	0.1	9.9	1.9
95th Queue (m)	1.8	21.8	9.2
Link Distance (m)	3705.4		1045.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		110.0	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement	EB
Directions Served	LR
Maximum Queue (m)	22.8
Average Queue (m)	8.1
95th Queue (m)	22.2
Link Distance (m)	143.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: Concession Road 3 & Goodwood Pit Site Access

Movement	SB
Directions Served	LT
Maximum Queue (m)	1.6
Average Queue (m)	0.1
95th Queue (m)	1.6
Link Distance (m)	420.4
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

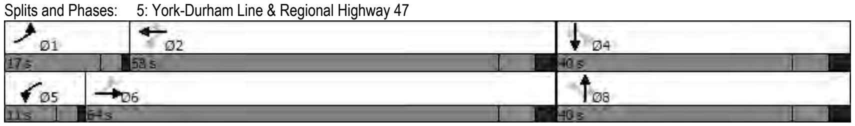
Network Summary

Network wide Queuing Penalty: 89

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	167	394	137	509	114	76	150	120	97	186	166
Future Volume (vph)	167	394	137	509	114	76	150	120	97	186	166
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6	5	2			8			4	
Permitted Phases	6		2		2	8		8	4		4
Detector Phase	1	6	5	2	2	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	50.0	7.0	50.0	50.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	58.0	18.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	17.0	64.0	11.0	58.0	58.0	40.0	40.0	40.0	40.0	40.0	40.0
Total Split (%)	14.8%	55.7%	9.6%	50.4%	50.4%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	70.2	56.3	63.5	52.5	52.5	21.0	21.0	21.0	21.0	21.0	21.0
Actuated g/C Ratio	0.67	0.54	0.61	0.50	0.50	0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.53	0.55	0.26	0.64	0.21	0.39	0.43	0.29	0.64	0.55	0.55
Control Delay	13.8	19.8	8.7	25.7	4.1	41.4	39.4	7.5	56.8	43.2	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.8	19.8	8.7	25.7	4.1	41.4	39.4	7.5	56.8	43.2	12.2
LOS	B	B	A	C	A	D	D	A	E	D	B
Approach Delay		18.2		19.4			28.8			34.7	
Approach LOS		B		B			C			C	

Intersection Summary	
Cycle Length: 115	
Actuated Cycle Length: 104.4	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 23.7	Intersection LOS: C
Intersection Capacity Utilization 91.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 5: York-Durham Line & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	167	394	60	137	509	114	76	150	120	97	186	166
Future Volume (vph)	167	394	60	137	509	114	76	150	120	97	186	166
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1074	1564		1668	1620	962	1606	1782	1616	1109	1708	873
Flt Permitted	0.33	1.00		0.45	1.00	1.00	0.58	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)	374	1564		792	1620	962	984	1782	1616	770	1708	873
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	170	402	61	140	519	116	78	153	122	99	190	169
RTOR Reduction (vph)	0	4	0	0	0	58	0	0	97	0	0	135
Lane Group Flow (vph)	170	459	0	140	519	58	78	153	25	99	190	34
Heavy Vehicles (%)	75%	25%	17%	7%	16%	66%	17%	11%	4%	61%	10%	83%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2		2	8		8	4		4
Actuated Green, G (s)	67.1	56.3		59.5	52.5	52.5	21.0	21.0	21.0	21.0	21.0	21.0
Effective Green, g (s)	67.1	56.3		59.5	52.5	52.5	21.0	21.0	21.0	21.0	21.0	21.0
Actuated g/C Ratio	0.64	0.54		0.57	0.50	0.50	0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Vehicle Extension (s)	3.0	0.2		3.0	0.2	0.2	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	313	844		510	815	484	198	358	325	155	343	175
v/s Ratio Prot	c0.06	0.29		0.02	c0.32			0.09			0.11	
v/s Ratio Perm	0.29			0.14		0.06	0.08		0.02	c0.13		0.04
v/c Ratio	0.54	0.54		0.27	0.64	0.12	0.39	0.43	0.08	0.64	0.55	0.19
Uniform Delay, d1	9.9	15.6		10.6	18.9	13.7	36.1	36.4	33.8	38.2	37.4	34.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9	2.5		0.3	3.8	0.5	2.7	1.7	0.2	11.4	3.3	1.1
Delay (s)	11.8	18.1		10.9	22.7	14.2	38.8	38.1	34.0	49.6	40.7	35.8
Level of Service	B	B		B	C	B	D	D	C	D	D	D
Approach Delay (s)		16.4			19.3			36.8			40.8	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	104.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

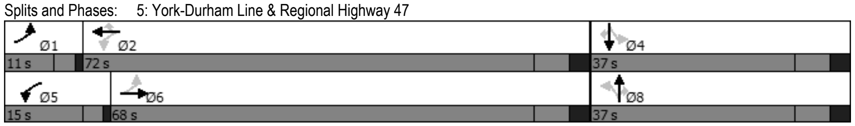
Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	T	R
Maximum Queue (m)	74.8	221.6	40.3	160.6	95.5	43.5	59.4	18.0	84.4	102.1	77.5
Average Queue (m)	53.2	92.9	15.8	76.7	21.4	19.3	25.2	0.6	34.8	38.4	30.5
95th Queue (m)	85.1	183.1	31.8	134.7	61.6	38.2	48.1	10.4	68.8	79.3	63.4
Link Distance (m)		1467.0		2728.8			719.9			722.5	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	55.0		120.0		50.0	50.0		40.0	50.0		50.0
Storage Blk Time (%)	12	12		19	0	0	2		7	2	3
Queuing Penalty (veh)	56	20		49	1	1	4		26	6	8

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	66	707	178	508	58	65	223	181	70	208	85
Future Volume (vph)	66	707	178	508	58	65	223	181	70	208	85
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6	5	2			8			4	
Permitted Phases	6		2		2	8		8	4		4
Detector Phase	1	6	5	2	2	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	50.0	7.0	50.0	50.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	58.0	18.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	11.0	68.0	15.0	72.0	72.0	37.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	9.2%	56.7%	12.5%	60.0%	60.0%	30.8%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	71.2	60.2	78.7	66.1	66.1	21.6	21.6	21.6	21.6	21.6	21.6
Actuated g/C Ratio	0.63	0.54	0.70	0.59	0.59	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.16	0.87	0.66	0.54	0.08	0.42	0.66	0.42	0.60	0.65	0.29
Control Delay	7.5	35.4	23.2	18.2	1.9	47.7	50.7	8.5	61.5	50.7	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.5	35.4	23.2	18.2	1.9	47.7	50.7	8.5	61.5	50.7	10.0
LOS	A	D	C	B	A	D	D	A	E	D	B
Approach Delay		33.2		18.1			34.0			43.3	
Approach LOS		C		B			C			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 112.4	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 30.2	Intersection LOS: C
Intersection Capacity Utilization 94.3%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 5: York-Durham Line & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	707	86	178	508	58	65	223	181	70	208	85
Future Volume (vph)	66	707	86	178	508	58	65	223	181	70	208	85
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1457	1834		1767	1740	1342	1773	1920	1632	1451	1824	1248
Flt Permitted	0.40	1.00		0.11	1.00	1.00	0.47	1.00	1.00	0.43	1.00	1.00
Satd. Flow (perm)	612	1834		209	1740	1342	877	1920	1632	661	1824	1248
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	72	768	93	193	552	63	71	242	197	76	226	92
RTOR Reduction (vph)	0	3	0	0	0	26	0	0	156	0	0	74
Lane Group Flow (vph)	72	858	0	193	552	37	71	242	41	76	226	18
Heavy Vehicles (%)	29%	6%	7%	1%	8%	19%	6%	3%	3%	23%	3%	28%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2		2	8		8	4		4
Actuated Green, G (s)	66.6	61.1		75.6	66.1	66.1	21.6	21.6	21.6	21.6	21.6	21.6
Effective Green, g (s)	66.6	61.1		75.6	66.1	66.1	21.6	21.6	21.6	21.6	21.6	21.6
Actuated g/C Ratio	0.59	0.54		0.67	0.58	0.58	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Vehicle Extension (s)	3.0	0.2		3.0	0.2	0.2	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	401	989		284	1016	783	167	366	311	126	348	238
v/s Ratio Prot	0.01	c0.47		c0.06	0.32			c0.13			0.12	
v/s Ratio Perm	0.10			0.39		0.03	0.08		0.03	0.11		0.01
v/c Ratio	0.18	0.87		0.68	0.54	0.05	0.43	0.66	0.13	0.60	0.65	0.07
Uniform Delay, d1	10.4	22.5		19.1	14.4	10.1	40.3	42.4	38.0	41.9	42.3	37.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	10.2		6.3	2.1	0.1	3.6	5.8	0.4	11.4	5.6	0.3
Delay (s)	10.6	32.7		25.5	16.4	10.2	43.9	48.3	38.4	53.3	47.9	37.9
Level of Service	B	C		C	B	B	D	D	D	D	D	D
Approach Delay (s)		31.0			18.1			43.9			46.6	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	31.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	113.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	T	R
Maximum Queue (m)	74.8	405.4	61.7	102.1	24.9	41.8	90.9	59.7	62.3	75.6	34.8
Average Queue (m)	27.7	234.0	27.2	45.3	5.5	15.2	39.4	8.0	23.4	35.1	10.5
95th Queue (m)	74.1	458.7	51.4	84.0	16.7	32.7	71.4	41.4	50.6	62.3	25.4
Link Distance (m)		1467.0		2729.5			719.9			722.1	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	55.0		120.0		50.0	50.0		40.0	50.0		50.0
Storage Blk Time (%)	0	42		7	0	0	8	0	3	3	0
Queuing Penalty (veh)	0	28		16	0	1	21	0	8	5	0

APPENDIX F-5

2033 Future Total Capacity and Queuing Analysis

HCM Unsignalized Intersection Capacity Analysis — Future Total 2033 AM
1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road — 07-13-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	1	162	0	0	0	146	115	0	0	201	105
Future Volume (Veh/h)	44	1	162	0	0	0	146	115	0	0	201	105
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	51	1	186	0	0	0	168	132	0	0	231	121
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	699	699	231	886	820	132	352			132		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	699	699	231	886	820	132	352			132		
tC, single (s)	7.2	6.5	6.4	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	83	100	76	100	100	100	86			100		
cM capacity (veh/h)	305	314	777	181	267	923	1174			1466		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	51	187	0	168	132	0	0	231	121
Volume Left	51	0	0	168	0	0	0	0	0
Volume Right	0	186	0	0	0	0	0	0	121
cSH	305	771	1700	1174	1700	1700	1700	1700	1700
Volume to Capacity	0.17	0.24	0.00	0.14	0.08	0.00	0.00	0.14	0.07
Queue Length 95th (m)	4.7	7.6	0.0	4.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	19.1	11.2	0.0	8.6	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	B	A	A					
Approach Delay (s)	12.9		0.0	4.8			0.0		
Approach LOS	B		A						

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis — Future Total 2033 AM
2: York-Durham Line & Wagg Road — 07-13-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	1	0	50	0	177	14	38	308	0
Future Volume (Veh/h)	0	0	0	1	0	50	0	177	14	38	308	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	0	1	0	54	0	190	15	41	331	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	664	618	331	610	610	198	331			205		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	664	618	331	610	610	198	331			205		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	100	100	100	100	100	94	100			97		
cM capacity (veh/h)	344	395	715	399	399	849	1240			1315		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	55	205	372
Volume Left	0	1	0	41
Volume Right	0	54	15	0
cSH	1700	832	1240	1315
Volume to Capacity	0.00	0.07	0.00	0.03
Queue Length 95th (m)	0.0	1.7	0.0	0.8
Control Delay (s)	0.0	9.6	0.0	1.1
Lane LOS	A	A		A
Approach Delay (s)	0.0	9.6	0.0	1.1
Approach LOS	A	A		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	184	223	408	8
Future Volume (Veh/h)	0	0	184	223	408	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	198	240	439	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1080	444	448			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1080	444	448			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	74			
cM capacity (veh/h)	179	619	747			

Direction, Lane #	NB 1	NB 2	SB 1
Volume Total	198	240	448
Volume Left	198	0	0
Volume Right	0	0	9
cSH	747	1700	1700
Volume to Capacity	0.26	0.14	0.26
Queue Length 95th (m)	8.5	0.0	0.0
Control Delay (s)	11.5	0.0	0.0
Lane LOS	B		
Approach Delay (s)	5.2		0.0
Approach LOS			

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	0	51	0	0	0	0	386	7	1	413	0
Future Volume (Veh/h)	15	0	51	0	0	0	0	386	7	1	413	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	16	0	56	0	0	0	0	424	8	1	454	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	884	888	454	940	884	428	454			432		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	884	888	454	940	884	428	454			432		
tC, single (s)	8.1	6.5	7.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.4	4.0	4.2	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	100	87	100	100	100	100			100		
cM capacity (veh/h)	183	285	445	215	286	631	1117			1138		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	16	56	0	432	455
Volume Left	16	0	0	0	1
Volume Right	0	56	0	8	0
cSH	183	445	1700	1700	1138
Volume to Capacity	0.09	0.13	0.00	0.25	0.00
Queue Length 95th (m)	2.3	3.4	0.0	0.0	0.0
Control Delay (s)	26.5	14.2	0.0	0.0	0.0
Lane LOS	D	B	A		A
Approach Delay (s)	17.0		0.0	0.0	0.0
Approach LOS	C		A		

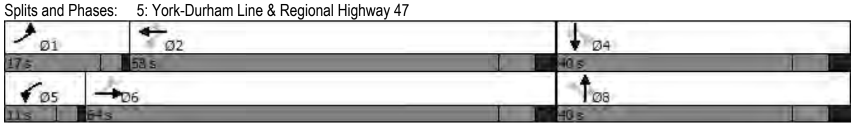
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	32.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	167	433	151	561	122	84	166	132	103	206	174
Future Volume (vph)	167	433	151	561	122	84	166	132	103	206	174
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6	5	2			8			4	
Permitted Phases	6		2		2	8		8	4		4
Detector Phase	1	6	5	2	2	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	50.0	7.0	50.0	50.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	58.0	18.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	17.0	64.0	11.0	58.0	58.0	40.0	40.0	40.0	40.0	40.0	40.0
Total Split (%)	14.8%	55.7%	9.6%	50.4%	50.4%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	70.3	56.2	63.2	52.2	52.2	22.0	22.0	22.0	22.0	22.0	22.0
Actuated g/C Ratio	0.67	0.53	0.60	0.50	0.50	0.21	0.21	0.21	0.21	0.21	0.21
v/c Ratio	0.58	0.61	0.31	0.71	0.23	0.45	0.46	0.30	0.68	0.59	0.55
Control Delay	16.3	21.9	9.6	29.1	4.6	43.6	39.8	7.4	60.0	44.1	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.3	21.9	9.6	29.1	4.6	43.6	39.8	7.4	60.0	44.1	11.9
LOS	B	C	A	C	A	D	D	A	E	D	B
Approach Delay		20.5		22.0			29.4			35.9	
Approach LOS		C		C			C			D	

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 105.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 25.6 — Intersection LOS: C
Intersection Capacity Utilization 93.0% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 5: York-Durham Line & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	167	433	66	151	561	122	84	166	132	103	206	174
Future Volume (vph)	167	433	66	151	561	122	84	166	132	103	206	174
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1074	1564		1668	1620	962	1606	1782	1616	1116	1708	878
Flt Permitted	0.28	1.00		0.41	1.00	1.00	0.54	1.00	1.00	0.63	1.00	1.00
Satd. Flow (perm)	320	1564		721	1620	962	914	1782	1616	742	1708	878
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	170	442	67	154	572	124	86	169	135	105	210	178
RTOR Reduction (vph)	0	4	0	0	0	63	0	0	107	0	0	141
Lane Group Flow (vph)	170	505	0	154	572	61	86	169	28	105	210	37
Heavy Vehicles (%)	75%	25%	17%	7%	16%	66%	17%	11%	4%	60%	10%	82%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2		2	8		8	4		4
Actuated Green, G (s)	67.3	56.3		59.2	52.2	52.2	22.0	22.0	22.0	22.0	22.0	22.0
Effective Green, g (s)	67.3	56.3		59.2	52.2	52.2	22.0	22.0	22.0	22.0	22.0	22.0
Actuated g/C Ratio	0.64	0.53		0.56	0.50	0.50	0.21	0.21	0.21	0.21	0.21	0.21
Clearance Time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Vehicle Extension (s)	3.0	0.2		3.0	0.2	0.2	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	284	836		468	803	476	190	372	337	155	356	183
v/s Ratio Prot	c0.06	0.32		0.02	c0.35			0.09			0.12	
v/s Ratio Perm	0.32			0.16		0.06	0.09		0.02	c0.14		0.04
v/c Ratio	0.60	0.60		0.33	0.71	0.13	0.45	0.45	0.08	0.68	0.59	0.20
Uniform Delay, d1	11.2	16.8		11.4	20.7	14.3	36.4	36.4	33.5	38.4	37.6	34.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.4	3.2		0.4	5.3	0.6	3.6	1.8	0.2	14.3	3.8	1.2
Delay (s)	14.6	20.1		11.8	26.0	14.9	39.9	38.2	33.8	52.7	41.4	35.6
Level of Service	B	C		B	C	B	D	D	C	D	D	D
Approach Delay (s)		18.7			21.8			37.1			41.7	
Approach LOS		B			C			D			D	

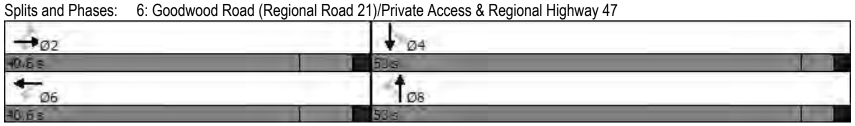
Intersection Summary			
HCM 2000 Control Delay	27.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	105.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	93.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	232	285	6	419	336	1	1	1
Future Volume (vph)	232	285	6	419	336	1	1	1
Turn Type	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2			6		8		4
Permitted Phases		2	6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	40.6	40.6	40.6	40.6	53.0	53.0	53.0	53.0
Total Split (%)	43.4%	43.4%	43.4%	43.4%	56.6%	56.6%	56.6%	56.6%
Yellow Time (s)	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	33.1	33.1	33.1	33.1	27.6	27.6		27.6
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.37	0.37		0.37
v/c Ratio	0.40	0.44	0.02	0.37	0.83	0.01		0.00
Control Delay	18.8	4.5	16.3	16.6	37.2	8.0		12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	18.8	4.5	16.3	16.6	37.2	8.0		12.5
LOS	B	A	B	B	D	A		B
Approach Delay	11.0			16.6		36.6		12.5
Approach LOS	B			B		D		B

Intersection Summary

Cycle Length: 93.6
Actuated Cycle Length: 74.5
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 19.7 Intersection LOS: B
Intersection Capacity Utilization 69.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	232	285	6	419	2	336	1	6	1	1	0
Future Volume (vph)	0	232	285	6	419	2	336	1	6	1	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor		1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.87			1.00	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)		1479	1238	1190	2951		1552	1632			1833	
Flt Permitted		1.00	1.00	0.60	1.00		0.76	1.00			0.96	
Satd. Flow (perm)		1479	1238	747	2951		1236	1632			1795	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	264	324	7	476	2	382	1	7	1	1	0
RTOR Reduction (vph)	0	0	180	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	264	144	7	478	0	382	4	0	0	2	0
Heavy Vehicles (%)	0%	27%	29%	50%	21%	0%	15%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)		33.1	33.1	33.1	33.1		27.6	27.6			27.6	
Effective Green, g (s)		33.1	33.1	33.1	33.1		27.6	27.6			27.6	
Actuated g/C Ratio		0.45	0.45	0.45	0.45		0.37	0.37			0.37	
Clearance Time (s)		8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)		4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)		658	551	332	1314		459	606			666	
v/s Ratio Prot		c0.18			0.16			0.00				
v/s Ratio Perm			0.12	0.01			c0.31				0.00	
v/c Ratio		0.40	0.26	0.02	0.36		0.83	0.01			0.00	
Uniform Delay, d1		13.9	12.9	11.5	13.6		21.2	14.7			14.7	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		1.8	1.2	0.1	0.8		12.2	0.0			0.0	
Delay (s)		15.7	14.1	11.6	14.4		33.4	14.7			14.7	
Level of Service		B	B	B	B		C	B			B	
Approach Delay (s)		14.8			14.4			33.1			14.7	
Approach LOS		B			B			C			B	

Intersection Summary				
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	74.3	Sum of lost time (s)	13.6	
Intersection Capacity Utilization	69.7%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

7: Concession Road 3 & Regional Highway 47

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	231	9	4	398	4	17	10	5	6	8	18
Future Volume (Veh/h)	8	231	9	4	398	4	17	10	5	6	8	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	257	10	4	442	4	19	11	6	7	9	20
Pedestrians					2			1				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.2			1.2				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	446			268			758	735	265	746	738	444
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	446			268			758	735	265	746	738	444
tC, single (s)	4.1			4.3			7.1	6.5	6.2	7.4	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.4			3.5	4.0	3.3	3.8	4.0	3.3
p0 queue free %	99			100			94	97	99	98	97	97
cM capacity (veh/h)	1125			1173			306	345	777	281	344	618

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	276	450	36	36
Volume Left	9	4	19	7
Volume Right	10	4	6	20
cSH	1125	1173	354	432
Volume to Capacity	0.01	0.00	0.10	0.08
Queue Length 95th (m)	0.2	0.1	2.7	2.2
Control Delay (s)	0.3	0.1	16.3	14.1
Lane LOS	A	A	C	B
Approach Delay (s)	0.3	0.1	16.3	14.1
Approach LOS			C	B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		

