Appendix B

Presentation for Various Project Meetings

MTE

Heart Lake Rd. & Countryside Dr. Class EA

Technical Advisory Committee (TAC) Meeting November 21, 2021

Engineers, Scientists, Surveyors

Agenda

- Introduction of TAC Members
- Background: Function/Design Review
- Need & Justification - Traffic Study (Paradigm)
- Drainage and Natural Environment Studies
- Update on other Studies
- Alternative Solutions (Preferred)
- Evaluation Matrix
- Utilities
- Next Steps
- Questions

Introduction

The City of Brampton initiated a Schedule B Class Environmental Assessment (EA) for improvements to the intersection of Heart Lake Road and Countryside Drive

Desired Outcomes of this Class EA Study:

- ✓ Safety and Operations – Including Traffic Calming;
- ✓ Minimize natural environment impacts and wildlife mortality;
- ✓ Conservation of Cultural Heritage Landscape;
- ✓ Consider proposed land uses and meet travel demands;
- ✓ Vison Zero Initiative, Active Transportation, Safety.

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Study Limits

Study Area

2019 Function & Design Review Study

Engineers, Scientists, Surveyors

Study Limits - Background

Function & Design Review of Heart Lake Rd From Sandalwood Parkway to Mayfield Road.

Recommendations (Short Term):

- ✓ **Transportation Improvements** - Narrower Lanes, M.U.T.;
- ✓ **Traffic Calming** - Reclassify as Collector Rd., 50 kmh speed limit; speed cushions between Mayfield and Hwy 410 Ramp; traffic circle at Conservation Area entrance;
- ✓ **Wildlife mortality** – Maintain solar powered flashers, maintain optical speed bars, install additional eco-passages, wildlife directional fencing, turtle nesting mounds.

Function & Design Review (Continued)

Recommendations (Long Term):

Separated bike lanes on Heart Lake Rd. & Roundabout at Countryside

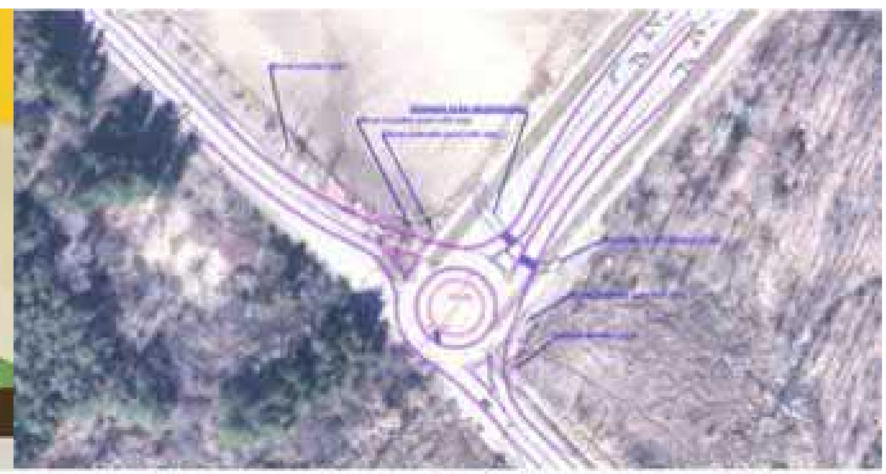


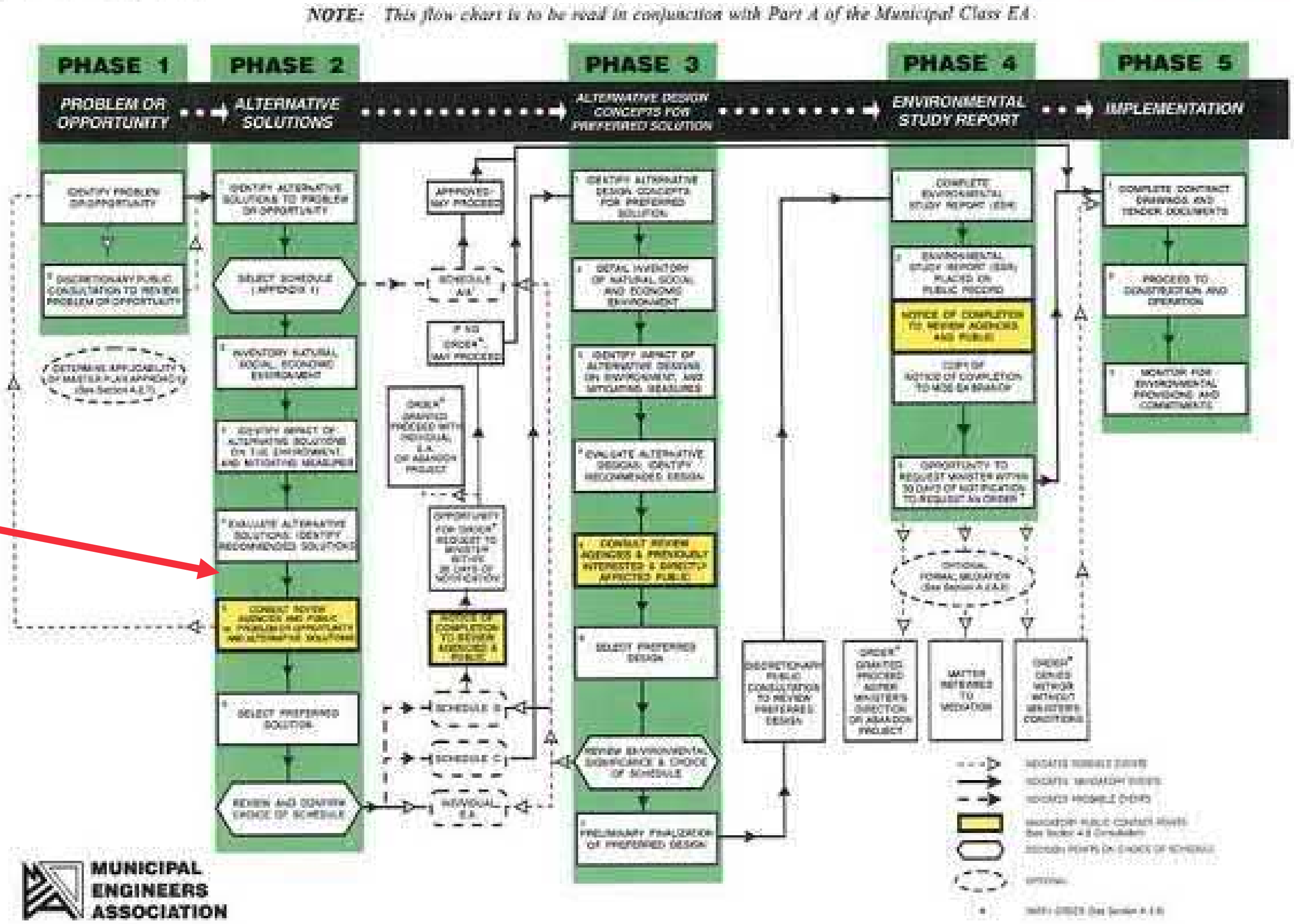
Figure 50: Roundabout at Countryside Option 2 (without encroachment on TRCA lands)

The EA Process

- ✓ The study is being undertaken in accordance with the Municipal Class EA planning and design process for Schedule “B” project.
- ✓ ***Study is for Heart Lake Rd. and Countryside Dr. intersection only***
- ✓ The “*Function & Design Review of Heart Lake Road Corridor (2019)*” provides background information, provide support for problem/opportunity identification for this intersection improvement
- ✓ Additional studies have been undertaken building upon existing background information and studies.

The Class EA Process

We are Here...



NEED AND JUSTIFICATION

Improve the safety and operations of the Heart Lake Road and Countryside Drive intersection including ***meeting the traffic demand*** of increasing population and growth.
while incorporating ***traffic calming and wildlife mortality reduction*** recommendations for the Heart Lake Road Corridor.

Paradigm Transportation Solutions Ltd (Paradigm)

- ✓ **TRAFFIC STUDY**
- ✓ The analysis included the feasibility of a roundabout;
- ✓ Westbound left-turn movement a critical movement under existing conditions, and operates over-capacity - will continue under future 2031 and 2041 traffic conditions.

- ✓ **SAFETY REVIEW** (Paradigm)
- ✓ Collision history (2015 – 2019) revealed no fatal collisions.
- ✓ Majority were ‘single motor vehicle’ collisions - driver error/behaviour

SAFETY REVIEW (Continued)

- ✓ Investigation confirmed there is more than adequate approach and departure sight distance available;
- ✓ However, even with the adequate sight distances a high frequency of collisions were reported, and were determined to be attributed to aggressive driver behavior (i.e. speed).
- ✓ Correlates with the poor traffic operations stemming from a lack of gaps within the traffic stream along Heart Lake Road.
- ✓ Concluded that the current intersection traffic warrants improvement.
- ✓ Reported number of current ‘correctible collisions’ fall just short of warranting the consideration of traffic signal control.

INTERSECTION IMPROVEMENTS

- ✓ Under base year conditions the intersection falls just short of meeting the threshold criteria for traffic signal control.
- ✓ Under future 2031 and 2041 traffic conditions the intersection is found to meet signal justification criteria.
- ✓ Under the 2041 horizon year operating under traffic signal control, the intersection was found to operate at acceptable levels of service and within capacity.

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INTERSECTION IMPROVEMENTS (Continued)

- ✓ It was determined that the Heart Lake Road/Countryside Drive intersection would be suitable for roundabout implementation to mitigate poor intersection operations
- ✓ Several roundabout configurations were investigated;
- ✓ A single-lane roundabout with single lane entry on the northbound and southbound Heart Lake Road approaches along with dual lane entry on the westbound Countryside Drive approach will operate at acceptable levels of service and well within capacity under 2041 traffic conditions.

Other Studies – Summary of findings

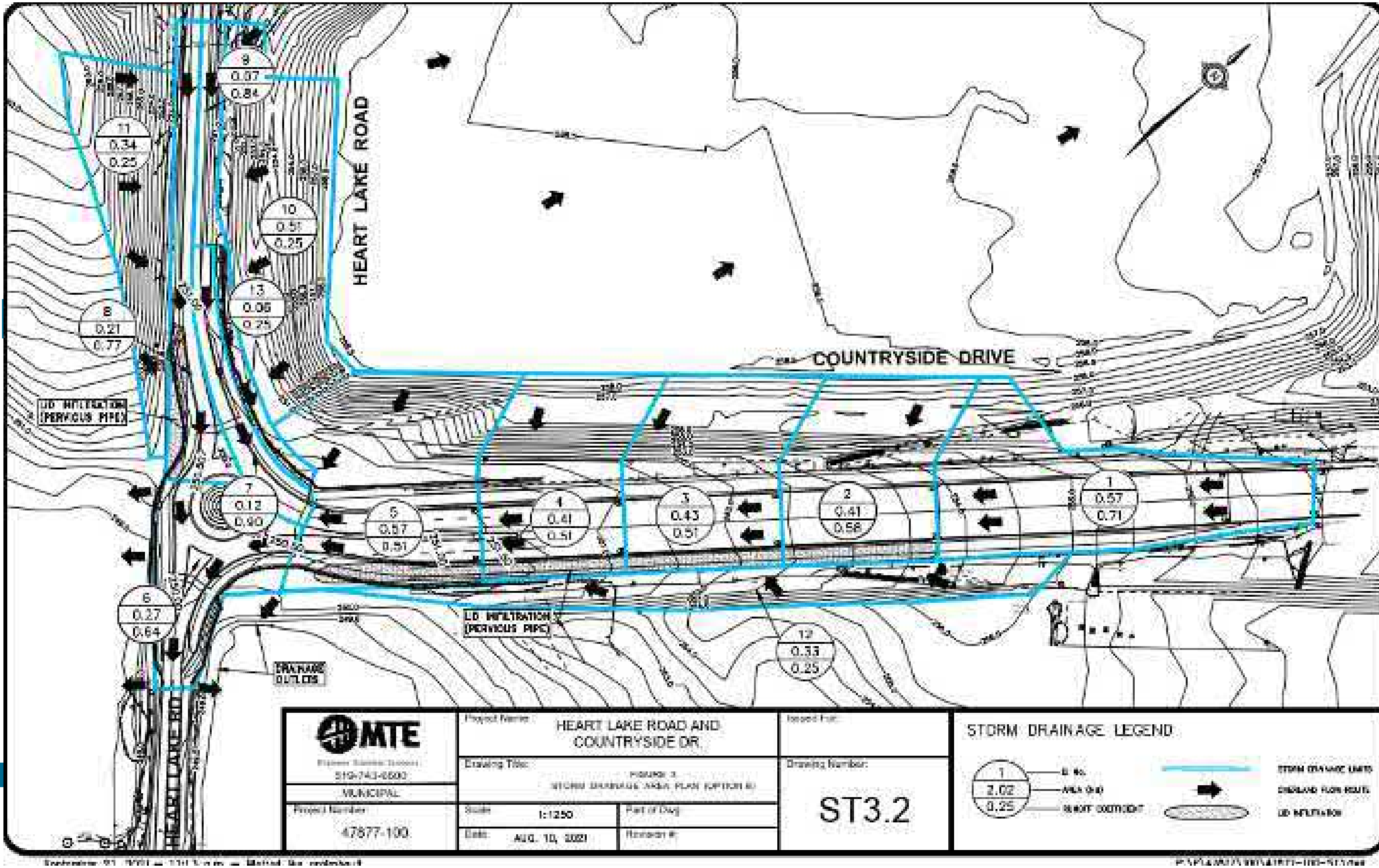
- ✓Natural Environment Study (Beacon)
- ✓Drainage Study (MTE)
- ✓Phase I ESA (MTE)
- ✓Stage 1 Archaeological Investigation (ARA)
- ✓Cultural/Built Heritage Study (ARA)
- ✓Geotechnical Investigation (MTE)

Natural Environment

Natural Environment (Beacon Environmental)

- ✓ Significant wetlands and woodlands near intersection (Part of Heart Lake PSW);
- ✓ Significant wildlife habitat in wetland & woodland communities – Endangered and threatened species:
    - ✓ Bats, turtles (incl. Snapping), waterfowl, raptor nesting, reptiles;
- ✓ Turtle nesting berms;
- ✓ No fish habitat;
- ✓ Adjacent to Heart Lake ANSI’s

Drainage Study



Drainage Study

- ✓ Draft study has been submitted to TRCA for review;
- ✓ Drainage basically the same as existing for signalized intersection;
- ✓ Roundabout results in an extra 14 l/s during 100 year storm compared to signalized intersection
- ✓ LID's recommended for quantity/quality control;
- ✓ Development drainage details to west (south side) on Countryside Drive to be included prior to construction ***IF*** their flows reach the Countryside Dr. road allowance.

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Drainage Study

MTE

Existing	Proposed
• 300 mm storm sewer with sub drains	• Replace existing and enhance with LID to promote infiltration
• Ditch drainage with culvert crossing Countryside Drive	• Re-grade / enhance ditches and replace / relocate culvert
• Overland flow draining to ditch / wetlands (generally uncontrolled drainage)	• Flows contained and conveyed into ditches or infiltrated within project limits

Drainage Study

Phase 1 ESA


N
N
Legend
Provincially Significant Wetland
ANSI
Heart Lake Road
0 10 20 30 40 50 m
Scale (11x17): 1:1500
MTE
The Corporation of the City of Brampton
Phase I ESA
Heart Lake Road and Countryside Drive, Brampton, ON
Site Features
2

Phase 1 ESA

- ✓ No records of spills;
- ✓ Fill has been added over the years;
- ✓ Additional testing should be undertaken prior to construction;
- ✓ Excess fill regulations.

Stage 1 Archaeological

Stage 1 Archaeological (ARA)

- ✓ Most areas have no archaeological potential – previously disturbed, permanently wet, previously assessed;
- ✓ Intersection options to be designed to avoid potential areas;
- ✓ If area on south side of Countryside east of Heart Lake Rd is disturbed, it may require a Stage 1 investigation;
- ✓ May require a Stage 1 investigation into property purchase area if not previously assessed.

BHR Assessment Results Map

1:11,000

0 250 500 m

N

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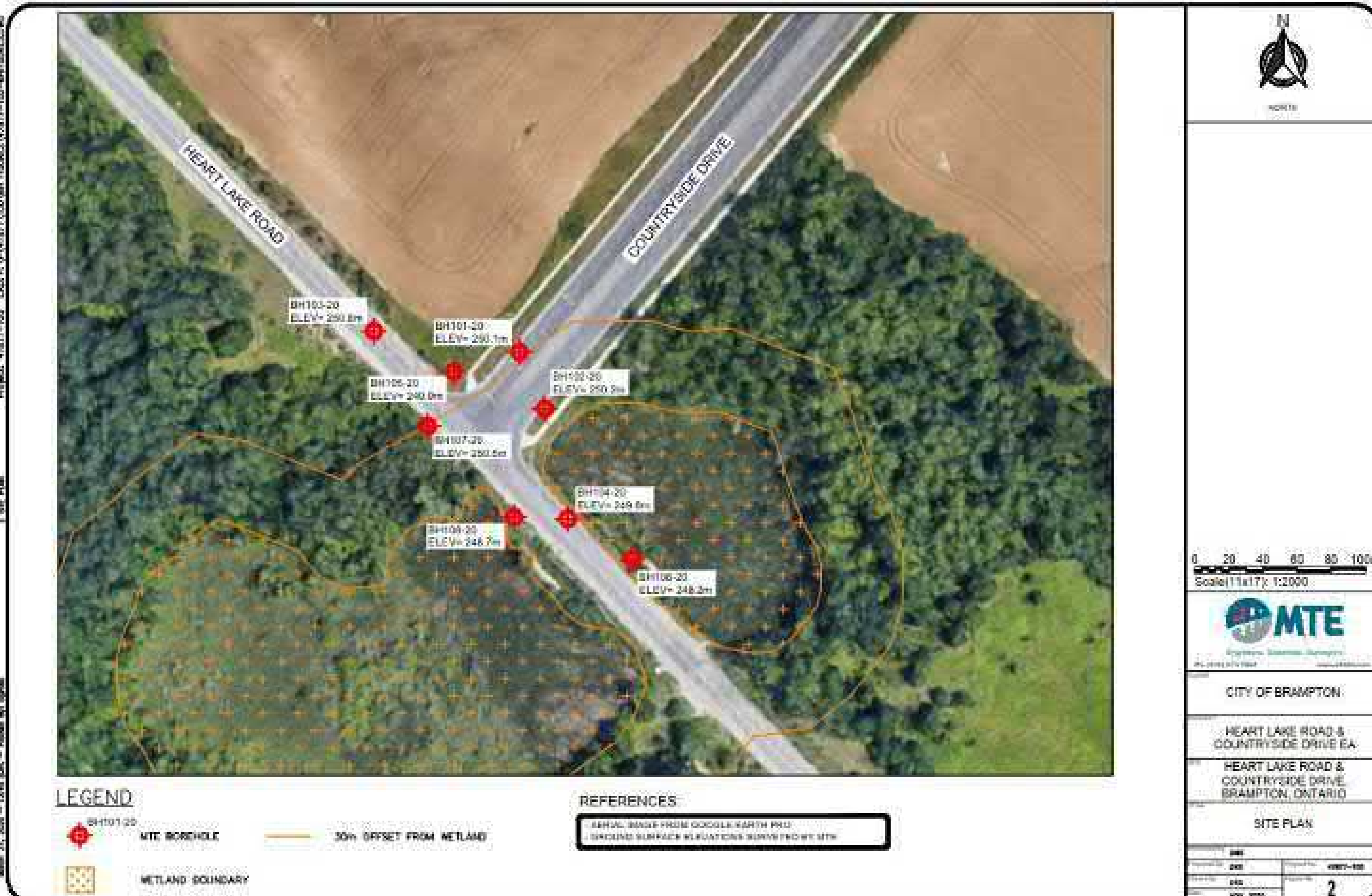
- Project Location
- Built Heritage Resource (BHR 1)
- Property Parcel

Built/Cultural Heritage (ARA)

- ✓ Wetland is considered a BHR;
- ✓ Heart Lake Rd is considered a CHL;
- ✓ Depending on final impacts, undertake a Heritage Impact Assessment to evaluate final details;
- ✓ If bus stops or seating areas included, examine opportunities for interpretive signing

Geotechnical



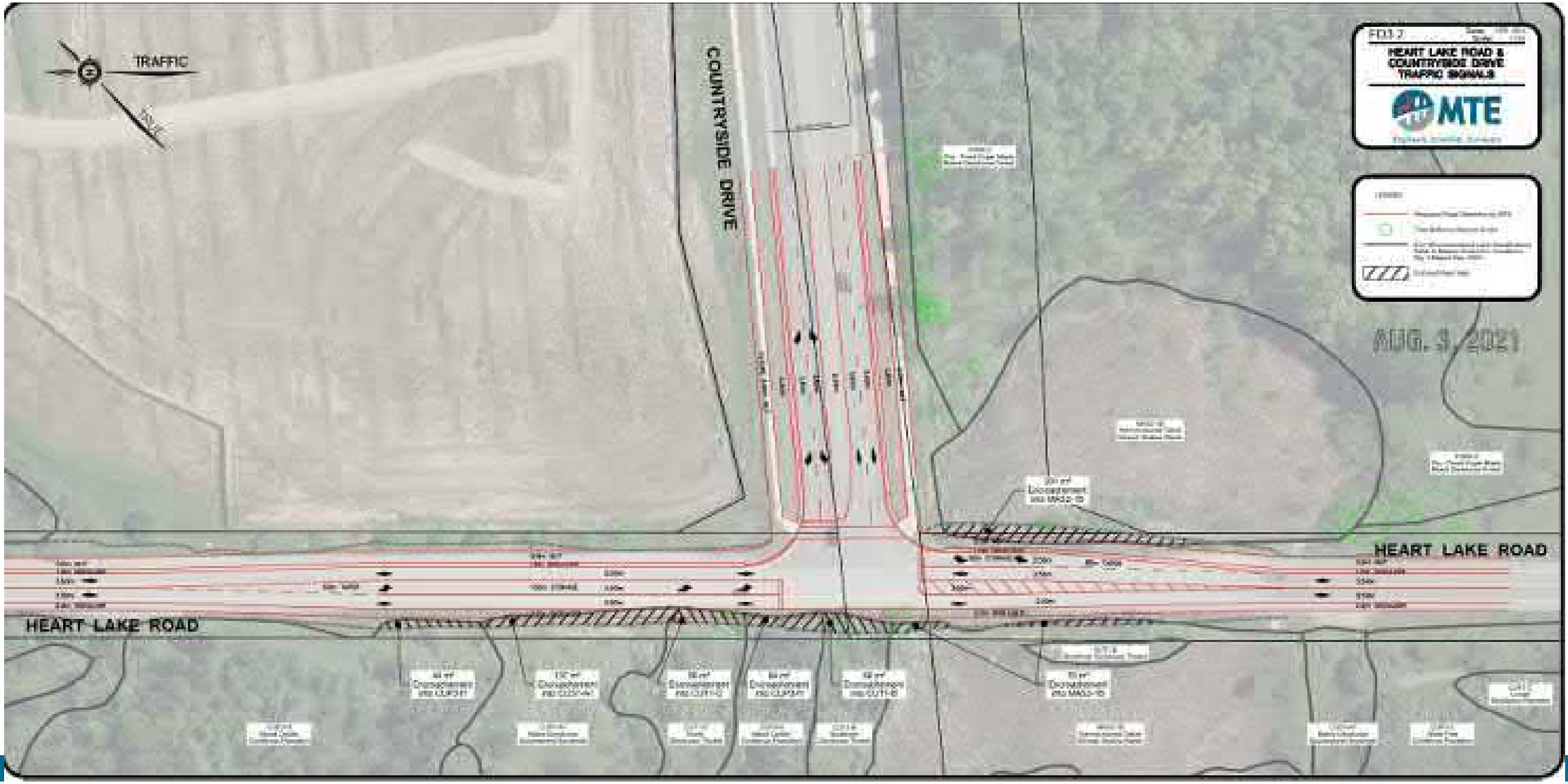
Geotechnical

- ✓ Underlying soil is glacial till – Gravelly silt;
- ✓ Pavement structure: 450 B, 150 A, 110 Binder, 50 Surface Asphalt;
- ✓ Peat deposit between 2-4 m, found on west side of Heart Lake south of Countryside Drive;
- ✓ Dewatering expected in excavations greater than 2 m deep;
- ✓ Excavated soil generally acceptable to be re-used on site – however some topsoil may need to be removed to a specialized site (waste transfer site)

ALTERNATIVES

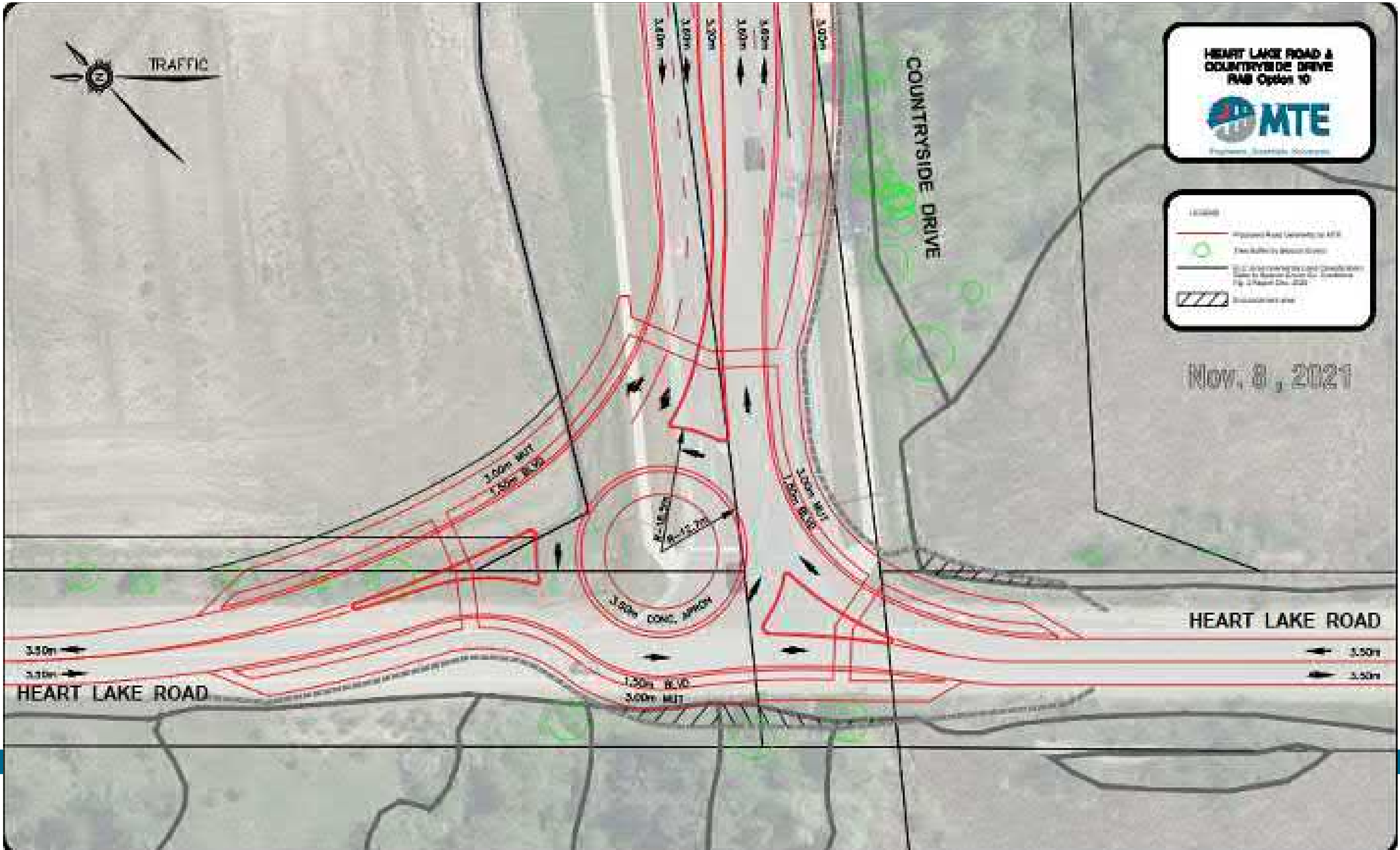
- ✓ DO NOTHING
- ✓ SIGNALIZED INTERSECTION WITH TURN LANES
- ✓ ROUNDABOUT

SIGNALIZED WITH TURN LANES



Engineers, Scientists, Surveyors

ROUNDABOUT



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EVALUATION MATRIX

Heart Lake Road at Countryside Drive

Environmental Assessment

Draft Evaluation Matrix

Legend

Least Desirable → Most Desirable

Does not address minimum criteria

Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
Natural Environment			
1. Minimize impacts to Designated Natural Areas, vegetation, wildlife, aquatic features	1. No impacts to existing Natural Areas, vegetation, wildlife or aquatic features, but Heart Lake Road traffic will continue at speed limit, increasing chance of wildlife strikes	1. a) Traffic with green light will continue at speed limit increasing chance of wildlife strikes b) Wildlife fencing and erosion controls to be installed	1. a) All traffic will slow down to navigate roundabout, which should reduce wildlife strikes b) Wildlife fencing and erosion controls to be installed
2. Minimize impacts to wetlands	2. No impacts to designated wetlands	2. Some intrusions into designated wetlands ($271m^2$)	2. Minimal intrusion into designated wetlands ($45m^2$)
3. Minimize impacts to surface water and groundwater	3. No change in runoff/ surface drainage	3. Least pavement drainage/surface water runoff	3. More pavement resulting in more drainage/ surface water runoff
4. Minimize air quality impacts and effects on climate change	4. Traffic volumes will continue to increase, resulting in increase delays / congestion	4. Traffic delays/congestion resulting in vehicles idling at red lights	4. Less traffic delays due to vehicles not having to stop at red lights, less vehicle starting/stopping
	4	1	3
Planning Objectives			
1. Adhere to Transportation Master Plan	1. Does not implement required improvements per Transportation Master Plan	1. Adheres to Transportation Master Plan	1. Adheres to Transportation Master Plan
2. Adhere to Offical Plan	2. Other transportation improvements will be required to adhere to the Official Plan	2. Adheres to Offical Plan	2. Adheres to Offical Plan
3. Adhere to Active Transportation Master Plan	3. Does not adhere to Active Transportation Master Plan	3. Adheres to Active Transportation Master Plan	3. Adheres to Active Transportation Master Plan
4. Adhere to Region Official Plan Policies	4. Other transportation improvements will be required to adhere to Offical Plan Policies	4. Adheres to Region Offical Plan Policies	4. Adheres to Region Offical Plan Policies
	0	4	4

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October 20, 2021

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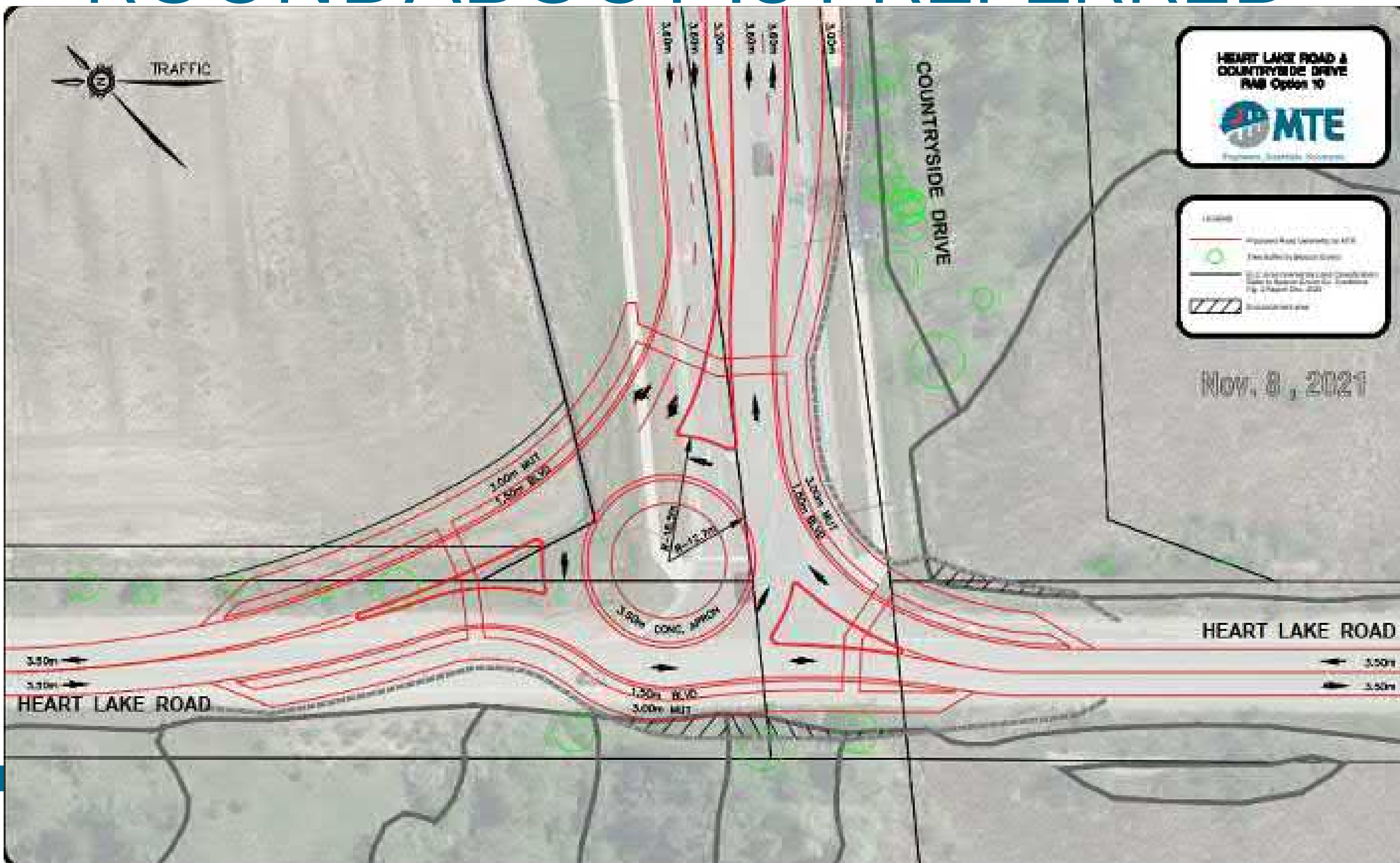
Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
Social and Cultural Environment			
1. Improve visual aesthetics	1. Visual aesthetics will remain the same, no opportunities to enhance landscape	1. Landscaping opportunities behind curb/ sidewalk/MUT	1. Opportunities for landscaping in center island and behind sidewalk/MUT
2. Preserve archaeological and cultural heritage features	2. No impacts to archaeological/ heritage features	2. a) No direct impacts to archaeological/ heritage features b) Some impact on existing rural road cross section	2. a) No direct impacts to known archaeological features b) Disrupt existing linear views c) Changes the existing cross section d) Additional Stage 1/2 Archaeological investigation required in property purchase area
3. Preserve the agricultural setting, community character and public realm	3. No impacts to existing setting, character or public realm	3. Signals contribute to urban look and setting	3. Opportunity to enhance the public realm, and all traffic must slow to navigate roundabout
4. Minimize traffic noise	4. Traffic noise will continue to increase as traffic volumes increase	4. Traffic noise will not decrease	4. Traffic noise will decrease due to less stop/starts of traffic
5. Minimize disruption due to construction	5. No disruption due to construction, however, increasing congestions may cause disruption	5. Least time for construction and traffic can be maintained during construction	5. Most time for construction and traffic can be maintained during construction
6. Minimize impacts to existing accesses in the area	6. No impacts to existing access, however, increasing congestion may impact access	6. No accesses impacted in the area	6. No accesses impacted in the area
	2	2	3
Economic Development			
1. Beneficial to business/ community with respect to travel time	1. Travel time will not be reduced, and will increase as traffic volumes increase	1. More delays than with a roundabout due to stopped traffic stopped for red lights	1. Roundabout provides more free flowing traffic, and results in less traffic delays/congestion.
2. Minimize capital and construction costs	2. No construction or capital costs	2. Road improvements and signal installation have lowest capital/construction costs - est. $1.15 million	2. Highest Capital Costs due to additional pavement, curb, signage and line markings - est. $1.57 million
3. Minimize property impacts/ requirements	3. No additional property required	3. No additional property required	3. Approximately 550 sm of property is required on NE corner, which can be obtained at no cost to the City
4. Minimize operating and maintenance costs	4. Operating and maintenance costs do not change	4. Operating and maintenance costs include powering and maintaining signals	4. No signal power and maintenance costs
	3	2	2

Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
Engineering and Technical			
1. Congestion and collisions will continue	1. Is safe for all travel modes	1. Safe for all travel modes	1. Safe for all travel modes. Roundabout reduces severity of collisions (i.e. less conflict points and sideswipes vs head-on or "T bone" collisions)
2. Create an Active Transportation Friendly Environment (Cyclists, pedestrians etc.)	2. No additional sidewalks or cycling facilities	2. Sidewalks, cycle facilities provided. Motorist must stop at red light and be aware of pedestrians.	2. Sidewalks, cycle facilities provided. Requires pedestrians to be sure motorists are aware of their presence. Cyclists can use Roundabout or multi-use path at Roundabout
3. Accommodate future travel demands	3. Future travel demands not accommodated	3. Future travel demands accommodated (20 years)	3. Future travel demands accommodated (20 years). Roundabout results in less delays/congestion
4. Improve transportation mode choice including transit	4. Transportation mode choice not improved	4. All transportation modes accommodated including transit	4. All transportation modes accommodated including transit.
5. Accommodate emergency services	5. Fire trucks can be accommodated, but may experience congestion in future	5. Fire Truck can use priority signal to enhance access through intersection	5. Fire trucks can navigate roundabout within acceptable response times - less congestion
6. Minimize impacts to utilities in the corridor	6. No utility relocations required	6. Utility relocations will be required, but somewhat less than Roundabout	6. Utility relocations required will be slightly more than signalized due mainly to additional street lighting
	1	4	3
Overall Evaluation Score			
	Does not meet planning objectives nor active transportation requirements, and will result in increased congestion.	Meets Planning and Engineering/ Technical objectives; some intersections encroach into natural areas; idling traffic will continue/ increase; and noise and urban look will increase.	Meets Planning and Engineering/ Technical objectives; visual/ landscaping can be enhanced; less idling/ congestion; lower lifecycle cost due to very low maintenance with no intrusions into wetlands; Pedestrians/ cyclists may be initially unfamiliar with Roundabouts.
	10	13	15

ROUNDABOUT IS PREFERRED



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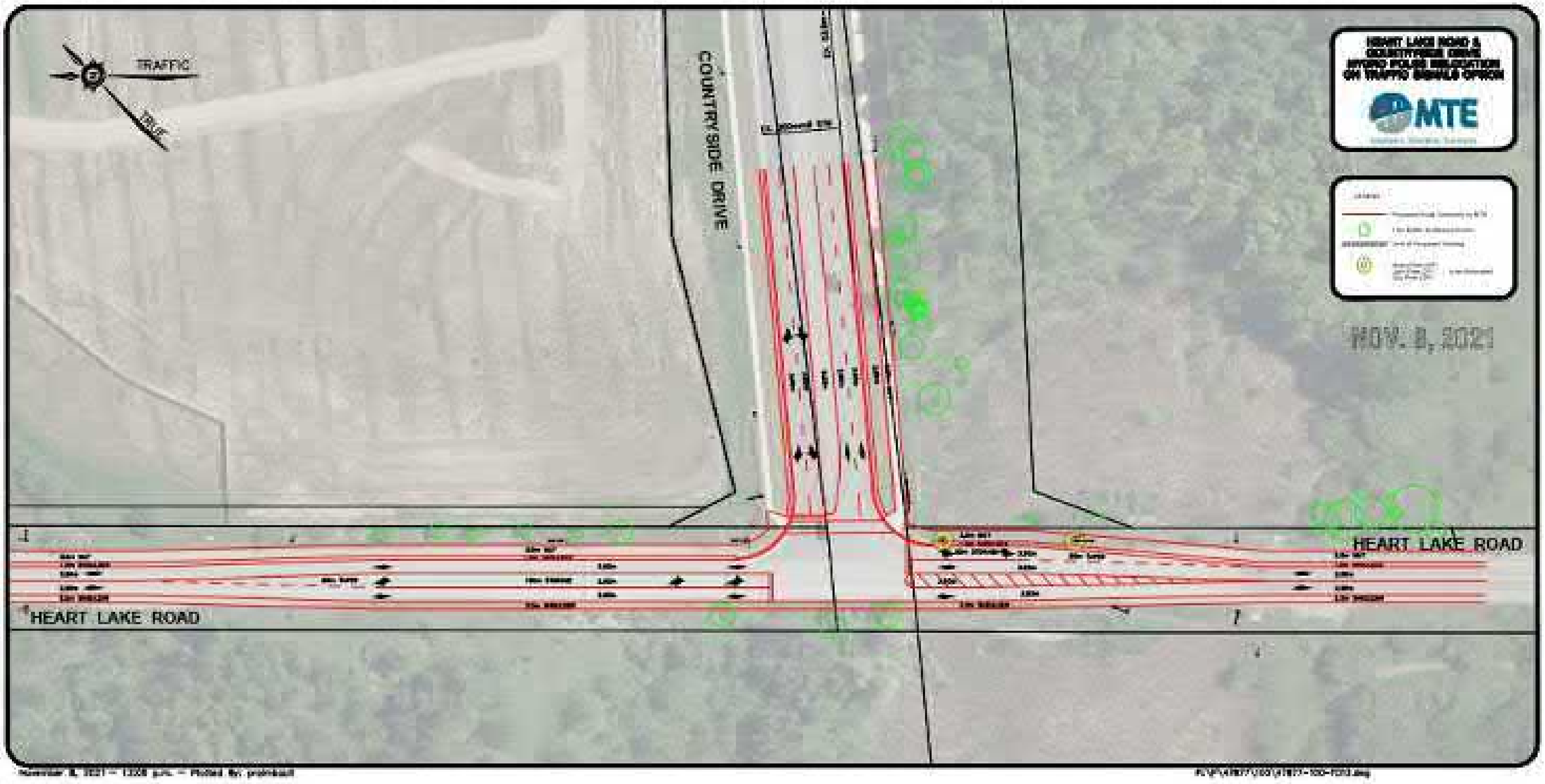
UTILITY ISSUES?

- Have not received much utility feedback based on Notice of Commencement
- Region of Peel Watermain/Wastewater
- Now that alternatives have been developed, specific comments can be based on the actual alternatives.


HEART LAKE ROAD &
COUNTRYSIDE DRIVE
HYDRO POLES RELOCATION
ON TRAFFIC SIGNALS OPTION
MTE
NOV. 8, 2021
TRAFFIC
TRUE
COUNTRYSIDE DRIVE
HEART LAKE ROAD
HEART LAKE ROAD

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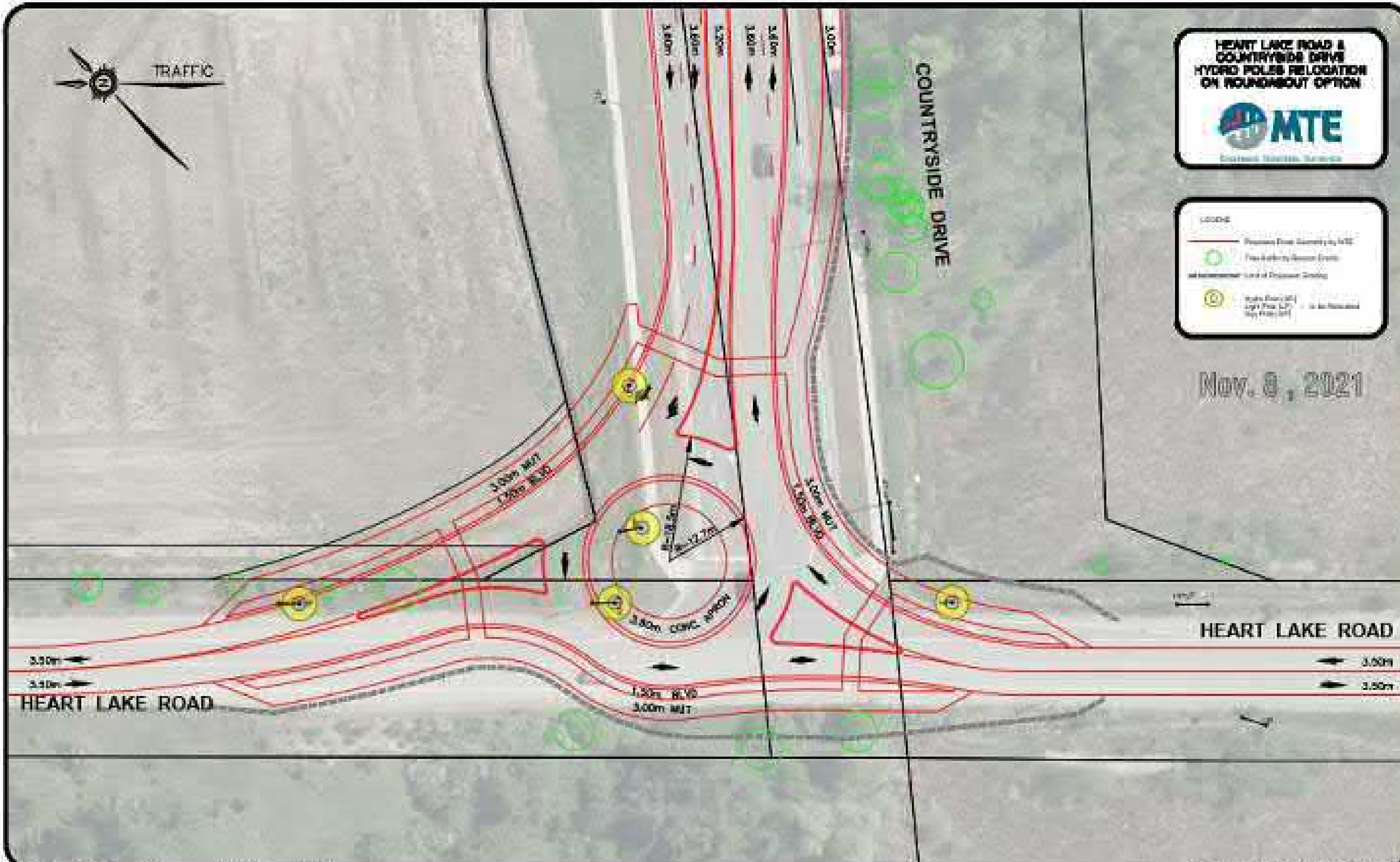

November 8, 2021 - 11:59 a.m. - Plotted By: pelmbault

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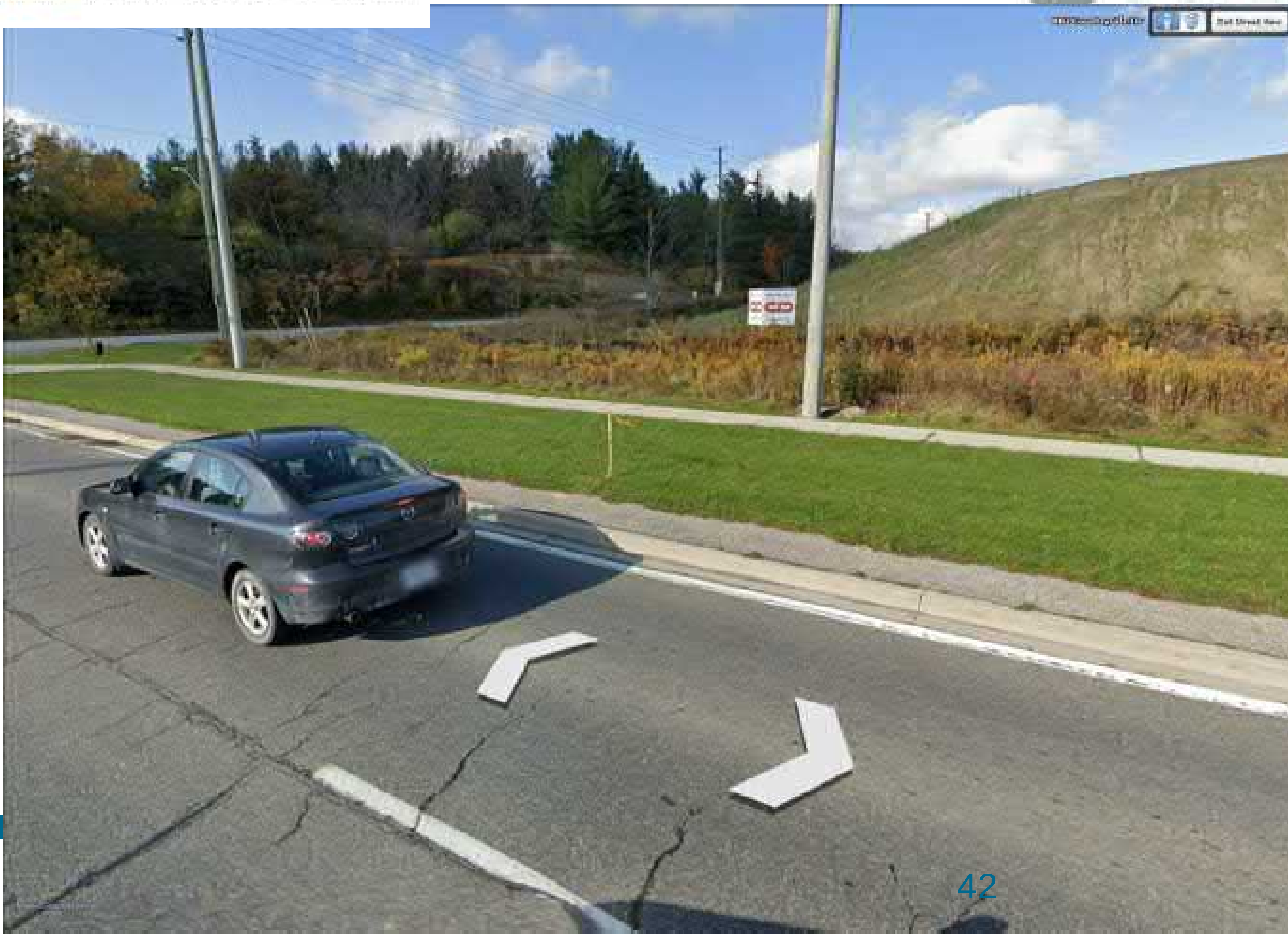
Next Steps:

- ✓ Complete Preliminary Preferred Design
- ✓ Stakeholder Meetings
- ✓ Finalize Technical Studies
- ✓ Public Information Centre (PIC) 1
- ✓ Finalize Recommended Design
- ✓ Write Environmental Project Report
- ✓ Notice Of Completion

Questions?



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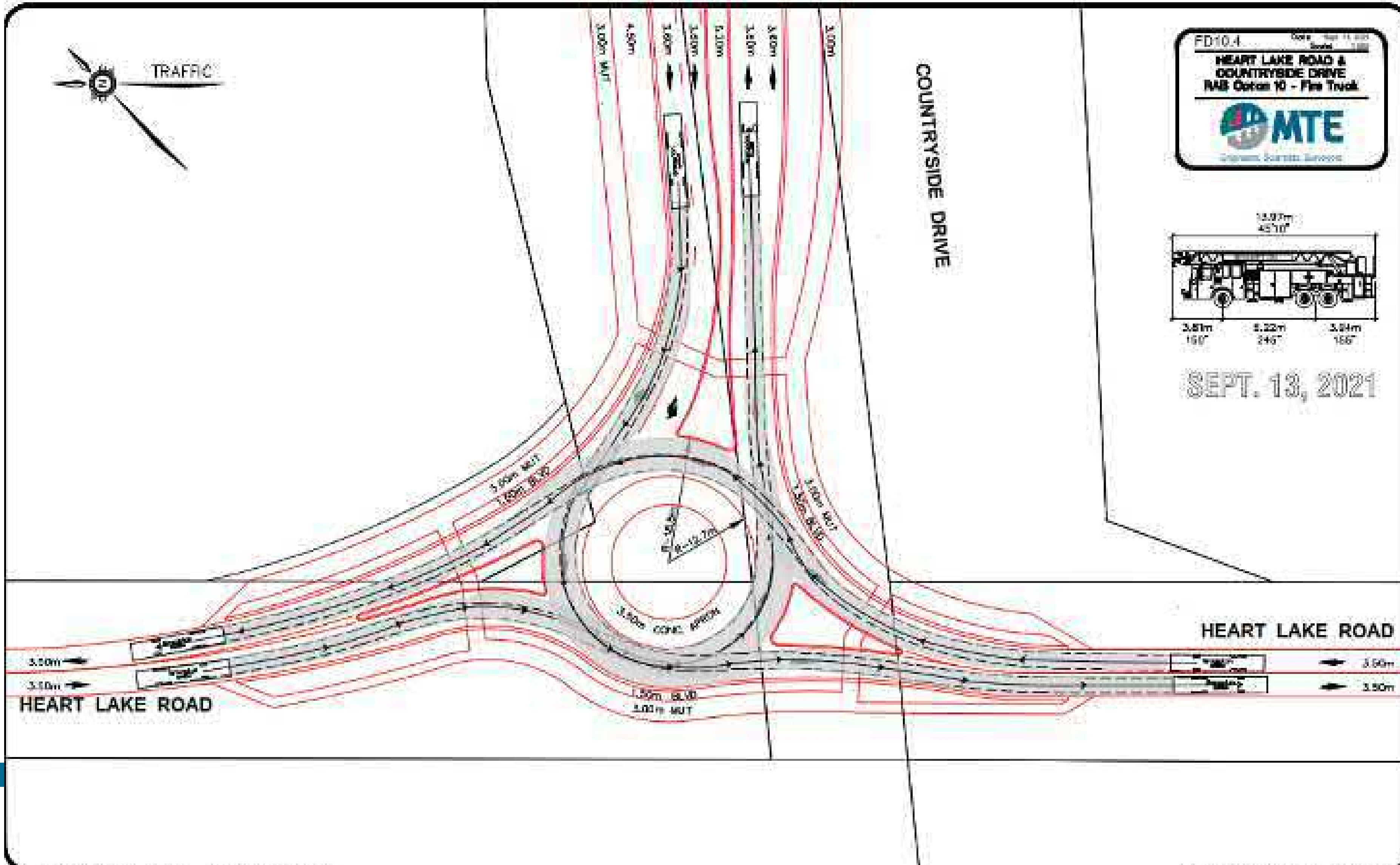

Heart Lake Rd. & Countryside Dr. Class EA

Project Team Meeting October 21, 2021

Engineers, Scientists, Surveyors

Agenda

- Introduction of Team Members
- Project Background
- Function & Design Review – Nov/2019
- Where are we in the Class EA “Process”
- Need & Justification
- Traffic Study (Paradigm)
- Brief update on other Studies
- Alternative Solutions (Preferred)
- Evaluation Matrix
- Next Steps - PIC
- Questions

Introduction

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Desired Outcomes of this Class EA Study:

- ✓ Safety and Operations – Including Traffic Calming;
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Introduction – Study Limits

Engineers, Scientists, Surveyors

2019 Function & Design Review Study

Engineers, Scientists, Surveyors

Study Limits - Background

Function & Design Review of Heart Lake Rd From Sandalwood Parkway to Mayfield Road.

Recommendations (Short Term):

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Function & Design Review (Continued)

Recommendations (Long Term):

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Figure 50: Roundabout at Countryside Option 2 (without encroachment on TRCA lands)

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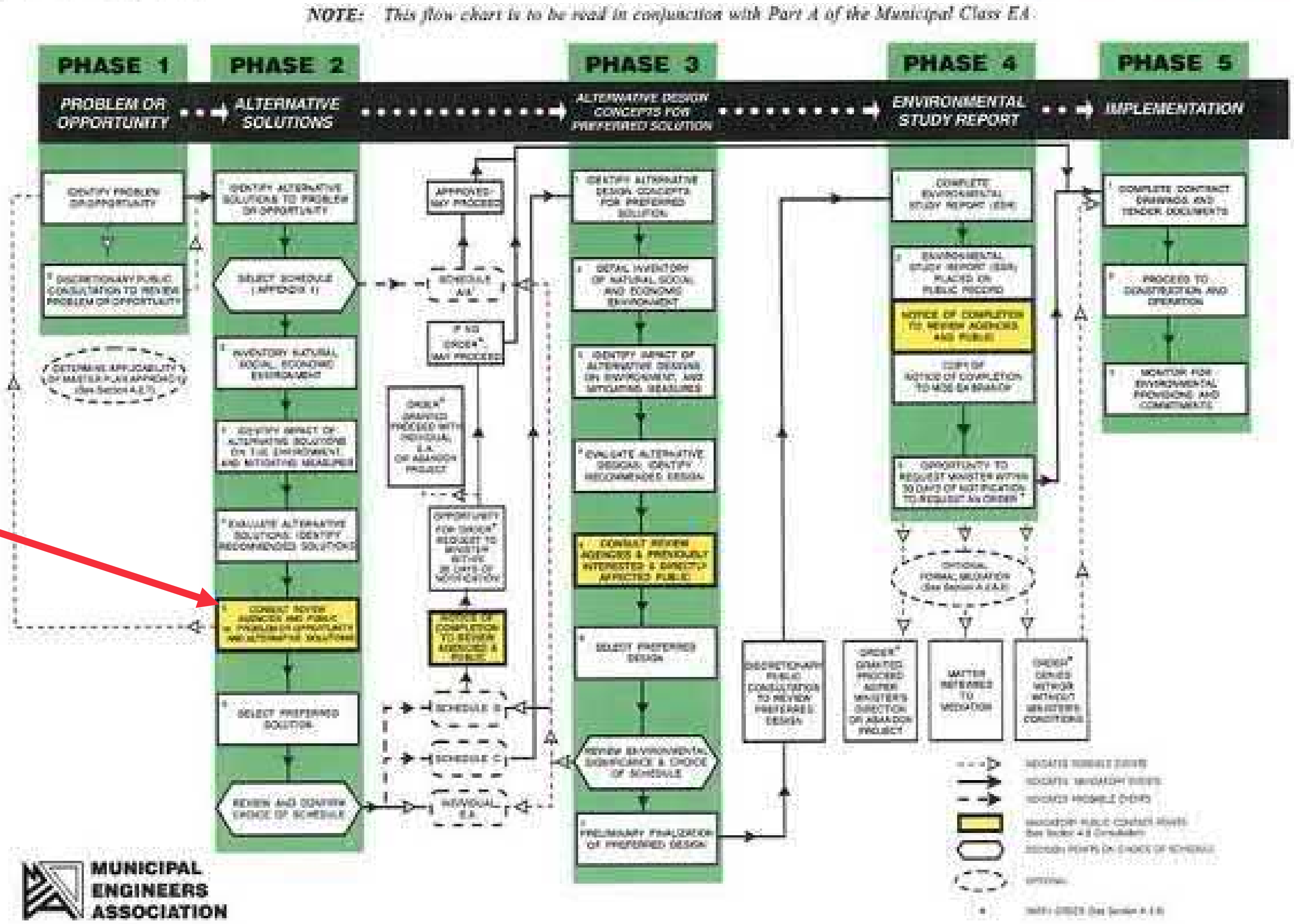
The Class EA Process

We are Here...



NEED AND JUSTIFICATION

Improve the safety and operations of the Heart Lake Road and Countryside Drive intersection, while incorporating ***traffic calming and wildlife mortality reduction*** recommendations for the Heart Lake Road Corridor. The study should ***minimize impacts to the natural environment, existing and proposed land use, conserve the cultural heritage landscape*** and include recommendations to ***meet the traffic demand*** of increasing population and growth.

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Studies

- ✓Traffic, Transportation and Safety Report
- ✓Drainage Study
- ✓Phase I ESA
- ✓Natural Environment Study
- ✓Stage 1 Archaeological Investigation
- ✓Cultural/Built Heritage Study
- ✓Geotechnical Investigation

TRAFFIC STUDY (Paradigm)

- ✓ Paradigm Transportation Solutions Limited (Paradigm) undertook a transportation analysis;
- ✓ The analysis included the feasibility of a roundabout;
- ✓ Westbound left-turn movement a critical movement under existing conditions, and operates over-capacity - will continue under future 2031 and 2041 traffic conditions.

- ✓ **SAFETY REVIEW** (Paradigm)
- ✓ Collision history (2015 – 2019) revealed no fatal collisions.
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SAFETY REVIEW (Continued)

- ✓ Sight distance investigation confirmed there is more than adequate approach and departure sight distance available;
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- ✓ Correlates with the poor traffic operations stemming for a lack of gaps within the traffic stream along Heart Lake Road.
- ✓ Based on these findings it indicates the current intersection traffic warrants improvement.
- ✓ Reported number of ‘correctible collisions’ fall just short of the warrant the consideration of traffic signal control.

INTERSECTION IMPROVEMENTS

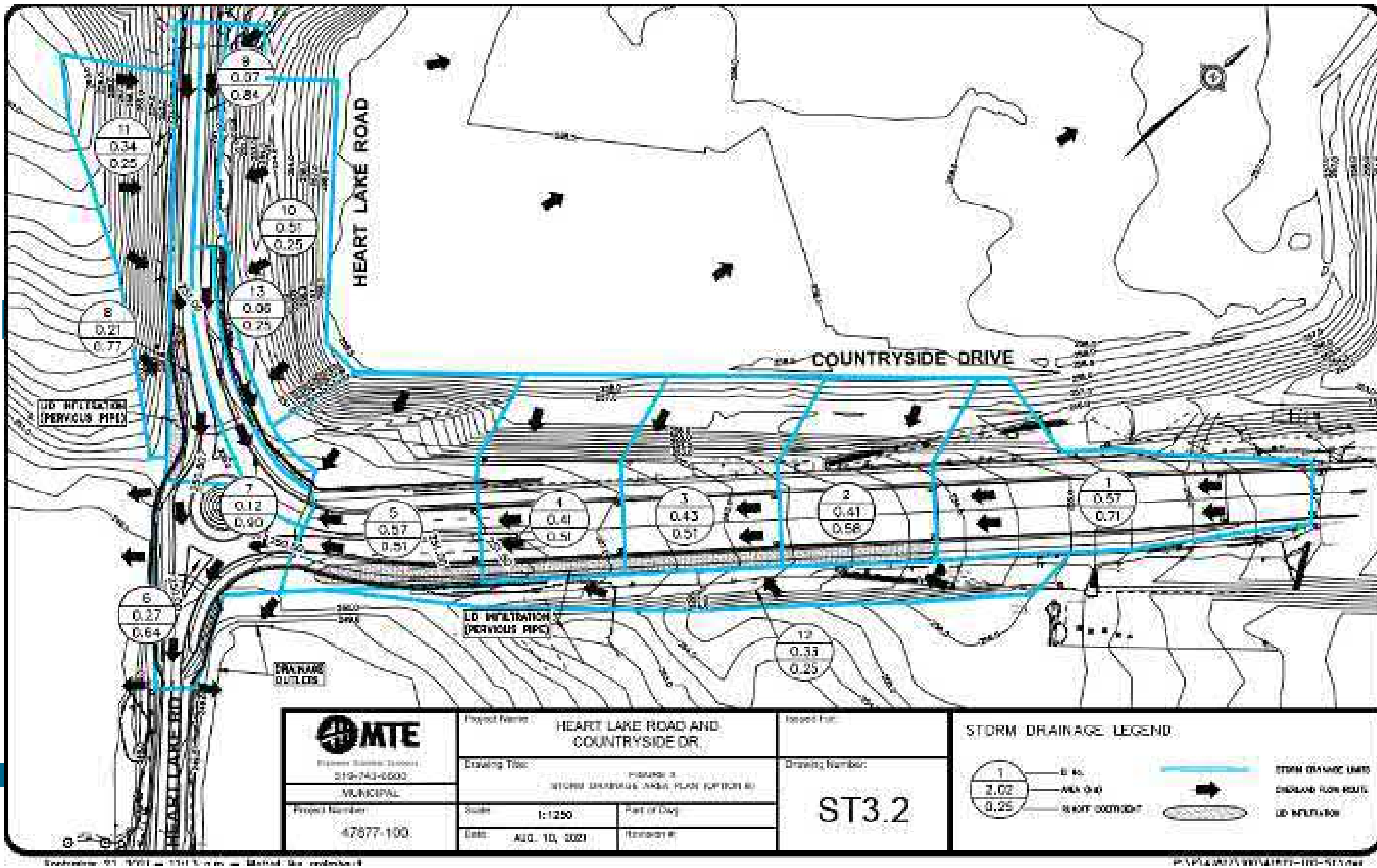
- ✓ Under base year conditions the intersection falls just short of meeting the threshold criteria for a traffic signal control.
- ✓ Under future 2031 and 2041 traffic conditions the intersection is found to meet signal justification criteria.
- ✓ Under the 2041 horizon year operating under traffic signal control, the intersection was found to operate at acceptable levels of service and within capacity.

INTERSECTION IMPROVEMENTS (Continued)

- ✓ It was determined that the Heart Lake Road/Countryside Drive intersection would be suitable for roundabout implementation to mitigate poor intersection operations
- ✓ Several roundabout configurations were investigated;
- ✓ A single-lane roundabout with single lane entry on the northbound and southbound Heart Lake Road approaches along with dual lane entry on the westbound Countryside Drive approach will operate at acceptable levels of service and well within capacity under 2041 traffic conditions.
- ✓ The feasibility of implementing an appropriately sized roundabout has been investigated from a detailed design perspective.

Other Studies – Summary of findings

- ✓Drainage Study (MTE)
- ✓Phase I ESA (MTE)
- ✓Natural Environment Study (Beacon)
- ✓Stage 1 Archaeological Investigation (ARA)
- ✓Cultural/Built Heritage Study (ARA)
- ✓Geotechnical Investigation (MTE)



HEART LAKE ROAD
COUNTRYSIDE DRIVE
LID INFILTRATION (PERVIOUS PIPE)
DRAINAGE OUTLETS
HEART LAKE RD
MTE
519-743-6500
MUNICIPAL
Project Number:
47877-100
Project Name:
HEART LAKE ROAD AND COUNTRYSIDE DR.
Drawing Title:
Scale:
1:1250
Date:
AUG. 10, 2021
Part of Dwg:
Revision #:
Issued For:
Drawing Number:
ST3.2
STORM DRAINAGE LEGEND

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N
Legend
Watercourse
Provincially Significant Wetland
ANSI
Heart Lake Road
0 10 20 30 40 50 m
Scale (11x17):1:1500
MTE
The Corporation of the City of Brampton
Phase I ESA
Heart Lake Road and Countryside Drive, Brampton, ON
Site Features
2

BRAMPTON MTE

BRAMPTON

MTE

ARA

1:1,425

0 20 40 m

N

Image

Study Area

Previous Assessments

Licence #P029-100 (Stage 1)

CIF #P163-016-2007 (Stage 1)

CIF #P013-522-2009 (Stage 1–2)

Potential Modelling (Recommended Survey Method)

Archaeological Potential (Test Pit Survey at an Interval of 5 m)

No Archaeological Potential - Permanently Wet (No Further Work)

No Archaeological Potential - Disturbed (No Further Work)

Previously Assessed (No Further Work)

BHR Assessment Results Map

1:11,000

0 250 500 m

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- Project Location
- Built Heritage Resource (BHR 1)
- Property Parcel

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N

NORTH

0 20 40 60 80 100m

Scale(11x17): 1:2000

CITY OF BRAMPTON

HEART LAKE ROAD & COUNTRYSIDE DRIVE EA

HEART LAKE ROAD & COUNTRYSIDE DRIVE BRAMPTON, ONTARIO

SITE PLAN

2

LEGEND

BH101-20 MTE BOREHOLE

30m OFFSET FROM WETLAND

WETLAND BOUNDARY

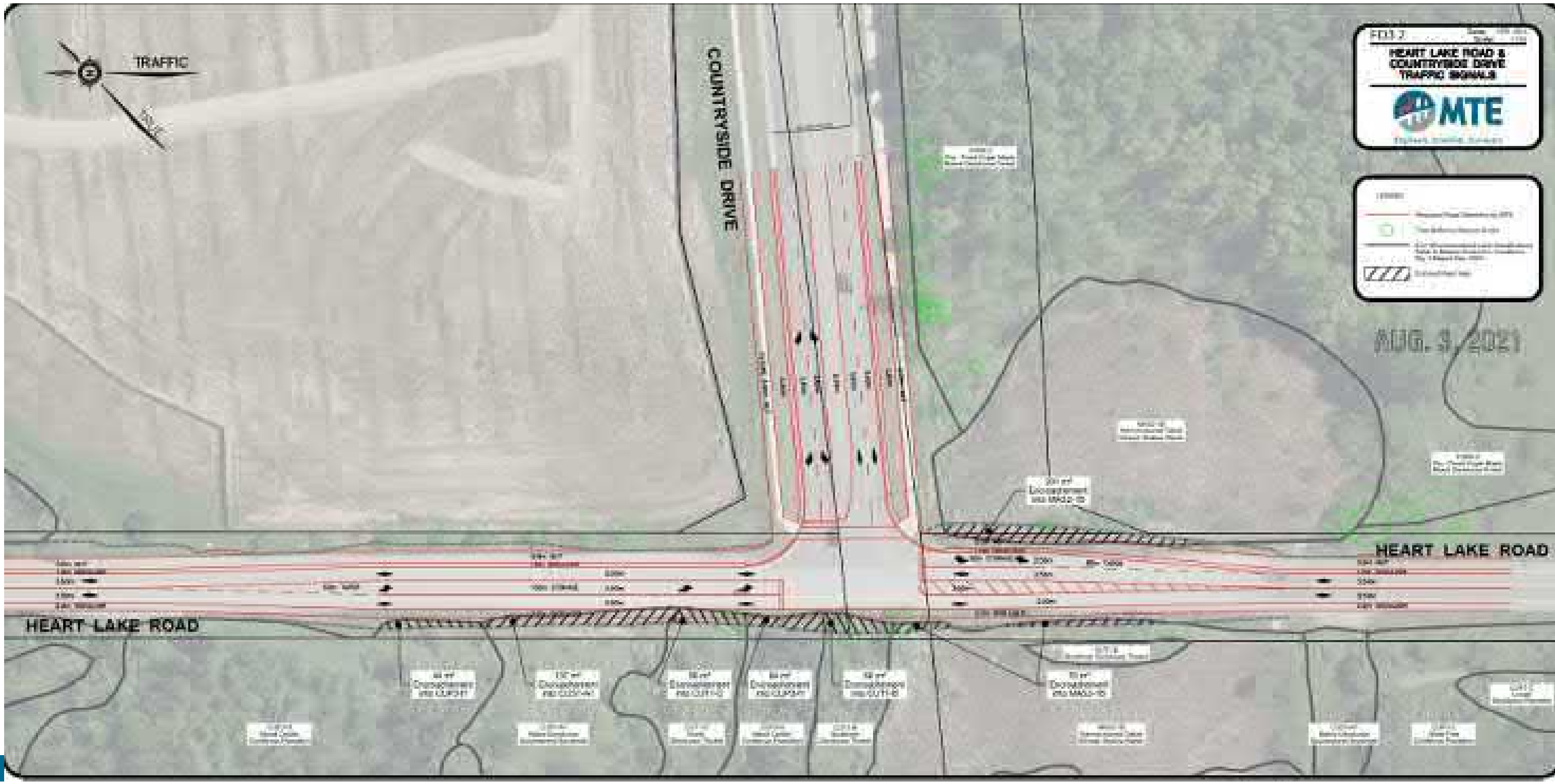
REFERENCES

- AERIAL IMAGE FROM GOOGLE EARTH PRO
- GROUND SURFACE ELEVATIONS SURVEYED BY MTE

ALTERNATIVES

- ✓ DO NOTHING
- ✓ SIGNALIZED INTERSECTION WITH TURN LANES
- ✓ ROUNDABOUT

SIGNALIZED WITH TURN LANES



Engineers, Scientists, Surveyors

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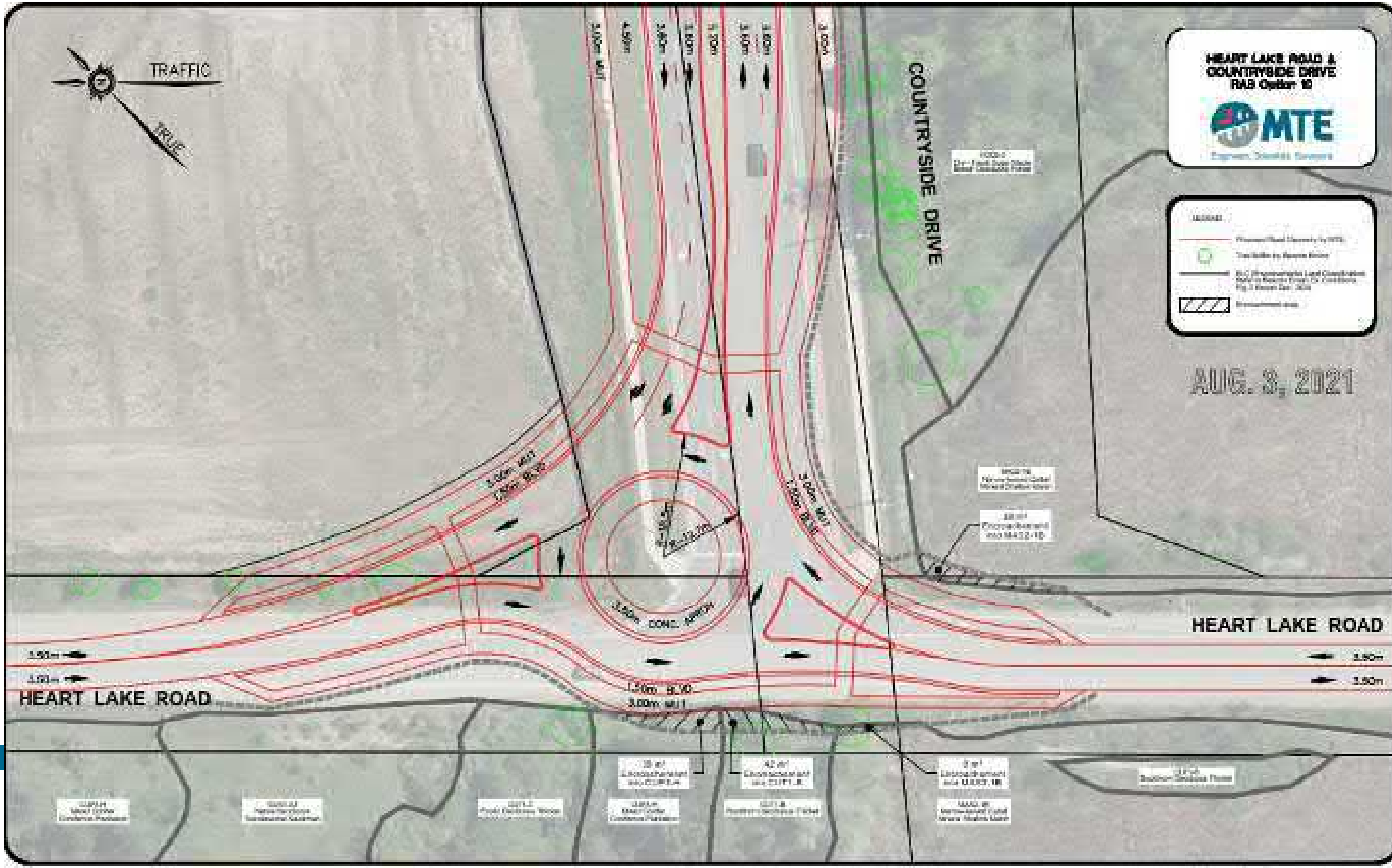
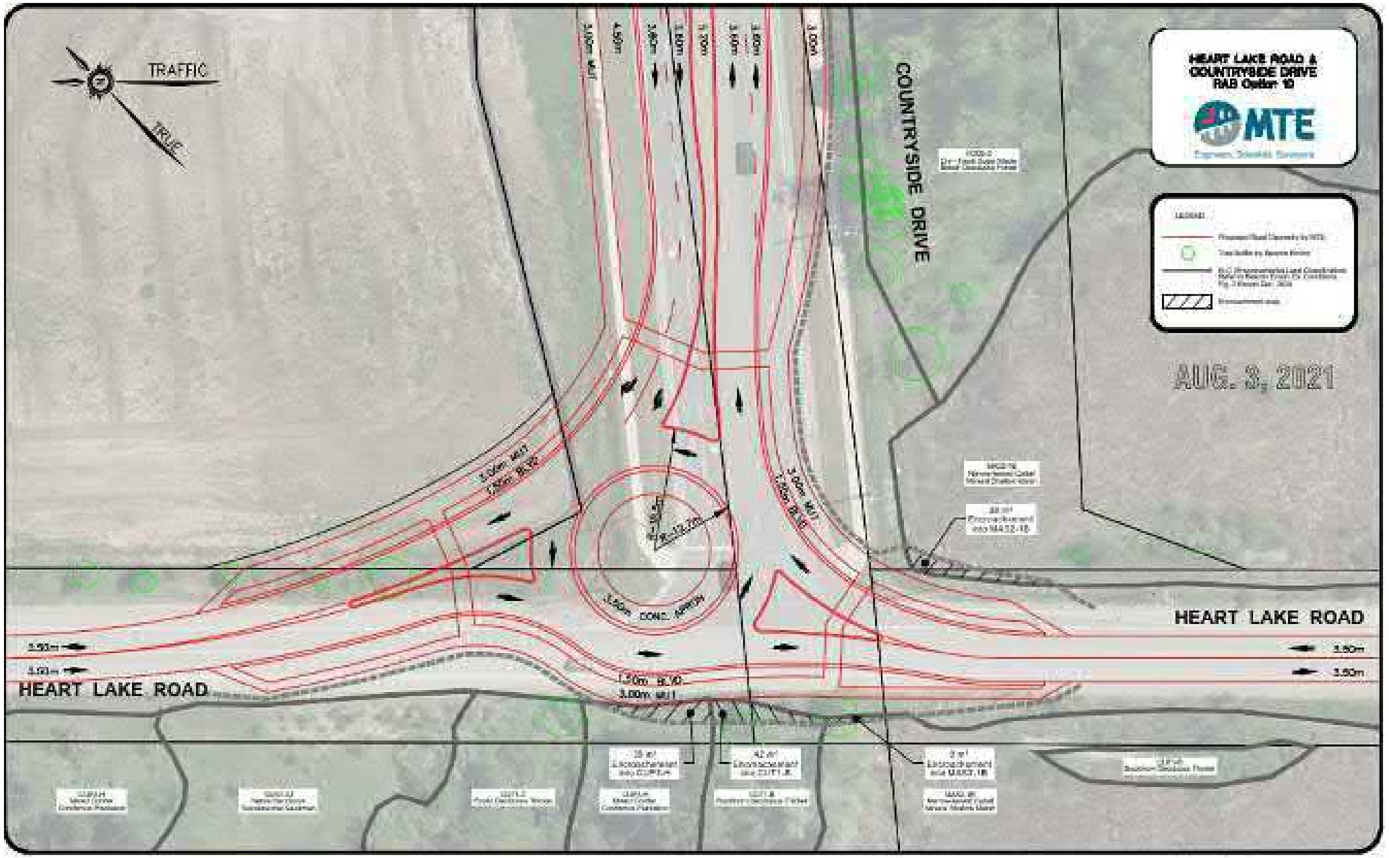
ROUNDABOUT



ROUNDABOUT IS PREFERRED



Engineers, Scientists, Surveyors

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MTE

EVALUATION MATRIX

Heart Lake Road at Countryside Drive Environmental Assessment

Draft Evaluation Matrix

Legend

Least Desirable → Most Desirable

Does not address minimum criteria

Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
Natural Environment			
1. Minimize impacts to Designated Natural Areas, vegetation, wildlife, aquatic features	1. No impacts to existing Natural Areas, vegetation, wildlife or aquatic features, but Heart Lake Road traffic will continue at speed limit, increasing chance of wildlife strikes	1. a) Traffic with green light will continue at speed limit increasing chance of wildlife strikes b) Wildlife fencing and erosion controls to be installed	1. a) All traffic will slow down to navigate roundabout, which should reduce wildlife strikes b) Wildlife fencing and erosion controls to be installed
2. Minimize impacts to wetlands	2. No impacts to designated wetlands	2. Some slight intrusions into designated wetlands	2. No intrusions into designated wetlands
3. Minimize impacts to surface water and groundwater	3. No change in runoff/ surface drainage	3. Least pavement drainage/surface water runoff	3. More pavement resulting in more drainage/ surface water runoff
4. Minimize air quality impacts and effects on climate change	4. Traffic volumes will continue to increase, resulting in increase delays / congestion	4. Traffic delays/congestion resulting in vehicles idling at red lights	4. Less traffic delays due to vehicles not having to stop at red lights, less vehicle starting/stopping
	4	1	3
Planning Objectives			
1. Adhere to Transportation Master Plan	1. Does not implement required improvements per Transportation Master Plan	1. Adheres to Transportation Master Plan	1. Adheres to Transportation Master Plan
2. Adhere to Official Plan	2. Other transportation improvements will be required to adhere to the Official Plan	2. Adheres to Official Plan	2. Adheres to Official Plan
3. Adhere to Active Transportation Master Plan	3. Does not adhere to Active Transportation Master Plan	3. Adheres to Active Transportation Master Plan	3. Adheres to Active Transportation Master Plan
4. Adhere to Region Offical Plan Policies	4. Other transportation improvements will be required to adhere to Official Plan Policies	4. Adheres to Region Official Plan Policies	4. Adheres to Region Official Plan Policies

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MTE

Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
Social and Cultural Environment			
1. Improve visual aesthetics	1. Visual aesthetics will remain the same, no opportunities to enhance landscape	1. Landscaping opportunities behind curb/ sidewalk/MUT	1. Opportunities for landscaping in center island and behind sidewalk/MUT
2. Preserve archaeological and cultural heritage features	2. No impacts to archaeological/ heritage features	2. a) No direct impacts to archaeological/ heritage features b) Some impact on existing rural road cross section	2. a) No direct impacts to known archaeological features b) Disrupt existing linear views c) Changes the existing cross section d) Additional Stage 1/2 Archaeological investigation required in property purchase area
3. Preserve the agricultural setting, community character and public realm	3. No impacts to existing setting, character or public realm	3. Signals contribute to urban look and setting	3. Opportunity to enhance the public realm, and all traffic must slow to navigate roundabout
4. Minimize traffic noise	4. Traffic noise will continue to increase as traffic volumes increase	4. Traffic noise will not decrease	4. Traffic noise will decrease due to less stop/starts of traffic
5. Minimize disruption due to construction	5. No disruption due to construction, however, increasing congestions may cause disruption	5. Least time for construction and traffic can be maintained during construction	5. Most time for construction and traffic can be maintained during construction
6. Minimize impacts to existing accesses in the area	6. No impacts to existing access, however, increasing congestion may impact access	6. No accesses impacted in the area	6. No accesses impacted in the area
	2	2	3
Economic Development			
1. Beneficial to business/ community with respect to travel time	1. Travel time will not be reduced, and will increase as traffic volumes increase	1. More delays than with a roundabout due to stopped traffic stopped for red lights	1. Roundabout provides more free flowing traffic, and results in less traffic delays/congestion.
2. Minimize capital and construction costs	2. No construction or capital costs	2. Road improvements and signal installation have lowest capital/construction costs - est. $1.15 million	2. Highest Capital Costs due to additional pavement, curb, signage and line markings - est. $1.57 million
3. Minimize property impacts/ requirements	3. No additional property required	3. No additional property required	3. Approximately 550 sm of property is required on NE corner, which can be obtained at no cost to the City
4. Minimize operating and maintenance costs	4. Operating and maintenance costs do not change	4. Operating and maintenance costs include powering and maintaining signals	4. No signal power and maintenance costs
	3	2	2

Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
Engineering and Technical			
1. Congestion and collisions will continue	1. Is safe for all travel modes	1. Safe for all travel modes	1. Safe for all travel modes. Roundabout reduces severity of collisions (i.e. less conflict points and sideswipes vs head-on or "T bone" collisions)
2. Create an Active Transportation Friendly Environment (Cyclists, pedestrians etc.)	2. No additional sidewalks or cycling facilities	2. Sidewalks, cycle facilities provided. Motorist must stop at red light and be aware of pedestrians.	2. Sidewalks, cycle facilities provided. Requires pedestrians to be sure motorists are aware of their presence. Cyclists can use Roundabout or multi-use path at Roundabout
3. Accommodate future travel demands	3. Future travel demands not accommodated	3. Future travel demands accommodated (20 years)	3. Future travel demands accommodated (20 years). Roundabout results in less delays/congestion
4. Improve transportation mode choice including transit	4. Transportation mode choice not improved	4. All transportation modes accommodated including transit	4. All transportation modes accommodated including transit
5. Accommodate emergency services	5. Fire trucks can be accommodated, but may experience congestion in future	5. Fire Truck can use priority signal to enhance access through intersection	5. Fire trucks can navigate roundabout within acceptable response times - less congestion
6. Minimize impacts to utilities in the corridor	6. No utility relocations required	6. Utility relocations will be required, but somewhat less than Roundabout	6. Utility relocations required will be slightly more than signalized due mainly to additional street lighting
	1	4	3
Overall Evaluation Score			
	Does not meet planning objectives nor active transportation requirements, and will result in increased congestion.	Meets Planning and Engineering/ Technical objectives; some intersections encroach into natural areas; idling traffic will continue/ increase; and noise and urban look will increase.	Meets Planning and Engineering/ Technical objectives: visual/ landscaping can be enhanced; less idling/ congestion; lower lifecycle cost due to very low maintenance with no intrusions into wetlands; Pedestrians/ cyclists may be initially unfamiliar with Roundabouts.
	10	13	15

Next Steps:

- ✓PIC NO. 1
- ✓COLLECT AND INCORPORATE PUBLIC/AGENCY FEEDBACK
- ✓FINALIZE RECOMMENDED ALTERNATIVE
- ✓WRITE ENVIRONMENTAL REPORT
- ✓NOTICE OF COMPLETION

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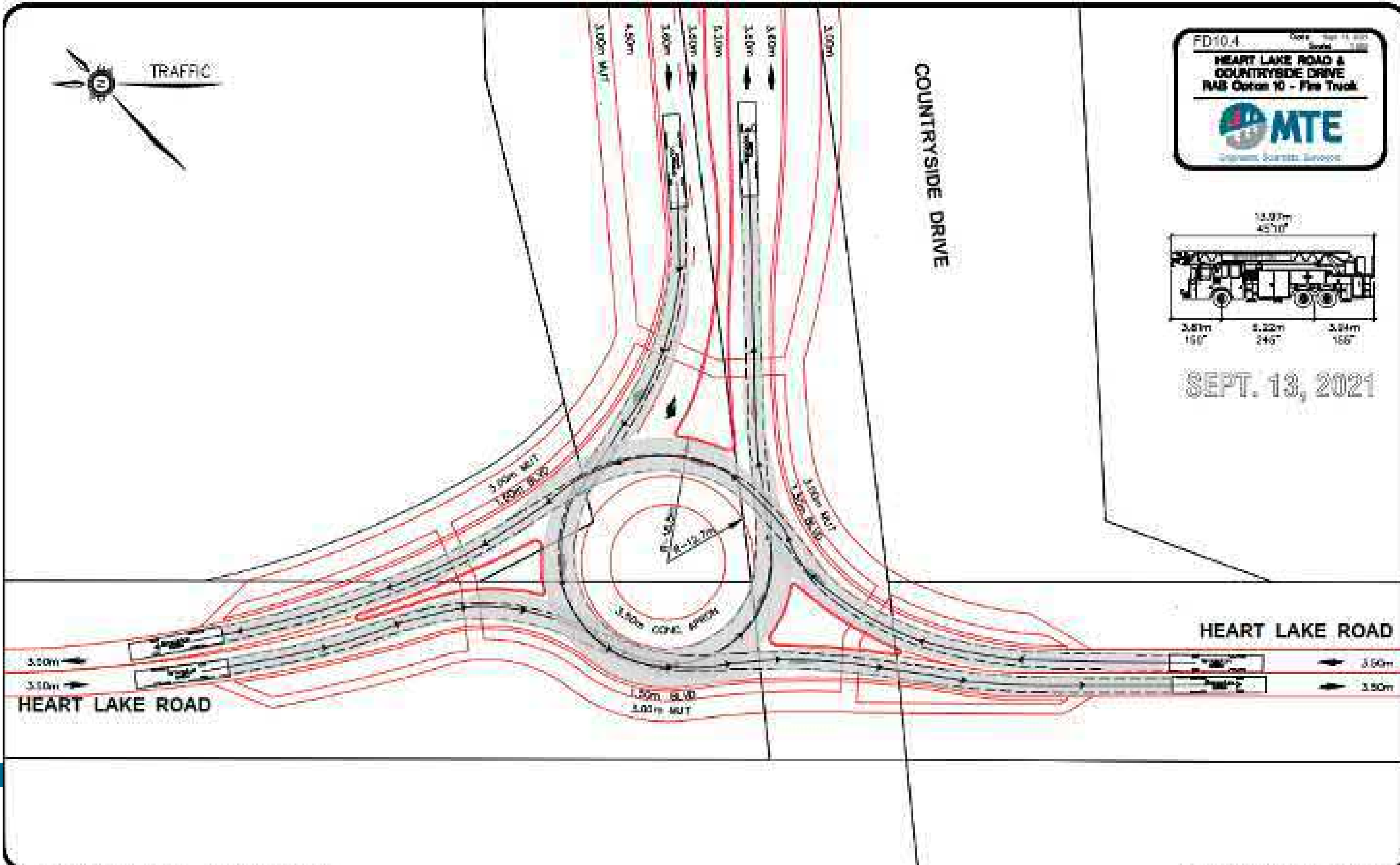
Questions?