8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	211	420	13	0	23
Future Volume (Veh/h)	0	211	420	13	0	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	0	264	525	16	0	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	541				789	525
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	541				789	525
tC, single (s)	4.1				6.4	7.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	4.2
p0 queue free %	100				100	93
cM capacity (veh/h)	1038				362	401

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	264	525	16	29
Volume Left	0	0	0	0
Volume Right	0	0	16	29
cSH	1700	1700	1700	401
Volume to Capacity	0.16	0.31	0.01	0.07
Queue Length 95th (m)	0.0	0.0	0.0	1.9
Control Delay (s)	0.0	0.0	0.0	14.7
Lane LOS				B
Approach Delay (s)	0.0	0.0		14.7
Approach LOS				B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	232	17	134	361	31	100
Future Volume (Veh/h)	232	17	134	361	31	100
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	261	19	151	406	35	112
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			280		978	270
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			280		978	270
tC, single (s)			4.2		7.2	6.3
tC, 2 stage (s)						
tF (s)			2.3		4.2	3.4
p0 queue free %			88		80	85
cM capacity (veh/h)			1254		178	754

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	280	151	406	147
Volume Left	0	151	0	35
Volume Right	19	0	0	112
cSH	1700	1254	1700	746
Volume to Capacity	0.16	0.12	0.24	0.20
Queue Length 95th (m)	0.0	3.3	0.0	5.8
Control Delay (s)	0.0	8.3	0.0	15.3
Lane LOS		A		C
Approach Delay (s)	0.0	2.2		15.3
Approach LOS				C

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	120	0	192	310	0
Future Volume (Veh/h)	0	120	0	192	310	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	129	0	206	333	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	539	333	333			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	539	333	333			
tC, single (s)	6.4	7.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	4.2	2.2			
p0 queue free %	100	76	100			
cM capacity (veh/h)	507	531	1238			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	129	206	333
Volume Left	0	0	0
Volume Right	129	0	0
cSH	531	1238	1700
Volume to Capacity	0.24	0.00	0.20
Queue Length 95th (m)	7.6	0.0	0.0
Control Delay (s)	13.9	0.0	0.0
Lane LOS	B		
Approach Delay (s)	13.9	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	14	0	10	31
Future Volume (Veh/h)	0	0	14	0	10	31
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	0	0	17	0	12	38
Pedestrians						1
Lane Width (m)						3.5
Walking Speed (m/s)						1.2
Percent Blockage						0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	79	18			17	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	79	18			17	
tC, single (s)	6.4	6.2			5.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			3.1	
p0 queue free %	100	100			99	
cM capacity (veh/h)	919	1065			1142	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	17	50
Volume Left	0	0	12
Volume Right	0	0	0
cSH	1700	1700	1142
Volume to Capacity	0.00	0.01	0.01
Queue Length 95th (m)	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	2.0
Lane LOS	A		A
Approach Delay (s)	0.0	0.0	2.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	19.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	NB	SB
Directions Served	L	TR	L	R
Maximum Queue (m)	23.2	24.1	22.6	6.1
Average Queue (m)	6.6	10.4	8.5	0.2
95th Queue (m)	15.7	18.8	18.9	2.5
Link Distance (m)		574.9		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)	80.0		50.0	70.0
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: York-Durham Line & Wagg Road

Movement	WB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	9.6	16.7
Average Queue (m)	6.6	1.9
95th Queue (m)	10.9	9.3
Link Distance (m)	1653.9	736.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB	SB
Directions Served	L	TR
Maximum Queue (m)	56.1	7.4
Average Queue (m)	23.3	0.4
95th Queue (m)	47.0	3.9
Link Distance (m)		986.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	70.0	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB	SB
Directions Served	L	R	LT
Maximum Queue (m)	26.5	33.7	5.4
Average Queue (m)	7.2	16.0	0.2
95th Queue (m)	21.9	28.5	3.2
Link Distance (m)	190.3	190.3	82.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	T	R
Maximum Queue (m)	74.8	210.6	94.9	201.0	58.7	56.9	73.2	58.9	87.7	116.2	90.1
Average Queue (m)	56.3	96.9	33.4	98.7	19.2	23.7	29.3	3.5	40.2	45.1	37.6
95th Queue (m)	88.3	181.9	88.1	175.7	41.8	47.3	58.2	26.7	77.1	95.4	74.5
Link Distance (m)		1467.0		3634.3	3634.3		719.9			722.5	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	55.0		55.0			50.0		40.0	50.0		50.0
Storage Blk Time (%)	15	13	0	24		3	4		11	3	4
Queuing Penalty (veh)	74	22	3	37		8	9		41	9	14

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	T	R	L	T	TR	L	TR	LTR
Maximum Queue (m)	64.4	1.3	14.7	63.7	47.6	49.8	93.7	6.9
Average Queue (m)	22.5	0.0	1.7	19.8	20.2	40.8	18.3	0.4
95th Queue (m)	49.0	1.3	8.9	44.3	40.1	55.5	69.0	3.1
Link Distance (m)	3634.3	3634.3		556.1			328.2	155.7
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			50.0		25.0	30.0		
Storage Blk Time (%)	0			4	5	20	0	
Queuing Penalty (veh)	0			8	11	1	0	

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	16.5	13.2	10.7	17.6
Average Queue (m)	1.2	0.6	3.9	5.1
95th Queue (m)	8.2	6.4	9.2	12.9
Link Distance (m)	556.1	395.4	439.5	1197.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	SB
Directions Served	LR
Maximum Queue (m)	25.0
Average Queue (m)	8.1
95th Queue (m)	21.3
Link Distance (m)	381.3
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	WB	NB
Directions Served	L	L
Maximum Queue (m)	17.3	32.6
Average Queue (m)	5.7	11.3
95th Queue (m)	14.9	26.6
Link Distance (m)		1045.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	110.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement	EB
Directions Served	LR
Maximum Queue (m)	48.2
Average Queue (m)	23.3
95th Queue (m)	39.1
Link Distance (m)	141.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: Concession Road 3 & Goodwood Pit Site Access

Movement	SB
Directions Served	LT
Maximum Queue (m)	3.1
Average Queue (m)	0.1
95th Queue (m)	2.2
Link Distance (m)	400.4
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 236

HCM Unsignalized Intersection Capacity Analysis
1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Future Total 2033 PM
07-13-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	1	196	0	3	1	171	334	1	1	195	69
Future Volume (Veh/h)	121	1	196	0	3	1	171	334	1	1	195	69
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	144	1	233	0	4	1	204	398	1	1	232	82
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1043	1041	232	1274	1122	398	314			399		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1043	1041	232	1274	1122	398	314			399		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	18	99	71	100	98	100	84			100		
cM capacity (veh/h)	175	194	797	90	173	656	1241			1171		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	144	234	5	204	398	1	1	232	82
Volume Left	144	0	0	204	0	0	1	0	0
Volume Right	0	233	1	0	0	1	0	0	82
cSH	175	787	203	1241	1700	1700	1171	1700	1700
Volume to Capacity	0.82	0.30	0.02	0.16	0.23	0.00	0.00	0.14	0.05
Queue Length 95th (m)	45.1	10.0	0.6	4.7	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	81.2	11.5	23.2	8.5	0.0	0.0	8.1	0.0	0.0
Lane LOS	F	B	C	A			A		
Approach Delay (s)	38.0		23.2	2.9			0.0		
Approach LOS	E		C						

Intersection Summary			
Average Delay	12.5		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: York-Durham Line & Wagg Road

Future Total 2033 PM
07-13-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	0	2	0	47	2	384	9	72	263	0
Future Volume (Veh/h)	2	0	0	2	0	47	2	384	9	72	263	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	0	0	2	0	53	2	431	10	81	296	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	951	903	296	898	898	436	296			441		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	951	903	296	898	898	436	296			441		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	99	100	91	100			93		
cM capacity (veh/h)	208	259	748	248	260	616	1277			1114		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	2	55	443	377
Volume Left	2	2	2	81
Volume Right	0	53	10	0
cSH	208	584	1277	1114
Volume to Capacity	0.01	0.09	0.00	0.07
Queue Length 95th (m)	0.2	2.5	0.0	1.9
Control Delay (s)	22.5	11.8	0.1	2.4
Lane LOS	C	B	A	A
Approach Delay (s)	22.5	11.8	0.1	2.4
Approach LOS	C	B		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis — Future Total 2033 PM
3: York-Durham Line & Pit Inbound Site Access — 07-13-2022

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	60	360	286	7
Future Volume (Veh/h)	0	0	60	360	286	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	67	400	318	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	856	322	326			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	856	322	326			
tC, single (s)	6.4	6.2	5.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	3.1			
p0 queue free %	100	100	92			
cM capacity (veh/h)	305	724	845			

Direction, Lane #	NB 1	NB 2	SB 1
Volume Total	67	400	326
Volume Left	67	0	0
Volume Right	0	0	8
cSH	845	1700	1700
Volume to Capacity	0.08	0.24	0.19
Queue Length 95th (m)	2.1	0.0	0.0
Control Delay (s)	9.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	1.4		0.0
Approach LOS			

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	25.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis — Future Total 2033 PM
4: York-Durham Line & Pit Outbound Site Access/Private Access — 07-13-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	0	45	10	0	2	0	413	2	0	292	0
Future Volume (Veh/h)	7	0	45	10	0	2	0	413	2	0	292	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	49	11	0	2	0	449	2	0	317	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	769	768	317	816	767	450	317			451		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	769	768	317	816	767	450	317			451		
tC, single (s)	7.7	6.5	7.1	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	4.0	4.0	4.1	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	91	96	100	100	100			100		
cM capacity (veh/h)	259	334	554	272	335	613	1255			1120		

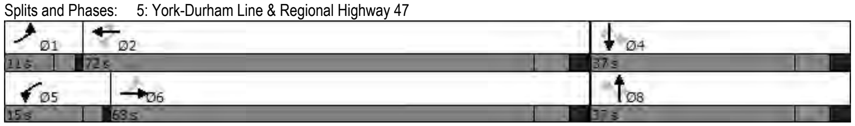
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	8	49	13	451	317
Volume Left	8	0	11	0	0
Volume Right	0	49	2	2	0
cSH	259	554	297	1700	1120
Volume to Capacity	0.03	0.09	0.04	0.27	0.00
Queue Length 95th (m)	0.8	2.3	1.1	0.0	0.0
Control Delay (s)	19.4	12.1	17.7	0.0	0.0
Lane LOS	C	B	C		
Approach Delay (s)	13.1		17.7	0.0	0.0
Approach LOS	B		C		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	35.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	71	779	197	559	64	71	247	199	76	229	92
Future Volume (vph)	71	779	197	559	64	71	247	199	76	229	92
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6	5	2			8			4	
Permitted Phases	6		2		2	8		8	4		4
Detector Phase	1	6	5	2	2	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	50.0	7.0	50.0	50.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.0	11.0	58.0	58.0	18.0	18.0	18.0	18.0	18.0	18.0
Total Split (s)	11.0	68.0	15.0	72.0	72.0	37.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	9.2%	56.7%	12.5%	60.0%	60.0%	30.8%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.0	4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	71.1	60.1	79.2	66.5	66.5	22.9	22.9	22.9	22.9	22.9	22.9
Actuated g/C Ratio	0.62	0.53	0.69	0.58	0.58	0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.19	0.98	0.90	0.60	0.08	0.48	0.70	0.45	0.70	0.68	0.30
Control Delay	8.0	52.3	65.4	20.2	2.5	50.8	52.2	10.7	72.9	52.0	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	52.3	65.4	20.2	2.5	50.8	52.2	10.7	72.9	52.0	9.6
LOS	A	D	E	C	A	D	D	B	E	D	A
Approach Delay		49.0		29.7			36.0			46.2	
Approach LOS		D		C			D			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 114.1	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 40.1	Intersection LOS: D
Intersection Capacity Utilization 99.4%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 5: York-Durham Line & Regional Highway 47



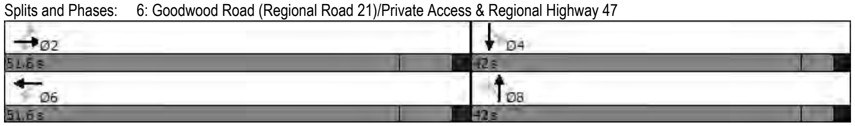
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	779	95	197	559	64	71	247	199	76	229	92
Future Volume (vph)	71	779	95	197	559	64	71	247	199	76	229	92
Ideal Flow (vphpl)	2000	2000	2000	1900	1900	1900	2000	2000	2000	1900	1900	1900
Total Lost time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1479	1834		1767	1740	1365	1773	1920	1632	1463	1824	1258
Flt Permitted	0.35	1.00		0.06	1.00	1.00	0.43	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	553	1834		114	1740	1365	795	1920	1632	592	1824	1258
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	77	847	103	214	608	70	77	268	216	83	249	100
RTOR Reduction (vph)	0	3	0	0	0	29	0	0	153	0	0	80
Lane Group Flow (vph)	77	947	0	214	608	41	77	268	63	83	249	20
Heavy Vehicles (%)	27%	6%	7%	1%	8%	17%	6%	3%	3%	22%	3%	27%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2		2	8		8	4		4
Actuated Green, G (s)	66.5	61.0		76.0	66.5	66.5	22.9	22.9	22.9	22.9	22.9	22.9
Effective Green, g (s)	66.5	61.0		76.0	66.5	66.5	22.9	22.9	22.9	22.9	22.9	22.9
Actuated g/C Ratio	0.58	0.53		0.66	0.58	0.58	0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	4.0	8.0		4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Vehicle Extension (s)	3.0	0.2		3.0	0.2	0.2	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	364	973		233	1007	790	158	382	325	117	363	250
v/s Ratio Prot	0.01	c0.52		c0.09	0.35			0.14			0.14	
v/s Ratio Perm	0.11			0.52		0.03	0.10		0.04	c0.14		0.02
v/c Ratio	0.21	0.97		0.92	0.60	0.05	0.49	0.70	0.19	0.71	0.69	0.08
Uniform Delay, d1	11.4	26.2		36.7	15.7	10.5	40.8	42.8	38.3	42.9	42.7	37.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	23.0		37.1	2.7	0.1	4.9	7.2	0.6	21.9	6.8	0.3
Delay (s)	11.7	49.2		73.8	18.4	10.6	45.7	50.0	38.9	64.8	49.4	37.7
Level of Service	B	D		E	B	B	D	D	D	E	D	D
Approach Delay (s)		46.4			31.0			45.1			49.7	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	41.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	114.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	99.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	2	491	446	6	312	281	3	5	2
Future Volume (vph)	2	491	446	6	312	281	3	5	2
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		8		4
Permitted Phases	2		2	6		8		4	
Detector Phase	2	2	2	6	6	8	8	4	4
Switch Phase									
Minimum Initial (s)	25.0	25.0	25.0	25.0	25.0	12.0	12.0	12.0	12.0
Minimum Split (s)	35.0	35.0	35.0	35.0	35.0	25.0	25.0	25.0	25.0
Total Split (s)	51.6	51.6	51.6	51.6	51.6	42.0	42.0	42.0	42.0
Total Split (%)	55.1%	55.1%	55.1%	55.1%	55.1%	44.9%	44.9%	44.9%	44.9%
Yellow Time (s)	5.9	5.9	5.9	5.9	5.9	3.7	3.7	3.7	3.7
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0	5.6	5.6		5.6
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	44.0	44.0	44.0	44.0	44.0	24.0	24.0		24.0
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.29	0.29		0.29
v/c Ratio	0.00	0.55	0.48	0.02	0.19	0.80	0.01		0.02
Control Delay	12.0	16.8	3.2	12.3	11.4	42.5	16.8		16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	12.0	16.8	3.2	12.3	11.4	42.5	16.8		16.8
LOS	B	B	A	B	B	D	B		B
Approach Delay		10.3			11.4		42.2		16.8
Approach LOS		B			B		D		B

Intersection Summary	
Cycle Length: 93.6	
Actuated Cycle Length: 81.7	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 16.4	Intersection LOS: B
Intersection Capacity Utilization 76.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	491	446	6	312	4	281	3	1	5	2	2
Future Volume (vph)	2	491	446	6	312	4	281	3	1	5	2	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.96			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1785	1807	1456	1523	3333		1638	1808			1773	
Flt Permitted	0.55	1.00	1.00	0.38	1.00		0.75	1.00			0.92	
Satd. Flow (perm)	1025	1807	1456	613	3333		1296	1808			1686	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	534	485	7	339	4	305	3	1	5	2	2
RTOR Reduction (vph)	0	0	223	0	1	0	0	1	0	0	1	0
Lane Group Flow (vph)	2	534	262	7	342	0	305	3	0	0	8	0
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	4%	7%	17%	7%	0%	9%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	44.0	44.0	44.0	44.0	44.0		24.0	24.0			24.0	
Effective Green, g (s)	44.0	44.0	44.0	44.0	44.0		24.0	24.0			24.0	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54		0.29	0.29			0.29	
Clearance Time (s)	8.0	8.0	8.0	8.0	8.0		5.6	5.6			5.6	
Vehicle Extension (s)	4.2	4.2	4.2	4.2	4.2		3.0	3.0			3.0	
Lane Grp Cap (vph)	552	974	785	330	1797		381	531			495	
v/s Ratio Prot		c0.30			0.10			0.00				
v/s Ratio Perm	0.00		0.18	0.01			c0.24				0.00	
v/c Ratio	0.00	0.55	0.33	0.02	0.19		0.80	0.01			0.02	
Uniform Delay, d1	8.7	12.3	10.6	8.8	9.7		26.6	20.4			20.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	2.2	1.1	0.1	0.2		11.4	0.0			0.0	
Delay (s)	8.7	14.5	11.7	8.9	9.9		38.0	20.4			20.4	
Level of Service	A	B	B	A	A		D	C			C	
Approach Delay (s)		13.2			9.9			37.8			20.4	
Approach LOS		B			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	81.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

7: Concession Road 3 & Regional Highway 47

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	448	25	5	315	7	12	14	10	4	18	14
Future Volume (Veh/h)	21	448	25	5	315	7	12	14	10	4	18	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	23	482	27	5	339	8	13	15	11	4	19	15
Pedestrians		3			3			5			7	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	354			514			927	910	504	923	920	353
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	354			514			927	910	504	923	920	353
tC, single (s)	4.1			4.1			7.1	6.6	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.1	3.3	3.5	4.0	3.3
p0 queue free %	98			100			94	94	98	98	93	98
cM capacity (veh/h)	1209			1058			225	260	569	229	264	690

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	532	352	39	38
Volume Left	23	5	13	4
Volume Right	27	8	11	15
cSH	1209	1058	289	342
Volume to Capacity	0.02	0.00	0.13	0.11
Queue Length 95th (m)	0.5	0.1	3.7	3.0
Control Delay (s)	0.6	0.2	19.4	16.9
Lane LOS	A	A	C	C
Approach Delay (s)	0.6	0.2	19.4	16.9
Approach LOS			C	C

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	461	326	4	2	6
Future Volume (Veh/h)	2	461	326	4	2	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	2	507	358	4	2	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	362				869	358
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	362				869	358
tC, single (s)	4.1				6.4	7.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	4.2
p0 queue free %	100				99	99
cM capacity (veh/h)	1208				324	512

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	509	358	4	9
Volume Left	2	0	0	2
Volume Right	0	0	4	7
cSH	1208	1700	1700	454
Volume to Capacity	0.00	0.21	0.00	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.5
Control Delay (s)	0.1	0.0	0.0	13.1
Lane LOS	A			B
Approach Delay (s)	0.1	0.0		13.1
Approach LOS				B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	35.9%	ICU Level of Service	A
Analysis Period (min)	15		

9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	446	16	164	306	8	146
Future Volume (Veh/h)	446	16	164	306	8	146
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	513	18	189	352	9	168
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						9
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			531		1252	522
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			531		1252	522
tC, single (s)			4.2		6.6	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.7	3.3
p0 queue free %			81		94	70
cM capacity (veh/h)			1007		139	555

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	531	189	352	177
Volume Left	0	189	0	9
Volume Right	18	0	0	168
cSH	1700	1007	1700	584
Volume to Capacity	0.31	0.19	0.21	0.30
Queue Length 95th (m)	0.0	5.5	0.0	10.2
Control Delay (s)	0.0	9.4	0.0	15.2
Lane LOS		A		C
Approach Delay (s)	0.0	3.3		15.2
Approach LOS				C

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

10: York-Durham Line & Hillsdale Drive

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	22	0	397	265	0
Future Volume (Veh/h)	0	22	0	397	265	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	25	0	446	298	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	744	298	298			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	744	298	298			
tC, single (s)	6.4	7.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	4.2	2.2			
p0 queue free %	100	96	100			
cM capacity (veh/h)	385	559	1275			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	25	446	298
Volume Left	0	0	0
Volume Right	25	0	0
cSH	559	1275	1700
Volume to Capacity	0.04	0.00	0.18
Queue Length 95th (m)	1.1	0.0	0.0
Control Delay (s)	11.7	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.7	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	30.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	40	0	2	21
Future Volume (Veh/h)	0	0	40	0	2	21
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	42	0	2	22
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	68	42			42	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	68	42			42	
tC, single (s)	6.4	6.2			5.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			3.1	
p0 queue free %	100	100			100	
cM capacity (veh/h)	940	1034			1114	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	42	24
Volume Left	0	0	2
Volume Right	0	0	0
cSH	1700	1700	1114
Volume to Capacity	0.00	0.02	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.7
Lane LOS	A		A
Approach Delay (s)	0.0	0.0	0.7
Approach LOS	A		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: York-Durham Line & Aurora Road (Regional Road 15)/Aurora Road