BRAMPTON

MTE



Heart Lake Rd. & Countryside Dr. Class EA

Stakeholder Group (SHG) Meeting February 25, 2022

Engineers, Scientists, Surveyors

Agenda

- Introduction of SHG
- Background: Function/Design Review
- Need & Justification - Traffic Study
- Drainage and Natural Environment Studies
- Update on other Studies
- Alternative Solutions (Preferred)
- Evaluation Matrix
- Utilities
- Next Steps
- Questions

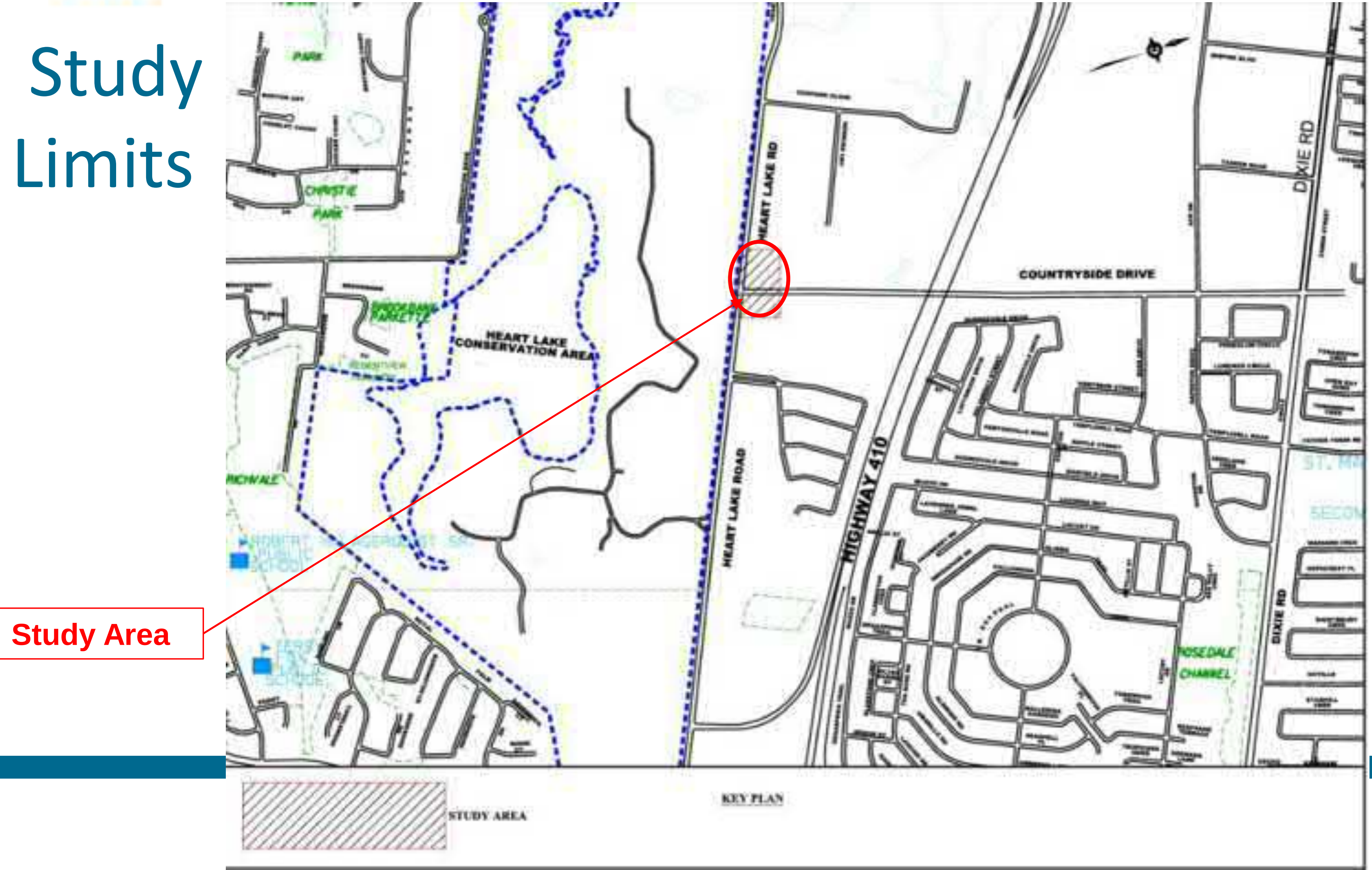
Introduction

The City of Brampton initiated a Schedule B Class Environmental Assessment (EA) for improvements to the intersection of Heart Lake Road and Countryside Drive

Desired Outcomes of this Class EA Study:

- ✓ Safety and Operations – Including Traffic Calming;
- ✓ Minimize natural environment impacts and wildlife mortality;
- ✓ Conservation of Cultural Heritage Landscape;
- ✓ Consider proposed land uses and meet travel demands;
- ✓ Vison Zero Initiative, Active Transportation, Safety.

Study Limits



2019 Function & Design Review Study

Engineers, Scientists, Surveyors

Study Limits - Background

Function & Design Review of Heart Lake Rd From Sandalwood Parkway to Mayfield Road.

Recommendations (Short Term):

- ✓ **Transportation Improvements** - Narrower Lanes, M.U.T.;
- ✓ **Traffic Calming** - Reclassify as Collector Rd., 50 kmh speed limit; speed cushions between Mayfield and Hwy 410 Ramp; traffic circle at Conservation Area entrance;
- ✓ **Wildlife mortality** – Maintain solar powered flashers, maintain optical speed bars, install additional eco-passages, wildlife directional fencing, turtle nesting mounds.

Function & Design Review (Continued)

Recommendations (Long Term):

Separated bike lanes on Heart Lake Rd. & Roundabout at Countryside

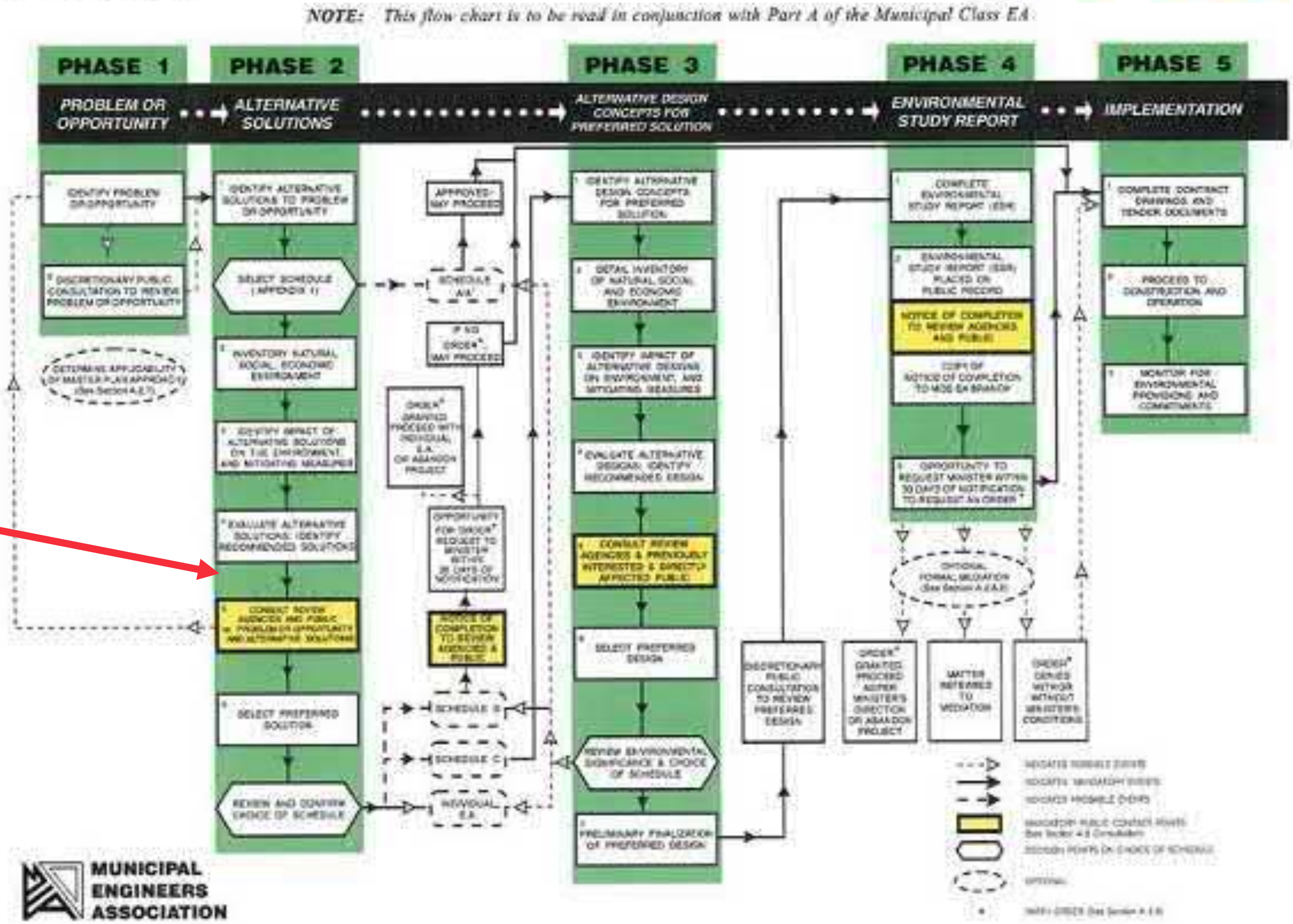
Figure 50: Roundabout at Countryside Option 2 (without encroachment on TRCA lands)

The EA Process

- ✓ The study is being undertaken in accordance with the Municipal Class EA planning and design process for Schedule “B” project.
- ✓ ***Study is for Heart Lake Rd. and Countryside Dr. intersection <u>only</u>***
- ✓ The “*Function & Design Review of Heart Lake Road Corridor (2019)*” provides background information, provide support for problem/opportunity identification for this intersection improvement
- ✓ Additional studies have been undertaken building upon existing background information and studies.

The Class EA Process

We are Here...



NEED AND JUSTIFICATION

Improve the safety and operations of the Heart Lake Road and Countryside Drive intersection including ***meeting the traffic demand*** of increasing population and growth.

while incorporating ***traffic calming and wildlife mortality reduction*** recommendations for the Heart Lake Road Corridor.

Paradigm Transportation Solutions Ltd (Paradigm)

TRAFFIC STUDY

✓ Westbound left-turn movement a critical movement under existing conditions, and operates over-capacity - will continue under future 2031 and 2041 traffic conditions.

SAFETY REVIEW (Paradigm)

✓ Collision history (2015 – 2019) revealed no fatal collisions.

✓ Majority were ‘single motor vehicle’ collisions - driver error/behaviour

SAFETY REVIEW (Continued)

- ✓ Investigation confirmed there is more than adequate approach and departure sight distance available;
- ✓ However, even with the adequate sight distances a high frequency of collisions were reported, and were determined to be attributed to aggressive driver behavior (i.e. speed).
- ✓ Correlates with the poor traffic operations stemming from a lack of gaps within the traffic stream along Heart Lake Road.
- ✓ Concluded that the current intersection traffic warrants improvement.

INTERSECTION IMPROVEMENTS

- ✓ Under base year conditions the intersection falls just short of meeting the threshold criteria for traffic signal control.
- ✓ Under future 2031 and 2041 traffic conditions the intersection is found to meet signal justification criteria.
- ✓ Under the 2041 horizon year operating under traffic signal control, the intersection was found to operate at acceptable levels of service and within capacity.

INTERSECTION IMPROVEMENTS (Continued)

- ✓ It was determined that the Heart Lake Road/Countryside Drive intersection would be suitable for roundabout implementation to mitigate poor intersection operations
- ✓ Several roundabout configurations were investigated;
- ✓ A single-lane roundabout with single lane entry on the northbound and southbound Heart Lake Road approaches along with dual lane entry on the westbound Countryside Drive approach will operate at acceptable levels of service and well within capacity under 2041 traffic conditions.

Other Studies – Summary of findings

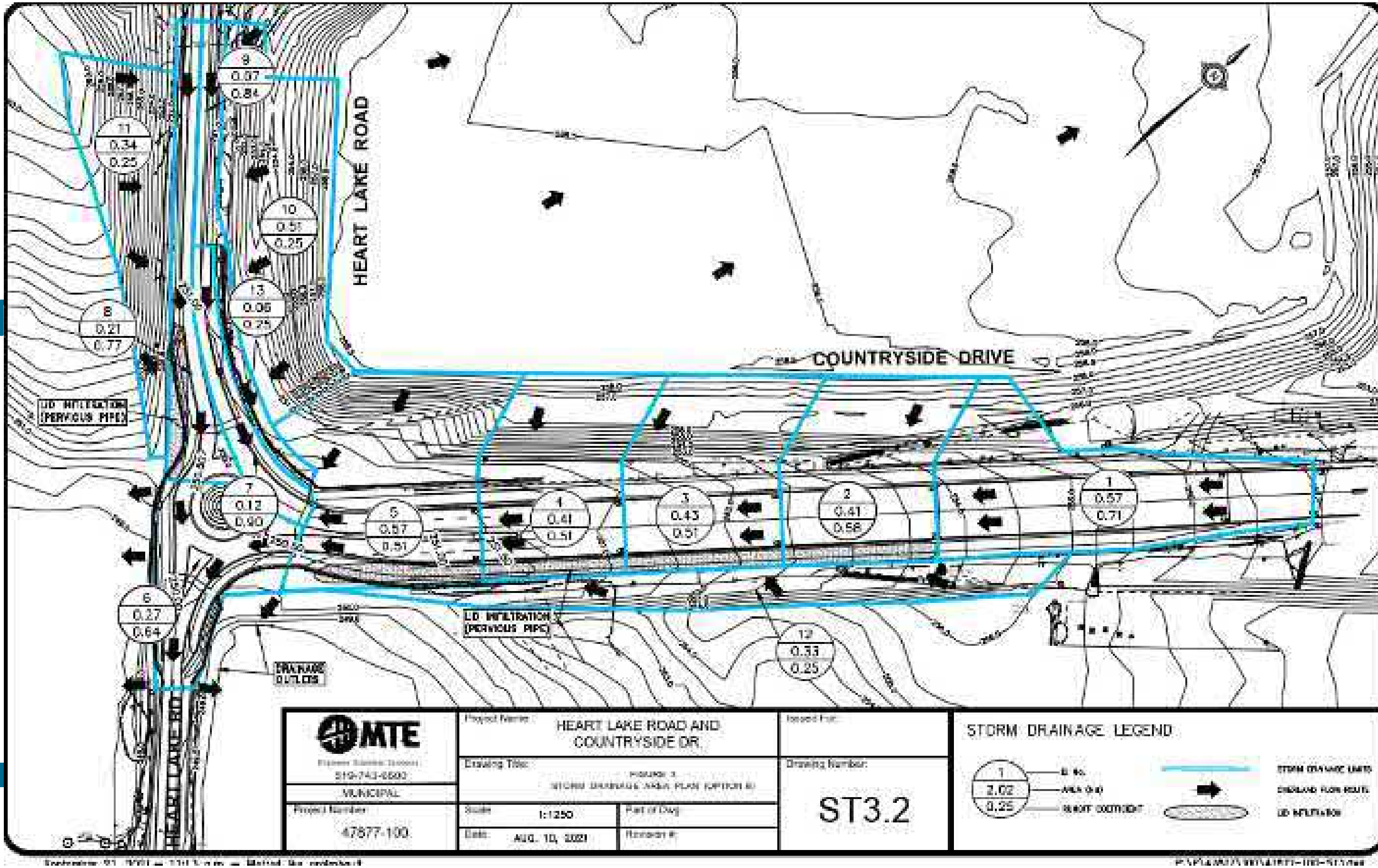
- ✓Natural Environment Study (Beacon)
- ✓Drainage Study (MTE)
- ✓Phase I ESA (MTE)
- ✓Stage 1 Archaeological Investigation (ARA)
- ✓Cultural/Built Heritage Study (ARA)
- ✓Geotechnical Investigation (MTE)

Natural Environment

Natural Environment (Beacon

- ✓ Significant wetlands and woodlands near intersection (Part of Heart Lake PSW);
- ✓ Significant wildlife habitat in wetland & woodland communities – Endangered and threatened species:
  - ✓ Bats, turtles (incl. Snapping), waterfowl, raptor nesting, reptiles;
- ✓ Turtle nesting berms;
- ✓ No fish habitat;
- ✓ Adjacent to Heart Lake ANSI’s

Drainage Study



Drainage Study

- ✓ Revised Draft study has been submitted to TRCA;
- ✓ Drainage basically the same as existing for signalized intersection;
- ✓ Roundabout results in an extra 14 l/s during 100 year storm compared to signalized intersection
- ✓ LID's recommended for quantity/quality control;
- ✓ Development drainage details to east (south side) on Countryside Drive to be included prior to construction ***IF*** their flows reach the Countryside Dr. road allowance.

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Drainage Study

MTE

Existing	Proposed
• 300 mm storm sewer with sub drains	• Replace existing and enhance with LID to promote infiltration
• Ditch drainage with culvert crossing Countryside Drive	• Re-grade / enhance ditches and replace / relocate culvert
• Overland flow draining to ditch / wetlands (generally uncontrolled drainage)	• Flows contained and conveyed into ditches or infiltrated within project limits

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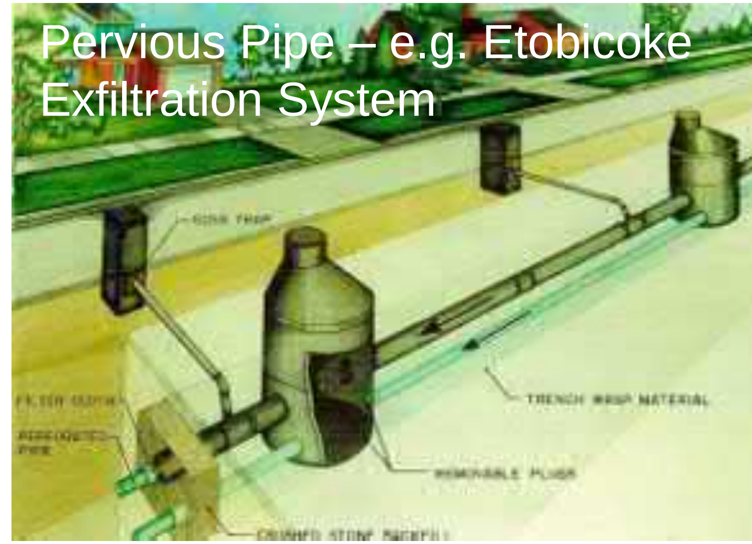
Drainage Study

MTE

Existing



Pervious Pipe – e.g. Etobicoke Exfiltration System

Bioswale – e.g. Haggert Ave

Phase 1 ESA

Legend
0 10 20 30 40 50 m
Scale (11x17): 1:1500
MTE
The Corporation of the City of Brampton
Phase I ESA
Heart Lake Road and Countryside Drive, Brampton, ON
Site Features
2

Phase 1 ESA

- ✓ No records of spills;
- ✓ Fill has been added over the years;
- ✓ Additional testing should be undertaken prior to construction;
- ✓ Excess fill regulations.

Stage 1 Archaeological

Stage 1 Archaeological (ARA)

- ✓ Most areas have no archaeological potential – previously disturbed, permanently wet, previously assessed;
- ✓ Intersection options to be designed to avoid potential areas;
- ✓ If area on south side of Countryside east of Heart Lake Rd is disturbed, it may require a Stage 1 investigation;
- ✓ May require a Stage 1 investigation into property purchase area if not previously assessed.

BHR Assessment Results Map

ARA

1:11,000

0 250 500 m

N

Contains information licensed under the Open Government Licence - Ontario Base Map Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Source: Proponent

- Project Location
- Built Heritage Resource (BHR 1)
- Property Parcel

Built/Cultural Heritage (ARA)

- ✓ Wetland is considered a BHR;
- ✓ Heart Lake Rd is considered a CHL;
- ✓ Depending on final impacts, undertake a Heritage Impact Assessment to evaluate final details;
- ✓ If bus stops or seating areas included, examine opportunities for interpretive signing

Geotechnical

Geotechnical

- ✓ Underlying soil is glacial till – Gravelly silt;
- ✓ Pavement structure: 450 B, 150 A, 110 Binder, 50 Surface Asphalt;
- ✓ Peat deposit between 2-4 m, found on west side of Heart Lake south of Countryside Drive;
- ✓ Dewatering expected in excavations greater than 2 m deep;
- ✓ Excavated soil generally acceptable to be re-used on site – however some topsoil may need to be removed to a specialized site (waste transfer site)

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ALTERNATIVES

- ✓ DO NOTHING
- ✓ SIGNALIZED INTERSECTION WITH TURN LANES
- ✓ ROUNDABOUT

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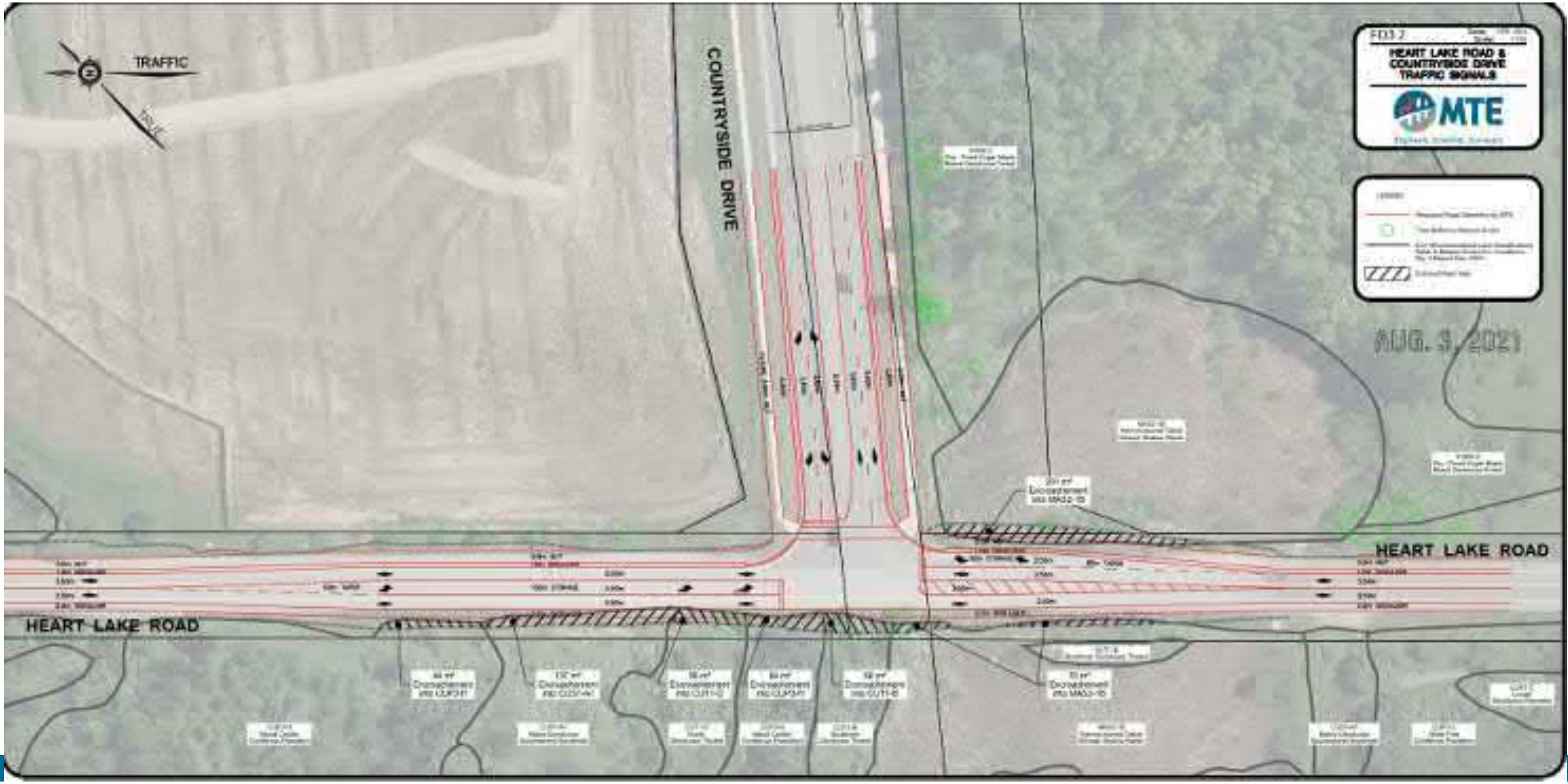
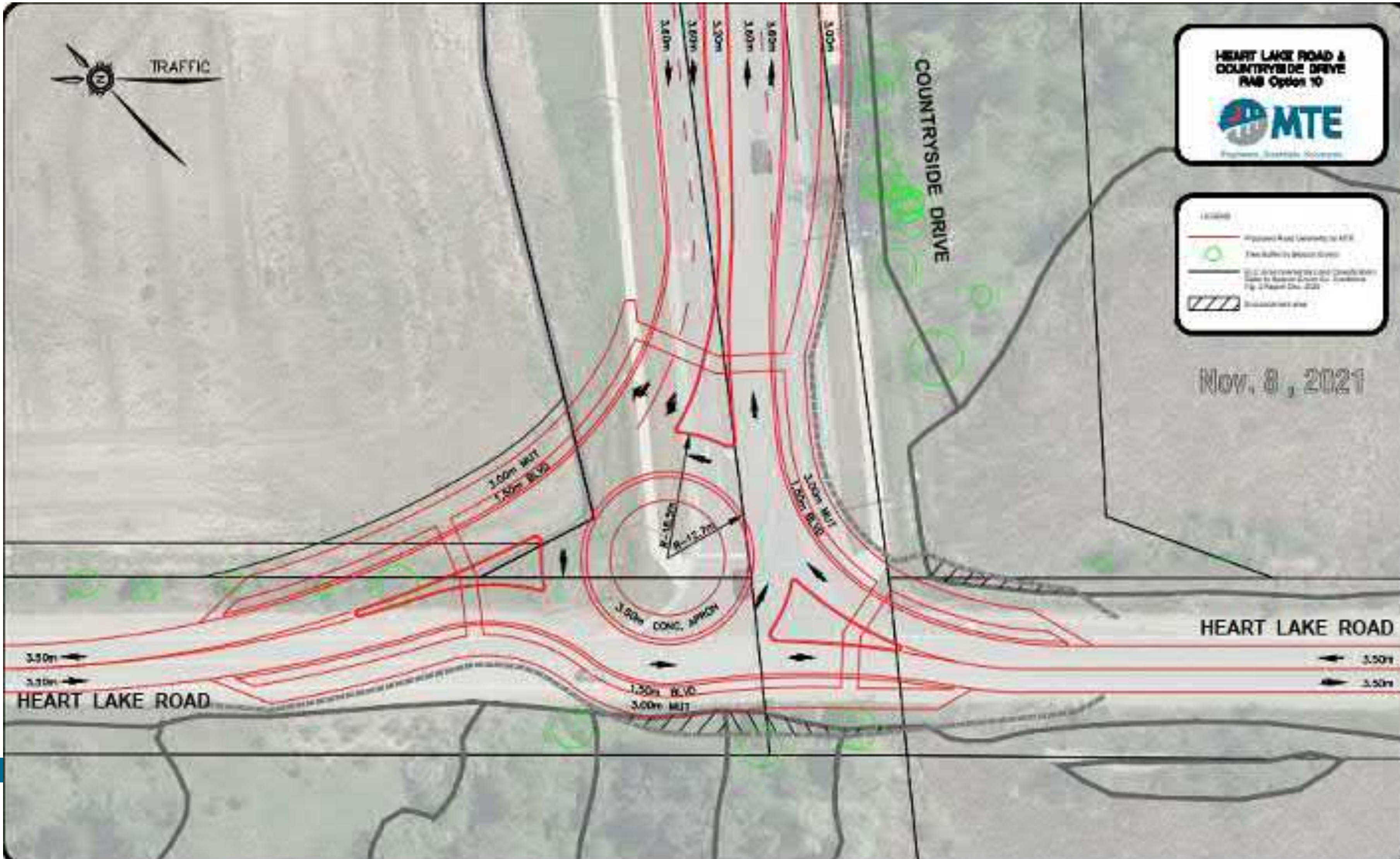
SIGNALIZED WITH TURN LANES



Engineers, Scientists, Surveyors

ROUNDABOUT



TRAFFIC
COUNTRYSIDE DRIVE
HEART LAKE ROAD & COUNTRYSIDE DRIVE RAB Option 10
MTE
Nov. 8, 2021
3.60m
3.60m
3.50m
3.60m
3.60m
3.00m
3.00m MUT
1.50m BLVD
3.50m CONC. APRON
1.50m BLVD
3.00m MUT
HEART LAKE ROAD
HEART LAKE ROAD
3.50m
3.50m
3.50m
3.50m

EVALUATION MATRIX

Heart Lake Road at Countryside Drive Environmental Assessment

Draft Evaluation Matrix

Legend

Least Desirable → Most Desirable

○ Does not address minimum criteria

Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
Natural Environment			
1. Minimize impacts to Designated Natural Areas, vegetation, wildlife, aquatic features	1. No impacts to existing Natural Areas, vegetation, wildlife or aquatic features, but Heart Lake Road traffic will continue at speed limit, increasing chance of wildlife strikes	1. a) Traffic with green light will continue at speed limit increasing chance of wildlife strikes b) Wildlife fencing and erosion controls to be installed	1. a) All traffic will slow down to navigate roundabout, which should reduce wildlife strikes b) Wildlife fencing and erosion controls to be installed
2. Minimize impacts to wetlands	2. No impacts to designated wetlands	2. Some intrusions into designated wetlands (271m²)	2. Minimal intrusion into designated wetlands (45m²)
3. Minimize impacts to surface water and groundwater	3. No change in runoff/ surface drainage	3. Least pavement drainage/surface water runoff	3. More pavement resulting in more drainage/ surface water runoff
4. Minimize air quality impacts and effects on climate change	4. Traffic volumes will continue to increase, resulting in increase delays / congestion	4. Traffic delays/congestion resulting in vehicles idling at red lights	4. Less traffic delays due to vehicles not having to stop at red lights, less vehicle starting/stopping
	● 4	◔ 1	◕ 3
Planning Objectives			
1. Adhere to Transportation Master Plan	1. Does not implement required improvements per Transportation Master Plan	1. Adheres to Transportation Master Plan	1. Adheres to Transportation Master Plan
2. Adhere to Offical Plan	2. Other transportation improvements will be required to adhere to the Offical Plan	2. Adheres to Official Plan	2. Adheres to Official Plan
3. Adhere to Active Transportation Master Plan	3. Does not adhere to Active Transportation Master Plan	3. Adheres to Active Transportation Master Plan	3. Adheres to Active Transportation Master Plan
4. Adhere to Region Official Plan Policies	4. Other transportation improvements will be required to adhere to Official Plan Policies	4. Adheres to Region Official Plan Policies	4. Adheres to Region Official Plan Policies
	○ 0	● 4	● 4

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Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
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1. Beneficial to business/ community with respect to travel time	1. Travel time will not be reduced, and will increase as traffic volumes increase	1. More delays than with a roundabout due to stopped traffic stopped for red lights	1. Roundabout provides more free flowing traffic and results in less traffic delays/congestion
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3. Minimize property impacts/ requirements	3. No additional property required	3. No additional property required	3. Approximately 550 sm of property is required on NE corner, which can be obtained through the subdivision approvals
4. Minimize operating and maintenance costs	4. Operating and maintenance costs do not change	4. Operating and maintenance costs include powering and maintaining signals	4. No signal power and maintenance costs
	3	2	2

Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
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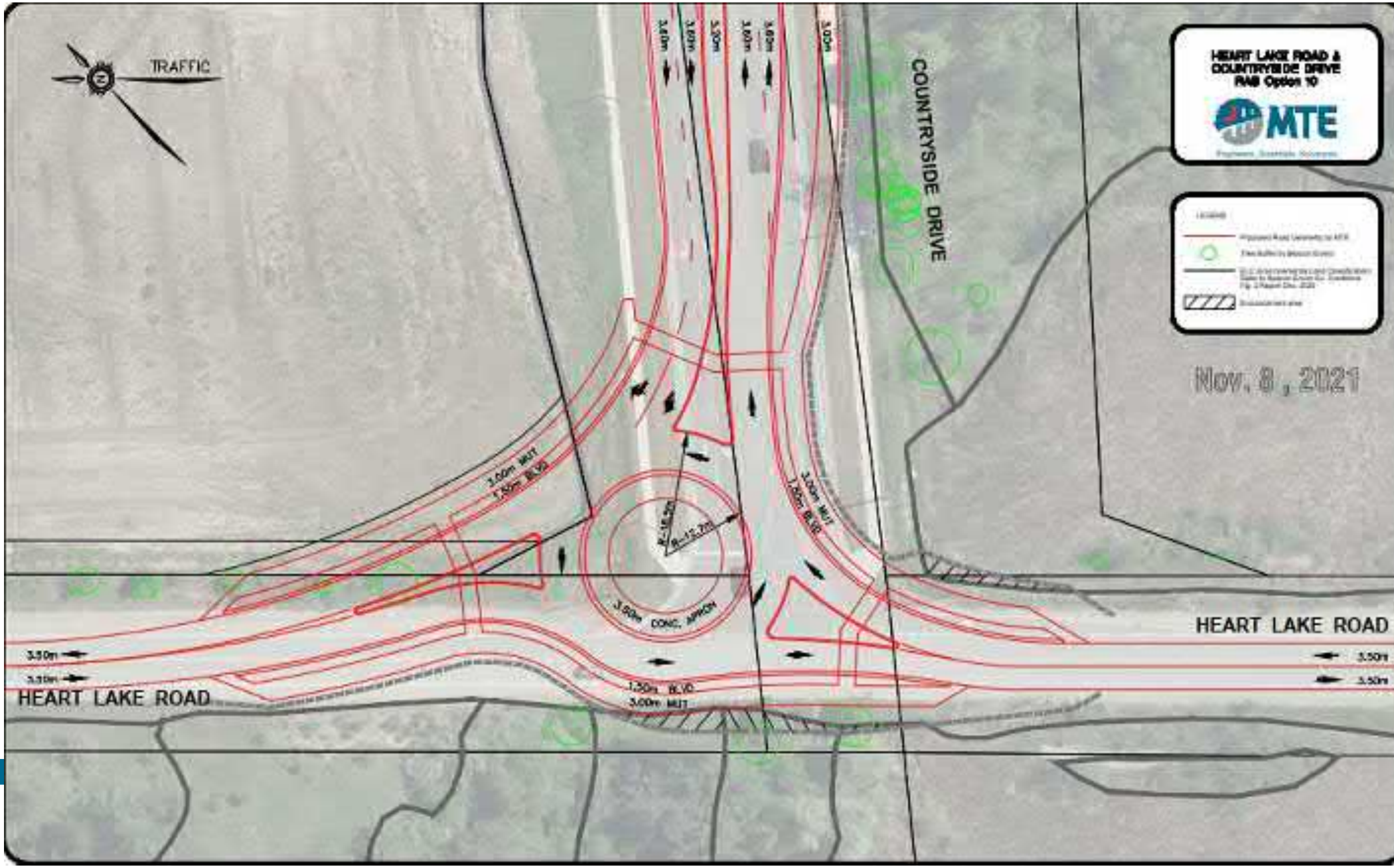
	1	4	3
Overall Evaluation Score			
	Does not meet planning objectives nor active transportation requirements, and will result in increased congestion.	Meets Planning and Engineering/ Technical objectives: some intersections encroach into natural areas; idling traffic will continue/ increase; and noise and urban look will increase.	Meets Planning and Engineering/ Technical objectives: visual/ landscaping can be enhanced; less idling/ congestion; lower lifecycle cost due to very low maintenance with no intrusions into wetlands; Pedestrians/ cyclists may be initially unfamiliar with Roundabouts.
	10	13	15

ROUNDABOUT IS PREFERRED



UTILITY ISSUES

- Hydro, some communications cables
- Not a lot of conflicts, but Hydro relocations & new Streetlighting is critical;
- Region of Peel Watermain/Wastewater
- Now that alternatives have been developed, specific comments can be based on the actual alternatives.

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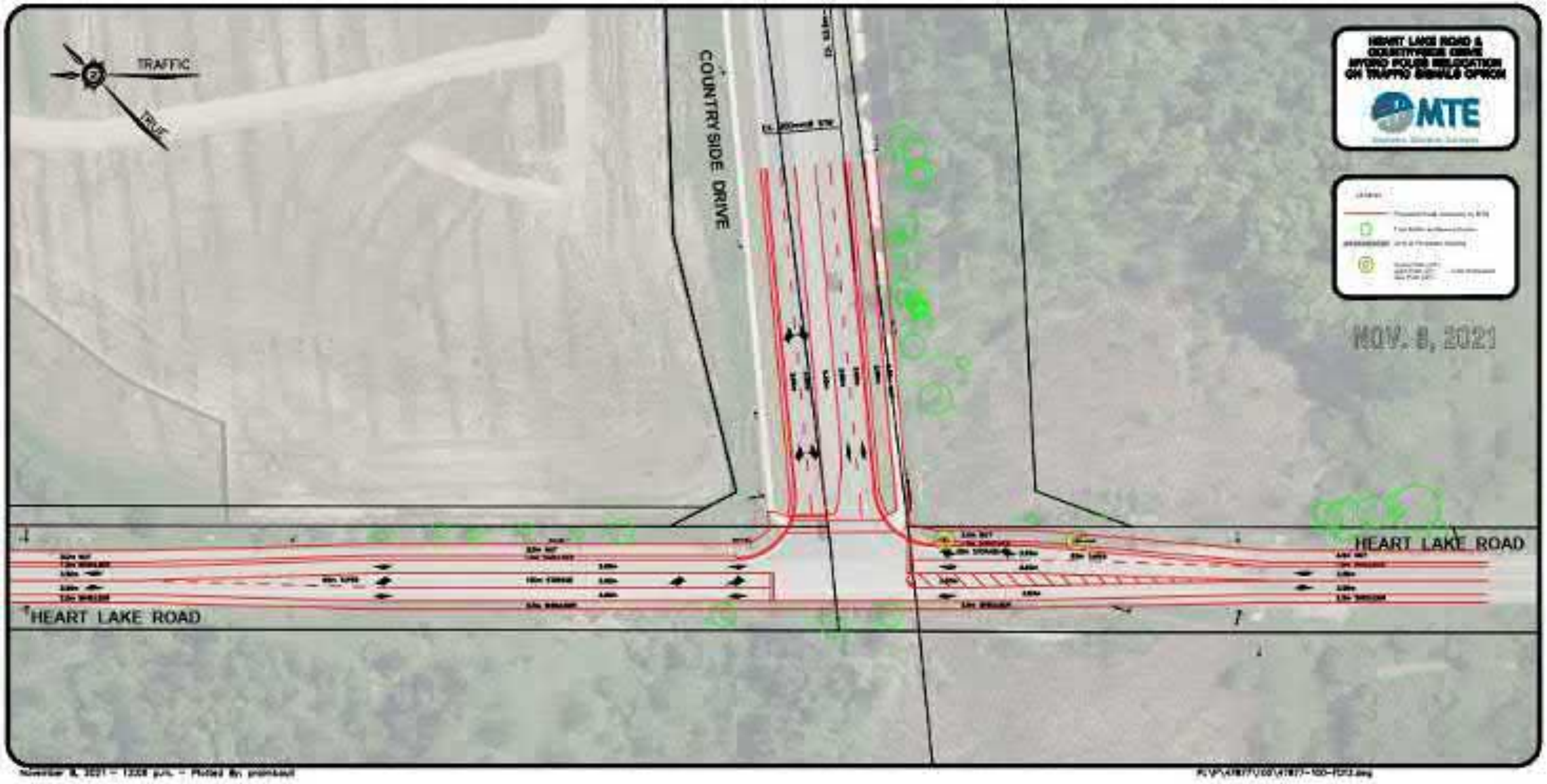

Engineers, Scientists, Surveyors

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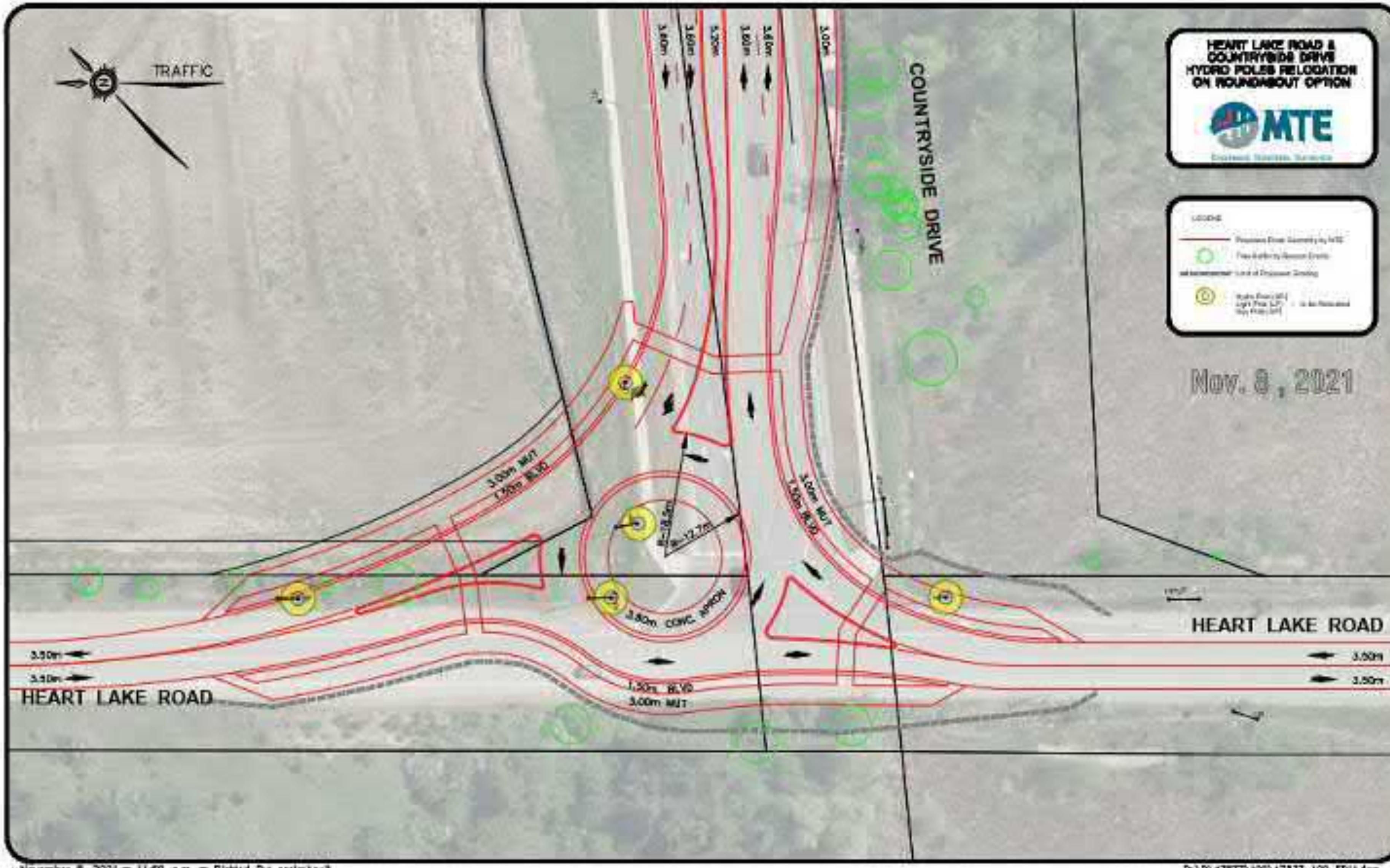

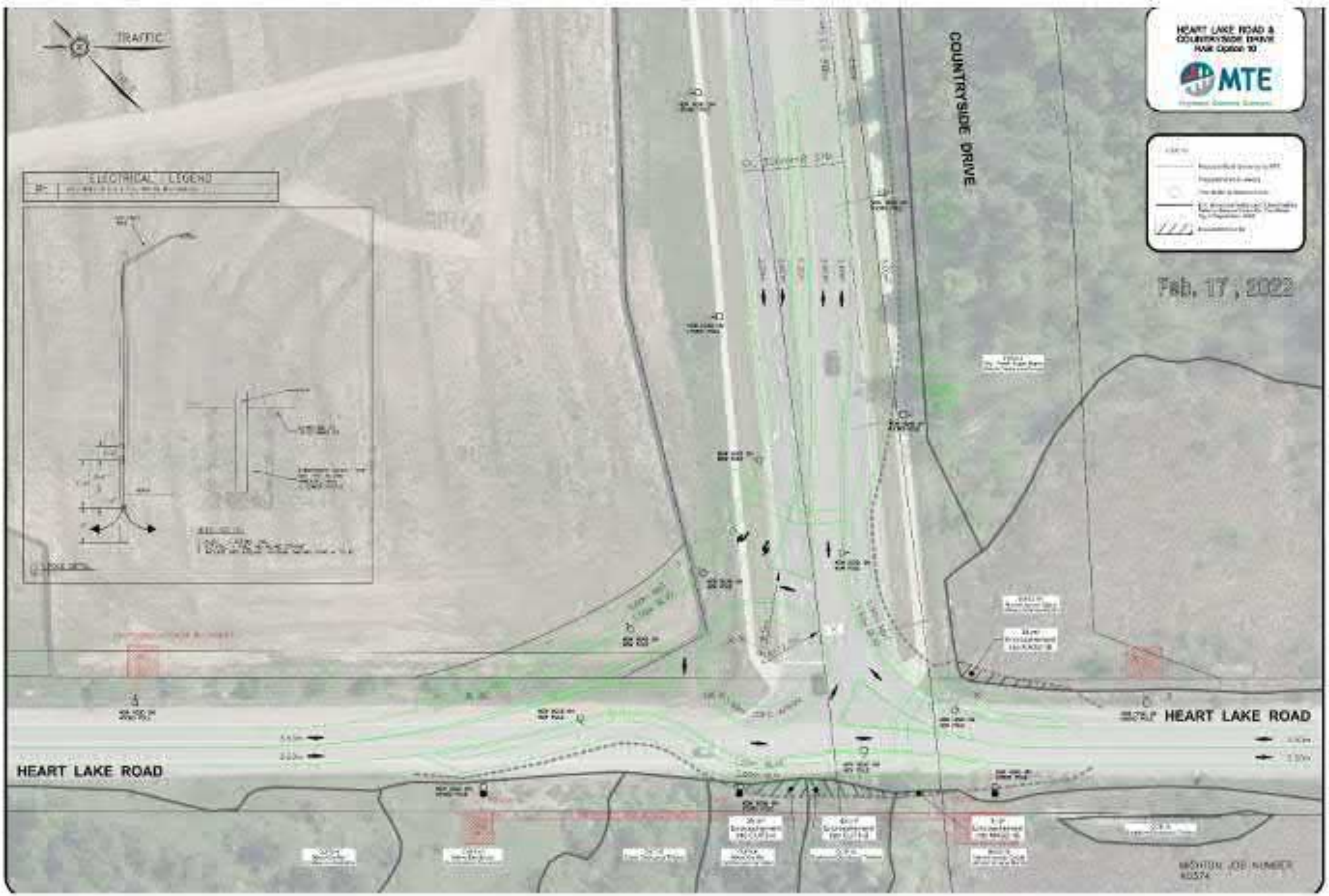

TRAFFIC
ELECTRICAL LEGEND
COUNTRYSIDE DRIVE
HEART LAKE ROAD & COUNTRYSIDE DRIVE
MTE
Feb. 17, 2022
HEART LAKE ROAD
HEART LAKE ROAD

Next Steps:

- ✓Review Comments/Info from SHG
- ✓Complete Preliminary Preferred Design
- ✓Finalize Technical Studies
- ✓Public Information Centre (PIC) 1
- ✓Finalize Recommended Design
- ✓Write Environmental Project Report
- ✓Notice Of Completion

Questions?

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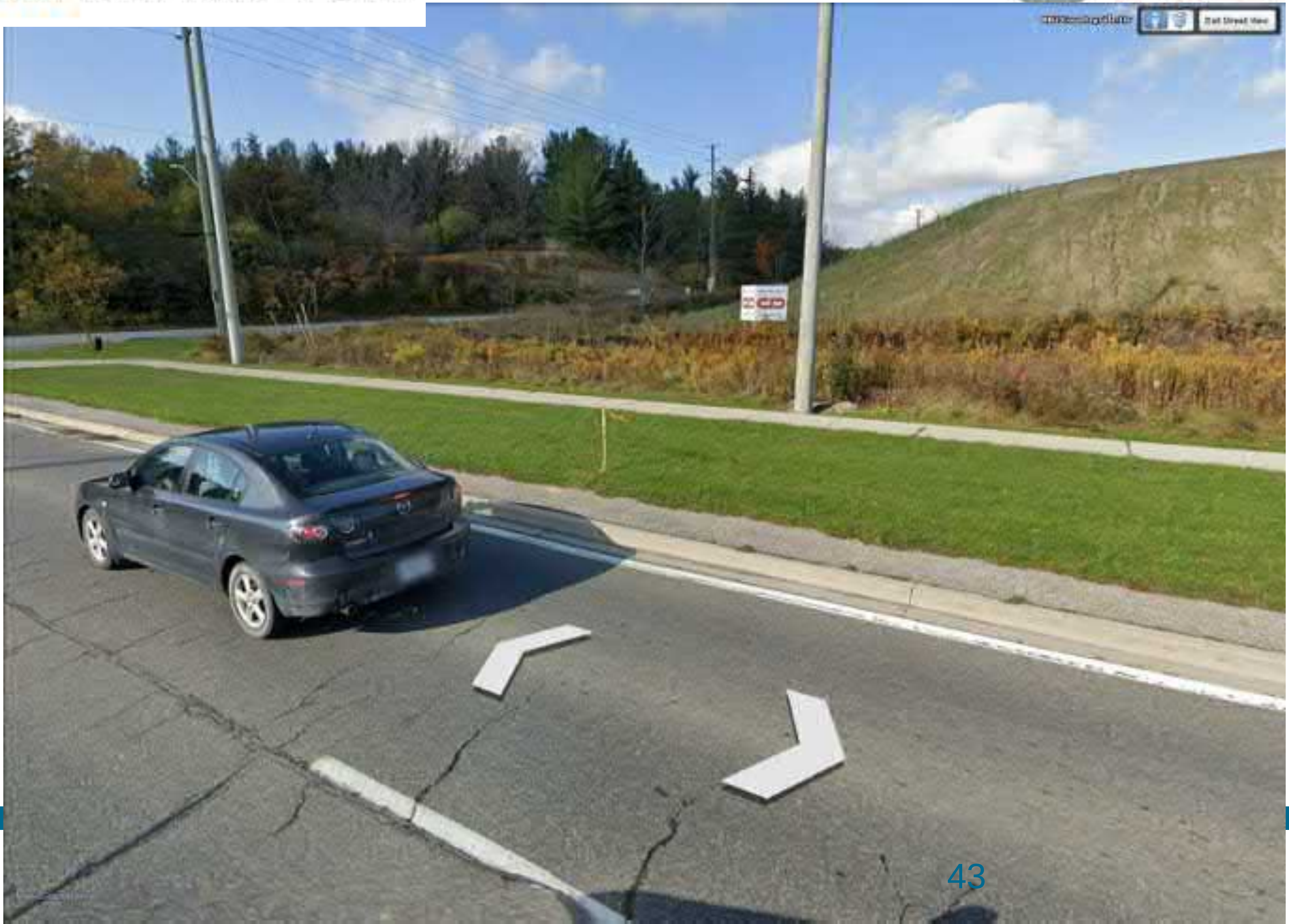

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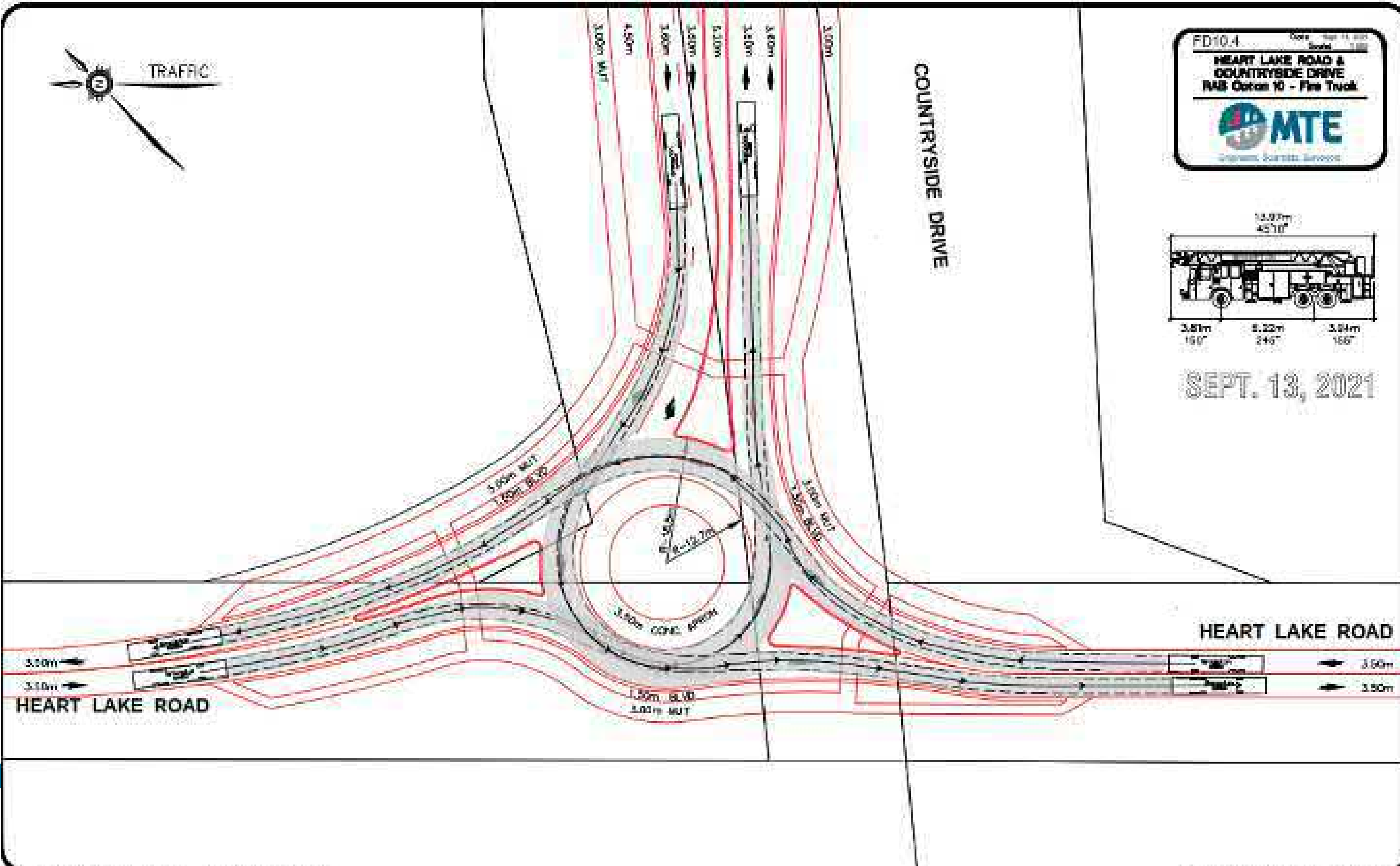


Appendix C

Natural Environmental Report

GUIDING SOLUTIONS IN THE
NATURAL ENVIRONMENT

DRAFT

Natural Environment Report
Heart Lake Road and Countryside Drive Intersection Improvements

Prepared For:

MTE Consultants Inc.

Prepared By:

Beacon Environmental Limited

Date:	*Project:*
September 2022	**220296**

Table of Contents

Figures

Tables

Appendices

1. Introduction

Beacon Environmental Limited (Beacon), on behalf of MTE Consultants Inc., was retained by the City of Brampton to provide input for the Heart Lake Road and Countryside Drive Environmental Assessment (EA), which is being completed for the proposed update to this intersection in the City of Brampton and the Region of Peel. The Study Area for this EA includes lands within 120 m of the intersection of Heart Lake Road and Countryside Drive (refer to **Figure 1**).

Lands immediately northeast of Countryside Drive are being developed, while other surrounding lands consist of forest and wetland, including portions of the Heart Lake Provincially Signficant Wetland (PSW). The Heart Lake Conservation Area is located west of Heart Lake. Natural areas within the Study Area are part of the City's Natural Heritage System (NHS) as depicted on Schedule D of the City of Brampton Official Plan and represent Core Areas that are part of the Region of Peel Greenlands System.

This Natural Environment Report identities, describes, and evaluates natural heritage features associated with the Study Area. This information is intended to support the decision-making process regarding options for upgrades to the Heart Lake Road and Countryside Drive intersection.

2. Study Methodology

2.1 Background Review

Background information on natural heritage resources was gathered and reviewed at the outset of the project. This involved consideration of the following documents or information sources relevant to the Subject Property:

- Ministry of Natural Resources' Natural Heritage Information Centre (NHIC) rare species database (accessed December 2020);
- Natural Heritage data for the Study Area provided by TRCA in October 2020, including ELC mapping, and records of flora and fauna;
- Peel-Caledon Significant Woodlands and Significant Wildlife Habitat Study (NSEI *et al*., 2009);
- Heart Lake Road Ecology and Turtle Population Study (White *et al*., 2018);
- Road Ecology Study and Mitigation: Provincially Significant Wetland – Area "C" (TRCA, 2016);
- Ontario Breeding Bird Atlas data (Cadman *et al*. 2007);
- Atlas of the Mammals of Ontario (Dobbyn 1994);
- Ontario Nature Reptile and Amphibian Atlas; and
- Ontario Butterfly Atlas (MacNaughton *et al.* 2016).

Other sources of information (such as aerial photography) were also consulted prior to commencing a field investigation.

2.2 Field Investigations

2.2.1 Vegetation Communities and Flora

Vegetation communities in the Study Area were classified and mapped based on field observations of October 22, 2020. A floristic survey was completed concurrently. Surveys were conducted in accordance with the methodology of the *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee *et al*. 1998) by an ecologist certified by the MNRF in the Ecological Land Classification (ELC) system. Privately-owned lands were assessed from within the road right-of-way.

To classify the ecological communities within the Subject Property, publicly accessible lands were walked, and discrete units of natural and semi-natural communities were delineated as polygons on an aerial photograph of the property. Information on site conditions, soils, vegetation composition and structure of each community was recorded, including dominant species, percent cover, and relative abundance of species in each height class. Vegetation community data provided by TRCA was ground-truthed. Vegetation communities not previously assessed by the TRCA were subject to a full assessment to the extent feasible given land access restrictions.

Additionally, a list of vascular plants encountered during the field investigation was compiled. TRCA records of significant species wihtin and ajdacnt to the study area were also included.

2.2.2 Tree Inventory

As part of the terrestrial field investigations, an inventory and assessment of all trees with a diameter at breast height (DBH) of 10 centimetres (cm) or more was completed on October 22, 2020 by an Arborist Certified by the International Society of Arboriculture (ISA). Trees were assessed and the following information was collected for each tree:

- Species;
- DBH (cm);
- Crown Diameter (m); and
- Condition rating based on health and structure (good, fair, poor, or dead).

Each tree was assigned a condition rating of good, fair, poor, or dead, based on the following criteria:

- ***Poor*** – Severe dieback, significant lean, missing leader, major defects, significant decay and/or disease presence;
- ***Fair*** – Moderate dieback and/or lean, limb defects, multiple stems, moderate foliage damage from stress;
- ***Good*** – Healthy vigorous growth, minor visible defects or damage; or
- ***Dead*** – No live crown (epicormic growth may be present).

Tree condition was assessed based on presence and severity of external flaws, damage, evidence of pests or diseases, structural condition, dead or dying branches, or other decline indicators.

Site Location	Figure 1
Heart Lake Road and Countryside Drive, Environmental Assessment, City of Brampton	
Project: 220296 Last Revised: December, 2020	
Client: MTE Consultants Inc.	Prepared by: DU Checked by: AB DRAFT
N 1:4,000	Inset Map:1:50,000

C:\Dropbox\Dropbox (Beacon)\All GIS Projects\2020\220296 EA Heart Lake Rd & Countryside Dr Intersection\MXD\20201020_Figure01_SiteLocation_220296.mxd

Trees were tagged, with metal numbered labels, using a staple gun. The location of individual trees and/or tree groupings was determined using a survey-grade Arrow Gold GNSS Receiver and incorporated into Geographical Information Systems (GIS) and AutoCAD platforms.

Limitations of the assessment are included in **Appendix B**.

2.2.3 Wildlife

Beacon did not complete specialized terrestrial wildlife surveys in the Study Area in 2020, although incidental records of terrestrial species were noted during other surveys. The characterization of the terrestrial wildlife will be completed through background resources, as described in **Section 3.1**.

2.2.4 Aquatic Habitat

An aquatic ecologist visited the subject property on October 8, 2020 with the intention of completing a habitat assessment of the mapped watercourse that crosses Heart Lake Road east of the Subject Property. However, an aquatic habitat assessment was not undertaken as it was determined that no channel or direct fish habitat were present.

3. Study Findings

3.1 Background Review

The data obtained during the background review supports the field work completed by Beacon in 2020 to characterize the biological environment in the Study Area and has been integrated in the results of the field investigations detailed in **Section 4.2** where applicable. Additionally, the background resources were used to screen for SAR (including Endangered, Threatened and Special Concern species) in the Study Area, as detailed in **Section 4.3**.

It is known through the review of background information that the stretch of Heart Lake Road spanning from the intersection with Countryside Drive approximately 200 m south east is a wildlife road mortality hotspot. The TRCA, in partnership with the City of Brampton, installed a wildlife crossing structure and directional fencing to mitigate wildlife road mortality in this area.

3.2 Field Investigations

3.2.1 Vegetation Communities and Flora

Upon completion of vegetation surveys, Beacon determined that vegetation community boundaries and types provided by TRCA were generally correct. Minor refinements were made to some polygon boundaries and one wetland community east of Countryside Drive was re-classified. The TRCA had identified this wetland as a Willow Organic Thicket Swamp (SWT3-2) but upon review it was determined

that is it a Cattail Mineral Shallow Marsh (MAS2-1). The MAS2-1 community is shown in **Photograph 1**.
Additionally, there is a mid-aged Dry - Fresh Sugar Maple - Beech Deciduous Forest (FOD5-2) community located east of Countryside Drive that was not previously mapped by TRCA. The canopy is dominated by Sugar Maple (*Acer saccharum spp. saccharum*), with American Beech (*Fagus grandifolia*) and Red Oak (*Quercus rubra*), forming lesser associates. Sugar Maple is also dominant in the subcanopy, with American Beech as an occasional associate. The understory is dominated by European buckthorn (*Rhamnus cathartica*) with Sugar Maple as an occasional associate. Large-leaved Aster (*Eurybia macrophylla*) and Common White Snakeroot (*Ageratina altissima* var. *altissima*) are abundant in the ground layer. Soil sampling using an auger confirmed soils are comprised of silty sands. No mottled soils, water or bedrock was encountered in the auger sampling.. This vegetation community is shown in **Photograph 1**.

Photograph 1. Facing North, MAS2-1 in Foreground and FOD5-2 in Background (October 8, 2020)

A total of 32 species of vascular plants were catalogued during the botanical inventory and vegetation community classification surveys conducted by Beacon within the ELC community FOD5-2 community. Additionally, the TRCA provided flora data known to the Study Area that included 31 species. All together, 62 vascular plants have been recorded in the Study Area, of which 61 were identified to the species level, and of this identified group, 53 (87%) are native to Ontario and 8 (13%) are introduced species. One sedge plant Carex sp. could not be identified to the species level due to the timing of the surveys. A list of flora recorded within the Study Area is included in **Appendix A**.

Most species recorded have a high range of habitat tolerances, as evidenced by the high proportion of species with a low coefficient of conservatism (CC) values. Species with narrow habitat tolerances (i.e., with CC values ≥7), of which five were recorded: one was found within ELC community FOD5-2 and four were recorded by TRCA in the Heart Lake Conservation Area. None of the species recorded during surveys are of global, national, or provincial significance. SAR flora, including and not limited to

Butternut, were not observed. Although, 12 species of local significance (i.e., ranked L1-L3 by the TRCA) were in the Study Area. These species are listed in **Table 1** below and are mapped on **Figure 2**. Please note that the occurrence numbers used to label species on **Figure 2** are listed in the table as well, with the exception for Running Strawberry-bush (*Euonymus obovata*), which was recorded by Beacon in the western edge of ELC community FOD5-2.

Table 1. Vegetation Species of Regional Conservation Concern

Species	Common Name	S-Rank[1]	L-Rank[2]	Data Source	Occurrence Number(s) (Fig. 2)
Calla palustris	Water Arum	S5	L2	TRCA	36, 41
Carex comosa	Bristly Sedge	S5	L3	TRCA	47
Carex crinita	Fringed Sedge	S5	L3	TRCA	20
Euonymus obovata	Running Strawberry-bush	S5	L3	Beacon	n/a, in FOD5-2
Ilex verticillata	Winterberry	S5	L3	TRCA	30
Iris versicolor	Northern Blue-flag	S5	L3	TRCA	28, 50
Lemna trisulca	Star Duckweed	S5	L3	TRCA	19, 34
Persicaria sagittata	Arrow-leaved Tearthumb	S4	L3	TRCA	35
Picea glauca	White Spruce	S5	L3	TRCA	1, 7, 17
Pinus resinosa	Red Pine	S5	L1	TRCA	6
Rosa palustris	Swamp Rose	S5	L2	TRCA	46
Sparganium emersum ssp. *emersum*	Narrow-leaved Bur-reed	S5	L3	TRCA	49

[1]Provincial Rank (NHIC): S4=Apparently Secure, S5=Secure
[2]Local Rank (TRCA):

- L1= Unable to withstand disturbance; many criteria are limiting factors; generally occur in high-quality natural areas in natural matrix; almost certainly rare in the TRCA jurisdiction; of concern regionally.
- L2= Unable to withstand disturbance; some criteria are very limiting factors; generally occur in high-quality natural areas, in natural matrix; probably rare in the TRCA jurisdiction; of concern regionally.
- L3= Able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern.

Additionally, through the background review, one vascular plant and one non-vascular plant listed by the NHIC as having provincial ranks of S2, meaning they are considered imperiled because of rarity due to very restricted range, very few populations(often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation. These two species are Honey Locust (*Gleditsia triacanthos*) and Narrow-leaved Beard Moss (*Elodium paludosum*), neither of which were recorded in the Study Area by Beacon or the TRCA.

3.2.2 Tree Inventory

At total of 41 roadside trees measuring between 10 cm DBH and 82 cm DBH were inventoried and assessed on and adjacent to the Study Area.

The majority of trees are Red Oak and Sugar Maple. Most trees inventoried are in good condition and ten were dead.

Tree locations are shown on **Figure 2**, and tree inventory data are presented in **Appendix C**. A detailed tree inventory and protection plan, will be produced for the preferred option selected though the EA process.

3.2.3 Wildlife

Beacon did not complete wildlife surveys in the Study Area in 2020, although during a vegetation survey on October 22, 2020, a single Eastern Garter snake (*Thamnophis sirtalis sirtalis*) was noted on the edge of the Native Deciduous Successional Savannah (ELC community CUS1-A1) near Heart Lake Road. This species is ranked as L4 by TRCA, meaning it is able to withstand some disturbance and is generally secure in rural matrix but of concern in urban matrix.