Movement	EB	EB	WB	NB	SB	SB
Directions Served	L	TR	LTR	L	L	R
Maximum Queue (m)	32.4	27.7	4.5	24.0	1.5	3.9
Average Queue (m)	12.4	10.5	0.5	8.0	0.0	0.1
95th Queue (m)	24.4	21.0	3.0	18.0	1.1	1.6
Link Distance (m)		574.9	230.8			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	80.0			50.0	50.0	70.0
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: York-Durham Line & Wagg Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	6.2	15.4	4.4	23.0
Average Queue (m)	0.4	7.0	0.2	5.3
95th Queue (m)	3.6	13.7	2.7	15.9
Link Distance (m)	104.9	1653.9	1318.6	736.1
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: York-Durham Line & Pit Inbound Site Access

Movement	NB	SB
Directions Served	L	TR
Maximum Queue (m)	21.6	1.9
Average Queue (m)	6.4	0.1
95th Queue (m)	19.6	1.4
Link Distance (m)		985.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	70.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: York-Durham Line & Pit Outbound Site Access/Private Access

Movement	EB	EB	WB
Directions Served	L	R	LTR
Maximum Queue (m)	18.3	28.7	10.9
Average Queue (m)	2.7	13.8	3.2
95th Queue (m)	11.9	26.5	9.9
Link Distance (m)	190.3	190.3	103.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: York-Durham Line & Regional Highway 47

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	T	R
Maximum Queue (m)	74.9	872.0	77.2	112.2	23.0	60.3	99.1	60.0	52.1	90.8	48.2
Average Queue (m)	28.7	487.6	30.7	54.3	6.1	20.0	45.0	10.7	21.7	40.6	11.7
95th Queue (m)	75.1	916.3	58.3	93.8	17.0	45.5	82.4	48.2	47.9	74.5	32.4
Link Distance (m)		1467.0		3634.3	3634.3		719.9			722.0	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	55.0		55.0			50.0		40.0	50.0		50.0
Storage Blk Time (%)	0	48	2	7		3	13	0	3	5	0
Queuing Penalty (veh)	0	34	9	14		12	34	0	10	9	0

Intersection: 6: Goodwood Road (Regional Road 21)/Private Access & Regional Highway 47

Movement	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	L	T	TR	L	TR	LTR
Maximum Queue (m)	4.9	77.9	13.7	30.5	33.1	49.8	80.8	9.3
Average Queue (m)	0.2	33.1	1.6	10.1	11.3	37.5	13.4	1.4
95th Queue (m)	2.3	62.8	7.8	24.5	26.3	54.4	57.1	6.6
Link Distance (m)		3634.3		556.1			328.2	155.7
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	70.0		50.0		25.0	30.0		
Storage Blk Time (%)		0		1	1	18		
Queuing Penalty (veh)		0		1	2	1		

Intersection: 7: Concession Road 3 & Regional Highway 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	35.8	21.6	13.2	15.0
Average Queue (m)	3.9	1.3	4.8	5.4
95th Queue (m)	18.6	9.7	10.9	12.1
Link Distance (m)	556.1	395.2	439.5	1157.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Regional Highway 47 & Goodwood Pit Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	12.2	19.4
Average Queue (m)	0.5	2.9
95th Queue (m)	6.8	12.5
Link Distance (m)	395.2	381.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Brock Road (Regional Road 1) & Regional Highway 47

Movement	EB	WB	NB
Directions Served	TR	L	L
Maximum Queue (m)	0.6	25.3	14.7
Average Queue (m)	0.0	9.6	1.8
95th Queue (m)	0.6	20.6	8.6
Link Distance (m)	3705.4		1045.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		110.0	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: York-Durham Line & Hillsdale Drive

Movement	EB
Directions Served	LR
Maximum Queue (m)	24.5
Average Queue (m)	8.4
95th Queue (m)	22.7
Link Distance (m)	143.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: Concession Road 3 & Goodwood Pit Site Access

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 127

APPENDIX G

Weigh Station Location

TMIG
A TYLIN INTERNATIONAL COMPANY
8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700
f: 905.738.0065

Lafarge Stouffville Pit - Site Alteration and Fill Permit
Weigh Station Location
Transportation Impact Study

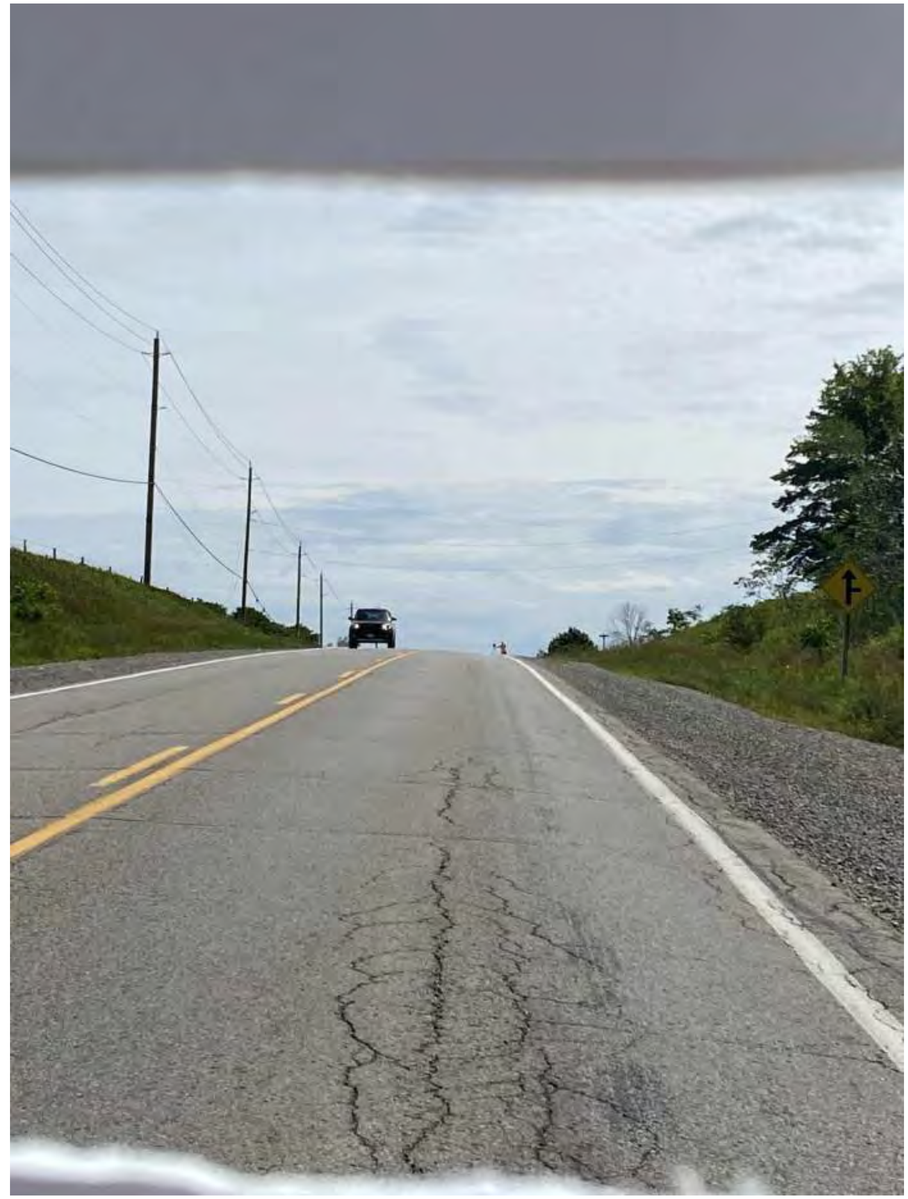
DATE: July 2022	PROJECT No. 19199
SCALE: 100 m	DRAWING No.

APPENDIX H

On-Site Sightline Analysis


METERS
dm
RRT12M
KESON
MAKE YOUR MARK


6662


METERS
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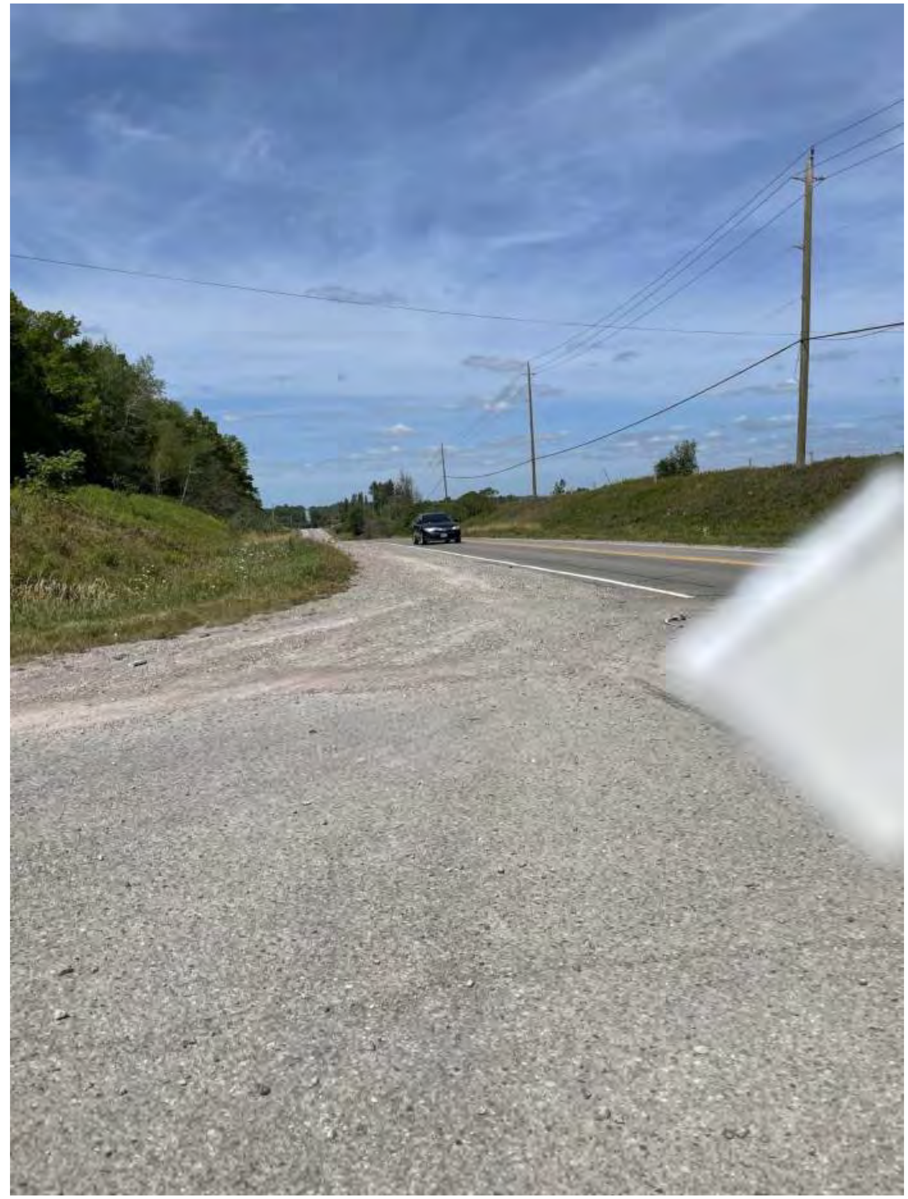
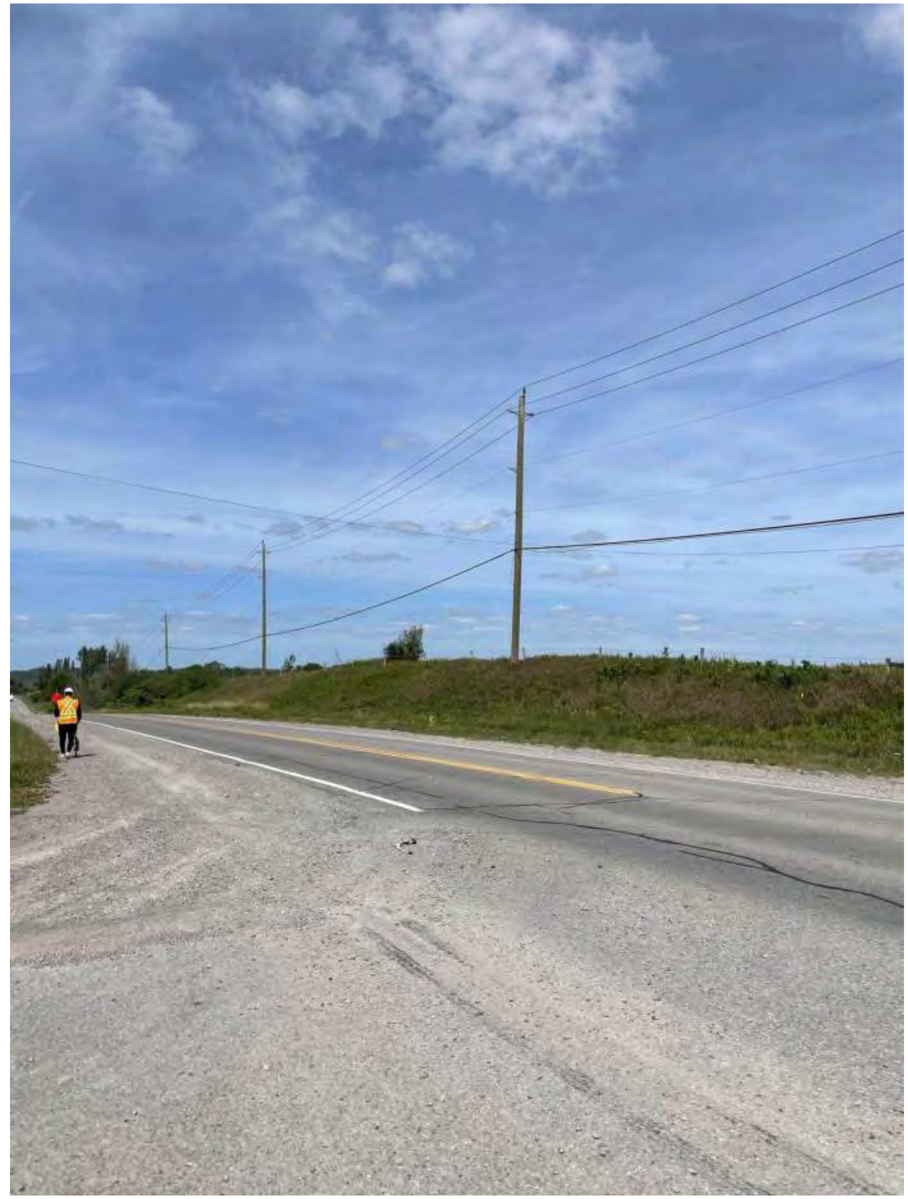
KESON
RRT12M



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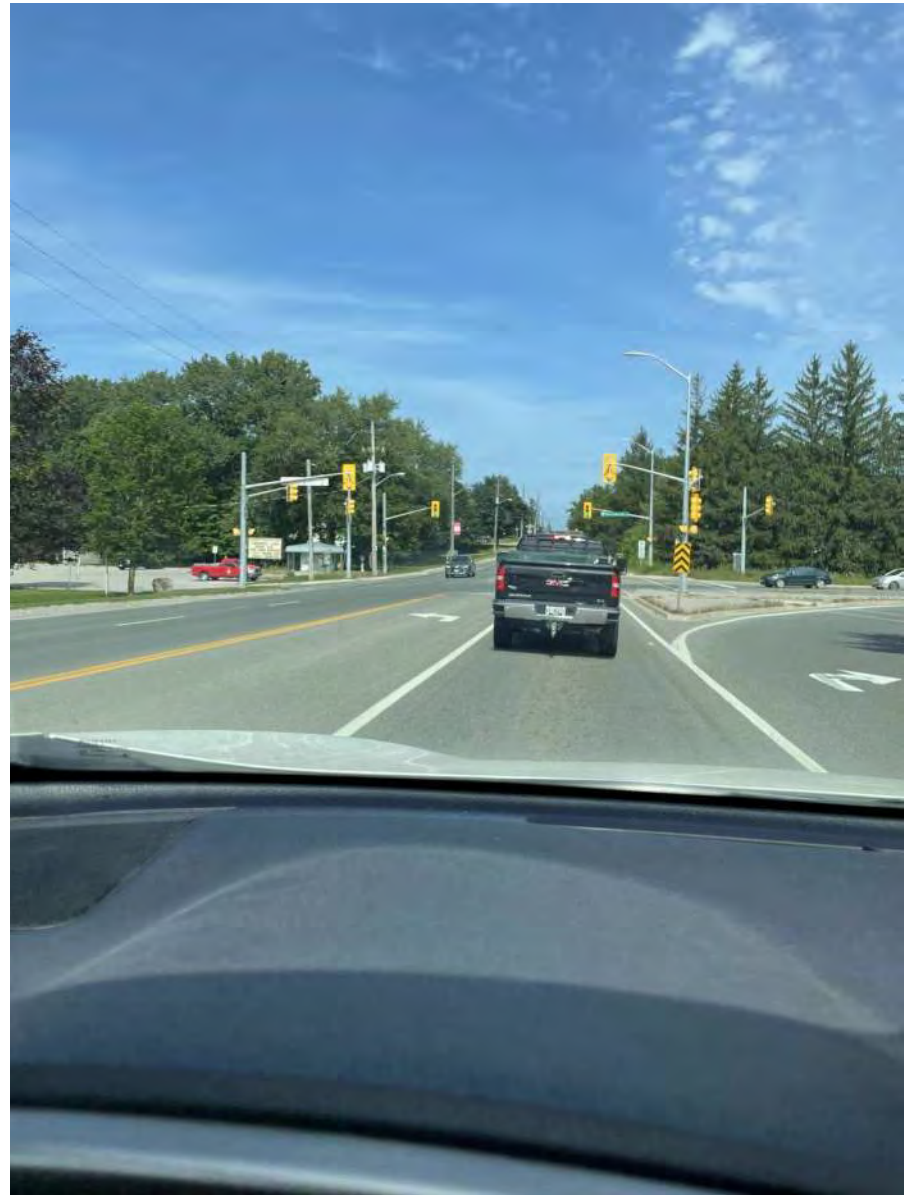
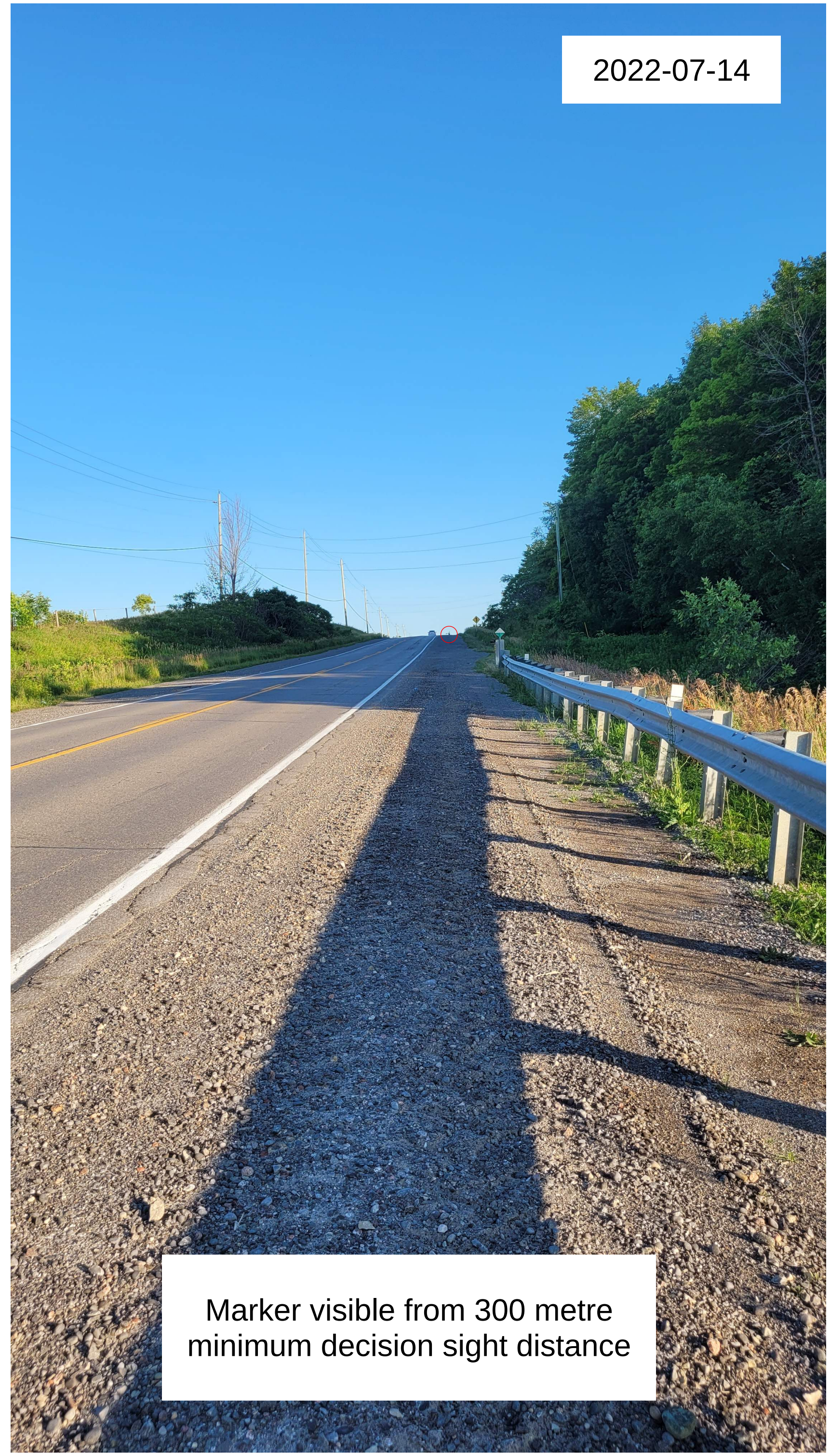
Goodwood




2022-07-14
Top marker visible from 300 metre minimum decision sight distance


2022-07-14
Marker visible from 300 metre minimum decision sight distance

APPENDIX H

Best Management Practices for the Control of Fugitive Dust

REPORT

Best Management Practices Plan for the Control of Fugitive Dust at 14204 Durham Regional Road 30, Town of Whitchurch-Stouffville, ON

Lafarge Canada Inc.

Submitted to:

Lafarge Canada Inc.

6509 Airport Road
Mississauga, Ontario
L4V 1S7

Submitted by:

Golder Associates Ltd.

6925 Century Avenue, Suite #100

Mississauga, Ontario, L5N 7K2 Canada

+1 905 567 4444

19115436

April 2022

Distribution List

Electronic copy - Lafarge Canada Inc.

Electronic copy - WSP Golder

Foreword

This Best Management Practices Plan (BMPP) documents the control of fugitive dust at the Lafarge Canada Inc. (“Lafarge”) property located at 14204 Durham Regional Road 30 in the Town of Whitchurch-Stouffville (the “Site”) and has been prepared in accordance with Technical Bulletin - Management Approaches for Industrial Fugitive Dust Sources, which accompanies the *Procedure for Preparing an Emission Summary and Dispersion Modelling Report* (Ontario Ministry of Environment, Conservation and Parks, 2018). The BMPP meets the requirements that are included in the Town of Whitchurch-Stouffville By-law 2014 – 101-RE.

As operations change and new fugitive dust sources are added to the Site, this Plan will be updated as required. In order to maintain version control all pages in the Plan have been dated and documented with a version number. The version number will change if the entire report is reissued; if individual pages are provided to update small portions of the Plan, then they will be issued with a subversion number and the updated pages will be listed on the following Version Control Page.

Version Control

Version	Date	Description of Changes	Updated Pages	Approved By
0	June 2021	Original document to support the proposed site alteration permit application in the Town of Whitchurch-Stouffville	N/A	Lafarge
1	April 2022	Updated document to address comments received from R.J. Burnside & Associates Ltd. and the Town of Whitchurch-Stouffville	5 (Table 3)	Lafarge

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1.0 INTRODUCTION

Golder Associates Ltd. (“Golder”) was retained by Lafarge Canada Inc. (“Lafarge”) (the “Owner”) to prepare a plan to document the Best Management Practices (BMPs) for the control of fugitive dust emissions from proposed site alteration taking place in the northeast corner of the Lafarge Canada Inc. (“Lafarge”) Stouffville Pit located at 14204 Durham Regional Road 30 in the Town of Whitchurch-Stouffville (the “Site”) and outline the decision making process that was used to develop these BMPs. The purpose of the site alteration is to accept suitable excess fill from construction projects in the surrounding area and to restore the Site to match the surrounding area. Fill will be placed such that the final topographic contours at the Site will be visually consistent with the elevations of the surrounding lands. Following the completion of the proposed alteration, the proposed future use of the Site is for agricultural crop production.

This Plan was prepared in accordance with Technical Bulletin – Management Approaches for Industrial Fugitive Dust Sources that accompanies the *Procedure for Preparing an Emission Summary and Dispersion Modelling Report* (March 2018) and fulfills the requirements that are included in the Town of Whitchurch-Stouffville By-law 2019-068-RE.

This Plan will:

- identify the main sources of fugitive dust emissions;
- identify potential causes for high dust emissions and opacity resulting from these sources;
- outline preventative and control measures in place or under development to minimize the likelihood of high dust emissions and opacity from the sources of fugitive dust emissions;
- provide an implementation schedule for the Plan, including training of Site personnel; and,
- identify inspection and maintenance procedures and monitoring initiatives to ensure effective implementation of the preventative and control measures.

The Plan follows the following structure:

- Section 2.0 provides a brief description of the Site;
- Section 3.0 outlines the responsibilities held by the different employment levels at the Site; and,
- Section 4.0 documents the BMPs that are in place at the Site and the decision-making process used to develop these BMPs. This section follows the Plan, Do, Check, and Act (PDCA) cycle according to ISO guidelines. The “Plan” section includes identification and characterization of the emission sources and existing BMPs at the Site. The “Do” section includes a schedule for implementation of the proposed improvements. The “Check” section includes a description of monitoring procedures and a recordkeeping system. The “Act” section includes guidelines for periodic review of the BMPs in order to promote its continuous improvement.

2.0 SITE DESCRIPTION

Table 1 outlines the general Site information that is relevant to this Plan. Figure 1 shows the site layout, receptors and wind rose showing the predominant wind direction for the area.

Table 1: Site Description

Site	Stouffville Pit Located at 14204 Durham Regional Road 30
Location	Northeast Corner of the Lafarge Stouffville Pit
Area Occupied	418 acres (169.19 hectares)
Proposed Site Area	92.6 acres (37.49 hectares)
Main Activities	Restoration of the northeast corner of the property to original grade
Production	Capacity of 8,047,200 m^3 fill materials
Nearest Sensitive Receptors (Distance/Direction)	Residential dwelling is approximately 25 m north (Figure 1)
Predominant Wind Direction	W, WNW, and S (Figure 1 inset)

3.0 RESPONSIBILITIES

The following identifies the responsibilities held by each of the employment levels at the Site as they pertain to this Plan.

3.1 Plant Manager

The Plant Manager, or designate, is responsible for:

- reviewing the effectiveness of the current dust control measures at the Site;
- ensuring the training of site personnel and contractors on the Plan and the best management practices to be implemented; and
- ensuring the required resources are in place to execute the Plan.

3.2 Circular Economy Field Technician

The Circular Economy Field Technician, or designate, is responsible for:

- reviewing the effectiveness of the current dust control measures at the Site;
- scheduling and coordinating the implementation of fugitive dust control measures; and
- maintaining documentation of schedules and logs.

3.3 Operations Supervisor

The Operations Supervisor is responsible for:

- reviewing the effectiveness of the current dust control measures at the Site;
- handle exceptions, identify when supplementary operational controls need to be enacted;
- implementing fugitive dust control measures; and,
- completing dust control logs.

3.4 Site Personnel and Contractors

All Site Personnel and Contractors are responsible for:

- reporting and recording evaluation of dust control measures via “Operational Control Adequacy Check” on a two-hour frequency; and,
- checking and confirming availability and effectiveness of operational controls to prevent dust emissions as part of the Day 1 operational plan and the pre-shift inspection prior to daily start-up.

4.0 FUGITIVE DUST EMISSIONS BEST MANAGEMENT PRACTICES PLAN

This section describes the fugitive dust control measures that are implemented at the Site and the decision-making process that has been used in the BMP development for the Site. This section follows the PDCA cycle according to the ISO guideline as follows:

- Section 4.1 PLAN - identifies and characterizes the emission sources and BMPs at the Site.
- Section 4.2 DO - documents the schedule for implementation of the proposed improvements.
- Section 4.3 CHECK - describes the monitoring procedures and a recordkeeping system.
- Section 4.4 ACT - describes the BMP review and update procedures in order to promote its continuous improvement.

4.1 PLAN – Identification and Characterization of Fugitive Dust Emission Sources

4.1.1 Identification of Fugitive Dust Emission Sources

Fugitive dust emissions are a result of mechanical disturbances of granular materials exposed to the air. Dust generated from these open sources is termed “fugitive” because it is not discharged to the atmosphere in a confined flow stream, such as emissions from an exhaust pipe or a stack (USEPA, 1995).

The mechanical disturbance may result from equipment movement, the wind, or both. Therefore, some fugitive dust emissions occur and/or intensified by equipment use, while others (i.e., wind erosion emissions) are independent of equipment used.

The main factors affecting the amount of fugitive dust emitted from a source include characteristics of the soil material being disturbed (i.e., particulate size distribution, density, and moisture) and intensity and frequency of the mechanical disturbance (i.e., wind conditions and/or equipment use conditions). Precipitation and evaporation conditions can affect the moisture of the granular material being disturbed and, therefore, have an indirect effect on the amount of fugitive dust emitted.

Once dust is emitted, its travelling distance from the source is affected by climatic conditions, specifically wind speed, wind direction, and precipitation and particle size distribution. Higher wind speeds increase the distance travelled while precipitation can accelerate its deposition. Finer particulates can travel further before settling and, therefore, deserve major concern.

Table 2 provides a list of the main sources of fugitive dust emissions at the Site.

Table 2: Sources of Fugitive Dust Emissions at the Site

Source Category	Activity/Source Location	Potential Causes for High Emissions and Opacity from Each Source (Parameters/Conditions)
Unpaved Roadways	Vehicle traffic on unpaved roadways	■ number of vehicles/large ■ weight of vehicles/heavy ■ silt content/high ■ wind speed/high ■ moisture content/dry
Material Storage	Stockpiling soil and overburden for use in rehabilitation and/or overburden stockpile	■ moisture content/dry ■ silt content on the stockpile surface/high ■ material size/fine ■ wind speed/high
Material Handling	Grading and re-greening the cleared areas of the site and the access road	■ moisture content/dry ■ material size/fine ■ material transfer rate/high ■ material drop height/high ■ wind speed/high
	Loading and unloading materials	

4.1.2 Fugitive Dust Best Management Practices

Control measures to reduce fugitive dust emissions should take into account the sources of the dust emission, the dispersion conditions and the location of sensitive areas. Control measures are in place to minimize one or more factors leading to the generation and/or dispersion of fugitive dust emissions. These control measures can be classified as follows:

- **Preventative Procedure**: Measure pertaining to the design and installation of structures and the operating procedures which are implemented on a regular basis in order to prevent the generation of dust and/or the dispersion of dust emitted reaching sensitive areas.
- **Reactive Control Measures**: Measures which are implemented in the event of unexpected circumstances which can lead to the generation of dust and/or the dispersion of dust emitted reaching sensitive areas.

Table 3 lists preventative procedures and reactive control measure for fugitive dust emissions that are associated with the Site.

Table 3: Preventative Procedures and Control Measures for Fugitive Dust Emissions at the Site

Emission Source	BMPs		Description	Frequency
Unpaved Roadways	**Preventative Procedure**	Road Maintenance	Ensure surface materials are smooth, reapply gravel to reduce silt content.	Monthly
		Speed Controls	Limit vehicle speed to 25 kilometres per hour.	Continual
	Reactive Control Measure	Watering	Water will be applied as a dust suppressant during non-freezing conditions.	At least 2 litres/m² after 12 hours of any previous wetting (i.e., rain or water truck) on hot dry days and within 48 hours on cooler, humid days, or as visually necessary during the twice daily inspections conducted by the Plant Manager or acting Supervisor, whichever is more frequent
Material Storage	**Preventative Procedure**	Material Placement	Material will be unloaded on level ground for inspection in keeping with Lafarge's Health and Safety Guideline for Fill Importation. Unloading will occur in designated areas with windbreaks and pile height will be confirmed to be below level of windbreak prior to unloading.	Continual
	Reactive Control Measure	Watering	Water will be applied as a dust suppressant during high windspeed conditions (i.e., greater than 28 kilometres per hour*)	When windspeeds are greater than 28 km/hr
Material Handling	**Preventative Procedure**	Maintain Minimum Drop Height	Material will be unloaded on level ground for inspection in keeping with Lafarge's Health and Safety Guideline for Fill Importation. Once material has been audit sampled and confirmed to be suitable for beneficial reuse, material will be moved using a bulldozer limited the drop distance to the shortest possible distance.	Continual
	Reactive Control Measure	Cease Operations, Watering	Cease operations or apply water as a dust suppressant during high windspeed conditions (i.e., greater than 28 kilometres per hour*).	At windspeeds greater than 28 km/hr, operations will be stopped and stockpiles will be covered or watered if visible dust is generated

*In the absence of on-Site anemometer (or wind meter), available resources (such as the internet or local television/radio weather forecasts) should be used to monitor wind speeds.

The Centre for Excellence in Mining Innovation (CEMI) prepared a fugitive dust guidance document in 2010 which includes a risk management tool to assess if BMPs in place at a site adequately manage the risk associated with each source. Each fugitive dust source at the Site was assessed using this tool. See Appendix A for the risk factors used in the ranking process. Table 4 identifies the fugitive dust sources with their respective relative risk score for the Site.

Hours of operation will be restricted during any period in which a wind warning for the area has been issued by Environment and Climate Change Canada and during any time where weather, traffic and unusual events would compromise the ability of site alteration activities to be conducted in a safe and environmentally sound manner with due consideration of the public. In the absence of on-Site anemometer (or wind meter), available resources (such as the internet or local television/radio weather forecasts) should be used to monitor wind speeds.

Table 4: Fugitive Dust Sources and Associated Relative Risk Scores

Source	Source Description	BMP (if any)	Relative Risk Score	Relative Risk Level
Unpaved Roads	Vehicle traffic on unpaved roadways	Road maintenance, watering	44	Low
Material Storage	Stockpiles	Pile placement, minimize pile height, watering	33	Low
Material Handling	Grading and re-greening the cleared areas of the site and the access road Loading and unloading material	Maintaining minimal drop heights, cease operations, watering	29	Low

There are no sources that are considered to be “high” risk after the implementation of the BMPs, therefore it is reasonable to assume that the BMPs in place adequately manage the risk associated with each fugitive dust source.

4.2 DO – Implementation Schedule for the BMP Plan

All of the BMPs listed in Table 3 are implemented at the Site.

All dust generating work performed at the Site, whether it is completed by Lafarge, or under contractual agreements, must conform to the requirements of this Plan.

Table 5 presents the process for implementing the BMPs for control of fugitive dust for any new emission sources at the Site as well as the corresponding start-up checklist that is to be completed. When new emission sources are added at the Site, they will be managed under the existing BMPs. Appendix B includes start-up checklists which are to be completed as new sources of fugitive dust are added i.e., new stockpiles or unpaved roads. The purpose of the checklists is to ensure that the new emission source will be managed following the same dust control procedures as the current sources at the Site and/or that new BMPs will be developed to adequately manage those sources.

Table 5: Implementation Process for New Emission Sources

New Emission Source	Examples	Start-up Checklists (Appendix B)
Unpaved roadways	New stretch of unpaved roadway	Unpaved Roadway Start-up Checklist
Material handling/storage	New loading/unloading procedures, new transfer point, new windrow location	Material Handling/Storage Start-up Checklist

4.2.1 Training

All Site personnel and contractors are to receive training on the requirements of this Plan. Training will be incorporated into the Site indoctrination that is required prior to working on the property. These training records will be kept on Site with all other training records.

4.3 CHECK – Inspection, Maintenance and Documentation

An inspection of the conformity with the BMPs will be documented monthly using the Dust Control Inspection Form (see Appendix C for an example form). A watering log has been included to record dust control activity pertaining to the unpaved road sources. Further, control adequacy checks will be completed every two hours to confirm the availability and suitability of controls given daily weather conditions.

In the event of a non-conformance, the inspector will add the incident to the Non-Conformance Log (Appendix E). Corrective action is to be taken to eliminate the cause(s) of the non-conformance. It is expected that all deficiencies identified in inspections be addressed immediately. Reviews of the Non-Conformance Logs will be done as part of the annual Plan review, explained in more detail in Section 4.4.

Table 6 provides a summary of the inspections that take place at the site under this Plan and the inspection frequency.

Table 6: Inspection Frequency Summary

Inspection Type	Frequency	Inspection Personnel
Roadways (Unpaved)	Monthly	Site Supervisor
Material handling/ storage	Monthly	Site Supervisor

4.3.1 Complaint Response Protocol

Responses to dust control concerns reported and received by Lafarge will follow Lafarge's complaint response procedure which includes a response within 24 hours, a summary of corrective actions taken, and reporting to the municipality. Where the concern is received and documented through the Town By-law office, Lafarge will provide a response on actions taken to the By-law office within the noted 24-hour timeframe. For any issues confirmed as requiring immediate attention, these will be addressed directly, or in the timeliest manner possible. Further specifics on the Complaint Response Protocol are included in Section 3.16 of the Site Alteration and Fill Management Plan.

4.4 ACT – Plan Review and Continuous Improvement

The Plan will be reviewed annually and updated as required. Review of the Plan is intended to evaluate the effectiveness of the dust control practices and focus on the identification of improvement opportunities that can reduce the risk of complaints related to fugitive dust emissions. The following will be completed during the annual Plan review:

- review of Non-Conformance Logs and updates to BMPs as required;
- review of Start-up Checklists and updates to Figure 1 as required;
- review of training records and schedule training as required; and
- review of staff responsibilities and update as required.

Inspections and monitoring procedures assist Lafarge personnel with the maintenance of an effective BMP Plan.

5.0 REFERENCES

Centre for Excellence in Mining Innovation (CEMI). 2010. Guide to the Preparation of a Best Management Practices Plan for the Control of Fugitive Dust for the Ontario Mining Section. Version 1.0, June 2010.

Ontario Ministry of the Environment, Conservation and Parks. 2017. Technical Bulletin: Management Approaches for Industrial Fugitive Dust Sources. February 2017.

Ontario Ministry of the Environment, Conservation and Parks. 2018. Procedure for Preparing an Emission Summary and Dispersion Modelling Report – Version 4.1. March 2018.

United States Environmental Protection Agency (USEPA). 1995. AP-42 – Compilation of Air Pollutant Emission Factors – Fifth Edition. January 1995.

Signature Page

Golder Associates Ltd.

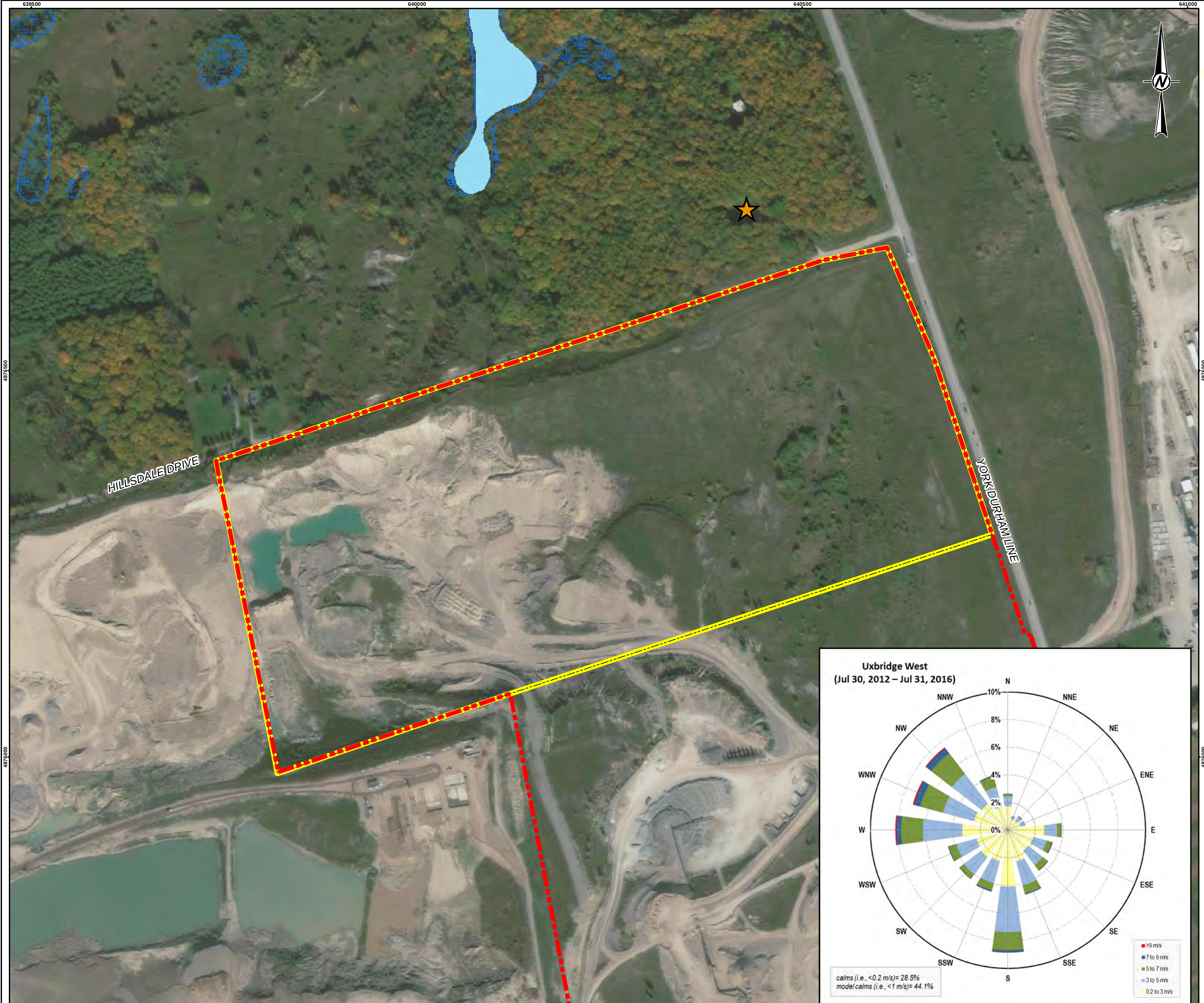
Chris Pons, BSc
Environmental Scientist

Katherine Armstrong, MSc
SeniorAir Quality Specialist

CF/CP/KSA/lb

https://golderassociates.sharepoint.com/sites/102618/deliverables/dust management plan/final/19115436-r-rev2-lafarge dust bmpp-april 11, 2022.docx

FIGURES



LEGEND

CLOSEST SENSITIVE RECEPTOR

PROPOSED SITE AREA

PROPERTY BOUNDARY

WATERBODY

WETLAND

DRAFT

0 200 400

1:5,000 METRES

NOTE(S)

1. M ASL = METRES ABOVE SEA LEVEL

REFERENCE(S)

BASE DATA - MNR LIO, OBTAINED 2019.
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2019
BASE IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

LAFARGE CANADA INC.