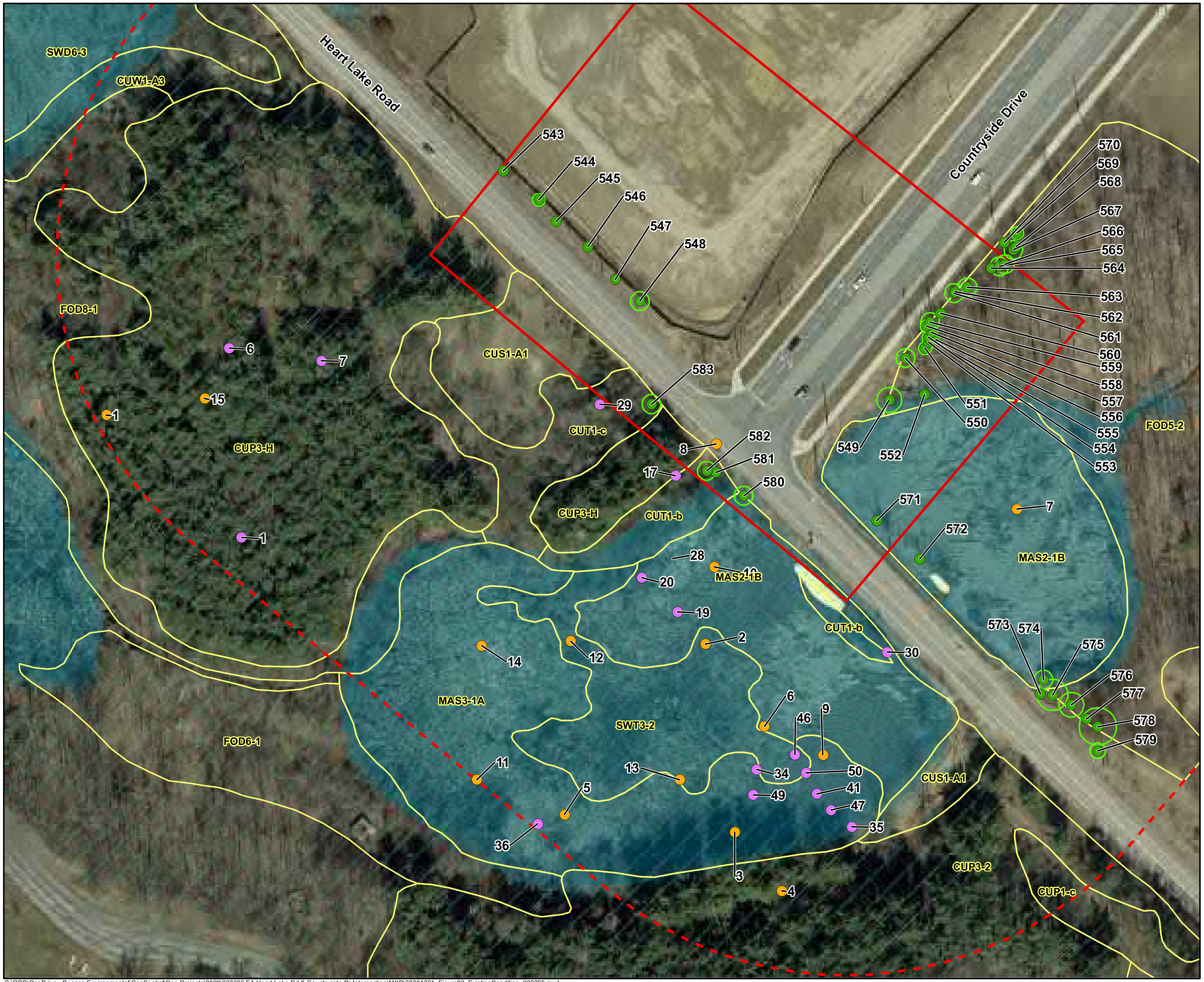
Also during the vegetation survey conducted in 2020, it was noted that the Dry - Fresh Sugar Maple - Beech Deciduous Forest (FOD5-2) community east of Countryside Drive contained suitable habitat for bat maternity roosts as described in the *Survey Protocol for Species at Risk Bats within Treed Habitats Little Brown Myotis, Northern Myotis & Tri-Colored Bat* (Guelph District MNRF 2017). The community contains numerous mature cavity trees, contains a relatively open understory, and is adjacent to a marsh. At the time of writing, no further bat habitat assessment was completed or planned for this feature.

As mentioned in **Section 3.2.3**, the terrestrial wildlife within the Study Area can be further characterized through the background data for the Study Area provided by the TRCA. Their species record for the Study Area are included in **Table 2**; these records are mapped on **Figure 2** in accordance with the occurrence numbers listed in the last column in the table.

Table 2. Fauna Records from TRCA for Study Area

Type	Species	Common Name	Breeding Status	Call Code[1]	S-Rank[2]	L-Rank[3]	Occurrence Number (Fig. 2)
Amphibian	*Pseudacris crucifer crucifer*	Spring Peeper	Probable	3	S5	L2	5
Amphibian	*Lithobates sylvatica*	Wood Frog	Probable	2	S5	L2	6
Amphibian	*Lithobates sylvatica*	Wood Frog	Probable	1	S5	L2	7
Amphibian	*Pseudacris crucifer crucifer*	Spring Peeper	Probable	1	S5	L2	9
Amphibian	*Lithobates sylvatica*	Wood Frog	Probable	1	S5	L2	10
Bird	*Vireo olivaceus*	Red-eyed Vireo	Probable	n/a	S5	L4	1
Bird	*Melospiza georgiana*	Swamp Sparrow	Possible	n/a	S5	L4	2
Bird	*Vireo olivaceus*	Red-eyed Vireo	Probable	n/a	S5	L4	3
Bird	*Accipiter cooperii*	Cooper's Hawk	Confirmed	n/a	S4	L4	4
Bird	*Setophaga ruticilla*	American Redstart	Probable	n/a	S5	L4	11
Bird	*Geothlypis trichas*	Common Yellowthroat	Probable	n/a	S5	L4	12
Bird	*Melospiza georgiana*	Swamp Sparrow	Probable	n/a	S5	L4	13
Bird	*Ceryle alcyon*	Belted Kingfisher	Possible	n/a	S4	L4	14
Bird	*Setophaga pinus*	Pine Warbler	Possible	n/a	S5	L4	15
Reptile	*Storeria occipitomaculata occipitomaculata*	Red-bellied Snake	Probable	n/a	S5	L3	8

[1]Call Count as per the Marsh Monitoring Protocol (Bird Studies Canada 2009):



Existing Conditions

Figure 2

Heart Lake Road and Countryside Drive, Environmental Assessment, City of Brampton

Legend

- Subject Property
- Study Area (120 m)
- Turtle Nesting Berms
- Vegetation Communities
- Surveyed Tree Crown Radius
- Surveyed Trees
- Fauna Records (TRCA)
- Flora of Local Conservation Concern (L1-L3) (TRCA)
- Wetland
- Candidate ANSI, Life

Code	Vegetation Community
CUP1-C	Locust Deciduous Plantation
CUP3-2	White Pine Coniferous Plantation
CUP3-H	Mixed Conifer Coniferous Plantation
CUS1-A1	Native Deciduous Successional Savannah
CUT1-B	Buckthorn Deciduous Thicket
CUT1-C	Exotic Deciduous Thicket
CUW1-A3	Native Deciduous Successional Woodland
FOD5-2	Dry - Fresh Sugar Maple - Beech Deciduous Forest
FOD6-1	Fresh-Moist Sugar Maple - Ash Deciduous Forest
FOD8-1	Fresh-Moist Poplar Deciduous Forest
MAS2-1B	Narrow-leaved Cattail Mineral Shallow Marsh
MAS3-1A	Broad-leaved Cattail Organic Shallow Marsh
SWD6-3	Swamp Maple Organic Deciduous Swamp
SWT3-2	Willow Organic Thicket Swamp

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Last Revised: September,

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Prepared by: BD
Checked by: DW

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- Call Code 1 - individuals of one species can be counted, calls not simultaneous.
- Call Code 2 - some calls of one species simultaneous, numbers can be reliably estimated.
- Call Code 3 - full chorus, calls continuous and overlapping.

[2]Provincial Rank (NHIC): S4=Apparently Secure, S5=Secure
[3]Local Rank (TRCA):

- L2= Unable to withstand disturbance; some criteria are very limiting factors; generally occur in high-quality natural areas, in natural matrix; probably rare in the TRCA jurisdiction; of concern regionally.
- L3= Able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern.
- L4 = Able to withstand some disturbance; generally secure in rural matrix; of concern in urban matrix.

As noted in **Table 2,** there is one L3 fauna species and five L2 fauna species on record in the vicinity of the Study Area. TRCA records do not include species that are of national or provincial significance.

Additionally, the TRCA has been studying road mortality on Heart Lake Road south of Countryside Drive and have found that turtle mortalities are very high for the section of Heart Lake Road east of Countryside Drive. In response to that, a wildlife crossing structure (open-bottom box culvert) and directional wildlife fencing have been installed, as shown in **Photograph 2** below. In addition to this, as illustrated on **Figure 2**, two turtle nesting berms exist on either side of Heart Lake Road south of Countryside Drive have also been installed.

Photograph 2. Wildlife Culvert with Fencing in Foreground, and Heart Lake Road in Background (October 8, 2020)

3.3 Species at Risk

Through the background review and surveys completed by Beacon, 20 species identified as Endangered, Threatened, or Special Concern under the provincial ESA that have been recorded within

5 km of the Study Area. To determine which of these species may be associated with the Study Area, Beacon completed an assessment based on habitat suitability. The assessment is provided in **Appendix D** and determines that suitable habitat exists in the study area for at least 8 of the 20 species noted, as summarized in **Table 3**.

Table 3. Endangered, Threatened or Special Concern Species Likelihood of Presence

Species	*Endangered Species Act* Status	Likelihood of Presence
Eastern Small-footed Myotis (Myotis leibii)	Endangered	Low, within FOD community
Little Brown Myotis (*Myotis lucifugus*)	Endangered	High, within FOD community
Northern Myotis (*Myotis septentrionalis*)	Endangered	Low, within FOD community
Tricoloured Bat (*Perimyotis subflavus*)	Endangered	Very Low, with FOD community
Eastern Wood-Pewee (*Contopus virens*)	Special Concern	Medium, within FOD/CUP community; however, there are no records for this species in the area based on TRCA data.
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	Special Concern	Very Low, within FOD community; no records for this species in the area based on TRCA data.
Snapping Turtle (*Chelydra serpentina)*	Special Concern	Confirmed based on records for the area (White et al., 2018)
Wood Thrush (*Hylocichla mustelina*)	Special Concern	Medium, within FOD community; however, there are no records for this species in the area based on TRCA data.

The potentially suitable habitat that was identified in the Study Area for all these species is associated primarily with the forested and wetland habitats. None of the species listed in **Table 3** have been recorded in the Study Area by Beacon or have been noted by TRCA, with the exception of Snapping Turtle (*Chelydra serpentina*), which has been recorded using the wildlife crossing and artificial nesting habitat on and adjacent to Heart Lake Road, respectively (White et al. 2018; TRCA 2016).

4. Evaluation of Significance

4.1 Habitat of Endangered Species and Threatened Species

In regard to the habitat of endangered species and threatened species, significance is defined by the PPS (2020) as:

The habitat, as approved by the Ontario Ministry of Natural Resources, that is necessary for the maintenance, survival, and/or the recovery of naturally occurring or reintroduced populations of endangered species or threatened species, and where those areas of occurrence are occupied or habitually occupied by the species during all or any part(s) of its life cycle.

As described in **Section 3.3**, there is potential for endangered bats to occur within the study area. The *Survey Protocol for Species at Risk Bats within Treed Habitats Little Brown Myotis, Northern Myotis & Tri-Colored Bat* (MNRF 2017) indicates that coniferous, deciduous or mixed wooded ecosite, including treed swamps, that includes trees at least 10 cm diameter-at-breast height (dbh) are potentially suitable for bat maternity roosts. Based on this guideline, the forest and swamp communities within the study represents potential habitat for SAR bats.

4.2 Significant Woodlands

Significant Woodlands are recognized as components of the City's Natural Heritage System. Significant Woodlands are defined in the PPS, ROP and City of Brampton Official Plan. All of the definitions are consistent with respect to attributes and functions that make a woodland special or significant.

The PPS (2020) defines Significant Woodlands as follows:

… 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. These are to be identified using criteria established by the Ontario Ministry of Natural Resources.

The PPS definition suggests that significant woodlands are to be identified using criteria established by the MNRF; however, such criteria do not currently exist.

The Region of Peel Official Plan defines Significant Woodlands as follows:

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 …the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history.

The City of Brampton Official Plan does not explicitly define Significant Woodlands; however, it utilizes the PPS definition as follows:

In regard to provincially significant natural heritage features, those identified by the Ministry of Natural Resources using evaluation procedures established by the Province.

Based on the application of the significance criteria noted above and through the criteria listed in Table 7-2 of the *Natural Heritage Reference Manual* (MNR 2010), the treed communities associated with the Study Area would be considered a significant woodland due to criteria such as their size, their proximity to other significant natural heritage features and in the case of woodland overlapping with the Heart Lake Conservation Area, social functional value. The following vegetation communities have been included as Significant Woodland:

- Locust Deciduous Plantation (CUP1-C);
- White Pine Coniferous Plantation (CUP3-2);
- Mixed Conifer Coniferous Plantation (CUP3-H);
- Native Deciduous Successional Woodland (CUW-A1);
- Dry - Fresh Sugar Maple - Beech Deciduous Forest (FOD5-2);
- Fresh - Moist Poplar Deciduous Forest (FOD8-1); and
- Swamp Maple Organic Deciduous Swamp (SWD6-3).

4.3 Significant Wetlands

In regard to wetlands, significance is defined by the PPS (2020) as:

> *An area identified as provincially significant by the Ontario Ministry of Natural Resources using evaluation procedures established by the Province, as amended from time to time.*

The wetlands within the Study Area form part of the Heart Lake Provincially Significant Wetland (PSW) complex. According to White et al. (2018), this PSW is ranked in the top ten of all evaluated wetlands in Ontario. The following vegetation communities are included within the portion of the Heart Lake PSW that falls within the Study Area:

- Narrow-leaved Cattail Mineral Shallow Marsh (MAS2-1B);
- Broad-leaved Cattail Organic Shallow Marsh (MAS3-1A);
- Swamp Maple Organic Deciduous Swamp (SWD6-3); and
- Willow Organic Thicket Swamp (SWT3-2).

4.4 Significant Wildlife Habitat

Significant wildlife habitat (SWH) is one of natural heritage features that require site-specific, comprehensive analysis to identify candidate features. It is our understanding that the Region of Peel has developed SWH criteria and thresholds which are included in Figure 5 of the ROP, but that the thresholds are not adopted as policy. The City of Brampton Official Plan does not define SWH, so it is presumed that it is defined as per the PPS.

> *Significant: means:* d) *"in regard to other features and areas, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system"*

According to the Significant Wildlife Habitat Technical Guidelines (MNR 2000), there are four broad categories of Significant Wildlife Habitat (SWH):

- Seasonal Concentration Areas of Animals;
- Rare Vegetation Communities or Specialized Habitat for Wildlife;

- Habitat for Species of Conservation Concern; and
- Animal Movement Corridors.

Within each of these categories, there are multiple types of SWH, each intended to capture a specialized type of habitat that may or may not be captured by other existing feature-based categories (e.g., significant wetlands, significant woodlands).

To determine if the Study Area potentially supports SWH, the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF 2015) was consulted. A complete screening in included in **Appendix E**. Based on the results of the screening, the Study Area supports potential SWH for the following:

- Bat Maternity Colonies associated of FOD5 community;
- Woodland Raptor Nesting Habitat based on presence of Cooper's Hawk nest (Fauna point number 4 in Figure 2);
- Turtle Wintering Area within cattail marsh community;
- Turtle Nesting Area (associated with constructed habitat as illustrated in **Figure 2**); and
- Habitat for Species of Conservation Concern based on records for Snapping Turtle.

4.5 Significant Areas of Natural and Scientific Interest

In regard to ANSIs, significance is defined by the PPS as:

> *Areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education.*

The Study Area overlaps with two Candidate Provincially Significant ANSIs: the Brampton Buried Esker Earth Science ANSI and the Heart Lake Forest and Bog Life Science ANSI. These two ANSIs are coincident with the Heart Lake Conservation Area.

4.6 Fish Habitat

No defined watercourses or aquatic features supporting direct fish habitat were identified in the Study Area. Diffuse flows from the wetlands within the Study Area may provided indirect contributions to downstream fish habitat.

5. Description of Proposed Alternatives

The current intersection of Hearth Lake Road and Countryside Drive consists of a T-intersection controlled by stop signs.

Two alternative designs were considered for the future intersection of Heart Lake Road and Countryside Drive:

- Round-about; and
- T-intersection controlled by traffic lights, with roads widened to accommodate left and right turning lanes.

The round-about and T-intersection alternatives are illustrated in **Figure 3a and 3b**.

Alternative 1 includes changes in stormwater management that includes curb and gutter at all approaches, a new culvert crossing east of the intersection, proposed stormwater capture using LID along the west side of Heart Lake Road and south side of Countryside Drive, new outlets to the southwest ditch and regrading and enhancement of the existing ditches (MTE 2022).

Under Alternative 2, the only significant change in the proposed drainage infrastructure from the existing design is the addition of curb and gutter along Heart Lake Road at the intersection approaches and proposed LID and new outlet along the south side of Countryside Drive (MTE 2022).

6. Impact Assessment

The following is an assessment/comparison of the impacts of the alternative intersection designs on the natural heritage and hydrological features within the study area. A "do nothing" option was also considered.

6.1 Terrestrial (Upland) Vegetation

6.1.1 Do nothing

Doing nothing would not result in any impacts on terrestrial vegetation

6.1.2 Alternative 1: Round About

Alternative 1 will require removal of vegetation from the edge of a Buckthorn cultural thicket and mixed conifer plantation on the west side of Heart Lake Road. The following is the approximate areas of encroachment into these vegetation communities:

- Buckthorn Cultural Thicket - 42 m^2; and
- Mixed Conifer Plantation - 39 m^2.

Based on the tree inventory, five trees will require removal under this alternative as summarized in **Table 4**. Four of the trees are dead and one is in poor condition.

Intersection Design Alternative 1: Roundabout

Figure 3a

Heart Lake Road and Countryside Drive, Environmental Assessment, City of Brampton

Legend

- Subject Property
- Study Area (120
- Proposed Development
- Construction Limit
- Vegetation Communities
- Fauna Records (TRCA)
- Flora of Local Conservation Concern (L1-L3) (TRCA)
- Surveyed Trees
- Surveyed Tree Crown Radius
- Turtle Nesting Berms
- Encroachment
- Wetland

Code	Encroachment (m^2)
CUP3-H	39
CUT1-B	42
MAS2-1B	47

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Client: MTE Consultants Inc.

Prepared by: BD
Checked by: DW

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Intersection Design Alternative 2: T-Intersection

Figure 3b

Heart Lake Road and Countryside Drive, Environmental Assessment, City of Brampton

Legend

- Subject Property
- Study Area (120 m)
- Proposed Development
- Construction Limit
- Surveyed Trees
- Fauna Records (TRCA)
- Flora of Local Conservation Concern (L1-L3) (TRCA)
- Vegetation Communities
- Turtle Nesting Berms
- Surveyed Tree Crown Radius
- Encroachment
- Wetland

Code	Encroachment (m^2)
CUP3-H	108
CUT1-B	66
CUT1-C	56
MAS2-1B	271

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Project: 220296
Last Revised: October, 2022

Client: MTE Consultants Inc.

Prepared by: DU
Checked by: DW

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Table 4. Tree Removals Required for Alternative 1

Tree Number	Scientific Name	Common Name	DBH (cm)	Condition
546	*Fraxinus pennsylvanica*	Green Ash	8, 10, 4	Dead
547	*Fraxinus pennsylvanica*	Green Ash	22	Dead
548	*Fraxinus pennsylvanica*	Green Ash	23, 30	Dead
580	*Acer negundo*	Manitoba Maple	28	Poor
581	*Ulmus americana*	White Elm	41	Dead

6.1.3 Alternative 2: T-Intersection Improvements

Alternative 2 requires removal of vegetation from the edge of an Exotic Cultural Thicket, Buckthorn Cultural Thicket, Mixed Conifer Plantation, and Deciduous Successional Savannah on the west side of Heart Lake Road. The following is the total area of encroachment into these vegetation communities:

- Exotic Cultural Thicket – 56 m^2;
- Buckthorn Cultural Thicket - 66 m^2;
- Mixed Conifer Plantation – 108 m^2; and
- Native Deciduous Successional Savanah – 137 m^2.

Based on the tree inventory, six trees will require removal under this alternative as summarized in **Table 5**. Three of the identified trees are Buckthorn, a highly invasive shrub. Other trees include a Service Berry in fair to good condition, a Manitoba Maple in poor condition, and a dead White Elm.

Table 5. Tree Removals required for Alternative 2

Tree Number	Scientific Name	Common Name	DBH (cm)	Condition
543	*Rhamnus cathartica*	Common Buckthorn	14	Good
545	*Amelanchier sp.*	Serviceberry	12	Fair-Good
580	*Acer negundo*	Manitoba Maple	28	Poor
581	*Ulmus americana*	White Elm	41	Dead
582	*Rhamnus cathartica*	Common Buckthorn	13, 14	Good
583	*Rhamnus cathartica*	Common Buckthorn	10,7, 8, 4, 9, 6	Fair-Good

6.1.4 Summary

The total area of encroachment into the terrestrial vegetation communities under Alternative 2 is 286 m^2 more than Alternative 1.

However, under both alternatives, the encroachments are limited to the edges of disturbed cultural vegetation communities, requiring removal of shrub thicket (dominated by invasive species) and cultural meadow vegetation.

While greater encroachment is required under Alternative 2, the encroachments are fairly minor under both alternatives, and are not likely to have significant negative impacts on the features or their ecological functions.

Under both alternatives, tree removals are minimal and involve the removal of low-quality vegetation (i.e. invasive species, trees that are in poor condition or dead).

6.2 Wetlands

6.2.1 Do nothing

Doing nothing would not result in any impacts on wetlands.

6.2.2 Alternative 1: Round About

The roundabout will involve encroachment into the adjacent cattail marsh wetland (MAS2-1b) communities on the east and west sides of Heart Lake Road. A total of 47 m^2 of wetland will be permanently impacted by this design alternative (38 m^2 on the east side and 9 m^2 on the west side).

The roundabout increases the amount of impervious surface and drainage footprint of the intersection by 300 m^2 (<1% increase over existing), which will result in an increase in run-off of 14L/s under the 100-year storm event. Impacts on wetland hydrology resulting from this increase are expected to be minimal and Low Impact Development (LID) options are proposed to mitigate this increase (MTE 2022).

6.2.3 Alternative 2: T-Intersection

Alternative 2 also impacts on adjacent wetlands on both sides of Heart Lake Road. A total of 271 m2 of wetland will be permanently impacted by this design alternative (201 m^2 on the east side, and 70 m^2 on the west side).

Peak runoff generated by a signal-controlled T-intersection is essentially unchanged from the existing condition due to the nominal changes in the configuration of the impervious and pervious surfaces of the right-of-way (MTE 2022).

6.2.4 Summary

The total area of encroachment into wetland vegetation communities (cattail marsh) under Alternative 2 is 224 m^2 more than Alternative 1.

While more wetland removal is required under Alternative 2, the encroachments into the wetland are fairly minor under both alternatives, representing a relatively small proportion of the total wetland area. The loss of wetland is not likely to have significant negative impacts on the wetland features or their ecological functions.

6.3 Wildlife and Wildlife Habitat

The loss of vegetation from upland and wetland features associated with the alternative intersection designs (discussed in preceding sections) will result in a corresponding loss of wildlife habitat.

The impacts of the alternatives on Potential SWH identified in **Section 4.4** are summarized in **Table 6**. The T-intersection improvements (alternative 3) results in a greater impact on wildlife habitat compared to the Round-about (alternative 2); however, under both alternatives, the loss of habitat is small and limited to the edges of the features and is not expected to have a signficant impact on wildlife.

Table 6. Impacts on features identified as Potential Signficant Wildlife Habitat

SWH Type	SWH Status	Location within Study Area	Do Nothing	Round-about	T-Intersection
Bat Maternity Colonies	Potential	FOD and SWD Communities	No Impact	No Impact	No Impact
Turtle Wintering Areas	Potential	MA- and SW-Communities	No Impact	Minor impact – lost of 47 m^2 of potentially suitable marsh habitat	Minor impact – 271 m^2 of potentially suitable marsh habitat
Woodland Raptor Nesting Habitat	Potential	Cooper's Hawk Nest (occurrence number 4 on **Figure 2**)	No Impact	No Impact	No Impact
Turtle Nesting Areas	Potential	Artificial nesting habitats (see **Figure 2**).	No Impact	No Impact	No Impact
Habitat for Species of Conservation Concern	Potential	There are records for Snapping Turtle, a species Special Concern, in the Study Area.	No Impact	Minor impact – lost of 47 m^2 of marsh habitat No Impact	Minor impact – loss of 271 m^2 of marsh habitat No Impact

No impacts on habitat for threatened or endangered species are expected to occur on under either alternative.

As discussed previously, a wildlife crossing structure (open-bottom box culvert) and directional wildlife fencing have been installed within the study area. The culvert passage is located outside the construction limits for the Roundabout. The culvert is located within the construction limits for the T-Intersection alternative. The culvert would remain in place during construction and lengthened to accommodate a slightly wider roadway. Wildlife may be deterred from using the culvert during construction due to construction-related interruptions and disturbances such as noise. However, long term impacts on wildlife passage are not anticipated.

6.4 Summary

A summary of the impacts of the intersection design alternatives on natural heritage features and functions within the study area is provided in **Table 7**.

Table 7. Summary of Impacts

Natural Environment	Measure of Potential Impact	Do Nothing	Alternative 1 Roundabout	Alternative 2 Signalized T-Intersection
Surface Water	Aquatic Species and Habitat	No impact on aquatic species or habitat	Potential impacts to aquatic species and habitat (outside of study area) through sedimentation during construction.	Potential impacts to aquatic species and habitat (outside of study area) through sedimentation during construction.
Vegetation	Wetlands	No impact on PSW	47 m2 encroachment into cattail marsh community associated with Heart Lake PSW. Potential for minor hydrological impact on wetlands due to small increase in impervious surface area and peak runoff.	271 m2 encroachment into cattail marsh community associated with Heart Lake PSW No change to impervious surface area and peak runoff.
	Terrestrial Vegetation	No impact on terrestrial vegetation	81 m2 encroachment along edges of cultural thicket and cultural plantation communities	367 m2 encroachment along edges of cultural thicket, cultural plantation, and cultural savanna communities
Wildlife	Signficant Wildlife Habitat	No impacts on SWH	Minor impact on cattail marsh which represents potential SWH for Turtle Wintering Area and Habitat for Species of Conservation Concern (i.e. Snapping Turtle). The small encroachment into the wetland along roadside is not expected to have a negative impact on these types of habitat.	Minor impact on cattail marsh which represents potential SWH for Turtle Wintering Area and Habitat for Species of Conservation Concern (Snapping Turtle). The small encroachment into the wetland along roadside is not expected to have a negative impact on these types of habitat.
	Species at Risk	No impacts on SAR	No impacts on SAR	No impacts on SAR
	Breeding Birds	No impacts on breeding birds	Potential impacts on breeding birds if vegetation is removed during the nesting period	Potential impacts on breeding birds if vegetation is removed during the nesting period
	Wildlife Crossing (open bottom culvert)	No impacts on wildlife crossing	The wildlife crossing structure is located outside the construction limits.	The wildlife crossing culvert is located within the construction limits. While the culvert will remain in-situ, wildlife may be deterred from using the culvert during construction due to construction-related interruptions and disturbances such as noise. However, Long term impacts on wildlife passage are not anticipated.

7. Recommended Mitigation

The following measures are recommended to avoid or minimize impacts on natural heritage and hydrological features within study area. Potential impacts can largely be avoided or minimized through the following mitigation recommendations, which are relevant to both intersection alternatives.

- Construction works such as grading, grubbing and excavation have the potential to result in the movement of sediment into the offsite watercourses and wetlands. An Erosion and Sediment Control (ESC) plan should be prepared prior to the start of the construction phase of the development and approved by the TRCA. The plan should include but not be limited to establishment of silt fence at the construction limit. ESC measures should be regularly inspected and maintained in good working order throughout the construction period;
- A spill response plan should be prepared for works in or near the watercourses and wetlands and take necessary actions and notify appropriate personnel in the event of a spill (identification of local MECP office);
- Low impact design (LID) measures should be utilized where feasible to promote infiltration and provide stormwater quality and quantity treatment (see MTE 2022);
- Following construction, temporary ESC measures should be removed after soils are sufficiently covered and stabilized. Exposed soils should be stabilized as soon as possible through re-vegetation using native species or other appropriate methods;
- Exterior lighting fixtures adjacent to the natural area should direct light downward to the surface where it is needed and minimize up-light;
- Landscaping plans should utilize a diversity of local native species that are complimentary to the adjacent natural features;
- The limits of the work area should be delineated by exclusion fencing for the protection of trees and other vegetation. Silt fence may double as tree/vegetation protection fencing;
- During construction, if wildlife is encountered within the construction limits, a qualified biologist should be contacted to ensure appropriate handling and relocation; and
- The removal of trees and other vegetation from the site has the potential to disturb nesting birds. The federal *Migratory Birds Convention Act* protects the nests, eggs and young of most bird species from harassment, harm, or destruction. The breeding bird season in southern Ontario is generally from April 1 to August 31; therefore, the clearing of vegetation should be outside of these dates (i.e., between September 1 and March 31).

8. Conclusion

This Natural Environment Report was prepared to support the Heart Lake Road and Countryside Drive EA that is being undertaken by MTE Consultants Inc.

The report identifies, describes, and evaluates existing conditions of the aquatic and terrestrial environment within the Hearth Lake Road and Countryside Drive Intersection Study Area using information collected from background resources and scoped field investigations. The information was used to evaluate impacts of alternative intersection designs on the natural heritage and hydrological features within the study area.

Significant natural heritage features identified in the Study Area include PSW, Signficant Woodland, Candidate ANSI, potential SWH, and potential habitat for threatened or endangered species (i.e. bats).

Two intersection designs were evaluated: a round-about and a signal-controlled T-Intersection. Both options would result in minimal direct impacts on the adjacent wetland and upland terrestrial vegetation communities in the study area. However, of the two alternatives, the round-about design results in less encroachment into the adjacent natural heritage features (notably PSW) and will not require construction in the vicinity of or modification to the wildlife passage culvert compared to the T-intersection. The roundabout option is the preferred alternative. The report provides a number of mitigation measures to minimize impacts on the natural environment prior to, during, and after construction.

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Appendix A

Vascular Plant Species List

Appendix A

Vascular Plant Species List

Species		CC	CW	Status					Introduced 0=n 1=y	Data Source	
Scientific Name	**Common Name**			**COSEWIC**	**COSSARO**	**TRCA***	**G-Rank**	**S-Rank**		**ELC Polygon FOD5-2**	**TRCA Data**
Acer platanoides	Norway Maple	0	5			L+	G?	SE5	I	X	
Acer rubrum	Red Maple	4	0			L4	G5	S5	0		X
Acer saccharum ssp. *saccharum*	Sugar Maple	4	3			L5	G5	S5	0	X	
Acer X freemanii	Freeman's Maple	n/a	n/a			L4	G?	S5	0		X
Ageratina altissima var. *altissima*	White Snakeroot	5	3			L5	G5	S5	0	X	
Alliaria petiolata	Garlic Mustard	0	0			L+	G?	SE5	I	X	
Asclepias incarnata ssp. *incarnata*	Swamp Milkweed	6	-5			L4	G5	S5	0		X
Betula papyrifera	White Birch	2	2			L4	G5	S5	0		X
Boehmeria cylindrica	False Nettle	4	-5			L4	G5	S5	0		X
Calla palustris	Water Arum	8	-5			L2	G5	S5	0		X
Carex comosa	Bristly Sedge	5	-5			L3	G5	S5	0		X
Carex crinita	Fringed Sedge	6	-4			L3	G5	S5	0		X
Carex lacustris	Lakebank Sedge	5	-5			L4	G5	S5	0		X
Carex pedunculata	Long-stalked Sedge	5	5			L4	G5	S5	0	X	
Carex pensylvanica	Pennsylvania Sedge	5	5			L4	G5	S5	0	X	
Carex Sp -unknown	Sedge	n/a	n/a			n/a	n/a	n/a	0	X	
Carya cordiformis	Bitternut Hickory	6	0			L4	G5	S5	0		X
Cornus amomum ssp. *obliqua*	Silky Dogwood	5	-4			L4	G5	S5	0		X
Cuscuta gronovii	Common Dodder	4	-3			L4	G5	S5	0		X
Dactylis glomerata	Orchard Grass	0	3			L+	G?	SE5	I	X	
Dryopteris carthusiana	Spinulose Wood Fern	5	-2			L5	G5	S5	0	X	
Epifagus virginiana	Beechdrops	6	5			L4	G5	S5	0	X	
Euonymus obovata	Running Strawberry-bush	6	5			L3	G5	S5	0	X	
Eupatorium perfoliatum	Common Boneset	2	-4			L5	G5	S5	0		X
Eurybia macrophylla	Large-leaved Aster	5	5			L4	G5	S5	0	X	
Fagus grandifolia	American Beech	6	3			L4	G5	S5	0	X	
Geranium robertianum	Herb Robert	0	5			L+?	G5	SE5	I	X	
Hydrophyllum virginianum	Virginia Water-leaf	6	-2			L5	G5	S5	0	X	
Ilex verticillata	Winterberry	5	-4			L3	G5	S5	0		X
Iris versicolor	Northern Blue-flag	5	-5			L3	G5	S5	0		X
Juglans nigra	Black Walnut	5	3			L4	G5	S4	0	X	
Lemna trisulca	Star Duckweed	4	-5			L3	G5	S5	0		X
Lonicera tatarica	Tartarian Honeysuckle	0	3			L+	G?	SE5	I	X	
Lysimachia thyrsiflora	Tufted Loosestrife	7	-5			L4	G5	S5	0		X
Persicaria sagittata	Arrow-leaved Tearthumb	5	-5			L3	G5	S4	0		X
Picea glauca	White Spruce	6	3			L3	G5	S5	0		X
Pinus resinosa	Red Pine	8	3			L1	G5	S5	0		X

Species		CC	CW	Status					Introduced	Data Source	
Scientific Name	Common Name			COSEWIC	COSSARO	TRCA*	G-Rank	S-Rank	0=n 1=y	ELC Polygon FOD5-2	TRCA Data
Pinus strobus	Eastern White Pine	4	3			L4	G5	S5	0	X	X
Prunus pensylvanica	Pin Cherry	3	4			L4	G5	S5	0	X	
Prunus serotina	Black Cherry	3	3			L5	G5	S5	0	X	
Prunus virginiana ssp. *virginiana*	Choke Cherry	2	1			L5	G5	S5	0	X	
Quercus rubra	Red Oak	6	3			L4	G5	S5	0	X	
Rhamnus cathartica	Common Buckthorn	0	3			L+	G?	SE5	I	X	
Ribes cynosbati	Prickly Gooseberry	4	5			L5	G5	S5	0	X	
Rosa palustris	Swamp Rose	7	-5			L2	G5	S5	0		X
Rubus idaeus ssp. idaeus	Red Raspberry	0	5			L5	G5	SE1	I	X	
Rumex britannica	Great Water Dock	6	-5			L4	G5	S4S5	0		X
Salix amygdaloides	Peach-leaved Willow	6	-3			L4	G5	S5	0		X
Salix discolor	Pussy Willow	3	-3			L4	G5	S5	0		X
Sium suave	Water-parsnip	4	-5			L5	G5	S5	0		X
Solidago caesia	Blue-stem Goldenrod	5	3			L5	G5	S5	0	X	
Solidago canadensis var. *canadensis*	Canada Goldenrod	1	3			L5	G5	S5	0	X	
Sparganium emersum ssp. *emersum*	Narrow-leaved Bur-reed	5	-5			L3	G5	S5	0		X
Spiraea alba	Narrow-leaved Meadowsweet	3	-4			L4	G5	S5	0		X
Symphyotrichum cordifolium	Heart-leaved Aster	5	5			L5	G5	S5	0	X	
Taraxacum officinale	Common Dandelion	0	3			L+	G5	SE5	I	X	
Thelypteris palustris var. *pubescens*	Marsh Fern	5	-4			L4	G5	S5	0		X
Thuja occidentalis	Eastern White Cedar	4	-3			L5	G5	S5	0		X
Tilia americana	Basswood	4	3			L5	G5	S5	0	X	
Tsuga canadensis	Eastern Hemlock	7	3			L4	G5	S5	0	X	
Typha latifolia	Broad-leaved Cattail	3	-5			L4	G5	S5	0		X
Ulmus americana	White Elm	3	-2			L5	G5?	S5	0	X	

Legend
CC = Coefficient of Conservatism

CW = Wetness Index: The wetness index gives an indication of where plant species are typically found . A wetness value (coefficient of wetness) between -5 and 5. The wetland categories and their corresponding values are as follows: OBL -5, FACW -4, FACW -3, FACW -2, FAC + - 1, FAC 0, FAC- 1, FACU+ 2, FACU 3, FACU- 4, UPL 5. OBL = Obligate Wetland Occurs almost always in wetlands under natural conditions (estimated > 99% probability); FACW = Facultative Wetland Usually occurs in wetlands, but occasionally found in non-wetlands (estimated 67-99% probability); FAC = Facultative Equally likely to occur in wetlands or non-wetlands (estimated 34-66% probability); FACU = Facultative Upland Occasionally occurs in wetlands, but usually occurs in non-wetlands (estimated 1-33% probability); UPL = Obligate Upland Occurs almost never in wetlands under natural conditions (estimated < 1 % probability).

COSEWIC = Committee on the Status of Endangered Wildlife in Canada
COSSARO = Committee on the Status of Species at Risk in Ontario
COSEWIC/COSSARO: END = Endangered, THR = Threatened, SC = Special Concern

*Local status per TRCA Rank (Toronto and Region Conservation Authority) for breeding status: L5 (Able to withstand high levels of disturbance; generally secure throughout the jurisdiction, including the urban matrix; may be of very localized concern in highly degraded areas), L4 (Able to withstand some disturbance; generally secure in rural matrix; of concern in urban matrix), L3 (Able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern), L2 (Unable to withstand disturbance; some criteria are very limiting factors; generally occur in high-quality natural areas, in natural matrix; probably rare in the TRCA jurisdiction; of concern regionally), L1 (Unable to withstand disturbance; many criteria are limiting factors; generally occur in high-quality natural areas in natural matrix; almost certainly rare in the TRCA jurisdiction; of concern regionally) and L+ (non-native species).

G-Rank = Global: G1 - extremely rare, G2 - very rare, G3 - rare to uncommon, GH - historic, no record in past 20 years, GX - globally extinct, GX - globally extinct, G - no information
S-Rank = Provincial (NHIC - Natural Heritage Information Centre of Ontario): S1 - extremely rare, S2 - very rare, S3 - rare to uncommon, S4 – common, S5 - very common, SH - historic, no records in last 20 years, SNA = plant is not a native component of Ontario flora, NR = unranked

Appendix B

Tree Inventory Limitations of Assessment

Appendix B

Limitations of Tree Assessment

It is the policy of Beacon Environmental Ltd. to attach the following clause regarding limitations of the tree assessment. The intent is to ensure that the client is aware of what is technically and professionally realistic in assessing and/or retaining trees.

The assessment of the trees presented in this report has been made using accepted arboricultural techniques. These techniques include a visual examination of the above-ground parts of each tree for structural defects, scars, external indications of decay such as fungal fruiting bodies, evidence of insect attack, crown dieback, discoloured foliage, the condition of any visible root structures, the degree and direction of lean (if any), the general condition of the tree(s) and the surrounding site, and the proximity of property and people. Except where specifically noted in the report, none of the trees examined were dissected, cored, probed, or climbed, and detailed root crown examinations involving excavation were not undertaken.

Notwithstanding the recommendations and conclusions made in this report, it must be recognized that trees are living organisms and their health and vigour constantly change over time. They are not immune to changes in site conditions, pests, or variations in the weather conditions including severe storms with high-speed winds. Furthermore, some symptoms may only be visible seasonally; the extent of observations that can be made may be limited by the time of year in which the inspection took place.

While reasonable efforts have been made to ensure that the trees recommended for retention are healthy unless stated otherwise within the report, no warranty or guarantees are offered, or implied, that these trees, or any parts of them, will have continued health or structure as noted in the report. It is both professionally and practically impossible to predict with absolute certainty the behaviour of any single tree or group of trees or their component parts in all circumstances. Inevitably, a standing tree will always pose some risk. Most trees have the potential for failure if provided with the necessary combinations of stresses and elements. This risk can only be eliminated if the tree is removed.

Although every effort has been made to ensure that this assessment is reasonably accurate, it is recommended that trees be re-assessed periodically to identify changes in condition. Design or site plan changes may also necessitate re-assessment and/or revisions to this report. **The assessment presented in this report is valid at the time of the inspection and is intended for sole use of the client.** Any use of this report by a third party, and any decision based on this report, is the singular responsibility of the third party.

Appendix C

Tree Inventory Table

Appendix C

Tree Inventory Table

Tree Number	Scientific Name	Common Name	DBH (cm)	Condition	Crown Diameter (m)	Comments
543	*Rhamnus cathartica*	Common Buckthorn	14	Good	1.5	
544	*Fraxinus pennsylvanica*	Green Ash	33	Poor	2	
545	*Amelanchier sp.*	Serviceberry	12	Fair-Good	1.5	Multiple stems growing into each other
546	*Fraxinus pennsylvanica*	Green Ash	8, 10, 4	Dead	1.5	
547	*Fraxinus pennsylvanica*	Green Ash	22	Dead	1	
548	*Fraxinus pennsylvanica*	Green Ash	23, 30	Dead	3	
549	*Juglans nigra*	Black Walnut	32	Good	4	
550	*Juglans nigra*	Black Walnut	11, 20	Good	3	
551	*Quercus rubra*	Red Oak	21	Good	2	
552	*Prunus serotina*	Black Cherry	10	Dead	1.5	Crown dieback
553	*Quercus rubra*	Red Oak	11	Good	2	
555	*Acer saccharum*	Sugar Maple	14	Good	2	
554	*Quercus rubra*	Red Oak	11	Good	2	
556	*Pinus sp*	Pine species	66	Dead	0.5	
557	*Prunus serotina*	Black Cherry	17	Good	2	
558	*Quercus rubra*	Red Oak	12	Good	2	
559	*Acer x freemanii*	Freeman's Maple	42	Fair-Good	3	Canopy trimmed near power lines
560	*Prunus serotina*	Black Cherry	10	Fair-Good	1.5	Some crown dieback
561	*Acer saccharum*	Sugar Maple	19	Poor-Fair	3	Suckers, broken crown
562	*Acer saccharum*	Sugar Maple	11	Fair	1	Adjacent tree fell on canopy and caused crown damage
563	*Acer saccharinum*	Silver Maple	35	Good	3	
564	*Ulmus americana*	White Elm	28	Dead	0	
565	*Acer saccharum*	Sugar Maple	17	Good	3	
566	*Acer saccharum*	Sugar Maple	20	Good	3	
567	*Fagus grandifolia*	American Beech	14	Good	3	
568	*Fagus grandifolia*	American Beech	39	Dead	0	
569	*Fagus grandifolia*	American Beech	15	Good	2	
570	*Fagus grandifolia*	American Beech	10	Good	1.5	
571	*Ulmus americana*	White Elm	39	Dead	1	
572	*Ulmus americana*	White Elm	15	Dead	0.5	
573	*Ulmus americana*	White Elm	12	Good	1	
575	*Quercus rubra*	Red Oak	53	Good	5	Suppressed crown on west side
574	*Juglans nigra*	Black Walnut	18	Good	3	
576	*Acer saccharum*	Sugar Maple	40	Good	4	
577	*Acer platanoides*	Norway Maple	15	Good	1	
578	*Quercus rubra*	Red Oak	82	Good	6	
579	*Quercus rubra*	Red Oak	17	Good	2.5	
580	*Acer negundo*	Manitoba Maple	28	Poor	3	
581	*Ulmus americana*	White Elm	41	Dead	0	
582	*Rhamnus cathartica*	Common Buckthorn	13, 14	Good	3	
583	*Rhamnus cathartica*	Common Buckthorn	10,7, 8, 4, 9, 6	Fair-Good	3	

Appendix D

Species at Risk Screening

Appendix D

Species at Risk Screening

Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Known Species Range[1, 2]	Potentially Suitable Habitat Present within the Subject Property	Likelihood of Presence
Butternut *Juglans cinerea*	END	END Schedule 1	END	In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges.	Butternut can be found throughout central and eastern North America. In Canada, Butternut occurs in Ontario, Quebec and New Brunswick. In Ontario, this species is found throughout the southwest, north to the Bruce Peninsula, and south of the Canadian Shield.	**Yes** Potentially suitable habitat is present within the forested habitat on the Subject Property and within the Study Area.	**Not present** (species not located during targeted field surveys in 2020 or by TRCA)
Redside Dace *Clinostomus elongatus*	END	END Schedule 1	END	The Redside Dace is found in pools and slow-moving areas of small streams and headwaters with a gravel bottom. They are generally found in areas with overhanging grasses and shrubs, and can leap up to 10 cm out of the water to catch insects. During spawning, they can be found in shallow parts of streams, which are also popular spawning areas for other minnow species.	In Canada, Redside Dace are found in a few tributaries of Lake Huron, in streams flowing into western Lake Ontario, the Holland River (which flows into Lake Simcoe), and Irvine Creek of the Grand River system (which flows into Lake Erie).	**No** Potentially suitable habitat is not present on the Subject Property or within the Study Area. Record associated with the Humber watershed aproximately 4.75 km to the east.	-
Eastern Small-footed Myotis (Bat) *Myotis leibii*	END	No Status	No Status	In the spring and summer, eastern small-footed bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same spot each year.	The Eastern Small-footed bat has been found from south of Georgian Bay to Lake Erie and east to the Pembroke area. There are also records from the Bruce Peninsula, the Espanola area, Hilton Falls Conservation Area and Lake Superior Provincial Park. Most documented sightings are of bats in their winter hibernation sites.	**Yes** Potentially suitable habitat is present within the forested habitat on the Subject Property and within the Study Area.	**Low**
Little Brown Myotis (Bat) *Myotis lucifugus*	END	END Schedule 1	END	Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas. Little brown bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing. This species can typically be associated with any community where suitable roosting (i.e. cavity trees, houses, abandoned buildings, barns, etc.) habitat is available.	The Little Brown Myotis is widespread in southern Ontario and found as far north as Moose Factory and Favourable Lake. Outside Ontario, this bat is found across Canada (except in Nunavut) and most of the United States.	**Yes** Potentially suitable habitat is present within the forested habitat on the Subject Property and within the Study Area.	**High**
Northern Myotis *(Bat)* *Myotis septentrionalis*	END	END Schedule 1	END	Northern Myotis bats are associated with boreal forests, choosing to roost under loose bark and in the cavities of trees. These bats hibernate from October or November to March or April, most often in caves or abandoned mines.	The Northern Myotis is found throughout forested areas in southern Ontario, to the north shore of Lake Superior and occasionally as far north as Moosonee, and west to Lake Nipigon.	**Yes** Potentially suitable habitat is present within the forested habitat on the Subject Property and within the Study Area.	**Low**

Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Known Species Range[1, 2]	Potentially Suitable Habitat Present within the Subject Property	Likelihood of Presence
Tricoloured Bat *Perimyotis subflavus*	END	END Schedule 1	END	Tricoloured Bat inhabits a variety of forested communities, and will roost older forests and barns (or other structures). Foraging habitats include areas over water and streams. They hibernate in cave where they typically roost independently rather than in groups.	Tricoloured Bat is found in southern Ontario, where its northern limit is in proximity to Sudbury. Due to its rarity, their distribution is scattered.	**Yes** Potentially suitable habitat is present within the forested habitat on the Subject Property and within the Study Area.	**Very Low**
Bank Swallow *Riparia riparia*	THR	THR Schedule 1	THR	Bank Swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable. The birds breed in colonies ranging from several to a few thousand pairs.	The Bank Swallow is found all across southern Ontario, with sparser populations scattered across northern Ontario. The largest populations are found along the Lake Erie and Lake Ontario shorelines, and the Saugeen River (which flows into Lake Huron).	**No** Potentially suitable habitat is not present on the Subject Property or within the Study Area.	-
Barn Swallow *Hirundo rustica*	THR	THR Schedule 1	THR	Barn Swallows often live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures such as open barns, under bridges and in culverts. The species is attracted to open structures that include ledges where they can build their nests, which are often re-used from year to year. They prefer unpainted, rough-cut wood, since the mud does not adhere as well to smooth surfaces.	The Barn Swallow may be found throughout southern Ontario and can range as far north as Hudson Bay, wherever suitable locations for nests exist.	**Yes** The wildlife crossing structure could provide nesting habitat for this species.	**Not Present** Nests were not observed during field surveys.
Bobolink *Dolichonyx oryzivorus*	THR	THR Schedule 1	THR	Historically, Bobolinks lived in North American tallgrass prairie and other open meadows. With the clearing of native prairies, Bobolinks moved to living in hayfields. Bobolinks often build their small nests on the ground in dense grasses. Both parents usually tend to their young, sometimes with a third Bobolink helping.	The Bobolink breeds across North America. In Ontario, it is widely distributed throughout most of the province south of the boreal forest, although it may be found in the north where suitable habitat exists.	**No** Potentially suitable habitat is not present on the Subject Property or within the Study Area as agricultural fields are currently under construction.	-
Chimney Swift *Chaetura pelagica*	THR	THR Schedule 1	THR	Before European settlement Chimney Swifts mainly nested on cave walls and in hollow trees or tree cavities in old growth forests. Today, they are more likely to be found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. They also tend to stay close to water as this is where the flying insects they eat congregate.	The Chimney Swift breeds in eastern North America, possibly as far north as southern Newfoundland. In Ontario, it is most widely distributed in the Carolinian zone in the south and southwest of the province, but has been detected throughout most of the province south of the 49th parallel. It winters in northwestern South America.	**No** Potentially suitable habitat is not present on the Subject Property or within the Study Area.	-
Eastern Meadowlark *Sturnella magna*	THR	THR Schedule 1	THR	Eastern Meadowlarks breed primarily in moderately tall grasslands, such as pastures and hayfields, but are also found in alfalfa fields, weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields, or other open areas. Small trees, shrubs or fence posts are used as elevated song perches.	In Ontario, the Eastern Meadowlark is primarily found south of the Canadian Shield but it also inhabits the Lake Nipissing, Timiskaming and Lake of the Woods areas.	**No** Potentially suitable habitat is not present on the Subject Property or within the Study Area as agricultural fields are currently under construction.	-

Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Known Species Range[1, 2]	Potentially Suitable Habitat Present within the Subject Property	Likelihood of Presence
Eastern Whip-poor-will *Caprimulgus vociferus*	THR	THR Schedule 1	THR	The Eastern Whip-poor-will is usually found in areas with a mix of open and forested areas, such as savannahs, open woodlands or openings in more mature, deciduous, coniferous and mixed forests. It forages in these open areas and uses forested areas for roosting (resting and sleeping) and nesting. It lays its eggs directly on the forest floor, where its colouring means it will easily remain undetected by visual predators.	The Eastern Whip-poor-will's breeding range includes two widely separate areas. It breeds throughout much of eastern North America, reaching as far north as southern Canada and also from the southwest United States to Honduras. In Canada, the Whip-poor-will can be found from east-central Saskatchewan to central Nova Scotia and in Ontario they breed as far north as the shore of Lake Superior.	**No** Potentially suitable habitat is not present within the Subject Property and within the Study Area.	-
Common Nighthawk *Chordeiles minor*	SC	THR Schedule 1	SC	Traditional Common Nighthawk habitat consists of open areas with little to no ground vegetation, such as logged or burned-over areas, forest clearings, rock barrens, peat bogs, lakeshores, and mine tailings. Although the species also nests in cultivated fields, orchards, urban parks, mine tailings and along gravel roads and railways, they tend to occupy natural sites.	The range of the Common Nighthawk spans most of North and Central America. In Canada, the species is found in all provinces and territories except Nunavut. In Ontario, the Common Nighthawk occurs throughout the province except for the coastal regions of James Bay and Hudson Bay.	**No** Potentially suitable habitat is not present on the Subject Property or within the Study Area.	-
Eastern Wood-Pewee *Contopus virens*	SC	SC Schedule 1	SC	The Eastern Wood-pewee lives in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in intermediate-age mature forest stands with little understory vegetation.	The eastern wood-pewee is found across most of southern and central Ontario, and in northern Ontario as far north as Red Lake, Lake Nipigon and Timmins.	**Yes** Potentially suitable habitat is present within the forested habitat on the Subject Property and within the Study Area.	**Medium**, however the species has not been recorded from the Study Area based on TRCA data
Grasshopper Sparrow *Ammodramus savannarum*	SC	SC Schedule 1	SC	It lives in open grassland areas with well-drained, sandy soil. It will also nest in hayfields and pasture, as well as alvars, prairies and occasionally grain crops such as barley. It prefers areas that are sparsely vegetated. Its nests are well-hidden in the field and woven from grasses in a small cup-like shape.	The Grasshopper Sparrow can be found throughout southern Ontario, but only occasionally on the Canadian Shield. It is most common where grasslands, hay or pasture dominate the landscape.	**No** Potentially suitable habitat is not present on the Subject Property or within the Study Area as agricultural fields are currently under construction.	-
Red-headed Woodpecker *Melanerpes erythrocephalus*	SC	THR Schedule 1	END	The Red-headed Woodpecker lives in open woodland and woodland edges, and is often found in parks, golf courses and cemeteries. These areas typically have many dead trees, which the bird uses for nesting and perching. This woodpecker regularly winters in the United States, moving to locations where it can find sufficient acorns and beechnuts to eat. A few of these birds will stay the winter in woodlands in southern Ontario if there are adequate supplies of nuts.	The Red-headed Woodpecker is found across southern Ontario, where it is widespread but rare. Outside Ontario, it lives in Alberta, Saskatchewan, Manitoba and Quebec, and is relatively common in the United States.	**Yes** Potentially suitable habitat is present within the forested and open habitat on the Subject Property and within the Study Area.	**Low**
Wood Thrush *Hylocichla mustelina*	SC	THR Schedule 1	THR	The Wood Thrush lives in mature deciduous and mixed (conifer-deciduous) forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing perches. These birds prefer large forests, but will also use smaller stands of trees. They build their nests in living saplings, trees or shrubs, usually in sugar maple or American beech.	The wood thrush is found all across southern Ontario. It is also found, but less common, along the north shore of Lake Huron, as far west as the southeastern tip of Lake Superior. There is a very small population near Lake of the Woods in northwestern Ontario, and there have been scattered sightings in the mixed forest of northern Ontario.	**Yes** Potentially suitable habitat is present within the forested habitat on the Subject Property and within the Study Area.	**Medium**, however the species has not been recorded from the Study Area based on TRCA data

Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Known Species Range[1, 2]	Potentially Suitable Habitat Present within the Subject Property	Likelihood of Presence
Northern Map Turtle *Graptemys geographica*	SC	SC Schedule 1	SC	The Northern Map Turtle inhabits rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female's mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled.	The Northern Map Turtle's range extends from the Great Lakes region west to Oklahoma and Kansas, south to Louisiana and east to the Adirondack and Appalachian mountain barrier. There are isolated populations in New Jersey and New York states. In Canada, it is found in southwestern Quebec and southern Ontario. In southern Ontario, it lives primarily on the shores of Georgian Bay, Lake St. Clair, Lake Erie and Lake Ontario, and along larger rivers including the Thames, Grand and Ottawa.	**No** Potentially suitable habitat is not present within the marsh and swamp habitat on the Subject Property and within the Study Area. However, this species is known to occur in Heart Lake (White et al., 2018).	-
Snapping Turtle *Chelydra serpentina*	SC	SC Schedule 1	SC	Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. During the nesting season, from early to mid summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.	The Snapping Turtle's range extends from Ecuador to Canada. In Canada this turtle can be found from Saskatchewan to Nova Scotia. It is primarily limited to the southern part of Ontario. The Snapping Turtle's range is contracting.	**Yes** Potentially suitable habitat is present within the wetland habitat on the Subject Property and within the Study Area.	**Confirmed** This species use of the wildlife tunnel and artificial nesting area within the Study Area has been confirmed (White et al., 2018; TRCA, 2016).
Western Chorus Frog *Pseudacris triseriata*	No Status	THR Schedule 1	THR	Western Chorus Frogs inhabit lowland areas such as marshes and wooded wetland areas. Like most frogs, it needs terrestrial and aquatic habitats in close proximity to each other to carry out its life cycle. For breeding purposes, Western Chorus Frog utilizes seasonally dry, temporary ponds devoid of predators, such as fish. They are rarely found in permanent ponds. This species hibernates in terrestrial habitats under rocks, dead trees or leaves, loose soil or animal burrows.	In southern Ontario, Western Chorus Frog's range is bounded by the United States border in the south, Georgian Bay in the northwest, and south of Algonquin Park and up the Ottawa River valley to the vicinity of Eganville in the east. This species is divided into two distinct populations: the Carolinian population (southwestern Ontario) and the Great Lakes/St. Lawrence–Canadian Shield population (other regions of Ontario). Only the Canadian Shield population as been listed as Threatened federally.	**Yes** Potentially suitable habitat is present within the wetland habitat on the Subject Property and within the Study Area.	**Low** This species has not been recorded by TRCA staff.

Appendix E

Significant Wildlife Habitat Screening

Appendix E

Significant Wildlife Habitat Screening

Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities		Provincial Guidance for SWH in Ecoregion 6E*	Application to the Subject Lands and Study Area
Seasonal Concentration Areas			
1. Waterfowl Stopover and Staging Areas (Terrestrial)			
American Black Duck Wood Duck Mallard Northern Pintail Gadwall Blue-winged Teal Green-winged Teal American Wigeon Northern Shoveler	CUM1 CUT1 Plus evidence of annual spring flooding from malt water or run-off within these Ecosites.	*Suitable Habitat* • Fields with sheet water during Spring (mid-March to May) *Suggested Criteria* Studies carried out and verified presence of an annual concentration of any listed species	No suitable habitat
2. Waterfowl Stopover and Staging Areas (Aquatic)			
Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintail Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed duck Surf Scoter White-winged Scoter Black Scoter Ring-necked duck Common Goldeneye Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	*Suitable Habitat* • Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration • Sewage treatment ponds and storm water ponds do not qualify as SWH, however a reservoir managed as a large wetland or pond/lake does qualify • These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water) *Suggested Criteria* Studies carried out and verified presence of: • Aggregations of 100 or more of listed species for 7 days, results in > 700 waterfowl use days • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH • Wetland area and shorelines associated with sites identified within the Significant Wildlife Habitat Technical Guide (SWHTG) (MNRF 2000) Appendix K are SWH	Potentially suitable ELC community present within the study area; however, no records for listed species.
3. Shorebird Migratory Stopover Area			
Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2	*Suitable Habitat* • Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats • Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH *Suggested Criteria* • Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period)	No suitable habitat within study area

Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities		Provincial Guidance for SWH in Ecoregion 6E*	Application to the Subject Lands and Study Area
Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	MAM3 MAM4 MAM5	• Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100 m radius area	
4. Raptor Wintering Area			
Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl Short-eared Owl Bald Eagle	Hawks/Owls: Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM, CUT, CUS, CUW. Bald Eagle: Forest Community Series: FOD, FOM, FOC, SWD, SWM, or SWC on shoreline areas adjacent to large rivers to adjacent to lakes with open water (hunting area).	*Suitable Habitat* • The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors • Raptor wintering (hawk/owl) sites need to be > 20 ha with a combination of forest and upland *Suggested Criteria* Studies confirm the use of these habitats by: • One or more Short-eared Owls or; One of more Bald Eagles or at least 10 individuals and two listed hawk/owl species • To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area	No suitable habitat (combination of ELC communities) identified within the Study Area. No records for listed species.
5. Bat Hibernacula			
Big Brown Bat Tri-colored Bat	Bat Hibernacula may be in the Ecosites: CCR1 CCR2 CCA1 CCA2	*Suitable Habitat* • Hibernacula may be found in caves, mine shafts, underground foundations and Karsts *Suggested Criteria* • All sites with confirmed hibernating bats are SWH • The area includes 200m radius around the entrance of the hibernaculum for most development types and for wind farms (Note: buildings are not to be considered SWH)	No suitable habitat identified within the study area.
6. Bat Maternity Colonies			
Big Brown Bat Silver-haired Bat	Maternity Colonies considered for SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM	*Suitable Habitat* • Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH) • Maternity colonies located in mature deciduous or mixed forest stands with >10/ha large diameter (>25cm dbh) wildlife trees • Female bats prefer wildlife tree (snags) in early stages of decay, class 1-3 or class 1 or 2 • Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred *Suggested Criteria* • Maternity colonies with confirmed use by; – >10 Big Brown Bats – >5 Adult Female Silver-haired Bats The area of the habitat includes the entire woodland or the forest stand ELC ecosite or an ecoelement containing the maternity colonies	Potentially suitable habitat associated with FOD5-2 community.

Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities		Provincial Guidance for SWH in Ecoregion 6E*	Application to the Subject Lands and Study Area
7. Turtle Wintering Areas			
Midland Painted Turtle Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles: ELC Community Classes; SW, MA, OA and SA, ELC Community Series; FEO and BOO. Northern Map Turtles: Open Water areas such as deeper rivers, or streams and lakes with current can also be used as over-wintering habitat.	*Suitable Habitat* • For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH *Suggested Criteria* • Presence of 5 over-wintering Midland Painted Turtles is significant • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant • The mapped ELC ecosite area with the over wintering turtles is the SWH If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH	Potentially suitable habitat associated with wetlands.
8. Reptile Hibernaculum			
Eastern Gartersnake Northern Water Snake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake Milksnake Eastern Ribbonsnake Five-lined Skink	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Tock Barren, Crevice, Cave and Alvar may be directly related to these habitats. Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator. For Five-lined Skink, ELC Community Series of FOD and FOM and ecosite: FOC1 and FOC3.	*Suitable Habitat* • For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural locations • The existence of features that go below frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying Candidate SWH • Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost • Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover • For five-lined Skink, Community Series FOD and FOM, and FOC1 and FOC3 should be considered. They prefer mixed forests with rock outcrop openings with cover rock overlaying granite bedrock with fissures *Suggested Criteria* Studies confirming: • Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (e.g., foundation or rocky slope) on sunny warm days in spring	No potentially suitable habitat identified within the study area.
9. Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)			
Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	Eroding banks, sandy hills, steep slopes and sand piles. Cliff faces, bridge abutments, silos and barns. Habitat found in the following ecosites: CUM1 CLO1 CUT1 CLS1 CUS1 CLT1 BLO1 BLS1 BLT1	*Suitable Habitat* • Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles • Does not include a licensed/permitted Mineral Aggregate Operation *Suggested Criteria* Studies confirming: • Presence of 1 or more nesting sites with 8 or more cliff swallow pairs or 50 Bank Swallow and/or Rough-winged Swallow pairs during the breeding season A colony identified as SWH will include a 50m radius habitat area from the peripheral nests	No suitable habitat identified within the study area.
10. Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs)			
Great Blue Heron Black-crowned Night-Heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6	*Suitable Habitat* • Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used • Most nests in trees are 11 to 15 m from ground, near the top of the tree *Suggested Criteria* Studies confirming: • Presence of 2 or more active nests of Great Blue Heron or other listed species The habitat extends from the edge of the colony and a minimum 300m radius or extent of the forest ecosite containing the colony or any island <15.0 ha with a colony is the SWH	No nesting colonies, nests or pairs of target species were identified within the Study Area.

Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities		Provincial Guidance for SWH in Ecoregion 6E*	Application to the Subject Lands and Study Area
	SWD7 FET1		
11. Colonially-Nesting Bird Breeding Habitat (Ground)			
Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island to peninsula (natural or artificial) with a lake or larger river. Close proximity or watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird). MAM1-6 MAS1-3 CUM CUT CUS	*Suitable Habitat* • Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands *Suggested Criteria* Studies confirming: • Presence of >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant • Presence of 5 or more pairs for Brewer's Blackbird • The edge of the colony and a minimum 150m area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a colony is the SWH	No suitable habitat within the Study Area.
12. Migratory Butterfly Stopover Areas			
Painted Lady Red Admiral Monarch	Combination of ELC Community Series; need to have present one Community Series from each land class: <u>Field:</u> CUM CUT CUS <u>Forest:</u> FOC FOD COM CUP A candidate site will have a history of butterflies being observed.	*Suitable Habitat* • A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Ontario or Lake Erie • The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat • Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest *Suggested Criteria* Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct). MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. • Numbers of butterflies can range from 100-500/day ⁻ significant variation can occur between years and multiple years of sampling should occur MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admirals is to be considered significant	Does not occur as the study area is over 5 km from Lake Ontario.
13. Landbird Migratory Stopover Areas			
All migratory songbirds	All Ecosites associated with the ELC Community Series; FOC FOM FOD SWC SWM SWD	*Suitable Habitat* • Woodlots >10 ha in size and within 5 km of Lake Ontario and Lake Erie • If multiple woodlands are located along the shoreline those Woodlands <2 km from Lake Erie or Ontario are more significant • Sites have a variety of habitats; forest, grassland and wetland complexes • The largest sites are more significant • Woodlots and forest fragments are important habitats to migrating birds, these features located along the shore and located within 5km of Lake Ontario are Candidate SWH *Suggested Criteria* Studies confirm: • Use of the woodlot by >200 birds/day and with >35 species with at least 10 bird spp. recorded on at least 5 different survey dates This abundance and diversity of migrant bird species is considered above average and significant	Does not occur as the study area is over 5 km from Lake Ontario.
14. Deer Yarding Areas			

Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities		Provincial Guidance for SWH in Ecoregion 6E*	Application to the Subject Lands and Study Area
White-tailed Deer	*Note: MNRF to determine this habitat.* ELC Community Series providing a thermal cover component for a deer yard would include: FOD, FOC, SWM and SWC. Or ELC Ecosites: CUP2, CUP3, FOD3 and CUT	*Suitable Habitat* • Deer yarding areas or winter concentration areas (yards) are areas deer move to in response to the onset of winter snow and cold. Deer establish traditional use areas with two areas called Stratum I and Stratum II • Stratum II covers entire winter yard and is usually in FOD or FOM (or agricultural lands) where browsing can occur. Deer move here in early winter, and will continue to stay here until snow depths reach about 30 cm. • Stratum I is the core of a deer yard, and is found within the Stratum II, and is critical for deer survival in areas where winter is severe. It is primarily coniferous trees with a canopy cover of at least 60% *Suggested Criteria* Studies confirm: • Snow depth and temperature or the greatest influence on deer use of winter yards. Snow depths of >40 cm for more than 60 days are minimum criteria for a deer yard to be considered as SWH • Deer management is an MNRF responsibility, and they field investigations (by aircraft over a series of winters to establish boundaries of Stratum I and II. Deer yarding areas considered significant will be mapped by MNRF If SWH is determined for deer wintering area or if a proposed development is within Stratum II yard areas, then movement corridors are to be considered	Habitat has not been identified in the Study Area by MNRF.
15. Deer Winter Congregation Areas			
White-tailed Deer	All Forested Ecosites with these ELC Community Series: FOC FOM FOD SWC SWM SWD Conifer Plantations much smaller than 50 ha may also be used.	*Suitable Habitat* • Woodlots >100 ha in size. Woodlots <100 ha may be considered significant based on MNRF studies or assessment • Deer movement during winter in Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands • Large woodlots > 100 ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha • Woodlots with high densities of deer due to artificial feeding are not significant *Suggested Criteria* Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF • Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF If SWH is determined for deer wintering area or if a proposed development is within Stratum II yard areas, then movement corridors are to be considered	Habitat has not been identified in the Study Area by MNRF.
Rare Vegetation Communities			
16. Cliffs and Talus Slopes			
ELC Communities: TAO, TAS, TAT, CLO, CLS, CLT		• A Cliff is vertical to near vertical bedrock >3m in height • A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris • Most cliff and talus slopes occur along the Niagara Escarpment	Does not occur within study area.
17. Sand Barren			
ELC Communities: SBO1, SBS1, BT1		• Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion • Usually located within other types of natural habitat such as forest or savannah • Vegetation can vary from patchy and barren to tree covered but less than 60% *Suggested Criteria* • A sand barren area >0.5ha in size • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics).	Does not occur within study area.
18. Alvar			

Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities	Provincial Guidance for SWH in Ecoregion 6E*	Application to the Subject Lands and Study Area
Field studies identify four of the five Alvar indicator species within ELC communities: ALO1, ALS, ALT1, FOC1, FOC2, CUM2, CUS2, CUT2-1, CUW2	• An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil • The hydrology of alvars is complex, with alternating periods of inundation and drought • Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant • Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species • Vegetation cover varies from patchy to barren with a less than 60% tree cover *Suggested Criteria* • An Alvar site > 0.5 ha in size • Five indicator species specific to alvars within Ecoregion 6E: *1) Carex crawei 2) Panicum philadelphicum 3) Eleocharis compressa 4) Scutellaria parvula 5) Trichostema brachiatum* • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics) • The Alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses	Does not occur within Study Area.
19. Old Growth Forest		
ELC Communities: FOD FOC FOM SWD SWC SWM	• Old-growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris *Suggested Criteria* • Woodland area is >30 ha with at least 10 ha of interior habitat • If dominant trees species of the ecosite are >140 years old, then stand is SWH • The-forested area containing the old growth characteristics will have experienced no recognizable forestry activities (cut stumps will not be present) • The area of forest ecosites combined or an eco-element within an ecosite that contain the old growth characteristics is the SWH	Does not occur within the Study Area.
20. Savannah		
ELC Communities: TPS1 TPS2 TPW1 TPW2 CUS2	• A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60% *Suggested Criteria* • No minimum size to site. Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH • Field studies confirm one or more of the Prairie indicator species listed in Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 6E should be used • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics)	Does not occur within the Study Area.
21. Tallgrass Prairie		
ELC Communities: TPO1 TPO2	• A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover • In ecoregion 6E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario) *Suggested Criteria* • No minimum size to site. Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH • ELC communities TPO1, TPO2 • Field studies confirm one or more of the Prairie indicator species listed in Appendix N in SWHTG (MNRF 2000) should be present. Prairie plant spp. list from Ecoregion 6E should be used • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics)	Does not occur within the Study Area.
22. Other Rare Vegetation Communities		
	• Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG (MNRF 2000) • Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps • ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in SWHTG (MNRF 2000) Appendix M	Does not occur within the Study Area.

Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities		Provincial Guidance for SWH in Ecoregion 6E*	Application to the Subject Lands and Study Area
		• The MNRF/NHIC will have up to date listing for rare vegetation communities	
Specialized Habitat for Species			
23. Waterfowl Nesting Area			
American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1, MAS2, MAS3 SAS1, SAM1, SAF1 MAM1, MAM2, MAM3, MAM4, MAM5, MAM6 SWT1, SWT2, SWD1, SWD2, SWD3, SWD4 Note: Includes adjacency to Provincially Significant Wetlands	*Suitable Habitat* • A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a wetland (>0.5 ha) with small wetlands (<0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur • Upland areas should be at least 120m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests *Suggested Criteria* Studies confirm: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or presence of 10 or more nesting pairs for listed species including Mallards • Any active nesting site of an American Black Duck is considered significant Wood Ducks and Hooded Mergansers utilize large diameter trees (>40 cm dbh) in woodlands for cavity nest sites	Suggested criteria not satisfied; no waterfowl have been recorded by the TRCA in the Heart Lake Conservation Area.
24. Bald Eagle and Osprey Nesting, Foraging and Perching Habitat			
Osprey Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM, SWC directly adjacent to riparian areas - rivers, lakes, ponds and wetlands.	*Suitable Habitat* • Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms) *Suggested Criteria Studies confirm the use of these nests by:* • One or more active Osprey or Bald Eagle nests in an area • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH [ccvii], maintaining undisturbed shorelines with large trees within this area is important • For a Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. Area of the habitat from 400-800m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat To be significant a site must be used annually. When found inactive, the site must be known to be inactive for >3 years or suspected of not being used for >5 years before being considered not significant	No records for Osprey or Bald Eagle Nests in the Study Area, and none were noted by Beacon during field investigations in 2020.
25. Woodland Raptor Nesting Habitat			

Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities		Provincial Guidance for SWH in Ecoregion 6E*	Application to the Subject Lands and Study Area
Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in: SWC SWM SWD CUP3	*Suitable Habitat* • All natural or conifer plantation woodland/forest stands combined >30ha or with >4 ha of interior habitat; interior habitat determined with a 200 m buffer • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore island • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest *Suggested Criteria* Studies confirm: • Presence of 1 or more active nests from species list is considered significant • Red-shouldered Hawk and Northern Goshawk **–** a 400m radius around the nest or 28 ha of suitable habitat is the SWH. (the 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest) • Barred Owl **–** a 200m radius around the nest is the SWH • Broad-winged Hawk and Coopers Hawk,**–** a 100m radius around the nest is the SWH Sharp-Shinned Hawk **–** a 50m radius around the nest is the SWH	A Cooper's Hawk nest was confirmed by TRCA within ELC community CUP3-2 in the southern portion of the Study Area (point 4 on **Figure 2**).
26. Turtle Nesting Areas			
Midland Painted Turtle Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) to within the following Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	*Suitable Habitat* • Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas • Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used *Suggested Criteria* Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles • One or more Northern Map Turtle or Snapping Turtle nesting • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100m around the nesting area dependant on slope, riparian vegetation and adjacent land use is the SWH Travel routes from wetland to nesting area are to be considered within the SWH	Constructed turtle nesting berms adjacent to MAS2 community are present within the study area.
27. Seeps and Springs			
Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	Seeps and springs are areas where ground water comes to the surface. Often, they are found within headwater areas within forested habitats. Any forested Ecosite within headwater areas of a stream could have seeps/springs.	*Suitable Habitat* • Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system (could contain a seep or spring - areas where ground water comes to the surface) • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species • The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat *Suggested Criteria* Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH The area of an ELC forest ecosite containing the seeps/springs is the SWH	No seeps or springs were observed within the study area.
28. Amphibian Breeding Habitat (Woodland)			

Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities		Provincial Guidance for SWH in Ecoregion 6E*	Application to the Subject Lands and Study Area
Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated within these ELC Community Series: FOC, FOM, FOD, SWC, SWM, SWD Breeding pools within the woodland or the shortest distance from the forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians.	*Suitable Habitat* • Presence of a wetland, pond, or woodland pool within or adjacent (within 120m) to a woodland (no minimum size) • Some small wetlands may not be mapped and may be important breeding pools for amphibians • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat *Suggested Criteria* Studies confirm: Presence of breeding population of 1 or more of the listed salamander species or 2 or more of the listed frog species with at least 20 individuals (adults, juveniles, eggs/larval masses) or 2 or more of the listed frog species with Call Level Codes of 3	Based on TRCA data, there are no records for breeding amphibians from forest or treed swamp features in the study area.
29. Amphibian Breeding Habitat (Wetland)			
Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Classes SW, MA, FE, BO, OA and SA. Typically, these wetland Ecosites will be isolated >120 m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bullfrog) may be adjacent to woodland.	*Suitable Habitat* • Wetlands >500 m^2 (about 25 m diameter) supporting high species diversity are significant • Some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators • Bullfrogs require permanent water bodies with abundant emergent vegetation *Suggested Criteria* Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog or toad species and with at least 20 individuals (adults, juveniles, eggs/larval masses) or 2 or more of the listed frog species with Call Level Codes of 3 The ELC ecosite wetland area and the shoreline are the SWH	Based on data provided by TRCA, the wetlands provide habitat for breeding anurans; however, the reported call level codes are lower than the identified thresholds for significance.
30. Woodland Area-Sensitive Bird Breeding Habitat			
Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Cerulean Warbler Canada Warbler	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	*Suitable Habitat* • Habitats where interior forest breeding birds are breeding • Typically large mature (>60 yrs old) forest stands or woodlots >30 ha • Interior forest habitat is at least 200 m from forest edge habitat *Suggested Criteria* Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. Any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH	Potentially suitable habitat is present within the study area; however, based on records from TRCA, none of this listed species were recorded from the Study Area.
Habitat for Species of Conservation Concern			
31. Marsh Bird Breeding Habitat			

Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities		Provincial Guidance for SWH in Ecoregion 6E*	Application to the Subject Lands and Study Area
American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan Black Tern Yellow Rail	MAM 1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	*Suitable Habitat* • Nesting occurs in wetlands • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water *Suggested Criteria* Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or breeding by any combination of 4 or more of the listed species • Note: any wetland with breeding of 1 or more Trumpeter Swans, Black Terns or Yellow Rail is SWH • Area of the ELC ecosite is the SWH	Potentially suitable habitat is present in the MAS and SW- communities within the Study Area. However, none of this listed species were recorded in the Study Area.
32. Open Country Bird Breeding Habitat			
Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow Short-eared Owl	CUM1 CUM2	*Suitable Habitat* • Large grassland areas (includes natural and cultural fields and meadows) >30 ha • Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years) • Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older • The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species *Suggested Criteria* Field Studies confirm: • Presence of nesting or breeding of 2 or more of the listed species • A field with 1 or more breeding Short-eared Owls is to be considered SWH. The area of SWH is the contiguous ELC ecosite field areas	No suitable habitat within the study area. Based on TRCA data, none of this listed species were recorded in the Study Area.
33. Shrub/Early Successional Bird Breeding Habitat			
<u>Indicator Species</u>: Brown Thrasher Clay-coloured Sparrow <u>Common Species:</u> Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher <u>Special Concern:</u> Yellow-breasted Chat Golden-winged Warbler	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species.	*Suitable Habitat* • Large natural field areas succeeding to shrub and thicket habitats >10ha in size. Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years) • Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands *Suggested Criteria* Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species • A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat The area of the SWH is the contiguous ELC ecosite field/thicket area	No suitable habitat is present within the Study Area.

<table>
<tr><th colspan="2">Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities</th><th>Provincial Guidance for SWH in Ecoregion 6E*</th><th>Application to the Subject Lands and Study Area</th></tr>
<tr><td colspan="4">34. Terrestrial Crayfish</td></tr>
<tr><td>Chimney or Digger Crayfish (Fallicambarus fodiens)
Devil Crawfish or Meadow Crayfish (Cambarus Diogenes)</td><td>MAM1, MAM2, MAM3, MAM4, MAM5, MAM6
MAS1, MAS2, MAS3
SWD, SWT, SWM

CUM1 within inclusions of above meadow marsh or swamp ecosites can be used by terrestrial crayfish.</td><td>Suitable Habitat
• Wet meadow and edges of shallow marshes (no minimum size) identified should be surveyed for terrestrial crayfish
• Constructs burrows in marshes, mudflats, meadows; the ground can't be too moist
• Can often be found far from water
• Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels; usually the soil is not too moist so that the tunnel is well formed

Suggested Criteria
Studies Confirm:
• Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable marsh meadow or terrestrial sites
Area of ELC Ecosite polygon is the SWH</td><td>No evidence of Terrestrial Crayfish was documented during field studies.</td></tr>
<tr><td colspan="4">35. Special Concern and Rare Wildlife Species</td></tr>
<tr><td colspan="2"></td><td>• All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species
• When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially rare species
• Linking candidate habitat on the site needs to be completed to ELC Ecosites

Suggested Criteria
Studies confirm:
• Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable
• Habitat form and function needs to be assessed from the assessment of ELC vegetation types and an area of significant habitat that protects the rare or special concern species identified
• The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH; this must be delineated through detailed field studies
• The habitat needs be easily mapped and cover an important life stage component for a species (e.g. specific nesting habitat or foraging habitat)</td><td>Records for Snapping Turtle, a Special Concern, has been identified with the study area.</td></tr>
<tr><td colspan="4">Animal Movement Corridors</td></tr>
<tr><td colspan="4">36. Amphibian Movement Corridors</td></tr>
<tr><td colspan="2">Eastern Newt
American Toad
Spotted Salamander
Four-toed Salamander
Blue-spotted Salamander
Gray Treefrog
Western Chorus Frog
Northern Leopard Frog
Pickerel Frog
Green Frog
Mink Frog
Bullfrog</td><td>• Amphibian movement corridors should only be identified as SWH where a confirmed or Candidate SWH has been identified by MNRF or the planning authority
• Movement corridors between breeding habitat and summer habitat
• Movement corridors must be considered when amphibian breeding habitat is confirmed as SWH
• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites
• Corridors should consist of native vegetation, with several layers of vegetation
• Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant
• Corridors should be at least 15 m of vegetation on both sides of waterway or be up to 200 m wide of woodland habitat and with gaps <20 m
• Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat</td><td>No amphibian corridors were identified within the Study Area.</td></tr>
<tr><td colspan="4">37. Deer Movement Corridors</td></tr>
<tr><td colspan="2">White-tailed Deer</td><td>• Deer movement corridors should only be identified as SWH where a confirmed or Candidate SWH has been identified by MNRF or the planning authority
• Corridors follow riparian areas, woodlots, areas of physical geography (ravines or ridges)
• Field Studies must be conducted at the time of year when species are expected to be migrating or moving to and from winter concentration areas
• Corridors that lead deer to wintering habitat should be unbroken by roads or residential areas</td><td>No deer movement corridors meeting the SWH criteria have been identified by MNRF to date within the Study Area.</td></tr>
</table>

Wildlife Habitat Category and Associated Species and Ecological Land Classification (ELC) Communities	Provincial Guidance for SWH in Ecoregion 6E*	Application to the Subject Lands and Study Area
	• Corridors should be at least 200 m wide with gaps less than 20 m, and if following a riparian area, there must be at least 15 m of vegetation on both sides of the waterway	

Appendix D

Stage 1 Archeological Assessment

Archeological Research Associates

October 2022

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

DRAFT
Stage 1 Archaeological Assessment
Heart Lake Road and Countryside Drive Intersection
Municipal Class Environmental Assessment
City of Brampton
Regional Municipality of Peel
Part of Lots 15–16, Concession 2–3 East of Centre Road
Geographic Township of Chinguacousy
Former Peel County, Ontario

Prepared for
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Licensed under
P.J. Racher
MHSTCI Licence #P007
PIF #P007-1154-2020
ARA File #2020-0171

27/10/2020

Original Report

EXECUTIVE SUMMARY

Under a contract awarded in August 2020, Archaeological Research Associates Ltd. carried out a Stage 1 assessment for the proposed Heart Lake Road and Countryside Drive Intersection Improvements project in the City of Brampton, Regional Municipality of Peel, Ontario. The assessment was carried out as part of a Schedule 'B' Municipal Class Environmental Assessment in accordance with the *Environmental Assessment Act*. The intersection improvements are part of an overall operational and safety improvement plan for the Heart Lake Road corridor. This report documents the background research and potential modelling involved in the investigation, and presents conclusions and recommendations pertaining to archaeological concerns.

The Stage 1 assessment was conducted in October 2020 under Project Information Form #P007-1154-2020. The investigation encompassed the entirety of the project lands. All field observations were made from accessible public areas; accordingly, no permissions were required for property access. At the time of assessment, the study area comprised the roadway platforms, shoulders, ditches, culverts and sidewalks associated with Heart Lake Road and Countryside Drive, as well as adjacent natural areas.

The Stage 1 assessment determined that the study area comprised a mixture of areas of archaeological potential, areas of no archaeological potential and previously assessed lands of no further concern. It is recommended that all identified areas of archaeological potential be subject to a Stage 2 property assessment in accordance with Section 2.1 of the 2011 *Standards and Guidelines for Consultant Archaeologists*.

The identified areas of no archaeological potential and previously assessed lands of no further concern do not require any additional assessment. Given that there are still outstanding archaeological concerns within the project lands, no ground alterations or development of any kind may occur until the Stage 2 assessment is complete, a recommendation that the lands require no further archaeological assessment is made, and the associated report is entered into the Ontario Public Register of Archaeological Reports.

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GLOSSARY OF ABBREVIATIONS

ARA – Archaeological Research Associates Ltd.
CHVI – Cultural Heritage Value or Interest
CIF – Contract Information Form
EA – Environmental Assessment
ECR – East of Centre Road
MHSTCI – Ministry of Heritage, Tourism, Sport and Culture Industries
PIF – Project Information Form
PTP – Positive Test Pit
S&Gs – Standards and Guidelines for Consultant Archaeologists

PERSONNEL

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Operations Manager: C.E. Gohm (#R187)
Project Manager: S. Bolstridge (#R471)
Field Director: S. Bolstridge
Cartographers: A. Bailey (#R1069), K. Brightwell (#R341)
Report Writer: L. Zepf (#P1033)
Editor: C.J. Gohm

1.0 PROJECT CONTEXT

1.1 Development Context

Under a contract awarded in August 2020, ARA carried out a Stage 1 assessment for the proposed Heart Lake Road and Countryside Drive Intersection Improvements project in the City of Brampton, Regional Municipality of Peel, Ontario. The assessment was carried out as part of a Schedule 'B' Municipal Class EA in accordance with the *Environmental Assessment Act*. The intersection improvements are part of an overall operational and safety improvement plan for the Heart Lake Road corridor. This report documents the background research and potential modelling involved in the investigation, and presents conclusions and recommendations pertaining to archaeological concerns.

The subject study area consists of an irregularly-shaped parcel of land with a total area of 1.21 ha (Map 1). This parcel is traversed by the current intersection and is generally bounded by agricultural lands to the north, natural areas to the east and the Heart Lake Conservation Area to the south and west. In legal terms, the study area falls on part of Lots 15–16, Concession 2–3 ECR in the Geographic Township of Chinguacousy, former Peel County.

The Stage 1 assessment was conducted in October 2020 under PIF #P007-1154-2020. The investigation encompassed the entirety of the project lands. All field observations were made from accessible public areas; accordingly, no permissions were required for property access. In compliance with the objectives set out in Section 1.0 of the 2011 *S&Gs*, this investigation was carried out in order to:

- Provide information concerning the geography, history and current land condition of the study area;
- Determine the presence of known archaeological sites in the study area;
- Present strategies to mitigate project impacts to such sites, if they are located;
- Evaluate in detail the archaeological potential of the study area; and
- Recommend appropriate strategies for Stage 2 archaeological assessment, if some or all of the study area has archaeological potential.

The MHSTCI is asked to review the results and recommendations presented herein and enter the report into the Ontario Public Register of Archaeological Reports. ARA did not engage with any Indigenous groups over the course of the subject investigation.

1.2 Historical Context

After a century of archaeological work in southern Ontario, scholarly understanding of the historic usage of the area has become very well-developed. With occupation beginning in the Palaeo period approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Indigenous and Euro-Canadian histories. Section 1.2.1 summarizes the region's settlement history, whereas Section 1.2.2 documents the study area's past and present land uses. Multiple previous archaeological reports containing relevant background information were obtained during the research component of the study. These reports are summarized in Section 1.3.3, and the references (including title, author and PIF number) appear in Section 8.0.

1.2.1 Settlement History

1.2.1.1 Pre-Contact

The Pre-Contact history of the region is lengthy and rich, and a variety of Indigenous groups inhabited the landscape. Archaeologists generally divide this vibrant history into three main periods: Palaeo, Archaic and Woodland. Each of these periods comprise a range of discrete sub-periods characterized by identifiable trends in material culture and settlement patterns, which are used to interpret past lifeways. The principal characteristics of these sub-periods are summarized in Table 1.

Table 1: Pre-Contact Settlement History
(Wright 1972; Ellis and Ferris 1990; Warrick 2000; Munson and Jamieson 2013)

Sub-Period	Timeframe	Characteristics
Early Palaeo	9000–8400 BC	Gainey, Barnes and Crowfield traditions; Small bands; Mobile hunters and gatherers; Utilization of seasonal resources and large territories; Fluted projectiles
Late Palaeo	8400–7500 BC	Holcombe, Hi-Lo and Lanceolate biface traditions; Continuing mobility; Campsite/Way-Station sites; Smaller territories are utilized; Non-fluted projectiles
Early Archaic	7500–6000 BC	Side-notched, Corner-notched (Nettling, Thebes) and Bifurcate traditions; Growing diversity of stone tool types; Heavy woodworking tools appear (e.g., ground stone axes and chisels)
Middle Archaic	6000–2500 BC	Stemmed (Kirk, Stanly/Neville), Brewerton side- and corner-notched traditions; Reliance on local resources; Populations increasing; More ritual activities; Fully ground and polished tools; Net-sinkers common; Earliest copper tools
Late Archaic	2500–900 BC	Narrow Point (Lamoka), Broad Point (Genesee) and Small Point (Crawford Knoll) traditions; Less mobility; Use of fish-weirs; True cemeteries appear; Stone pipes emerge; Long-distance trade (marine shells and galena)
Early Woodland	900–400 BC	Meadowood tradition; Crude cord-roughened ceramics emerge; Meadowood cache blades and side-notched points; Bands of up to 35 people
Middle Woodland	400 BC–AD 600	Point Peninsula tradition; Vinette 2 ceramics appear; Small camp sites and seasonal village sites; Influences from northern Ontario and Hopewell area to the south; Hopewellian influence can be seen in continued use of burial mounds
Middle/Late Woodland Transition	AD 600–900	Gradual transition between Point Peninsula and later traditions; Princess Point tradition emerges elsewhere (i.e., in the vicinity of the Grand and Credit Rivers)
Late Woodland (Early)	AD 900–1300	Glen Meyer tradition; Settled village-life based on agriculture; Small villages (0.4 ha) with 75–200 people and 4–5 longhouses; Semi-permanent settlements
Late Woodland (Middle)	AD 1300–1400	Uren and Middleport traditions; Classic longhouses emerge; Larger villages (1.2 ha) with up to 600 people; More permanent settlements (30 years)
Late Woodland (Late)	AD 1400–1600	Huron-Petun tradition; Globular-shaped ceramic vessels, ceramic pipes, bone/antler awls and beads, ground stone celts and adzes, chipped stone tools, and even rare copper objects; Large villages (often with palisades), temporary hunting and fishing camps, cabin sites and small hamlets; Territorial contraction in early 16th century; Fur trade begins ca. 1580; European trade goods appear

Although Iroquoian-speaking populations tended to leave a much more obvious mark on the archaeological record and are therefore emphasized in the Late Woodland entries above, it must be understood that Algonquian-speaking populations also represented a significant presence in southern Ontario. Due to the sustainability of their lifeways, archaeological evidence directly associated with the Anishinaabeg remains elusive, particularly when compared to sites associated with the more sedentary agriculturalists. Many artifact scatters in southern Ontario were likely camps, chipping stations or processing areas associated with the more mobile Anishinaabeg, utilized during their travels along the local drainage basins while making use of seasonal resources. This part of southern Ontario represents the ancestral territory of various Indigenous groups, each with their own land use and settlement pattern tendencies.

1.2.1.2 Post-Contact

The arrival of European explorers and traders at the beginning of the 17th century triggered widespread shifts in Indigenous lifeways and set the stage for the ensuing Euro-Canadian settlement process. Documentation for this period is abundant, ranging from the first sketches of Upper Canada and the written accounts of early explorers to detailed township maps and lengthy histories. The Post-Contact period can be effectively discussed in terms of major historical events, and the principal characteristics associated with these events are summarized in Table 2.

Table 2: Post-Contact Settlement History
(Smith 1846; Coyne 1895; Lajeunesse 1960; Ellis and Ferris 1990; Surtees 1994; Wilson's Publishing Co. 2000; AO 2015)

Historical Event	Timeframe	Characteristics
Early Exploration	Early 17th century	Brûlé explores southern Ontario in 1610; Champlain travels through in 1613 and 1615/1616, encountering a variety of Indigenous groups (including both Iroquoian-speakers and Algonquian-speakers); European goods begin to replace traditional tools
Increased Contact and Conflict	Mid- to late 17th century	Conflicts between various First Nations during the Beaver Wars result in numerous population shifts; European explorers continue to document the area, and many Indigenous groups trade directly with the French and English; 'The Great Peace of Montreal' treaty established between roughly 39 different First Nations and New France in 1701
Fur Trade Development	Early to mid-18th century	Growth and spread of the fur trade; Peace between the French and English with the Treaty of Utrecht in 1713; Ethnogenesis of the Métis; Hostilities between French and British lead to the Seven Years' War in 1754; French surrender in 1760
British Control	Mid- to late 18th century	*Royal Proclamation* of 1763 recognizes the title of the First Nations to the land; Numerous treaties subsequently arranged by the Crown; First land cession under the new protocols is the Seneca surrender of the west side of the Niagara River in 1764; The Niagara Purchase (Treaty 381) in 1781 included this area
Loyalist Influx	Late 18th century	United Empire Loyalist influx during and after the American Revolutionary War (1775–1783); British develop interior communication routes and acquire additional lands; *Constitutional Act* of 1791 creates Upper and Lower Canada
County Development	Late 18th to early 19th century	Area initially adjacent to York County's 'West Riding'; Became part of York County's 'West Riding' in 1798; Provisional agreement for the purchase of the southern portion (Treaty 13A) completed in 1805; Confirmed during the Head of the Lake Purchase (Treaty 14) in 1806; Northern portion acquired as part of the Ajetance Purchase (Treaty 19) in 1818; Peel County established after the abolition of the district system in 1849

Historical Event	Timeframe	Characteristics
Township Formation	Early 19th century	Chinguacousy primarily comprised lands obtained in 1818 and was settled around the same time; Surveyed by R. Bristol in 1819, divided into west and east halves on either side of Hurontario Street (Centre Road); Majority of first settlers from New Brunswick, the United States and parts of Upper Canada; Combined population of Toronto Gore and Chinguacousy was only 412 by 1821
Township Development	Mid-19th to early 20th century	Population reached 3,965 by 1842; 30,342 ha taken up by 1846, with 10,629 ha under cultivation; 7 saw mills and 1 grist mill in operation at that time; Traversed by the Grand Trunk Railway (1856), the Hamilton & North Western Railway (1877), the Credit Valley Railway (1878/79) and the Toronto Suburban Railway (1917); Brampton was the principal settlement; Other communities at Cheltenham, Salmonville, Victoria, Campbell's Cross, Kilmanagh, Sand Hill, Mayfield, Edmonton, Alloa, Norval Station, Westervelt's Corners, Woodhill, Springbrook and Huttonville

1.2.2 Past and Present Land Use

1.2.2.1 Overview

During Pre-Contact and Early Contact times, the vicinity of the study area would have comprised a mixture of coniferous trees, deciduous trees and open areas. Indigenous communities would have managed the landscape to some degree. During the early 19th century, Euro-Canadian settlers arrived in the area and began to clear the forests for agricultural and settlement purposes. The study area was located south of the historic community of Mayfield. The land use at the time of assessment can be classified as transportation (the roadways and associated infrastructure) and natural lands (the undeveloped areas).

1.2.2.2 Mapping and Imagery Analysis

In order to gain a general understanding of the study area's past land uses, one patent plan, two historic settlement maps, one topographic map and two aerial images were examined during the research component of the study. Specifically, the following resources were consulted:

- The *Chinguacousy Township* Patent Plan (No Date) (AO 2015);
- G.R Tremaine's *Tremaine's Map of the County of Peel, Canada West* (1859) (OHCMP 2019);
- Walker & Miles *Illustrated Historical Atlas of the County of Peel, Ont.* (1877) (McGill University 2001);
- A topographic map from 1909 (OCUL 2020); and
- Aerial images from 1954 and 2006 (Google Earth 2020; University of Toronto 2020).

The limits of the study area are shown on georeferenced versions of the consulted historical resources in Map 2–Map 7.

The *Chinguacousy Township* Patent Plan, initiated on a copy of an original survey plan and updated with patent information until the records were transferred to the Archives of Ontario, indicates that Lot 15, Concession 3 ECR was patented to the Canada Company and Lot 16, Concession 3 ECR to Thady (Thaddeus) Ingoldsby (Map 2). Interestingly, Heart Lake is not depicted.

Tremaines' Map of the County of Peel, Canada West (1859) identifies Thomas Ingoldsby as an early occupant of Lot 15 and M. Ingoldsby as an early occupant of Lot 16 (Map 3). No structures are illustrated within the study area. Heart Lake, two tributaries and a kettle lake are depicted in the surrounding landscape, as is Heart Lake Road and Countryside Drive. Countryside Drive is illustrated as continuing past Heart Lake Road and through Heart Lake, though this reflects an unopened road allowance instead of a continuation of the roadway. The *Illustrated Historical Atlas of the County of Peel, Ont.* (1877) demonstrates that Thomas Ingoldsby continued to occupy Lot 15 as well as Lot 16; formerly occupied by M. Ingoldsby (Map 4). No structures are present within the study area, however, at least six structures are depicted in the surrounding area, including the Ingoldsby farmstead and orchards to the east.

The topographic map from 1909 shows that the study area consisted of a mixture of transportation corridors, cleared land to the northwest and deciduous woodlot to the southeast (Map 5). No structures are present within the study area; however, a bridge abuts the southeastern limit. A variety of brick/stone (red) and wood (black) homes are shown within adjacent lands. Heart Lake and its associated wetlands, tributary and forested areas are clearly depicted. The aerial image from 1954 depicts the study area in a similar vein to the topographic map (Map 6). Imagery from 2006 depicts extensive disturbance in the central part of the study area associated with the widening and reconstruction of Countryside Drive (Map 7).

1.3 Archaeological Context

The Stage 1 assessment (property inspection) was conducted on October 1, 2020 under PIF #P007-1154-2020. The limits of the study area were confirmed using georeferenced aerial imagery showing artificial and natural formations in relation to the subject lands.

The archaeological context of any given study area must be informed by 1) the condition of the property as found (Section 1.3.1), 2) a summary of registered or known archaeological sites located within a minimum 1 km radius (Section 1.3.2) and 3) descriptions of previous archaeological fieldwork carried out within the limits of, or immediately adjacent to the property (Section 1.3.3).

1.3.1 Condition of the Property

The study area lies within the Great Lakes–St. Lawrence forest region, which is a transitional zone between the southern deciduous forest and the northern boreal forest. This forest extends along the St. Lawrence River across central Ontario to Lake Huron and west of Lake Superior along the border with Minnesota, and its southern portion extends into the more populated areas of Ontario. This forest is dominated by hardwoods, featuring species such as maple, oak, yellow birch, white and red pine. Coniferous trees such as white pine, red pine, hemlock and white cedar commonly mix with deciduous broad-leaved species, such as yellow birch, sugar and red maples, basswood and red oak (MNRF 2020).

In terms of local physiography, the subject lands fall within the South Slope. This region includes lands along the southern slope of the Oak Ridges Moraine as well as lands south of the Peel Plain (including the Trafalgar Moraine and a strip of fluted till plain). The surface is morainic in the area west of Maple, comprising ground moraine of limited relief (Chapman and Putnam 1984:172–173).

The Brampton esker is located southwest of the study area and is designated as a regional earth science area of natural and scientific interest (ANSI). The esker provides a regional terrestrial and hydrological linkage to the Provincial Greenbelt and Oak Ridges Moraine natural systems. The esker is a significant hydrological feature and supports both provincially-significant wetlands and approximately eight lakes, including Heart Lake within the Heart Lake Conservation Area. The Heart Lake Provincially Significant Wetland complex is one of the largest remaining wetland complexes on the Peel South Slope and contains 40 wetland communities located primarily along both sides of Heart Lake Road.

According to the Ontario Soil Survey for Peel County, the study area consists of Oneida clay loam in the north and centre and organic muck in the south. Oneida clay loam generally comprises dark greyish brown clay loam over well developed horizons, and is characterized by few stones, a smooth to moderately sloping topography and good surface drainage. Muck soils consist of black well-decomposed organic material of varying depths over sand, clay or marl. They are stone-free and are characterized by depressional topography and very poor surface drainage (Hoffman and Richards 1953:41–42).

The subject lands fall within the Etobicoke and Mimico Creek drainage basin, which is under the jurisdiction of the Toronto and Region Conservation Authority (TRCA 2020). Specifically, the study area is traversed by two wetlands associated with the Heart Lake Wetland Complex and a tributary of Spring Creek and is located 339 m northwest of Heart Lake.

At the time of assessment, the study area comprised the roadway platforms, shoulders, ditches, culverts and sidewalks associated with Heart Lake Road and Countryside Drive, as well as adjacent natural areas. Field conditions were ideal during the investigation, with high ground surface visibility. No unusual physical features were encountered that affected the results of the Stage 1 assessment.

1.3.2 Registered or Known Archaeological Sites

The Ontario Archaeological Sites Database and the Ontario Public Register of Archaeological Reports were consulted to determine whether any registered or known archaeological resources occur within a 1 km radius of the study area. The available search facility returned a total of 26 registered sites located within at least a 1 km radius (the facility returns sites in a rectangular area, rather than a radius, potentially resulting in returns beyond the specified distance). In terms of other known resources (e.g., Isolated Non-Diagnostic Find Spots, Leads or unreported deposits), three unregistered sites were identified within a 1 km radius. The sites are summarized in Table 3.

Table 3: Registered or Known Archaeological Sites

Borden No. / Identifier	Site Name	Time Period	Affinity	Site Type	Distance from Study Area
AkGw-2	Heart Lake	Pre-Contact	Indigenous	Camp/campsite	300 m–1 km
AkGw-13	655339 Ontario	Post-Contact	Euro-Canadian	Homestead	300 m–1 km
AkGw-14	Allison	Other	Indigenous	Unknown	> 1 km
AkGw-15	Clearbrook	Post-Contact	Euro-Canadian	Homestead	> 1 km
AkGw-49	Armbro	Post-Contact	Euro-Canadian	Homestead	> 1 km
AkGw-231	Sunnydale Site	Pre-Contact	Indigenous	Scatter	> 1 km

Borden No. / Identifier	Site Name	Time Period	Affinity	Site Type	Distance from Study Area
AkGw-309	Stopover 2	Pre-Contact	Indigenous	Unknown	> 1 km
AkGw-310	Stopover 3	Post-Contact, Pre-Contact	Indigenous, Euro-Canadian	Unknown	> 1 km
AkGw-311	Stopover	Pre-Contact	Indigenous	Unknown	> 1 km
AkGw-312	Stopover 4	Post-Contact, Pre-Contact	Indigenous, Euro-Canadian	Unknown	> 1 km
AkGw-329	Sprucedale Site	Post-Contact	Euro-Canadian	Farmstead, homestead	> 1 km
AkGw-384	Sandringham Site	Post-Contact	Euro-Canadian	Homestead	> 1 km
AkGw-399	Countryside Drive H1	Post-Contact	Euro-Canadian	Homestead	> 1 km
AkGw-400	Countryside Drive H2	Post-Contact	Euro-Canadian	Homestead	> 1 km
AkGw-410	Ingoldsby	Post-Contact	Euro-Canadian	Homestead	50 m–300 m
AkGw-411	Lakeheart	Archaic, Middle	Indigenous	Campsite	300 m–1 km
AkGw-412	Gitigaan Mashkiki	Archaic, Paleo-Indian	Indigenous	Camp/campsite	300 m–1 km
AkGw-413	Ibrox	Pre-Contact	Indigenous	Camp/campsite	300 m–1 km
AkGw-414	-	Pre-Contact	Indigenous	Findspot	300 m–1 km
AkGw-416	Adams H1	Post-Contact	Euro-Canadian	Unknown	> 1 km
AkGw-422	Gray Homestead Site	Post-Contact	Euro-Canadian	Homestead	> 1 km
AkGw-462	Heart Lake 1	Archaic, Late	Indigenous	Findspot	300 m–1 km
AkGw-500	Heart Lake 2	Pre-Contact	Indigenous	Unknown	300 m–1 km
AkGw-513	H1	Unknown	Unknown	Unknown	> 1 km
AkGw-531	19PL-280 P2	Unknown	Unknown	Unknown	> 1 km
AlGp-72	Newcastle Site 1	Post-Contact	Euro-Canadian	Homestead	> 1 km
Unregistered	IF #1 (AA 2010)	Pre-Contact	Indigenous	Findspot	50 m–300 m
Unregistered	IF #2 (AA 2010)	Pre-Contact	Indigenous	Findspot	300 m–1 km
Unregistered	IF #3 (AA 2010)	Pre-Contact	Indigenous	Findspot	300 m–1 km

None of these previously identified sites are located within or immediately adjacent to the subject lands; accordingly, they have no potential to traverse the study area. AkGw-410 and unregistered IF #1 do fall within 300 m, however, and must be considered as relevant features of archaeological potential. The remaining sites represent distant archaeological resources.

1.3.3 Previous Archaeological Work

Reports documenting assessments conducted within the subject lands and assessments that resulted in the discovery of sites within adjacent lands were sought during the research component of the study. In order to ensure that all relevant past work was identified, an investigation was launched to identify reports involving assessments within 50 m of the study area. The investigation determined that there are three available reports documenting previous archaeological fieldwork within the specified distance. The relevant results and recommendations are summarized below as required by Section 7.5.8 Standards 4–5 of the 2011 *S&Gs*.

1.3.3.1 Countryside Drive Widening and Reconstruction (Stage 1)

A Stage 1 assessment was conducted for the Countryside Drive Road Widening and Reconstruction project in August 2004 under Licence #P029-100 (AW 2004). The assessed area overlaps the entirety of the subject lands. To facilitate discussion, the ±13 km corridor was separated into five segments: a) Highway 50 to Gore Road, b) Gore Road to McVean Drive, c) McVean Drive to

Goreway Drive, d) Goreway Drive to Airport Road and e) Airport Road to Heart Lake Road. The subject lands fall within the Airport Road to Heart Lake Road segment. This segment was documented as comprising a mixture of cultivated fields, herbaceous cover, residential frontage with disturbed rural driveways, shallow drainage ditches, narrow shoulders and low-lying wet areas. Areas of archaeological potential and areas of no archaeological potential were identified. It was recommended that a Stage 2 assessment be conducted for all areas beyond the ditched and low-lying wet areas (AW 2004:12). No specific field methods were recommended at the time.

1.3.3.2 Countryside Villages (Stage 1)

In September 2007, a Stage 1 assessment was conducted for the Countryside Villages (Springdale North Secondary Plan Area 48) project under CIF #P163-016-2007 (ASI 2007). The assessed area overlaps the northern portion of the subject lands on the north side of Countryside Drive. To facilitate discussion, the Secondary Plan Area was separated into four sections: 1) Heart Lake Road to Dixie Road, 2) Dixie Road to Bramalea Road, 3) Bramalea Road to Torbram Road and 4) Torbram Road to the west branch of the Humber River. The subject lands are located within the Heart Lake Road to Dixie Road portion. This section was documented as comprising a mixture of residential, transportation and agricultural lands alongside natural woodlots, areas of slope and low-lying wet areas. Areas archaeological potential and areas of no archaeological potential were identified. It was recommended that a Stage 2 assessment be conducted for all areas of archaeological potential (ASI 2007:11). The assessed portion of the subject lands was determined to be disturbed and not recommended for Stage 2 assessment. The overlapping area of previous assessment is therefore of no further archaeological concern.

1.3.3.3 Emery Investments Property (Stage 1–2)

In December 2009, Stage 1 and 2 assessments were completed for the Emery Investments property under CIF #P013-522-2009 (AA 2010). The assessed area abuts the northwestern edge of the subject lands. The Stage 1 assessment identified a mixture of areas of archeological potential (the agricultural field) and areas of no archaeological potential (a low-lying wet area). The Stage 2 assessment resulted in the identification of five sites: AkGw-410, AkGw-411 and IF#1–3. AkGw-410 consisted of a mid-19th century Euro-Canadian homestead, AkGw-411 comprised a Middle Archaic Indigenous campsite and the remaining sites represented Indigenous findspots. The Ingoldsby site (AkGw-410) and the Lakeheart site (AkGw-411) were found to be of further CHVI and were recommended for Stage 3 site-specific assessment. The remaining sites were not recommended for any additional assessment (AA 2010:7).

2.0 STAGE 1 BACKGROUND STUDY

2.1 Background

The Stage 1 assessment involved background research to document the geography, history, previous archaeological fieldwork and current land condition of the study area. This desktop examination included research from archival sources, archaeological publications and online databases. It also included the analysis of a variety of historic maps and aerial imagery. The results of the research conducted for the background study are summarized below.

With occupation beginning approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Pre-Contact and Post-Contact histories (Section 1.2). Artifacts associated with Palaeo, Archaic, Woodland and Early Contact traditions are well-attested in the City of Brampton, and Euro-Canadian archaeological sites dating to pre-1900 and post-1900 contexts are likewise common. The presence of 29 previously identified sites in the surrounding area demonstrates the desirability of this locality for early settlement (Section 1.3.2). The investigation confirmed that none of these sites extend into the subject lands. Background research identified two areas of previous assessment within the study area (Section 1.3.3).

The natural environment of the study area would have been attractive to both Indigenous and Euro-Canadian populations as a result of proximity to Heart Lake and the Heart Lake Wetland Complex. The Oneida clay loam soils would have been ideal for agriculture and pastureland, and the diverse local vegetation would also have encouraged settlement throughout Ontario’s lengthy history. Euro-Canadian populations would have been particularly drawn to Heart Lake Road and Countryside Drive, both of which were historically-surveyed thoroughfares.

In summary, the background study included an up-to-date listing of sites from the Ontario Archaeological Sites Database (within at least a 1 km radius), the consideration of previous local archaeological fieldwork (within at least a 50 m radius), the analysis of historic maps (at the most detailed scale available) and the study of aerial imagery. ARA therefore confirms that the standards for background research set out in Section 1.1 of the 2011 *S&Gs* were met.

2.2 Field Methods (Property Inspection)

In order to gain first-hand knowledge of the geography, topography and current condition of the study area, a property inspection was conducted on October 1, 2020. Environmental conditions were ideal during the inspection, with partly overcast skies, bright lighting and a temperature of 12 °C. ARA therefore confirms that fieldwork was carried out under weather and lighting conditions that met the requirements set out in Section 1.2 Standard 2 of the 2011 *S&Gs*.

The study area was subjected to random spot-checking in accordance with the requirements set out in Section 1.2 of the 2011 *S&Gs*. Specifically, the inspection began in the northwest on the eastern side of Heart Lake Road and progressed in a generally clockwise direction. The inspection confirmed that all surficial features of archaeological potential (e.g., the historically-surveyed roadways, etc.) were present where they were previously identified and did not result in the identification of any additional features of archaeological potential not visible on mapping (e.g., relic water channels, patches of well-drained soils, etc.).

The inspection determined that parts of the study area were disturbed by past roadworks. Two permanently wet areas were also encountered and documented during the assessment. No other natural features (e.g., sloped lands, overgrown vegetation, heavier soils than expected, etc.) or significant built features (e.g., heritage structures, landscapes, plaques, monuments, cemeteries, etc.) that would affect assessment strategies were identified.

2.3 Analysis and Conclusions

In addition to relevant historical sources and the results of past archaeological assessments, the archaeological potential of a property can be assessed using its soils, hydrology and landforms as considerations. Section 1.3.1 of the 2011 *S&Gs* recognizes the following features or characteristics as indicators of archaeological potential: previously identified sites, water sources (past and present), elevated topography, pockets of well-drained sandy soil, distinctive land formations, resource areas, areas of Euro-Canadian settlement, early transportation routes, listed or designated properties, historic landmarks or sites, and areas that local histories or informants have identified with possible sites, events, activities or occupations.

The Stage 1 assessment resulted in the identification of several features of archaeological potential in the vicinity of the study area (Map 8; SD Map 1). The closest and most relevant indicators of archaeological potential (i.e., those that would directly affect survey interval requirements) include two previously identified sites (AkGw-410 and IF#1), one primary water source (a tributary of Spring Creek), seven secondary water sources (parts of the Heart Lake Wetland Complex), one physiographic landform (the Brampton Esker), two historic roadways (Heart Lake Road and Countryside Drive), and multiple historic structure localities (19^{th}-century houses). Background research did not identify any features indicating that the study area has potential for deeply buried archaeological resources.

Although proximity to a feature of archaeological potential is a significant factor in the potential modelling process, current land conditions must also be considered. Section 1.3.2 of the 2011 *S&Gs* emphasizes that 1) quarrying, 2) major landscaping involving grading below topsoil, 3) building footprints and 4) sewage/infrastructure development can result in the removal of archaeological potential, and Section 2.1 states that 1) permanently wet areas, 2) exposed bedrock and 3) steep slopes (> 20°) can also be considered as having no archaeological potential. Areas previously assessed and not recommended for further work also require no further assessment.

One previously assessed area was identified within the project lands, which was determined to be disturbed and did not warrant additional assessment. ARA's visual inspection, coupled with the analysis of historical sources and digital environmental data, resulted in the identification of several areas of no archaeological potential within the remaining lands. Specifically, deep land alterations have resulted in the removal of archaeological potential from the roadway platforms, shoulders and ditches associated with Heart Lake Road and Countryside Drive and related sidewalks and intersection infrastructure (Image 1–Image 6). A steep berm was also present running along the south side of Heart Lake Road. These areas had clearly been impacted by past earth-moving/construction activities, resulting in the disturbance of the original soils to a significant depth and severe damage to the integrity of any archaeological resources.

One area of previously assessed lands was photo-documented (Image 7) and two permanently wet areas were also identified (Image 8). The remainder of the study area has potential for Indigenous and Euro-Canadian archaeological materials or requires test pit survey to confirm the presence/extent of any subsurface disturbances. The area of archaeological potential includes the wooded area southeast of Countryside Drive (Image 9–Image 10).

In summary, the Stage 1 assessment determined that the study area comprised a mixture of areas of archaeological potential, areas of no archaeological potential and previously assessed lands of no further concern. The potential modelling results are presented in Map 9. The project lands (‘study area’) are depicted as a layer in this map.

3.0 RECOMMENDATIONS

The Stage 1 assessment determined that the study area comprised a mixture of areas of archaeological potential, areas of no archaeological potential and previously assessed lands of no further concern. It is recommended that all identified areas of archaeological potential be subject to a Stage 2 property assessment in accordance with Section 2.1 of the 2011 *S&Gs*.

The wooded area must be assessed using the test pit survey method. A survey interval of 5 m will be required due to the proximity of the lands to the identified features of archaeological potential. Each test pit must be excavated into at least the first 5 cm of subsoil, and the resultant pits must be examined for stratigraphy, potential features and/or evidence of fill. The soil from each test pit must be screened through mesh with an aperture of no greater than 6 mm and examined for archaeological materials. If archaeological materials are encountered, all PTPs must be documented and intensification may be required.

The identified areas of no archaeological potential and previously assessed lands of no further concern do not require any additional assessment. Given that there are still outstanding archaeological concerns within the project lands, no ground alterations or development of any kind may occur until the Stage 2 assessment is complete, a recommendation that the lands require no further archaeological assessment is made, and the associated report is entered into the Ontario Public Register of Archaeological Reports.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

Section 7.5.9 of the 2011 *S&Gs* requires that the following information be provided for the benefit of the proponent and approval authority in the land use planning and development process:

- This report is submitted to the Minister of Heritage, Sport, Tourism and Culture Industries as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. 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 MHSTCI, a letter will be issued by the ministry stating that there are no further concerns with regard 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 licensed 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 licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that 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 a new archaeological site 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 human remains must notify the police or coroner and the Registrar at the Ministry of Government and Consumer Services.

6.0 IMAGES

Image 1: Disturbed Lands
(October 1, 2020; Facing Southeast)

Image 2: Disturbed Lands
(October 1, 2020; Facing Southeast)

Image 3: Disturbed Lands
(October 1, 2020; Facing Southwest)

Image 4: Disturbed Lands
(October 1, 2020; Facing Northeast)

Image 5: Disturbed Lands
(October 1, 2020; Facing Northwest)

Image 6: Disturbed Lands
(October 1, 2020; Facing Northwest)

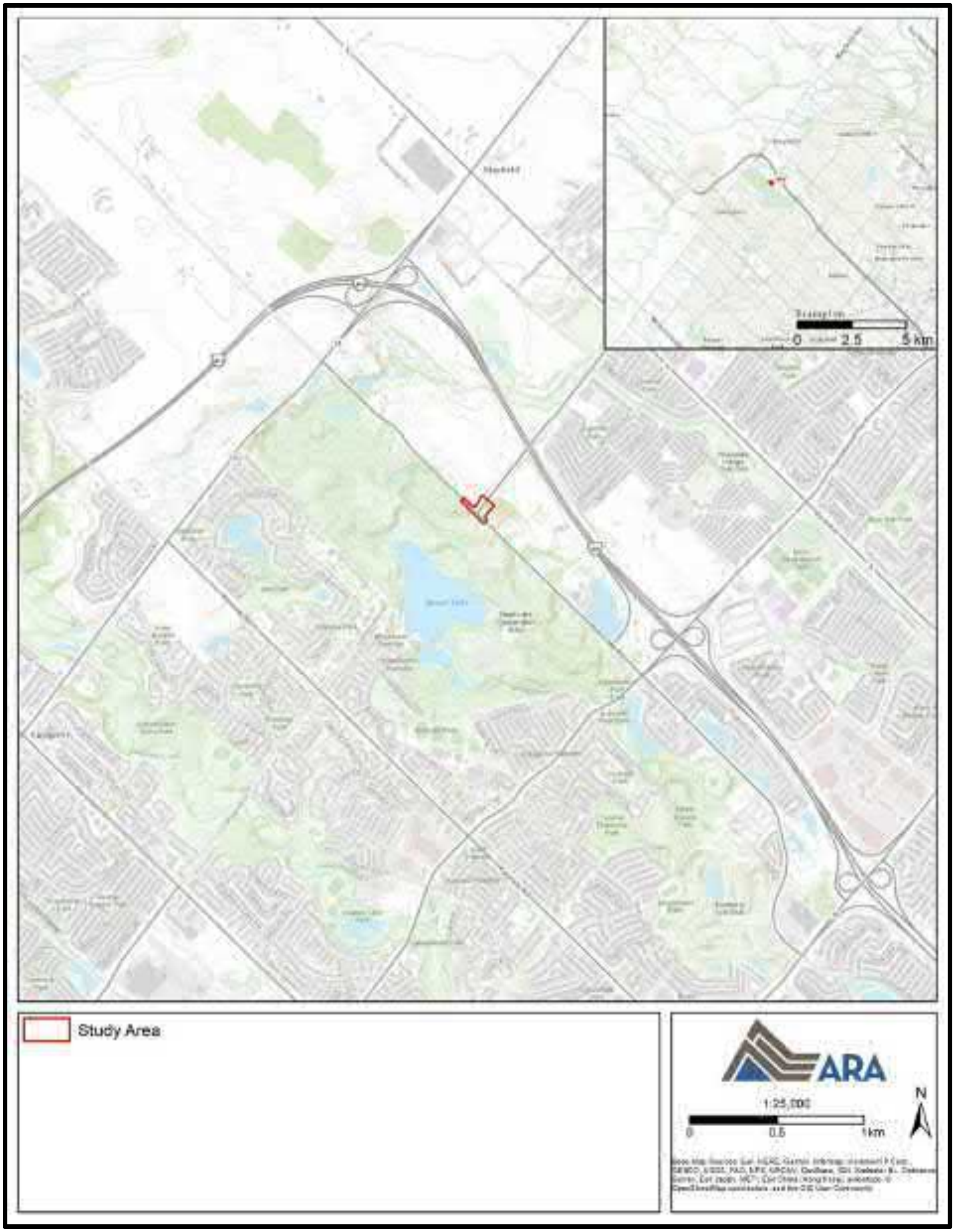
Image 7: Previously Assessed Lands
(October 1, 2020; Facing Northwest)

Image 8: Permanently Wet Lands
(October 1, 2020; Facing Northeast)

Image 9: Area of Potential
(October 1, 2020; Facing Southeast)

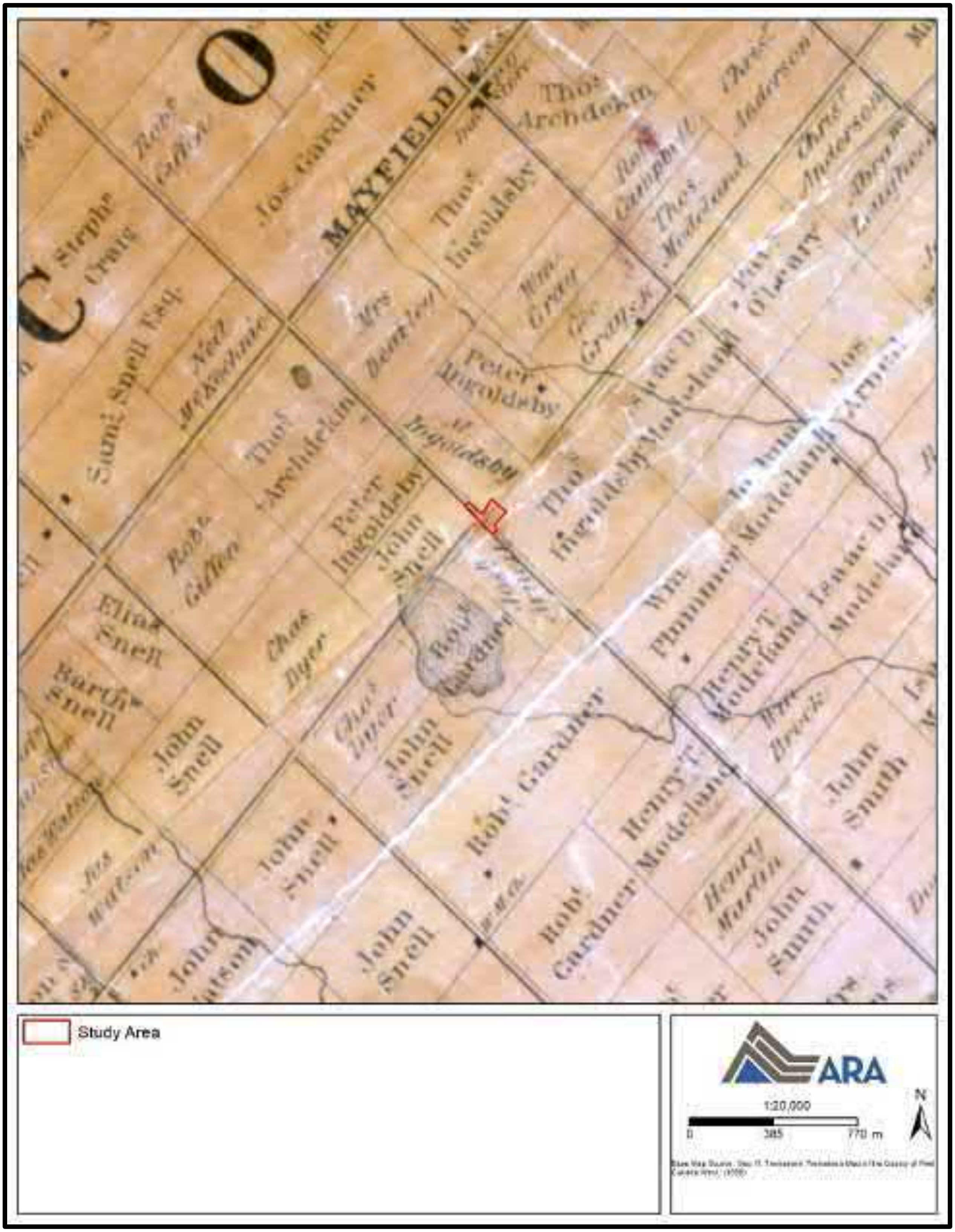
Image 10: Area of Potential
(October 1, 2020; Facing East)

7.0 MAPS

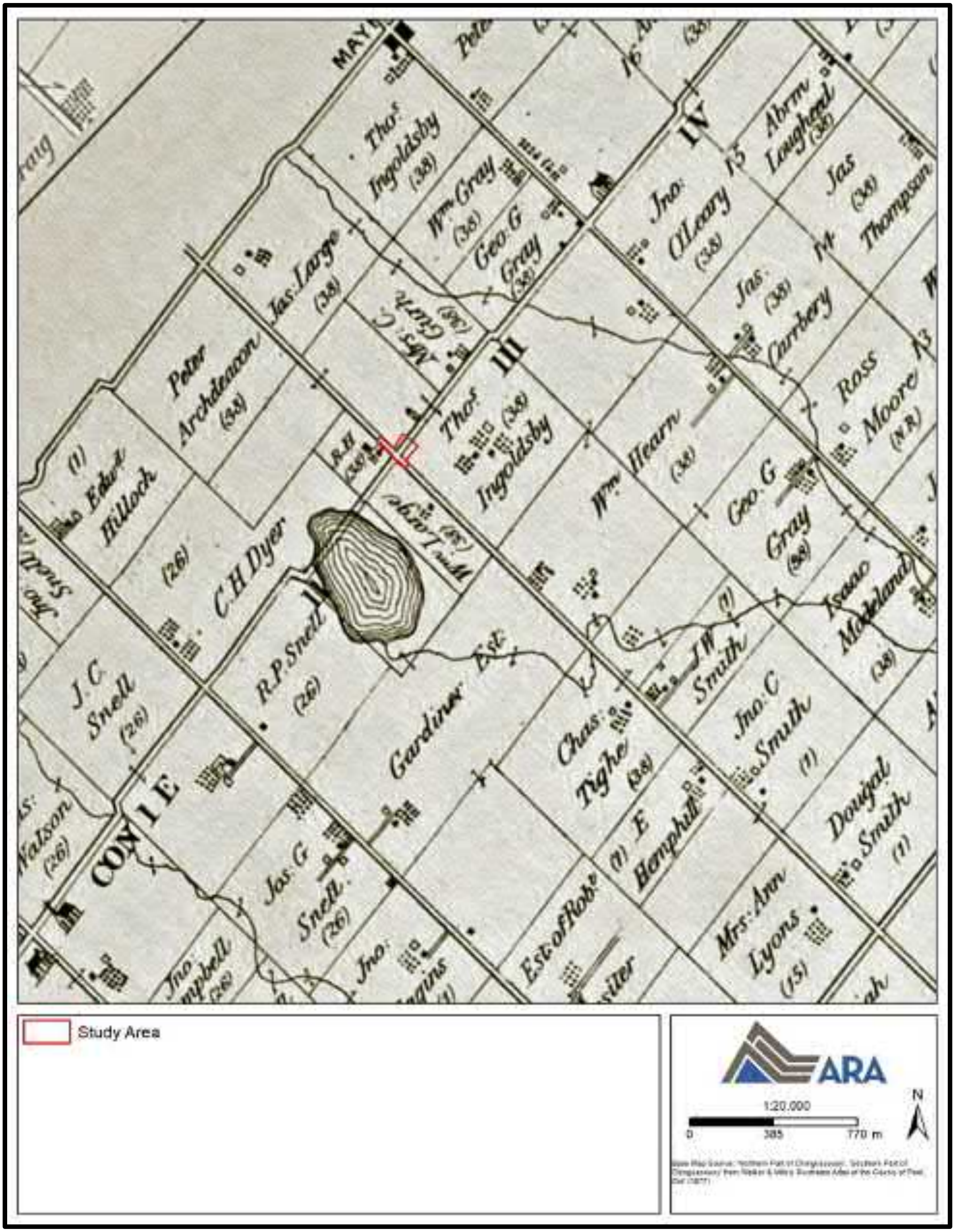


Map 1: Location of the Study Area
(Produced under licence using ArcGIS® software by Esri, © Esri)

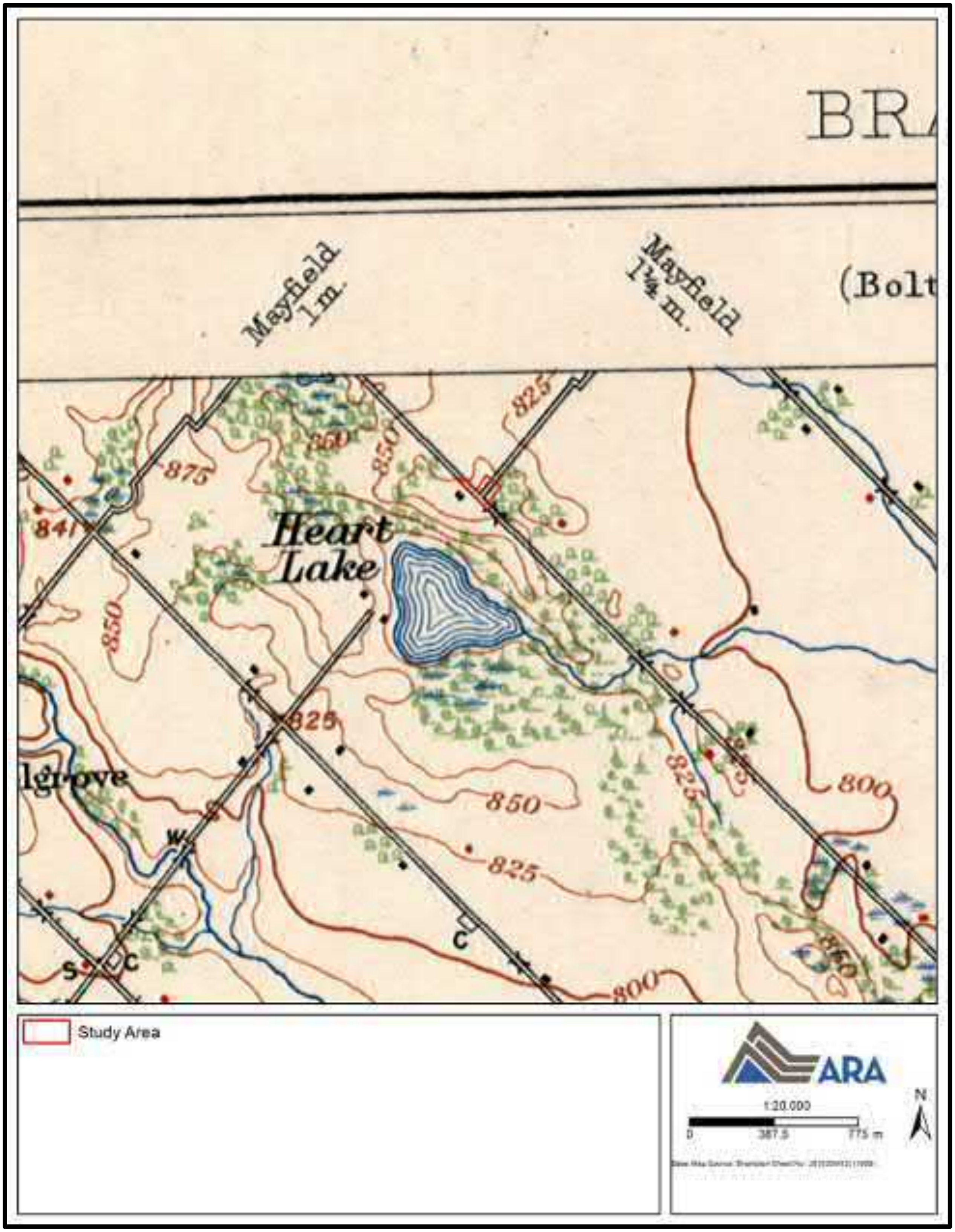
Map 2: ***Chinguacousy Township*** **Patent Plan (No Date)**
(Produced under licence using ArcGIS® software by Esri, © Esri; AO 2015)



Map 3: G.R. Tremaine's *Tremaine's Map of the County of Peel, Canada West* (1859)
(Produced under licence using ArcGIS® software by Esri, © Esri; OHCMP 2019)



Map 4: Walker & Miles' *Illustrated Historical Atlas of the County of Peel, Ont.* (1877)
(Produced under licence using ArcGIS® software by Esri, © Esri; McGill University 2001)



Map 5: Topographic Map (1909)
(Produced under licence using ArcGIS® software by Esri, © Esri, OCUL 2020)

Map 6: Aerial Image (1954)
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Map 8: Features of Potential
(Produced under licence using ArcGIS® software by Esri, © Esri)

Map 9: Potential Modelling and Recommendations
(Produced under licence using ArcGIS® software by Esri, © Esri)

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ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

DRAFT

Stage 1 Archaeological Assessment
Heart Lake Road and Countryside Drive Intersection
Municipal Class Environmental Assessment
City of Brampton
Regional Municipality of Peel
Part of Lots 15–16, Concession 2–3 East of Centre Road
Geographic Township of Chinguacousy
Former Peel County, Ontario

Prepared for
MTE Consultants Inc.
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Licensed under
P.J. Racher
MHSTCI Licence #P007
PIF #P007-1154-2020
ARA File #2020-0171

27/10/2020

Supplementary Documentation

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1.0 SUPPLEMENTARY DOCUMENTATION

1.1 Detailed Site Location Information

In keeping with Section 7.6.1 of the 2011 *Standards and Guidelines for Consultant Archaeologists*, detailed site location information was not included within the project report. The previously identified archaeological sites falling within 300 m of the study area are shown in SD Map 1.

2.0 SD MAPS

SD Map 1: Features of Potential with Site Information
(Produced under licence using ArcGIS® software by Esri, © Esri)

Appendix E

Cultural Heritage Assessment Report, Archeological Research Associates

December 2022

MTE

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Cultural Heritage Assessment Report
Heart Lake Road and Countryside Drive Intersection
City of Brampton
Regional Municipality of Peel
Lots 15-16, Concessions 3 East of Centre Road
Geographic Township of Chinguacousy
Former Peel County

Prepared for

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HR-203-2020
Project # 2020-0172

17/12/2020
Original Report

EXECUTIVE SUMMARY

Under a contract awarded in August 2020, Archaeological Research Associates Ltd. (ARA) carried out a Cultural Heritage Assessment Report (CHAR), for the proposed Heart Lake Road and Countryside Drive Intersection Improvement project in the City of Brampton, Regional Municipality of Peel, Ontario. The assessment was carried out as part of a Schedule 'B' Municipal Class EA in accordance with the *Environmental Assessment Act*. The intersection improvements are part of an overall operational and safety improvement plan for the Heart Lake Road corridor.

The purpose of this assessment is to identify and evaluate the cultural heritage resources within the project location that may be impacted by the proposed Heart Lake Road and Countryside Drive Intersection Improvement project. This assessment was conducted in accordance with the aims of the *Environmental Assessment Act*, R.S.O. 1990, *Provincial Policy Statement* (2014) and the *Ontario Heritage Act*, R.S.O. 1990, c. O.18, and the *City of Brampton Official Plan* (Consolidated September 2020).

Heart Lake Road and Countryside Drive are presently considered Minor Arterial Roads as outlined in Schedule B of the City of Brampton Official Plan. Currently Heart Lake Road is a two-lane road with a rural cross section (i.e. partly paved shoulders and open ditches) which intersects with Countryside Drive which has an urban cross-section (i.e. five-lane road, curbs, sidewalks, streetlights).

The Cultural Heritage Assessment Report approach included:

- Background research concerning the project and historical context of the project location;
- Consultation with City of Brampton staff regarding heritage matters in the project location;
- Identification of any designated or recognized properties within the limits of the project location;
- On-site inspection and creation of an inventory of all properties with potential Built Heritage Resources and Cultural Heritage Landscapes within the project location;
- A description of the location and nature of potential cultural heritage resources;
- Evaluation of each potential cultural heritage resource against the criteria set out in Ontario Regulation 9/06, and 10/06, where applicable, for determining cultural heritage value or interest;
- Evaluation of potential project impacts; and
- Provision of suggested strategies for the future conservation of identified cultural heritage resources.

As a result of consultation and field survey, the following Built Heritage Resources were identified: 10881 Heart Lake Road (BHR1) and the Heart Lake Road Corridor (CHL1).

Detailed designs or plans for the intersection improvements were not available at the time this report was written; however, it is not anticipated that the heritage attribute BHR1 will be directly impacted. CHL-1 is located within the project location and may be impacted by the proposed intersection improvements. There may also be some indirect impacts to the identified resources

during construction activities. Some of these indirect impacts may, in fact, prove to be positive as efforts can be undertaken to interpret cultural heritage resources (i.e., with plaques or public art).

As a result of this Cultural Heritage Assessment Report, the following mitigation strategies are recommended:

- That intersection improvements and any construction staging areas should avoid the use of land which is part of BHR1 at 10881 Heart Lake Road;
- That should project-related activities be expected to impact the BHR1, a qualified heritage consultant should be contracted to complete a property specific Heritage Impact Assessment and provide detailed mitigation options to address potential impacts of the proposed design on the resources;
- That the design alternatives and planned intersection improvements should consider the heritage attributes of CHL 1, specifically the rural cross section of the road, including the width of the road, two lanes of traffic, and ditching; wood utility poles along the roadside; natural setting of the roadscape, and linear corridor views along Heart Lake Road;
- That following the development of the preferred design alternative a Heritage Impact Assessment should be prepared for the Heart Lake Corridor (CHL 1), a potential significant cultural heritage landscape, to evaluate the impacts and suggest mitigation measures. This study should be undertaken by a qualified heritage consultant;
- That public consultation may result in additional potential cultural heritage resources being identified. These potential cultural heritage resources should be reviewed by a qualified heritage consultant to: 1) determine their cultural heritage value or interest, 2) evaluate potential project impacts, and 3) suggest strategies for future conservation of any identified cultural heritage resources;
- That should the intersection improvement activities or the project location expand beyond the scope examined in this report, a qualified heritage consultant should be retained to determine the potential impacts and suggest mitigation measures; and,
- That should intersection and road improvements create seating areas and/or transit stops, this may provide an opportunity to interpret some of the identified cultural heritage resources (i.e., with plaques, public art).

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GLOSSARY OF ABBREVIATIONS

ARA – Archaeological Research Associates Ltd.
BHR – Built Heritage Resource
CHAR – Cultural Heritage Assessment Report
CHL – Cultural Heritage Landscape
CHVI – Cultural Heritage Value or Interest
EA – Environmental Assessment
HIA – Heritage Impact Assessment
HSMBC – Historic Sites and Monuments Board of Canada
MCEA – Municipal Class Environmental Assessment
MHSTCI – Ministry of Heritage, Sport, Tourism and Culture Industries
MMAH – Ministry of Municipal Affairs and Housing
OHA – Ontario Heritage Act
OHT – Ontario Heritage Trust
OP – Official Plan
O. Reg. – Ontario Regulation
PIC – Public Information Centre
PPS – Provincial Policy Statement

TRCA – Toronto Region Conservation Authority

PERSONNEL

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Photography: A. Barnes
Cartographer: A. Bailey (GIS), K. Brightwell (GIS),
Technical Writers: A. Barnes, K. Jonas Galvin, P. Young, MA, CAHP,
Editor: J. McDermid, BA

Two-page Curriculum Vitae (CV) for key team members that demonstrate the qualifications and expertise necessary to perform cultural heritage work in Ontario are provide in Appendix B.

1.0 PROJECT CONTEXT

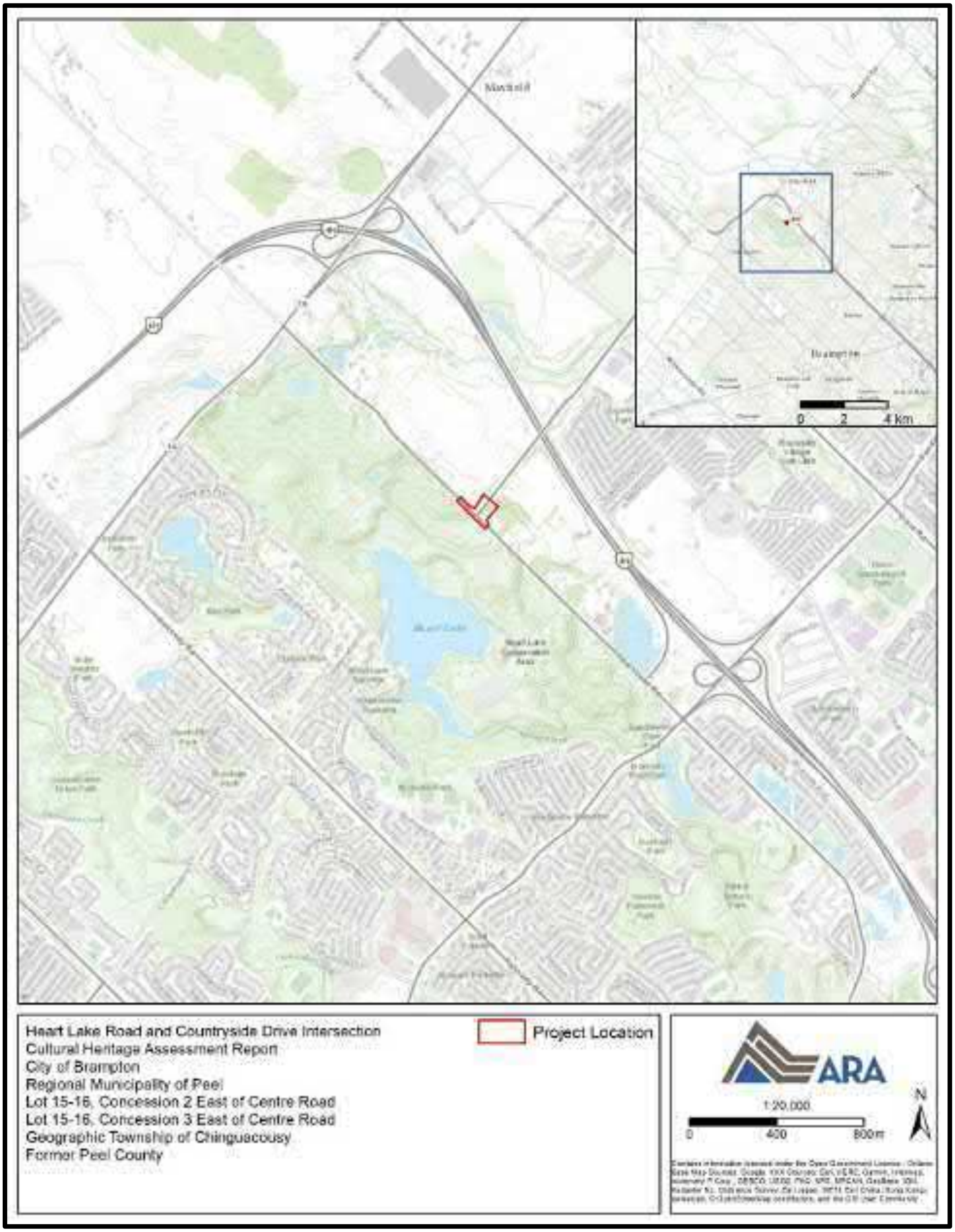
Under a contract awarded in August 2020, Archaeological Research Associates Ltd. (ARA) carried out a Cultural Heritage Assessment Report (CHAR), for the proposed Heart Lake Road and Countryside Drive Intersection Improvement project in the City of Brampton, Regional Municipality of Peel, Ontario. The assessment was carried out as part of a Schedule 'B' Municipal Class EA in accordance with the *Environmental Assessment Act*. The intersection improvements are part of an overall operational and safety improvement plan for the Heart Lake Road corridor.

The project location consists of an irregularly shaped parcel of land with a total area of 1.21 ha (see Map 1). This parcel is traversed by the current intersection and is generally bounded by agricultural lands to the north, natural areas to the east and the Heart Lake Conservation Area to the south and west. In legal terms, the project falls on part of Lots 15–16, Concession 2–3 ECR in the Geographic Township of Chinguacousy, former Peel County.

Heart Lake Road and Countryside Drive are presently considered Minor Arterial Roads as outlined in Schedule B of the *City of Brampton Official Plan*. Currently Heart Lake Road is a two-lane road with a rural cross section (i.e., partly paved shoulders and open ditches) which intersects with Countryside Drive which has an urban cross-section (i.e., five-lane road, curbs, sidewalks and streetlights).

The purpose of this assessment is to identify and evaluate cultural heritage resources within and adjacent to the project location that may be impacted by the proposed Heart Lake Road and Countryside Drive Intersection Improvement project. This assessment was conducted in accordance with the aims of the *Environmental Assessment Act*, R.S.O. 1990, *Provincial Policy Statement* (2020) and the *Ontario Heritage Act*, R.S.O. 1990, c. O.18, *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* (MHSTCI 1992), *Ontario Heritage Tool Kit series* (MHSTCI 2006a), the *Region of Peel Official Plan* (2018) and *City of Brampton Official Plan* (Consolidated September 2020).

All notes, photographs and records pertaining to the heritage assessment are currently housed in ARA's office located at 900 Guelph Street – Unit 219, Kitchener, Ontario. Subsequent long-term storage will occur at the same location.



Map 1: Project Location in the City of Brampton
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri)

2.0 LEGISLATION AND POLICY REVIEW

The framework for this assessment report is provided by federal guidelines, provincial environmental and planning legislation and policies as well as regional and local municipal Official Plans and guidelines.

2.1 Federal Guidelines

At the national level, *The Standards and Guidelines for Conservation of Historic Places in Canada* (Parks Canada 2010) provides guidance for the preservation, rehabilitation and restoration of historic places, including cultural heritage landscapes (CHLs) and built heritage resources (BHRs). Such guidance includes the planning and implementation of heritage conservation activities.

2.2 Provincial Policies and Guidelines

2.2.1 Environmental Assessment Act and Guideline

Within the *Environmental Assessment Act*, the environment includes *"any building, structure, machine or other device or thing made by humans."* An Environmental Assessment (EA) is a study that evaluates both the potential positive and/or negative effects of a project on the environment. This assessment is conducted as part of a streamlined EA process known as a Municipal Class EA (MCEA), which applies to routine projects grouped into classes that range from A (minor undertakings) to C (construction of new large facilities). The MCEA applies to municipal infrastructure undertakings including roads, water and wastewater projects.

The *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* indicates a need to describe the "affected environment" that is "a spatially defined area within which land will be altered as a result of the proponent's development" (MHSTCI 1992:3). As such, ARA completes in-depth research and evaluation of any potential cultural heritage resource within the project area. ARA's business practice also considers the project location and any adjacent properties. This ensures that every BHR and CHL that may be subject to potential indirect project impacts is identified.

2.2.2 Planning Act

Section 2 of the Ontario *Planning Act* indicates that a council of a Municipality have regard for matters of provincial interest such as: "(d) the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest" (Government of Ontario 2018). Section 3 of the *Planning Act* directs a municipal Council's decisions to be consistent with the *Provincial Policy Statement* (PPS 2020, MMAH 2020).

2.2.3 The Provincial Policy Statement (2020)

The *Provincial Policy Statement* (PPS 2020) contains a combined statement of the Province's land use planning policies. It provides the provincial government's policies on a range of land use planning issues including cultural heritage outlined. As outlined in Section 2.0 on Wise Use of and Management of Resources: "Ontario's long-term prosperity, environmental health, and social wellbeing depend on conserving biodiversity, protecting the health of the Great Lakes, and protecting natural heritage, water, agricultural, mineral and cultural heritage and archaeological resources for their economic, environmental and social benefits” (MMAH 2020:24). The PPS 2020 (MMAH 2020:31) promotes the conservation of cultural heritage resources through detailed polices in Section 2.6, such as “2.6.1 Significant built heritage resources and significant cultural heritage landscapes shall be conserved” and “2.6.3 Planning authorities shall not permit development and site alteration on adjacent lands to protected heritage property except where the proposed development and site alteration has been evaluated and it has been demonstrated that the heritage attributes of the protected heritage property will be conserved."

2.2.4 Ontario Heritage Act

The *Ontario Heritage Act, R.S.O. 1990, c.018* (OHA) is the guiding piece of provincial legislation for the conservation of significant cultural heritage resources in Ontario. The *OHA* gives provincial and municipalities governments the authority and power to conserve Ontario’s heritage. The Act has policies which address individual properties (Part IV), heritage districts (Part V), and allows municipalities to create a register of non-designated properties which may have cultural heritage value or interest (Section 27).

In order to objectively identify cultural heritage resources, O. Reg. 9/06 made under the *OHA* sets out three principal criteria with nine sub-criteria for determining cultural heritage value or interest (CHVI) (MHSTCI 2006b:20–27). The criteria set out in the regulation were developed to identify and evaluate properties for designation under the *OHA*. Best practices in evaluating properties that are not yet protected employ O. Reg. 9/06 to determine if they have CHVI. O. Reg 9/06 is also applied to consider the built and natural features and the property as a whole. The O. Reg. 9/06 criteria include: design or physical value, historical or associative value and contextual value.

1. The property has design value or physical value because it,
    i. is a rare, unique, representative or early example of a style, type, expression, material or construction method,
    ii. displays a high degree of craftsmanship or artistic merit, or
    iii. demonstrates a high degree of technical or scientific achievement.

2. The property has historical value or associative value because it,
    i. has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community,
    ii. yields, or has the potential to yield, information that contributes to an understanding of a community or culture, or
    iii. demonstrates or reflects the work or ideas of an architect, artist, builder, designer or theorist who is significant to a community.

3. The property has contextual value because it,
    i. is important in defining, maintaining or supporting the character of an area,
    ii. is physically, functionally, visually or historically linked to its surroundings, or
    iii. is a landmark. O. Reg. 9/06, s. 1 (2).

The *OHA* provides three key tools for the conservation of built heritage resources (BHRs) and cultural heritage landscapes (CHLs). It allows for protection as:

1. A single property (i.e., farmstead, park, garden, estate, cemetery), a municipality can designate BHRs and CHLs as individual properties under Part IV of the *OHA*.
2. Multiple properties or a specific grouping of properties may be considered a CHL, as such, a municipality can designate the area as a Heritage Conservation District (HCD) under Part V of the *OHA*.
3. Lastly, a municipality has the authority to add an individual or grouping of non-*OHA* designated property(ies) of heritage value or interest on their Municipal Heritage Register.

An *OHA* designation provides the strongest heritage protection available for conserving cultural heritage resources. It allows a municipality to deny demolition permits, to guide change through development review of protected property(ies) and adjacent protected property(ies) and to control property alterations through a heritage permit system.

2.2.5 Summary of Provincial Policies

The PPS addresses cultural heritage resources, including cultural heritage landscapes. The PPS notes that significant heritage resources "shall be conserved". This cultural heritage assessment will evaluate the potential cultural heritage resources located within the area to be affected by the Heart Lake Road and Countryside Drive Intersection Improvement project.

2.3 Municipal Policies

2.3.1 Region of Peel

One of the main goals of *Region of Peel Official Plan* is: "To create healthy and sustainable regional communities for those living and working in Peel which is characterized by physical, mental, economic and social well being; minimized crime, hunger and homelessness; a recognition and preservation of the region's natural and cultural heritage" (Region of Peel 2018:6). The importance of cultural heritage in the Region of Peel is emphasized by the numerous policies the OP has addressing cultural heritage.

Section 3.6 of the OP identifies policies related specifically to cultural heritage in Peel Region. Subsection 3.6.1 provides the objectives including:

1. *To identify, preserve and promote cultural heritage resources, including the material, cultural, archaeological and built heritage of the region, for present and future generations.*
2. *To promote awareness and appreciation, and encourage public and private stewardship of Peel's heritage*
3. *To encourage cooperation among the area municipalities, when a matter having inter-municipal cultural heritage significance is involved.*
4. *To support the heritage policies and programs of the area municipalities* (2018:89).

The Peel Regional Council has outlined multiple policies that encourage and, in some cases, direct area municipalities to appropriate manage their cultural heritage resources. Policy 3.6.2.1 (2018:89) states that Regional Council will "Direct the area municipalities to include in their official plans policies for the definition, identification, conservation and protection of cultural heritage resources in Peel, in cooperation with the Region, the conservation authorities and aboriginal groups, and to provide direction for their conservation and preservation, as required." Additionally, there are policies that direct the Region's actions as outlined in Policy 3.6.2.4 (2018:90) stating: "Require and support cultural heritage resource impacts assessments, where appropriate for infrastructure projects, including Region of Peel projects". There also is a need to address development adjacent to cultural heritage properties (i.e. "protected" properties), such that area municipalities are directed to only allow development and site alteration on adjacent lands "where the proposed property has been evaluation and it has been demonstrated that the heritage attributes of the protected heritage property will be conserved (Region of Peel 2018:90).

2.3.2 City of Brampton Official Plan

With respect to cultural heritage, goals of the *City of Brampton Official Plan* (OP) are to: "conserve the cultural heritage resources of the City for the enjoyment of existing and future generations" and to "Preserve, restore and rehabilitate structures, buildings or sites deemed to have significant historic, archaeological, architectural or cultural significance and, preserve cultural heritage landscapes; including significant public views" (2020a:4.10-2).

Section 2.1 Physical and Environmental Consideration notes:

> *Two major conservation areas (Claireville and Heart Lake), together with additional lands owned by the Toronto and Region Conservation Authority are significant permanent open space resources. Also contributing to open space resources are the City's park system and the natural heritage features and areas acquired and secured through the development approvals process* (2020a:2-3)

Section 4.10.1.4 of the OP lays out the criteria for assess heritage significance. It states:

> *Criteria for assessing the heritage significance of cultural heritage resources shall be developed. Heritage significance refers to the aesthetic, historic, scientific, cultural, social or spiritual importance or significance of a resource for past, present or future generations. The significance of a cultural heritage resource is embodied in its heritage attributes and other character defining elements including: materials, forms, location, spatial configurations, uses and cultural associations or meanings. Assessment criteria may include one or more of the following core values:*
>
> - *Aesthetic, Design or Physical Value;*
> - *Historical or Associative Value; and/or,*
> - *Contextual Value.* (2020a:4.10-3)

Section 4.10.1.6 states:

> *The City will give immediate consideration to the designation of any heritage resource under the Ontario Heritage Act if that resource is threatened with demolition, significant alterations or other potentially adverse impacts* (2020a:4.10-3).

Section 4.10.2 outlines policies regarding Cultural Heritage Landscapes. The policies include:

> *4.10.2.1* *The City shall identify and maintain an inventory of cultural heritage landscapes as part of the City's Cultural Heritage Register to ensure that they are accorded with the same attention and protection as the other types of cultural heritage resources.*
>
> *4.10.2.2* *Significant cultural heritage landscapes shall be designated under either Part IV or Part V of the Ontario Heritage Act, or established as Areas of Cultural Heritage Character as appropriate.*
>
> *4.10.2.3* *Owing to the spatial characteristics of some cultural heritage landscapes that they may span across several geographical and political jurisdictions, the City shall cooperate with neighbouring municipalities, other levels of government, conservation authorities and the private sector in managing and conserving these resources.* (2020a:4.10-6)

Section 4.10.9 outlines implementation and decision-making processes. Policies 4.10.9.2 reads:

> *The City shall use the power and tools provided by the enabling legislation, policies and programs, particularly the Ontario Heritage Act, the Planning Act, the Environmental Assessment Act and the Municipal Act in implementing and enforcing the policies of this section. These shall include but not be limited to the following:*
>
> > *(i)The power to stop demolition and alteration of designated heritage properties and resources provided under the Ontario Heritage Act and as set out in Section 4.10.1 of this policy;*
> >
> > *(ii)Requiring the preparation of a Heritage Impact Assessment for development proposals and other land use planning proposals that may potentially affect a designated or significant heritage resource or Heritage Conservation District;*
> >
> > *(vii)Identifying, documenting and designating cultural heritage resources as appropriate in the secondary and block plans and including measures to protect and enhance any significant heritage resources identified as part of the approval conditions; and,* (2020a:4.10-13)

The policies quote here are a sample of the broad range of policies for the conservation of cultural heritage resources contained in the *City of Brampton Official Plan.*

2.3.3 Summary of Municipal Policies

These Official Plan policies call for a careful analysis of the CHVI and attributes of identified resources and landscapes, coupled with an analysis of project impacts and an outline of potential mitigation measures to support the preservation, restoration and utilization of heritage resources.

2.4 Legislation Summary

Through careful analysis of the heritage values and attributes of an identified resource, coupled with an analysis of project impacts and an outline of potential mitigation measures, the aims of the *Standards and Guidelines for the Conservation of Historic Places in Canada*, the provincial policies and guides as well as the Regional and Municipal Official Plans can be met.

3.0 KEY CONCEPTS

The following concepts require clear definition in advance of the methodological overview and proper understanding is fundamental for any discussion pertaining to cultural heritage resources:

- **Cultural Heritage Value or Interest** (CHVI), also referred to as Heritage Value, is identified if a property meets one of the criteria outlined in O. Reg. 9/06 namely historic or associate value, design or physical value and/or contextual value. Provincial significance is defined under *Ontario Heritage Act (OHA) O. Reg*. 10/06.
- **Built Heritage Resource** (BHR) can be defined in the *PPS* as: "a building, structure, monument, installation or any manufactured or constructed part or remnant that contributes to a property's cultural heritage value or interest as identified by a community, including Indigenous community. Built heritage resources are located on property that has been designated under Parts IV or V of the *Ontario Heritage Act*, or that may be included on local, provincial and/or federal and/or international registers" (MMAH 2020:41).
- **Cultural Heritage Landscape** (CHL) is defined in the *PPS* as: "a defined geographical area that may have been modified by human activity and is identified as having cultural heritage value or interest by a community, including an Aboriginal community. The area may involve features such as structures, spaces, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association. Examples may include, but are not limited to, heritage conservation districts designated under the *Ontario Heritage Act*; villages, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trailways, viewsheds, natural areas and industrial complexes of heritage significance; and areas recognized by federal or international designation authorities (e.g., a National Historic Site or District designation, or a UNESCO World Heritage Site)" (MMAH 2020:42).

  It is recognized that the heritage value of a CHL is often derived from its association with historical themes that characterize the development of human settlement in an area (see Scheinman 2006 for discussion of typical themes).

The *Standards and Guidelines for the Conservation of Historic Places* define a CHL as "any geographical area that has been modified, influenced or given special cultural meaning by people, and that has been formally recognized for its heritage value" (Parks Canada 2010:113). It identifies the three categories of cultural landscapes which are also contained within the UNESCO (2019) Operational Guidelines for the Implementation of the World Heritage Convention: designed; organically evolved (vernacular); and associative. The *Standards and Guidelines* further outlines specific guidelines for cultural heritage landscapes, including 11 subsections on: "evidence of land use; evidence of traditional practices; land patterns; spatial organization; visual relationships; circulation; ecological features; vegetation; landforms; water features; and built features" (Parks Canada 2010:50). The Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) *Information Sheet #2 Cultural Heritage Landscapes* (2006d:1-2) continues these definitions:

- Designed Cultural Landscapes – These are areas that are clearly defined and created intentionally by human design. They may include garden and parkland landscapes constructed for aesthetic reasons and may be associated with religious or monumental buildings.
- Evolved Cultural Landscapes – This type of landscape is often the result of a social, economic, administrative and/or religious motivation that has continued to develop into its present form due to associations with, or in response to, its natural environment. There are two sub-categories of this CHL type:
    - Relic Landscape – One in which an evolutionary process came to an end but its significant distinguishing features are still visible.
    - Continuing Landscape – One that retains associations with traditional practices but which retains an active social role in the current community while continuing to evolve and exhibit material evidence of this ongoing evolution.

Associative Cultural Landscapes – These landscapes have religious, artistic, or cultural associations with nature rather than with material cultural evidence, which may be insignificant or absent.

- **Conserved** means "the identification, protection, management and use of built heritage resources, cultural heritage landscapes and archaeological resources in a manner that ensures their cultural heritage value or interest is retained. This may be achieved by the implementation of recommendations set out in a conservation plan, archaeological assessment, and/or heritage impact assessment that has been approved, accepted or adopted by relevant planning authority and/or decision-makers. Mitigative measures and/or alternative development approaches can be included in these plans and assessments" (MMAH 2020:41).
- **Heritage Attributes** are defined as: "the principal features or elements that contribute to a protected heritage property's cultural heritage value or interest, and may include the property's built, constructed, or manufactured elements, as well as natural landforms, vegetation, water features, and its visual setting (e.g. significant views or vistas to or from a protected heritage property)." (MMAH 2020:44-45).