PROJECT

FUGITIVE DUST BMPP
14204 DURHAM REGIONAL ROAD 30, WHITCHURCH-STOUFFVILLE, ONTARIO

TITLE

SITE LOCATION PLAN

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2019-09-30
DESIGNED	JT
PREPARED	JT
REVIEWED	KA
APPROVED	KA

PROJECT NO.	CONTROL	REV.	FIGURE
19115436	0004	A	1

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

25mm

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APPENDIX A

Risk Factors

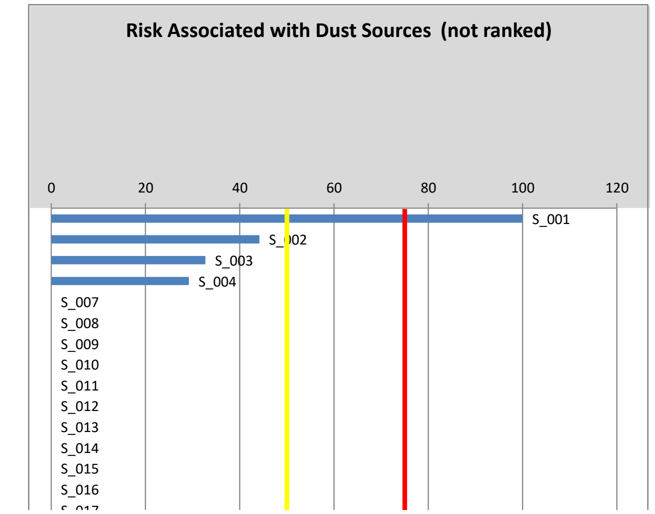
Fugitive Dust Risk Management Tool

Step 1 - Calculation of risks associated with fugitive dust sources

	Cells to be populated
	Drop-down menu
	Automatically

100	Max:
75	Red: >
50	Yellow: >

			Source	Path	Path	Source	Receptor	Path / Receptor	Path	Source	Source	Source	Source	
			Risk Factors											
			1	2	3	4	5	6	7	8	9	10	11	Risk
Source ID Number	Description of the structure / equipment	Category	Frequency of process / activity that generates fugitive dust:	Position of the source related to sensitive areas (e.g.: communities, working areas):	Predominant wind direction is from the source to the closest sensible area?	Relative amount of visible dust generated in the process / activity:	Dust composition	Dust size range (higher mass percentage)	Is there some wind barrier (e.g.: trees, buldings, landscape) which can prevent the emissions from this source to reach the closest sensitive area?	Is there some measure applied on regular basis to prevent dust emission from this source (preventative)?	Is there some measure applied to this source to reduce dust emission once it occur (reactive)?	Is there some monitoring procedure applied to this source related to fugitive dust control?	Monitoring data / information trigger some control measure?	Total Normal.
S_001	WCS - Worst Case Scenario	Process	Continuous	Close	Yes	High	Metals	Fine	No	No	No	No	No	100
S_002	Vehicle traffic on unpaved roadways	Unpaved road / area	Continuous	Close	Yes	Medium	No metals	Medium	Yes	Yes	Yes	No	No	44
S_003	Material storage	Material stockpile	Continuous	Close	Yes	Medium	No metals	Medium	Yes	Yes	Yes	No	No	33
S_004	Unloading material	Material transfer (drop operations)	Continuous	Close	Yes	High	No metals	Medium	Yes	Yes	Yes	No	No	29
S_007														0
S_008														0
S_009														0
S_010														0
S_011														0
S_012														0
S_013														0
S_014														0
S_015														0



APPENDIX B

Start-up Forms

Unpaved Roadways
Start-up Checklist

Roadway Characteristics	
Source ID:	
Location (note proximity to the property line):	
Length:	
Surface materials:	
Anticipated volume of vehicle traffic:	
Peak traffic time:	
Anticipated vehicle speed limit:	

Special Considerations for the Control of Dust Emissions

Implementation	Yes
Has this roadway been added to the water truck schedule?	
Has this roadway been added to the inspection protocol?	

Answering "Yes" to the implementation questions documents compliance with the Best Management Practice Plan for Control of Fugitive Dust Emissions.

Name of Plant Contact:		Name of Supervisor:	
Signature:		Signature:	
Date:		Date:	

Material Handling / Storage
Start-up Checklist

Unit Process Characteristics	
Source ID:	
Operation type:	
Location:	
Material being handled:	
Material handling rate:	
Peak handling time:	

Special Considerations for the Control of Dust Emissions

Implementation	Yes
Has the storgae pile been oriented with prevailings winds?	
Has the storage pile been oriented to reduce exposed surface area?	
Has the storage pile been placed to take advantage of natural wind breaks?	
Have material drop heights been discussed with the operators?	
Has this unit been added to the inspection logs?	

Answering "Yes" to the implementation questions documents compliance with the Best Management Practice Plan for Control of Fugitive Dust Emissions.

Name of Plant Contact:		**Name of Supervisor:**	
Signature:		**Signature:**	
Date:		**Date:**	

APPENDIX C

Dust Control Inspection Form

Dust Control Inspection Form

Date:

Inspector Name:

Monthly Inspection

Unpaved Roadways				
Please check all segments that were inspected: UPR ____				
If some segments were not inspected, pleased indicate below which segment and why it was not inspected.				
Inspection Items	**Response**	**Requirement**	**Conformance (Y or N)**	**Description of Non-Conformance**
Is visible dust observed from any section of roadway?		N		
Are appropriate load sizes maintained on haul vehicles?		Y		
Are roadways well maintained? (ie good housekeeping)		Y		
Has the watering log been maintained?		Y		
Has the non-conformance log been maintained?		Y		
Have previous non-conformances been rectified?		Y		

Monthly or Semi-Annual Inspection

Material Handling / Storage				
Please check all areas that were inspected: SS ____ COS ____				
If some areas were not inspected, pleased indicate below which area and why it was not inspected.				
Inspection Items	**Response**	**Requirement**	**Conformance (Y or N)**	**Description of Non-Conformance**
Is visible dust observed from any material handling location?		N		
Are low drop heights maintained?		Y		
Are material handling locations well maintained? (ie good housekeeping)		Y		
Has the activity log been maintained?		Y		
Has the non-conformance log been maintained?		Y		
Have previous non-conformances been rectified?		Y		

All non-conformances must be documented in the Non-Conformance Log

Inspector Sign Off: ______________________________

APPENDIX D

Watering Log

Unpaved Roads
Watering Log

Section of Roadway (Source ID)	Date	Description of Watering (Equipment used, amount of water applied)	Start Time	End Time	Operator Name & Company	Company Sign Off

Material Handling / Storage
Dust Control Activity Log

Material Handling / Storage Area (Source ID)	Date	Description of Activity	Start Time	End Time	Operator Name & Company	Company Sign Off

APPENDIX E

Non-Conformance Log

Non - Conformance Log

Date	Time	Inspector Name	Potential or Actual Non-Conformance		Cause	Action	Recommendation	Corrective Action Sign Off
			Location / Source ID	Activity / Process / Condition				

APPENDIX I

Noise Impact Assessment

Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203
Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044

NOISE IMPACT ASSESSMENT
PROPOSED SITE ALTERATION APPLICATION
STOUFFVILLE, ONTARIO

Prepared for

Lafarge Canada Inc.
6509 Airport Road
Mississauga, Ontario
L4V 1S7

Prepared by

Petr Chocensky, PhD, PEng

LICENSED PROFESSIONAL ENGINEER
13-Jun-22
C.D. KiNART
100079328
PROVINCE OF ONTARIO

And

Corey Kinart, MBA, PEng

June 13, 2022

HGC Engineering Project No. 01900232

Table of Contents

1 INTRODUCTION AND SUMMARY

1.1 Context

HGC Engineering was retained by Lafarge Canada Inc. to prepare a noise impact assessment in support of a site alteration permit application for the property located at 14204 Durham Regional Road 30 in the Town of Whitchurch-Stouffville.

The analysis was based on a review of the grading plans for the proposed site alteration prepared by Golder Associates Ltd., a digital terrain model of the existing lands and the surrounding area, sound emission levels representative of the equipment to be used at the site, and additional information provided by Lafarge regarding the planned operation.

The assessment considers all operations associated with the proposed application, including delivery of fill materials by trucks and management of the fill using up to two dozers. Overall sound levels from the site were assessed against the noise limits stipulated in the Ontario Ministry of the Environment, Conservation and Parks ("MECP") guideline NPC-300 [1]. The results of the analysis indicate that, with the benefit of noise control measures integral to the site design, the sound emissions from the site will comply with the MECP limits. Details of the analysis are outlined below.

1.2 Summary of Updates

- Four additional points of reception (R1A through R4A) have been added to the assessment to represent outdoor amenity spaces associated with the four dwelling assessed in the original report.
- The analysis has been updated to consider revised topography reflected on the most recent grading plan. This has resulted in revisions to the operationally permitted areas in Figures 3 and 4, geometries of which have also been simplified for ease of operational implementation.

2 DESCRIPTION OF SITE AND SURROUNDING AREA

The site is located at 14204 Durham Regional Road 30 in Stouffville. A key plan of the area is included as Figure 1.

The purpose of the site alteration is to accept suitable excess fill from construction projects in the surrounding area and to restore the site to match the elevation of surrounding lands. It is noted that filling this area will be a continuation of the approved site alteration occurring west of the Lafarge property. Fill will be placed such that the final topographic contours at the site will be visually consistent with the elevations of the surrounding lands and match the original grade at Durham Regional Road 30. Following the completion of the proposed alteration, the proposed future use of the site is for agricultural crop production. The proposed site alteration does not include the storage of bulk fuel or bulk chemicals at the Site. A copy of the site grading plan is included as Appendix A.

The hours of operation at the site will be Monday to Friday, from 7:00 to 17:00. Trucks delivering fill materials will enter the site from Durham Regional Road 30 and exit the north side of the site onto Hillsdale Drive. The equipment used to manage fill materials to achieve the final grading of the site will include up to two dozers, occasionally supported by a front-end loader or excavator. Details of the on-site operations considered for the purposes of this study are included as Appendix B.

The nearest noise-sensitive points of reception are residential homes approximately 100 metres north of the site, and approximately 500 metres to the west and southeast. Four assessment locations have been chosen to represent the most-potentially impacted façades of the existing homes, marked as locations R1 through R4 in Figure 2. For each of these homes, this assessment includes an additional receptor (with an identifier suffix of “A”, e.g. R1A) representing the outdoor amenity space within 30 metres of the dwelling in the direction of subject site, per the guidance in NPC-300.

The background sound in the area is dominated by traffic noise on Durham Regional Road 30, based on observations during a visit to the site and a review of traffic counts obtained from the Region of Durham.

3 CRITERIA FOR ACCEPTABLE SOUND LEVELS

The applicable sound level limits, for the purposes of this assessment, were established in accordance with MECP guideline NPC-300. According to the guideline, the applicable sound level limit is the greater of either the exclusion limit of 50 dBA or the minimum hourly background sound level occurring during the period corresponding with operation of the equipment under assessment.

HGC Engineering predicted the background sound levels in the area using STAMSON, a computer algorithm developed by the MECP, based on hourly traffic volumes on Durham Regional Road 30. The results indicate that the background sound levels are less than the exclusion limits at locations R1/A through R3/A but can be greater than the exclusion limits at location R4/A. Therefore, the exclusion limits are applicable at locations R1/A through R3/A and have been conservatively adopted at location R4/A.

4 ASSESSMENT METHODOLOGY

The predictive model used for this study (*CadnaA, version 2021 MR2*) is based on the methods from ISO Standard 9613-2.2 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of Calculation" [2] which accounts for reductions in sound levels due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures and topography. The ISO method tends to be conservative, as it assumes a moderate downwind condition (favorable for the propagation of sound from the source to a receiver) in all directions, at all times.

5 NOISE CONTROL MEASURES

The site currently includes complex terrain features/berms on the north and east perimeter that have, over time, become permanent components of the site topography. Topographical data for the existing site were provided by the proponent and included in the analysis. Using the predictive model detailed in the previous section and the operational details summarized in Appendix B, the following noise control measures have been developed for the site (note that all references to dozers include a supporting front-end loader or excavator):

- Fill operations may occur anywhere on the site using two dozers at elevations of 331 metres and lower, or using one dozer at elevations of 337 metres and lower;
- Once the fill exceeds the elevations above, the operating areas using one or two dozers will be limited as depicted in Figure 3, except for the purpose of adding fill that will become the foundation for the noise berms depicted in Figure 4 (this activity constitutes construction, and is exempt from assessment);
- Following implementation of the berms depicted in Figure 4, the operating areas using one or two dozers will be limited as depicted in Figure 4;
- The sound emission levels from equipment employed at the site will not exceed the assumed sound levels listed in Appendix B;

6 ASSESSMENT RESULTS

Assuming the benefit of the noise control measures detailed in the previous section, the overall sound levels of the site were predicted to range from 45 to 50 dBA at locations R1/A through R4/A under predictable "worst case" conditions, which are within the applicable MECP noise criteria. The results are summarized in Table 1, below.

Table 1: Predicted "Worst-Case" Sound Levels, L_{EQ} [dBA]

Point of Reception	Sound Levels of Subject Site	Applicable Limits	Within Limits? (Yes/No)
R1 – Home to West	27 – 48	50	Yes
R1A – Outdoor Amenity Area of R1	27 - 48	50	Yes
R2 – Home to North	34 – 50	50	Yes
R2A – Outdoor Amenity Area of R2	31 – 50	50	Yes
R3 – Home to North	40 – 50	50	Yes
R3A – Outdoor Amenity Area of R3	38 – 49	50	Yes
R4 – Home to Southeast	39 – 49	50	Yes
R4A – Outdoor Amenity Area of R3	36 – 45	50	Yes

Note: The sound level ranges reported above represent the minimum and maximum sound levels predicted at each receptor resulting from operations on any part of the subject site when at the final fill elevations indicated on the site grading plan included as Appendix A.

7 CONCLUSIONS

The results of the acoustical analysis indicate that, with the benefit of the noise control measures incorporated into the site design, sound levels from the proposed operations will comply with the noise limits set out in MECP guideline NPC-300.

REFERENCES

1. Ontario Ministry of the Environment, Conservation and Parks Publication NPC-300, *Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning*, August, 2013.

2. International Organization for Standardization, *Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation*, ISO-9613-2, Switzerland, 1996.

3. Google Maps and Aerial Imagery, Internet application: *maps.google.com*

Limitations

This document was prepared solely for the addressed party and titled project or named part thereof, and should not be relied upon or used for any other project without obtaining prior written authorization from HGC Engineering. HGC Engineering accepts no responsibility or liability for any consequence of this document being used for a purpose other than for which it was commissioned. Any person or party using or relying on the document for such other purpose agrees, and will by such use or reliance be taken to confirm their agreement to indemnify HGC Engineering for all loss or damage resulting therefrom. HGC Engineering accepts no responsibility or liability for this document to any person or party other than the party by whom it was commissioned.

Any conclusions and/or recommendations herein reflect the judgment of HGC Engineering based on information available at the time of preparation, and were developed in good faith on information provided by others, as noted in the report, which has been assumed to be factual and accurate. Changed conditions or information occurring or becoming known after the date of this report could affect the results and conclusions presented.

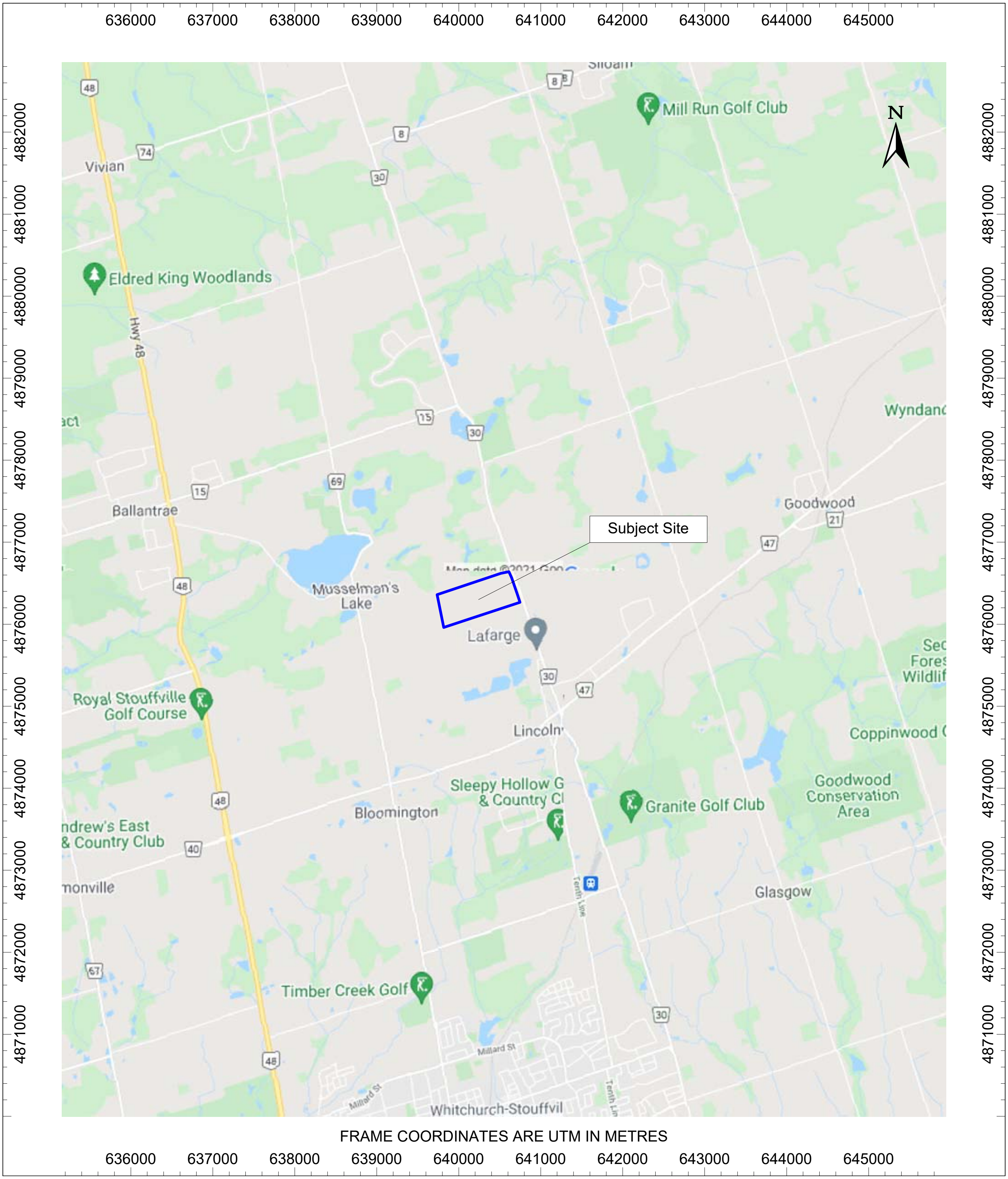


Figure 1: Location Map

Figure 2: Site Layout and Points of Reception

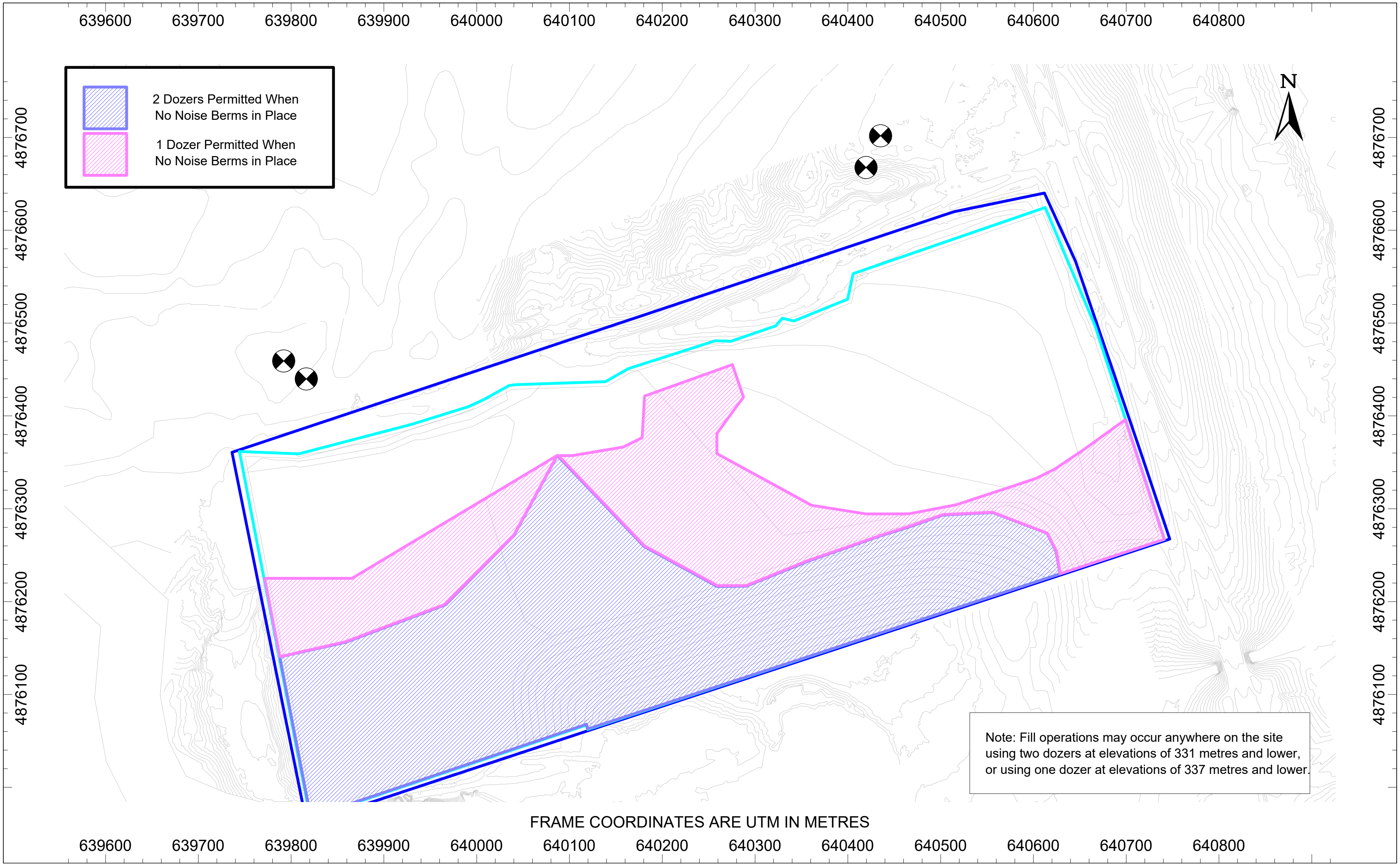


Figure 3: Areas Where Dozers May Operate with No Noise Berms in Place
(see Section 5 for additional details regarding noise control measures)

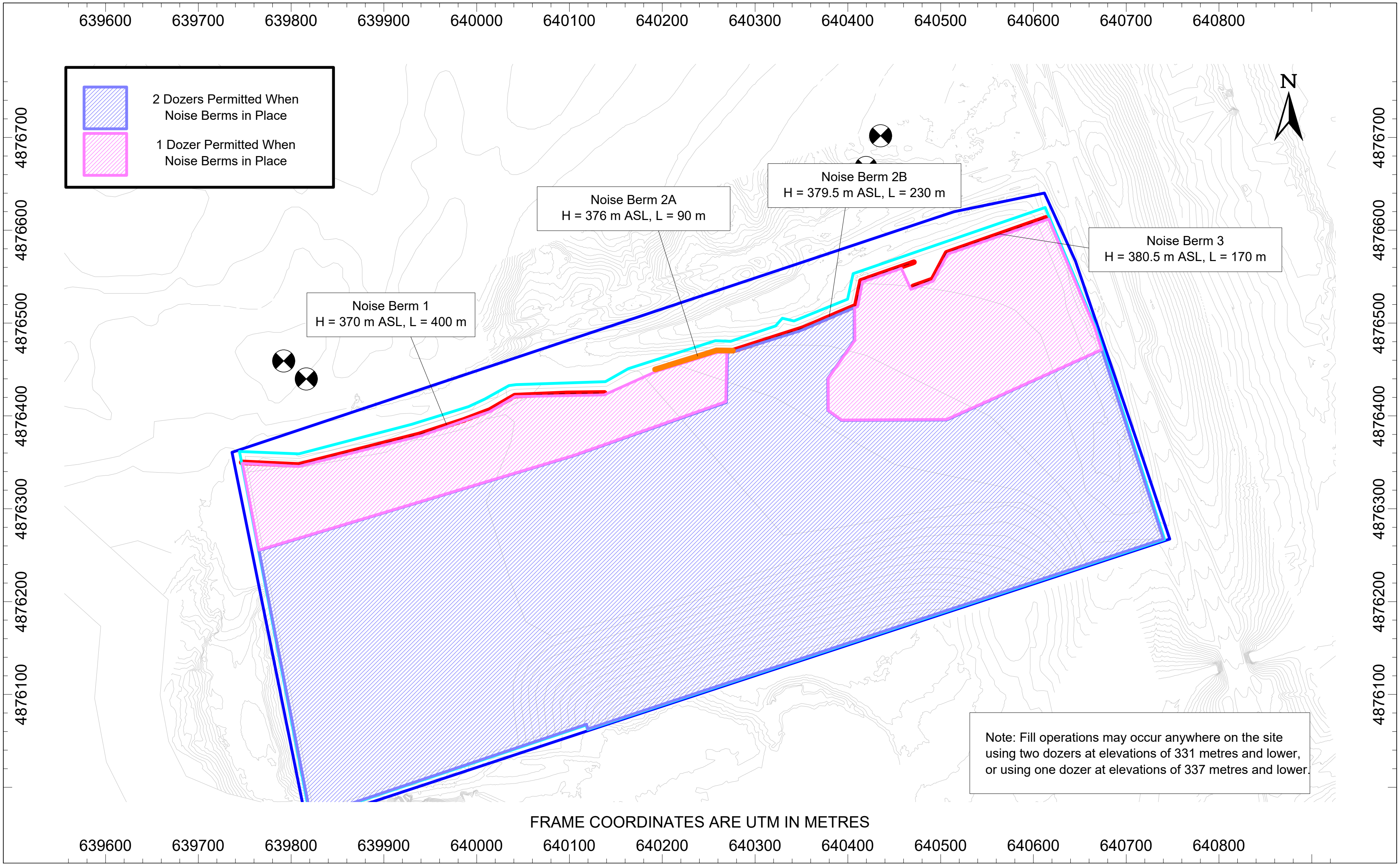
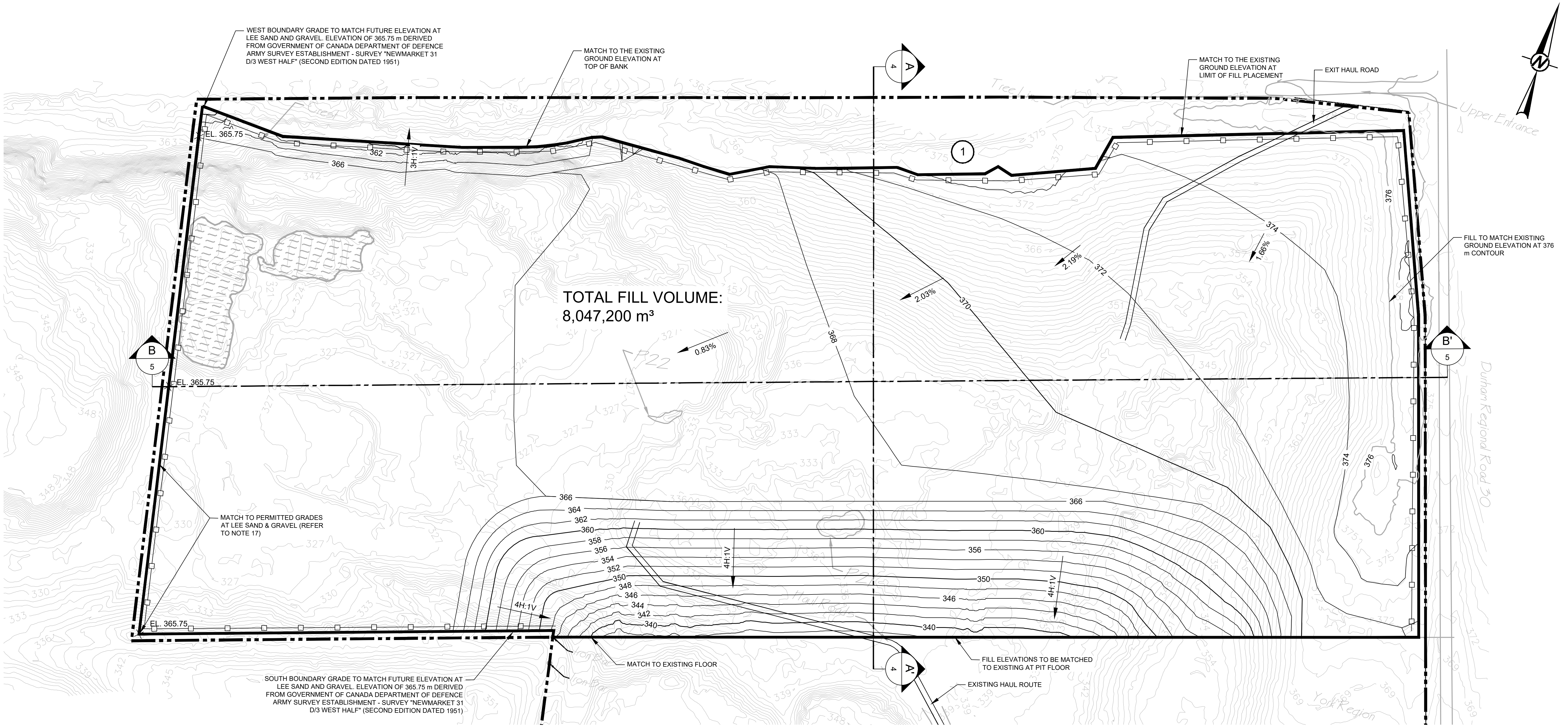


Figure 4: Areas Where Dozers May Operate with Noise Berms in Place
(see Section 5 for additional details regarding noise control measures)

APPENDIX A

Site Grading Plan



NOTES

1. CONSTRUCTION SHALL BE IN ACCORDANCE WITH MUNICIPAL STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD AND OPSS), WHERE APPLICABLE. OPSD AND OPSS SHALL APPLY WHERE NO MUNICIPAL STANDARDS ARE AVAILABLE. THE OPERATOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE MUNICIPALITY AND EXTERNAL AGENCIES PRIOR TO ANY SITE ALTERATION ACTIVITY.
2. ALL DISTURBED AREAS ARE TO BE REINSTATED TO EQUAL OR BETTER CONDITION. ALL NEW WORK SHALL BLEND NEATLY INTO EXISTING.
3. THE OPERATOR IS RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL MEASURES IN WORKING CONDITION AT ALL TIMES TO THE SATISFACTION OF THE ENGINEER. THE OPERATOR SHALL INSPECT ALL EROSION AND SEDIMENT CONTROL DEVICES ON A WEEKLY BASIS. THE CONTROL MEASURES SHALL BE PREPARED WITHIN 48 HOURS AFTER ANY DEFICIENCY IS NOTED.
4. THE EROSION AND SEDIMENT CONTROL MEASURES SHOWN ARE CONSIDERED THE MINIMUM PRECAUTIONS. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED.
5. THE OPERATOR SHALL REINSTATE ALL DISTURBED AREAS WITH 100 MILLIMETRES OF TOPSOIL AND SEED AS SOON AS POSSIBLE AFTER FINAL ELEVATIONS ARE ACHIEVED.
6. OPERATOR TO PROTECT MONITORING WELLS FROM DAMAGE FROM CONSTRUCTION EQUIPMENT WITH A 1 METRE SECTION OF 900 MM CORRUGATED STEEL CULVERT OR SIMILAR.
7. OPERATOR TO IMPLEMENT A GROUNDWATER MONITORING PROGRAM IN ACCORDANCE WITH THE REQUIREMENTS OF THE SITE ALTERATION AND FILL MANAGEMENT PLAN.
8. EROSION AND SEDIMENT CONTROL MEASURES THAT ARE DESCRIBED IN THE SITE ALTERATION AND FILL MANAGEMENT PLAN AND DRAWING TO BE IMPLEMENTED AS REQUIRED PRIOR TO THE START OF FILL IMPORTATION.
9. DURING FILL PLACEMENT, OPERATOR TO CONSTRUCT TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES (TO BE APPROVED BY ENGINEER) TO MINIMIZE EROSION AND ROUTE RUNOFF INTO THE UNFILLED AREA OF AGGREGATE EXTRACTION.
10. ENGINEER TO INSPECT ALL EROSION AND SEDIMENT CONTROL DEVICES AS REQUIRED IN THE SITE ALTERATION AND FILL MANAGEMENT PLAN.
11. PLACE SILT FENCING AS PER OPSD 219.110 ALONG THE PERIMETER OF THE BUFFER AREAS. SILT FENCING WILL CONSIST OF A NON-WOVEN GEOTEXTILE WITH A MATERIAL DENSITY OF 270R OR GREATER.
12. AVOID DISTURBANCE OR REMOVAL OF VEGETATION DURING THE ACTIVE SEASON FOR BREEDING BIRDS (APRIL 15 - AUGUST 15), UNLESS CONSTRUCTION DISTURBANCE IS PRECEDED BY A NESTING SURVEY CONDUCTED BY A QUALIFIED BIOLOGIST.
13. ENSURE ALL EQUIPMENT IS CLEANED PRIOR TO TRANSPORTATION AND USE ON THE SITE TO AVOID THE SPREAD OR INTRODUCTION OF INVASIVE SPECIES SEED ON THE SITE.
14. PLACE APPROVED FILL IN LIFTS GENERALLY NOT EXCEEDING 1.0 METRE IN THICKNESS AND NOMINALLY COMPACTED.
15. OPERATOR TO ROUTE THE INTERNAL ACCESS ROUTE AND INSTALL SIGNS AS NEEDED TO FACILITATE FILL OPERATIONS, AVOIDING CROSSING OF THE ENTRANCE AND EXIT LANES.
16. PLACE APPROVED FILL IN SEQUENTIAL PHASES (STARTING AT THE WEST SIDE, MOVING PROGRESSIVELY EASTWARD).
17. SOURCE OF 365.75 m CONTOUR IS FROM THE LEE SAND & GRAVEL PIT REHABILITATION SITE ALTERATION GRADING PLAN PREPARED BY SCS CONSULTING GROUP LTD. DATED AUGUST 2014.

LEGEND

SITE BOUNDARY
LIMIT OF FILL PLACEMENT
EXISTING CONTOUR
360 PROPOSED CONTOUR
1 DECIDUOUS FOREST BUFFER
EL. 365.75 PROPOSED SURFACE ELEVATION
PROPOSED SILT FENCE

REFERENCE

1. BASE PLAN PROVIDED BY LAFARGE, IN AN E-MAIL DATED FEBRUARY 11, 2019.

NOT FOR CONSTRUCTION

0 50 100
1:3,000 METRES

CLIENT
LAFARGE CANADA INC.

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-03-10
DESIGNED	CP
PREPARED	WS
REVIEWED	CP
APPROVED	EH

PROJECT
SITE ALTERATION AND FILL MANAGEMENT PLAN
14204 DURHAM REGIONAL ROAD 30,
WHITCHURCH-STOUFFVILLE

TITLE
GRADING PLAN

PROJECT NO.	CONTROL	REV.	DRAWING
19115436	0006	B	3

APPENDIX B

Summary of Assessed Operations

The following on-site operations were considered for the purposes of this study, based on input from Lafarge personnel:

- The management of fill materials will be achieved by up to two dozers that may operate continuously during all hours of operation (07:00 – 17:00);
- An excavator or a front-end loader can occasionally operate at the site to fulfill various supporting tasks, one of which was assumed to operate continuously along with the dozers noted above;
- Fill material will be delivered by trucks, which will enter the site via Durham Regional Road 30 and exit via a gate onto Hillsdale Drive. Up to 45 trucks may enter and exit the site per hour and were assumed to travel throughout the site at the posted speed limit of 25 km/hr.
- The equipment sound power levels assumed for the purposes of this assessment were based on measurements conducted by HGC Engineering for similar past projects and are summarized below.

Table B1: Source Sound Power Levels [dBA re: 10^{-12} W]

Source	Sound Power Level
Dozer (each)	112
Excavator or Front-End Loader	106
Moving Truck	101

APPENDIX C

Sample Calculations

R1	Upper Storey Window of Single-Storey Dwelling	639288	4876193	345.7												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	R1 - Dozer 1	639783	4876170	368.3	112	65	0	0.0	0.7	0.0	2.2	0.0	0.0	0.0	0.0	45
NS-02	R1 - Dozer 2	639783	4876170	368.3	112	65	0	0.0	0.7	0.0	2.2	0.0	0.0	0.0	0.0	45
NS-03	R1 - Loader	639783	4876170	368.3	106	65	0	0.0	0.4	0.0	2.5	0.0	0.0	0.0	0.0	38
NS-04	Arriving/Departing Road Trucks	640504	4875894	355.9	107	75	0	0.0	-1.5	20.6	195.3	0.0	0.0	0.0	0.0	26

R1A	Outdoor Amenity Space of R1	639317	4876194	347.6												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	R1A - Dozer 1	639783	4876170	368.3	112	64	0	0.0	0.6	0.0	2.1	0.0	0.0	0.0	0.0	45
NS-02	R1A - Dozer 2	639783	4876170	368.3	112	64	0	0.0	0.6	0.0	2.1	0.0	0.0	0.0	0.0	45
NS-03	R1A - Loader	639783	4876170	368.3	106	64	0	0.0	0.3	0.0	2.4	0.0	0.0	0.0	0.0	39
NS-04	Arriving/Departing Road Trucks	640504	4875892	355.9	107	75	0	0.0	-1.5	20.1	192.0	0.0	0.0	0.0	0.0	27

R2	Upper Storey Window of Two-Storey Dwelling	639792	4876460	359.5												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	R2 - Dozer 1	639813	4876281	368.5	112	56	0	0.0	-0.8	9.6	0.6	0.0	0.0	0.0	0.0	47
NS-02	R2 - Dozer 2	639813	4876281	368.5	112	56	0	0.0	-0.8	9.6	0.6	0.0	0.0	0.0	0.0	47
NS-03	R2 - Loader	639813	4876281	368.5	106	56	0	0.0	-0.5	9.5	0.7	0.0	0.0	0.0	0.0	40
NS-04	Arriving/Departing Road Trucks	640504	4875891	355.8	107	73	0	0.0	-1.5	25.0	154.3	0.0	0.0	0.0	0.0	33

R2A	Outdoor Amenity Space of R2	639816	4876440	355.8												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	R2A - Dozer	640153	4876432	370.2	112	61.6	0	0.0	0.3	0.0	1.6	0.0	0.0	0.0	0.0	49
NS-03	R2A - Loader	640153	4876432	370.2	106	61.6	0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	43
NS-04	Arriving/Departing Road Trucks	640504	4875891	355.8	107	73.2	0	0.0	-1.4	25.0	150.7	0.0	0.0	0.0	0.0	31

R3	Upper Storey Window of Two-Storey Dwelling	640435	4876702	380.5												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	R3 - Dozer 1	640083	4876392	369.1	112	64	0	0.0	-0.7	0.0	2.1	0.0	0.0	0.0	0.0	47
NS-02	R3 - Dozer 2	640083	4876392	369.1	112	64	0	0.0	-0.7	0.0	2.1	0.0	0.0	0.0	0.0	47
NS-03	R3 - Loader	640083	4876392	369.1	106	64	0	0.0	-0.6	0.0	2.4	0.0	0.0	0.0	0.0	40
NS-04	Arriving/Departing Road Trucks	640500	4875875	355.8	107	72	0	0.0	-0.7	5.2	125.4	0.0	0.0	0.0	0.0	39

R3A	Outdoor Amenity Space of R3	640420	4876668	373.3												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	R3A - Dozer 1	640663	4876490	379.5	112	61	0	0.0	1.3	3.5	1.4	0.0	0.0	0.0	0.0	46
NS-02	R3A - Dozer 2	640663	4876490	379.5	112	61	0	0.0	1.3	3.5	1.4	0.0	0.0	0.0	0.0	46
NS-03	R3A - Loader	640663	4876490	379.5	106	61	0	0.0	1.2	3.7	1.7	0.0	0.0	0.0	0.0	39
NS-04	Arriving/Departing Road Trucks	640500	4875879	355.8	107	71	0	0.0	-0.7	23.3	122.6	0.0	0.0	0.0	0.0	37

R4	Upper Storey Window of Two-Storey Dwelling	640939	4875852	352.5												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	R4 - Dozer 1	640713	4876263	374.3	112	64	0	0.0	0.4	0.0	2.1	0.0	0.0	0.0	0.0	45
NS-02	R4 - Dozer 2	640713	4876263	374.3	112	64	0	0.0	0.4	0.0	2.1	0.0	0.0	0.0	0.0	45
NS-03	R4 - Loader	640713	4876263	374.3	106	64	0	0.0	0.5	0.0	2.4	0.0	0.0	0.0	0.0	39
NS-04	Arriving/Departing Road Trucks	640500	4875890	355.8	107	68	0	0.0	-1.2	10.4	82.0	0.0	0.0	0.0	0.0	38

R4A	Outdoor Amenity Space of R4	640917	4875867	349.9												
Src ID	Src Name	Easting	Northing	Elevation	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr
NS-01	R4A - Dozer 1	640713	4876263	374.3	112	64	0	0.0	3.2	1.9	2.1	0.0	0.0	0.0	0.0	41
NS-02	R4A - Dozer 2	640713	4876263	374.3	112	64	0	0.0	3.2	1.9	2.1	0.0	0.0	0.0	0.0	41
NS-03	R4A - Loader	640713	4876263	374.3	106	64	0	0.0	2.9	2.1	2.4	0.0	0.0	0.0	0.0	35
NS-04	Arriving/Departing Road Trucks	640502	4875890	355.7	107	68	0	0.0	-1.2	23.3	78.9	0.0	0.0	0.0	0.0	36

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

The column headings in this table follow the terminology of standard ISO 9613-2. All quantities include adjustments for time-weighting, if applicable.

APPENDIX D

Consultant’s Curriculum Vitae

Petr Chocensky

Project Consultant, PhD, PEng

pchocensky@hgcengineering.com
Ph: 905-826-4044

Education

PhD in Civil Engineering, Czech Technical University in Prague,
Faculty of Transportation Sciences, Prague, Czech Republic,
Masters Degree in Civil Engineering, Czech Technical University in Prague,
Faculty of Transportation Sciences, Prague, Czech Republic

Professional History

2010 to Present Project Engineer, HGC Engineering, Toronto, Canada
2003 to 2004/2006 to 2010 Project Engineer, EKOLAgroup, Czech Republic
2004 to 2005 Noise Review Engineer, Ministry of Health, Czech Republic

Experience

Dr. Chocensky's area of expertise covers acoustic assessments and noise mapping for large transportation and industrial projects. He has completed large-scale noise mapping projects for large urban areas, including noise emissions from airports, railways, and roadways. He is an expert in computerized noise modeling and the use of CadnaA modeling software.