- **Protected heritage property** is defined as ”property designated under Parts IV, V or VI of the Ontario Heritage Act; property subject to a heritage conservation easement under Parts II or IV of the Ontario Heritage Act; property identified by the Province and prescribed public bodies as provincial heritage property under the Standards and Guidelines for Conservation of Provincial Heritage Properties; property protected under federal legislation, and UNESCO World Heritage Sites” (MMAH 2020:49).
- **Significant** in reference to cultural heritage is defined as: “resources that have been determined to have cultural heritage value or interest. Processes and criteria for determining cultural heritage value or interest are established by the Province under the authority of the Ontario Heritage Act” (MMAH 2020:51).

The Region of Peel provides definitions of terms that are relevant to their cultural heritage policies. Many reinforce the Provinces terminology; however, one is distinctive:

- **Cultural Heritage Landscapes** are “any discrete aggregation of features altered through human activity which has been identified as being important to a community. They can provide the contextual and spatial information necessary to preserve, interpret or reinforce the understanding of important historical settings and changes to past patterns of land use. Cultural landscape include any heritage area perceived as an ensemble of culturally derived features such as neighborhood, townscapes, farmscape, or waterscape that illustrate noteworthy relationships between people and their surround environment” (Region of Peel 2018:121).

City of Brampton’s Official Plan also contains distinctive terms related to their cultural heritage policies. Several are:

- **Adjacent lands** means “lands that are contiguous to a specific natural heritage feature or area where it is likely that development or site alteration would have a negative impact on the feature, or area…(City of Brampton 2020:5-3).
- **Significant** for cultural heritage is defined as: “in regard to cultural heritage and archaeology, resources that are valued for the important contribution they make to our understanding of the history of a place, an event, or a people (2020a:5-23).

4.0 HISTORICAL CONTEXT

Background information is obtained from aerial photographs, historical maps (i.e., illustrated atlases), archival sources (i.e., historical publications and records), published secondary sources (online and print) and local historical organizations.

4.1 Historical Context

The City of Brampton and Region of Peel have a long history of settlement including pre-contact and post-contact Indigenous campsites and villages due to its favourable farmland and productive river and lakeside lands. As the potential cultural heritage resource located within the project location are tied to this history prior to the arrival of colonial settlers as well as the initial settlement and growth of Euro-Canadian communities in the City of Brampton, this historical context section spans the Pre-Contact Indigenous occupation history through Euro-Canadian settlement history to present. The early history of the project location can be effectively discussed in terms of major historical events. The principal characteristics associated with these events are summarized in Table 1 and Table 2.

4.2 Settlement History

4.2.1 Pre-Contact

The Pre-Contact history of the region is lengthy and rich, and a variety of Indigenous groups inhabited the landscape. Archaeologists generally divide this vibrant history into three main periods: Palaeo, Archaic, and Woodland. Each of these periods comprise a range of discrete sub-periods characterized by identifiable trends in material culture and settlement patterns, which are used to interpret past lifeways. The principal characteristics of these sub-periods are summarized in Table 1.

Table 1: Pre-Contact Settlement History
(Wright 1972; Ellis and Ferris 1990; Warrick 2000; Munson and Jamieson 2013)

Sub-Period	Timeframe	Characteristics
Early Palaeo	9000–8400 BC	Gainey, Barnes and Crowfield traditions; Small bands; Mobile hunters and gatherers; Utilization of seasonal resources and large territories; Fluted projectiles
Late Palaeo	8400–7500 BC	Holcombe, Hi-Lo and Lanceolate biface traditions; Continuing mobility; Campsite/Way-Station sites; Smaller territories are utilized; Non-fluted projectiles
Early Archaic	7500–6000 BC	Side-notched, Corner-notched (Nettling, Thebes) and Bifurcate traditions; Growing diversity of stone tool types; Heavy woodworking tools appear (e.g., ground stone axes and chisels)
Middle Archaic	6000–2500 BC	Stemmed (Kirk, Stanly/Neville), Brewerton side- and corner-notched traditions; Reliance on local resources; Populations increasing; More ritual activities; Fully ground and polished tools; Net-sinkers common; Earliest copper tools
Late Archaic	2500–900 BC	Narrow Point (Lamoka), Broad Point (Genesee) and Small Point (Crawford Knoll) traditions; Less mobility; Use of fish-weirs; True cemeteries appear; Stone pipes emerge; Long-distance trade (marine shells and galena)
Early Woodland	900–400 BC	Meadowood tradition; Crude cord-roughened ceramics emerge; Meadowood cache blades and side-notched points; Bands of up to 35 people
Middle Woodland	400 BC–AD 600	Point Peninsula tradition; Vinette 2 ceramics appear; Small camp sites and seasonal village sites; Influences from northern Ontario and Hopewell area to the south; Hopewellian influence can be seen in continued use of burial mounds
Middle/Late Woodland Transition	AD 600–900	Gradual transition between Point Peninsula and later traditions; Princess Point tradition emerges elsewhere (i.e., in the vicinity of the Grand and Credit Rivers)
Late Woodland (Early)	AD 900–1300	Glen Meyer tradition; Settled village-life based on agriculture; Small villages (0.4 ha) with 75–200 people and 4–5 longhouses; Semi-permanent settlements

Sub-Period	Timeframe	Characteristics
Late Woodland (Middle)	AD 1300–1400	Uren and Middleport traditions; Classic longhouses emerge; Larger villages (1.2 ha) with up to 600 people; More permanent settlements (30 years)
Late Woodland (Late)	AD 1400–1600	Huron-Petun tradition; Globular-shaped ceramic vessels, ceramic pipes, bone/antler awls and beads, ground stone celts and adzes, chipped stone tools, and even rare copper objects; Large villages (often with palisades), temporary hunting and fishing camps, cabin sites and small hamlets; Territorial contraction in early 16th century; Fur trade begins ca. 1580; European trade goods appear

Although Iroquoian-speaking populations tended to leave a much more obvious mark on the archaeological record and are therefore emphasized in the Late Woodland entries above, it must be understood that Algonquian-speaking populations also represented a significant presence in southern Ontario. Due to the sustainability of their lifeways, archaeological evidence directly associated with the Anishinaabeg remains elusive, particularly when compared to sites associated with the more sedentary agriculturalists. Many artifact scatters in southern Ontario were likely camps, chipping stations or processing areas associated with the more mobile Anishinaabeg, utilized during their travels along the local drainage basins while making use of seasonal resources. This part of southern Ontario represents the ancestral territory of various Indigenous groups, each with their own land use and settlement pattern tendencies.

4.2.2 Post-Contact

The arrival of European explorers and traders at the beginning of the 17th century triggered widespread shifts in Indigenous lifeways and set the stage for the ensuing Euro-Canadian settlement process. Documentation for this period is abundant, ranging from the first sketches of Upper Canada and the written accounts of early explorers to detailed township maps and lengthy histories. The Post-Contact period can be effectively discussed in terms of major historical events, and the principal characteristics associated with these events are summarized in Table 2.

Table 2: Post-Contact Settlement History
(Smith 1846; Coyne 1895; Lajeunesse 1960; Ellis and Ferris 1990; Surtees 1994; Wilson's Publishing Co. 2000; AO 2015)

Historical Event	Timeframe	Characteristics
Early Exploration	Early 17th century	Brûlé explores southern Ontario in 1610; Champlain travels through in 1613 and 1615/1616, encountering a variety of Indigenous groups (including both Iroquoian-speakers and Algonquian-speakers); European goods begin to replace traditional tools

Historical Event	Timeframe	Characteristics
Increased Contact and Conflict	Mid- to late 17th century	Conflicts between various First Nations during the Beaver Wars result in numerous population shifts; European explorers continue to document the area, and many Indigenous groups trade directly with the French and English; 'The Great Peace of Montreal' treaty established between roughly 39 different First Nations and New France in 1701
Fur Trade Development	Early to mid-18th century	Growth and spread of the fur trade; Peace between the French and English with the Treaty of Utrecht in 1713; Ethnogenesis of the Métis; Hostilities between French and British lead to the Seven Years' War in 1754; French surrender in 1760
British Control	Mid- to late 18th century	*Royal Proclamation* of 1763 recognizes the title of the First Nations to the land; Numerous treaties subsequently arranged by the Crown; First land cession under the new protocols is the Seneca surrender of the west side of the Niagara River in 1764; The Niagara Purchase (Treaty 381) in 1781 included this area
Loyalist Influx	Late 18th century	United Empire Loyalist influx during and after the American Revolutionary War (1775–1783); British develop interior communication routes and acquire additional lands; *Constitutional Act* of 1791 creates Upper and Lower Canada
County Development	Late 18th to early 19th century	Area initially adjacent to York County's 'West Riding'; Became part of York County's 'West Riding' in 1798; Provisional agreement for the purchase of the southern portion (Treaty 13A) completed in 1805; Confirmed during the Head of the Lake Purchase (Treaty 14) in 1806; Northern portion acquired as part of the Ajetance Purchase (Treaty 19) in 1818; Peel County established after the abolition of the district system in 1849
Township Formation	Early 19th century	Chinguacousy primarily comprised lands obtained in 1818 and was settled around the same time; Surveyed by R. Bristol in 1819, divided into west and east halves on either side of Hurontario Street (Centre Road); Majority of first settlers from New Brunswick, the United States and parts of Upper Canada; Combined population of Toronto Gore and Chinguacousy was only 412 by 1821
Township Development	Mid-19th to early 20th century	Population reached 3,965 by 1842; 30,342 ha taken up by 1846, with 10,629 ha under cultivation; 7 saw mills and 1 grist mill in operation at that time; Traversed by the Grand Trunk Railway (1856), the Hamilton & North Western Railway (1877), the Credit Valley Railway (1878/79) and the Toronto Suburban Railway (1917); Brampton was the principal settlement; Other communities at Cheltenham, Salmonville, Victoria, Campbell's Cross, Kilmanagh, Sand Hill, Mayfield, Edmonton, Alloa, Norval Station, Westervelt's Corners, Woodhill, Springbrook and Huttonville

4.2.3 Heart Lake Area History

Heart Lake is a heart-shaped kettle lake that was created by a block of ice that was trapped under a melting glacier approximately 10,000 years ago. The lake itself is 16.5 ha (40.8 ac) and is situated within wetlands that now comprise the Heart Lake Conservation Area (Stantec 2019:5.1–5.3). Historically, the surrounding area was exploited by settlers for farming purposes, though today the principle use is suburban development. In 1957, the Heart Lake Conservation Area was established on lands purchased from A.E. Taylor by the Metropolitan Toronto and Region Conservation Authority (TRCA) in 1956 (TRCA n.d.:14). Heart Lake Road parallels the east side of the conservation area, which was formerly known as Concession Road 2 in the Township of Chinguacousy.

4.3 Project Location History

4.3.1 Mapping and Imagery Analysis

In order to gain a general understanding of the project location, one patent plan, two historic settlement maps, one topographic map and two aerial images were examined during the research component of the study. Specifically, the following resources were consulted:

- The *Chinguacousy Township* Patent Plan (No Date) (AO 2015);
- G.R Tremaine's *Tremaine's Map of the County of Peel, Canada West* (1859) (OHCMP 2019);
- Walker & Miles *Illustrated Historical Atlas of the County of Peel, Ont.* (1877) (McGill University 2001);
- A topographic map from 1909 (OCUL 2020); and
- Aerial images from 1954 and 2006 (Google Earth 2020; University of Toronto 2020).

The limits of the project location are shown on georeferenced versions of the consulted historical resources in Map 2–Map 7.

The *Chinguacousy Township* Patent Plan, initiated on a copy of an original survey plan and updated with patent information until the records were transferred to the Archives of Ontario, indicates that Lot 15, Concession 3 ECR was patented to the Canada Company and Lot 16, Concession 3 ECR to Thady (Thaddeus) Ingoldsby (see Map 2). Interestingly, Heart Lake is not depicted.

Tremaines' Map of the County of Peel, Canada West (1859) identifies Thomas Ingoldsby as an early occupant of Lot 15 and M. Ingoldsby as an early occupant of Lot 16 (see Map 3). The buildings associated with the Ingoldsby property are not located within the project location. As early settlers to the Chinguacousy Township, the Ingoldsby family, including Thomas and his son, played an important contribution to the civic growth and early development of the area. Thomas Ingoldsby,

> *was, at one time, the owner of an inn in Mayfield. He served the township as a path master, a school board Trustee and a Justice of the Peace. Son Thomas J.*

> *Ingoldsby took over the farm in 1889. He served as a school board trustee, a councillor on the Chinguacousy Township Counsel, deputy Reeve and Reeve (1901-1093[1903]). Thomas Ingoldsby III took over the family farm in 1915 after his father's retirement* (ERA 2010:7)

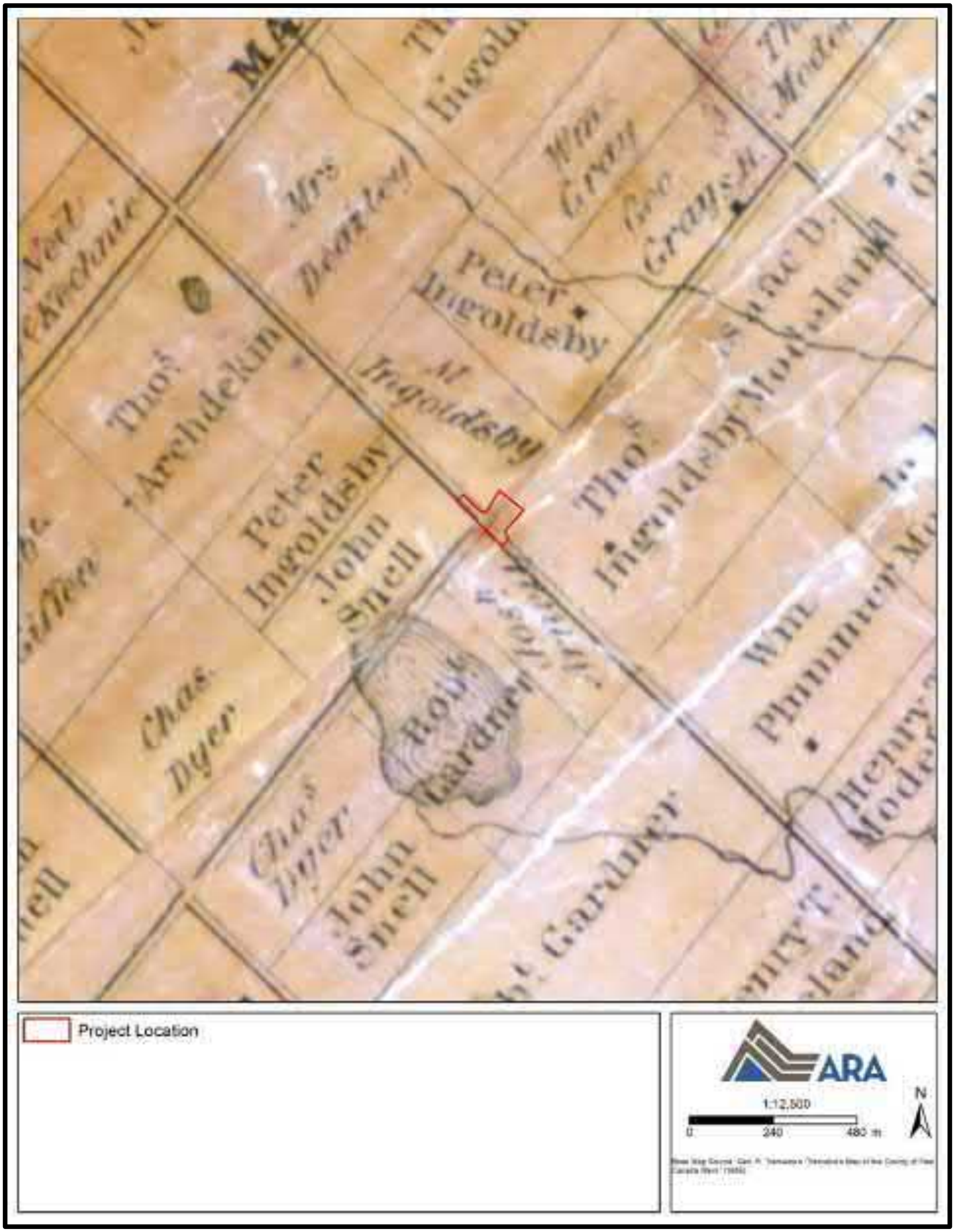
Heart Lake, two tributaries and a kettle lake are depicted in the surrounding landscape, as is Heart Lake Road and Countryside Drive. Countryside Drive is illustrated as continuing past Heart Lake Road and through Heart Lake, though this reflects an unopened road allowance instead of a continuation of the roadway.

The *Illustrated Historical Atlas of the County of Peel, Ont.* (1877) demonstrates that Thomas Ingoldsby continued to occupy Lot 15 as well as Lot 16; formerly occupied by M. Ingoldsby (see Map 4). No structures are present within the project location, however, at least six structures are depicted in the surrounding area, including the Ingoldsby farmstead and orchards to the east. Census documentation confirms that Thomas, his wife Anne and their twelve children, had a well-established farm with two houses, a barn and an orchard by this time.

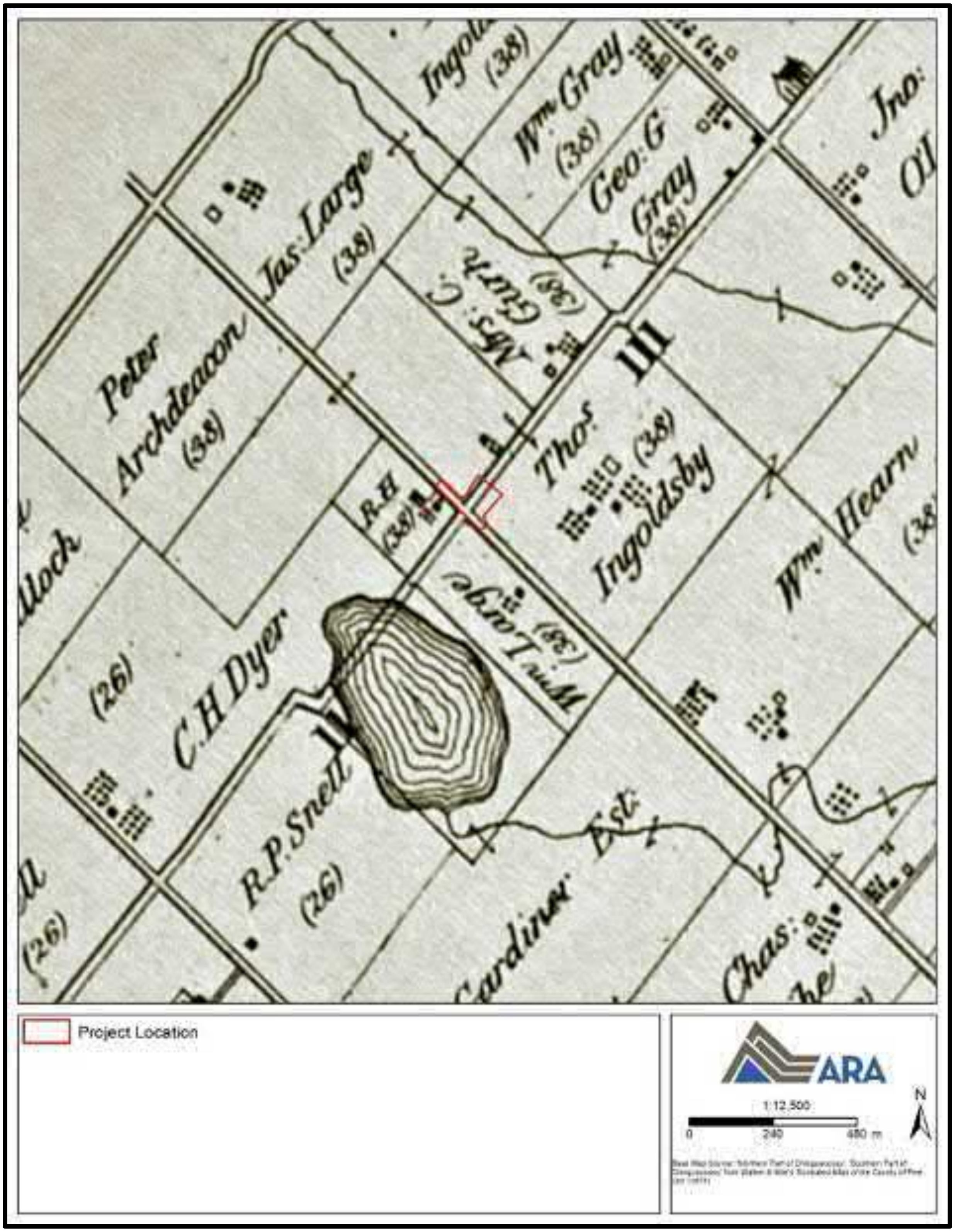
The topographic map from 1909 shows that the project location consisted of a mixture of transportation corridors, cleared farming lands to the north and deciduous woodlot to the southeast (see Map 5). No structures are present within the project location; however, a bridge abuts the southeastern limit. The Ingoldsby brick farmhouse (red square) is present and there is also a wood (black) homes are shown within adjacent lands. Heart Lake and its associated wetlands, tributary and forested areas are clearly depicted.

The aerial image from 1954 depicts the project location in a similar vein to the topographic map, with the Ingoldsby's farm and associated complex of buildings visible including the long driveway which provides access to Heart Lake Road (see Map 6). The aerial shows the buildings are surrounded by a row of mature trees which are further surrounded by open agricultural fields. The property continues to be owned by the Ingoldsby family at this time. The Ingoldsby family were "one of only 106 Peel County properties owned by direct decedents of the same family since 1867" and commemorated in 1967 as an Ontario Century Farm" (ERA 2010:8). Since the 1909 topographical map, subsequent images and aerials show the presence of the woodlot on Ingoldsby property at the south-east corner of the project location. The imagery from 2006 depicts the widening and reconstruction of Countryside Drive (see Map 7). The imagery shows the woodlot on the south-east side of Countryside drive and it appears the north side of the Countryside drive continues to be used for agricultural purposes.

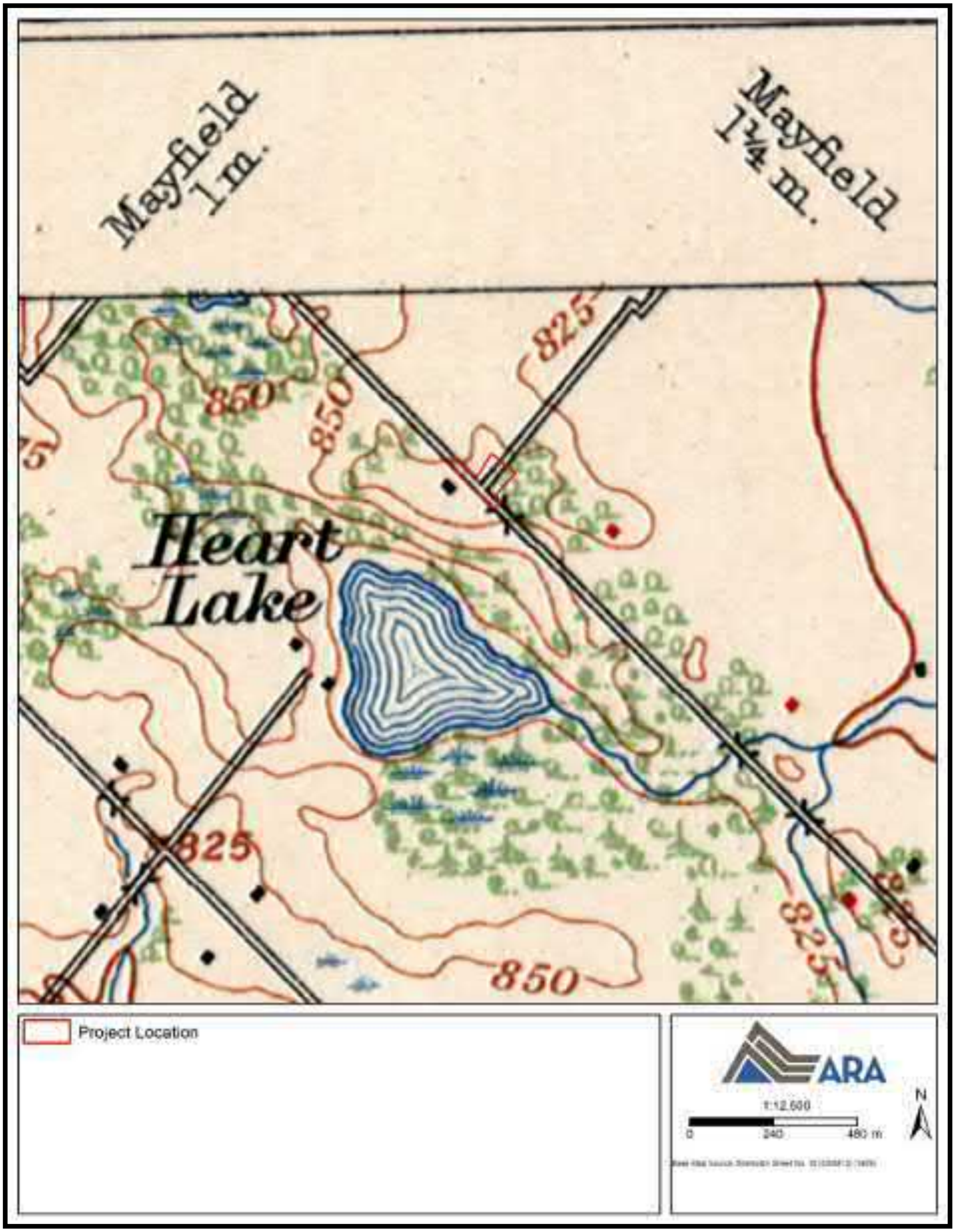
Map 2: *Chinguacousy Township* Patent Plan (No Date)
(Produced under licence using ArcGIS® software by Esri, © Esri; AO 2015)



Map 3: G.R. Tremaine's *Tremaine's Map of the County of Peel, Canada West* (1859)
(Produced under licence using ArcGIS® software by Esri, © Esri; OHCMP 2019)



Map 4: Walker & Miles' Illustrated Historical Atlas of the County of Peel, Ont. (1877)
(Produced under licence using ArcGIS® software by Esri, © Esri; McGill University 2001)



Map 5: Topographic Map (1909)
(Produced under licence using ArcGIS® software by Esri, © Esri, OCUL 2020)

Map 6: Aerial Image (1954)
(Produced under licence using ArcGIS® software by Esri, © Esri; University of Toronto 2020)

Map 7: Aerial Image (2006)
(Produced under licence using ArcGIS® software by Esri, © Esri; Google Earth 2020)

5.0 CONSULTATION AND HERITAGE CONTEXT

BHRs and CHLs are broadly referred to as cultural heritage resources. A variety of types of recognition exist to commemorate and/or protect cultural heritage resources in Ontario.

The Minister of Canadian Heritage, on the advice of the Historic Sites and Monuments Board of Canada (HSMBC), makes recommendations to declare a site, event or person of national significance. The National Historic Sites program commemorates important sites that had a nationally significant effect on, or illustrates a nationally important aspect of, the history of Canada. A National Historic Event is a recognized event that evokes a moment, episode, movement or experience in the history of Canada. National Historic People are people who are recognized as those who through their words or actions, have made a unique and enduring contribution to the history of Canada. There exists Parks Canada's online *Directory of Federal Heritage Designations* which captures these national commemorations. This directory also lists Heritage Railway Stations, Federal Heritage Buildings and Heritage Lighthouses. The *Federal Canadian Heritage Database* was searched, and no plaques or properties were noted within or adjacent to the project location. It is important to note that these federal commemoration programs do not offer protection from alteration or destruction.

The Ontario Heritage Trust (OHT) operates the Provincial Plaque Program that has over 1,250 provincial plaques recognizing key people, places and events that shaped the province. Additionally, properties owned by the province may be recognized as a "provincial heritage property" (MHSTCI 2010). The OHT plaque database were searched and none of the properties within or adjacent to the project location are commemorated with an OHT plaque. A cultural heritage resource may also be protected through an OHT or municipal easement.

MHSTCI's current list of Heritage Conservation Districts was consulted. No designated districts were identified in or adjacent to the project location (MHSTCI 2019). The list of properties designated by the MHSTCI under Section 34.5 of the OHA was consulted. No properties in or adjacent to the project location are listed.

Many municipal heritage committees and historical societies provide plaques for local places of interest. "One role of municipal heritage groups (i.e., municipal heritage committees, historical societies) is to educate and inform the community on local heritage and several ways this could occur could include: producing descriptive guides and newsletters or by installing commemorative plaques" (MHSTCI 2007:8).

At project commencement, ARA contacted the City of Brampton to inquire about: 1) protected properties within or adjacent to the project location, 2) properties with other types of recognition in or adjacent to the project location, 3) previous studies relevant to the current study, and 4) other heritage concerns regarding the project location.

ARA staff contacted the City of Brampton via email on October 2, 2020. A response was received from the City's Heritage Planner, indicating that the Heart Lake Road corridor, from Sandalwood Parkway to Mayfield Road, is considered a CHL, however it has not been formally recognize or identified on the Heritage Register, and that the property at 10881 Heart Lake Road used to contain a farmhouse (lost due to fire) outbuildings (collapsed circa 2001) and a silo (demolished circa 2010) continues to be listed on the register. Lastly, it was also noted that the class identification system used to prioritize heritage resources is not something that current heritage staff employ and does not need to be referenced in the assessment.

5.1 Lake Conservation Area Master Plan

The *Heart Lake Conservation Area Master Plan* was created in 2009 with the goal "to protect, conserve and restore the valuable ecological features and functions of the site, while guiding the current and potential future public uses of the area" (HLCA Master Plan, 2009:5).

Section 4.3 Cultural Heritage Resources recommendations include:

- Ensure that the TRCA's Archaeological Resource Management Unit conducts archaeological assessments of any locations where ground level disturbances are planned, such as for trail routes, parking lots, picnic shelters and washroom facilities.
- Protect and conserve all archaeological sites (known and unknown) within HLCA. This is important given their rarity and the direct connection that they provide to the past.
- Pursue all opportunities to preserve and interpret heritage sites for public education. For example, interpretive signage could be provided at old drinking water wells to explain the significance of these structures as a part of the range of water sources local people have used. TRCA should contact staff at the Region of Peel and the City of Brampton to further TRCA's understanding of these heritage sites.
- Research the history of HLCA and incorporate it into regeneration activities.
- Determine if there was an Aboriginal community in the HLCA area by conducting a frozen finger analysis of Teapot Lake. If the data indicates that such a community existed, incorporate this information into interpretive signage at HLCA.
- Create a Medicine Wheel garden at HLCA to celebrate past and current Aboriginal use of the area.
- Make the HLCA Background Report available to researchers and members of the public to raise awareness and appreciation of the history of humankind in this area. n Encourage the City of Brampton Heritage Board to continue to update and add to their existing inventories.

The recommendations outlined in the Master Plan generally pertain to archaeological resources. Archaeological assessment is outside of the scope of this CHAR and addressed in a separate process. Nonetheless they have been considered throughout this assessment.

6.0 FIELD SURVEY

The field survey component of an assessment involves the collection of primary data through systematic photographic documentation of all potential cultural heritage resources within the project location, as identified through historical research and consultation. Generally, potential cultural heritage resources are identified by applying a 40-year rolling timeline. This timeline is considered an industry best practice (i.e., MTO 2008). A date of 40 years does not automatically attribute CHVI to a resource; rather, that it should be flagged as a potential resource and evaluated for CHVI.

Additional cultural heritage resources may also be identified during the survey itself. Photographs capturing all properties with potential BHRs and CHLs are taken, as are general views of the surrounding landscape. The field survey also assists in confirming the location of each potential cultural heritage resource and helps to determine the relationship between resources. Given that such surveys are limited to areas of public access (i.e., roadways, intersections, non-private lands, etc.), there is always the possibility that obscured cultural heritage resources may be missed or that heritage attributes may be refined upon closer inspection.

A field survey was conducted in October 2020 in order to photograph and document the project location, and to record any local features that could enhance ARA's understanding of their setting in the landscape and contribute to the cultural heritage evaluation process. The field survey was conducted from publicly accessible, non-private lands.

7.0 HERITAGE ASSESSMENT

The project location consists of the intersection of Heart Lake Road and Countryside Drive. The project location includes the road, the right of way and a small portion of the adjacent property parcels.

As a result of consultation, existing heritage assessment and field survey, the following BHR and CHL were identified as having potential CHVI: 10881 Heart Lake Road and the Heart Lake Road Corridor.

A summary of the results of the evaluation of the BHR and CHL against the criteria set out in O. Reg. 9/06 can be found in Table 3 and Table 4 and the information sheets with background information, and the evaluations of each heritage resource can be found in Appendix A. The assessment determined that BHR1 and CHL1 met one or more O. Reg. 9/06 criteria.

Map 8: BHR Assessment Results Map
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri)

Map 9: CHL Assessment Results Map
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri)

Table 3: BHR and CHL with CHVI

Type and Number	Address/Name	Adjacent/ Participating	CHVI (Y/N)	Criteria Met
BHR1	10881 Heart Lake Road	Adjacent	Yes	Historic/associative value.
CHL1	Heart Lake Road Corridor (Sandalwood Parkway to Mayfield Road)	Adjacent and Participating	Yes	Historical/associative value and Contextual Value

Table 4: BHR and CHL Value Statements and Heritage Attributes

Type/Number	Address/Name	Value Statement(s)	Heritage Attributes
BHR1	10881 Heart Lake Road	The primary built heritage resources are no longer extant. Nonetheless the City of Brampton has retained the proprety on the Municipal Heritage Registered as a listed property. 10881 Heart Lake Road is listed on the Municipal Heritage Register due to its historical association with the Ingoldsby family. The Ingoldsby family began farming in the area in 1828 and owned the lands associated with 10881 Heart Lake Road for over 150 years. The Ingoldsby family were early settler in Chinguacousy Township and family members served in civic capacities in the early for many years.	In 2010 the Planning Design and Development department report which discussed the CHVI of the silo noted that at that time that the property still retained the: - Tree lines surrounding the original structures - Laneway from Heart Lake Road into the property
CHL1	Heart Lake Corridor	Heart Lake Road is a two-lane, rural road set in a significant natural setting that has strong historical associative value and contextual heritage value. Its historical value is related to its associations with early road building techniques in the City of Brampton and the TRCA through its connection to the Heart Lake Road Conservation Area. Heart Lake Road and its surrounding land has also yielded, and has potential to further yield, information regarding Indigenous land use and culture due to the archaeological potential of the area and high number of archaeological sites dating to the Archaic period.	The heritage attributes listed are taken directly from Stantec Report described in Section 6.3: •Rural cross section of the road, including the width of the road, two lanes of traffic, and ditching (where present); •Bend in the road to avoid TRCA wetland, approximately 500 m southeast of Mayfield Road; •Intermittent presence of split rail and post-and-rail fencing along the roadside; •Wood utility poles along the roadside; •Natural topography of adjacent lands, including the remaining sections of the Brampton Buried Esker; •Potential, and known, archaeological sites; •Likely historical association with corduroy road construction techniques; •Historical association with the Heart Lake Conservation Area and TRCA;

Type/Number	Address/Name	Value Statement(s)	Heritage Attributes
			•Linear corridor views along Heart Lake Road, bordered by significant natural areas; and •Natural setting of the roadscape, including forests, wetlands, and kettle lakes on the west side of the road and wetlands, agricultural fields, and kettle lakes on the east side of the road.

*Heritage attributes may include, but are not limited to, those listed in this table.

8.0 DEVELOPMENT PLAN

According to the Request for Proposal for *Environmental Assessment Study for Heart Lake Road and Countryside Drive Intersection:*

> *Countryside Drive has been improved based on previous TMP and Environmental Assessment recommendations, however, Heart Lake Road was not previously identified as a candidate for improvement in the [Transportation Master Plan] TMP.*
>
> *The City has identified the need for intersection improvements at Heart Lake Road and Countryside Drive, as part of the overall operational and safety improvements for the Heart Lake Road Corridor"* (City of Brampton 2020b: 48).
>
> The existing conditions of the intersection are described as follows:
>
> *Heart Lake Road is a north-south minor arterial road, under the jurisdiction of the City, and consists of a 2-lane rural cross-section with a posted speed of 60km/h and a right-of-way (ROW) of 20-30 meters. Countryside Drive is an east-west minor arterial road, also under the jurisdiction of the City, and consists of a 4-lane urban cross-section with a posted speed limit of 60-70km/hr and a right-of-way (ROW) of 30 meters. The existing traffic measures in place at the intersection is a stop control sign on Countryside Drive for vehicles traveling westbound and there is no stop control measure in place for vehicles traveling north-south on Heart Lake Road.* (City of Brampton 2020b:50).

The factors that have influenced this EA are described by the City of Brampton in the RFP as follows:

1) Opportunity to improve the safety and operations of the intersection;
2) Provide traffic calming to support future traffic calming recommendations along Heart Lake Road and to help reduce wildlife mortality along Heart Lake Road;
3) Potential to impact the natural environment adjacent to Heart Lake Road;
4) Conservation of the cultural heritage landscape
5) Approve and proposed adjacent land use; and

6) Long-range transportation planning to meet the demand of increasing population and growth (2020b: 51)

9.0 ANALYSIS OF POTENTIAL IMPACTS

The intersection improvements have the potential to affect cultural heritage resources. MHSTCI InfoSheet #5: Heritage Impact Assessments and Conservation Plans (MHSTCI 2006e:3). provides a list of potential negative impacts for evaluating against any proposed development impacts can be classified as either direct or indirect.

Direct impacts (those that physically affect the heritage resources themselves) include, but are not limited to: initial project staging, excavation/levelling operations, construction of access roads and renovations or repairs over the life of the project. These direct impacts may destroy some or all significant heritage attributes or may alter soils and drainage patterns and adversely impact unknown archaeological resources.

Indirect impacts include, but are not limited to: alterations that are not compatible with the historic fabric and appearance of the area, the creation of shadows that alter the appearance of an identified heritage attribute, the isolation of a heritage attribute from its surrounding environment, the obstruction of significant views and vistas, change in land use such as rezoning allowing for a reduction in open spaces and other less-tangible impacts. There may be positive environmental and cultural effects as a result of an EA undertaking.

An Environmental Assessment Act project has the potential for creating the above negative impacts; however, there may be positive effects as a result of an undertaking. For example, more recent infrastructure may be removed to restore the original views to cultural heritage resources or streetscape improvements might be made.

This project entails intersection improvements and road improvements; as such, there are no detailed designs available that would aid in the identification of project impacts. As a result, potential impacts and mitigation options related to the project will be discussed at a high level.

The heritage value of BHR1 will not be directly or indirectly impacted by the proposed project. BHR1 is adjacent to the project location and no improvement activities are planned for the property parcel. Further, the heritage attributes identified by the City of Brampton are located a distance away from the intersection.

The heritage value and associated attributes of CHL1, may be directly and indirectly impacted by the proposed project. Depending on the nature and extent of the intersection improvements, the rural cross section of the road, including the width of the road, two lanes of traffic, and ditching (where present) may be directly impacted. Further, some wood utility poles along the roadside and the Natural setting of the roadscape, specifically vegetation may be removed during intersection improvements. Linear corridor views along Heart Lake Road, bordered by significant natural areas may also be impacted.

There are no split rail and post-and-rail fencing along the roadside within the project location, and the Bend in the road to avoid TRCA wetland, approximately 500 m southeast of Mayfield Road is located a distance away from the intersection, therefore no direct impacts are anticipated to these heritage attributes.

The heritage attributes of natural topography of adjacent lands, including the remaining sections of the Brampton Buried Esker; likely historical association with corduroy road construction techniques and historical association with the Heart Lake Conservation Area and TRCA will not be impacted by the planned improvements.

The impacts to potential, and known, archaeological sites are being addressed through the archaeological assessment process.

10.0 MITIGATION MEASURES AND RECOMMENDATIONS

The project location consists of an irregularly-shaped parcel of land with a total area of 1.21 ha (Map 1). This parcel is traversed by the current intersection and is generally bounded by agricultural lands to the north, natural areas to the east and the Heart Lake Conservation Area to the south and west.

Heart Lake Road is a two-lane road with a rural cross section (i.e. partly paved shoulders and open ditches) which intersects with Countryside Drive which has an urban cross-section (i.e. five-lane road, curbs, sidewalks, streetlights). The following BHR and CHL were identified within and adjacent to the project location: 10881 Heart Lake Road (BHR1) and Heart Lake Road Corridor (CHL 1).

Detailed designs or plans for the intersection improvements were not available at the time this report was written, however it is not anticipated that the heritage attributes of BHR will not be directly impacted by any intersection improvements. A portion of the Heart Lake Road Corridor (CHL 1) falls within the project location and may be impacted by the proposed intersection improvements. Depending on the nature and extent of the intersection improvements, the rural cross section of the road, including the width of the road, two lanes of traffic, and ditching (where present) may be directly impacted. Further, some wood utility poles along the roadside and the Natural setting of the roadscape, specifically vegetation may be removed during intersection improvements. Linear corridor views along Heart Lake Road, bordered by significant natural areas may also be impacted.

As potential impacts have been identified mitigation measures must be recommended. The MHSTCI *InfoSheet #5: Heritage Impact Assessments and Conservation Plans* (2006d:3) lists specific methods to minimize negative impacts. Several mitigative measures include reducing impacts through alternative development approaches; isolating development from cultural heritage resources and limiting the height and density of development.

As a result of this Cultural Heritage Assessment Report, the following mitigation strategies are recommended:

- That intersection improvements and any construction staging areas should avoid the use of land which is part of BHR1 at 10881 Heart Lake Road;
- That should project-related activities be expected to impact the BHR1 , a qualified heritage consultant should be contracted to complete property specific HIA and provide detailed mitigation options to address the proposed design on the resources.
- That the design alternatives and planned intersection improvements should consider the heritage attributes of CHL 1, specifically the rural cross section of the road, including the width of the road, two lanes of traffic, and ditching; wood utility poles along the roadside; natural setting of the roadscape, and linear corridor views along Heart Lake Road;
- That following the development of the preferred design alternative a Heritage Impact Assessment (HIA) should be prepared for the Heart Lake Corridor (CHL 1), a potential significant cultural heritage landscape, to evaluate the impacts and suggest mitigation measures. This study should be undertaken by a qualified heritage consultant.
- That public consultation may result in additional potential cultural heritage resources being identified. These potential cultural heritage resources should be reviewed by a qualified heritage consultant to: 1) determine their cultural heritage value or interest, 2) evaluate potential project impacts, and 3) suggest strategies for future conservation of any identified cultural heritage resources.
- That should the intersection improvement activities or the project location expand beyond the scope examined in this report, a qualified heritage consultant should be retained to determine the potential impacts and suggest mitigation measures.
- That should intersection and road improvements create seating areas and/or transit stops, this may provide an opportunity to interpret some of the identified cultural heritage resources (i.e., with plaques, public art).
- That this Cultural Heritage Assessment Report should be provided to staff/planners at the City of Brampton
- That a Stage 1 archaeological assessment is currently being undertaken to address the identified archaeological potential associated with the project location. It is encouraged that the results be shared with the TRCA as suggested in the Heart Lake Conservation Area Master Plan, so that they might better understand the archeological history of the area.

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Appendix A: Built Heritage Resources and Cultural Heritage Landscapes

BUILT HERITAGE RESOURCE NO. 1

DESCRIPTION OF PROPERTY	
Street Address	10881 Heart Lake Road
Name	n/a
Recognition	*Listed* on Municipal Heritage Register
Location	City of Brampton
Type of Property	Vacant (former agricultural)
Date(s)	Farmhouse (lost due to fire) Outbuildings (collapsed circa 2001) Silo (demolished circa 2010)
Description	10881 Heart Lake Road is a large rectangular property bounded by Heart Lake Road (west), Countryside Drive (north) and Hwy 410 (east). The property contains a woodlot in the north-west corner, while large open areas containing mature trees occupy the remaining parcel. The property at 10881 Heart Lake Road was originally part of a larger farm complex and historically associated with the Ingoldsby family. The Ingoldsby family were early settlers and began farming in the area in 1828. Members of the Ingoldsby family owned the property for over 150 years. The property consisted of a group of buildings including the original farmhouse and outbuildings when it was added to the Municipal Heritage Register and listed under Section 27 of the OHA. Unfortunately, after it was listed, the farmhouse was lost to a fire and barn and outbuildings eventually collapsed. By 2010 the only remaining built structure associated with the property was a silo. As part of a Block plan for a proposed subdivision (Sandringham Place), a Heritage Resource Impact Assessment was completed by ERA in April 2010 to examine the CHVI of the silo. The report concluded that the "silo located at 10881 Heart Lake Road has lost its farm context, is in poor condition, exhibits limited heritage value, does not meet the criteria for heritage designation under the Ontario Heritage Act" (1). In response to ERA's report, on June 15, 2010, the Staff comment form (L3-1) noted the following heritage consideration and mitigative measures: "Due to diminished cultural heritage value associated with the silo and other considerations, demolition of structure should be supported with certain conditions of mitigation. Mitigation to include: o Documentation (complete) o Appropriate commemoration of the historical land uses of the property (e.g. naming of municipal assets such as parkettes and storm ponds) o Production of historical interpretive plaque on a suitable public space within the subdivision o Archaeological assessment as part of the subdivision planning due diligence; o Proposed retention of tree lines and other remaining contextual features if deemed feasible under review of proposed plan of subdivision." (2010:4) All the built heritage resources associated with 10881 Heart Lake Road are no longer extant. The driveway into the property towards the original farmstead and the trees which originally surrounded the buildings, remain visible from aerial photographs. Both natural features are not located within, or directly adjacent to the project location. The cultural heritage value or interest associated with 10881 Heart Lake Road is expressed in its historical and/or associative value with the Ingoldsby family.
Photograph	

	
Date of Photo	October 1, 2020

EVALUATION OF PROPERTY			
Criteria	**Description**	✓	**Value Statement(s)**
Design or Physical Value	Is a rare, unique, representative or early example of a style, type, expression, material or construction method		The original farmhouse, barn, outbuilding/s and silo are no longer extant. The property is not rare, unique, representative or early example of a style, type, expression, material or construction method.
	Displays a high degree of craftsmanship or artistic value		The farmhouse, barn, outbuilding/s and silo are no longer extant. The property does not display a high degree of craftsmanship or artistic value.
	Displays a high degree of technical or scientific achievement		The farmhouse, barn, outbuilding/s and silo are no longer extant. The property does not display a high degree of technical or scientific achievement.
Historical or Associative Value	Has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community	✓	The property is directly associated with the Ingoldsby family. The Ingoldsby family were early settlers and began farming in the area in 1828. Members of the Ingoldsby family played a prominent role in the early local civic matters. The Ingoldsby family owned the property for over 150 years.
	Yields or has the potential to yield information that contributes to the understanding of a community or culture	✓	The property has the potential to yield information that contributes to an understanding of the Indigenous culture and community.

	Demonstrates or reflects the work or ideas of an architect, builder, artist, designer or theorist who is significant to a community		The farmhouse, outbuilding, and silo are no longer extant. The property does not demonstrate or reflect the work or ideas of an architect, builder, artist, designed or theorist who is significant to a community.
Contextual Value	Is important in defining, maintaining or supporting the character of an area		The property reinforces the rural character of the surrounding area, however, it is not important in defining, maintaining or supporting the character of the area.
	Is physically, functionally, visually or historically linked to its surroundings		The property is no longer physically, functionally, visually, or historically linked to its surroundings. Historically, the Ingoldsby family owned and farmed a larger portion of land located in the surrounding area. The property does not appear to be used for any agricultural pursuits.
	Is a landmark		The property is not a landmark.

RESULTS OF HERITAGE ASSESSMENT	
CHVI Evaluation	Has CHVI
Heritage Attributes	In 2010 the Planning Design and Development department report which discussed the CHVI of the silo noted that at that time the property still retained the: - Tree lines surrounding the original structures - Laneway from Heart Lake Road into the property

CULTURAL HERITAGE RESOURCE NO. 1

DESCRIPTION OF PROPERTY	
Boundary	Heart Lake Road from Sandalwood Parkway to Mayfield Road
Name	Heart Lake Road Corridor
Recognition	No official heritage recognition. Considered by City of Brampton as a Cultural Heritage Landscape.
Location	Heart Lake Road from Sandalwood Parkway to Mayfield Road
Type of Landscape	Rural Road
Description	In November 2019, Stantec completed the *Function and Design Review of Heart Lake Corridor* report. The report was commissioned by City of Brampton in a response to wildlife mortality and traffic concerns. Withing the report it was noted that, *"in 2014, the Brampton Heritage Board received a delegation from the public seeing the possible recognition of Heart Lake Road as a cultural heritage landscape. The recognition was not defined at the time and the City of Brampton is seeking additional clarification regarding what recognition options are available." (2019:5.1)* The report examined several elements including, transportation, ecology, environmental, and cultural heritage and provided several road designs or design alternative to address wildlife and traffic concerns in the short and long term. Section 5 of the report addresses cultural heritage and includes a detailed site history which discusses the physiography, 19th and 20th century historical development along with a description of the site and photographic documentation. Section 5.1.5 contains the heritage evaluation of the Heart Lake Road corridor according to O. Reg. 9/06. The evaluation concluded that the Heart Lake corridor met five of the nine criteria (2.i., 2.ii, 3.i, 3.ii, 3.iii) outlined in O. Reg 9/06. The heritage value resides in the historical/associative value and contextual value. The report found that Heart Lake Drive did not meet the criteria related to Design and Physical value. The rational is provided in Section 5.1.5.3, it reads: "*Heart Lake Road does not illustrate or exemplify a style, type, expression, material or construction method. It is highly likely that this road was once a corduroy road. However, road improvements completed in the mid-20th century and in 1987 have removed evidence of this early road construction technique. The present physical conditions of Heart Lake Road, including two lanes of traffic, gravel shoulder, and ditching, are typical of other rural roads in the City of Brampton. Therefore, Heart Lake Road does not meet criterion 1.i of O. Reg. 9/06.* *Heart Lake Road does not display a high degree of craftsmanship or artistic merit. The road has standard paving and shoulders and does not have details that are greater than normal quality or are that are implemented at an intensity above an industry standard. Therefore, Heart Lake Road does not meet criterion 1.ii of O. Reg. 9/06.*

	Heart Lake Road does not display a high degree of technical or scientific achievement. The existing conditions of the road evolved through time from an unimproved concession road in the 19th and early-mid 20th century to an improved road in the mid-20th century. It is likely that road improvements to Heart Lake Road were completed in response to the opening of the HLCA in 1957 since increased traffic along this section of the road was anticipated. The existing conditions of Heart Lake Road reflect the road improvements carried out in the mid-20th century. The construction methods used to improve the road do not display a high degree of technical expertise, adaptation of materials, forms, or spatial arrangements, or a breakthrough in design or construction techniques. Therefore, Heart Lake Road does not meet criterion 1.iii of O. Reg. 9/06." (2019:5.9) Regarding historic and associative value, Section 5.1.5.4 provides a rationale for how Heart Lake Road does not meet criteria 2.i but does meets criteria 2.ii, 2.iii. It reads: *Heart Lake Road is historically associated with the theme of early road building in the Town of Chinguacousy and has direct associations with the Heart Lake Conservation Area and the TRCA. Regarding Euro-Canadian history, there were three successive attempts to settle the Heart Lake Road area. The first attempts were made by John Pettit Jr, George Coon, and Thomas Graham in 1819. All three landowners were unable to settle the land and returned their grants since the land was too swampy to settle, which made farming difficult if not impossible (City of Brampton 2014: 7-8). Richard Stinson successfully settled Concession 2E, east quarter of Lot 16 between 1823 and 1827. King's College (subsequently the University of Toronto) was granted a Crown patent for 200 acres in 1828. King's College subsequently subdivided the lot and sold it off during the mid-19th century. The swampy nature of Heart Lake Road, and the difficulties experienced by early settlers, support the claim that Heart Lake Road was originally constructed as a corduroy road. 19th century corduroy roads consisted of laying young trees (cut in similar size) side by side across a road to create a passable surface. This construction technique was reserved for areas with soft, swampy ground that could not be drained. While no direct evidence (i.e. archival photos, maps, or travelers accounts) exists to definitively prove that Heart Lake Road was a corduroy road, it is highly likely that this road construction technique was used here due to the undulating topography and historically documented swampy conditions.* *In addition to the historical theme of early road building, Heart Lake Road is directly associated with the TRCA. The Heart Lake Conservation Area was formed in 1956 and was opened to the public in 1957. Mid-century improvements to Heart Lake Road were likely complete in response to the opening of the conservation area. Presently, Heart Lake Conservation Area is one of the largest natural green space areas in the City of Brampton. In relation to the Study Area, the entire west side of the Heart Lake Road between Sandalwood Parkway and Mayfield Road is owned and operated by the TRCA. Therefore, Heart Lake Road meets criterion 2.i of O. Reg. 9/06 due to the likelihood that Heart Lake Road is historically associated with*

	the theme of early road construction, specifically corduroy roads, in the Township of Chinguacousy and the direct historical association with the TRCA. *Heart Lake Road has the potential to yield, information that contributes to an understanding of a community or culture. As identified in the draft listing report prepared by the City of Brampton, Heart Lake Road and its surrounding lands have archaeological potential and known archaeological sites related to the Paleo-Indian Period (10000-7000 BC), Archaic Period (7000-1000 BC), Initial Woodland Period (1000 BC to AD 700), and Late Woodland Period (AD 700-1651) are well documented in the area. Specifically, a high number of Indigenous campsites from the Archaic Period were discovered in the area by the TRCA during 2007 excavations of the Heart Lake Road Conservation Area, which has resulted in the area being dubbed "The Stopover Site" (2014). Therefore, Heart Lake Road meets criterion 2.ii of O. Reg. 9/06 due to the potential to yield archaeological information that will contribute to an understanding of Indigenous history in the area.* *Heart Lake Road was an unimproved concession road until the mid-20th century when it was improved, likely in response to the opening of the Heart Lake Road Conservation Area in 1957. The road was subsequently rebuilt and paved in 1987 (City of Brampton 2014:11). Heart Lake Road evolved through time and does not reflect the work or ideas of a builder or theorist. Therefore, Heart Lake Road does not meet criterion 2.iii of O. Reg. 9/06. (2019:5.10).* Regarding contextual value, Section 5.1.5.5. highlights how Heart Lake Road meet criteria 3.i, 3.ii, 3.iii. It reads: *Heart Lake Road, between Sandalwood Parkway and Mayfield Road is important in maintaining and supporting the character of the surrounding landscape. Although improved and updated, Heart Lake Road still maintains its rural road cross section with two lanes of traffic, gravel shoulders, and ditches. As a rural road, Heart Lake Road supports and maintains the significant natural areas on the east and west sides of the road, which are now rare in the City of Brampton. Specifically, the Heart Lake Road Conservation Area, located on the west side of Heart Lake Road, is an Environmentally Significant Area (ESA), Provincially Significant Wetland (PSW), and Area of Natural and Scientific Interest (ANSI). Heart Lake Conservation Area contains six provincially rare vegetative community types, the remaining portions of Brampton Buried Esker, and 26 species of threatened bird species, including the Barn Swallow and Trumpeter Swans. The Eastern Snapping Turtle and Eastern Milksnake are found at the Heart Lake Conservation Area; both are provincially and nationally designated species of Special Concern. Over 48% of the conservation area is covered with forest, which is rare since most forests within Peel Region were cleared for agricultural purposes during the 19th century (City of Brampton 2014:11). The rural setting of Heart Lake Road, including the TRCA lands on the west side of the road and mix of*

	agricultural lands and forested kettle lakes on the east side of the road support and maintain the significant natural heritage value present along the road between Sandalwood Parkway and Mayfield Road. The continuing rural and relatively undeveloped setting of the road is unique in the City of Brampton, which has become increasingly urbanized. Accordingly, Heart Lake Road meets criterion 3.i of O. Reg. 9/06. *Heart Lake Road is functionally, visually, and historically linked to its surroundings. The road is functionally and historically linked to its surrounding context since it has been used as a rural road since the road was opened in 1819. With the exception of the physical condition of the road, which was improved in the mid-20th century and again in 1987, the surrounding context of Heart Lake Road has remained remarkably intact. Specifically, the forested lands on the west side of the road and the agricultural lands, kettle lakes, and wetlands on the east side of the road are rare within the City of Brampton. In addition, Heart Lake Road is visually linked to its surroundings. The rural character of the road, the conservation area on the west, and open rural/agricultural land on the east together create a unique roadscape that is primarily defined by its naturalized, undeveloped character. Accordingly, Heart Lake Road meets criterion 3.ii of O. Reg. 9/06.* *Heart Lake Road acts as a landmark within the City of Brampton. The section of Heart Lake Road between Sandalwood Parkway and Mayfield is visually distinctive from surrounding roads. Heart Lake Road is bordered by development to the east, south, and west. Highway 410 borders Heart Lake Road to the north. Despite the surrounding development, Heart Lake Road retains its rural cross section and offers views to the adjacent natural heritage resources, including forests, kettle lakes, wetlands, and agricultural fields. The natural setting of Heart Lake Road is distinctive and is notable to those travelling along this section of the road. Heart Lake Road is a popular route for cyclists and the conservation area is a popular destination with more than five million visitors since it opened in 1957 (City of Brampton 2018). Therefore, Heart Lake Road meets criterion 3.iii of O. Reg. 9/06.* (2019:5.10-5.11) A summary of the results of the evaluation Heart Lake Road corridor against the criteria set out in O. Reg. 9/06 determined that the Heart Lake Road met five of the nine criteria. The following Statement of Significance for the Heart Lake Road Cultural Heritage Landscape was prepared as by Stantec: *STATEMENT OF CULTURAL HERITAGE SIGNIFICANCE* *Heart Lake Road is a two-lane, rural road set in a significant natural setting that has strong historical associative value and contextual heritage value. Its historical value is related to its associations with early road building techniques in the City of Brampton and the TRCA through its connection to the Heart Lake Road Conservation Area. Heart Lake Road and its surrounding land has also yielded, and has potential to further yield, information regarding Indigenous land use and culture due to the*

	archaeological potential of the area and high number of archaeological sites dating to the Archaic period. *Historically, there were three successive attempts to settle the Heart Lake Road area. The first attempts were made by John Pettit Jr, George Coon, and Thomas Graham in 1819. All three landowners were unable to settle the land and returned their grants since the land was too swampy to settle, which made farming difficult if not impossible (City of Brampton 2014: 7-8). Richard Stinson successfully settled Concession 2E, east quarter of Lot 16 between 1823 and 1827. King's College (subsequently the University of Toronto) was granted a Crown patent for 200 acres in 1828. King's College subsequently subdivided the lot and sold it off during the mid-19th century. The swampy nature of Heart Lake Road, and the difficulties experienced by early settlers, support the claim that Heart Lake Road was originally constructed as a corduroy road. 19th century corduroy roads consisted of laying young trees (cut in similar size) side by side across a road to create a passable surface. This construction technique was reserved for areas with soft, swampy ground that could not be drained. While no direct evidence (i.e. archival photos, maps, or travelers accounts) exists to definitively prove that Heart Lake Road was a corduroy road, it is highly likely that this road construction technique was used here due to the undulating topography and historically documented swampy conditions.* *Heart Lake Road has direct, historical associations with the TRCA. The Heart Lake Conservation Area was formed in 1956 and was opened to the public in 1957. Mid-century improvements to Heart Lake Road were likely completed in response to the opening of the conservation area. Presently, Heart Lake Conservation Area is one of the largest natural green space areas in the City of Brampton. The entire west side of the Heart Lake Road between Sandalwood Parkway and Mayfield Road is owned and operated by the TRCA.* *Heart Lake Road has the potential to yield information that contributes to an understanding of a community or culture. As identified in the draft listing report prepared by the City of Brampton, Heart Lake Road and its surrounding lands have archaeological potential and known archaeological sites related to the Paleo-Indian Period (10000-7000 BC), Archaic Period (7000-1000 BC), Initial Woodland Period (1000 BC to AD 700), and Late Woodland Period (AD 700- 1651) are well documented in the area. Specifically, a high number of Indigenous campsites from the Archaic Period were discovered in the area by the TRCA during 2007 excavations of the Heart Lake Road Conservation Area, which has resulted in the area being dubbed "The Stopover Site" (City of Brampton 2014).* *Heart Lake Road has contextual value since it maintains and supports the surrounding natural character of the area, is functionally, visually, and historically linked to its surroundings, and acts as a landmark. Heart Lake Road retains its rural cross section and is surrounded by significant*

	natural land, including forested land on the west and agricultural land, kettle lakes, and wetland on the east. When considered together with its rare surroundings, Heart Lake Road is a unique roadscape within the City of Brampton. *Heart Lake Road, between Sandalwood Parkway and Mayfield Road is important in maintaining and supporting the character of the surrounding landscape. Although improved and updated, Heart Lake Road still maintains its rural* *road cross section with two lanes of traffic, gravel shoulders, and ditches. As a rural road,* *Heart Lake Road supports and maintains the significant natural areas on the east and west sides of the road, which are now rare in the City of Brampton. Specifically, the Heart Lake Road Conservation Area, located on the west side of Heart Lake Road, is an Environmentally Significant Area (ESA), Provincially Significant Wetland (PSW), and Area of Natural and Scientific Interest (ANSI). Heart Lake Conservation Area contains six provincially rare vegetative community types, the remaining portions of Brampton Buried Esker, and 26 species of threatened bird species, including the Barn Swallow and Trumpeter Swans. The Eastern Snapping Turtle and Eastern Milksnake are found at the Heart Lake Conservation Area; both are provincially and nationally designated species of Special Concern. Over 48% of the conservation area is covered with forest, which is rare since most forests within Peel Region were cleared for agricultural purposes during the 19th century (City of Brampton 2014:11). The rural setting of Heart Lake Road, including the TRCA lands on the west side of the road and mix of agricultural lands and forested land, and kettle lakes on the east side of the road support and maintain the significant natural heritage value present along the road between Sandalwood Parkway and Mayfield Road. The continuing rural and relatively undeveloped setting of the road is unique in the City of Brampton, which has become increasingly urbanized.* *Heart Lake Road is functionally, visually, and historically linked to its surroundings. The road is functionally and historically linked to its surrounding context since it has been used as a rural road since the road was opened in 1819. With the exception of the physical condition of the road, which was improved in the mid-20th century and again in 1987, the surrounding context of Heart Lake Road has remained remarkably intact. Specifically, the forested lands on the west side of the road and the agricultural lands, kettle lakes, and wetlands on the east side of the road are rare within the City of Brampton. In addition, Heart Lake Road is visually linked to its surroundings. The rural character of the road, the conservation area on the west, and open rural/agricultural land on the east together create a unique roadscape that is primarily defined by its naturalized, undeveloped character.* *Heart Lake Road acts as a landmark within the City of Brampton. The section of Heart Lake Road between Sandalwood Parkway and Mayfield*

	is visually distinctive from surrounding roads. Heart Lake Road is bordered by development to the east, south, and west. Highway 410 borders Heart Lake Road to the north. Despite the surrounding development, Heart Lake Road retains its rural cross section and offers views to the adjacent natural heritage resources, including forests, kettle lakes, wetlands, and agricultural fields. The natural setting of Heart Lake Road is distinctive and is notable to those travelling along this section of the road. Heart Lake Road is a popular route for cyclists and the conservation area is a popular destination with more than five million visitors since it opened in 1957 (City of Brampton 2018). *HERITAGE ATTRIBUTES* *Based on the evaluation of CHVI, the following heritage attributes were identified for Heart Lake Road between Sandalwood Parkway and Mayfield Road:* *• Rural cross section of the road, including the width of the road, two lanes of traffic, and ditching (where present);* *• Bend in the road to avoid TRCA wetland, approximately 500 m southeast of Mayfield Road;* *• Intermittent presence of split rail and post-and-rail fencing along the roadside;* *• Wood utility poles along the roadside;* *• Natural topography of adjacent lands, including the remaining sections of the Brampton Buried Esker;* *• Potential, and known, archaeological sites;* *• Likely historical association with corduroy road construction techniques;* *• Historical association with the Heart Lake Conservation Area and TRCA;* *• Linear corridor views along Heart Lake Road, bordered by significant natural areas; and* *• Natural setting of the roadscape, including forests, wetlands, and kettle lakes on the west side of the road and wetlands, agricultural fields, and kettle lakes on the east side of the road.*
Photographs	

Date of Photos	October 1, 2020

EVALUATION OF PROPERTY			
Criteria	**Description**	**✓**	**Value Statement(s)***
Design or Physical Value	Is a rare, unique, representative or early example of a style, type, expression, material or construction method		Heart Lake Road does not illustrate or exemplify a style, type, expression, material or construction method. It is highly likely that this road was once a corduroy road. However, road improvements completed in the mid-20th century and in 1987 have removed evidence of this early road construction technique. The present physical conditions of Heart Lake Road, including two lanes of traffic, gravel shoulder, and ditching, are typical of other rural roads in the City of Brampton.
	Displays a high degree of craftsmanship or artistic value		Heart Lake Road does not display a high degree of craftsmanship or artistic merit.
	Displays a high degree of technical or scientific achievement		Heart Lake Road does not display a high degree of technical or scientific achievement.
Historical or Associative Value	Has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community	✓	Heart Lake Road is historically associated with the theme of early road building in the Town of Chinguacousy and has direct associations with the Heart Lake Conservation Area and the TRCA.
	Yields or has the potential to yield information that contributes to the understanding of a community or culture	✓	Heart Lake Road and its surrounding lands have archaeological potential and known archaeological sites. The property has the potential to yield information contributing to the understanding of Indigenous history in the area.
	Demonstrates or reflects the work or ideas of an architect, builder, artist, designer or theorist who is significant to a community		Heart Lake Road has evolved over time and does not reflect the work or idea of an architect, builder, artist, designer or theorist who is significant to a community.
Contextual Value	Is important in defining, maintaining or supporting the character of an area	✓	Heart Lake Road, between Sandalwood Parkway and Mayfield Road is important in maintaining and supporting the character of the surrounding landscape. Although improved and updated, Heart Lake Road still maintains its rural road cross section with two lanes of traffic, gravel shoulders, and ditches. As a rural road, Heart Lake Road supports and maintains the significant natural areas on the east and west sides of the road, which are now rare in the City of Brampton.
	Is physically, functionally, visually or historically linked to its surroundings	✓	The road is functionally and historically linked to its surrounding context since it has been used as a rural road since the road was opened in 1819. The rural character of the road, the conservation area on the west, and open rural/agricultural land on the east together create a unique roadscape that is primarily defined by its naturalized, undeveloped character.

	Is a landmark	✓	Heart Lake Road acts as a landmark within the City of Brampton. The section of Heart Lake Road between Sandalwood Parkway and Mayfield is visually distinctive from surrounding roads. The natural setting of Heart Lake Road is distinctive and is notable to those travelling along this section of the road. Heart Lake Road is a popular route for cyclists and the conservation area is a popular destination with more than five million visitors since it opened in 1957

* The value statement taken directly from Stantec Report Described in Section 6.3

RESULTS OF HERITAGE ASSESSMENT	
CHVI Evaluation	Has CHVI
Heritage Attributes*	The heritage attributes listed are taken directly from Stantec Report Described in Section 6.3 • Rural cross section of the road, including the width of the road, two lanes of traffic, and ditching (where present); • Bend in the road to avoid TRCA wetland, approximately 500 m southeast of Mayfield Road; • Intermittent presence of split rail and post-and-rail fencing along the roadside; • Wood utility poles along the roadside; • Natural topography of adjacent lands, including the remaining sections of the Brampton Buried Esker; • Potential, and known, archaeological sites; • Likely historical association with corduroy road construction techniques; • Historical association with the Heart Lake Conservation Area and TRCA; • Linear corridor views along Heart Lake Road, bordered by significant natural areas; and • Natural setting of the roadscape, including forests, wetlands, and kettle lakes on the west side of the road and wetlands, agricultural fields, and kettle lakes on the east side of the road.

Appendix B: Team Member Curriculum Vitae

Paul J. Racher, MA, CAHP
Principal - Management and Senior Review (MSR) Team
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Biography

Paul Racher is a Principal of ARA. He has a BA in Prehistoric Archaeology from WLU and an MA in anthropology from McMaster University. He began his career as a heritage professional in 1986. Over the three decades since, he has overseen the completion of several hundred archaeological and cultural heritage contracts. Paul has years of experience related to linear transportation and rail projects, notably through the ongoing work to complete a Cultural Heritage Inventory for the Region of Waterloo's Stage 2 LRT from Kitchener to Cambridge, Ontario. He holds professional license #P007 with the MTCS. Paul is a former lecturer in Cultural Resource Management at WLU. He is a professional member of the Canadian Association of Heritage Professionals (CAHP) and the former President of the Ontario Archaeological Association (OAS).

Education

1992-1997	PhD Programme, Department of Anthropology, University of Toronto. Supervisors: E.B. Banning and B. Schroeder. Withdrawn.
1989-1992	M.A., Department of Anthropology, McMaster University, Hamilton, Ontario. Thesis titled: "The Archaeologist's 'Indian': Narrativity and Representation in Archaeological Discourse."
1985-1989	Honours B.A., Wilfrid Laurier University, Waterloo, Ontario. Major: Prehistoric Archaeology.

Professional Memberships and Accreditations

Current	Ministry of Tourism Culture and Sport Professional Licence (#P007). Professional Member of the Canadian Association of Heritage Professionals (CAHP), Volunteer on the ethics committee. Member of the Ontario Archaeological Society (OAS), Volunteer on the Professional Committee. Associate of the Heritage Resources Centre, University of Waterloo. RAQS registered with MTO.

Work Experience

Current	**Vice-President, Operations, Archaeological Research Associates Ltd.** Responsible for winning contracts, client liaison, project excellence, and setting the policies and priorities for a multi-million dollar heritage consulting firm.

2000-2011	**Project Manager/Principal Investigator, Archaeological Research Associates Ltd.** Managed projects for a heritage consulting firm. In 10 field seasons, managed hundreds of projects of varying size.
2008-2011	**Part-Time Faculty, Wilfrid Laurier University.** Lecturer for Cultural Resource Management course (AR 336). In charge of all teaching, coursework, and student evaluations.
1995	**Field Archaeologist, University of Toronto.** Served as a supervisor on a multinational archaeological project in northern Jordan.
1992-1995	**Teaching Assistant, University of Toronto.** Responsible for teaching and organizing weekly tutorials for a number of courses.
1991-1994	**Part-Time Faculty, Wilfrid Laurier University.** Lectured for several courses in anthropology. Held complete responsibility for all teaching, coursework, and student evaluations.
1992-1996	**Partner in Consulting Company, Cultural Management Associates Incorporated.** Supervised several archaeological contracts in Southern Ontario. Participated in a major (now published) archaeological potential modeling project for MTO.
1989-1991	**Partner in Consulting Company, Cultural Resource Consultants.** Managed the financial affairs of a consulting firm whilst supervising the completion of several contracts performed for heritage parks in central Ontario.
1988-1991	**Principal Investigator/Project Director, Archaeological Research Associates Ltd.** Oversaw the completion of large contracts, wrote reports, and was responsible for ensuring that contracts were completed within budget.
1988	**Assistant Director of Excavations, St. Marie among the Hurons, Midland, Ontario.** Duties included crew supervision, mapping, report writing and photography.
1986-1987	**Archaeological Crew Person, Archaeological Research Associates Ltd., Waterloo, Ontario.** Participated in background research, survey, and excavation on a number of Archaeological sites across Ontario.

Kayla Jonas Galvin, MA, RPP, MCIP, CAHP
Heritage Operations Manager
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Biography

Kayla Jonas Galvin, Archaeological Research Associates Ltd.'s Heritage Operations Manager, has extensive experience evaluating cultural heritage resources and landscapes for private and public-sector clients to fulfil the requirements of provincial and municipal legislation such as the *Environmental Assessment Act*, the *Standards & Guidelines for the Conservation of Provincial Heritage Properties* and municipal Official Plans. She served as Team Lead on the Ministry of Tourism, Culture and Sport Historic Places Initiative, which drafted over 850 Statements of Significance and for *Heritage Districts Work!*, a study of 64 heritage conservation districts in Ontario. Kayla was an editor *of Arch, Truss and Beam: The Grand River Watershed Heritage Bridge Inventory* and has worked on Municipal Heritage Registers in several municipalities. Kayla has drafted over 150 designation reports and by-laws for the City of Kingston, the City of Burlington, the Town of Newmarket, Municipality of Chatham-Kent, City of Brampton and the Township of Whitchurch-Stouffville. Kayla is the Heritage Team Lead for ARA's roster assignments for Infrastructure Ontario and oversees evaluation of properties according to *Standards & Guidelines for the Conservation of Provincial Heritage Properties*. Kayla is a Registered Professional Planner (RPP), a Member of the Canadian Institute of Planners (MCIP), is a professional member of the Canadian Association of Heritage Professionals (CAHP) and sits on the board of the Ontario Association of Heritage Professionals.

Education

2016	MA in Planning, University of Waterloo. Thesis Topic: *Goderich – A Case Study of Conserving Cultural Heritage Resources in a Disaster*
2003-2008	Honours BES University of Waterloo, Waterloo, Ontario Joint Major: Environment and Resource Studies and Anthropology

Professional Memberships and Accreditations

Current	Registered Professional Planner (RPP) Member of the Canadian Institute of Planners (MCIP) Professional Member, Canadian Association of Heritage Professionals (CAHP) Board Member, Ontario Association of Heritage Professionals

Work Experience

Current	**Heritage Operations Manager, Archaeological Research Associates Ltd.** Oversees business development for the Heritage Department, coordinates completion of designation by-laws, Heritage Impact Assessments, Built Heritage and Cultural Heritage Landscape Assessments, and Cultural Heritage Resource Evaluations.

2009-2013 **Heritage Planner, Heritage Resources Centre, University of Waterloo**
Coordinated the completion of various contracts associated with built heritage including responding to grants, RFPs and initiating service proposals.

2008-2009, 2012 **Project Coordinator–Heritage Conservation District Study, ACO**
Coordinated the field research and authored reports for the study of 32 Heritage Conservation Districts in Ontario. Managed the efforts of over 84 volunteers, four staff and municipal planners from 23 communities.

2007-2008 **Team Lead, Historic Place Initiative, Ministry of Culture**
Liaised with Ministry of Culture Staff, Centre's Director and municipal heritage staff to draft over 850 Statements of Significance for properties to be nominated to the Canadian Register of Historic Places. Managed a team of four people.

Selected Professional Development

2019 OPPI and WeirFoulds Client Seminar: Bill 108 – More Homes, More Choice, 2019
2019 Annual attendance at Ontario Heritage Conference, Goderich, ON (Two-days)
2019 Information Session: Proposed Amendments to the OHA, by Ministry of Tourism, Culture and Sport
2018 Indigenous Canada Course, University of Alberta
2018 Volunteer Dig, Mohawk Institute
2018 Indigenizing Planning, three webinar series, Canadian Institute of Planners
2018 Cultural Heritage, Archaeology and Planning Symposium
2018 Transforming Public Apathy to Revitalize Engagement, Webinar, MetorQuest
2018 How to Plan for Communities: Listen to the Them, Webinar, CIP
2017 Empowering Indigenous Voices in Impact Assessments, Webinar, International Association for Impact Assessments
2017 Cultural Heritage, Archaeology and Planning Symposium
2017 Capitalizing on Heritage, National Trust Conference, Ottawa, ON.
2016 Cultural Heritage, Archaeology and Planning Symposium
2016 Heritage Rising, National Trust Conference, Hamilton
2016 Ontario Heritage Conference St. Marys and Stratford, ON.
2016 Heritage Inventories Workshop, City of Hamilton & ERA Architects
2015 Cultural Heritage, Archaeology and Planning Symposium
2015 City of Hamilton: Review of Existing Heritage Permit and Heritage Designation Process Workshop.
2015 Leadership Training for Managers Course, Dale Carnegie Training

Selected Publications

2018 "Conserving Cultural Heritage Landscapes in Waterloo: An Innovative Approach." *Ontario Association of Heritage Professionals Newsletter*, Winter 2018.
2018 "Restoring Pioneer Cemeteries" *Ontario Association of Heritage Professionals Newsletter.* Spring 2018. *In print.*
2015 "Written in Stone: Cemeteries as Heritage Resources." *Municipal World*, Sept. 2015.
2015 "Bringing History to Life." *Municipal World*, February 2015, pages 11-12.
2014 "Inventorying our History." *Ontario Planning Journal*, January/February 2015.
2014 "Assessing the success of Heritage Conservation Districts: Insights from Ontario Canada." with R. Shipley and J. Kovacs. *Cities*.

Amy Barnes, M.A., CAHP
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Biography

Amy Barnes, a Project Manager with the Heritage Team, has over ten years of experience evaluating cultural heritage resources and leading community engagement. Amy has extensive experience working with provincial and municipal legislation and guidelines, including the Ontario Heritage Act, Official Plans, the Standards and Guidelines for the Conservation of Historic Places, and the Ontario Heritage Toolkit. Ms. Barnes has completed over fifty heritage related projects including 150+ cultural assessments and has been qualified as an expert witness at the Ontario Superior Court of Justice. Amy has worked in the public and private sector where her duties included project management, public consultation, facilitator, research, database and records management, and report author. Amy has worked with the Town of Oakville, City of Cambridge, City of Kitchener, Niagara-on-the-Lake, City of London, and the City of Kingston on projects which range in size, scale and complexity. Amy Barnes holds an M.A. in Heritage Conservation from the School of Canadian Studies at Carleton University in Ottawa, Ontario. Amy has successfully completed the International Association of Public Participation (IAP2) Foundations in Public Participation, the IAP2 Planning and Techniques for Effective Public Participation, and Indigenous Awareness Training through Indigenous Awareness Canada. Amy is a professional member of the Canadian Association of Heritage Professionals (CAHP) and currently serves as the Vice-Chair of the Cambridge Municipal Heritage Advisory Committee.

Education

2009	MA in Heritage Conservation, School of Canadian Studies, Carleton University, Ottawa, Ontario.
2006	Honours BA, Carleton University, Ottawa, Ontario Canadian Studies (Major) and Psychology (Minor).

Professional Memberships and Accreditations

Current	Professional Member, Canadian Association of Heritage Professionals (CAHP) Member, International Network for Traditional Building, Architecture & Urbanism, Guelph Chapter.

Work Experience

Current	**Heritage Project Manager, Archaeological Research Associates Ltd.** Coordinates the completion of designation by-laws, Heritage Impact Assessments, Built Heritage and Cultural Heritage Landscape Assessments, and Cultural Heritage Resource Evaluations.
2020 2012-2015	**Principal Heritage Consultant, Amy Barnes Consulting.** Coordinated the completion of various contracts associated with built heritage, cultural heritage landscapes, including Heritage Impact Assessments, Cultural Heritage Evaluation Reports, Designation Reports and professional consultation.

2019-2020 **Manager of Operations- Outreach and Engagement, Yorklands Green Hub.**
Coordinated the development of a feasibility study and strategic planning initiatives for the anticipated purchase of a Provincial Property of Provincial Heritage Significance. Coordination of workshops and community events, external outreach and communications and implementing strategic planning initiatives. Liaison with Infrastructure Ontario, Ministry of Heritage, Sport, Tourism and Cultural Industries, non-profits, charities, school boards and community members.