Selected Projects

Strategic Noise Map for Prague International Airport, Prague, Czech Republic
Noise Monitoring to Assess Noise from Prague International Airport, Czech Republic
Strategic Noise Maps for Roads, Prague, Czech Republic
Noise Control Measures for Outer Transit Corridor, Prague, Czech Republic
Noise Control Measures for National Highway D11
Noise Control Measures for Railway Corridor Prague – Pilsen
Noise Map of the City of Prague
Noise Map of the City of Jihlava
The Bay Adelaide Centre, Toronto, Ontario
One York, Toronto, Ontario
Lafarge Canada Inc., various sites, Ontario
G.E. Booth Wastewater Treatment Facility, Mississauga, Ontario
Petro-Canada, Mississauga, Ontario
Vale & Kelly Mine, Sudbury, Ontario
Bunge, Hamilton, Ontario
Dufferin Concrete, various sites, Ontario
Dufferin Construction, various sites, Ontario
NOVA Chemicals, Corunna, Ontario
Kellogg Canada Inc., London, Ontario
Morrison-Hershfield Energy Centre, Windsor, Ontario

Toronto
HGC Engineering
2000 Argentia Road,
Plaza 1, Suite 203
Mississauga, Ontario L5N 1P7
Canada
Ph: 905-826-4044

Calgary
HGC Engineering
444-5th Avenue SW, Suite 1620
Calgary, Alberta, T2P 2T8
Canada
Ph: 587-441-1583

www.hgcengineering.com

ACOUSTICS NOISE VIBRATION

HGC ENGINEERING

Corey D. Kinart

Senior Associate, MBA, PEng

ckinart@hgcengineering.com
Ph: 905-826-4044

Toronto
HGC Engineering
2000 Argentia Road,
Plaza 1, Suite 203
Mississauga, Ontario L5N 1P7
Canada
Ph: 905-826-4044

Calgary
HGC Engineering
444-5th Avenue SW, Suite 1620
Calgary, Alberta, T2P 2T8
Canada
Ph: 587-441-1583

www.hgcengineering.com

ACOUSTICS NOISE VIBRATION

Education

University of Waterloo, Bachelor of Applied Science, Mechanical Engineering, 2001
Schulich School of Business, York University, Master of Business Administration, 2015

Professional Memberships

Professional Engineers Ontario (PEO)
Canadian Acoustical Association (CAA)

Professional History

2009 to present	Senior Associate, HGC Engineering, Mississauga
2006 to 2009	Project Engineer, HGC Engineering, Mississauga
2001 to 2006	Mechanical Engineer, Magellan Aerospace, Mississauga
2000 to 2001	Contract Engineer, HGC Engineering, Mississauga

Experience

Mr. Kinart has extensive experience in the assessment and mitigation of noise emissions from industrial and commercial facilities, and specializes in the use of advanced sound intensity measurement equipment and techniques. He has conducted feasibility studies, acoustic assessments and audits for government approvals, as well as noise complaint investigations for hundreds of facilities across Ontario and abroad. His experience spans a wide variety of industrial and commercial sectors and is highlighted by natural gas fired power generation facilities, natural gas transmission and distribution facilities, electrical transformer stations, petrochemical refineries, mineral mines, hot mix asphalt, ready-mix concrete and cement plants, aggregate pits and quarries and myriad of other sites and facilities of varying size and complexity.

Selected Projects

Union Gas Limited, Numerous sites throughout Ontario
General Dynamics Land Systems, London, Ontario
Vale, Copper Cliff & Garson, Ontario
Suncor Energy Products Inc., Mooretown, Ontario
Lafarge Canada Inc., Numerous sites throughout Ontario
National Gas Company of Trinidad & Tobago, Trinidad & Tobago
General Motors, St. Catharines, Ontario
Enbridge Gas Distribution, Numerous sites throughout Ontario
Petro-Canada, Mississauga, Ontario
TransCanada Pipelines Ltd., Numerous sites in Ontario and Western Canada
Canada Building Materials, Numerous sites throughout Ontario
DeBeers Victor Mine Project, Northern Ontario
Staatsolie, Tout Lui Faut, Suriname
Dufferin Concrete, Numerous sites throughout Ontario
NOVA Chemicals, Corunna, Mooretown & St. Clair, Ontario
Hydro One, Numerous sites throughout Ontario

APPENDIX J

Construction Specifications and Protocols

ECAN BUSINESS UNIT

Inert Fill Importation Protocol

Procedure for Assessing and Receiving Inert Fill for Rehabilitation at Lafarge Pits and Quarries

Lafarge Employee Guide

Version 1.3

October 2018

TABLE OF CONTENTS

1. INTRODUCTION

Lafarge Canada Inc. (Lafarge) is committed to conducting its business in a safe and environmentally responsible manner. As a method of risk reduction against the receipt of non-inert fill in its licensed pits and quarries, Lafarge policy is to assess all sources seeking to import inert fill and excess soil onto Lafarge land for rehabilitation purposes.

The importation of inert fill and excess soil for rehabilitation purposes in permitted pits and quarries can greatly assist Lafarge in achieving its rehabilitation objectives and in many cases can significantly improve the productivity and utility of these lands after extraction is complete. However, the importing of inert fill without fully understanding the environmental risks associated with accepting it has the potential to significantly increase Lafarge's financial and environmental liabilities if the fill material being accepted is not inert. Once fill has been placed on the property, it becomes the permanent responsibility of Lafarge, and if the fill is contaminated, the resulting environmental degradation also becomes Lafarge's responsibility. It is the responsibility of the Lafarge team to manage fill importation in an environmentally responsible manner that creates short- and long-term value for the company.

2. BACKGROUND

2.1 What does the Circular Economy mean to Lafarge?

Lafarge believes in the possibility of creating symbiotic relationships between industries where one company's waste can be the fuel or raw material for another and preserving natural resources.

Cities are growing. By adopting planning strategies such as infill development and urban intensification, municipal leaders and planners can make this growth more sustainable. Denser communities, however, create what is referred to in the industry as excess soil and inert fill. Excess soil and inert fill result when the construction of new buildings or the development of infrastructure projects generates surplus earth materials and there is no space to reuse the soil at the site of origin.

Responsible excess soil and inert fill management is integral to building better cities. By applying human capabilities - operational, commercial, sustainability, regulatory compliance competencies - urban growth, environmental protection and sustainability objectives of surrounding communities can be reconciled.

2.2 Fundamentals of Responsible Excess Soil and Inert Fill Management

Prevent Adverse Impacts

Materials should be extracted, handled and disposed of or repurposed in a manner that prevents adverse impacts to the environment and human health and mitigates potential hazards and negative effects.

Encourage Recycling & Preservation of Resources

Earth materials are non-renewable resources; their loss and degradation is not recoverable within a human lifespan. Soils need to be recognized and valued for their productive capacities as well as their contribution to food security and the maintenance of key ecosystem services.

Aggregate Extraction is an Interim Land Use

Over the course of extraction and once pits and quarries are depleted, they must be rehabilitated so that they are safe, support local ecosystems and enable optimal end use of the land. Pits and quarries without sufficient overburden to complete rehabilitation require soil importation from offsite sources.

2.3 References

The following is a list of resources that provide guidance on responsible excess soil and inert fill management. The Lafarge Inert Fill Protocol has been prepared referencing these requirements/best practices and shall be reviewed periodically by a third-party Qualified Person to ensure ongoing suitability, sustainable environmental performance and appropriate risk control.

Aggregate Resources Act

The purposes of this Act are,
(a) to provide for the management of the aggregate resources of Ontario;
(b) to control and regulate aggregate operations on Crown and private lands;
(c) to require the rehabilitation of land from which aggregate has been excavated; and
(d) to minimize adverse impact on the environment in respect of aggregate operations.

Policy A.R. 6.00.03: Importation of Inert Fill for the Purpose of Rehabilitation

MNRF Aurora District Off-Site Fill Acceptance Protocol

Site Specific - Individual Site Plan Approvals

Canadian Association for Laboratory Accreditation Inc. (CALA) Protocols and Standards

CALA is an internationally recognized not-for-profit accreditation body serving both public and private sector testing laboratories in Canada and abroad.

CALA Guide to Current Sampling Practices

Canadian Council of Ministers of the Environment Guidance Manuals

CCME is the primary minister-led intergovernmental forum for collective action on environmental issues of national and international concern.

Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment

Guidance Manual on Sampling Analysis and Data Management for Contaminated Sites

Conservation Authorities Act

The purpose of Conservation Authorities Act is to provide for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario.

Site Specific – Permits and Approvals

Environmental Protection Act

The purpose of this Act is to provide for the protection and conservation of the natural environment.

Reg. 347: General – Waste Management

Reg. 153/04: Records of Site Condition

Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act

Management of Excess Soil – A Guide for Best Management Practices

Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act

Rationale Document for Reuse of Excess Soil at Receiving Sites*

Proposed Rules for On-Site and Excess Soil Management*

Proposed On-Site and Excess Soil Management Regulation*

Site Specific - Environmental Compliance Approvals and Permits

International Organization for Standardization

ISO/IEC 17025 Standard General requirements for the competence of testing and calibration laboratories

Lafarge Environmental Policies and Work Practices

Every Lafarge operation must comply with all applicable laws and regulations and conduct its businesses consistent with sustainable development principles.

Environmental Policy – North America

Work Practices including but not limited to:

Excess Soil Management System

Dust Control

Environmental Aspects Management

Operational Control

Spill Containment and Response

Lafarge Health and Safety Policies and Work Practices

Manuals and Work Practices including but not limited to:

Hazard Identification and Control

Quarry Safety Manual (incl. Slope Stability / Engulfment Prevention)

Lafarge Canada Inc. Health & Safety Guideline for Fill Importation

Energy Isolation

Material Unloading

Mobile Equipment

Respirable Crystalline Silica & Total Dust

Municipal Act

Municipalities are created by the Province of Ontario to be responsible and accountable governments with respect to matters within their jurisdiction and each municipality is given powers and duties under this Act and many other Acts for the purpose of providing good government with respect to those matters.

Site Amendment Bylaws

Site Specific - Municipal Permits and Approvals

Ontario Provincial Standards and Specifications

The mandate of the Ontario Provincial Standards for Roads and Public Works (OPS) organization is to develop and maintain consistent cost-effective methods to improve the administration of road and infrastructure building in Ontario

Ontario Provincial Standard Specification 180 - General Specification for the Management of Excess Materials

Planning Act

The Planning Act is provincial legislation that sets out the ground rules for land use planning in Ontario. It describes how land uses may be controlled, and who may control them.

Municipal Official Plans

Provincial Policy Statements

Zoning Bylaws

3. RESPONSIBILITIES

3.1 General Manager

(1) Identify competent individual(s) to be Circular Economy Champions at all sites undertaking importation of materials

(2) Provide adequate financial and human resources to ensure environmental performance related to inert fill importation.

(3) Ensure Circular Champions are trained.

(4) Ensure that the protocol is being used properly and consistently.

3.2 Commercial Manager

(1) Act as an advocate for the Inert Fill Protocol and communicate Inert Fill Protocol requirements to customers, industry association and other stakeholders.

(2) Ensure all offers to sources of inert material are conditional on compliance with the Inert Fill Protocol and that all sources are pre-qualified. Satisfactory pre-qualification shall be documented by an Ontario Provincial Standard Form (OPSF) 180-1 or 180-2, which has been signed by the Circular Economy Champion.

(3) Have a working knowledge of protocol and ensure that all employees coordinating import with sources of inert fill have a working knowledge of the protocol.

3.3 Circular Economy Champion

(1) Maintain a high degree of knowledge of the Inert Fill Protocol and undertake ongoing training to maintain a current awareness of underlying regulations and best practices.

(2) Maintain an awareness of the net material deficit relative to the approved rehabilitation plan as set out in the site-specific regulatory instrument. Ensure that all material imported is beneficially reused in accordance with the rehabilitation plan through regular inspections. Prevent importation of material in excess of the volume required for rehabilitation.

(3) Coordinate with operations and the Corporate Land Group to confirm the active rehabilitation footprint and ensure continued access to remaining aggregate reserves.

(4) Ensure that all sources of incoming material are pre-qualified in accordance with the Inert Fill Protocol.

(5) Document pre-qualification of sources using the appropriate OPSF 180-1 or 180-2.

(6) Ensure that each inbound load of material is manifested with a Lafarge issued manifest and originated at a pre-qualified source. Chain of custody from the source of inert material shall be maintained until such time as audit sample analytical results have been returned. Upon quality confirmation through audit sampling, the material may be incorporated into the rehabilitation project.

(7) Ensure that incoming loads undergo visual and olfactory inspection. Monitor and control percent deleterious content of inbound material to ensure material meets acceptance criteria.

(8) Cease import from any individual source of material if material does not meet the geotechnical requirements for the rehabilitation project or slump criteria as set out in Ontario Regulation 347.

(9) Ensure that audit sampling is conducted in accordance with the Inert Fill Protocol.

(10) Ensure that every load of inert material imported is incorporated into a Cumulative Record of Import for all sites importing material in accordance with the Inert Fill Protocol.

(11) Conduct periodic audits of the Cumulative Records of Import. Retain records of any audit findings and any corrective actions undertaking to address audit findings.

(12) Ensure that all Inert Fill Protocol non-conformances (FPNCs) are documented, that necessary and sufficient corrective actions are identified and that corrective actions are implemented in a timely fashion. Records related to FPNCs and associated corrective actions shall be maintained as part of the Cumulative Record of Import.

(13) Ensures that records are properly stored and available for inspection. Undertake reference filling procedure. Determines (in consultation with other Lafarge team members) if third party testing of the inert fill will be required.

(14) Ensure ongoing compliance with all other Lafarge Environmental and Health and Safety Policies and Practices.

3.4 Corporate Land and Environment Groups

(1) Review rehabilitation plans for each individual site and communicate where deficits of material may impede progressive and final rehabilitation.

(2) Ensure that fill importation occurs only at sites where the Site Plan Approval has a note permitting this activity. Communicate any site-specific requirements as set out in the Site Plan Approval or other regulatory instruments to the Circular Economy Champion.

(3) Ensure adherence to regulatory requirements as set out in site specific permits and approvals through periodic inspections.

(4) Participate in periodic audits of Cumulative Records of Import to ensure adherence to the Inert Fill Protocol and that all materials being brought in for rehabilitation are suitable for the purpose of rehabilitation.

(5) Provide technical support and expertise as required.

(6) Conduct periodic site visits to ensure adequacy of operational controls to prevent risk, prevent environmental impact and prevent safety hazards. These site visits should also assess adherence to Lafarge policies, practices and standards.

4. THE INERT FILL IMPORTATION PROCESS – PRE-QUALIFICATION

4.1 Quality Requirements

Only Lafarge aggregate sites licensed under the Aggregate Resources Act and permitted to import material and with a deficit of material required for rehabilitation shall import inert material. The Inert Fill Protocol identifies two categories of inert materials (excess soil and inert rock fill) and consolidates guidance from various sources to derive conservative criteria for acceptance.

Excess Soil

Applicable Definitions

- Meets the definition of Inert Fill as set out in MECP's O.Reg 347: General – Waste Management (v. September 30, 2017), specifically "earth or rock fill or waste of a similar nature that contains no putrescible materials or soluble or decomposable chemical substances."

- Meets the definition of Soil as set out in MECP's O.Reg. 153/04: Record of Site Condition, specifically "unconsolidated naturally occurring mineral particles and other naturally occurring material resulting from the natural breakdown of rock or organic matter by physical, chemical or biological processes that are smaller than 2 millimetres in size or that pass the US #10 sieve."

- Meets the definition of Excess Soil as proposed in MECP's draft regulation for On-Site and Excess Soil Management, specifically "soil that has been excavated as part of a project and removed from the project area."

- Meets the definition of Acceptable Fill as set out in the MNRF Aurora District Off-Site Fill Acceptance Protocol.

Environmental Quality

- Meets Table 1 – Full Depth Background Site Condition parameters of the Soil, Ground Water and Sediment Standards, for Use Under Part XV.1 of the Environmental Protection Act respecting the anticipated future property use and municipal zoning.

- Meets leachate standards as set out in TABLE E: Leachate Standards Required for a Potable Ground Water Condition, Rationale Document for Reuse of Excess Soil at Receiving Sites. This provides additional operational control to prevent the movement of inorganics from inert fill to groundwater.

- SAR & EC exceedances of Table 1 parameters may be accommodated if material is to be used subsurface in reclamation and placement considers other MECP best practice guidance.

Other Considerations

- Meets physical parameters to render material suitable for use in rehabilitation, including but not limited to the following - free of deleterious materials (concrete, brick and asphalt are considered deleterious) and moisture content controlled within 3% of standard Proctor optimum value.

- Material has <u>not</u> been treated, mixed or processed. If processing is carried out under an Environmental Compliance Approval (Waste Systems) or otherwise should be carried out under and Environmental Compliance Approval (Waste Systems), it does not meet acceptable quality criteria.

Inert Fill

Applicable Definitions

- Meets the definition of Inert Fill as set out in MECP O.Reg 347: General – Waste Management (v. September 30, 2017), specifically “earth or rock fill or waste of a similar nature that contains no putrescible materials or soluble or decomposable chemical substances.”

- Meets the definition of Aggregate as set out in the Aggregate Resources Act, specifically “gravel, sand, clay, earth, shale, stone, limestone, dolostone, sandstone, marble, granite or other prescribed material,” but <u>DOES NOT</u> meet the definition of Soil as set out in MECP’s O.Reg. 153/04: Record of Site Condition, specifically “unconsolidated naturally occurring mineral particles and other naturally occurring material resulting from the natural breakdown of rock or organic matter by physical, chemical or biological processes that are smaller than 2 millimetres in size or that pass the US #10 sieve.”

- Meets the definition of Acceptable Fill as set out in the MNRF Aurora District Off-Site Fill Acceptance Protocol.

Environmental Quality

- Meets leachate standards as set out in TABLE E: Leachate Standards Required for a Potable Ground Water Condition, Rationale Document for Reuse of Excess Soil at Receiving Sites. This provides additional operational control to prevent the movement of inorganics from inert fill to groundwater.

Other Considerations

- Meets physical parameters to render material suitable for use in rehabilitation, including but not limited to the following - free of deleterious materials (concrete, brick and asphalt are considered deleterious) and moisture content controlled within 3% of standard Proctor optimum value.

- Material has <u>not</u> been treated, mixed or processed. If processing is carried out under an Environmental Compliance Approval (Waste Systems) or otherwise should be carried out under and Environmental Compliance Approval (Waste Systems), it does not meet acceptable quality criteria.

4.2 Information Required for Pre-Qualification

To pre-qualify a source of material requires the following information be collected:

Completion of the Inert Fill Importation Form;

Completion of the Pre-Screening checklist;

Submission of Supporting Documentation, which provides a third-party assessment of the environmental quality of the source;

Inspection and/or verification of the source location; and

Completion of the Affidavit by the source material owner.

4.2.1 The Inert Fill Importation Form

The Inert Fill Importation Form provides initial source site information to start the evaluation of the source.

The Circular Economy Champion should:

(1) Compare the net volume of material required to complete a rehabilitation project to the volume of material that will be generated by the source. If the source is generating more material than the volume required by the Lafarge site, the source should be advised of the volume limitation on import.

(2) Review the location of the source. Check land use information resources to confirm current and historical land uses of the source location and surrounding properties. Make note of any current or legacy potentially contaminating activities that should be addressed by Supporting Documentation.

(3) The applicant's or hauler's record of import may be reviewed at the initial request stage. Applicants and haulers with a history of non-conformances with site access conditions, the Lafarge Inert Fill Protocol or the Lafarge H&S Guideline for Fill Importation should be flagged. Additional operational controls to ensure conformance may be appropriate. An applicant or hauler may be declined based on past performance.

(4) The timing of import shall be used to coordinate safe import with mining and aggregate processing activities occurring onsite. Logistical restrictions may also need to be considered, e.g. haul route restrictions.

ALL QUESTIONS MUST BE COMPLETED FOR THE FORM TO BE PROCESSED BY LAFARGE.

LAFARGE PIT/QUARRY: ____________________

Applicant's Name: ____________________

Contact Person: ____________________

Address: ____________________

Phone no.: ____________________

Material Source Location: ____________________

Legal Description (i.e. lot and concession): ____________________

Municipal Address: ____________________

Registered Owner of Land: ____________________

Volume of Excess Material: ____________________

Anticipated Date of Shipment: ____________________

Hauler: ____________________

Name of Qualified Person Assigned by the Owner____________________

4.2.2 The Pre-Screening Checklist

The Pre-Screening Checklist provides a verification of whether the source of material is or may have been subject to actual or potential contamination. Any answers reported as unknown or any indication that the material may not be inert will be flagged and either result in disqualification of source or prompt a requirement for additional information and clarification from the source.

Information reported in the Pre-Screening Checklist should be cross referenced with an independent review of the material source location as reported in the Fill Information Sheet.