2015-2019 **Project Manager and Senior Cultural Heritage Specialist – Letourneau Heritage Consulting Inc.**
Coordinated and authored various heritage related contracts. Duties included historic research, heritage impact assessments, cultural heritage assessments and evaluations, and public engagement activities. Served as the firm's Public Engagement Specialist.

2011-2012 **Creative Content Developer, Virtual Museums Canada.**
Worked as part of an interdisciplinary team to help create an online virtual exhibit for Virtual Museums Canada. Responsible for historical research, record management, creative design, narrative and content development and internal coordination for the Archives and Research Team.

2010 **Junior Heritage Planner, Municipality of North Grenville.**
Responsible for historic research, public consultation and engagement and community development for heritage related projects. Worked with local heritage committees, Council and planning staff in accordance with the Ontario Heritage Act, Official Plans and other guiding policies.

2009 **Heritage Planner Intern, City of Kingston**.
Aided in heritage related projects and worked closely with heritage committees, Council, and planning staff.

Selected Professional Development

2020 Indigenous Awareness Training and Certification, Indigenous Awareness Canada.
– Indigenous Awareness Certification
– Indigenous Peoples and Cultures
– Indigenous Communication & Consultation
– Indigenous Employment Outreach, Recruit, and Retain

2019 Enviroseries "Creating a Heritage Landmark Park For Guelph at The Former Ontario Reformatory". Yorklands Green Hub..

2017 International Association of Public Participation Certification
- Foundations in Public Participation
- Planning and Techniques for Effective Public Participation.

Publications

2013 "Landmark Series." Cambridge Times. Selected Issues.
"Alice King Sculthorpe." Acorn Magazine, 2013.

Penny M. Young, MA, CAHP (#P092)
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Biography
Penny Young has 27 years of cultural heritage management experience, 21 years working in government, as a Heritage Planner, Heritage Coordinator, Regional Archaeologist and Archaeological Database Coordinator where she managed and coordinated the impacts to cultural heritage resources including built heritage, archaeological sites and cultural heritage landscapes for compliance with municipal, provincial and federal legislation and policy. She has conducted results-driven and collaborative management of complex cultural heritage resource projects within the public sector involving developing project terms of reference, defining scope of work, preparation of budgets and conducting sites visits to monitor and provide heritage/archaeological and environmental advice and direction. At the Ministry of Transportation Penny revised, updated and developed policy, as part of a team, for the *Ontario Heritage Bridge Guidelines for Provincially Owned Bridge Guidelines for Provincially Owned Bridges*. She received the MTO Central Region Employee Recognition Award in 2001 and 2002. While at MTO she provided technical advice and input into the development of the *MTO Environmental Reference for Highway Design - Section 3.7 Built Heritage and Cultural Heritage Landscapes* and the *MTO Environmental Guide for Built Heritage and Cultural Heritage Landscapes.* She is a professional member of the Canadian Association of Heritage Planners (CAHP) and holds Professional License #P092 from MTCS. She also holds memberships in the Ontario Professional Planners Institute (OPPI) and the Ontario Archaeological Society (OAS).

Education

1990-1993	Master of Arts, Department of Anthropology McMaster University, Hamilton Ontario. Specializing in Mesoamerican and Ontario archaeology.
1983-1987	Honours Bachelor of Arts (English and Anthropology), McMaster University, Hamilton, Ontario.

Professional Memberships and Accreditations

Current	Professional Member, Canadian Association of Heritage Professionals (CAHP) Member of Ontario Archaeological Society Pre-Candidate Member, Ontario Professional Planners Institute (OPPI) Ministry of Tourism Culture & Sport Professional Licence (#P092)

Work Experience

Current	**Project Manager - Heritage, Archaeological Research Associates Ltd.** Coordinates ARA project teams and conducts heritage assessment projects including Heritage Impact Assessments, Built Heritage and Cultural Heritage Landscape Assessments, and Cultural Heritage Resource Evaluations. Additional responsibilities include the completion of designation by-laws and heritage

	inventories. Liaises with municipal staff, provincial ministries and Indigenous communities to solicit relevant project information and to build relationships.
2008-2016	**Heritage Planner, Culture Services Unit, Ministry of Tourism, Culture & Sport (MTCS)** Responsible for advising and providing technical review for management of cultural heritage resources in environmental assessment undertakings and planning projects affecting provincial ministries, municipalities, private sector proponents and Indigenous communities. Advised on municipalities' Official Plan (OP) policies cultural heritage conservation policies. Provided guidance on compliance with the Public Work Class EA, other Class EA legislation and 2010 *Standards and Guidelines for Provincial Heritage Properties*.
2014	**Senior Heritage Planner, Planning and Building Department, City of Burlington** (temporary assignment) Project manager of the study for a potential Heritage Conservation District. Provided guidance to a multiple company consultant team and reported to municipal staff and the public. Liaised with Municipal Heritage Committee and municipal heritage property owners approved heritage permits and provided direction on Indigenous engagement, archaeological site assessments and proposed development projects.
2011	**Heritage Coordinator, Building, Planning and Design Department, City of Brampton** (temporary assignment) Project lead for new Heritage Conservation District Study. The assignment included directing consultants, managing budgets, organizing a Public Information Session, and reporting to Senior Management and Council. Reviewed development/planning documents for impacts to heritage including OP policies, OP Amendments, Plans of subdivision and Committee of Adjustment applications and Municipal Class EA undertakings.
2010-2011	**Senior Heritage Coordinator, Culture Division, City of Mississauga** (temporary assignment) Provided advice to Senior Management and Municipal Council on heritage conservation of built heritage, archaeological sites and cultural heritage landscapes. Liaised with multiple municipal staff including the Clerks' office, Parks and development planners and the public. Supervised and directed project work for junior heritage planner.
1999-2008	**Regional Archaeologist, Planning and Environmental Section, Ministry of Transportation (MTO)** Responsibilities included: project management and coordination of MTO archaeology and heritage program, managed multiple consultants, conducted and coordinated field assessments, surveys and excavations, liaised with First Nations' communities and Band Councils, estimated budgets including $200,000 retainer contracts.

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Biography

Sarah Clarke is Archaeological Research Associates Ltd.'s Heritage Research Manager. Sarah has over 12 years of experience in Ontario archaeology and 10 years of experience with background research. Her experience includes conducting archival research (both local and remote), artifact cataloguing and processing, and fieldwork at various stages in both the consulting and research-based realms. As Team Lead of Research, Sarah is responsible for conducting archival research in advance of ARA's archaeological and heritage assessments. In this capacity, she performs Stage 1 archaeological assessment field surveys, conducts preliminary built heritage and cultural heritage landscape investigations and liaises with heritage resource offices and local community resources in order to obtain and process data. Sarah has in-depth experience in conducting historic research following the *Ontario Heritage Toolkit* series, and the *Standards and Guidelines for Provincial Heritage Properties*. Sarah holds an Honours B.A. in North American Archaeology, with a Historical/Industrial Option from Wilfrid Laurier University and is currently enrolled in Western University's Intensive Applied Archaeology MA program. She is a member of the Ontario Archaeological Society (OAS), the Society for Industrial Archaeology, the Ontario Genealogical Society (OGS), the Canadian Archaeological Association, and is a Council-appointed citizen volunteer on the Brantford Municipal Heritage Committee. Sarah holds an R-level archaeological license with the MTCS (#R446).

Education

Current	MA Intensive Applied Archaeology, Western University, London, ON. Proposed thesis topic: Archaeological Management at the Mohawk Village.
1999–2010	Honours BA, Wilfrid Laurier University, Waterloo, Ontario Major: North American Archaeology, Historical/Industrial Option

Professional Memberships and Accreditations

Current	Member of the Ontario Archaeological Society
Current	Member of the Society for Industrial Archaeology
Current	Member of the Brant Historical Society
Current	Member of the Ontario Genealogical Society
Current	Member of the Canadian Archaeological Association
Current	Member of the Archives Association of Ontario

Work Experience

Current	**Team Lead – Research; Team Lead – Archaeology, Archaeological Research Associates Ltd.** Manage and plan the research needs for archaeological and heritage projects. Research at offsite locations including land registry offices, local libraries and local

	and provincial archives. Historic analysis for archaeological and heritage projects. Field Director conducting Stage 1 assessments.
2013-2015	**Heritage Research Manager; Archaeological Monitoring Coordinator, Archaeological Research Associates Ltd.** Stage 1 archaeological field assessments, research at local and distant archives at both the municipal and provincial levels, coordination of construction monitors for archaeological project locations.
2010-2013	**Historic Researcher, Timmins Martelle Heritage Consultants Inc.** Report preparation, local and offsite research (libraries, archives); correspondence with the Ministry of Tourism, Culture, and Sport; report submission to the MTCS and clients; and administrative duties (PIF and Borden form completion and submission, data requests).
2008-2009	**Field Technician, Archaeological Assessments Ltd.** Participated in field excavation and artifact processing.
2008-2009	**Teaching Assistant, Wilfrid Laurier University.** Responsible for teaching and evaluating first year student lab work.
2007-2008	**Field and Lab Technician, Historic Horizons.** Participated in excavations at Dundurn Castle and Auchmar in Hamilton, Ontario. Catalogued artifacts from excavations at Auchmar.
2006-2010	**Archaeological Field Technician/Supervisor, Wilfrid Laurier University.** Field school student in 2006, returned as a field school teaching assistant in 2008 and 2010.

Professional Development

2019	Annual attendance at Ontario Heritage Conference, Goderich, ON
2018	Cultural Heritage, Archaeology and Planning Symposium
2018	Grand River Watershed 21st Annual Heritage Day Workshop & Celebration
2018	Mississaugas of the New Credit First Nation Historical Gathering and Conference
2017	Ontario Genealogical Society Conference
2016	Ontario Archaeological Society Symposium
2015	Introduction to Blacksmithing Workshop, Milton Historical Society
2015	Applied Research License Workshop, MTCS
2014	Applied Research License Workshop, MTCS
2014	Heritage Preservation and Structural Recording in Historical and Industrial Archaeology. Four-month course taken at Wilfrid Laurier University, Waterloo, ON. Professor: Meagan Brooks.

Presentations

2018	*The Early Black History of Brantford.* Brant Historical Society, City of Brantford.
2017	*Mush Hole Archaeology.* Ontario Archaeological Society Symposium, Brantford.
2017	*Urban Historical Archaeology: Exploring the Black Community in St. Catharines, Ontario.* Canadian Archaeological Association Conference, Gatineau, QC.

Volunteer Experience

Current	Council-appointed citizen volunteer for the Brantford Municipal Heritage Committee.

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Biography

Jacqueline McDermid has ten years of technical writing and management experience; Seven years direct heritage experience. She has gained seven years of experience conducting primary and secondary research for archaeological and heritage assessments and drafting reports and evaluating property according to Ontario Regulation 9/06 and 10/06 as part of Municipal Heritage Registers. Jacqueline is expert at copy editing heritage reports including checking grammar, consistency and fact checking, to ensure a high-quality product is delivered to clients. She has experience assisting with the drafting of Heritage Conservation District Studies through the drafting of reports for potential Heritage Conservation Districts in the City of Toronto (Weston HCD) and Township of Bradford West Gwillimbury (Bond Head HCD). Jacqueline has proven project management experience gained by completing projects on time and on budget as well as formal Project Management training. In 2018, under a six-month contract as the Heritage Planner at the Ministry of Transportation, acquired considerable experience conducting technical reviews of consultant heritage reports for Ministry compliance including Cultural Heritage Evaluation Reports, Heritage Impact Assessment, Strategic Conservation Plans, and Cultural Heritage Resource Assessments as well as gained valuable insight on provincial heritage legislation (*Ontario Heritage Bridge Guidelines*, *Ontario MTO Environmental Standards and Practices for Cultural Heritage*, *MTO Environmental Reference for Highway Design – Heritage*, MTCS' *Heritage Identification & Evaluation Process* as well as the new *MHTCI Information Bulletins on Heritage Impact Assessments* and *Strategic Conservation Plans*, and inter-governmental processes. She has extensive Knowledge of heritage and environmental policies including the *Planning Act*, *Provincial Policy Statement*, the *Ontario Heritage Act*, Official Plans, *Environmental Assessment Act* and *Green Energy Act*. Working knowledge of the *Standards and Guidelines for Consultant Archaeologists* (2011), Ministry of Tourism, Culture and Sport.

Education

2000-2007	Honours B.A., Wilfrid Laurier University, Waterloo, Ontario Major: Near Eastern Archaeology.

Work Experience

2015-Present	**Technical Writer and Researcher – Heritage, Archaeological Research Associates Ltd., Kitchener, ON** Research and draft designation by-laws, heritage inventories, Heritage Impact Assessments, Built Heritage and Cultural Heritage Landscape Assessments, and Cultural Heritage Resource Evaluations using Ontario Regulation 9/06, 10/06 and the Ontario Heritage Bridge Guidelines.
2018	**Environmental Planner – Heritage Ministry of Transportation, Central Region** – Six-month contract.

Responsibilities included: project management and coordination of MTO heritage program, managed multiple consultants, conducted and coordinated field assessments and surveys, estimated budgets including $750,000 retainer contracts. Provided advice on heritage-related MTO policy to Environmental Policy Office (EPO) and the bridge office.

2017-2018 **Acting Heritage Team Lead – Heritage Archaeological Research Associates Ltd., Kitchener, ON**
Managed a team of Heritage Specialists, oversaw the procurement of projects, retainers; managed all Heritage projects, ensured quality of all outgoing products.

2014-2015 **Technical Writer – Archaeology, Archaeological Research Associates Ltd., Kitchener, ON**
Report preparation; correspondence with the Ministry of Tourism, Culture, and Sport; report submission to the Ministry and clients; and administrative duties (PIF and Borden form completion).

2012-2013 **Lab Assistant, Archaeological Research Associates Ltd., Kitchener, ON**
Receive, process and register artifacts.

2011-2012 **Field Technician, Archaeological Research Associates Ltd., Kitchener, ON**
Participated in field excavation and artifact processing.

2005-2009 **Teaching Assistant, Wilfrid Laurier University, Waterloo, ON**
Responsible for teaching and evaluating first, second, third- and fourth-year student lab work, papers and exams.

2005-2007 **Lab Assistant, Wilfrid Laurier University – Near Eastern Lab, Waterloo, ON**
Clean, Process, Draw and Research artifacts from various sites in Jordan.

Professional Development

2019 OPPI and WeirFoulds Client Seminar: Bill 108 – More Homes, More Choice, 2019
2019 Ontario Heritage Conference, Goderich, ON (Two-days)
2019 Rural Heritage, Webinar, National Trust for Canada
2019 Information Session: Proposed Amendments to the OHA, by Ministry of Tourism, Culture and Sport
2019 Indigenous Heritage Places and Perspectives, Webinar, National Trust for Canada
2018 Indigenous Canada, University of Alberta
2018 Grand River Watershed 21st Annual Heritage Day Workshop and Celebration (One day)
2017 Leadership Training for Managers Course, Dale Carnegie Training
2015 Introduction to Blacksmithing, One-Day
2015 Ontario Heritage Trust symposium, topics included: Cultural landscapes, City building, Tangible heritage, How the public engages with heritage, and Conserving intangible heritage
2014 Community Heritage Ontario, webinar, Part IV and V of the *Ontario Heritage Act*.

Presentations

2019 **Cemeteries and Burials Research.** Cultural Heritage Planning and Archaeology Symposium, Burlington.

Appendix F

Storm Drainage Analysis Memo
MTE Consultants Inc.
April 2022

To: City of Brampton

MTE File No.: 47877-100

Date: Revised April 22,2022

From: Dave Hallman, P.Eng., Samir Dhanvantari. P.Eng.

Project Name: Heart Lake Road Reconstruction

MEMORANDUM

Heart Lake Road at Countryside Drive Storm Drainage Analysis

1.0 Introduction

The Function and Design Review of the Heart Lake Road Corridor Study (Stantec, 2019) indicated that a roundabout option was preferred for the configuration of the intersection of Heart Lake Road at Countryside Drive and that the recommended alternative was subject to further study under the Municipal Class Environmental Assessment (Class EA) planning and design process. The Study also stated that the TRCA is to be consulted as part of the future planning and design process.

MTE was retained by the City of Brampton to undertake a Schedule B Class EA for the intersection of Heart Lake Road at Countryside Drive. As part of the design process, the existing conditions and options in the Function and Design Review Study for the intersection were assessed for functionality and storm drainage design.

1.1 Objective

The objective of this memorandum was to analyze the surface runoff under existing conditions and the impacts on surface flow per the following alternatives:

- Option A – Signalized Intersection
  - Assume that existing storm conveyance infrastructure will be replaced or rehabilitated; and
  - Re-graded intersection and approaches and new major system flow paths.
- Option B – Roundabout
  - Cut into 0.13 ha of developer lands to the north east; and
  - Storm drainage infrastructure improvements including:
    - Reconfiguration of ditches along the east side of Heart Lake Road;
    - Culvert replacement; and
    - New major system flow paths

2.0 Methodology

2.1 Sub-catchment Area Delineations

The development of the drainage sub-catchment areas was based on information provided from the City of Brampton's Open Data platform along with as-built drawings provided by the City of Brampton and Region of Peel. Updated contour information was used to identify the existing high and low points. The existing surface drainage conditions and infrastructure were identified using the above data sources along with observations from Google Earth and a field visit on July 25, 2021 to confirm catchbasin locations and drainage along Countryside Drive. Drawings ST1.2, 2.2 and 3.2 in Appendix C summarize the delineated sub-catchment areas, infrastructure and major system flow paths for Existing Conditions, Proposed Conditions Option A and Proposed Conditions Option B respectively. Overall, the proposed roundabout design slightly increases the intersection drainage area footprint by 0.3 ha as summarized below:

Total Drainage Area Footprint:

- Existing: 4.27 ha
- Option A (Signalized Intersection): 4.27 ha
- Option B (Roundabout): 4.30 ha

Assumptions

Key assumptions in the development of the sub-catchment areas included the following:

- The existing contour information represented the most current data set;
- It was confirmed that the development lands to the north east will have no impact on storm runoff to Countryside Drive or Heart Lake Road
- Runoff along Countryside Drive is captured by the existing storm sewer system and will not spill to the future road development to the southeast;
- Runoff coefficients used are assumed to be applicable up to the 5-year return period event;
- The majority of flows runoff along the Heart Lake Road beyond the intersection at Countryside Drive is uncontrolled sheet flow directed to either the ditch to the northwest where flow is conveyed to the wetlands via culvert under Countryside Drive and downstream across Heart Lake Road, or directly into the wetlands west of Heart Lake Road;
- Assumptions on existing storm sewer invert elevations are based on a minimum surface cover of approximately 1 m;
- The potential impact on the downstream eco-passage considered in the analysis; and
- Future urbanization of Heart Lake Road beyond the proposed limits of construction for the proposed works was not considered in the design.

2.2 Peak Runoff

The City of Brampton Stormwater Design Standard was provided by the City for the methodology to estimate the peak runoff rate for each catchment. The Rational Formula, shown below, was used to estimate existing peak runoff:

Q=0.00278*C*I*A

Where:

- Q=Peak Runoff Rate (m3/s);
- C=Runoff Coefficient;
- I=Average Rainfall Intensity (mm/h) based on a Time of Concentration (T_c) of 10 min, and;
- A=Catchment Area (ha);
- The factor of 0.00278 represents the unit conversion factor (m3*h)/(mm*ha*s).

Rainfall Intensity (I) was based off the following interpolation equation developed from the City's IDF curve in the City of Brampton Standard No. 343:

$I = A\,(T_c)^B$

Runoff coefficients typically account for imperviousness and slope. Table 1 shows typical runoff coefficients in the urban environment sourced from the American Society of Civil Engineers. These runoff coefficients assume that the ground is not frozen and applicable for design storms from the 5-year to 10-year return period.

Table 1: Summary of Runoff Coefficients

Character of Surface / Land Use	Runoff Coefficient
Road Surface Asphalt, Concrete Permeable Pavements	 0.7-0.95 0.15-0.25
Forest and dense wooded areas	0.1-0.25
Parks / Open Space	0.1-0.35
Lawns Sandy Soils 0%-2% gradient 2%-7% gradient >7% gradient	 0.05-0.1 0.1-0.15 0.15-.20
Lawns Heavy Soils 0%-2% gradient 2%-7% gradient >7% gradient	 0.13-0.17 0.18-.22 0.25-0.35

In the City of Brampton's Standard No. 342 for storm sewer design specifies the urban runoff coefficients to be used for storm design. Based on the City's standard, the composite runoff coefficients for each drainage area are based on the following coefficients from the City standard:

- Road Surface (Paved, concrete) – 0.9
- Pervious surface (grassed areas, ditches, wooded areas) – 0.25

For the larger return-period events, the following adjustment factors were applied to the Rational Formula per the Region of Peel Storm Design Criteria summarized in Table 2:

Table 2: C Adjustment Factors for Return Period Events

Design Storm Frequency	Adjustment Factor
10-year	1.0
25-year	1.1
50-year	1.2
100-year	1.25

Figure 1 shows the existing storm drainage catchment areas based on the latest topographical information and site information. Figures 2 and 3 shows the proposed storm drainage catchment areas for Options A and B respectively. Peak runoff calculations area tabulated in Appendix A.

2.2 Design

The basis of the design for storm drainage was not to exceed the existing peak runoff and to advance opportunities to offset any increase in the footprint of the intersection using best practices including directing drainage to ditches, enhancing ditches and LID. The existing culvert cross Countryside Drive would also be replaced.

Figure 4 shows the existing storm drainage infrastructure, while Figures 5 and 6 show the proposed drainage infrastructure for Options A and B respectively.

2.2.1 Existing

Figure 1 shows the existing drainage subcatchment areas delineated based on the overland flow paths and drainage infrastructure capturing the overland flow into the minor (storm sewer) system. The City's storm drainage criteria states that the 5-year storm is to be captured and conveyed off the road. Subcatchment areas 1 through 6 drain into the storm sewer system along Countryside Drive and outlet to the southeast ditch at Heart Lake Road via a 450 mm diameter ribbed PVC outlet (Figure 4). Subcatchment areas 7, 10 and 13 area assumed to be captured by the northeast ditch and conveyed through the 600 mm diameter culvert in to the southeast ditch. The remaining subcatchment areas area assumed to be drain to side ditches and into the wetlands.

2.2.1 Option A – Signalized Intersection

As shown in Figure 2, there is no change in the drainage catchment areas between existing conditions and Option A given that the road profile and cross-section are mostly unchanged. The improvements over the existing drainage conditions mainly consist of like for like replacement of existing drainage infrastructure (see Figure 5) with sheet flow along the west side of Heart Lake Road uncontrolled flowing west into the wooded area and wetland per the major system flow paths. The only significant change in the proposed drainage infrastructure for Option A from the existing design is the addition of curb and gutter along Heart Lake Road at the intersection approaches and proposed LID and new outlet along the south side of Countryside Drive (Figure 5). The LID infiltration design and infiltration rates will be calculated at the 60% design.

All of the proposed infrastructure will reside within the proposed right-of-way or as possible to the existing infrastructure alignment to mitigate potential wetland disturbance. Constructability at ditch and outlet locations will be determined pending the outcome of the additional field survey requirement noted in Figure 7.

2.2.2 Option B – Roundabout

For Option B, the storm drainage catchments follow the proposed grading of the intersections with the low points at the east and south sides of the intersection just outside the roundabout lanes per Figure 3. Surface flow to the west side of the intersection is directed south with overflow into the wooded area to the west; mitigation measures can include capturing and directing flows to the ditch to the southeast or diverting part of the flows into an LID feature at the bump-out upstream to address water quality (i.e. road salt conductivity) concerns. The drainage outlets area summarized in Table 3:

Table 3: Option B Proposed Drainage Outlets

Subcatchment Area	Outlet
1, 2, 3, 4 and 5	Proposed twin 300 mm diameter culvert via existing/replaced 300 mm diameter storm sewer along Countryside Drive (potential LID infiltration).
7,9,10,13	Twin 300 mm box culvert via realigned ditch and DCBMH
6, 8 and 11	Surface flow to downstream ditch/wetland with potential LID capture in area 8.

As shown on Figure 6, Option B has significant changes in stormwater management that includes curb and gutter at all approaches, a new culvert cross east of the intersection, proposed stormwater capture using LID along the west side of Heart Lake Road and south side of Countryside Drive, new outlets to the southwest ditch and regrading and enhancement of the existing ditches. The LID infiltration design and infiltration rates will be calculated at the 60% design.

At time of this analysis, it has been determined that the proposed infrastructure will reside either within the proposed right-of-way or within areas outside of the proposed right-of-way previously disturbed as much as possible to minimize disturbance to the wetland areas. The location of the main outlet at the southeast corner of the intersection with be constructed outside the wetland boundary with flows directed to the existing ditch area. Constructability at ditch and outlet locations will be finalized pending the outcome of the additional field survey requirement noted in Figure 7.

The geotechnical report prepared by MTE (December 17, 2020) indicated the presence of groundwater approximately 2 m below ground in the vicinity of the lowest point of the proposed LID on Countryside Drive and dry conditions along the northwest portion of the intersection, however seasonal groundwater fluctuations will need to be monitored to determine the extent that the infiltration trench for LID can be installed while maintaining 1 m separation from the water table. Much of the proposed LID infrastructure is proposed to be installed along Countryside Drive and Heart Lake Road where the road is at a higher elevation than the wetland areas downstream; the proposed locations and design will be determined during detailed design.

The functional design for all Options is summarized per the City of Brampton Standard No. 342 design sheets in Appendix B.

All figures are shown in Appendix C.

MTE

Memorandum

3.0 Results

The Rational Method calculation results based on the overall drainage area are discussed below. The Peak Flow calculations for each individual subcatchment area is shown in Appendix A. Flows from each sub-catchment area are directed to different outlets (i.e. sewer, ditch and overflow out of the drainage area) as seen on Figures 1 to 3.

3.1 Peak Flow

The overall peak runoff generated by the sub-catchment areas delineated for the existing and proposed conditions are summarized in Table 4:

Table 4: Overall Peak Runoff Rate Results Based on Total Drainage Area

			Peak runoff Rate (m^3/s)		
Return Period	I (mm/h)	C1*	Ex	Option A	Option B
2Yr	79.43	1.00	0.474	0.474	0.479
5Yr	104.99	1.00	0.626	0.626	0.633
10Yr	121.93	1.00	0.727	0.727	0.735
25Yr	143.48	1.10	0.941	0.941	0.951
50Yr	159.52	1.20	1.141	1.141	1.154
100Yr	175.36	1.25	1.307	1.307	1.321

*Adjustment factor added for higher intensity storms per Region of Peel

The rational formula calculations indicate that the peak runoff generated by Option A is unchanged given the nominal changes in the configuration of the impervious and pervious surfaces of the right-of-way from the existing conditions. indicated on Figures 2 and 5. The existing storm sewers along Countryside Drive conveys the 5-year design storm flows and is surcharged under the 100-year peak flows per the design calculations in Appendix B. Under the 100-year event, approximately 0.1 m^3/s of peak flow will be conveyed overland with ponding possible at the low-point located at the double-inlet catchbasins. The major system will be further analysed to ensure compliance with the City storm drainage criteria for major roads (one lane free from flooding for emergency vehicles). While the amount surface conveyance indicates that the surface ponding will likely not impede road accessibility under the 100-year event, LID is recommended along Countryside Drive to allow for more infiltration of flows to reduce the impacts of runoff under a major storm event. Impacts to the downstream eco-passage crossing Heart Lake Road are expected to be mostly unchanged compared to existing conditions.

Option B has a minor overall increase in post-development surface runoff by 14 L/s under the 100-year return period with the 300 m^2 increase in the drainage footprint of the intersection. The major system flow paths in Figure 3 and proposed design per Figure 6 indicate better management of surface flow compared to the existing conditions and Option A with surface grading, curb and gutter, replacement of the current culvert under Countryside Drive and redesign and improvement of the ditches along the northeast and southeast of the intersection. The existing storm sewer along Countryside Drive conveys the 5-year flows into the proposed culvert without surcharging to the road. The 100-year event is conveyed by both the storm sewer and overland into the proposed culvert. Under the 100-year event, approximately 0.1 m^3/s of peak flow will be conveyed overland down Countryside Drive to the intersection at Heart Lake Road with ponding possible at the low-point located at the proposed double-inlet catchbasins that outlet to the culvert. The amount of surface conveyance is likely well within the road capacity and will not impede emergency access under a major storm event; however, LID is recommended along Countryside Drive to allow for more infiltration of flows to reduce the impacts of runoff under a major storm event. Along Heart Lake Road, surface flow is directed southbound into the ditches, however there is an opportunity for additional infiltration at the northwest section of the roundabout using LID to offset the increased drainage area footprint and limit the drainage impacts to the wetland. Impact to the downstream eco-passage is unknown with the projected minor increased runoff but is not expected to be significant with upstream flow mitigation efforts discussed here and in Section 4.

The storm sewer design flows are summarized in Appendix B.

3.2 Flow Velocity

Overall surface flow velocities remain unchanged for Option B from Existing Conditions for the 2-Year through 100-Year return period as shown in Table 4:

Table 5: Overall Surface Flow Velocity Calculations

	Average Surface Flow Velocity (m/s)		
Return Period	Existing	Option A	Option B
2-Yr	0.11	0.11	0.11
5-Yr	0.15	0.15	0.15
10Yr	0.17	0.17	0.17
25Yr	0.22	0.22	0.22
50Yr	0.27	0.27	0.27
100Yr	0.31	0.31	0.31

The overall flow velocities in Table 5 are based on the entire drainage area and do not represent the individual subcatchment drainage paths. As noted on Figures 1 to 3, drainage is conveyed by a combination of storm sewers, ditch/culvert systems and sheet flow into the ditch systems and woodlands.

For pipe flow, the City's criteria are summarized below:

- Maximum flow velocities 4.5 m/s
- Minimum flow velocities 0.75 m/s

Under Option A, the design flow exceeds the maximum allowable under the 5-year event, however this may be due to the assumptions for sewer invert elevations from which the storm design calculations are based on. The invert elevations of the storm sewer along Countryside Drive were assumed and will need to be surveyed. Additional survey will also be required for the storm sewer and culvert outlets as well as the ditches to verify the design calculations; the area of proposed additional survey is shown in Figure 7.

3.3 Stormwater Quality Control Measures

The only evidence of any form of existing stormwater quality control are perforated outlets along the south side of Heart Lake Road at the east end of the study area for the drainage area upstream and another at the southeast corner of the intersection at Countryside Drive based on the provided as-built data.

TRCA's water balance requirement states that 5 mm of runoff from impervious surfaces must be retained and infiltrated and achieve and enhanced level of treatment (80% TSS) prior to discharge to the wetlands. As previously mentioned, perforated pipe systems are proposed to address both stormwater quantity and quality target. The design will be based on the design of perforated pipe systems Section 4.10 in the Low

Impact Development Stormwater Management Planning and Design Guide (2010) and Section 4 of the Stormwater Planning and Design Manual.

Preliminary calculations for the areas to directed to the perforated pipe system indicated a volume retention/treatment target of 71 cubic meters. The total length of LID measures under a preliminary design was approximately 213 m with a total potential infiltration volume of approximately 285 cubic meters. Preliminary design calculations can be seen in Appendix B.

LID pre-treatment design will include catchbasins located with curb inlets directing road drainage into boulevard areas where catchbasins will be located or a forebay-type configuration before flows enter the catchbasin similar to these used for bioretention cells per the Stormwater Planning and Design Manual.

Guidance will also be taken from the LID Stormwater Management and Planning Guide (CVC, TRCA, 2010) from Section 4.10 on the design for perforated pipe systems. The design would follow the volumetric reduction benefits and pollutant removal capacity for different configurations as well as pre-treatment guidance that may include a grass forebay (requiring 25% of the water quality storage volume), gravel diaphragm or other methods to dissipate flow energy prior to flows reaching the inlet of the perforated pipe system. Conductivity monitoring will also guide the final design for pretreatment.

The design calculations also indicate the volume retained/infiltrated will exceed the target volume by an order of magnitude of 3 to 4 times resulting in keeping flow volumes at or below existing peak flows that will mitigate potential impacts on the wildlife corridor downstream.

3.4 Impacts on the Wildlife Corridor

A wildlife corridor exists downstream to the south from the construction limit. As mentioned in the previous section, the anticipated volume retention using LID in conjunction with pre-treatment of flows prior to entering the LID measure was calculated to be sufficient to mitigate the impacts of a 14 L/s increase in flows hat in turn, would mitigate any impacts on the wildlife corridor.

3.5 Erosion and Sediment Control During Construction

Effective sediment control involves addressing those activities that may result in increased erosion and sedimentation in both the planning and the construction stages. Given the sensitive nature of the wetlands and potential impacts on the downstream wildlife corridor, consultation with the TRCA and Region of Peel on the appropriate erosion control requirements and staging during constructions will be completed prior to the submission of the ECA. Examples of erosion and sediment control practices during construction include, but not limited to, the following:

- Storing materials off-site away from sensitive areas,
- Best practices to capture sediments on or off site including:
  - Flow diversions to temporary ponds or tanks and collecting sediments for disposal or reuse; and
  - Temporary silt fencing;

,

4.0 Conclusions and Recommendations

In conclusion, storm drainage in Option A is essentially unchanged from the existing conditions while Option B increases the amount of peak runoff by 14 L/s into the wetlands under the 100-year return period event using a rational approach to the analysis. There appear to be more opportunities to control/mitigate surface flows and protect water quality and flows directed toward the wildlife corridor under Option B then with Option A that maintains the status quo for storm drainage.

Key recommendations are summarized below:

1. Hydrogeotechnical review is required to confirm the soil infiltration rate and groundwater levels that will affect the LID approach;
2. An erosion and sediment control plan is required to detail mitigation measures during construction to protect the wetlands and wildlife corridor during construction;
3. The proposed LID alternatives for water quantity and quality impact mitigation are to be reviewed by the TRCA and modified for functionality. Figures 5 and 6 show potential LID location options to reduce surface runoff for Options A and B respectively. Option B offers a greater opportunity to direct drainage to LID infrastructure to mitigate flow volume and water quality impacts;
4. Flow monitoring upstream of the wildlife corridor should be conducted to establish the baseflow; and
5. Additional survey is recommended per Figure 7 to identify potential constructability issues, confirm outlet locations and begin detailed design.

Please do not hesitate to contact the undersigned for any questions.

MTE Consultants Inc.

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Water Resources Engineer
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SXD:zeg
Cc: Dave Hallman, MTE Consultants Inc.
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APPENDIX A –

RATIONAL METHOD PEAK RUNOFF CALCULATIONS

Subcatchment Area Peak Runoff

Area No.	Catchment Area (ha)			Proportional Area			C Value			Weighted C Value		
	Ex	Option A	Option B	Ex	Option A	Option B	Ex	Option A	Option B	Ex	Option A	Option B
1	0.57	0.57	0.57	0.13	0.13	0.13	0.71	0.71	0.71	0.094	0.094	0.093
2	0.41	0.41	0.41	0.10	0.10	0.10	0.58	0.58	0.58	0.055	0.055	0.055
3	0.43	0.43	0.43	0.10	0.10	0.10	0.51	0.51	0.51	0.051	0.051	0.051
4	0.41	0.41	0.41	0.10	0.10	0.10	0.51	0.51	0.51	0.049	0.049	0.049
5	0.36	0.36	0.57	0.08	0.08	0.13	0.58	0.58	0.51	0.048	0.048	0.068
6	0.22	0.22	0.27	0.05	0.05	0.06	0.77	0.77	0.64	0.040	0.040	0.040
7	0.17	0.17	0.12	0.04	0.04	0.03	0.87	0.87	0.90	0.035	0.035	0.025
8	0.19	0.19	0.21	0.04	0.04	0.05	0.87	0.87	0.77	0.039	0.039	0.038
9	0.02	0.02	0.07	0.00	0.00	0.02	0.87	0.87	0.84	0.004	0.004	0.014
10	0.58	0.58	0.51	0.14	0.14	0.12	0.25	0.25	0.25	0.034	0.034	0.030
11	0.34	0.34	0.34	0.08	0.08	0.08	0.25	0.25	0.25	0.020	0.020	0.020
12	0.33	0.33	0.33	0.08	0.08	0.08	0.25	0.25	0.25	0.019	0.019	0.019
13	0.24	0.24	0.06	0.06	0.06	0.01	0.25	0.25	0.25	0.014	0.014	0.003
Total	4.27	4.27	4.30	1	1	1				0.502	0.502	0.504

Area No.	Peak Runoff Rate (m3/s) 2-Yr			5-Yr			10-Yr			25-Yr			50-Yr			100-Yr		
	Ex	Option A	Option B	Ex	Option A	Option B	Ex	Option A	Option B	Ex	Option A	OptionB	Ex	Option A	Option B	Ex	Option A	Option B
1	88.736	8.874	0.089	0.118	0.118	0.118	0.137	0.137	0.137	0.178	0.178	0.178	0.215	0.215	0.215	0.245	0.245	0.245
2	0.052	0.052	0.052	0.069	0.069	0.069	0.080	0.080	0.080	0.104	0.104	0.104	0.126	0.126	0.126	0.144	0.144	0.144
3	0.048	0.048	0.048	0.064	0.064	0.064	0.075	0.075	0.075	0.097	0.097	0.097	0.118	0.118	0.118	0.134	0.134	0.134
4	0.046	0.046	0.046	0.061	0.061	0.061	0.071	0.071	0.071	0.092	0.092	0.092	0.112	0.112	0.112	0.127	0.127	0.127
5	0.046	0.046	0.064	0.061	0.061	0.085	0.071	0.071	0.099	0.091	0.091	0.128	0.111	0.111	0.156	0.126	0.126	0.177
6	0.037	0.037	0.038	0.050	0.050	0.051	0.058	0.058	0.059	0.075	0.075	0.076	0.091	0.091	0.093	0.103	0.103	0.105
7	0.033	0.033	0.024	0.043	0.043	0.032	0.050	0.050	0.037	0.065	0.065	0.048	0.079	0.079	0.058	0.090	0.090	0.066
8	0.036	0.036	0.036	0.048	0.048	0.048	0.056	0.056	0.055	0.073	0.073	0.071	0.088	0.088	0.087	0.100	0.100	0.099
9	0.004	0.004	0.013	0.005	0.005	0.017	0.006	0.006	0.020	0.008	0.008	0.026	0.009	0.009	0.031	0.011	0.011	0.036
10	0.032	0.032	0.028	0.043	0.043	0.037	0.050	0.050	0.044	0.064	0.064	0.056	0.078	0.078	0.068	0.088	0.088	0.078
11	0.019	0.019	0.019	0.025	0.025	0.025	0.029	0.029	0.029	0.038	0.038	0.038	0.046	0.046	0.046	0.052	0.052	0.052
12	0.018	0.018	0.018	0.024	0.024	0.024	0.028	0.028	0.028	0.036	0.036	0.036	0.044	0.044	0.044	0.050	0.050	0.050
13	0.013	0.013	0.003	0.018	0.018	0.004	0.020	0.020	0.005	0.027	0.027	0.007	0.032	0.032	0.008	0.037	0.037	0.009
Total	89.121	9.258	0.479	0.630	0.630	0.637	0.732	0.732	0.740	0.948	0.948	0.958	1.149	1.149	1.162	1.307	1.307	1.321

Rainfall Intensity and Peak Runoff
Tc (min) 10
Q=0.00278*C1*C*I*A

Return Period		A	B	R (mm/h)	C1*	Q Total Ex	Option A	Option B
2Yr	I=A(Tc)^B	22.1	-0.714	79.43	1.00	0.474	0.474	0.479
5Yr	I=A(Tc)^B	29.9	-0.701	104.99	1.00	0.626	0.626	0.633
10Yr	I=A(Tc)^B	35.1	-0.695	121.93	1.00	0.727	0.727	0.735
25Yr	I=A(Tc)^B	41.6	-0.691	143.48	1.10	0.941	0.941	0.951
50Yr	I=A(Tc)^B	46.5	-0.688	159.52	1.20	1.141	1.141	1.154
100Yr	I=A(Tc)^B	51.3	-0.686	175.36	1.25	1.307	1.307	1.321

*Adjustment factor for higher intensity storms per Region of Peel

APPENDIX B –
STORM DESIGN SHEETS

Storm Design Sheet - Heart Lake Road - Existing

					Notes
Time of Conc. (T_c)	10	min			
Rainfall Intensity (I)	$I=A(T_c)^B$	mm/h			# Region of Peel factor for storms > 5-yr; Existing storm sewer and culvert invert elevations
Return Period	A	B	I (mm/h)	C_1 #	* Proportional Area (m/m); assumed based on surface elevation data
5Yr	29.9	-0.701	104.99	1.00	Peak Flow - $Q=0.00278*C_1*C*I*A$
100Yr	51.3	-0.686	175.36	1.25	Pipe Flow - $Q_{CAP}=A*(A/P)^{2/3}*S^{1/2}/n$

Designed: SD
Checked:

Street	Area No.	US_MH	US_Inv (mAD)	DS_MH	DS_Inv (mAD)	A (ha)	A_{CUM} (ha)	Runoff Coefficient (Proportion A * C) Impervious C	Impervious A_P*	Pervious C	Pervious A_P*	Composite C	A*C	T_c (min)	Rainfall Intensity (mm/h) I_5	I_{100}	Peak Flow (m^3/s) Q_5	Q_{100}	Peak Flow $_{CUM}$ (m^3/s) Q_5	Q_{100}	Pipe L (m)	Size (mm)	A (m^2)	P (m)	S (m/m)	Q_{CAP} (m^3/s)	V_5 (m/s)	V_{100} (m/s)	%Full 5 yr	100 yr
Countryside Drive																														
Storm Sewer	1		255.46		252.27	0.57	0.57	0.9	0.7	0.25	0.3	0.71	0.40185	10	104.99	175.36	0.117	0.196	0.117	0.196	140.2	300	0.07	0.94	0.02	0.788	1.66	2.77	15%	25%
	2		252.27		250.93	0.41	0.98	0.9	0.5	0.25	0.5	0.58	0.23575	10	104.99	175.36	0.069	0.115	0.186	0.311	58.5	300	0.07	0.94	0.02	0.791	2.63	4.40	24%	39%
	3		250.93		250.15	0.43	1.41	0.9	0.4	0.25	0.6	0.51	0.2193	10	104.99	175.36	0.064	0.107	0.250	0.418	58.4	300	0.07	0.94	0.01	0.604	3.54	5.91	41%	69%
	4		250.15		249.45	0.41	1.82	0.9	0.4	0.25	0.6	0.51	0.2091	10	104.99	175.36	0.061	0.102	0.311	0.520	53.5	300	0.07	0.94	0.01	0.598	4.40	7.35	52%	87%
	5		249.45		249	0.36	2.18	0.9	0.4	0.25	0.6	0.51	0.1836	10	104.99	175.36	0.054	0.090	0.365	0.609	71.3	300	0.07	0.94	0.01	0.415	5.16	8.62	88%	147%
	6		249		248.75	0.22	1.63	0.9	0.8	0.25	0.2	0.77	0.1694	10	104.99	175.36	0.049	0.083	0.414	0.692	20	300	0.07	0.94	0.01	0.584	5.86	9.79	71%	118%
Overland	12					0.33	0.33	0.9	0	0.25	1	0.25	0.0825	11	104.99	175.36	0.024	0.040	0.024	0.040										
Heart Lake Road																														
Culvert	7					0.12	0.12	0.9	0.95	0.25	0.05	0.87	0.1041	10	104.99	175.36	0.030	0.051	0.030	0.051										
	10					0.51	0.63	0.9	0	0.25	1	0.25	0.1275	10	104.99	175.36	0.037	0.062	0.068	0.113										
	13	Inlet	249	Inlet	248.5	0.06	0.69	0.9	0	0.25	1	0.25	0.015	10	104.99	175.36	0.004	0.007	0.072	0.120	43.5	600	0.28	1.88	0.01	3.558	0.25	0.43	2%	3%
Overland	8					0.19	0.19	0.9	0.95	0.25	0.05	0.87	0.16	10	104.99	175.36	0.048	0.080	0.048	0.080										
	11					0.34	0.53	0.9	0	0.25	1	0.25	0.09	10	104.99	175.36	0.025	0.041	0.073	0.122										

Storm Design Sheet - Heart Lake Road - Option A

Time of Conc. (T_c)	10	min		
Rainfall Intensity (I)	$I=A(T_c)^B$	mm/h		
Return Period	A	B	I (mm/h)	C_1#
5Yr	29.9	-0.701	104.99	1.00
100Yr	51.3	-0.686	175.36	1.25

Notes

Region of Peel factor for storms > 5-yr

+ Proportional Area (m/m)

Peak Flow - $Q=0.00278*C_1*C*I*A$

Pipe Flow - $Q_{CAP}= A*(A/P)^{2/3}*S^{1/2}/n$

Existing storm sewer and culvert invert elevations assumed based on surface elevation data

* equivalent size

Designed: SD

Checked:

Street	Area No.	US_MH	US_Inv (mAD)	DS_MH	DS_Inv (mAD)	A (ha)	A_{CUM} (ha)	Runoff Coefficient (Proportion A * C) Impervious C	Impervious A_P+	Pervious C	Pervious A_P+	Composite C	A*C	T_c (min)	Rainfall Intensity (mm/h) I_5	I_{100}	Peak Flow (m^3/s) Q_5	Q_{100}	Peak Flow $_{CUM}$ (m^3/s) Q_5	Q_{100}	Pipe L (m)	Size (mm)*	A (m2)	P (m)	S (m/m)	Q_{CAP} (m^3/s)	V_5 (m/s)	V_{100} (m/s)	%Full 5 yr	100 yr
Countryside Drive																														
Storm Sewer	1		255.46		252.27	0.57	0.57	0.9	0.7	0.25	0.3	0.71	0.40185	10	104.99	175.36	0.117	0.196	0.117	0.196	140.2	300	0.07	0.94	0.02	0.788	1.66	2.77	15%	25%
	2		252.27		250.93	0.41	0.98	0.9	0.5	0.25	0.5	0.58	0.23575	10	104.99	175.36	0.069	0.115	0.186	0.311	58.5	300	0.07	0.94	0.02	0.791	2.63	4.40	24%	39%
	3		250.93		250.15	0.43	1.41	0.9	0.4	0.25	0.6	0.51	0.2193	10	104.99	175.36	0.064	0.107	0.250	0.418	58.4	300	0.07	0.94	0.01	0.604	3.54	5.91	41%	69%
	4		250.15		249.45	0.41	1.82	0.9	0.4	0.25	0.6	0.51	0.2091	10	104.99	175.36	0.061	0.102	0.311	0.520	53.5	300	0.07	0.94	0.01	0.598	4.40	7.35	52%	87%
	5		249.45		249	0.36	2.18	0.9	0.4	0.25	0.6	0.51	0.1836	10	104.99	175.36	0.054	0.090	0.365	0.609	71.3	300	0.07	0.94	0.01	0.415	5.16	8.62	88%	147%
	6		249		248.75	0.22	1.63	0.9	0.8	0.25	0.2	0.77	0.1694	10	104.99	175.36	0.049	0.083	0.414	0.692	20	300	0.07	0.94	0.01	0.584	5.86	9.79	71%	118%
Overland	12					0.33	0.33	0.9	0	0.25	1	0.25	0.0825	11	104.99	175.36	0.024	0.040	0.024	0.040										
Heart Lake Road																														
Culvert	7					0.12	0.12	0.9	0.95	0.25	0.05	0.87	0.1041	10	104.99	175.36	0.030	0.051	0.030	0.051										
	10					0.51	0.63	0.9	0	0.25	1	0.25	0.1275	10	104.99	175.36	0.037	0.062	0.068	0.113										
	13	Twin Inlet	249	Twin Outlet	248.5	0.06	0.69	0.9	0	0.25	1	0.25	0.015	10	104.99	175.36	0.004	0.007	0.072	0.120	43.5	600	0.28	1.88	0.01	3.558	0.25	0.43	1%	2%
Overland	8					0.19	0.19	0.9	0.95	0.25	0.05	0.87	0.16	10	104.99	175.36	0.048	0.080	0.048	0.080										
	11					0.34	0.53	0.9	0	0.25	1	0.25	0.09	10	104.99	175.36	0.025	0.041	0.073	0.122										

Storm Design Sheet - Heart Lake Road - Option B

Time of Conc. (T_c)	10	min			Notes	
Rainfall Intensity (I)	$I=A(T_c)^B$	mm/h			[#] Region of Peel factor for storms > 5-yr	Existing storm sewer and culvert invert elevations
Return Period	A	B	I (mm/h)	C_1 [#]	[*] Proportional Area (m/m)	assumed based on surface elevation data
5Yr	29.9	-0.701	104.99	1.00	Peak Flow - $Q=0.00278*C_1*C*I*A$	* equivalent size
100Yr	51.3	-0.686	175.36	1.25	Pipe Flow - $Q_{CAP}= A*(A/P)^{2/3}*S^{1/2}/n$	

Designed: SD
Checked:

Street	Area No.	US_MH	US_Inv (mAD)	DS_MH	DS_Inv (mAD)	A (ha)	A_{CUM} (ha)	Runoff Coefficient (Proportion A * C)				Composite C	A*C	T_c (min)	Rainfall Intensity (mm/h)		Peak Flow (m^3/s)		Peak Flow $_{CUM}$ (m^3/s)		Pipe								%Full	
								Impervious		Pervious					I_5	I_{100}	Q_5	Q_{100}	Q_5	Q_{100}	L (m)	Size (mm)*	A (m2)	P (m)	S (m/m)	Q_{CAP} (m^3/s)	V_5 (m/s)	V_{100} (m/s)	5 yr	100 yr
								C	A	C	A																			
Heart Lake Road																														
	1		255.46		252.27	0.57	0.57	0.9	0.7	0.25	0.3	0.71	0.40	10	104.99	175.36	0.117	0.196	0.117	0.196	140.2	300	0.07	0.94	0.02	0.79	1.66	2.77	15%	25%
	2		252.27		250.93	0.41	0.98	0.9	0.5	0.25	0.5	0.58	0.24	10	104.99	175.36	0.069	0.115	0.186	0.311	58.5	300	0.07	0.94	0.02	0.79	2.63	4.40	24%	39%
Storm Sewer	3		250.93		250.15	0.43	1.41	0.9	0.4	0.25	0.6	0.51	0.22	10	104.99	175.36	0.064	0.107	0.250	0.418	58.4	300	0.07	0.94	0.01	0.60	3.54	5.91	41%	69%
	4		250.15		249.45	0.41	1.82	0.9	0.4	0.25	0.6	0.51	0.21	10	104.99	175.36	0.061	0.102	0.311	0.520	53.5	300	0.07	0.94	0.01	0.60	4.40	7.35	52%	87%
	5		249.45		249		1.82	0.9	0.4	0.25	0.6	0.51	0.00	10	104.99	175.36	0.000	0.000	0.311	0.520	71.3	375	0.11	1.18	0.01	0.75	2.82	4.71	41%	69%
Overland	12					0.33	0.33	0.9	0	0.25	1	0.25	0.0825	11	104.99	175.36	0.024	0.040	0.024	0.040										
Countryside Drive																														
	5					0.57	0.57	0.9	0.4	0.25	0.6	0.51	0.29	10	104.99	175.36	0.085	0.142	0.085	0.142										
	7					0.12	0.69	0.9	1	0.25	0	0.90	0.11	10	104.99	175.36	0.032	0.053	0.116	0.194										
Culvert	9					0.07	0.76	0.9	0.9	0.25	0.1	0.84	0.06	10	104.99	175.36	0.017	0.028	0.133	0.223										
	10					0.51	1.27	0.9	0	0.25	1	0.25	0.13	10	104.99	175.36	0.037	0.062	0.171	0.285										
	13	Twin Inlet	248.97	Twin Outlet	248.40	0.06	1.33	0.9	0	0.25	1	0.25	0.02	10	104.99	175.36	0.004	0.007	0.175	0.292	44.4	600	0.283	1.885	0.013	3.737	0.62	1.03	2%	4%
	6					0.27	0.27	0.9	0.6	0.25	0.4	0.64	0.17	10	104.99	175.36	0.050	0.084	0.050	0.084										
Overland	8					0.19	0.46	0.9	0.95	0.25	0.05	0.87	0.16	10	104.99	175.36	0.048	0.080	0.099	0.165										
	11					0.34	0.80	0.9	0	0.25	1	0.25	0.09	10	104.99	175.36	0.025	0.041	0.123	0.206										

Heart Lake Road at Countryside Drive
LID PRACTICE EVALUATION - PRELIMINARY
Kitchener, Ontario

Project No.: 47877-100
Date: February 22, 2022
Design By: SD
File: C:\Users\SDhanvantari\Desktop\47877 Heart Lake Road\Storm Drainage Memo\47877-100-100 LID-Screening.xlsx

Analysis of Rights-of-way Only

Table 1A

Location #		Contributing Area						LID Facility								Evaluation			Infitration Possble?	Comments
	Proposed Facility	Area Number	Area (A), ha	Runoff Coeff. (C)	I (=AxC), (m^2)	Runoff Volume, m^3		Location		Length, (m)	Functional Width, (m)	Depth of Practice, (m)	Void Ratio	Volume Treated, (m^3)	Pervious Area (P), (m^2)	I/P Ratio[1]	Meets Design Criteria?			
						From 5 mm	*From 12.5 mm*	*Downstream MH*	*Upstream MH*								For 5 mm	For 12.5 mm		
Heart Lake	EES-1	1,2,3,4,5	1.000	0.750	7500	37.500	93.750			112.6	2.00	1.5	0.4	135.1	225.2	33.30	YES	YES	YES	
Countryside	EES-2	6,8	0.210	0.770	1617	8.085	20.213			100.0	2.00	1.5	0.4	120.0	200.0	8.09	YES	YES	YES	

Area Potentially Treated by LID's	**1.21**
Total Area of Right of Way[3]	**1.42**
% Area Potentially Treated by LIDs	**85%**

Table 1B

Location #	Infiltration Calculations											Comments
	Proposed Facility	Runoff Volume, m^3		Footprint Area, A_f (m^2)	Reservoir Depth, d_r (mm)	Void Ratio, V_r	Assumed Infiltration Rate[2], i (mm/hr)	Time to Drain, t_s (hr)	Volume Infiltrated, WQV (m^3)	Meets Design Criteria?		
		From 5 mm	*From 12.5 mm*							For 5 mm	For 12.5 mm	
Heart Lake	EES-1	37.500	93.750	225.20	1500.00	0.4	12.0	50.0	135.12	YES	YES	
Countryside	EES-2	8.085	20.213	200.00	1500.00	0.4	14.0	42.9	120.00	YES	YES	

Potential Volume Infiltrated	**255.12**
Target Volume (First 5 mm Runoff)[4]	**71.00**
% Runoff Infiltrated by LIDs	**359%**

NOTES:

1. Credit Valley Conservation (CVC) and Toronto Region Conservation (TRCA) Guidelines suggest an I/P ratio of between 5 and 10 for perforated pipe systems.
2. The assumed infiltration rate is taken from the approximate infiltration rate of sand. A 2.5 Safety Factor was added based on Table C2 of the CVC and TRC Guidelines.
3. The total area of the rights-of-way includes the Cambridge Ave and Fife Ave right of ways within the contract limits.
4. The target volume is based on the total area of right-of-way.

Heart Lake Road at Countryside Drive
LID PRACTICE EVALUATION - PRELIMINARY
Kitchener, Ontario

Project No.: 47877-100
Date: February 22, 2022
Design By: SD
File: C:\Users\SDhanvantari\Desktop\47877 Heart Lake Road\Storm Drainage Memo\47877-100-100 LID-Screening.xlsx

Analysis of Entire Catchments

Table 2A

Location #		Contributing Area						LID Facility								Evaluation			Infitration Possble?	Comments
	Proposed Facility	Area Number	Area (A), ha	Runoff Coeff. (C)	I (=AxC), (m^2)	Runoff Volume, m^3		Location		Length, (m)	Functional Width, (m)	Depth of Practice, (m)	Void Ratio	Volume Treated, (m^3)	Pervious Area (P), (m^2)	I/P Ratio[1]	Meets Design Criteria?			
						From 5 mm	*From 12.5 mm*	*Downstream MH*	*Upstream MH*								For 5 mm	For 12.5 mm		
ST3.2 - Heart Lake	EES-1	1,2,3,4,5	2.090	0.510	10659	53.295	133.238			112.6	2.00	1.5	0.4	135.1	225.2	47.33	YES	YES	YES	
ST3.2 - Countryside	EES-2	6,8	0.550	0.454	2499	31.240	67.478			100.0	2.00	1.5	0.4	120.0	200.0	12.50	YES	YES	YES	

Area Potentially Treated by LID's	**2.09**
Total Area of Right of Way[3]	**1.42**
% Area Potentially Treated by LIDs	**147%**

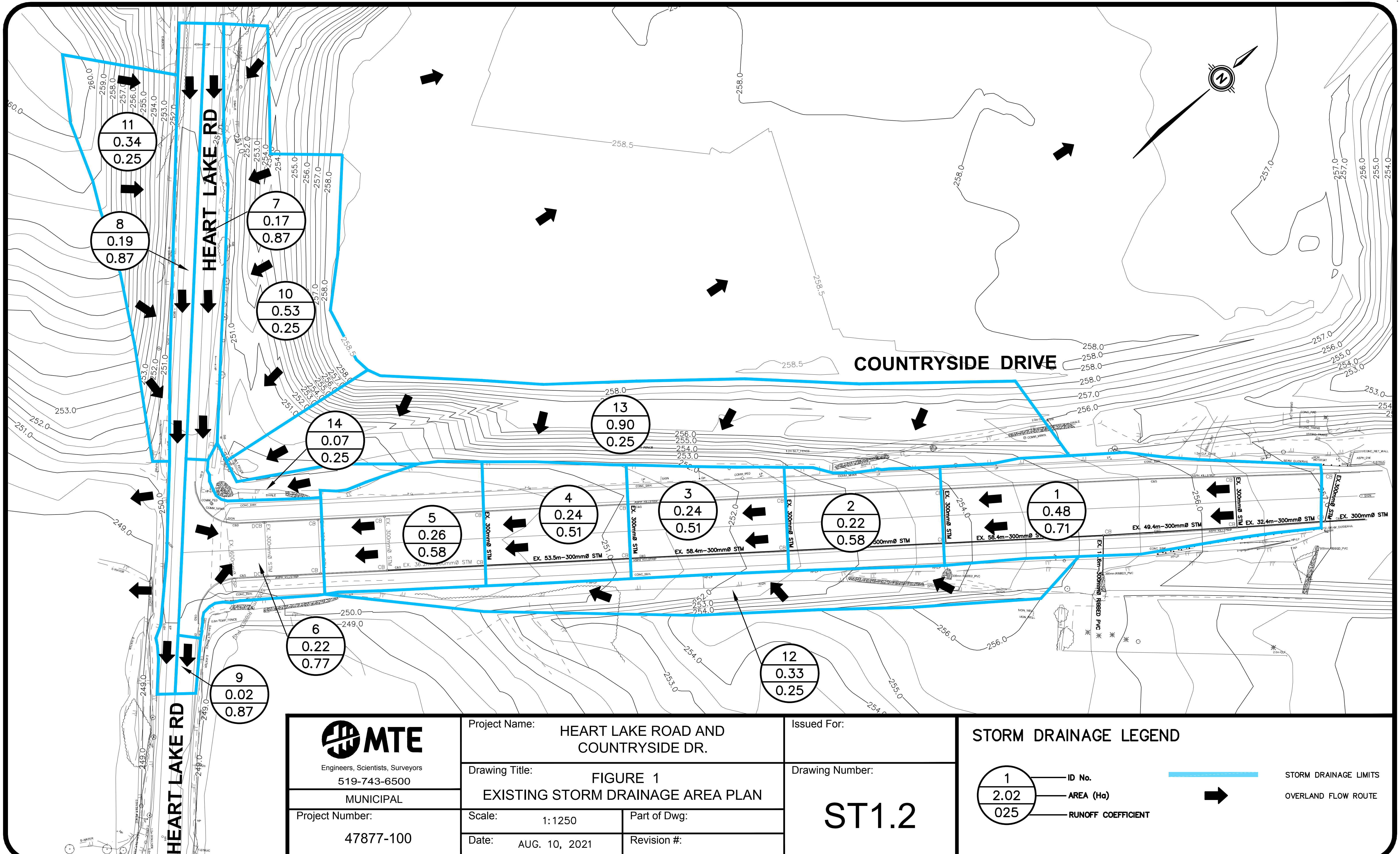
Table 2B

Location #	Infiltration Calculations										Comments
	Proposed Facility	Runoff Volume, m^3		Footprint Area, A_f (m^2)	Reservoir Depth, d_r (mm)	Void Ratio, V_r	Assumed Infiltration Rate[2], i (mm/hr)	Time to Drain, t_s (hr)	Volume Infiltrated, WQV (m^3)	Meets Design Criteria?		
		From 5 mm	*From 12.5 mm*							For 5 mm	For 12.5 mm	
Heart Lake	EES-1	53.295	133.238	225.20	1500.00	0.4	12.0	50.0	135.12	YES	YES	
Countryside	EES-2	31.240	67.478	200.00	1500.00	0.5	12.0	62.5	150.00	YES	YES	

Potential Volume Infiltrated	**285.12**
Target Volume (First 5 mm Runoff)[4]	**71.00**
% Runoff Infiltrated by LIDs	**402%**

NOTES:
1. Credit Valley Conservation (CVC) and Toronto Region Conservation (TRCA) Guidelines suggest an I/P ratio of between 5 and 10 for perforated pipe systems.
2. The assumed infiltration rate is taken from the approximate infiltration rate of sand. A 2.5 Safety Factor was added based on Table C2 of the CVC and TRC Guidelines.
3. The total area of the rights-of-way includes the Cambridge Ave right of ways within the contract limits.
4. The target volume is based on the total area of right-of-way.

APPENDIX C –
FIGURES



MTE
Engineers, Scientists, Surveyors
519-743-6500
MUNICIPAL

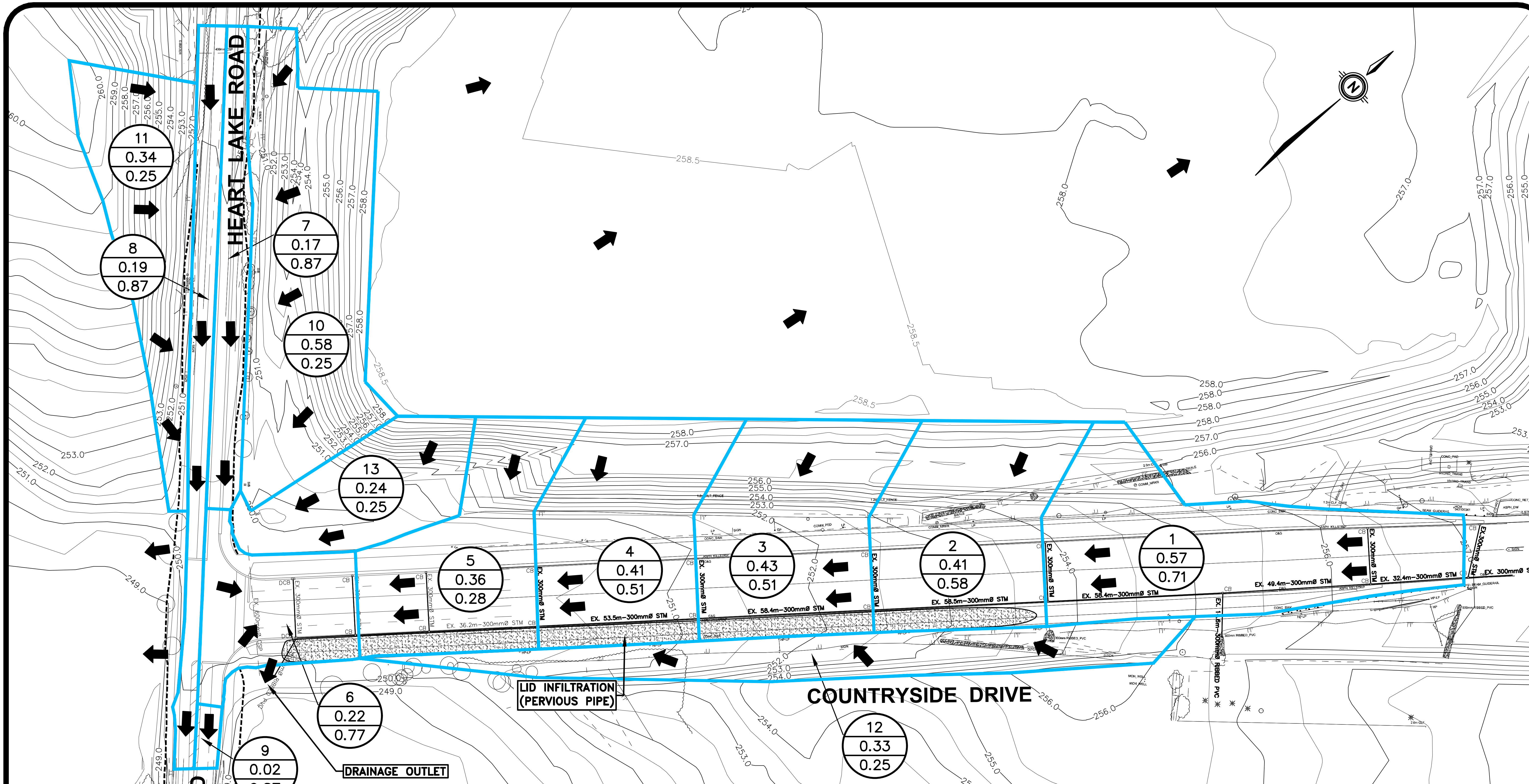
Project Name:	HEART LAKE ROAD AND COUNTRYSIDE DR.
Issued For:	
Drawing Title:	FIGURE 1 EXISTING STORM DRAINAGE AREA PLAN
Drawing Number:	ST1.2
Project Number:	47877-100
Scale:	1:1250
Part of Dwg:	
Date:	AUG. 10, 2021
Revision #:	

STORM DRAINAGE LEGEND

1 — ID No.
2.02 — AREA (Ha)
025 — RUNOFF COEFFICIENT
STORM DRAINAGE LIMITS
OVERLAND FLOW ROUTE

September 21, 2021 — 11:14 a.m. — Plotted By: praimbault

P:\P\47877\100\47877-100-ST1.dwg



MTE

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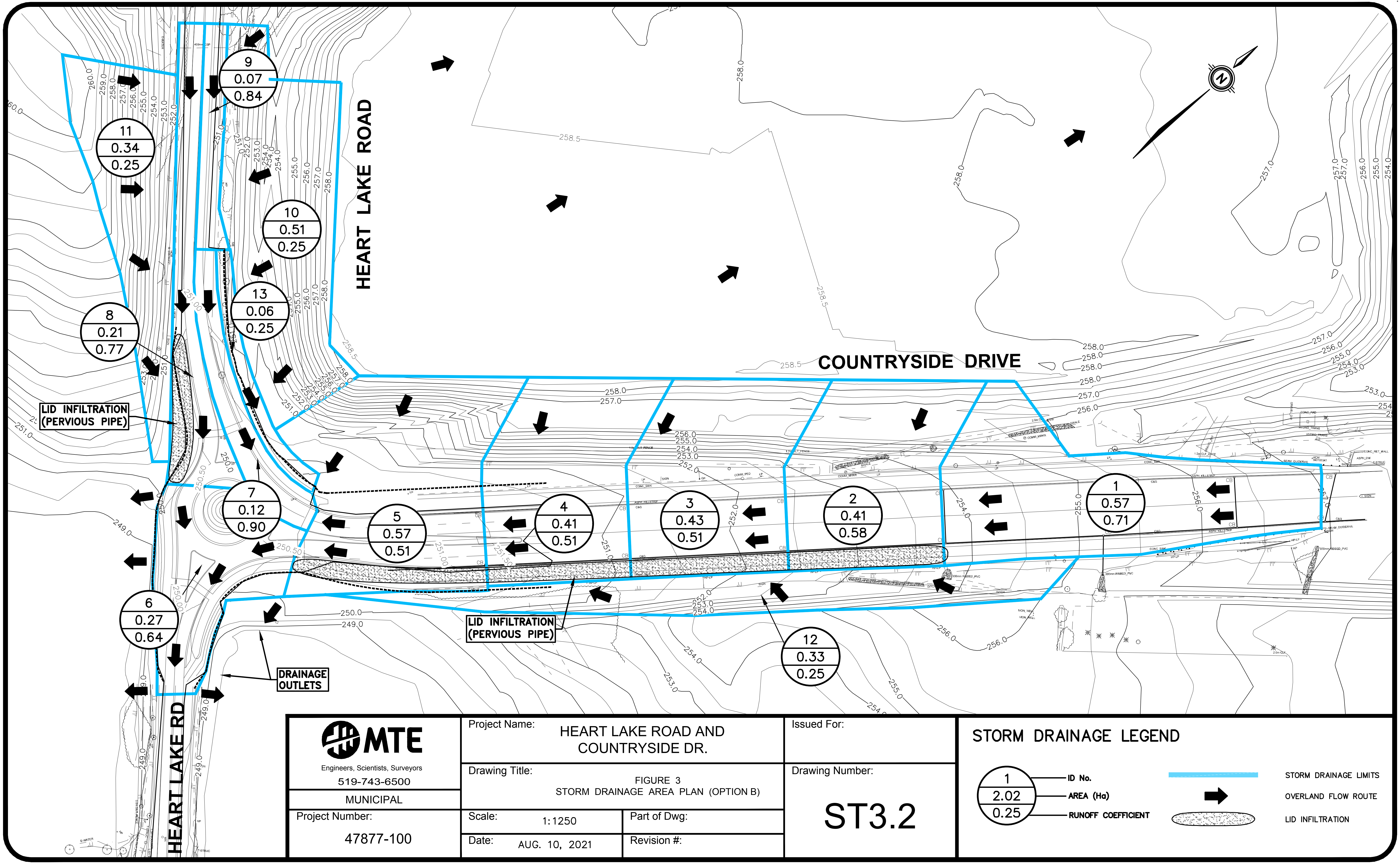
519-743-6500

MUNICIPAL

Project Number:	47877-100
Project Name:	HEART LAKE ROAD AND COUNTRYSIDE DR.
Drawing Title:	FIGURE 2 STORM DRAINAGE AREA PLAN (OPTION A)
Scale:	1:1250
Part of Dwg:	
Date:	AUG. 10, 2021
Revision #:	1
Issued For:	
Drawing Number:	ST2.2

STORM DRAINAGE LEGEND

- 1 — ID No.
- 2.02 — AREA (Ha)
- 0.25 — RUNOFF COEFFICIENT
- STORM DRAINAGE LIMITS
- OVERLAND FLOW ROUTE
- LID INFILTRATION



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Engineers, Scientists, Surveyors
519-743-6500
MUNICIPAL

Project Number: 47877-100

Project Name: HEART LAKE ROAD AND COUNTRYSIDE DR.

Drawing Title: FIGURE 3 STORM DRAINAGE AREA PLAN (OPTION B)

Scale: 1:1250

Part of Dwg:

Date: AUG. 10, 2021

Revision #:

Issued For:

Drawing Number: ST3.2

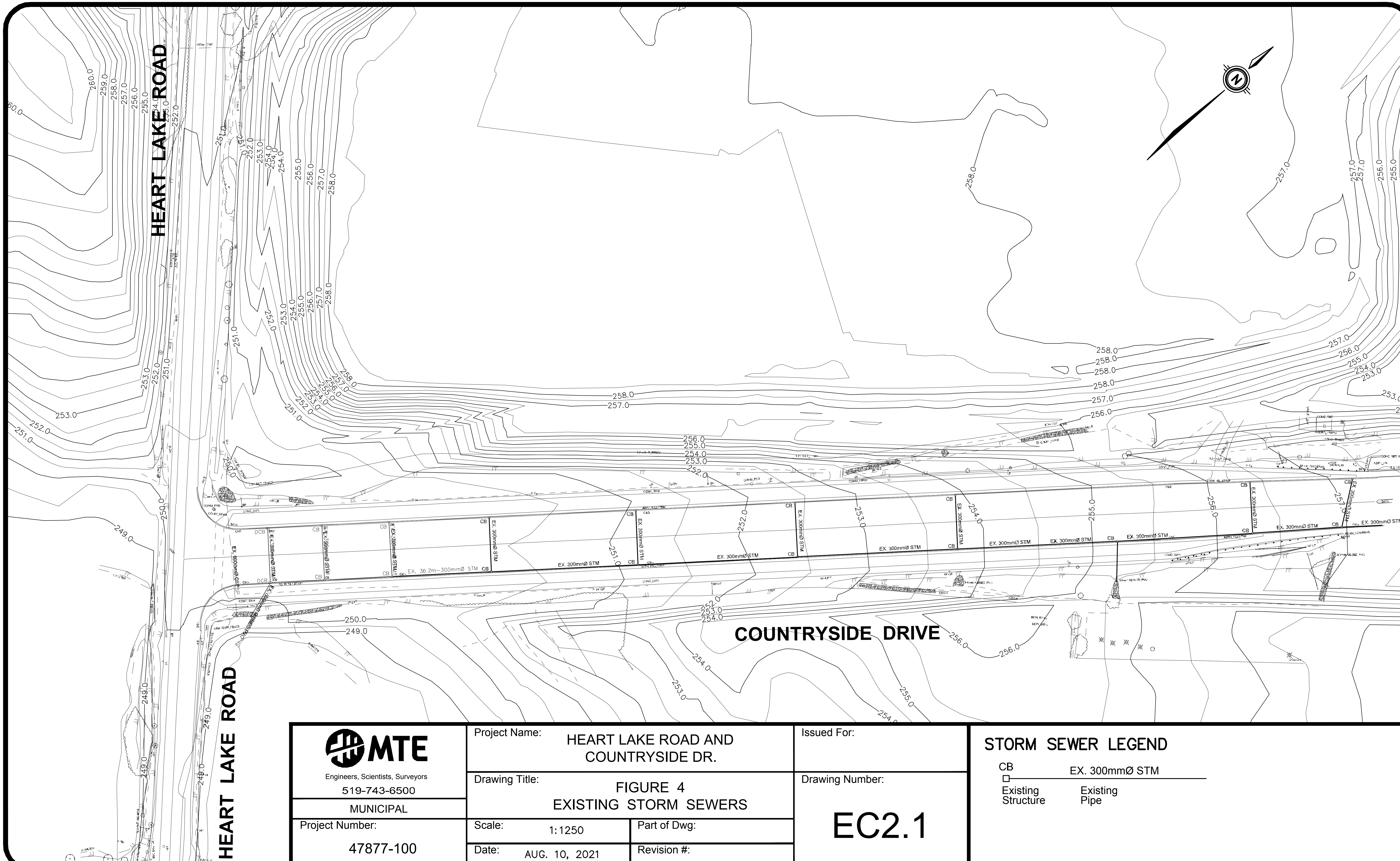
STORM DRAINAGE LEGEND

1 — ID No.
2.02 — AREA (Ha)
0.25 — RUNOFF COEFFICIENT

STORM DRAINAGE LIMITS
OVERLAND FLOW ROUTE
LID INFILTRATION

February 25, 2022 — 3:54 p.m. — Plotted By: praimbault

P:\P\47877\100\47877-100-ST3.dwg



MTE
Engineers, Scientists, Surveyors
519-743-6500

MUNICIPAL

Project Number: 47877-100

Project Name: HEART LAKE ROAD AND COUNTRYSIDE DR.

Drawing Title: FIGURE 4 EXISTING STORM SEWERS

Scale: 1:1250

Part of Dwg:

Date: AUG. 10, 2021

Revision #:

Issued For:

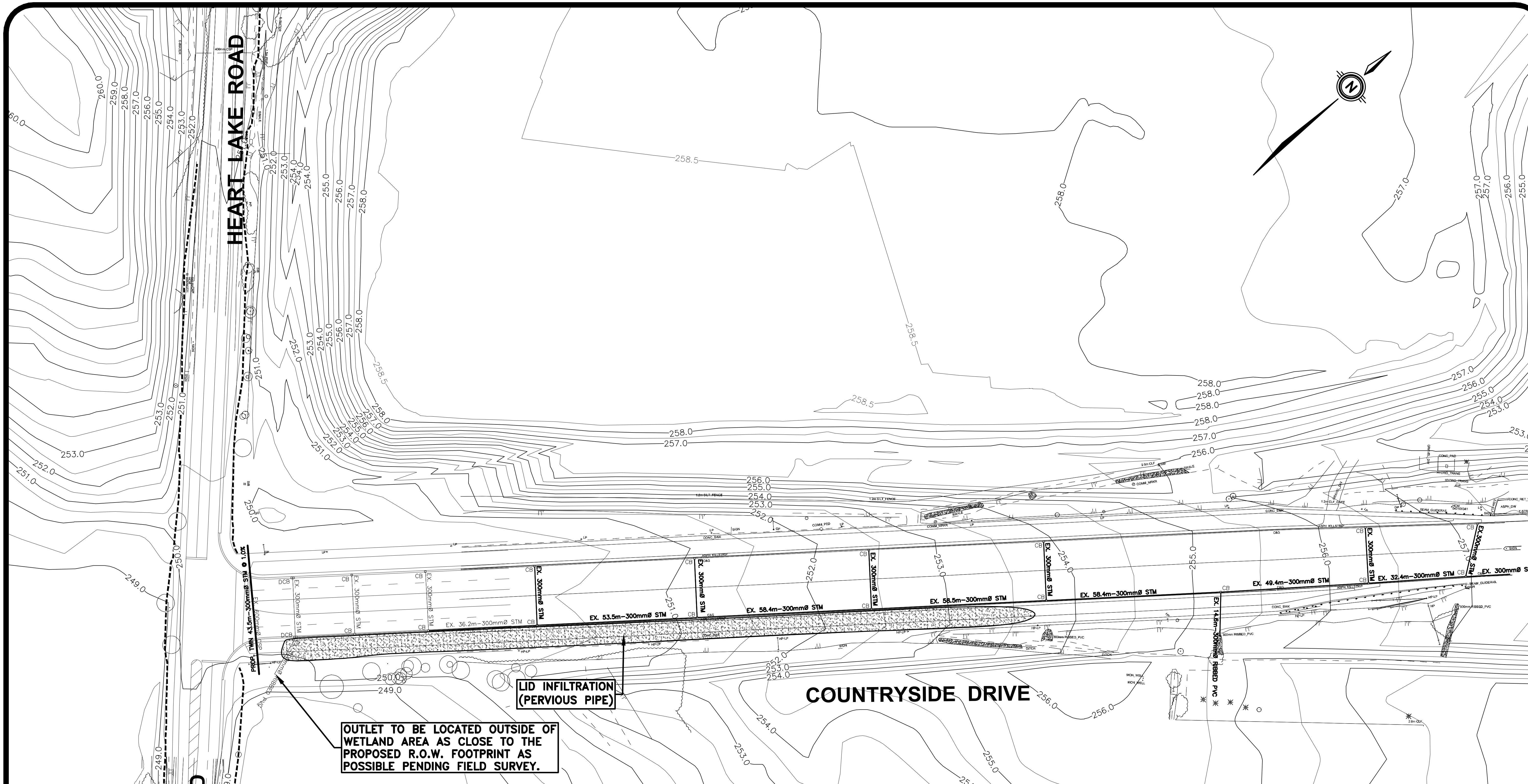
Drawing Number: EC2.1

STORM SEWER LEGEND

CB	EX. 300mmØ STM
Existing Structure	Existing Pipe

September 21, 2021 — 1:13 p.m. — Plotted By: praimbault

P:\P\47877\100\47877-100-EC2.dwg



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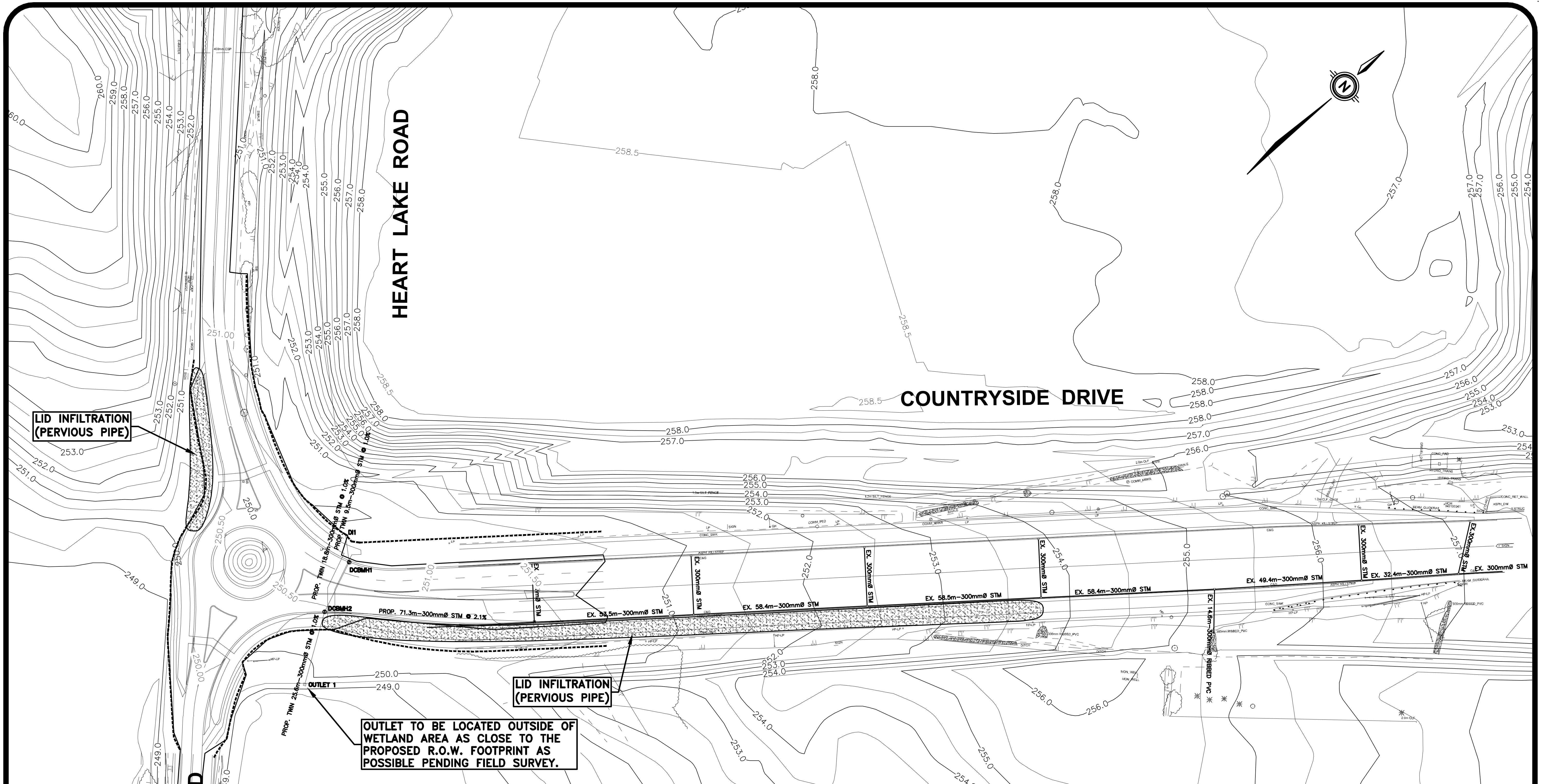
519-743-6500
MUNICIPAL

Project Number: 47877-100	Project Name: HEART LAKE ROAD AND COUNTRYSIDE DR.		Issued For:
	Drawing Title: FIGURE 5 PROPOSED STORM SEWER (OPTION A)		Drawing Number: GP1.1
	Scale: 1:1250	Part of Dwg:	
	Date: AUG. 10, 2021	Revision #: 1	

STORM SEWER LEGEND

CB — EX. 300mmØ STM
Existing Structure — Existing Pipe

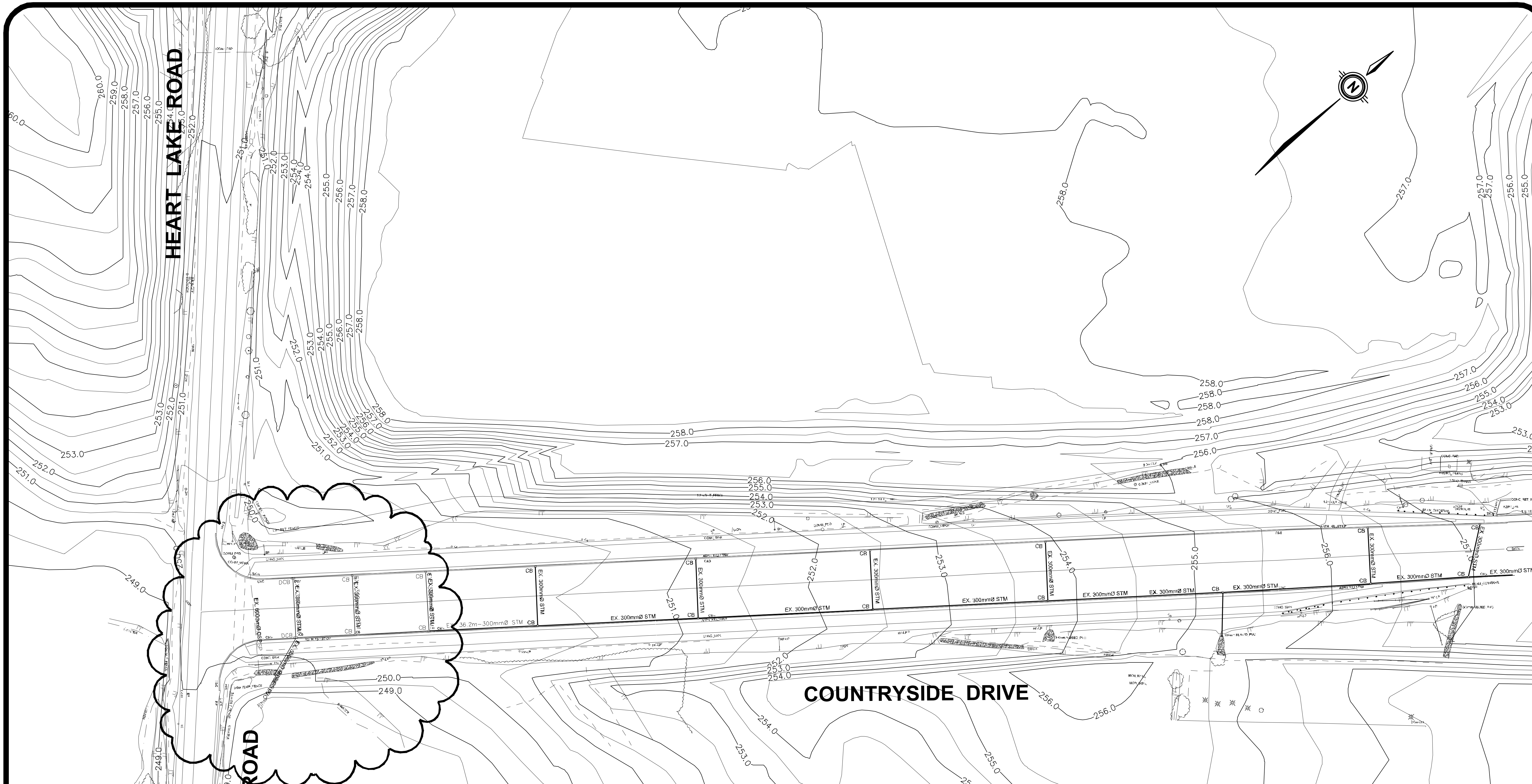
DI — PROP. 300mmØ STM @ 1.0%
Proposed Structure — Proposed Pipe



MTE Engineers, Scientists, Surveyors 519-743-6500	HEART LAKE ROAD AND COUNTRYSIDE DR.	Issued For:	STORM SEWER LEGEND
MUNICIPAL	Drawing Title: FIGURE 6 PROPOSED STORM SEWERS (OPTION B)	Drawing Number: GP2.1	CB — EX. 300mmØ STM (Existing Structure, Existing Pipe)
Project Number: 47877-100	Scale: 1:1250 / Part of Dwg:		DI — PROP. 300mmØ STM @ 1.0% (Proposed Structure, Proposed Pipe)
	Date: SEP. 20, 2021 / Revision #:		

February 25, 2022 — 4:16 p.m. — Plotted By: praimbault

P:\P\47877\100\47877–100–GP2.dwg



MTE
Engineers, Scientists, Surveyors
519-743-6500

MUNICIPAL

Project Name: HEART LAKE ROAD AND COUNTRYSIDE DR.		Issued For:	
Drawing Title: FIGURE 7 ADDITIONAL SURVEY REQUIRED		Drawing Number: EC2.2	
Project Number: 47877-100	Scale: 1:1250	Part of Dwg:	
	Date: AUG. 10, 2021	Revision #:	

LEGEND

AREA OF ADDITIONAL SURVEY REQUIRED

Appendix G

Geotechnical Investigation Report
MTE Consultants Inc.
August 2022

Heart Lake Road & Countryside Drive EA

Geotechnical Investigation Report

Project Location:

Heart Lake Road & Countryside Drive, Brampton, ON

Prepared for:

City of Brampton
2 Wellington Street West
Brampton, ON

Prepared by:

MTE Consultants Inc.
365 Home Street
Stratford, ON N5A 2A5

August 16, 2022

MTE File No.: 47877-100

Engineers, Scientists, Surveyors.

Contents

Tables

Appendices

1.0 Introduction

MTE Consultants Inc. (MTE) was retained by the City of Brampton to conduct a geotechnical investigation for the reconstruction of the intersection at Heart Lake Road and Countryside Drive in Brampton Ontario, as shown on **Figure 1 in Appendix A**.

It is understood that the project will involve upgrading the intersection at Heart Lake Road and Countryside Drive in Brampton Ontario. The intersection currently comprises a stop sign at Countryside Drive and through traffic along Heart Lake Road. Concrete curbs, gutters, and sidewalks are currently present along both sides of Countryside Drive and gravel shoulders and ditches are currently present along Heart Lake Road.

The intersection upgrade would consist of a full reconstruction of the existing pavement structure. The intersection upgrade configuration was not determined at the time of this report.

Heart Lake Road generally slopes down from northwest to southeast with a grade difference of 1.2 m between Boreholes BH103-20 and BH104-20. Countryside Drive is generally level within the subject area with a grade difference of 0.1 m between Boreholes BH101-20 and BH102-20. The boreholes conducted in the ditches were approximately 0.9 to 1.4 m below the road surface.

The purpose of this geotechnical investigation is to determine the soil and groundwater conditions along the roadways and provide geotechnical engineering recommendations for site preparation, excavations and dewatering, pavement structure design and construction, and pavement drainage requirements. In addition, soil was sampled from the investigated locations for laboratory chemical analysis for preliminary soil management discussion purposes.

2.0 Previous Assessment and Summary of Findings

Prior to completing the geotechnical investigation for the Heart Lake Road and Countryside Drive intersection, MTE completed a Phase I Environmental Site Assessment (ESA) for the Project/Project Area. The purpose of the Phase I ESA was to identify potential environmental concerns which may environmentally impact the Project Area. A summary of the Phase I ESA findings is provided below. Please refer to MTE's Phase I ESA report (provided under separate cover) for additional information.

The findings of the Phase I ESA were used to: determine potential locations for the environmental assessment in conjunction with the geotechnical boreholes to adequately assess areas of potential environmental concern, to develop the preliminary soil sampling and analysis work plan for the proposed drilling activities, and to determine the general environmental quality of the on-site soil for preliminary soil management discussion purposes ahead of the planned construction activities.

For the readers' benefit, the current Ministry of Environment, Conservation and Parks (MECP) was previously named the Ontario Ministry of the Environment (MOE) and the Ontario Ministry of the Environment and Climate Change (MOECC). For ease of discussion in this report, "MECP" is used to represent this provincial ministry and is inclusive of MOE and MOECC.

Based on a review of historical aerial photographs, the Project Area has been used as an intersection since at least 1946. MTE reviewed information for the Project Area and properties within 250 m of the Intersection (representing the "Phase I Study Area"), including aerial photographs, geology and hydrogeological records and mapping, "MECP" database records and previous reports.

The Project Area is bordered to the north by an on-going land development project with evidence of earthworks (former agricultural parcel); and to the east, south and west by wetlands and/or wooded areas.

Based on the findings of the Phase I ESA, no evidence of actual contamination in connection with the Project Area or surrounding properties was identified. However, fill materials of unknown quality may have been imported for use during the construction of Heart Lake Road and Countryside Drive, due to the lower elevation of the adjacent wetland areas.

As a potential environmental concern was identified within the road allowance (e.g. presence of fill of unknown quality), soil was subsequently sampled from the investigated locations for laboratory chemical analysis and preliminary management discussion purposes.

3.0 Investigative Program

3.1 Field Program

The fieldwork for this investigation was carried out on November 17, 2020 and involved the drilling of eight (8) boreholes (Boreholes BH101-20 to BH108-20) to depths of 1.2 to 3.7 m. The locations of the boreholes are shown on the Site Plan, **Figure 2 in Appendix A**.

Public utility companies were contacted prior to the start of drilling activities in order to isolate underground utilities near the boring locations. It is noted, no existing watermain, sanitary, and/or storm sewers were located along the subject sections of the roadways.

Boreholes BH101-20 to BH104-20, and BH107-20 were advanced with a Diedrich CME55 truck mounted drill rig equipped with continuous flight hollow and solid stem augers. Boreholes BH105-20, BH106-20, and BH108-20 were advanced with a Pionjar Jackhammer drill. Both drills were supplied and operated by London Soil Test Ltd.

Representative soil samples were recovered throughout the depths explored. Standard Penetration Tests (SPT) were carried out during sampling operations in Boreholes BH101-20 to BH104-20, and BH107-20 using conventional split spoon equipment. The SPT N-values recorded are plotted on Boreholes BH101-20 to BH104-20, and BH107-20 in **Appendix B**. Due to access constraints SPT were not able to be conducted on Boreholes BH105-20, BH106-20, and BH108-20.

Selected soil samples collected from the boreholes (within the proposed construction depths) were subdivided for visual and olfactory screening, combustible soil vapour (CSV) headspace measurements, and/or laboratory chemical analysis. Samples for chemical analysis were collected directly into pre-cleaned, laboratory supplied, test group specific containers. For the analysis of PHC F1 and VOCs/BTEX, soil samples were collected by means of plastic syringe core samplers into Teflon lined screw cap, gas tight glass vials prepared by the subcontracted laboratory with methanol preservative.

Upon completion of drilling, the boreholes were backfilled with soil cuttings and bentonite in accordance with Ontario Regulation 468/10 (formerly O. Reg. 903) under the provinces Water Resources Act.

The fieldwork was monitored throughout by a member of our geotechnical and environmental engineering staff, who directed the drilling procedures; recorded the SPT values; documented the soil stratigraphy; monitored the groundwater conditions; and transported the recovered soil samples to our office for further classification.

The borehole coordinates and ground surface elevations were surveyed by MTE with a Leika Global Navigation Satellite System (GNSS) rover. The borehole locations are referenced to Canadian Spatial Reference System (CSRS 1997) coordinates with the zone reference (17T) excluded. The geodetic ground surface elevations are based on GNSS and local base station telemetry and have a vertical root mean squared error of less than 20 mm.

The borehole locations and elevations are provided in the following table;

Table 1 - Borehole Coordinate Summary

Borehole	Northing (m)	Easting (m)	Elevation (masl)
BH101-20	4844285.2	597252.2	250.1
BH102-20	4844261.5	597259.4	250.2
BH103-20	4844292.2	597188.3	250.8
BH104-20	4844217.4	597266.5	249.6
BH105-20	4844278.9	597225.0	249.9
BH106-20	4844207.5	597286.1	248.2
BH107-20	4844259.7	597209.3	250.5
BH108-20	4844221.2	597243.1	248.7

Notes: masl – meters above sea level

3.2 Geotechnical Laboratory Program

All of the soil samples collected were submitted for moisture content testing with the results shown on the borehole logs in **Appendix B**. Additionally, one soil sample from the pavement structure granular materials was submitted for a grain size distribution analysis, one native soil sample was submitted for a particle size distribution analysis, and one sample of the peat was submitted for organic content testing. The laboratory test results are provided in **Appendix C**. The remaining soil samples will be stored for a period of 3 months and will be discarded of at that time without prior request from the client to extend storage time.

3.3 Environmental Laboratory Program

Environmental analyses were conducted on selected soil samples, representing material considered likely to be excavated or removed as part of the shallow reconstruction of the existing pavement structure. All samples were submitted to ALS Environmental (ALS), a CALA-accredited laboratory, for analysis of one or more of the parameters of potential concern (as warranted based on field observations and headspace results) to assess the soils for soil management purposes, as follows:

Table 2 - Environmental Laboratory Testing Summary

Sample ID	Approx. Depth (mbgs)	Matrix	Analysis
BH101-20 SS2	0.8-1.4	Silt Till	PHC, BTEX, Metals, SAR, EC
BH102-20 SS1	0.0-0.6	Topsoil	PHC, BTEX, Metals, pH
BH1002-20 SS1	0.0-0.6	Topsoil	Field Duplicate - PHC, BTEX, Metals, TCLP
BH102-20 SS2B	1.2-1.5	Buried Topsoil	PHC, BTEX, Metals, PAHs
BH103-20 SS2	0.8-1.4	Silt Till	PHC, BTEX, Metals, SAR/EC
BH104-20 SS2	0.8-1.4	Fill	PHC, BTEX, Metals, PAHs, SAR/EC

Sample ID	Approx. Depth (mbgs)	Matrix	Analysis
BH104-20 SS3	1.5-2.1	Silt and Sand	PHC, BTEX, Metals, SAR/EC, pH
BH105-20 SA/DP1	0.0-0.6	Topsoil	PHC, BTEX, Metals, OC Pesticides, mSPLP
BH106-20 SA/DP1	0.0-0.6	Topsoil/Fill	PHC, BTEX, Metals, SAR/EC, OC Pesticides
BH106-20 SA/DP2	0.6-1.2	Sand and Silt	PHC, BTEX, Metals, SAR/EC, pH
BH107-20 SS1	0.0-0.6	Fill	PHC, BTEX, Metals, PAHs, SAR/EC
BH108-20 SA/DP1	0.0-0.6	Fill with organics	PHC, BTEX, Metals, SAR/EC, mSPLP
BH108-20 SA/DP2	0.6-1.2	Peat	Metals, mSPLP

Notes: SS – split spoon; SA/DP – sample/direct push; PHC – petroleum hydrocarbon fractions; BTEX – benzene, toluene, ethylbenzene and xylenes; PAHs – polycyclic aromatic hydrocarbons; SAR – sodium adsorption ratio; EC – electrical conductivity; OC – Organochlorinated Pesticides; TCLP – Toxicity Characteristic Leachate Procedure; mSPLP – Modified Synthetic Precipitation Leaching Procedure.

Standard QA/QC protocols for bottle preparation, sample collection and transportation were followed as outlined in the Ministry of Environment's (MOE's) 1996 document entitled, "Guidance on Sampling and Analytical Methods of Use at Contaminated Sites in Ontario". In addition, as noted in Table 2 above, a blind field duplicate soil sample was submitted to the laboratory for chemical analysis for QA/QC purposes. Refer to the Certificates of Analysis included in **Appendix D** for submission details.

4.0 Soil Conditions

Reference is provided to the appended borehole logs for soil stratigraphy details, SPT N-values, moisture content profiles, and groundwater observations and measurements. Soil conditions encountered at the site typically include pavement structure and/or fill, overlying native glacial till, silt and sand, silty sand and gravel, and peat deposits.

4.1 Existing Pavement Structure

Boreholes BH101-20, BH103-20, and BH104-20 were advanced along the subject roadways. The existing pavement structure generally comprised of surficial asphaltic concrete underlain by granular base and subbase soils. The asphaltic concrete and granular base and subbase soils thicknesses at the aforementioned borehole locations are summarized in the following table;

Table 3 - Pavement Structure Thicknesses

Borehole Number	Asphaltic Concrete (mm)	Base Thickness (mm)	Subbase Thickness (mm)
BH101-20	130	180	410
BH103-20	200	130	380
BH104-20	300	200	410

The range and mean of the asphaltic concrete, granular base and subbase soils are summarized in the following table;

Table 4 - Summary of the Pavement Structure

Road Structure	Range	Mean
Asphaltic Concrete	130 - 300 mm	210 mm
Base	130 - 200 mm	170 mm
Subbase	380 - 410 mm	400 mm

The pavement structure granular materials typically range in composition from brown sand and gravel to brown gravelly sand. The results of a grain size distribution analysis conducted on a sample of the granular materials is provided in **Appendix C** and summarized in the following table;

Table 5 - Results of Granular Base/Subbase Grain Size Distribution Analysis

Borehole Number	Sample Depth (mm)	Gravel (%)	Sand (%)	Fines (%)
BH104-20	300 - 510	43	44	13

The granular material sample marginally did not meet the OPSS 1010 gradation specifications for Granular 'B' Type I soils due to high fines content.

SPT N-values in the granular materials range from 34 to 41 blows per 300 mm penetration of the split spoon sampler indicating dense conditions.

Insitu moisture contents in the granular materials range from about 4 to 6% indicating moist conditions.

4.2 Fill

Fill was encountered surficially in Boreholes BH102-20, and BH105-20 to BH108-20 and also beneath the pavement structure in Borehole BH104-20. The fill extended to depths of 0.6 to 1.5 m (average depth of 1.0 m). The fill is brown to dark brown in colour and typically ranges in composition from silty sand and gravel to silt with some sand and gravel. Topsoil fill was encountered surficially in Boreholes BH102-20, BH105-20, and BH106-20 and topsoil/organics were encountered within the fill at depth in Boreholes BH102-20, BH107-20, and BH108-20. SPT N-values in the fill range from 5 to 16 blows per 300 mm penetration of the split spoon sampler indicating loose to compact conditions.

Insitu moisture contents in the fill range from about 5 to 24% indicating moist to wet conditions.

4.3 Glacial Till

Glacial till was encountered beneath the pavement structure, fill, and/or silt and sand in Boreholes BH101-20 to BH107-20 and extends to the termination depth of Boreholes BH101-20, and BH103-20 to BH107-20. The upper portion of till in Borehole BH101-20 was 1.9 m thick and the till in Borehole BH102-20 was 0.8 m thick. The till is brown to grey in colour and typically ranges in composition from gravelly silt to clayey silt. Occasional cobbles were noted within the till in Borehole BH103-20. The results of a particle size distribution analysis conducted on a sample of the glacial till are provided in **Appendix C** and summarized in the following table;

Table 6 - Results of Glacial Till Particle Size Distribution Analysis

Borehole Number	Sample Depth (mbgs)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH107-20	0.8 - 1.4	10	33	38	19

SPT N-values measured in the till range from 9 to above 50 blows per 300 mm penetration of the split spoon sampler indicating loose to very dense conditions. It is noted the loose conditions were encountered within the till deposit in Borehole BH102-20.

Insitu moisture contents in the till range from about 7 to 24% indicating very moist to saturated conditions. The cohesive portion of till encountered in Borehole BH104-20 appeared to range from drier than the plastic limit to about the plastic limit.

4.4 Silt and Sand

Silt and sand deposits were encountered beneath the fill and/or glacial till in Boreholes BH101-20, BH104-20, and BH106-20 and were 0.4 to 0.9 m thick. Silt and sand was also encountered beneath the silty sand and gravel deposit in Borehole BH102-20 and extends to the termination depth of the borehole. The silt and sand was brown to grey in colour and typically ranges in composition from silt and sand to sandy silt. SPT N-values measured in the silt and sand range from 6 to 19 blows per 300 mm penetration of the split spoon sampler indicating loose to compact conditions. It is noted the loose conditions were encountered within the silt and sand deposit in Borehole BH104-20.

Insitu moisture contents in the silt and sand range from about 7 to 23% indicating very moist to saturated conditions.

4.5 Silty Sand and Gravel

A brown silty sand and gravel deposit was encountered beneath the glacial till in Borehole BH102-20 at a depth of 2.3 m (Elevation 247.9 m) and was 0.7 m thick. A SPT N-value measured in the silty sand and gravel was 12 blows per 300 mm penetration of the split spoon sampler indicating compact conditions.

An insitu moisture content in the silty sand and gravel was about 12% indicating saturated conditions.

4.6 Peat

Dark brown to light brown sandy peat was encountered beneath the fill in Borehole BH108-20 and extended to the termination depth of the borehole. The organic content of a sample of the peat was determined to be 56%. Insitu moisture contents in the peat were approximately above 40% indicating wet conditions.

5.0 Groundwater Conditions

Groundwater observations and measurements were carried out in the open boreholes at the time of drilling and are summarized on the borehole logs. Saturated soil conditions encountered at the time of drilling are summarized in the following table;

Table 7 - Saturated Soil Conditions

Borehole Number	Saturated Soil Type	Depth of Saturated Soil (mbgs)	Elevation of Saturated Soil (masl)
BH101-20	150 mm Sand Seam	2.4	247.7
BH102-20	Sandy Silt Till / Silty Sand and Gravel / Silt and Sand	2.0	248.2
BH103-20	Dry		
BH104-20	Silt and Sand	1.5	248.1
BH105-20	Dry		
BH106-20	Silt and Sand	0.9	247.3
BH107-20	150 mm Sandy Silt Till Seam	2.1	248.4
BH108-20	80 mm Saturated Peat Seam	1.2	247.5

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations and local variations.

6.0 Environmental Soil

Headspace screening of organic vapour concentrations was conducted using a RKI Eagle II meter. The field headspace readings were generally measured to be between <5 parts per million (ppm) and 50 ppm for organic vapour, indicative of low (typical background) concentrations of volatiles in the recovered soil samples.

To determine the general environmental quality of the soil within the Project Area in relation to **on-site reuse** of excavated soil, the soil results have been compared to the Table 1 Full Depth Background Site Condition Standards (SCS) due to the presence of the adjacent wetlands and the Table 3 Full Depth Generic SCS in a Non-Potable Groundwater Condition of the “Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act” (April 15, 2011) for residential/parkland/institutional and/or industrial/commercial/community property use with coarse textured soils, respectively (herein referred to as the “2011 Table 1 SCS” and “2011 Table 3 SCS”). These SCS are typically appropriate for properties within the City of Brampton.

Surplus soil is typically generated during road construction activities and export of this surplus soil is often required. To determine appropriate **off-site reuse/disposal/management** options for surplus soils that may be generated during the construction activities (planned for 2024), the analytical results have also been compared to the Table 3.1 Full Depth Generic Excess Soil Quality Standards (ESQS) in a Non-Potable Groundwater Condition for industrial/commercial/community property use from Appendix 1 of the Rules for Soil Management associated with O.Reg.406/19 (December 8, 2020) under the Environmental Protection Act (herein referred to as the “2020 Table 3.1 ESQS”).

6.1 Soil Quality

The results of the soil chemical analyses are summarized in Tables 101 to 104 and 201 to 204 in **Appendix C** and copies of the ALS Laboratory Certificates of Analysis are included in **Appendix D**.

The analytical results for the selected soil samples representing the proposed Project Area along the subject portions of Heart Lake Road and Countryside Drive indicate that PHC-related concentrations above the 2011 Table 3 SCS (and therefore, also the 2011 Table 1 SCS and 2020 Table 3.1 ESQS) have been identified in the topsoil at one location. In addition, SAR and EC (salt use-related) levels exceeding the above-noted Standards have been identified at varying depths, generally across the Project Area.

The above-noted impacted soils are summarized in the following table;

Table 8 - Locations Exceeding the 2011 Table 3 SCS (in addition to exceeding the 2011 Table 1 SCS, and the 2020 Table 3.1 ESQS)

Sample ID	Approx. Depth (mbgs)	Soil Type	Parameter Exceeding Standards
Majority of analyzed locations	Various	Fill and native soils	SAR and/or EC
BH102-20 SS1 (and its duplicate)	0.0-0.6	Topsoil	PHC Fraction F4G

A Toxicity Characteristic Leachate Procedure (TCLP) analysis was subsequently conducted on the impacted soil at Borehole BH102-20 (TCLP parameters; VOCs, PCBs, Metals and Inorganics) and shows that concentrations of the analyzed parameters meet the O.Reg. 347 Schedule 4 leachate criteria (see **Appendix D**). As such, the analyzed topsoil at the assessed location is characterized as non-hazardous for disposal purposes.

Additional parameters exceeding the more stringent 2011 Table 1 SCS (considered background concentrations for Ontario) and the 2020 Table 3.1 ESQS were also detected at Borehole BH102-20 where the 2011 Table 3 SCS were exceeded and, as such, will be managed accordingly in conjunction with those contaminated soils.

The following table summarizes other locations where the analyzed parameters were detected at concentrations exceeding the more stringent 2011 Table 1 SCS.

Table 9 - Locations Exceeding the 2011 Table 1 SCS Only

Sample ID	Approx. Depth (mbgs)	Soil Type	Parameter Exceeding 2011 Table 1 SCS	Parameter Exceeding 2020 Table 3.1 ESQS
BH102-20 SS2B	1.2-1.5	Fill (buried topsoil)	PHC Fractions F4/F4G	-
BH106-20 SA/DP1	0.0-0.6	Topsoil/Fill	PHC Fraction F4G	-
BH107-20 SS1	0.0-0.6	Fill	PHC Fractions F3, F4/F4G	-

Sample ID	Approx. Depth (mbgs)	Soil Type	Parameter Exceeding 2011 Table 1 SCS	Parameter Exceeding 2020 Table 3.1 ESQS
BH108-20 SA/DP1	0.0-0.6	Fill with organics	PHC Fractions F4/F4G	-
BH108-20 SA/DP2	0.6-1.2	Peat	Metals (Selenium)	-

It is noted that the laboratory Method Detection Limits (MDLs) reported for one or more OC Pesticide parameters in a sample from Borehole BH106-20 (SA/DP1, 0.0-0.6 m) are above their respective 2011 and/or 2020 Standards. As reported in ALS Certificate of Analyses No. L2530806, the elevated MDLs were due to a detection limit adjustment related to sample matrix effects (i.e. chemical interference, colour, turbidity). These parameters were not detected above the MDLs nor the 2011 Table 1 SCS in the other topsoil sample submitted for OC Pesticide analysis. As such, OC Pesticides are not considered to be potential contaminants of concern in relation to the management of soil materials that may be excavated from the proposed Project Area.

In accordance with O.Reg. 406/19, a minimum number of Leachate Screening tests (i.e. Modified Synthetic Precipitation Leaching Procedure [mSPLP]) are required for certain contaminants of concern. Based on the above-noted Selenium results (above the 2011 Table 1 SCS), three selected samples from Boreholes BH106-20 and BH108-20 were submitted for mSPLP-Metals analysis. The results indicate that the concentrations of the analyzed parameters meet the applicable O.Reg. 406/19 Table 3.1 Leachate Screening Criteria (**see Appendix D**) and, therefore, confirm that the analyzed soil meets the 2020 Table 3.1 ESQS.

All other results indicate that the analyzed soils meet the 2011 Table 1 SCS for the analyzed parameters.

7.0 Discussion and Recommendations

The project will involve upgrading the intersection at Heart Lake Road and Countryside Drive in Brampton Ontario. The intersection currently comprises a stop sign at Countryside Drive and through traffic along Heart Lake Road. The intersection upgrade would consist of a full reconstruction of the existing pavement structure. The intersection upgrade configuration was not determined at the time of this report.

The subsurface stratigraphy at the site generally comprises pavement structure and/or fill, overlying native glacial till, silt and sand, silty sand and gravel, and peat deposits. Saturated soil conditions were encountered within the native soils throughout the site at depths ranging from 0.9 to 2.4 m (Elevation 247.3 to 248.4 m).

Based on the results of this geotechnical investigation, full reconstruction of the pavement structure and upgrading the layout if the intersection is feasible for the site; however, the encountered groundwater and peat soils will affect design and construction. The following subsections of this report contain geotechnical and environmental recommendations pertaining to excess soil management, site preparation, excavations and dewatering, pavement structure design and construction, and pavement drainage requirements.

7.1 Preliminary Excess Soil Management

7.1.1 Excess Soil in Ontario – Regulatory Update and Discussion

In December 2019, the MECP finalized their On-Site and Excess Soil Management regulatory package, including Ontario Regulation 406/19 ("Regulation") and Rules for Soil Management and Excess Soil Quality Standards ("Rules"). The Regulation become law on January 1, 2021. On April 21, 2022 the MECP announced they are "pausing" the major Planning Documents and Requirements, previously required under the Regulation until January 1, 2023. **Based on the planned construction schedule (2024), the pause does not influence this project.**

Notwithstanding the above, under O.Reg. 406/19, given certain grandfather exemptions (Section 11 (3) and Section 12 (6)) the work completed to date for the project (e.g. Phase I ESA and sampling and analysis plan completed as part of this geotechnical investigation) may preclude the need for future excess soil Reporting Requirements (such as: Assessment of Past Uses (APU), a Sampling and Analysis Plan (SAP), and a Soil Characterization Report (SCR). However, other Planning Requirements such as an Excess Soil Destination Assessment Report (ESDAR), filing notices on the Registry, and the requirement for a formal soil tracking system may be triggered. The need for these requirements can be determined once additional project information is available (e.g. volume of excess soil to be generated).

In addition, movements of soil from one infrastructure project to another infrastructure project are exempt, with temporary storage allowed between such projects, if applicable for the City.

Although the excess soil sampling and analysis completed do not meet all of the requirements defined in the Regulation or Rules, due to the nature of the pre-design process, completing preliminary excess soil sampling and analysis in conjunction with this geotechnical investigation is considered a **reasonable and very appropriate "first step"**. Should the project not be exempt or grandfathered from the Regulation and Rules, additional work associated with excess soil management will be required at a future time (e.g. impact delineation, expanding upon existing information to meet one or more of the Planning Requirements).

The City and their design consultant are strongly encouraged to reduce the amount of excess soil to be generated, where/if practical. It is recommended that the above-noted Planning Requirements be considered early on in the design stage and that supplemental excess soil assessment and reporting, if required, be initiated a minimum of six to eight months ahead of the planned construction.

Regardless of possible exemptions and grandfathering clauses, as of January 1, 2021, the Project Leader (typically the owner, not the contractor) is responsible for the following:

- Understanding and determining appropriate reuse and disposal sites, and obtaining written consent from the reuse site(s) before excess soil from this project can be received.
- Providing a written procedure outlining the process and steps to be taken by the Contractor, should impacted soils be encountered during construction (e.g. visual/olfactory).
- Understanding and adhering to soil storage requirements including management of: noise; dust; mud tracking; run-off and erosion; leaching into groundwater, and potential odour issues. Soils tested and found to be of different quality must be segregated. Individual stockpiles must not exceed 2,500 m^3 each, and must be placed greater than 30 m from a water body.

If soils are contaminated, such material must be transported using MECP licensed haulers. Vehicles transporting/hauling of excess soil must be safe, appropriate, leak proof (if applicable), covered when appropriate, etc. The vehicle operator will be expected to know, and provide the following information (verbal or record), if requested: loading location, date/time it was loaded, quantity, contact information for person in charge at project area, transport company/driver information, license plate, and reuse site location.

The final requirements for the management of excess soil for the project, including export/import of fill, and the findings and recommendations provided herein should be reviewed well in advance of tendering and construction.

7.1.2 Summary of Findings

A concentration of PHC Fraction F4G was detected above the 2011 Table 3 SCS within the topsoil at Borehole BH102-20 (SS1, between approximately 0.0 to 0.6 m).

Further, topsoil fill and fill materials at Boreholes BH102-20 (approximately 1.2 to 1.5 m), BH106-20 (approximately 0.0 to 0.6 m), BH107-20 (approximately 0.0 to 0.6 m), and BH108-20 (approximately 0.0 to 0.6 m) exceed the 2011 Table 1 SCS for PHC Fractions F3 and/or F4/F4G. The underlying peat at Borehole BH108-20 (approximately 0.6 to 1.2 m) also exceeds the 2011 Table 1 SCS for Selenium.

<u>**Additional soil sampling and analysis between and beyond the boreholes noted above should be completed to better define the spatial extent of these impacts to support excess soil reuse and disposal options and to determine volume of impacted soil.**</u>

In addition, SAR and/or EC (salt use related) impacted soils exceeding all of the referenced Standards were identified at variable depths, generally across the Project Area. SAR is a parameter of ecological significance, which is a measure of the exchange of sodium and calcium and magnesium ions on the permeability of aggregate soils. The detection of elevated levels of SAR and EC is an indication of de-icing road salt impacts.

Under O.Reg. 153/04, as amended, SAR and/or EC are not considered as contaminants of concern when related to de-icing activities. As such, the elevated concentrations of SAR and/or EC (above the 2011 Table 1SCS, 2011 Table 3 SCS and/or 2020 Table 3.1 ESQS) are not considered to be of concern to the Project Area. However, an intended receiver of any excess soil from this Project Area must be made aware of the elevated levels of SAR and EC, so that they may place, or dispose of the soil appropriately and in accordance with the Soil Rules, which came into effect on January 1, 2021.

7.1.3 Excavated and Excess Soil Management Options

The discussion and recommendations provided herein are based on:

1. components of Regulation 406/19 and its associated Rules, effective April 21, 2022;
2. current industry best management practices; and,
3. the soil samples collected and analyzed from the eight boreholes completed for this assignment on November 17, 2020 only.

The final requirements for the management of excess soil for the Project must be reviewed well in advance of tendering, once the estimated volume of excess soil is determined.

A. Contaminated Soils - Above the 2011 Table 3 SCS

Based on the analytical results, PHC impacted topsoil material at Borehole BH102-20 (approximately 0.0 to 0.6 m) should be delineated, separated and transferred to an appropriate reuse/disposal site.

TCLP analysis indicates that the topsoil at Borehole BH102-20 is characterized as non-hazardous for disposal purposes.

In accordance with O.Reg. 406/19, appropriate receivers may include:

- MECP licensed landfill/waste receiver (prior to 2025 and via MECP licensed haulers);
- Class 1 Soil Management Sites; and
- Local Waste Transfer Facility.

It is recommended that the topsoil be handled by workers with caution. The contractor should include appropriate precautions with respect to handling impacted soil in their Health and Safety Plan for the duration of the excavation(s) and construction.

B. On-Site Reuse

Generally stated, the on-site soils are environmentally suitable for on-site reuse (excluding soil described in Item A above). However, the presence of the adjacent wetlands must be considered. Additional soil sampling and analysis between and beyond the boreholes could be completed to better define the spatial extent of these impacts to support appropriate on-site reuse.

If disturbed/excavated during construction, fill and/or peat materials at Boreholes BH102-20 (approximately 1.2 to 1.5 m), BH106-20, BH107-20 and BH108-20, which exceed the 2011 Table 1 SCS should be segregated. These soils may be reused within the Project Area, if geotechnically suitable; however, should be placed beyond the 30 m buffer zones associated with the adjacent wetlands (see **Figure 2**) and not along a property boundary, including the location of origin.

In addition, reuse of any on-site soil (all assumed to be impacted by salt), including the remaining locations investigated should be restricted to below a 1.5 m depth within the boulevards and, as such, assumed to be below penetration depths of plant root systems.

C. Excess Soil – Above the Table 1 SCS (All Other Concentrations Below the 2020 Table 3.1 ESQS) and Salt Impacted Soils

Similar to Item B, the majority of the on-site soils are environmentally suitable for off-site reuse at an **appropriate** reuse site (excludes soil described in Item A above). However, the concentrations of PHCs and/or Selenium which exceed the 2011 Table 1 SCS in the fill and peat at Boreholes BH102-20, BH106-20, BH107-20 and BH108-20; and the SAR/EC levels must be considered.

The PHC- and Metals-related impacts (concentrations above the 2011 Table 1 SCS, but below the 2020 Table 3.1 ESQS and 2020 Table 3.1 Leachate Screening [mSPLP] criteria, where applicable) could be delineated to determine the spatial extent for soil management purposes as these concentrations may limit the options available for reuse.

Should excess soil be exported from the Project Area for off-site reuse, such soils must be free of staining; PHC- or solvent-like odours, and/or debris. Reuse Site options may include, but may not be limited to:

- Other development projects, in accordance with the Soil Rules;
- Site Alteration Permit Properties (SAPPs) having appropriate approval to accept such PHC-, Metals- and salt-impacted soil;
- Class 1 Soil Management Site;

- Class 2 Soil Management Site;
- Local Waste Transfer Facility; and
- Aggregate pits having appropriate approval to accept such salt-impacted soil (excluding the fill and peat at Boreholes BH102-20, BH106, BH107-20, and BH108-20).

The deposit of this material on a Reuse Site is also subject to the following conditions:

1. The analytical results documented herein (and any future analytical results) should be forwarded to the owner/manager of the Reuse Site(s) prior to proceeding with the shipment of soil. In accordance with O. Reg. 406/19, the Reuse Site must provide written consent to accept the soil. We find that OPSS Forms PH-CC-181, 182 and/or 183 are currently useful in this regard.
2. The intended Reuse Site must be made aware of the elevated levels of SAR, so that they may dispose of, or place, the soil appropriately and in accordance with the Soil Rules (Rules for Specific Soil Types – Salt Impacted Excess Soil). For example, the excess soil is placed at least 1.5 m below the surface of the soil, and is not finally placed within 30 m of a waterbody, or within 100 m of a potable water well or area with an intended property use that may require a potable water well; where it is reasonable to expect that the soil will be affected by the same chemicals as a result of continued de-icing applications; or at an industrial or commercial property use site and to which non-potable standards would be applicable.
3. The Reuse Site must have a beneficial purpose for the material being imported and the quantity of soil must be suitable and placed for that purpose. Consultation with a geotechnical engineer may be required.
4. The moisture content of the material is suitable for transportation.
5. The excess soil must be finally placed no later than two years after it is deposited at the Reuse Site.

Other considerations should include:

- Ensuring appropriate drainage patterns are maintained during and following placement at the Reuse Site.
- Ensuring the protection of natural heritage features (wetlands and woodlands) during the and following placement at the receiving site, including the use of erosion controls.

If soils are encountered during the excavation and/or loading activities that appear to have been environmentally impacted and not assessed herein (i.e. presence of debris, soil exhibiting staining and/or odour, etc.), the Project QP_{ESA} be should be notified immediately. These soils should be segregated, inspected, and sampled to determine appropriate handling and/or disposal requirements in accordance with the attached (**Appendix E**) project procedures for potential contamination discovered during earthworks.

7.2 Site Preparation

The existing asphaltic concrete within the proposed work area should be removed. The existing granular base and subbase soils only marginally failed the OPSS 1010 specification for Granular 'B' Type 1 soils due to high fines content, therefore MTE recommends reusing the material within the road allowance as subgrade or subbase soil. The existing base/subbase materials may be stripped and stockpiled on-site and must be placed back in the roadway in maximum 300 mm thick lifts and compacted to 100% standard Proctor maximum dry density (SPMDD).

The existing fill materials (extending to depths of 0.6 to 1.5 m) that are environmentally suitable (refer to Sections 7.1.2 and 7.1.3) are generally considered geotechnically suitable to be left below the new road structure in the reconstruction areas; however, topsoil/organics were encountered within the fill at depths ranging from 0.4 to 1.2 m in Boreholes BH102-20, BH107-20, and BH108-20.

The subgrade soils **should be proof rolled and inspected by qualified geotechnical personnel** to ensure stability. Any areas with excessive organic content and/or topsoil must be subexcavated and if the subgrade is wet and unstable, additional granular subbase will be required. The surficial topsoil fill encountered in Boreholes BH102-20, BH105-20, and BH106-20 should also be removed from any road reconstruction areas.

It is anticipated that the Heart Lake Road and Countryside Drive intersection will have to be widened to accommodate the proposed intersection upgrade and also for the possibility of new curbs and sidewalks. Surficial topsoil fill must be removed from any road widening area. To conduct the widening process, granular material would have to be placed outside of the existing road envelope and then the pavement design constructed above. The existing base/subbase material will have to be benched into the imported granular material used to raise grades. The benching process is outlined on **Figure 3 in Appendix A**.

Due to the peat deposit encountered in Borehole BH108-20, MTE does not recommend to construct the proposed intersection upgrades in the vicinity of this borehole (south portion of the intersection). MTE recommends construction the intersection upgrades to the north and east where possible.

7.3 Excavations and Dewatering

Temporary excavations at this site must comply with the Ontario Occupational Health and Safety Act and Regulations for Construction Projects. The pavement structure, fill, silt and sand, and silty sand and gravel soils encountered at the site are classified as Type 3 soils (O. Reg. 213/91, s. 226 (4)). Temporary side slopes through this material must be cut at an inclination of 1.0 horizontal to 1.0 vertical or less from the base of the excavation. The deposit of peat would be classified as Type 4 soil (O. Reg. 213/91, s. 226 (4)) and temporary side slopes through this material must be cut at an inclination of 3.0 horizontal to 1.0 vertical or less from the base of the excavation, exclusive of groundwater effects.

The glacial till soils encountered at the site are classified as Type 2 soils and temporary side slopes can be cut near vertical at 1.2 m above the base of excavation and then at an inclination of 1.0 horizontal to 1.0 vertical or less above this level, exclusive of groundwater effects. Where wet to saturated conditions are encountered, excavation side slopes should be expected to slough to flatter inclinations, potentially 3.0 horizontal to 1.0 vertical or flatter.

Trench side slopes must be continuously inspected especially after periods of heavy rainfall or snow melt to identify areas of instability. Surface water should be directed away from entering the trench.

Where spatial limitations (from utility poles, existing underground services, above ground structures, etc.) do not permit overburden cut slopes at the inclinations above, a steeper cut slope can be employed if trench boxes are used to protect workers. Some movement or slumping of the soils adjacent to the trench box should be expected if this option is used.

Minor groundwater inflow should be expected where/if excavations extend into the saturated glacial till encountered in Borehole BH102-20 at a depth of 2.0 m (Elevation 248.2 m) and the saturated seams encountered within the glacial till in Boreholes BH101-20 and BH107-20 at depths of 2.4 m and 2.1 m (Elevation 247.7 m and 248.4 m), respectively. Minor groundwater inflow should also be expected where/if excavations extend into the saturated silt and sand encountered in Boreholes BH104-20 and BH106-20 at depths of 1.5 m and 0.9 m (Elevation 248.1 m and 247.3 m), respectively. It is envisioned that conventional sump pump techniques will be suitable to control the groundwater inflow if excavations extend into the saturated soil conditions encountered in these areas.

Moderate groundwater inflow should be expected where/if excavations extend into the saturated silty sand and gravel deposit encountered in Borehole BH102-20 at a depth of 2.3 m (Elevation 247.9 m). It is our opinion that extensive pumping may be required to handle the groundwater infiltration if excavations extend to 2.3 m or below in this area.

A saturated seam was also encountered within the peat deposit in Borehole BH108-20 at a depth of 1.2 m (Elevation 247.5 m). MTE recommends to avoid excavations in this area due to the peat deposit.

It will be necessary to flatten or support the excavation side slopes where groundwater seepage is occurring to ensure stability. Every excavation that a worker may be required to enter shall be kept reasonably free of water (O. Reg. 213/91, s. 230).

It should be noted that an Environmental Activity and Sector Registry (EASR) or Permit to Take Water (PTTW), issued by the Ministry of Environment, Conservation and Parks, will be required if the dewatering system/sumps result in a water taking of more than 50,000 L/day to 400,000 L/day, respectively. The design of the dewatering system should be left to the contractor's discretion to control groundwater at least 0.5 m below the invert level in order to provide stable excavation base. The contractor should notify the prime consultant in the event that he feels that an EASR/PTTW will be needed.

7.4 Surface Works

7.4.1 Curbs, Gutter, and Sidewalks

The concrete for curbs, gutters and sidewalks should be proportioned, mixed, placed and cured in accordance with the requirements of OPSS 353, and OPSS 1350 and shall meet the following specific requirements (OPSS 353.05.01), as per The Corporation of the City of Brampton's Part D Scope of Work Specifications and Drawings document:

- Minimum compressive strength = 32 MPa at 28 days
- Maximum water to cement (w/c) ratio = 0.45
- Coarse aggregate = 19.0 mm nominal max. size
- Maximum slump = 45 mm (for curb) / 70 ± 20 mm (for sidewalk)

- Air entrainment = 6.5 ± 1.5%

A minimum of 150 mm of OPSS 1010 Granular ‘A’ material compacted to at least 100% SPMDD is required as a base for sidewalks. During cold weather any freshly placed concrete must be covered with insulating blankets to protect against freezing as per OPSS 904. Three cylinders from each day’s pour should be taken for compressive strength testing. Air entrainment, temperature and slump tests should be conducted on the same batch of concrete from the test cylinders made.

7.4.2 Empirical Pavement Assessment

To determine if the City of Brampton’s minimum pavement design would be suitable for the subject roadways an assessment was completed in accordance with the guidelines provided by the Ontario Ministry of Transportation (MTO) publication MTO MI-183 (*Adoption and Verification of AASHTO Pavement Design Guide for Ontario Conditions*). The assessment was completed for a 25-year design life.

The roadways are classified as arterial roadways by the City of Brampton and do not have a transit routes. A traffic volume of 8,150 Average Annual Daily Traffic (AADT) for Heart Lake Road and a traffic volume of 12,200 AADT for Countryside Drive was provided by Paradigm Transportation Solutions Limited. A detailed breakdown of the traffic composition by vehicle classification was not available and design parameters were assumed by MTE. It is understood that projected traffic counts are being obtained and the pavement design should be reassessed when received.

A base truck percentage of 1.5% for Heart Lake Road and 1.2% for Countryside Drive was provided by Paradigm Transportation Solutions Limited. The combined truck factor was derived using the MTO MI-183 Table D-3 and D-4, typical truck compositions, and truck factors.

In consideration of the rural landscape and new subdivision developments near the subject sections of the roadways, a growth rate of 3.0% was assumed in the pavement assessment.

The pavement subgrade soils are expected to comprise compacted subgrade fill in the road widening areas, existing fill materials or native soils. The predominate materials encountered in the boreholes would be classified as Category 6 soils in accordance with MTO MI-183 Table D-8 and were taken to be in ‘poor to fair’ condition. Based on Category 6 soils in a poor to fair condition, the estimated modulus of subgrade was taken to be 20 MPa for the roadways.

The full pavement design parameters utilized in the assessment and estimated Equivalent Single Axel Loads (EASLs) for Heart Lake Road and Countryside Drive are provided in **Tables 401 and 402 in Appendix C**.

Based on the pavement assessment completed, the required design Structural Number (SN) for Heart Lake Road would be 120 mm. The City of Brampton specified pavement design for an arterial roadway without a transit route would provide a SN of 112 mm and as such, is considered to be insufficient for the reconstruction.

Based on the pavement assessment completed, the required design Structural Number (SN) for Countryside Drive would be 126 mm. The City of Brampton specified pavement design for an arterial roadway without a transit route would provide an SN of 112 mm and as such, is considered to be insufficient for the reconstruction.

7.4.3 Pavement Construction

A full reconstruction of the pavement structure is proposed at the intersection of Heart Lake Road and Countryside Dive and would involve removing the existing pavement structure materials, reusing the granular pavement structure soils as subbase soils, and placement of new Granular ‘B’ subbase soils (if needed), Granular ‘A’ base soils and asphaltic concrete.

The existing fill materials are suitable to be left below the road structure following a proof roll and inspection by qualified geotechnical personnel. Areas with excessive organic content and/or topsoil must be subexcavated. Depending on finished grades at the site the pavement subgrade soils will comprise of compacted subgrade fill, existing fill materials or native soils.

The City of Brampton specified pavement design for an arterial roadway was deemed insufficient for Heart Lake Road. Based on the pavement assessment, the required SN for Heart Lake Road would be 120 mm. The following pavement design provides an adequate SN for the roadway;

Table 10 - MTE Pavement Design for Heart Lake Road

Pavement Component	Heart Lake Road
HL3 (High Stability) Surface Hot Mix Asphalt	50 mm
HL8 Binder Hot Mix Asphalt	100 mm
OPSS 1010 Granular ‘A’ Base	150 mm
OPSS 1010 Granular ‘B’ Subbase	450 mm
Structural Number	125 mm

The City of Brampton specified pavement design for an arterial roadway was deemed insufficient for Countryside Drive. Based on the pavement assessment, the required SN for Countryside Drive would be 126 mm. The following pavement design provides an adequate SN for the roadway;

Table 11 - MTE Pavement Design for Countryside Drive

Pavement Component	Countryside Drive
HL3 (High Stability) Surface Hot Mix Asphalt	50 mm
HL8 Binder Hot Mix Asphalt	110 mm
OPSS 1010 Granular ‘A’ Base	150 mm
OPSS 1010 Granular ‘B’ Subbase	450 mm
Structural Number	129 mm

Samples of aggregates should be checked for conformance to OPSS 1010 prior to utilization on-site and during construction. The Granular 'B' subbase and Granular 'A' base courses must be compacted to 100% SPMDD, as verified by insitu density testing.

The hot mix asphalt paving materials should conform to the requirements of OPSS 1150. The asphalt should be placed and compacted in accordance with OPSS 310. The City of Brampton specified Performance Graded Asphalt Cement (PG-AC) designation for the hot mix asphalt is 64-28.

The surface asphalt should be placed in one lift. The binder asphalt should be placed in two lifts. It is recommended to place the surface asphalt as soon as possible following placement of the binder asphalt to ensure the full pavement strength is provided for regular traffic.

A joint transition treatment will be required where old and new pavement meet. Provided the existing pavement is 100 mm thick or greater, the recommended transition treatment comprises milling of the old surface layer approximately 0.3 m wide and 50 mm deep. Where the existing pavement is less than 100 mm thick, the transition treatment should comprise saw cutting the existing asphalt to provide a clean face to tie the new asphalt into.

It is recommended to clean all of the construction joints with stiff bristle brooms and compressed air to remove all dirt, dust, and other foreign matter. A tack coat should be applied to all construction joints prior to the placement of hot mix asphalt to ensure an adequate bond is achieved between the pavement layers.

The necessity for continuous repair work and paving supervision as well as quality assurance testing during road reconstruction projects cannot be over emphasized. An annual maintenance program is also recommended to maintain the pavements at a suitable level.

The pavement design is based on the assumption that construction will be carried out during the drier time of the year and that the subgrade soil is stable as determined by proof-rolling inspected by qualified geotechnical personnel. The subgrade and subbase materials can be significantly damaged and loose internal strength if construction is conducted in unfavorable weather. If the subgrade is wet and unstable, additional granular subbase will be required.

All materials and construction services required for the work should be in accordance with the relevant sections of the Ontario Provincial Standard Specifications.

7.5 Pavement Drainage

Adequate subsurface drainage is considered critical to the performance and lifespan of pavement. The pavement subgrade should be sloped at a minimum of 3% to promote drainage, and the pavement granular courses and asphalt should be sloped at a minimum of 2% to promote rainwater drainage. Surface water should not be allowed to pond along the outside pavement edges.

Where curbs are not constructed on the roadways, adequate ditches should be constructed to promote drainage of the pavement structure. Ditches should be constructed with an invert 500 mm below the top of subgrade in accordance with OPSD 200.010.

Where curbs are constructed, continuous pavement subdrains should be constructed to drain the pavement structure. The purpose of the subdrains is to remove excess subsurface water in order to improve overall pavement serviceability and increase the pavement life.

The work of subdrain installation shall be in accordance with OPSS 405 and OPSD 216.021. The subdrain shall be 150 mm diameter perforated pipe conforming to OPSS 1801 or 1840, and prewrapped with geotextile conforming to OPSS 1860. A typical detail of a pavement subdrain is provided on **Figure 4 in Appendix A**.

7.6 Construction Inspection and Testing

MTE recommends that geotechnical inspection and testing procedures be conducted throughout the various phases of the project.

Engineer site visits should be conducted to confirm suitable subgrade. Imported granular materials should be tested for conformance to specifications prior to importation to the site. Field compaction testing of the pavement structure components (granulars and hot mix asphalt) should be conducted. Samples of the hot mix asphalt should be collected during pavement and laboratory testing for compliance completed. It is recommended to collect hot mix asphalt samples at a minimum frequency of 1 sample for each 500 tonnes placed on-site.

During placement of concrete at the site, testing should be performed on-site to confirm the slump and air content of the concrete are within specifications. Concrete test cylinders should be cast for compressive strength testing from the same samples tested for slump and air content. Concrete should be tested at a frequency of once every 100 m^3 or daily, whichever is greater.

MTE offers soil compaction, concrete, and asphalt testing, as well as soil inspection services through our Stratford and London offices.

8.0 Limitations of Report

Services performed by MTE Consultants Inc. (MTE) were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the Geotechnical Engineering & Consulting profession practicing under similar conditions in the same geographic area were the services are provided. No other warranty or representation expressed or implied as to the accuracy of the information, conclusions or recommendations is included or intended in this report.

This report was completed for the sole use of the Client. This report is not intended to be exhaustive in scope or to imply a risk-free site. As such, this report may not deal with all issues potentially applicable to the site and may omit aspects which are or may be of interest to the reader.

In addition, it should be recognized that a soil sample result represents one distinct portion of a site at the time it is collected, and that the findings of this report are based on conditions as they existed during the time period of the investigation. The material in the report reflects our best judgment using the information available at the time the report was written. The soil and groundwater conditions between and beyond the test holes may differ from those encountered in the test holes. Should subsurface conditions arise that are different from those in the test holes MTE should be notified to determine whether or not changes should be made as a result of these conditions.

It should be recognized that the passage of time may affect the views, conclusions and recommendations (if any) provided in this report because groundwater conditions of a property can change, along with regulatory requirements. All design details were not known at the time of submission of this report and it is recommended MTE should be retained to review the final design documents prior to construction to confirm they are consistent with our report recommendations. Should additional or new information become available, MTE recommends that it be brought to our attention in order that we may determine whether it affects the contents of this report.

Any use which another party makes of this report, or any reliance on, or decisions to be made based upon it, are the responsibility of such parties. MTE accepts no responsibility for liabilities incurred by or damages, if any, suffered by another party as a result of decisions made or actions taken, based upon this report. Others with interest in the site should undertake their own investigations and studies to determine how or if the condition affects them or their plans. The contractors bidding on this project or undertaking the construction should make their own interpretation of the factual information and draw their own conclusions as to how subsurface conditions may affect their work.

The benchmark and elevations provided in this report are primarily established to identify differences between the test hole locations and should not be used for other purposes such as, planning, development, grading, and excavation.

All of which is respectfully submitted,

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M:\47877\100\Geotechnical\Report\Final\47877-100_2022-08-16_Geotechnical Report_Final.docx

Appendix A

Figures

MTE

March 31, 2020 — 12:40 p.m. — Plotted By: dgross   1 LOCATION PLAN   Project: 47877–100   CAD: P:\P\47877\100\BH FIGURES\47877–100–BHFIGURES.DWG

REFERENCES:

- AERIAL IMAGE FROM GOOGLE EARTH PRO

MTE
Engineers, Scientists, Surveyors
Ph. (519) 271-7952   www.mte85.com

SCALE: N.T.S

CLIENT	CITY OF BRAMPTON
TITLE	LOCATION PLAN
PROJECT	HEART LAKE ROAD & COUNTRYSIDE DRIVE EA
SITE	HEART LAKE ROAD & COUNTRYSIDE DRIVE, BRAMPTON, ONTARIO
Reviewed By	DMG
Prepared By	DXG
Drawn By	DXG
Date	NOV. 2020
Project No.	47877–100
Figure No.	1

N
NORTH

LEGEND

BH101-20 MTE BOREHOLE

30m OFFSET FROM WETLAND

WETLAND BOUNDARY

REFERENCES:

- AERIAL IMAGE FROM GOOGLE EARTH PRO
- GROUND SURFACE ELEVATIONS SURVEYED BY MTE

N
NORTH

0 20 40 60 80 100m
Scale(11x17): 1:2000

MTE
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CLIENT
CITY OF BRAMPTON

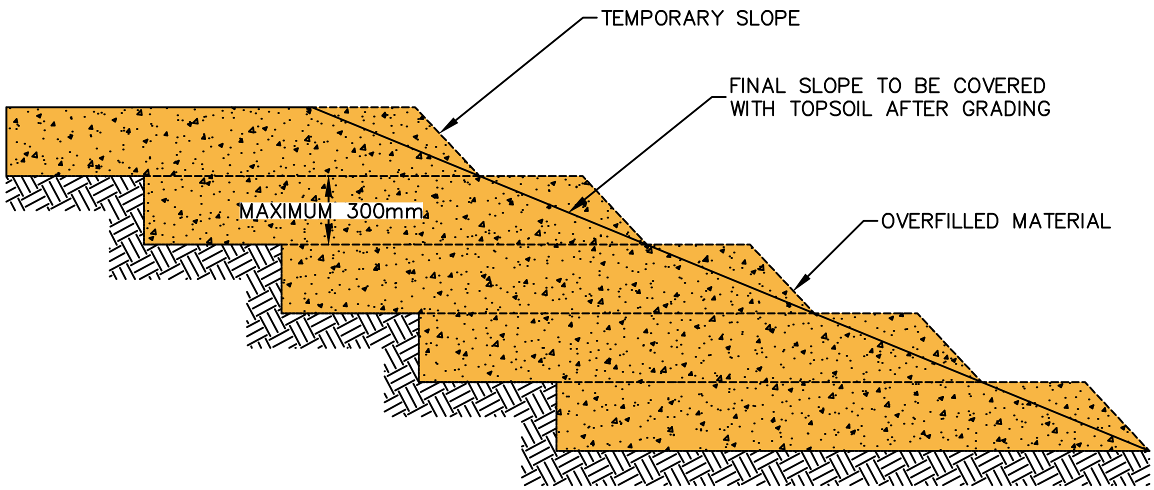
PROJECT
HEART LAKE ROAD & COUNTRYSIDE DRIVE EA

SITE
HEART LAKE ROAD & COUNTRYSIDE DRIVE, BRAMPTON, ONTARIO

TITLE
SITE PLAN

Reviewed By	DMG		
Prepared By	DXG	Project No.	47877-100
Drawn By	DXG	Figure No.	2
Date	NOV. 2020		

Project: 47877-100 CAD: P:\P\47877\100\BH FIGURES\47877-100-BHFIGURES.DWG 1 LOCATION PLAN March 31, 2020 - 12:40 p.m. - Plotted By: dgross



GENERAL REQUIREMENTS

1. THE SUBGRADE SHOULD BE INSPECTED AND APPROVED BY A GEOTECHNICAL ENGINEER PRIOR TO FILL CONSTRUCTION. FILL PLACEMENT AND COMPACTION OPERATIONS TO BE CARRIED OUT UNDER ENGINEERING SUPERVISION.

2. POOR SUBGRADE SOIL CONDITIONS OR GROUNDWATER SEEPAGE MAY REQUIRE SPECIAL DRAINAGE PROVISIONS, GEOTEXTILE FABRIC AND/OR GRANULAR FILL.

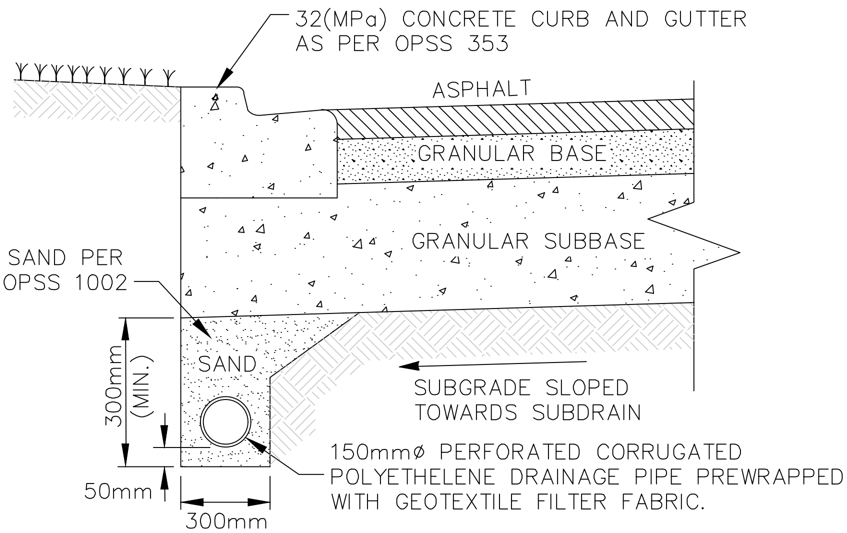
3 LIFTS SHOULD BE PLACED ONE LEVEL AT A TIME AND THE FILL COMPACTED BEFORE THE NEXT BENCHING LEVEL IS PLACED.

4 THE OVERFILL MATERIAL SHOULD BE EXCAVATED AND REUSED IF POSSIBLE.

5. THE FINISHED SLOPE SHOULD BE GRADED AT MAXIMUM 3H:1V AND COVERED WITH AT LEAST 200mm OF TOPSOIL IMMEDIATELY AFTER GRADING.

MTE Engineers, Scientists, Surveyors Ph. (519) 271-7952 www.mte85.com	CLIENT CITY OF BRAMPTON	TITLE FILL PLACEMENT FOR ROAD WIDENING
	PROJECT HEART LAKE ROAD & COUNTRYSIDE DRIVE EA	Reviewed By DMG Prepared By DXG Drawn By DXG Date NOV. 2020 Project No. 47877-100 Figure No. 3
SCALE: N.T.S	SITE HEART LAKE ROAD & COUNTRYSIDE DRIVE, BRAMPTON, ONTARIO	N NORTH

Project: 47877-100 CAD: P:\P\47877\100\BH FIGURES\47877-100-BHFIGURES.DWG 1 LOCATION PLAN March 31, 2020 – 12:40 p.m. – Plotted By: DHoskings



NOTE:
INSTALLATION OF SUBDRAIN WILL BE REQUIRED TO RUN CONTINUOUSLY ALONG BOTH SIDES OF THE ROAD WITH CURB AND GUTTER.

GENERAL REQUIREMENTS FOR PAVEMENT SUBDRAINS:

1. PERFORATED CORRUGATED POLYETHYLENE DRAINAGE PIPE SHALL MEET THE REQUIREMENTS OF OPSS 1840.
2. PIPE FILTER FABRIC CONFORMING TO OPSS 1860 FOR GEOTEXTILE CLASS 1 WITH A FILTRATION OPENING SIZE OF 150 TO 450 MICRONS SHALL BE SUPPLIED ON ALL SECTIONS OF PERFORATED PIPE.
3. THE OPEN UPSTREAM ENDS OF PIPES SHOULD BE CAPPED.
4. SUBDRAIN PIPES TO BE SET ON AT LEAST 1% GRADE DRAINING TO A POSITIVE FROST-FREE OUTLET. IF THE SUBDRAINS ARE OUTLETTED TO A DITCH THEN THE LAST 1.5 M OF THE OUTLET PIPE SHOULD CONSIST OF A CORRUGATED GALVANIZED STEEL PIPE EQUIPPED WITH A RODENT GATE.
5. BEDDING AND BACKFILL MATERIAL SHALL BE CONCRETE SAND MEETING THE GRADATION REQUIREMENTS OF OPSS 1002 (FINE AGGREGATE FOR CONCRETE).
6. THIS IS NOT A DESIGN DRAWING OR CONTRACT SPECIFICATION.

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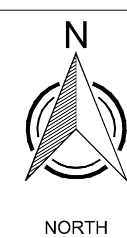
Engineers, Scientists, Surveyors
Ph. (519) 271-7952 www.mte85.com

SCALE: N.T.S

CLIENT	CITY OF BRAMPTON
PROJECT	HEART LAKE ROAD & COUNTRYSIDE DRIVE EA
SITE	HEART LAKE ROAD & COUNTRYSIDE DRIVE, BRAMPTON, ONTARIO
TITLE	TYPICAL PAVEMENT SUBDRAIN DETAIL
Reviewed By	DMG
Prepared By	DXG
Drawn By	DXG
Date	AUG 2022
Project No.	47877-100
Figure No.	4



Appendix B

Borehole Logs

Abbreviations and Symbols

MTE Boreholes BH101-20 to BH108-20

MTE

The following are abbreviations and symbols commonly used on borehole logs, figures and reports.

Sample Types

AS	Auger Sample
CS	Chunk Sample
BS	Bulk Sample
GS	Grab Sample
WS	Wash Sample
SS	Split Spoon
RC	Rock Core
SC	Soil Core
TW	Thinwall, Open
TP	Thinwall, Piston

Soil Tests

PP	Pocket Penetrometer
FV	Field Vane
SPT	Standard Penetration Test
CPT	Cone Penetration Test
WC	Water Content
WL	Water Level

Penetration Resistance

Standard Penetration Test, N (ASTM D1586)	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.) open spilt spoon sampler for a distance of 300 mm (12 in.).
Dynamic Cone Penetration Resistance	The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive an uncased 50 mm (2 in.) diameter, 60o cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

Soil Description

Cohesive Soils	Undrained Shear Strength (Cu)	
Consistency	kPa	psf
Very Soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1,000
Stiff	50 to 100	1,000 to 2,000
Very Stiff	100 to 200	2,000 to 4,000
Hard	Above 200	Above 4,000

Cohesionless Soils	
Relative Density	SPT N Value
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Above 50

WH	Sampler advanced by static weight of hammer
WR	Sampler advanced by static weight of drilling rods
PH	Sampler advanced by hydraulic force
PM	Sampler advanced by manual force

DTPL	Drier than Plastic Limit
APL	About Plastic Limit
WTPL	Wetter than Plastic Limit
mbgs	Metres below Ground Surface

ID Number: BH101-20

Project: Heart Lake Road & Countryside Drive EA

Project No: 47877-100

Client: City of Brampton

Site Location: Heart Lake Road & Countryside Drive, Brampton, ON

Drill Date: 11/17/2020

Drilling Contractor: London Soil Test Ltd.

Drill Rig: CME55 Truck

Drill Method: Solid Stem Augers

Protective Cover: N/A

Subsurface Profile		Sample		Dynamic Cone / Standard Penetration (20 40 60 80)	Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)	Water Content % (10 20 30)	Groundwater Observations and Standpipe Details
Soil Description	**Elevation (masl) / Depth (m)**	**Number**	**Type**				
Ground Surface	250.1 / 0.0						
PAVEMENT STRUCTURE ASPHALT: 130mm GRANULAR BASE: dense brown sand and gravel, some silt, moist (180mm) GRANULAR SUBBASE: dense brown gravelly sand, some silt, moist (410mm)	249.8 / 0.3 249.4 / 0.7	1	SS	34		6	Cuttings
SILT TILL compact mottled grey/brown silt, some gravel, trace clay and sand, very moist	248.6 / 1.5	2	SS	11		14	
SANDY SILT TILL compact grey/brown sandy silt, trace clay and gravel, wet	247.7 / 2.4	3	SS	12		20	Bentonite
150mm saturated sand seam	247.5 / 2.6					16	Water encountered at 2.4mbgs during drilling
SANDY SILT compact grey sandy silt, some clay, very moist to wet	247.1 / 3.0	4	SS	11		11	Wet Cave
SILT TILL compact grey silt, some gravel and clay, trace sand, very moist	246.4 / 3.7	5	SS	14		9	
Drilling Terminated							

Depth scale: ft 0–12; m 0–2

Field Technician: M. Dalgliesh

Drafted by: B. Heinbuch

Reviewed by: D. Gonser

MTE

Sheet: 1 of 1

ID Number: BH102-20

Project: Heart Lake Road & Countryside Drive EA

Project No: 47877-100

Client: City of Brampton

Site Location: Heart Lake Road & Countryside Drive, Brampton, ON

Drill Date: 11/17/2020

Drilling Contractor: London Soil Test Ltd.

Drill Rig: CME55 Truck

Drill Method: Hollow Stem Augers

Protective Cover: N/A

Subsurface Profile

Soil Description	Elevation (masl) / Depth (m)
Ground Surface	250.2
FILL (TOPSOIL) dark brown sandy silt, wet (150mm)	0.0
FILL loose dark brown silty sand and gravel, some organics (rootlets), very moist	250.0 / 0.2
compact	249.4 / 0.8
compact dark brown sandy silt, some gravel and topsoil, very moist	249.0 / 1.2
SANDY SILT TILL loose brown sandy silt, some gravel, trace clay, very moist	248.7 / 1.5
saturated	248.2 / 2.0
SILTY SAND AND GRAVEL compact brown silty sand and gravel, saturated	247.9 / 2.3
SILT AND SAND compact grey silt and sand, some gravel, saturated	247.2 / 3.0
Drilling Terminated	246.5 / 3.7

Sample

Number	Type	Standard Penetration (N)
1	SS	8
2	SS	16
3	SS	9
4	SS	12
5	SS	19

Dynamic Cone ×; Standard Penetration ● (20 40 60 80)

Shear Strength (PP) kPa ▲; Shear Strength (FV) kPa ■ (50 100 150 200)

Water Content % ● (10 20 30): 7, 7, 24, 18, 12, 15

Groundwater Observations and Standpipe Details

Cuttings

Bentonite

Wet Cave

Water encountered at 2.0mbgs during drilling

Field Technician: M. Dalgliesh

Drafted by: B. Heinbuch

Reviewed by: D. Gonser

MTE

Sheet: 1 of 1

ID Number: BH103-20

Project: Heart Lake Road & Countryside Drive EA

Project No: 47877-100

Client: City of Brampton

Site Location: Heart Lake Road & Countryside Drive, Brampton, ON

Drill Date: 11/17/2020

Drilling Contractor: London Soil Test Ltd.

Drill Rig: CME55 Truck

Drill Method: Solid Stem Augers

Protective Cover: N/A

Soil Description	Elevation (masl) / Depth (m)	Sample Number	Type	Standard Penetration	Water Content (%)	Groundwater Observations and Standpipe Details
Ground Surface	250.8					
PAVEMENT STRUCTURE ASPHALT: 200mm	0.0					
GRANULAR BASE: dense brown sand and gravel, some silt, moist (130mm)	250.6 / 0.2					
GRANULAR SUBBASE: dense brown gravelly sand, some silt, moist (380mm)		1	SS	36	4	Cuttings
GRAVELLY SILT TILL compact to very dense brown gravelly silt, some sand, trace clay, very moist	250.1 / 0.7	2	SS	28	8	Cuttings
		3	SS	29	11	Cuttings
occasional cobbles	248.7 / 2.1	4	SS	54	9	Bentonite
SANDY SILT TILL very dense grey sandy silt, some clay, trace gravel, very moist	247.8 / 3.0	5	SS	89/200mm	10	Dry Cave
Drilling Terminated	247.5 / 3.3					Borehole dry upon drilling completion

Depth scale: 0–12 ft; 0–2 m

Dynamic Cone / Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa; Shear Strength (FV) kPa: 50 100 150 200

Water Content %: 10 20 30

Field Technician: M. Dalgliesh

Drafted by: B. Heinbuch

Reviewed by: D. Gonser

MTE

Sheet: 1 of 1

ID Number: BH104-20

Project: Heart Lake Road & Countryside Drive EA

Project No: 47877-100

Client: City of Brampton

Site Location: Heart Lake Road & Countryside Drive, Brampton, ON

Drill Date: 11/17/2020

Drilling Contractor: London Soil Test Ltd.

Drill Rig: CME55 Truck

Drill Method: Solid Stem Augers

Protective Cover: N/A

Elevation (masl) / Depth (m)	Soil Description	Sample Number	Sample Type	Standard Penetration (N)	Water Content (%)	Groundwater Observations and Standpipe Details
249.6	Ground Surface					
0.0	**PAVEMENT STRUCTURE** ASPHALT: 300mm					Cuttings
249.3 / 0.3	GRANULAR BASE: dense brown sand and gravel, some silt, moist (200mm)	1	SS	41	4	
249.1 / 0.5	GRANULAR SUBBASE: dense brown gravelly sand, some silt, moist (410mm)					
248.7 / 0.9	**FILL** compact brown silty sand and gravel, moist	2	SS	11	5	Bentonite
248.1 / 1.5	**SILT AND SAND** loose brown silt and sand, saturated	3	SS	6	17	
247.2 / 2.4	**SANDY SILT TILL** compact brown sandy silt, some gravel, trace clay, very moist to wet	4	SS	17	17	Wet Cave
246.6 / 3.0	**CLAYEY SILT TILL** stiff to very stiff grey/brown clayey silt, some gravel, trace sand, DTPL to APL	5	SS	19	24	
245.9 / 3.7	Drilling Terminated					

Water encountered at 1.5mbgs during drilling

Chart scales: Dynamic Cone / Standard Penetration 20 40 60 80; Shear Strength (PP) kPa; Shear Strength (FV) kPa 50 100 150 200; Water Content % 10 20 30. Depth: ft 0–12, m 0–2.

Field Technician: M. Dalgliesh

Drafted by: B. Heinbuch

Reviewed by: D. Gonser

Notes: A grab sample was taken at a depth of 0.3 to 0.5mbgs

Sheet: 1 of 1

ID Number: BH105-20

Project: Heart Lake Road & Countryside Drive EA

Project No: 47877-100

Client: City of Brampton

Site Location: Heart Lake Road & Countryside Drive, Brampton, ON

Drill Date: 11/17/2020

Drilling Contractor: London Soil Test Ltd.

Drill Rig: Pionjar Jackhammer

Drill Method: Direct Push

Protective Cover: N/A

Depth (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Dynamic Cone / Standard Penetration (20 40 60 80)	Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)	Water Content % (10 20 30)	Groundwater Observations and Standpipe Details
0 ft / 0 m		Ground Surface	249.9						
		FILL (TOPSOIL) dark brown sandy silt, very moist to wet (150mm)	0.0						Bentonite
		FILL dark brown silt, some sand and gravel, very moist to wet	249.7 / 0.2	1	DP			19	
2 ft		**SILT TILL** mottled grey/brown silt, some sand and gravel, trace clay, very moist to wet	249.3 / 0.6	2	DP			15	
4 ft		Drilling Terminated	248.7 / 1.2						Dry Cave

Borehole dry upon drilling completion

Depth scale: ft 0, 2, 4, 6, 8, 10, 12; m 0, 2

Field Technician: M. Dalgliesh

Drafted by: B. Heinbuch

Reviewed by: D. Gonser

Sheet: 1 of 1

ID Number: BH106-20

Project: Heart Lake Road & Countryside Drive EA

Project No: 47877-100

Client: City of Brampton

Site Location: Heart Lake Road & Countryside Drive, Brampton, ON

Drill Date: 11/17/2020

Drilling Contractor: London Soil Test Ltd.