Pre-Screening Checklist:			
What kind of site is the soil from (either historically or currently)? Mark the appropriate box(s).	Yes	No	Unknown
A totally undeveloped site			
Agricultural land			
Residential land			
Commercial Land			
Transportation corridor			
Industrial land			
What are the adjoining lands (either historically or currently)? Mark the appropriate box(s)	Yes	No	Unknown
A totally undeveloped site			
Agricultural land			
Residential land			
Commercial Land			
Transportation corridor			
Industrial land			
Does the material consist of or contain any of the following:	Yes	No	Unknown
Biodegradable, organic materials such as tree trunks, leaves, etc.			
Construction or Demolition Debris, plastic, metal, wood, brick, concrete, etc.			
Former fill material			
Soil of unusual appearance?			
Was manure or sewage sludge spread on the site?			
Were there any septic tanks or septic systems on the site?			
Were storage tanks on the property or adjoining properties?			
Was the site used for the storage of any materials such as fuels, pesticides, solvents, batteries or other potential contaminants?			
Were there any historical spills of contaminants at the site? Chemical analysis of the materials is included, and results indicate that the concentrations are less than the Lafarge "Minimum Screening Parameters" Include copies of all required chemical analysis.			

4.2.3 Minimum Requirements for Supporting Documentation

All sources of material must be characterized prior to import and supporting documentation provided by the source to confirm that the material is inert.

Baseline requirements for supporting documentation include:

(1) An environmental characterization report prepared by a third party and independent Qualified Person that asserts the quality of the source material at the location asserted by the applicant in the Inert Fill Importation Form.

(2) Representative chemical analysis of source material compared to Lafarge's screening parameters of Metals & Inorganics (M&I), Petroleum Hydrocarbons (PHC), Polycyclic Aromatic Hydrocarbons (PAH), Polychlorinated Biphenyls (PCB) and Volatile Organic Compounds (VOC).

In addition to the above minimum requirements, the Circular Economy Champions will request additional information in the following circumstances:

- If Phase 1 and/or Phase 2 Environmental Site Assessments have been conducted at the source site, copies of all such reports shall be requested as part of the pre-qualification review.

- If the sampling rationale provided by the source site Qualified Person does not adhere to the sampling frequencies recommended below, a sampling plan review may be undertaken to ensure that analysis submitted to pre-qualify a source is representative of that source.

  Recommended Sampling Frequencies

  FOR INSITU MATERIAL - A minimum of three sample analysis is required for every source with an additional sample being required for every additional 5000, cubic meters.

  FOR STOCKPILED MATERIAL – The requirements for stockpile characterization as set out in Table 2 of Ontario Regulation 153/04 apply.

- If Potentially Contaminating Activities (PCAs) are flagged during pre-qualification and minimum screening parameters do not adequately address those PCAs, then the source will be rejected unless additional representative chemical analysis of source site material can be provided by a Qualified Person to confirm that the material is inert.

- If there is any risk that material will not meet slump requirements as set out in Ontario Reg. 347, geotechnical reports will be requested.

- In the event of ambiguity or uncertainty following the standard pre-qualification review, the source material should be rejected or a third-party assessment of the suitability of the material should be undertaken.

4.2.4 Inspection / Verification of Source Location

Material that is accepted, based on the Pre-Screening Checklist, or cited as requiring further assessment, should be inspected at the source site by Lafarge to ascertain if the source site is as described and if the material is as expected. To document the visit, pictures should be taken and the Site Inspection Checklist should be used. Any discrepancies should be documented and discussed with the contractor/supplier for clarification. If any of the information requires further evaluation or testing, a third-party assessment should be completed.

Site Visit Checklist

LAFARGE PIT/QUARRY MATERIAL WILL BE BROUGHT TO: ____________________

Applicant's Name:____

Contact Person: ____

Address: ____

Phone no.:____

Material Source Location:

Legal Description (i.e. lot and concession)______________________________________

Municipal Address:____

Registered Owner of Land:____

Site and Fill Material Appearance

Is the site where and as described by the material supplier? ___ yes ___ no

Is the material description provided by the supplier reasonable? ___ yes ___ no

Any obvious issues of concern? ___ yes ___ no

If yes, describe: ____

____

Supplier Documentation

Any Regulatory Agency correspondence available? ___ yes ___ no

Is a consultant's assessment of the materials available? ___ yes ___ no

Is Does that assessment conclude that the materials meet criteria? ___ yes ___ no

Ontario Only

Analysis for the Table 1 Standards? ___ yes ___ no

Do they comply with the Table 1 Standards described in the MECP Standards?

___ yes ___ no

Regulation 347 leachate test Results? ___ yes ___ no

Do the materials classify as inert (less than 1 times schedule 4 criteria)?___ yes ___ no

List any Issues of concern: ____

Previous Environmental Reports for the Site or Materials?

Previous reports available? ___ yes ___ no

List reports:____

____

List any Issues of concern: ____

____

Physical Setting (Include Photographs)

Property Size____

Ground Surfaces ___ Concrete ___ Grass ___ Asphalt ___ Landscaped ___ Combination

___Other (describe): ____

Aboveground Storage Tanks (ASTs)

Are ASTs present? ___ Unknown __ Yes ___ No

Previous leakage/remediation: ___ Yes ___ No

Describe any issues of concern: ____

Underground Storage Tanks (USTs)

Are USTs present (fill pipes, vent pipes, pump island)?___ Unknown ___ Yes ___ No

Previous leakage/remediation: ____

Describe any issues of concern:____

Waste Storage Area

Are waste storage areas present? ___ Yes ___ No

Describe any issues of concern:

____

____

Material/Other Storage Area

Are material/other storage areas present ___ Yes ___ No

If yes, list areas:____

____

Describe any issues of concern: ____

Vegetation Stress and Staining

Was any vegetation stress/die back observed? ___ Yes ___ No

Was any staining observed? ___ Yes ___ No

State type and location of vegetation stress/ die back or staining: ___________________

Neighbouring Properties

List neighbouring Businesses/Land Use:

North: ____

East: ____

South: ____

West: ____

List any concerns or potential for cross boundary issues: _________________________

Selected Materials of Concern

Asbestos-Containing Materials (ACMs)

Are suspected ACMs present? Yes ___ No

Polychlorinated Biphenyls (PCBs)

Are suspect PCB equipment, waste or materials present? ___ Yes ___ No

If any, list concerns: ____

____

Mercury Substances

Are mercury-containing materials present? ___ Yes ___ No

If any, list concerns: ____

Radioactive Materials

Are radioactive materials present ___ Yes ___ No

If any, list concerns: ____

Lead-Based Paints (LBPs)

Are suspect LBPs present on-site ___ Yes ___ No

Herbicides/Pesticides

Are herbicides/pesticides stored on-site? ___ Yes ___ No

Are herbicides/pesticides used on-site property? ___ Unknown ___ Yes ___ No

If any, list concerns: ____

Biodegradable, organic materials such as tree trunks, leaves, etc.

If any, list concerns:____

____

Construction or Demolition Debris, plastic, metal, wood, brick, concrete, etc.

If any, list concerns: ____

____

Former fill material

If any, list concerns: ____

4.2.5 Source Material Owner Certification

Prior to issuing permission to access a Lafarge site, the source material owner should certify that to the best of their knowledge the source material meets required environmental criteria. The source material owner should also commit to removing all material from Lafarge property that does not meet required environmental criteria

Affidavit.

I (see below) as a duly authorized representative of the company and in consideration for being permitted to deposit materials at this Lafarge Canada Inc.'s facility for rehabilitation purposes, by signing this document am in agreement with the following conditions imposed upon my company by Lafarge Canada Inc. concerning deposit of materials at Lafarge's facility.

I certify the material being transported onto the property is in compliance with Ontario Reg. 347, Ontario Reg. 153/04(09) and Table 1 Standards of the MOE, Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004(09), as amended.

Details as to the source location of each load of material being transported onto Lafarge property will be made available to Lafarge.

My company will be responsible for depositing the material on the property in a manner and location as directed by Lafarge.

My company will be responsible for promptly removing any material deposited at any Lafarge facility which fails to meet Table 1 criteria, at its sole expense, and will indemnify Lafarge for all costs and expenses which it incurs as a result of deposit of such material.

COMPANY: ____

NAME: ____

TITLE: ____

SIGNATURE OF REPRESENTATIVE: ___________________________________
I have the authority to bind the corporation

DATE: ____

LAFARGE OPERATION ____

4.2.6 Approving a Source of Inert Material

The Lafarge Circular Economy Champion will review and assess information provided through the pre-qualification process.

The Circular Economy Champion will consult with Corporate Land, Environment and Legal resources to decide whether the material should be rejected, accepted or cited as requiring further assessment through inspection and additional testing.

Final approval of a source by a Circular Economy Champion will be documented using the Ontario Provincial Standard Form (OPSF) 180-1 or 180-2, to provide clarity on what source of material is pre-qualified for what receiving site and if any conditions of site access apply.

Once the source material owner is notified and if they agree to the conditions of site access by signing the OPSF 180-1 or 180-2, the process then moves to Stage 2 – Management of Importation at Individual Sites.

5. MANAGEMENT OF IMPORTATION PROCESS AT INDIVIDUAL SITES

5.1 Staffing

All Lafarge sites importing material shall be staffed by a Lafarge Site Attendant or Lafarge Rehabilitation Project Coordinator. These employees are accountable to the Circular Economy Champion and are necessary to ensure that all Inert Fill Protocol requirements are observed.

5.2 Load Manifest/Ticket System

Throughout the transfer of materials, a manifest or weigh ticket is required for each load of material that is brought to the site. These tickets will be retained to provide a permanent record until all materials are tested and identified as inert. Load check systems will be implemented for all materials entering the site.

Undocumented loads without manifest will not be accepted under any circumstances.

5.3 Maintaining Chain of Custody

All lots (shipments) should be placed in segregated areas to allow the lot to be identified and removed should a problem be identified either through inspections or through additional testing.

5.4 Visual and Olfactory Inspections

All inbound loads of material must be inspected upon receipt. Any sign of soil stains, unusual odours, bricks, demolition debris, plastics or any other aesthetic wastes, is enough to ascertain that the material may be unsuitable. Shipment of unsuitable material should be stopped pending review of the prequalification and a visit to the source site. Any staged materials that did not pass visual and olfactory inspection should be removed from the Lafarge site by the source material generator/owner and/or hauler at their expense.

5.5 Audit Sampling

Additional sampling will be conducted by Lafarge to ensure that materials are appropriate and suitable for use in the rehabilitation of pits and quarries. This sampling is conducted as an additional safeguard to assure that the O. Reg. 347 and O. Reg 153/04(09), Table 1 Standards are met. Representative samples will be taken a minimum of 1:70 loads of material.

Soil samples shall be collected and submitted to a laboratory accredited by Canadian Association for Laboratory Accreditation (CALA), which operating in accordance with the International Standard ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories. Analytical procedures should be conducted as outlined in section 47 of Ontario Regulation 153/04 and in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act, July 1, 2011.

5.6 Fill Protocol Non-Conformances

If audit sampling yields results that do not conform to Table 1 acceptance criteria, the following response will be initiated.

- Immediate filing of fill protocol nonconformance report.

- Immediate demarcation and isolation of staging area containing non-conformant loads.

- Notification to source site of non-conformance and outline of requirements for corrective action to resolve non-conformance.

- Review of non-conformant source site pre-qualification.

- Cessation of import or implementation of supplementary operational controls for the source site while the source pre-qualification is being reviewed and corrective actions completed.

- Retention of third party QP where required to resolve nonconformance.

- Close out of each non-conformance with a documented corrective action, including records of removal.

- Records to be retained as part of Cumulative Record of Import.

5.7 Other Operational Controls to Prevent Environmental Impacts and Safety Hazards

Lafarge Site Attendants and Rehabilitation Project Coordinators shall submit site inspection updates every two hours for sites importing material. These updates will check the sufficiency of operational controls in place to prevent impacts to the environment and hazards to the health and safety of employees, customers, contractors and the public.

The Circular Economy Champion in partnership with Lafarge Operations is responsible for reviewing inspection reports and implementing corrective actions as required.

5.8 Cumulative Record of Import

A Cumulative Record of Import is a continuously updated record that evidences:

- The site-specific regulatory instrument allowing inert fill importation;
- The rehabilitation project planned for the site;
- The cut-fill material balance of the rehabilitation project;
- Any deficit of material that must be balanced with import of inert material from offsite (Site Capacity); and
- A record of each load of material imported into the site (Truck Log).

The Truck Log links information from various sources to demonstrate that each inbound load conforms to management system and regulatory requirements. The Truck Log includes: (1) load manifest identifier, (2) hauler information, (3) Source Site identifier, (4) record of source pre-qualification, (5) link to any terms and conditions of access to the Lafarge Site, (6) the time and date dispatched from a pre-qualified Source Site, (7) the time and date of unloading at the Receiving Site and (8) the quality control record that verifies that material is inert.

Our Cumulative Record of Import helps Lafarge:

- Demonstrate compliance and risk mitigation to our stakeholders on an ongoing basis;
- Establish a traceable chain of custody from every Source Site to a Lafarge Receiving Site; and
- Align functions – from commercial through compliance - on a common objective of importing only material that is appropriate for the beneficial end use identified.

5.9 Audit of Cumulative Record of Import

Internal audits of the Cumulative Record of Import to ensure completeness and rigour shall be conducted and documented on a quarterly basis.

Additionally, external audits shall be undertaken at a minimum on an annual basis or at a volume driven frequency once for every 100,000m^3, whichever is more frequent.

External audits should be led by an independent third-party Qualified Person as defined in Ontario Reg. 153/04 and the Environmental Protection Act.

The scope of the audit will include:

(1) Review of the Inert Fill Protocol to ensure:

- compliance with applicable regulations;

- protocol effectiveness for ensuring environmental performance; and

- protocol effectiveness for ensuring prevention of adverse effects.

(2) Records review to assess completeness and adherence to the Inert Fill Protocol.

(3) Identification of system non-conformance by responsible parties and corrective actions required to rectify any system non-conformances.

(4) Identification of opportunities for continuous improvement.

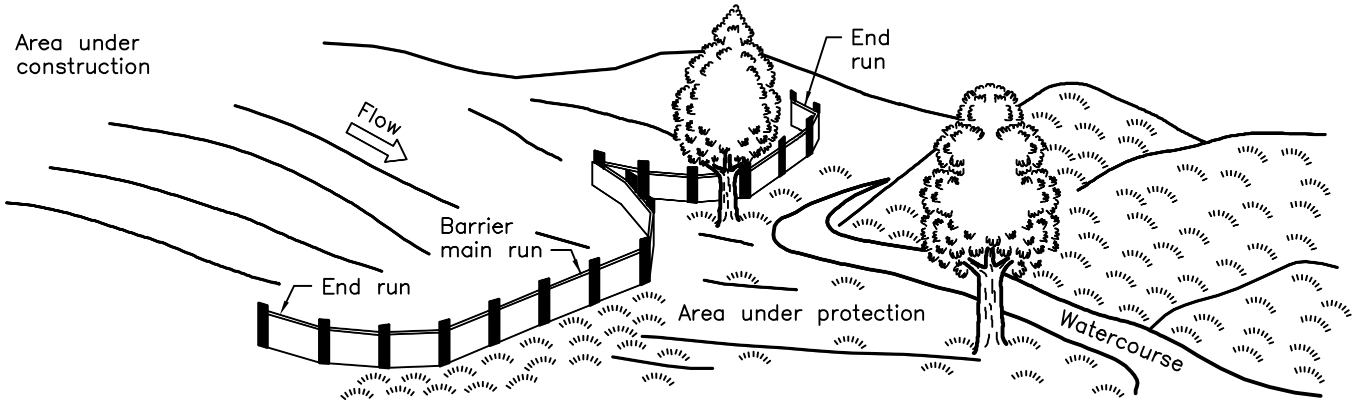
(5) Confirmation that the Inert Fill Protocol supports Lafarge's long-term objectives of transitioning the property to a subsequent and possibly more sensitive land use upon completion of mining and extraction through the Record of Site Condition regulatory process.

(6) Issuance of a memo summarizing the results of the audit, which will be retained as part of the Cumulative Record of Import.

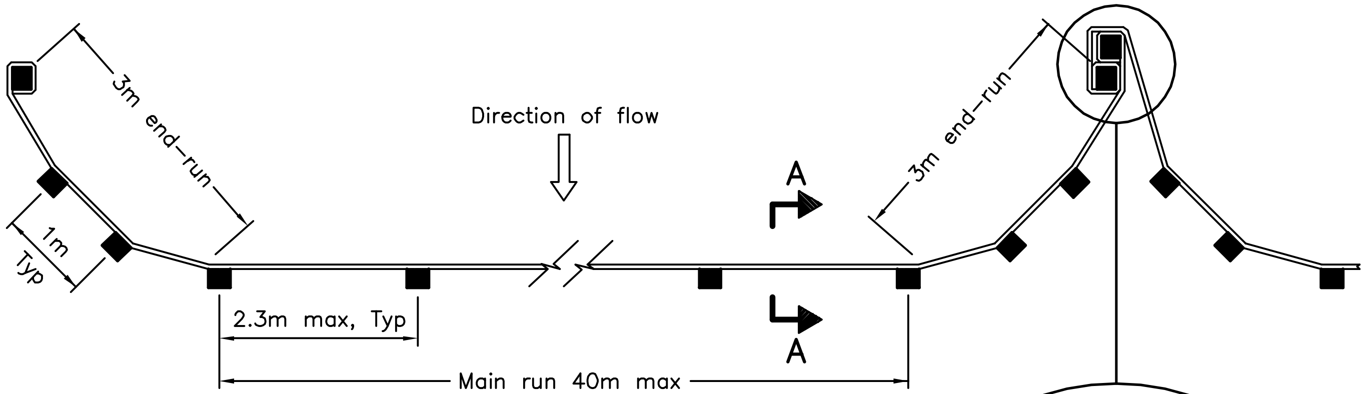
5.10 Training

All Circular Economy Champions will undergo training and evaluation for competence on an annual basis. Training will be conducted by a Qualified Person.

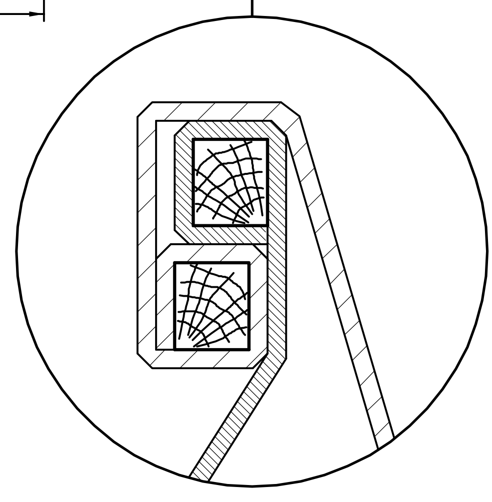
Additionally, records of individual training and professional development will be retained by Circular Economy Champions and in Lafarge Convergence.



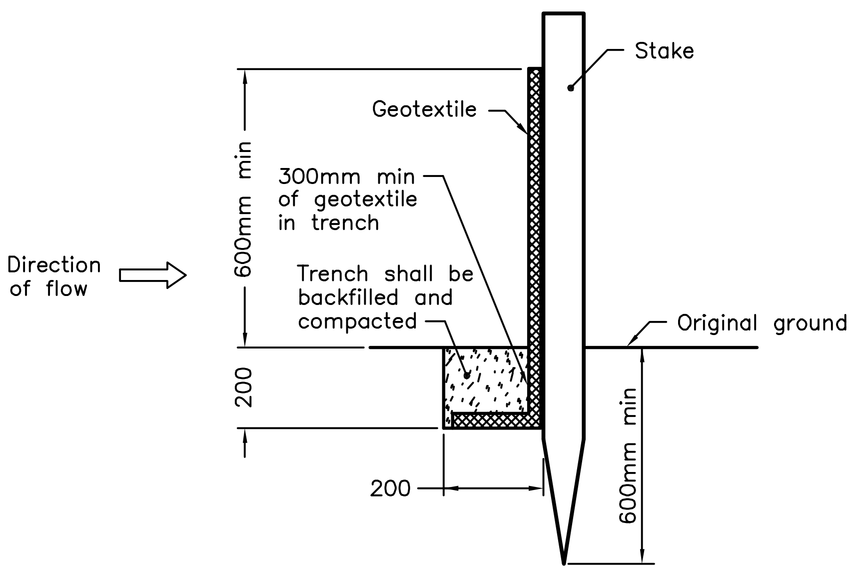
PERSPECTIVE VIEW



PLAN



JOINT DETAIL



SECTION A–A

NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT–DUTY SILT FENCE BARRIER		
	OPSD 219.110	

APPENDIX K

Limitations

LIMITATIONS

This report (the "Report") was prepared for the exclusive use of Lafarge Canada Inc. for the express purpose of providing advice with respect to the Site. Golder Associates Ltd. has relied in good faith on information provided by others as noted in the Report. We have assumed that the information provided is factual and accurate. We accept no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Any use which a third party makes of this Report, or any reliance on or decisions to be made based on it, are the sole responsibility of the third parties. If a third party require reliance on this Report, written authorization from Golder is required. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The scope and the period of Golder's assessments are described in this Report, and are subject to restrictions, assumptions and limitations. Except as noted herein, the work was conducted in accordance with the scope of work and terms and conditions within Golder's proposal. Distances noted in this report were determined using mapping data of variable accuracy, and should therefore be considered approximate. Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Report. Conditions may therefore exist which were not detected given the limited nature of the assessment Golder was retained to undertake with respect to the Site and additional environmental studies and actions may be required. In addition, it is recognized that the passage of time affects the information provided in the Report. Golder's opinions are based upon information available to Golder as of the date of date collection. It is understood that the services provided for in the scope of work allowed Golder to form no more than an opinion of the actual conditions at the Site at the time of the site visit, and cannot be used to assess the effect of any subsequent changes in any laws or regulations and the environmental quality of the Site or its surroundings. If a service is not expressly indicated, do not assume it has been provided.

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