Drill Rig: Pionjar Jackhammer

Drill Method: Direct Push

Protective Cover: N/A

Subsurface Profile				Sample		Dynamic Cone / Standard Penetration (20 40 60 80)	Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)	Water Content % (10 20 30)	Groundwater Observations and Standpipe Details
Depth (ft / m)	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type				
0		Ground Surface	248.2						
0		**FILL (TOPSOIL)** dark brown sandy silt, very moist to wet (150mm)	0.0						
		FILL light brown sandy silt, some gravel, very moist to wet	248.0 0.2	1	DP			20	← Cuttings
		SILT AND SAND light brown silt and sand, saturated	247.3 0.9	2	DP			19	← Bentonite
									← Wet Cave
		SILT TILL mottled grey/brown silt, some sand and gravel, trace clay, wet	246.7 1.5	3	DP			20, 19	Water encountered at 0.9mbgs during drilling
		Drilling Terminated	246.4 1.8						

Depth scale: ft 0, 2, 4, 6, 8, 10, 12; m 0, 2

Field Technician: M. Dalgliesh

Drafted by: B. Heinbuch

Reviewed by: D. Gonser

MTE

Sheet: 1 of 1

ID Number: BH107-20

Project: Heart Lake Road & Countryside Drive EA

Project No: 47877-100

Client: City of Brampton

Site Location: Heart Lake Road & Countryside Drive, Brampton, ON

Drill Date: 11/17/2020

Drilling Contractor: London Soil Test Ltd.

Drill Rig: CME55 Truck

Drill Method: Solid Stem Augers

Protective Cover: N/A

Subsurface Profile

Elevation (masl) / Depth (m)	Soil Description
250.5	Ground Surface
0.0	**FILL** loose dark brown silty sand and gravel, trace organics (rootlets), very moist
249.7 / 0.8	**SANDY SILT TILL** compact brown sandy silt, some clay and gravel, very moist
248.4 / 2.1	150mm saturated seam
248.2 / 2.3	grey
246.8 / 3.7	Drilling Terminated

Sample

Number	Type	Standard Penetration	Water Content (%)
1	SS	5	6
2	SS	17	10
3	SS	28	9
4	SS	20	7
5	SS	20	7

Dynamic Cone: 20 40 60 80

Shear Strength (PP) kPa; Shear Strength (FV) kPa: 50 100 150 200

Water Content %: 10 20 30

Groundwater Observations and Standpipe Details

Cuttings

Bentonite

Wet Cave

Water encountered at 2.1mbgs during drilling

Field Technician: M. Dalgliesh

Drafted by: B. Heinbuch

Reviewed by: D. Gonser

Sheet: 1 of 1

ID Number: BH108-20

Project: Heart Lake Road & Countryside Drive EA

Project No: 47877-100

Client: City of Brampton

Site Location: Heart Lake Road & Countryside Drive, Brampton, ON

Drill Date: 11/17/2020

Drilling Contractor: London Soil Test Ltd.

Drill Rig: Pionjar Jackhammer

Drill Method: Direct Push

Protective Cover: N/A

Depth (m)	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Water Content (%)	Groundwater Observations and Standpipe Details
0	Ground Surface	248.7				
0.0–0.4	**FILL** brown sandy silt, some gravel and organics (rootlets), wet	0.0 / 248.3	1	DP	18	Cuttings
0.4–0.6	dark brown sandy silt (topsoil), some organics, wet	0.4 / 248.1				
0.6–1.2	**PEAT** dark brown to light brown sandy peat, some organics, wet	0.6 / 247.5	2	DP	40	Bentonite
1.2–2.1	80mm saturated sand seam	1.2 / 246.6	3	DP	40	Wet Cave
			4	DP	40	
2.1	Drilling Terminated	2.1				

Dynamic Cone: 20 40 60 80

Standard Penetration: 20 40 60 80

Shear Strength (PP) kPa: 50 100 150 200

Shear Strength (FV) kPa: 50 100 150 200

Water Content %: 10 20 30

Depth scale: ft 0 2 4 6 8 10 12; m 0 2

Water encountered at 1.2mbgs during drilling

Field Technician: M. Dalgliesh

Drafted by: B. Heinbuch

Reviewed by: D. Gonser

Sheet: 1 of 1

Appendix C

Laboratory Test Results

Tables 101 to 105

201 to 205

301 to 302

401 to 402

Table 101: Metals and Inorganics Analysis in Soil

Parameters	Unit	RDL	2011 Table 3 SCS (I/C/C, Coarse)		Sample Location	BH101-20	BH102-20	BH102-20	BH102-20	BH103-20	BH104-20	BH104-20	BH105-20	BH106-20	BH106-20	BH107-20	BH108-20	BH108-20
					Sample Name	BH101-20 SS2	BH102-20 SS1	BH1002-20 SS1	BH102-20 SS2B	BH103-20 SS2	BH104-20 SS2	BH104-20 SS3	BH105-20 SA1	BH106-20 SA1	BH106-20 SA2	BH107-20 SS1	BH108-20 SA1	BH108-20 SA2
					Lab Job #	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806
					Laboratory ID	L2530806-1	L2530806-2	L2530806-3	L2530806-4	L2530806-5	L2530806-6	L2530806-7	L2530806-8	L2530806-9	L2530806-10	L2530806-11	L2530806-12	L2530806-13
					Sampling Date	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020
					Maximum Concentration			Field Duplicate										
Metals and Inorganics																		
Antimony	µg/g	1	40	<	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	µg/g	1	18		9.7	9.7	3.7	3.5	4.9	5.1	3.6	2.1	5.2	3.5	2	2.6	2.4	6.1
Barium	µg/g	1	670		122	67.7	49.6	52	105	77.4	47.6	20.3	115	53.9	15.8	32.4	24.8	122
Beryllium	µg/g	0.5	8		0.95	0.73	<0.50	<0.50	0.79	<0.50	<0.50	<0.50	0.95	<0.50	<0.50	<0.50	<0.50	0.62
Boron	µg/g	5	120		7.1	5	6.9	7.1	6.4	6.1	<5.0	<5.0	6.6	5.6	<5.0	<5.0	<5.0	6.8
Cadmium	µg/g	0.5	1.9		1.07	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.07
Chromium	µg/g	1	160		28.6	21.8	16.9	18.9	26	16	9.9	6.8	28.6	15.9	7.7	17.4	10.6	15.9
Cobalt	µg/g	1	80		9.9	9.9	4.6	4.6	8.2	9.3	4.9	3.5	9.1	6.5	3.1	3.7	4	4.7
Copper	µg/g	1	230		42.8	34.6	14.8	15.8	42.4	32.6	29.5	19.7	30.2	31.7	13.1	42.8	15.9	35.7
Lead	µg/g	1	120		26.3	10.3	25.7	26.3	15.5	7.3	8.4	4.8	12.1	16.4	3.8	25.7	12.6	15.4
Molybdenum	µg/g	1	40		1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2
Nickel	µg/g	1	270		25.2	22.2	9.5	10.3	20.5	16.8	9.5	6.9	25.2	13.4	6.1	8.7	8.4	15.2
Selenium	µg/g	1	5.5		1.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.6
Silver	µg/g	0.2	40	<	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium	µg/g	0.5	3.3	<	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	µg/g	1	33		1.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	1.7
Vanadium	µg/g	1	86		39.8	35.6	25.2	27.2	34.8	25.7	18.5	14.4	39.8	21.9	16.5	20.9	15	26
Zinc	µg/g	5	340		93.2	44.4	79.3	67.8	58.9	42.9	35.1	22.7	93.2	89.6	19.3	66	48.8	65.5
Electrical Conductivity	mS/cm	0.004	1.4		**1.87**	1.36	-	-	-	**1.61**	1.37	**1.87**	-	0.473	0.985	0.127	0.363	-
Sodium Adsorption Ratio (SAR)	unitless	0.1	12		**89.2**	10.1	-	-	-	**89.2**	**12.6**	**40.5**	-	6.54	**24.3**	1.86	**13.9**	-
pH	pH units	0.1	NR		8	-	8	-	-	-	-	7.6	-	-	7.34	-	-	-

Notes:

2011 Site Condition Standards (SCS) - As identified in 'Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act' (as amended April 15, 2011)

Bold - Exceeds 2011 Table 3 SCS

"-" - parameter not analyzed

RDL - Reported detection limit

NR - Not Relevant

NV- No Value

NA - Not Applicable

"<" - Less than the Reporting Detection Limit

Parameters	Unit	RDL	2011 Table 3 SCS (I/C/C, Coarse)	Sample Location		BH105-20	BH106-20
				Sample Name		BH105-20 SA1	BH106-20 SA1
				Lab Job #		L2530806	L2530806
				Laboratory ID		L2530806-8	L2530806-9
				Sampling Date		17-Nov-2020	17-Nov-2020
				Maximum Concentration			
Organochlorine Pesticides (OCs)							
Aldrin	µg/g	0.02	0.088	<	0	<0.020	<0.020
alpha-Chlordane	µg/g	0.02	NR	<	0.02	<0.020	<0.020
gamma-Chlordane	µg/g	0.02	NR	<	0.02	<0.020	<0.020
Chlordane (Total)	µg/g	0.028	0.05	<	0.028	<0.028	<0.028
o,p-DDD	µg/g	0.02	NR	<	0.02	<0.020	<0.020
p,p-DDD	µg/g	0.02	NR	<	0.02	<0.020	<0.020
o,p-DDD + p,p-DDD	µg/g	0.028	4.6	<	0.028	<0.028	<0.028
o,p-DDE	µg/g	0.02	NR	<	0.02	<0.020	<0.020
p,p-DDE	µg/g	0.02	NR	<	0.02	<0.020	<0.020
o,p-DDE + p,p-DDE	µg/g	0.028	0.52	<	0.028	<0.028	<0.028
o,p-DDT	µg/g	0.02	NR	<	0.02	<0.020	<0.020
p,p-DDT	µg/g	0.02	NR	<	0.02	<0.020	<0.020
o,p-DDT + p,p-DDT	µg/g	0.028	1.4	<	0.028	<0.028	<0.028
Dieldrin	µg/g	0.02	0.088	<	0.02	<0.020	<0.020
Endosulfan I	µg/g	0.02	NR	<	0.02	<0.020	<0.020
Endosulfan II	µg/g	0.02	NR	<	0.02	<0.020	<0.020
Total Endosulfan	µg/g	0.028	0.3	<	0.028	<0.028	<0.028
Endrin	µg/g	0.02	0.04	<	0.02	<0.020	<0.020
Heptachlor	µg/g	0.02	0.19	<	0.02	<0.020	<0.020
Heptachlor epoxide	µg/g	0.02	0.05	<	0.02	<0.020	<0.020
Hexachlorobenzene	µg/g	0.01	0.66	<	0.05	<0.010	<0.050
Hexachlorobutadiene	µg/g	0.01	0.031	**<**	**0.05**	<0.010	**<0.050**
gamma-Hexachlorocyclohexane (Lindane)	µg/g	0.01	0.056	<	0.05	<0.010	<0.050
Hexachloroethane	µg/g	0.01	0.21	<	0.05	<0.010	<0.050
Methoxychlor	µg/g	0.02	1.6	<	0.02	<0.020	<0.020

Notes:
2011 Site Condition Standards (SCS) - As identified in 'Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act' (as amended

Bold - Exceeds 2011 Table 3 SCS
Bold - Detection limit exceeds 2011 Table 3 SCS
"-" - parameter not analyzed
RDL - Reported detection limit
NR - Not Relevant
NV- No Value
NA - Not Applicable
"<" - Less than the Reporting Detection Limit

Table 103: Polycyclic Aromatic Hydrocarbons (PAHs) Analysis in Soil

Parameters	Unit	RDL	2011 Table 3 SCS (I/C/C, Coarse)	Sample Location		BH102-20	BH104-20	BH107-20
				Sample Name		BH102-20 SS2B	BH104-20 SS2	BH107-20 SS1
				Lab Job #		L2530806	L2530806	L2530806
				Laboratory ID		L2530806-4	L2530806-6	L2530806-11
				Sampling Date		17-Nov-2020	17-Nov-2020	17-Nov-2020
				Maximum Concentration				
Polycyclic Aromatic Hydrocarbons (PAHs)								
Acenaphthene	µg/g	0.05 - 0.4	96	<	0.05	<0.050	<0.050	<0.050
Acenaphthylene	µg/g	0.05 - 0.125	0.15	<	0.05	<0.050	<0.050	<0.050
Anthracene	µg/g	0.05 - 0.125	0.67	<	0.05	<0.050	<0.050	<0.050
Benz(a)anthracene	µg/g	0.05 - 0.125	0.96	<	0.05	<0.050	<0.050	<0.050
Benzo(a)pyrene	µg/g	0.05 - 0.125	0.3	<	0.05	<0.050	<0.050	<0.050
Benzo(b)fluoranthene	µg/g	0.05 - 0.125	0.96	<	0.05	<0.050	<0.050	<0.050
Benzo(g,h,i)perylene	µg/g	0.05 - 0.15	9.6	<	0.05	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	µg/g	0.05 - 0.125	0.96	<	0.05	<0.050	<0.050	<0.050
Chrysene	µg/g	0.05 - 0.125	9.6		0.055	<0.050	<0.050	0.055
Dibenz(a,h)anthracene	µg/g	0.05 - 0.125	0.1	<	0.05	<0.050	<0.050	<0.050
Fluoranthene	µg/g	0.05 - 0.5	9.6	<	0.05	<0.050	<0.050	<0.050
Fluorene	µg/g	0.05 - 0.125	62	<	0.05	<0.050	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	µg/g	0.05 - 0.125	0.76	<	0.05	<0.050	<0.050	<0.050
1-Methylnaphthalene	µg/g	0.03 - 0.075	76	<	0.03	<0.030	<0.030	<0.030
2-Methylnaphthalene	µg/g	0.03 - 0.075	76	<	0.03	<0.030	<0.030	<0.030
1+2-Methylnaphthalene	µg/g	0.0424 - 0.106	76	<	0.042	<0.042	<0.042	<0.042
Naphthalene	µg/g	0.013 - 0.32	9.6	<	0.013	<0.013	<0.013	<0.013
Phenanthrene	µg/g	0.046 - 0.46	12	<	0.046	<0.046	<0.046	<0.046
Pyrene	µg/g	0.05 - 0.5	96	<	0.05	<0.050	<0.050	<0.050

Notes:

2011 Site Condition Standards (SCS) - As identified in 'Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act' (as amended April 15, 2011)

Bold - Exceeds 2011 Table 3 SCS

"-" - parameter not analyzed
RDL - Reported detection limit
NR - Not Relevant
NV- No Value
NA - Not Applicable
"<" - Less than the Reporting Detection Limit

Table 104: Petroleum Hydrocarbons (PHCs) Analysis in Soil

Parameters	Unit	RDL	2011 Table 3 SCS (I/C/C, Coarse)		Sample Location	BH101-20	BH102-20	BH102-20	BH102-20	BH103-20	BH104-20	BH104-20	BH105-20	BH106-20	BH106-20	BH107-20	BH108-20
					Sample Name	BH101-20 SS2	BH102-20 SS1	BH1002-20 SS1	BH102-20 SS2B	BH103-20 SS2	BH104-20 SS2	BH104-20 SS3	BH105-20 SA1	BH106-20 SA1	BH106-20 SA2	BH107-20 SS1	BH108-20 SA1
					Lab Job #	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806
					Laboratory ID	L2530806-1	L2530806-2	L2530806-3	L2530806-4	L2530806-5	L2530806-6	L2530806-7	L2530806-8	L2530806-9	L2530806-10	L2530806-11	L2530806-12
					Sampling Date	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020
					Maximum Concentration			Field Duplicate									
Petroleum Hydrocarbons (PHCs)																	
F1 (C6 to C10)	µg/g	5	55	<	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
F1 (C6 to C10) minus BTEX	µg/g	5	55	<	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
F2 (C10 to C16)	µg/g	10 - 50	230	<	50	<10	<50	<50	<10	<10	<10	<10	<10	<10	<10	<20	<10
F3 (C16 to C34)	µg/g	50 - 250	1700		650	<50	650	390	89	<50	<50	<50	<50	<50	<50	410	56
F4 (C34 to C50)	µg/g	50 - 250	3300		2270	<50	2270	1390	189	<50	<50	<50	<50	115	<50	830	126
Reached Baseline at C50	unitless		NR		NA	YES	NO	NO	NO	YES	YES	YES	YES	NO	YES	NO	NO
F4G (Gravimetric)	µg/g	250	3300		**7680**	-	**7680**	**5620**	790	-	-	-	-	610	-	3040	550

Notes:
2011 Site Condition Standards (SCS) - As identified in 'Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act' (as amended April 15, 2011)

Bold - Exceeds 2011 Table 3 SCS

"-" - parameter not analyzed
RDL - Reported detection limit
NR - Not Relevant
NV- No Value
NA - Not Applicable
"<" - Less than the Reporting Detection Limit

Parameters	Unit	RDL	2011 Table 3 SCS (I/C/C, Coarse)	Sample Location		BH101-20	BH102-20	BH102-20	BH102-20	BH103-20	BH104-20	BH104-20	BH105-20	BH106-20	BH106-20	BH107-20	BH108-20
				Sample Name		BH101-20 SS2	BH102-20 SS1	BH1002-20 SS1	BH102-20 SS2B	BH103-20 SS2	BH104-20 SS2	BH104-20 SS3	BH105-20 SA1	BH106-20 SA1	BH106-20 SA2	BH107-20 SS1	BH108-20 SA1
				Lab Job #		L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806
				Laboratory ID		L2530806-1	L2530806-2	L2530806-3	L2530806-4	L2530806-5	L2530806-6	L2530806-7	L2530806-8	L2530806-9	L2530806-10	L2530806-11	L2530806-12
				Sampling Date		17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020
				Maximum Concentration				Field Duplicate									
Volatile Organic Compounds (VOCs)																	
Benzene	µg/g	0.0068	0.32	<	0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068
Ethylbenzene	µg/g	0.018	9.5	<	0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018
Toluene	µg/g	0.08	68	<	0.08	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080
o-Xylene	µg/g	0.02	NR	<	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
m+p-Xylene	µg/g	0.03	NR	<	0.03	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Xylene Mixture	µg/g	0.05	26	<	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Notes:
2011 Site Condition Standards (SCS) - As identified in 'Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act' (as amended April 15, 2011)
Bold - Exceeds 2011 Table 3 SCS
"-" - parameter not analyzed
RDL - Reported detection limit
NR - Not Relevant
NV- No Value
NA - Not Applicable
"<" - Less than the Reporting Detection Limit

Parameters	Unit	RDL	2011 Table 1 SCS (R/P/I or I/C/C, Coarse)	Table 3.1 ESQS (I/C/C)		Sample Location	BH101-20	BH102-20	BH102-20	BH102-20	BH103-20	BH104-20	BH104-20	BH105-20	BH106-20	BH106-20	BH107-20	BH108-20	BH108-20
						Sample Name	**BH101-20 SS2**	**BH102-20 SS1**	**BH1002-20 SS1**	**BH102-20 SS2B**	**BH103-20 SS2**	**BH104-20 SS2**	**BH104-20 SS3**	**BH105-20 SA1**	**BH106-20 SA1**	**BH106-20 SA2**	**BH107-20 SS1**	**BH108-20 SA1**	**BH108-20 SA2**
						Lab Job #	**L2530806**	**L2530806**	**L2530806**	**L2530806**	**L2530806**	**L2530806**	**L2530806**	**L2530806**	**L2530806**	**L2530806**	**L2530806**	**L2530806**	**L2530806**
						Laboratory ID	**L2530806-1**	**L2530806-2**	**L2530806-3**	**L2530806-4**	**L2530806-5**	**L2530806-6**	**L2530806-7**	**L2530806-8**	**L2530806-9**	**L2530806-10**	**L2530806-11**	**L2530806-12**	**L2530806-13**
						Sampling Date	**17-Nov-2020**	**17-Nov-2020**	**17-Nov-2020**	**17-Nov-2020**	**17-Nov-2020**	**17-Nov-2020**	**17-Nov-2020**	**17-Nov-2020**	**17-Nov-2020**	**17-Nov-2020**	**17-Nov-2020**	**17-Nov-2020**	**17-Nov-2020**
						Maximum Concentration			**Field Duplicate**										
Metals and Inorganics																			
Antimony	µg/g	1	1.3	40	<	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	µg/g	1	18	18		9.7	9.7	3.7	3.5	4.9	5.1	3.6	2.1	5.2	3.5	2	2.6	2.4	6.1
Barium	µg/g	1	220	670		122	67.7	49.6	52	105	77.4	47.6	20.3	115	53.9	15.8	32.4	24.8	122
Beryllium	µg/g	0.5	2.5	8		0.95	0.73	<0.50	<0.50	0.79	<0.50	<0.50	<0.50	0.95	<0.50	<0.50	<0.50	<0.50	0.62
Boron	µg/g	5	36	120		7.1	5	6.9	7.1	6.4	6.1	<5.0	<5.0	6.6	5.6	<5.0	<5.0	<5.0	6.8
Cadmium	µg/g	0.5	1.2	1.9		1.07	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.07
Chromium	µg/g	1	70	160		28.6	21.8	16.9	18.9	26	16	9.9	6.8	28.6	15.9	7.7	17.4	10.6	15.9
Cobalt	µg/g	1	21	80		9.9	9.9	4.6	4.6	8.2	9.3	4.9	3.5	9.1	6.5	3.1	3.7	4	4.7
Copper	µg/g	1	92	230		42.8	34.6	14.8	15.8	42.4	32.6	29.5	19.7	30.2	31.7	13.1	42.8	15.9	35.7
Lead	µg/g	1	120	120		26.3	10.3	25.7	26.3	15.5	7.3	8.4	4.8	12.1	16.4	3.8	25.7	12.6	15.4
Molybdenum	µg/g	1	2	40		1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2
Nickel	µg/g	1	82	270		25.2	22.2	9.5	10.3	20.5	16.8	9.5	6.9	25.2	13.4	6.1	8.7	8.4	15.2
Selenium	µg/g	1	1.5	5.5		**1.6**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**
Silver	µg/g	0.2	0.5	40	<	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium	µg/g	0.5	1	3.3	<	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	µg/g	1	2.5	33		1.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	1.7
Vanadium	µg/g	1	86	86		39.8	35.6	25.2	27.2	34.8	25.7	18.5	14.4	39.8	21.9	16.5	20.9	15	26
Zinc	µg/g	5	290	340		93.2	44.4	79.3	67.8	58.9	42.9	35.1	22.7	93.2	89.6	19.3	66	48.8	65.5
Electrical Conductivity	mS/cm	0.004	0.57	1.4		**1.87**	**1.36**	-	-	-	**1.61**	**1.37**	**1.87**	-	0.473	**0.985**	0.127	0.363	-
Sodium Adsorption Ratio (SAR)	unitless	0.1	2.4	12		**89.2**	**10.1**	-	-	-	**89.2**	**12.6**	**40.5**	-	**6.54**	**24.3**	1.86	**13.9**	-
pH	pH units	0.1	NR	NV		8	-	8	-	-	-	-	7.6	-	-	7.34	-	-	-

Notes:
2011 Site Condition Standards (SCS) - As identified in 'Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act' (as amended April 15, 2011)
2019 Excess Soil Quality Standards (ESQS) - As identified in Appendix 1 of the Rules for Soil Management adopted by reference in O.Reg. 406/19 made under the Environmental Protection Act (December 4, 2019)

Bold (grey)	- Exceeds 2011 Table 1 SCS
Bold (orange)	- Exceeds Table 3.1 ESQS (I/C/C)

"-" - parameter not analyzed
RDL - Reported detection limit
NR - Not Relevant
NV- No Value
NA - Not Applicable
"<" - Less than the Reporting Detection Limit

Table 202: Organochlorine (OC) Pesticides Analysis in Soil

Parameters	Unit	RDL	2011 Table 1 SCS (R/P/I or I/C/C, Coarse)	Table 3.1 ESQS (I/C/C)		Sample Location	BH105-20	BH106-20
						Sample Name	BH105-20 SA1	BH106-20 SA1
						Lab Job #	L2530806	L2530806
						Laboratory ID	L2530806-8	L2530806-9
						Sampling Date	17-Nov-2020	17-Nov-2020
						Maximum Concentration		
Organochlorine Pesticides (OCs)								
Aldrin	µg/g	0.02	0.05	0.088	<	0	<0.020	<0.020
alpha-Chlordane	µg/g	0.02	NR	NV	<	0.02	<0.020	<0.020
gamma-Chlordane	µg/g	0.02	NR	NV	<	0.02	<0.020	<0.020
Chlordane (Total)	µg/g	0.028	0.05	0.05	<	0.028	<0.028	<0.028
o,p-DDD	µg/g	0.02	NR	NV	<	0.02	<0.020	<0.020
p,p-DDD	µg/g	0.02	NR	NV	<	0.02	<0.020	<0.020
o,p-DDD + p,p-DDD	µg/g	0.028	0.05	NV	<	0.028	<0.028	<0.028
o,p-DDE	µg/g	0.02	NR	NV	<	0.02	<0.020	<0.020
p,p-DDE	µg/g	0.02	NR	NV	<	0.02	<0.020	<0.020
o,p-DDE + p,p-DDE	µg/g	0.028	0.05	NV	<	0.028	<0.028	<0.028
o,p-DDT	µg/g	0.02	NR	NV	<	0.02	<0.020	<0.020
p,p-DDT	µg/g	0.02	NR	NV	<	0.02	<0.020	<0.020
o,p-DDT + p,p-DDT	µg/g	0.028	1.4	NV	<	0.028	<0.028	<0.028
Dieldrin	µg/g	0.02	0.05	0.088	<	0.02	<0.020	<0.020
Endosulfan I	µg/g	0.02	NR	NV	<	0.02	<0.020	<0.020
Endosulfan II	µg/g	0.02	NR	NV	<	0.02	<0.020	<0.020
Total Endosulfan	µg/g	0.028	0.04	0.04	<	0.028	<0.028	<0.028
Endrin	µg/g	0.02	0.04	0.04	<	0.02	<0.020	<0.020
Heptachlor	µg/g	0.02	0.05	0.072	<	0.02	<0.020	<0.020
Heptachlor epoxide	µg/g	0.02	0.05	0.05	<	0.02	<0.020	<0.020
Hexachlorobenzene	µg/g	0.01	0.01	0.66	**<**	**0.05**	<0.010	**<0.050**
Hexachlorobutadiene	µg/g	0.01	0.01	0.01	**<**	**0.05**	<0.010	**<0.050**
gamma-Hexachlorocyclohexane (Lindane)	µg/g	0.01	0.01	0.01	**<**	**0.05**	<0.010	**<0.050**
Hexachloroethane	µg/g	0.01	0.01	0.13	**<**	**0.05**	<0.010	**<0.050**
Methoxychlor	µg/g	0.02	0.05	0.19	<	0.02	<0.020	<0.020

Notes:

2011 Site Condition Standards (SCS) - As identified in 'Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act' (as amended April 15, 2011)

2019 Excess Soil Quality Standards (ESQS) - As identified in Appendix 1 of the Rules for Soil Management adopted by reference in O.Reg. 406/19 made under the Environmental Protection Act (December 4, 2019)

Bold	- Exceeds 2011 Table 1 SCS
Bold	- Exceeds Table 3.1 ESQS (I/C/C)
Bold	- Detection limit exceeds at least one of 2011 Table 1, 3 SCS or Table 3.1 ESQS (I/C/C)~

"-" - parameter not analyzed
RDL - Reported detection limit
NR - Not Relevant
NV- No Value
NA - Not Applicable
"<" - Less than the Reporting Detection Limit

Table 203: Polycyclic Aromatic Hydrocarbons (PAHs) Analysis in Soil

Parameters	Unit	RDL	2011 Table 1 SCS (R/P/I or I/C/C, Coarse)	Table 3.1 ESQS (I/C/C)	Sample Location		BH102-20	BH104-20	BH107-20
					Sample Name		BH102-20 SS2B	BH104-20 SS2	BH107-20 SS1
					Lab Job #		L2530806	L2530806	L2530806
					Laboratory ID		L2530806-4	L2530806-6	L2530806-11
					Sampling Date		17-Nov-2020	17-Nov-2020	17-Nov-2020
					Maximum Concentration				
Polycyclic Aromatic Hydrocarbons (PAHs)									
Acenaphthene	µg/g	0.05 - 0.4	0.072	15	<	0.05	<0.050	<0.050	<0.050
Acenaphthylene	µg/g	0.05 - 0.125	0.093	0.093	<	0.05	<0.050	<0.050	<0.050
Anthracene	µg/g	0.05 - 0.125	0.16	0.16	<	0.05	<0.050	<0.050	<0.050
Benz(a)anthracene	µg/g	0.05 - 0.125	0.36	1	<	0.05	<0.050	<0.050	<0.050
Benzo(a)pyrene	µg/g	0.05 - 0.125	0.3	0.7	<	0.05	<0.050	<0.050	<0.050
Benzo(b)fluoranthene	µg/g	0.05 - 0.125	0.47	7	<	0.05	<0.050	<0.050	<0.050
Benzo(g,h,i)perylene	µg/g	0.05 - 0.15	0.68	13	<	0.05	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	µg/g	0.05 - 0.125	0.48	7	<	0.05	<0.050	<0.050	<0.050
Chrysene	µg/g	0.05 - 0.125	2.8	14		0.055	<0.050	<0.050	0.055
Dibenz(a,h)anthracene	µg/g	0.05 - 0.125	0.1	0.7	<	0.05	<0.050	<0.050	<0.050
Fluoranthene	µg/g	0.05 - 0.5	0.56	70	<	0.05	<0.050	<0.050	<0.050
Fluorene	µg/g	0.05 - 0.125	0.12	6.8	<	0.05	<0.050	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	µg/g	0.05 - 0.125	0.23	0.76	<	0.05	<0.050	<0.050	<0.050
1-Methylnaphthalene	µg/g	0.03 - 0.075	0.59	NV	<	0.03	<0.030	<0.030	<0.030
2-Methylnaphthalene	µg/g	0.03 - 0.075	0.59	NV	<	0.03	<0.030	<0.030	<0.030
1+2-Methylnaphthalene	µg/g	0.0424 - 0.106	0.59	8.7	<	0.042	<0.042	<0.042	<0.042
Naphthalene	µg/g	0.013 - 0.32	0.09	1.8	<	0.013	<0.013	<0.013	<0.013
Phenanthrene	µg/g	0.046 - 0.46	0.69	12	<	0.046	<0.046	<0.046	<0.046
Pyrene	µg/g	0.05 - 0.5	1	70	<	0.05	<0.050	<0.050	<0.050

Notes:

2011 Site Condition Standards (SCS) - As identified in 'Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act' (as amended April 15, 2011)

2019 Excess Soil Quality Standards (ESQS) - As identified in Appendix 1 of the Rules for Soil Management adopted by reference in O.Reg. 406/19 made under the Environmental Protection Act (December 4, 2019)

Bold - Exceeds 2011 Table 1 SCS

Bold - Exceeds Table 3.1 ESQS (I/C/C)

"-" - parameter not analyzed

RDL - Reported detection limit

NR - Not Relevant

NV- No Value

NA - Not Applicable

"<" - Less than the Reporting Detection Limit

Parameters	Unit	RDL	2011 Table 1 SCS (R/P/I or I/C/C, Coarse)	Table 3.1 ESQS (I/C/C)		Sample Location	BH101-20	BH102-20	BH102-20	BH102-20	BH103-20	BH104-20	BH104-20	BH105-20	BH106-20	BH106-20	BH107-20	BH108-20
						Sample Name	BH101-20 SS2	BH102-20 SS1	BH1002-20 SS1	BH102-20 SS2B	BH103-20 SS2	BH104-20 SS2	BH104-20 SS3	BH105-20 SA1	BH106-20 SA1	BH106-20 SA2	BH107-20 SS1	BH108-20 SA1
						Lab Job #	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806
						Laboratory ID	L2530806-1	L2530806-2	L2530806-3	L2530806-4	L2530806-5	L2530806-6	L2530806-7	L2530806-8	L2530806-9	L2530806-10	L2530806-11	L2530806-12
						Sampling Date	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020
						Maximum Concentration			Field Duplicate									
Petroleum Hydrocarbons (PHCs)																		
F1 (C6 to C10)	µg/g	5	25	NV	<	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
F1 (C6 to C10) minus BTEX	µg/g	5	25	25	<	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
F2 (C10 to C16)	µg/g	10 - 50	10	26	**<**	**50**	<10	**<50**	**<50**	<10	<10	<10	<10	<10	<10	<10	**<20**	<10
F3 (C16 to C34)	µg/g	50 - 250	240	1700		**650**	<50	**650**	**390**	89	<50	<50	<50	<50	<50	<50	**410**	56
F4 (C34 to C50)	µg/g	50 - 250	120	3300		**2270**	<50	**2270**	**1390**	**189**	<50	<50	<50	<50	115	<50	**830**	**126**
Reached Baseline at C50	unitless		NR	NV		NA	YES	NO	NO	NO	YES	YES	YES	YES	NO	YES	NO	NO
F4G (Gravimetric)	µg/g	250	120	3300		**7680**	-	**7680**	**5620**	**790**	-	-	-	-	**610**	-	**3040**	**550**

Notes:

2011 Site Condition Standards (SCS) - As identified in 'Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act' (as amended April 15, 2011)

2019 Excess Soil Quality Standards (ESQS) - As identified in Appendix 1 of the Rules for Soil Management adopted by reference in O.Reg. 406/19 made under the Environmental Protection Act (December 4, 2019)

Bold	- Exceeds 2011 Table 1 SCS
Bold	- Exceeds Table 3.1 ESQS (I/C/C)
Bold	- Detection limit exceeds at least one of 2011 Table 1, 3 SCS or Table 3.1 ESQS (I/C/C)~

"-" - parameter not analyzed
RDL - Reported detection limit
NR - Not Relevant
NV- No Value
NA - Not Applicable
"<" - Less than the Reporting Detection Limit

Table 205: Volatile Organic Compounds (VOCs) Analysis in Soil

Parameters	Unit	RDL	2011 Table 1 SCS (R/P/I or I/C/C, Coarse)	Table 3.1 ESQS (I/C/C)	Sample Location		BH101-20	BH102-20	BH102-20	BH102-20	BH103-20	BH104-20	BH104-20	BH105-20	BH106-20	BH106-20	BH107-20	BH108-20
					Sample Name		BH101-20 SS2	BH102-20 SS1	BH1002-20 SS1	BH102-20 SS2B	BH103-20 SS2	BH104-20 SS2	BH104-20 SS3	BH105-20 SA1	BH106-20 SA1	BH106-20 SA2	BH107-20 SS1	BH108-20 SA1
					Lab Job #		L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806	L2530806
					Laboratory ID		L2530806-1	L2530806-2	L2530806-3	L2530806-4	L2530806-5	L2530806-6	L2530806-7	L2530806-8	L2530806-9	L2530806-10	L2530806-11	L2530806-12
					Sampling Date		17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020	17-Nov-2020
					Maximum Concentration				Field Duplicate									
Volatile Organic Compounds (VOCs)																		
Benzene	µg/g	0.0068	0.02	0.034	<	0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068
Ethylbenzene	µg/g	0.018	0.05	1.9	<	0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018
Toluene	µg/g	0.08	0.2	7.8	<	0.08	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080
o-Xylene	µg/g	0.02	NR	NV	<	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
m+p-Xylene	µg/g	0.03	NR	NV	<	0.03	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Xylene Mixture	µg/g	0.05	0.05	3	<	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Notes:

2011 Site Condition Standards (SCS) - As identified in 'Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act' (as amended April 15, 2011)

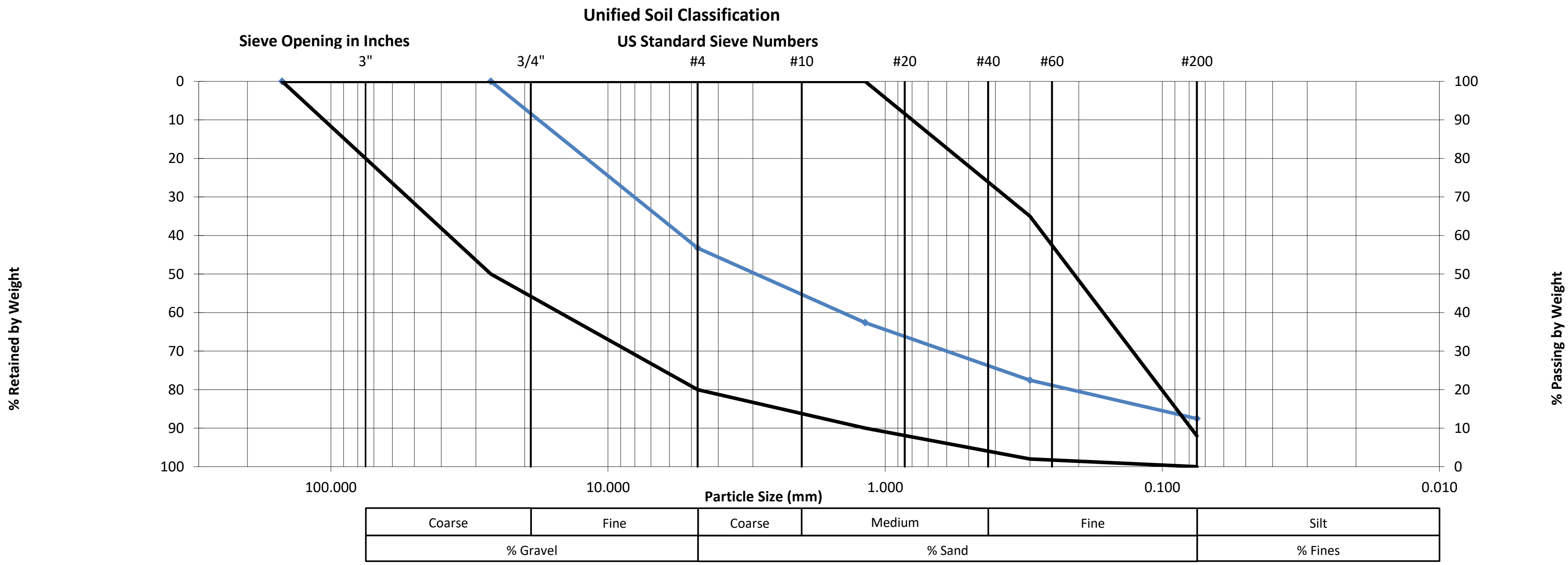
2019 Excess Soil Quality Standards (ESQS) - As identified in Appendix 1 of the Rules for Soil Management adopted by reference in O.Reg. 406/19 made under the Environmental Protection Act (December 4, 2019)

Bold	- Exceeds 2011 Table 1 SCS
Bold	- Exceeds Table 3.1 ESQS (I/C/C)

"-" - parameter not analyzed
RDL - Reported detection limit
NR - Not Relevant
NV- No Value
NA - Not Applicable
"<" - Less than the Reporting Detection Limit

Particle Size Distribution Analysis Test Results

Project Name:	**Heart Lake Road & Countryside Drive EA**	**Date Sampled:**	**Nov. 17, 2020**	**MTE File No.:**	**47877-100**
Client:	**City of Brampton**	**Date Tested:**	**Nov. 24, 2020**	**Table No.:**	**301**
Project Location:	**Heart Lake Road & Countryside Drive, Brampton, ON**				



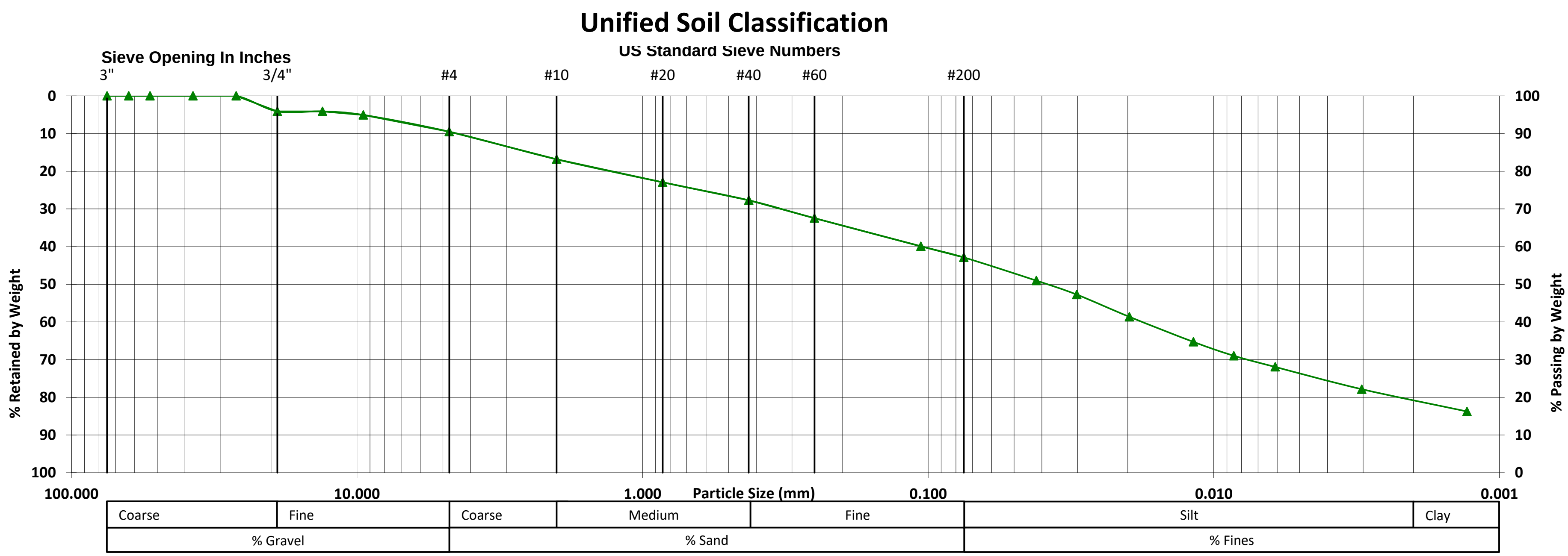
Black lines represent the acceptable ranges for % Passing by mass as per OPSS 1010 specifications for a Granular 'B' Type 1

Symbol	Borehole ID	Sample #	*Sample Depth*	Description
	BH104-20	GS-1	300-510 mm	SAND and GRAVEL, some Silt

NOTES:

Particle Size Distribution Analysis Test Results

Project Name:	**Heart Lake Road & Countryside Drive EA**	**Date Sampled:**	**Nov. 17, 2020**	**MTE File No:**	**47877-100**
Client:	**City of Brampton**	**Date Tested:**	**Dec. 1-4, 2020**	**Table No.:**	**302**
Location:	**Heart Lake Road & Countryside Drive, Brampton, ON**				



Symbol	Borehole ID	Sample #	*Sample Depth*	Description
─▲─	BH107-20	SS-2	0.8-1.4 mbgs	Sandy SILT TILL, some Clay and Gravel

NOTES:

Table 401
Pavement Design Parameters and Estimated EASLs
Heart Lake Road - Street Lights Intersection Option
City Brampton
47877-100

DESIGN YEAR	YEAR	AVERAGE ANNUAL DAILY TRAFFIC	ESTIMATED CUMULATIVE ANNUAL ESALs
0	2,021	8,395	-
1	2,022	8,646	31,000
2	2,023	8,906	62,900
3	2,024	9,173	95,800
4	2,025	9,448	129,700
5	2,026	9,732	164,600
6	2,027	10,023	200,500
7	2,028	10,324	237,500
8	2,029	10,634	275,600
9	2,030	10,953	314,900
10	2,031	11,282	355,400
11	2,032	11,620	397,100
12	2,033	11,969	440,000
13	2,034	12,328	484,200
14	2,035	12,697	529,700
15	2,036	13,078	576,600
16	2,037	13,471	624,900
17	2,038	13,875	674,700
18	2,039	14,291	725,900
19	2,040	14,720	778,700
20	2,041	15,161	833,100
21	2,042	15,616	889,100
22	2,043	16,085	946,800
23	2,044	16,567	1,006,200
24	2,045	17,064	1,067,400
25	2,046	17,576	1,130,400

Roadway Classification	Arterial
Combined Truck Factor (CTF) =	**1.31**
Percent Trucks =	1.5%
Traffic Growth Rate =	3.0%
Days Per Year For Truck Traffic =	365
Number of Lanes in one Direction =	1
Estimated Resilient Modulus of Subgrade =	20 MPa
Initial Serviceability	4.5
Terminal Serviceability	2.5
Reliability Level	90%
Overall Standard Deviation	0.47

Table 402
Pavement Design Parameters and Estimated EASLs
Countryside Drive - Street Lights Intersection Option
City Brampton
47877-100

DESIGN YEAR	YEAR	AVERAGE ANNUAL DAILY TRAFFIC	ESTIMATED CUMULATIVE ANNUAL ESALs
0	2,021	12,566	-
1	2,022	12,943	41,800
2	2,023	13,331	84,800
3	2,024	13,731	129,100
4	2,025	14,143	174,700
5	2,026	14,567	221,700
6	2,027	15,004	270,100
7	2,028	15,455	320,000
8	2,029	15,918	371,400
9	2,030	16,396	424,300
10	2,031	16,888	478,800
11	2,032	17,394	534,900
12	2,033	17,916	592,700
13	2,034	18,454	652,300
14	2,035	19,007	713,600
15	2,036	19,577	776,800
16	2,037	20,165	841,900
17	2,038	20,770	908,900
18	2,039	21,393	977,900
19	2,040	22,035	1,049,000
20	2,041	22,696	1,122,300
21	2,042	23,376	1,197,700
22	2,043	24,078	1,275,400
23	2,044	24,800	1,355,400
24	2,045	25,544	1,437,800
25	2,046	26,310	1,522,700

Roadway Classification	Arterial
Combined Truck Factor (CTF) =	**1.31**
Percent Trucks =	1.5%
Traffic Growth Rate =	3.0%
Days Per Year For Truck Traffic =	365
Number of Lanes in one Direction =	2
Estimated Resilient Modulus of Subgrade =	20 MPa
Initial Serviceability	4.5
Terminal Serviceability	2.5
Reliability Level	90%
Overall Standard Deviation	0.47

Appendix D

Laboratory Certificate of Analysis

L2530806

L2534350

MTE CONSULTANTS INC. (Kitchener)
ATTN: JEN LAMBKE
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Date Received: 18-NOV-20
Report Date: 26-NOV-20 12:19 (MT)
Version: FINAL REV. 2

Client Phone: 519-743-6500

Certificate of Analysis

Lab Work Order #: L2530806

Project P.O. #: NOT SUBMITTED
Job Reference: 47877-100 (HEART LAKE)
C of C Numbers: 17-825494
Legal Site Desc:

Emily Hansen
Account Manager

47877-100 (HEART LAKE)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-1	BH101-20 SS2							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL							
Physical Tests								
	Conductivity	1.36		0.0040	mS/cm	24-NOV-20	*0.57	1.4
	% Moisture	11.7		0.25	%	20-NOV-20		
Saturated Paste Extractables								
	SAR	10.1		0.10	SAR	24-NOV-20	*2.4	12
	Calcium (Ca)	34.5		0.50	mg/L	24-NOV-20		
	Magnesium (Mg)	2.40		0.50	mg/L	24-NOV-20		
	Sodium (Na)	228		0.50	mg/L	24-NOV-20		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	9.7		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	67.7		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	0.73		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	5.0		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	21.8		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	9.9		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	34.6		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	10.3		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	22.2		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	35.6		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	44.4		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	68
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	113.8		50-140	%	20-NOV-20		
	Surrogate: 1,4-Difluorobenzene	113.0		50-140	%	20-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	55
	F1-BTEX	<5.0		5.0	ug/g	20-NOV-20	25	55
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	230
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	20-NOV-20		
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	85.1		60-140	%	20-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	105.3		60-140	%	20-NOV-20		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-2	BH102-20 SS1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Physical Tests								
	% Moisture	10.6		0.25	%	20-NOV-20		
	pH	8.00		0.10	pH units	23-NOV-20		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	3.7		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	49.6		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	6.9		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	16.9		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	4.6		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	14.8		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	25.7		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	9.5		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	25.2		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	79.3		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	68
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	113.6		50-140	%	20-NOV-20		
	Surrogate: 1,4-Difluorobenzene	110.2		50-140	%	20-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	55
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	55
	F2 (C10-C16)	<50	DLM	50	ug/g	24-NOV-20	**10	230
	F3 (C16-C34)	650	DLM	250	ug/g	24-NOV-20	*240	1700
	F4 (C34-C50)	2270	DLM	250	ug/g	24-NOV-20	*120	3300
	F4G-SG (GHH-Silica)	7680		250	ug/g	23-NOV-20	*120	*3300
	Total Hydrocarbons (C6-C50)	2910		360	ug/g	24-NOV-20		
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	71.8		60-140	%	24-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	87.1		60-140	%	20-NOV-20		
L2530806-3	BH1002-20 SS1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Physical Tests								

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-3	BH1002-20 SS1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Physical Tests								
	% Moisture	8.36		0.25	%	20-NOV-20		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	3.5		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	52.0		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	7.1		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	18.9		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	4.6		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	15.8		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	26.3		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	10.3		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	27.2		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	67.8		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	68
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	112.2		50-140	%	20-NOV-20		
	Surrogate: 1,4-Difluorobenzene	106.7		50-140	%	20-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	55
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	55
	F2 (C10-C16)	<50	DLM	50	ug/g	24-NOV-20	**10	230
	F3 (C16-C34)	390	DLM	250	ug/g	24-NOV-20	*240	1700
	F4 (C34-C50)	1390	DLM	250	ug/g	24-NOV-20	*120	3300
	F4G-SG (GHH-Silica)	5620		250	ug/g	23-NOV-20	*120	*3300
	Total Hydrocarbons (C6-C50)	1780		360	ug/g	24-NOV-20		
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	85.5		60-140	%	24-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	93.5		60-140	%	20-NOV-20		
L2530806-4	BH102-20 SS2B							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Physical Tests								
	% Moisture	20.8		0.25	%	20-NOV-20		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-4	BH102-20 SS2B							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL							
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	4.9		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	105		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	0.79		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	6.4		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	26.0		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	8.2		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	42.4		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	15.5		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	20.5		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	34.8		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	58.9		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	68
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	105.5		50-140	%	20-NOV-20		
	Surrogate: 1,4-Difluorobenzene	102.5		50-140	%	20-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	55
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	55
	F2 (C10-C16)	<10		10	ug/g	24-NOV-20	10	230
	F2-Naphth	<10		10	ug/g	24-NOV-20		
	F3 (C16-C34)	89		50	ug/g	24-NOV-20	240	1700
	F3-PAH	89		50	ug/g	24-NOV-20		
	F4 (C34-C50)	189		50	ug/g	24-NOV-20	*120	3300
	F4G-SG (GHH-Silica)	790		250	ug/g	23-NOV-20	*120	3300
	Total Hydrocarbons (C6-C50)	278		72	ug/g	24-NOV-20		
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	74.0		60-140	%	24-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	93.1		60-140	%	20-NOV-20		
Polycyclic Aromatic Hydrocarbons								
	Acenaphthene	<0.050		0.050	ug/g	20-NOV-20	0.072	96
	Acenaphthylene	<0.050		0.050	ug/g	20-NOV-20	0.093	0.15
	Anthracene	<0.050		0.050	ug/g	20-NOV-20	0.16	0.67
	Benzo(a)anthracene	<0.050		0.050	ug/g	20-NOV-20	0.36	0.96
	Benzo(a)pyrene	<0.050		0.050	ug/g	20-NOV-20	0.3	0.3

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

47877-100 (HEART LAKE)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-4	BH102-20 SS2B							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Polycyclic Aromatic Hydrocarbons								
	Benzo(b)fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.47	0.96
	Benzo(g,h,i)perylene	<0.050		0.050	ug/g	20-NOV-20	0.68	9.6
	Benzo(k)fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.48	0.96
	Chrysene	<0.050		0.050	ug/g	20-NOV-20	2.8	9.6
	Dibenzo(ah)anthracene	<0.050		0.050	ug/g	20-NOV-20	0.1	0.1
	Fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.56	9.6
	Fluorene	<0.050		0.050	ug/g	20-NOV-20	0.12	62
	Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	20-NOV-20	0.23	0.76
	1+2-Methylnaphthalenes	<0.042		0.042	ug/g	20-NOV-20	0.59	76
	1-Methylnaphthalene	<0.030		0.030	ug/g	20-NOV-20	0.59	76
	2-Methylnaphthalene	<0.030		0.030	ug/g	20-NOV-20	0.59	76
	Naphthalene	<0.013		0.013	ug/g	20-NOV-20	0.09	9.6
	Phenanthrene	<0.046		0.046	ug/g	20-NOV-20	0.69	12
	Pyrene	<0.050		0.050	ug/g	20-NOV-20	1	96
	Surrogate: 2-Fluorobiphenyl	84.8		50-140	%	20-NOV-20		
	Surrogate: p-Terphenyl d14	94.4		50-140	%	20-NOV-20		
L2530806-5	BH103-20 SS2							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Physical Tests								
	Conductivity	1.61		0.0040	mS/cm	24-NOV-20	*0.57	*1.4
	% Moisture	8.75		0.25	%	20-NOV-20		
Saturated Paste Extractables								
	SAR	89.2	SAR:M	0.10	SAR	24-NOV-20	*2.4	*12
	Calcium (Ca)	0.94		0.50	mg/L	24-NOV-20		
	Magnesium (Mg)	<0.50		0.50	mg/L	24-NOV-20		
	Sodium (Na)	314		0.50	mg/L	24-NOV-20		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	5.1		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	77.4		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	6.1		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	16.0		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	9.3		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	32.6		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	7.3		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	16.8		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	25.7		1.0	ug/g	24-NOV-20		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

ANALYTICAL GUIDELINE REPORT

47877-100 (HEART LAKE)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2530806-5	BH103-20 SS2							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Metals								
							86	86
	Zinc (Zn)	42.9		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	68
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	111.1		50-140	%	20-NOV-20		
	Surrogate: 1,4-Difluorobenzene	106.5		50-140	%	20-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	55
	F1-BTEX	<5.0		5.0	ug/g	23-NOV-20	25	55
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	230
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	23-NOV-20		
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	76.2		60-140	%	20-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	98.9		60-140	%	20-NOV-20		
L2530806-6	BH104-20 SS2							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Physical Tests								
	Conductivity	1.37		0.0040	mS/cm	24-NOV-20	*0.57	1.4
	% Moisture	7.47		0.25	%	20-NOV-20		
Saturated Paste Extractables								
	SAR	12.6		0.10	SAR	24-NOV-20	*2.4	*12
	Calcium (Ca)	14.4		0.50	mg/L	24-NOV-20		
	Magnesium (Mg)	7.69		0.50	mg/L	24-NOV-20		
	Sodium (Na)	239		0.50	mg/L	24-NOV-20		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	3.6		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	47.6		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	<5.0		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	9.9		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	4.9		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	29.5		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	8.4		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	9.5		1.0	ug/g	24-NOV-20	82	270

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-6	BH104-20 SS2							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL							
Metals								
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	18.5		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	35.1		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	68
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	120.7		50-140	%	20-NOV-20		
	Surrogate: 1,4-Difluorobenzene	119.6		50-140	%	20-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	55
	F1-BTEX	<5.0		5.0	ug/g	23-NOV-20	25	55
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	230
	F2-Naphth	<10		10	ug/g	23-NOV-20		
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700
	F3-PAH	<50		50	ug/g	23-NOV-20		
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	23-NOV-20		
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	81.3		60-140	%	20-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	79.1		60-140	%	20-NOV-20		
Polycyclic Aromatic Hydrocarbons								
	Acenaphthene	<0.050		0.050	ug/g	20-NOV-20	0.072	96
	Acenaphthylene	<0.050		0.050	ug/g	20-NOV-20	0.093	0.15
	Anthracene	<0.050		0.050	ug/g	20-NOV-20	0.16	0.67
	Benzo(a)anthracene	<0.050		0.050	ug/g	20-NOV-20	0.36	0.96
	Benzo(a)pyrene	<0.050		0.050	ug/g	20-NOV-20	0.3	0.3
	Benzo(b)fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.47	0.96
	Benzo(g,h,i)perylene	<0.050		0.050	ug/g	20-NOV-20	0.68	9.6
	Benzo(k)fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.48	0.96
	Chrysene	<0.050		0.050	ug/g	20-NOV-20	2.8	9.6
	Dibenzo(ah)anthracene	<0.050		0.050	ug/g	20-NOV-20	0.1	0.1
	Fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.56	9.6
	Fluorene	<0.050		0.050	ug/g	20-NOV-20	0.12	62
	Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	20-NOV-20	0.23	0.76
	1+2-Methylnaphthalenes	<0.042		0.042	ug/g	23-NOV-20	0.59	76
	1-Methylnaphthalene	<0.030		0.030	ug/g	20-NOV-20	0.59	76
	2-Methylnaphthalene	<0.030		0.030	ug/g	20-NOV-20	0.59	76
	Naphthalene	<0.013		0.013	ug/g	20-NOV-20	0.09	9.6
	Phenanthrene	<0.046		0.046	ug/g	20-NOV-20	0.69	12

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-6	BH104-20 SS2							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Polycyclic Aromatic Hydrocarbons								
	Pyrene	<0.050		0.050	ug/g	20-NOV-20	1	96
	Surrogate: 2-Fluorobiphenyl	81.5		50-140	%	20-NOV-20		
	Surrogate: p-Terphenyl d14	88.7		50-140	%	20-NOV-20		
L2530806-7	BH104-20 SS3							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Physical Tests								
	Conductivity	1.87		0.0040	mS/cm	24-NOV-20	*0.57	*1.4
	% Moisture	17.5		0.25	%	20-NOV-20		
	pH	7.60		0.10	pH units	23-NOV-20		
Saturated Paste Extractables								
	SAR	40.5		0.10	SAR	24-NOV-20	*2.4	*12
	Calcium (Ca)	4.11		0.50	mg/L	24-NOV-20		
	Magnesium (Mg)	0.98		0.50	mg/L	24-NOV-20		
	Sodium (Na)	352		0.50	mg/L	24-NOV-20		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	2.1		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	20.3		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	<5.0		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	6.8		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	3.5		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	19.7		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	4.8		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	6.9		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	14.4		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	22.7		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	68
	o-Xylene	<0.020		0.020	ug/g	19-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	116.8		50-140	%	19-NOV-20		
	Surrogate: 1,4-Difluorobenzene	113.0		50-140	%	19-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	55

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-7 BH104-20 SS3								
Sampled By: MATT D. on 17-NOV-20								
Matrix: SOIL							#1	#2
Hydrocarbons								
	F1-BTEX	<5.0		5.0	ug/g	23-NOV-20	25	55
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	230
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	23-NOV-20		
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	63.8		60-140	%	20-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	97.7		60-140	%	19-NOV-20		
L2530806-8 BH105-20 SA1								
Sampled By: MATT D. on 17-NOV-20								
Matrix: SOIL							#1	#2
Physical Tests								
	% Moisture	18.6		0.25	%	20-NOV-20		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	5.2		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	115		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	0.95		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	6.6		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	28.6		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	9.1		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	30.2		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	12.1		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	25.2		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	1.1		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	39.8		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	93.2		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	68
	o-Xylene	<0.020		0.020	ug/g	19-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	118.3		50-140	%	19-NOV-20		
	Surrogate: 1,4-Difluorobenzene	113.9		50-140	%	19-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	55
	F1-BTEX	<5.0		5.0	ug/g	23-NOV-20	25	55

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-8	BH105-20 SA1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Hydrocarbons								
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	230
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	23-NOV-20		
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	76.9		60-140	%	20-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	95.2		60-140	%	19-NOV-20		
Organochlorine Pesticides								
	Aldrin	<0.020		0.020	ug/g	25-NOV-20	0.05	0.088
	gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	25-NOV-20	0.01	0.056
	a-chlordane	<0.020		0.020	ug/g	25-NOV-20		
	Chlordane (Total)	<0.028		0.028	ug/g	25-NOV-20	0.05	0.05
	g-chlordane	<0.020		0.020	ug/g	25-NOV-20		
	op-DDD	<0.020		0.020	ug/g	25-NOV-20		
	pp-DDD	<0.020		0.020	ug/g	25-NOV-20		
	Total DDD	<0.028		0.028	ug/g	25-NOV-20	0.05	4.6
	o,p-DDE	<0.020		0.020	ug/g	25-NOV-20		
	pp-DDE	<0.020		0.020	ug/g	25-NOV-20		
	Total DDE	<0.028		0.028	ug/g	25-NOV-20	0.05	0.52
	op-DDT	<0.020		0.020	ug/g	25-NOV-20		
	pp-DDT	<0.020		0.020	ug/g	25-NOV-20		
	Total DDT	<0.028		0.028	ug/g	25-NOV-20	1.4	1.4
	Dieldrin	<0.020		0.020	ug/g	25-NOV-20	0.05	0.088
	Endosulfan I	<0.020		0.020	ug/g	25-NOV-20		
	Endosulfan II	<0.020		0.020	ug/g	25-NOV-20		
	Endosulfan (Total)	<0.028		0.028	ug/g	25-NOV-20	0.04	0.3
	Endrin	<0.020		0.020	ug/g	25-NOV-20	0.04	0.04
	Heptachlor	<0.020		0.020	ug/g	25-NOV-20	0.05	0.19
	Heptachlor Epoxide	<0.020		0.020	ug/g	25-NOV-20	0.05	0.05
	Hexachlorobenzene	<0.010		0.010	ug/g	25-NOV-20	0.01	0.66
	Hexachlorobutadiene	<0.010		0.010	ug/g	25-NOV-20	0.01	0.031
	Hexachloroethane	<0.010		0.010	ug/g	25-NOV-20	0.01	0.21
	Methoxychlor	<0.020		0.020	ug/g	25-NOV-20	0.05	1.6
	Surrogate: 2-Fluorobiphenyl	68.8		50-140	%	25-NOV-20		
	Surrogate: d14-Terphenyl	61.5		50-140	%	25-NOV-20		
L2530806-9	BH106-20 SA1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Physical Tests								
	Conductivity	0.473		0.0040	mS/cm	24-NOV-20	0.57	1.4
	% Moisture	12.8		0.25	%	20-NOV-20		
Saturated Paste Extractables								
	SAR	6.54		0.10	SAR	24-NOV-20	*2.4	12
	Calcium (Ca)	13.7		0.50	mg/L	24-NOV-20		
	Magnesium (Mg)	0.58		0.50	mg/L	24-NOV-20		

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-9	BH106-20 SA1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL							
Saturated Paste Extractables								
	Sodium (Na)	90.9		0.50	mg/L	24-NOV-20		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	3.5		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	53.9		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	5.6		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	15.9		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	6.5		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	31.7		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	16.4		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	13.4		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	21.9		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	89.6		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	68
	o-Xylene	<0.020		0.020	ug/g	19-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	117.3		50-140	%	19-NOV-20		
	Surrogate: 1,4-Difluorobenzene	112.3		50-140	%	19-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	55
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	55
	F2 (C10-C16)	<10		10	ug/g	24-NOV-20	10	230
	F3 (C16-C34)	<50		50	ug/g	24-NOV-20	240	1700
	F4 (C34-C50)	115		50	ug/g	24-NOV-20	120	3300
	F4G-SG (GHH-Silica)	610		250	ug/g	23-NOV-20	*120	3300
	Total Hydrocarbons (C6-C50)	115		72	ug/g	24-NOV-20		
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	81.7		60-140	%	24-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	97.5		60-140	%	19-NOV-20		
Organochlorine Pesticides								
	Aldrin	<0.020		0.020	ug/g	25-NOV-20	0.05	0.088
	gamma-hexachlorocyclohexane	<0.050	DLM	0.050	ug/g	25-NOV-20	**0.01	0.056
	a-chlordane	<0.020		0.020	ug/g	25-NOV-20		
	Chlordane (Total)	<0.028		0.028	ug/g	25-NOV-20	0.05	0.05
	g-chlordane	<0.020		0.020	ug/g	25-NOV-20		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2530806-9	BH106-20 SA1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Organochlorine Pesticides								
	op-DDD	<0.020		0.020	ug/g	25-NOV-20		
	pp-DDD	<0.020		0.020	ug/g	25-NOV-20		
	Total DDD	<0.028		0.028	ug/g	25-NOV-20	0.05	4.6
	o,p-DDE	<0.020		0.020	ug/g	25-NOV-20		
	pp-DDE	<0.020		0.020	ug/g	25-NOV-20		
	Total DDE	<0.028		0.028	ug/g	25-NOV-20	0.05	0.52
	op-DDT	<0.020		0.020	ug/g	25-NOV-20		
	pp-DDT	<0.020		0.020	ug/g	25-NOV-20		
	Total DDT	<0.028		0.028	ug/g	25-NOV-20	1.4	1.4
	Dieldrin	<0.020		0.020	ug/g	25-NOV-20	0.05	0.088
	Endosulfan I	<0.020		0.020	ug/g	25-NOV-20		
	Endosulfan II	<0.020		0.020	ug/g	25-NOV-20		
	Endosulfan (Total)	<0.028		0.028	ug/g	25-NOV-20	0.04	0.3
	Endrin	<0.020		0.020	ug/g	25-NOV-20	0.04	0.04
	Heptachlor	<0.020		0.020	ug/g	25-NOV-20	0.05	0.19
	Heptachlor Epoxide	<0.020		0.020	ug/g	25-NOV-20	0.05	0.05
	Hexachlorobenzene	<0.050	DLM	0.050	ug/g	25-NOV-20	**0.01	0.66
	Hexachlorobutadiene	<0.050	DLM	0.050	ug/g	25-NOV-20	**0.01	**0.031
	Hexachloroethane	<0.050	DLM	0.050	ug/g	25-NOV-20	**0.01	0.21
	Methoxychlor	<0.020		0.020	ug/g	25-NOV-20	0.05	1.6
	Surrogate: 2-Fluorobiphenyl	67.8		50-140	%	25-NOV-20		
	Surrogate: d14-Terphenyl	58.3		50-140	%	25-NOV-20		
L2530806-10	BH106-20 SA2							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Physical Tests								
	Conductivity	0.985		0.0040	mS/cm	24-NOV-20	*0.57	1.4
	% Moisture	20.6		0.25	%	20-NOV-20		
	pH	7.34		0.10	pH units	23-NOV-20		
Saturated Paste Extractables								
	SAR	24.3	SAR:M	0.10	SAR	24-NOV-20	*2.4	*12
	Calcium (Ca)	4.48		0.50	mg/L	24-NOV-20		
	Magnesium (Mg)	<0.50		0.50	mg/L	24-NOV-20		
	Sodium (Na)	187		0.50	mg/L	24-NOV-20		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	2.0		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	15.8		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	<5.0		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	7.7		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	3.1		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	13.1		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	3.8		1.0	ug/g	24-NOV-20	120	120

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-10	BH106-20 SA2							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Metals								
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	6.1		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	16.5		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	19.3		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	68
	o-Xylene	<0.020		0.020	ug/g	19-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	112.3		50-140	%	19-NOV-20		
	Surrogate: 1,4-Difluorobenzene	107.9		50-140	%	19-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	55
	F1-BTEX	<5.0		5.0	ug/g	23-NOV-20	25	55
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	230
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	23-NOV-20		
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	72.7		60-140	%	20-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	83.1		60-140	%	19-NOV-20		
L2530806-11	BH107-20 SS1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Physical Tests								
	Conductivity	0.127		0.0040	mS/cm	24-NOV-20	0.57	1.4
	% Moisture	9.13		0.25	%	20-NOV-20		
Saturated Paste Extractables								
	SAR	1.86	SAR:M	0.10	SAR	24-NOV-20	2.4	12
	Calcium (Ca)	5.85		0.50	mg/L	24-NOV-20		
	Magnesium (Mg)	<0.50		0.50	mg/L	24-NOV-20		
	Sodium (Na)	16.3		0.50	mg/L	24-NOV-20		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	2.6		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	32.4		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	<5.0		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-11	BH107-20 SS1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL							
Metals								
	Chromium (Cr)	17.4		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	3.7		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	42.8		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	25.7		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	8.7		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	20.9		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	66.0		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	68
	o-Xylene	<0.020		0.020	ug/g	19-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	137.4		50-140	%	19-NOV-20		
	Surrogate: 1,4-Difluorobenzene	135.1		50-140	%	19-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	55
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	55
	F2 (C10-C16)	<20	DLM	20	ug/g	24-NOV-20	**10	230
	F2-Naphth	<20		20	ug/g	24-NOV-20		
	F3 (C16-C34)	410	DLM	100	ug/g	24-NOV-20	*240	1700
	F3-PAH	410		100	ug/g	24-NOV-20		
	F4 (C34-C50)	830	DLM	100	ug/g	24-NOV-20	*120	3300
	F4G-SG (GHH-Silica)	3040		250	ug/g	23-NOV-20	*120	3300
	Total Hydrocarbons (C6-C50)	1240		140	ug/g	24-NOV-20		
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	81.0		60-140	%	24-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	88.8		60-140	%	19-NOV-20		
Polycyclic Aromatic Hydrocarbons								
	Acenaphthene	<0.050		0.050	ug/g	24-NOV-20	0.072	96
	Acenaphthylene	<0.050		0.050	ug/g	24-NOV-20	0.093	0.15
	Anthracene	<0.050		0.050	ug/g	24-NOV-20	0.16	0.67
	Benzo(a)anthracene	<0.050		0.050	ug/g	24-NOV-20	0.36	0.96
	Benzo(a)pyrene	<0.050		0.050	ug/g	24-NOV-20	0.3	0.3
	Benzo(b)fluoranthene	<0.050		0.050	ug/g	24-NOV-20	0.47	0.96
	Benzo(g,h,i)perylene	<0.050		0.050	ug/g	24-NOV-20	0.68	9.6
	Benzo(k)fluoranthene	<0.050		0.050	ug/g	24-NOV-20	0.48	0.96
	Chrysene	0.055		0.050	ug/g	24-NOV-20	2.8	9.6
	Dibenzo(ah)anthracene	<0.050		0.050	ug/g	24-NOV-20	0.1	0.1
	Fluoranthene	<0.050		0.050	ug/g	24-NOV-20	0.56	9.6

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-11	BH107-20 SS1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Polycyclic Aromatic Hydrocarbons								
	Fluorene	<0.050		0.050	ug/g	24-NOV-20	0.12	62
	Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	24-NOV-20	0.23	0.76
	1+2-Methylnaphthalenes	<0.042		0.042	ug/g	24-NOV-20	0.59	76
	1-Methylnaphthalene	<0.030		0.030	ug/g	24-NOV-20	0.59	76
	2-Methylnaphthalene	<0.030		0.030	ug/g	24-NOV-20	0.59	76
	Naphthalene	<0.013		0.013	ug/g	24-NOV-20	0.09	9.6
	Phenanthrene	<0.046		0.046	ug/g	24-NOV-20	0.69	12
	Pyrene	<0.050		0.050	ug/g	24-NOV-20	1	96
	Surrogate: 2-Fluorobiphenyl	78.4		50-140	%	24-NOV-20		
	Surrogate: p-Terphenyl d14	92.8		50-140	%	24-NOV-20		
L2530806-12	BH108-20 SA1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Physical Tests								
	Conductivity	0.363		0.0040	mS/cm	24-NOV-20	0.57	1.4
	% Moisture	14.8		0.25	%	20-NOV-20		
Saturated Paste Extractables								
	SAR	13.9	SAR:M	0.10	SAR	24-NOV-20	*2.4	*12
	Calcium (Ca)	2.01		0.50	mg/L	24-NOV-20		
	Magnesium (Mg)	<0.50		0.50	mg/L	24-NOV-20		
	Sodium (Na)	71.8		0.50	mg/L	24-NOV-20		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	2.4		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	24.8		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	<5.0		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	10.6		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	4.0		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	15.9		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	12.6		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	8.4		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	15.0		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	48.8		5.0	ug/g	24-NOV-20	290	340
Volatile Organic Compounds								
	Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.32
	Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	9.5
	Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	68

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

47877-100 (HEART LAKE)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-12	BH108-20 SA1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Volatile Organic Compounds								
	o-Xylene	<0.020		0.020	ug/g	19-NOV-20		
	m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20		
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	26
	Surrogate: 4-Bromofluorobenzene	110.1		50-140	%	19-NOV-20		
	Surrogate: 1,4-Difluorobenzene	106.8		50-140	%	19-NOV-20		
Hydrocarbons								
	F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	55
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	55
	F2 (C10-C16)	<10		10	ug/g	24-NOV-20	10	230
	F3 (C16-C34)	56		50	ug/g	24-NOV-20	240	1700
	F4 (C34-C50)	126		50	ug/g	24-NOV-20	*120	3300
	F4G-SG (GHH-Silica)	550		250	ug/g	23-NOV-20	*120	3300
	Total Hydrocarbons (C6-C50)	181		72	ug/g	24-NOV-20		
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20		
	Surrogate: 2-Bromobenzotrifluoride	66.5		60-140	%	24-NOV-20		
	Surrogate: 3,4-Dichlorotoluene	89.2		60-140	%	19-NOV-20		
L2530806-13	BH108-20 SA2							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40
	Arsenic (As)	6.1		1.0	ug/g	24-NOV-20	18	18
	Barium (Ba)	122		1.0	ug/g	24-NOV-20	220	670
	Beryllium (Be)	0.62		0.50	ug/g	24-NOV-20	2.5	8
	Boron (B)	6.8		5.0	ug/g	24-NOV-20	36	120
	Cadmium (Cd)	1.07		0.50	ug/g	24-NOV-20	1.2	1.9
	Chromium (Cr)	15.9		1.0	ug/g	24-NOV-20	70	160
	Cobalt (Co)	4.7		1.0	ug/g	24-NOV-20	21	80
	Copper (Cu)	35.7		1.0	ug/g	24-NOV-20	92	230
	Lead (Pb)	15.4		1.0	ug/g	24-NOV-20	120	120
	Molybdenum (Mo)	1.2		1.0	ug/g	24-NOV-20	2	40
	Nickel (Ni)	15.2		1.0	ug/g	24-NOV-20	82	270
	Selenium (Se)	1.6		1.0	ug/g	24-NOV-20	*1.5	5.5
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3
	Uranium (U)	1.7		1.0	ug/g	24-NOV-20	2.5	33
	Vanadium (V)	26.0		1.0	ug/g	24-NOV-20	86	86
	Zinc (Zn)	65.5		5.0	ug/g	24-NOV-20	290	340

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON511/11-T1/T3-RPIICC/ICC-SOIL

#1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use **#2: T3-Soil-Ind/Com/Commu. Property Use (Coarse)**

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
SAR:M	Reported SAR represents a maximum value. Actual SAR may be lower if both Ca and Mg were detectable.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

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).

ALS Test Code	Matrix	Test Description	Method Reference***
CHLORDANE-T-CALC-WT	Soil	Chlordane Total sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

ALS Test Code	Matrix	Test Description	Method Reference***
DDD-DDE-DDT-CALC-WT	Soil	DDD, DDE, DDT sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

ALS Test Code	Matrix	Test Description	Method Reference***
EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity 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).

ALS Test Code	Matrix	Test Description	Method Reference***
ENDOSULFAN-T-CALC-WT	Soil	Endosulfan Total sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

ALS Test Code	Matrix	Test Description	Method Reference***
F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S

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

Hydrocarbon results are expressed on a dry weight basis.

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.
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.

ALS Test Code	Matrix	Test Description	Method Reference***
F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then 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).

Reference Information

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

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

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).

F4G-ADD-511-WT	Soil	F4G SG-O.Reg 153/04 (July 2011)	MOE DECPH-E3398/CCME TIER 1

F4G, gravimetric analysis, is determined if the chromatogram does not return to baseline at or before C50. A soil sample is extracted with a solvent mix, the solvent is evaporated and the weight of the residue is determined.

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-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020B (mod)

Soil/sediment is dried, disaggregated, and sieved (2 mm). For tests intended to support Ontario regulations, the <2mm fraction is ground to pass through a 0.355 mm sieve. Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.

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	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking techniqueis used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by 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).

PEST-OC-511-WT	Soil	OC Pesticides-O.Reg 153/04 (July 2011)	SW846 8270 (511)

Soil sample is extracted in a solvent, after extraction a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

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	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

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).

Reference Information

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

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).

XYLENES-SUM-CALC-WT	Soil	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:

17-825494

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	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.

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT	**Soil**							
Batch R5290437								
WG3447892-4	**DUP**	**WG3447892-3**						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	19-NOV-20
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	19-NOV-20
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-NOV-20
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	19-NOV-20
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	19-NOV-20
WG3447892-2	**LCS**							
Benzene			110.8		%		70-130	19-NOV-20
Ethylbenzene			102.8		%		70-130	19-NOV-20
m+p-Xylenes			103.9		%		70-130	19-NOV-20
o-Xylene			105.9		%		70-130	19-NOV-20
Toluene			107.6		%		70-130	19-NOV-20
WG3447892-1	**MB**							
Benzene			<0.0068		ug/g		0.0068	19-NOV-20
Ethylbenzene			<0.018		ug/g		0.018	19-NOV-20
m+p-Xylenes			<0.030		ug/g		0.03	19-NOV-20
o-Xylene			<0.020		ug/g		0.02	19-NOV-20
Toluene			<0.080		ug/g		0.08	19-NOV-20
Surrogate: 1,4-Difluorobenzene			121.1		%		50-140	19-NOV-20
Surrogate: 4-Bromofluorobenzene			126.4		%		50-140	19-NOV-20
WG3447892-5	**MS**	**WG3447892-3**						
Benzene			103.8		%		60-140	19-NOV-20
Ethylbenzene			94.9		%		60-140	19-NOV-20
m+p-Xylenes			96.7		%		60-140	19-NOV-20
o-Xylene			98.2		%		60-140	19-NOV-20
Toluene			100.3		%		60-140	19-NOV-20
Batch R5290765								
WG3447145-4	**DUP**	**WG3447145-3**						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	20-NOV-20
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	20-NOV-20
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	20-NOV-20
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	20-NOV-20
WG3447145-2	**LCS**							
Benzene			108.6		%		70-130	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT	**Soil**							
Batch	**R5290765**							
WG3447145-2	**LCS**							
Ethylbenzene			86.0		%		70-130	20-NOV-20
m+p-Xylenes			90.6		%		70-130	20-NOV-20
o-Xylene			87.0		%		70-130	20-NOV-20
Toluene			91.4		%		70-130	20-NOV-20
WG3447145-1	**MB**							
Benzene			<0.0068		ug/g		0.0068	20-NOV-20
Ethylbenzene			<0.018		ug/g		0.018	20-NOV-20
m+p-Xylenes			<0.030		ug/g		0.03	20-NOV-20
o-Xylene			<0.020		ug/g		0.02	20-NOV-20
Toluene			<0.080		ug/g		0.08	20-NOV-20
Surrogate: 1,4-Difluorobenzene			113.4		%		50-140	20-NOV-20
Surrogate: 4-Bromofluorobenzene			97.1		%		50-140	20-NOV-20
WG3447145-5	**MS**	**WG3447145-3**						
Benzene			110.8		%		60-140	20-NOV-20
Ethylbenzene			87.6		%		60-140	20-NOV-20
m+p-Xylenes			91.7		%		60-140	20-NOV-20
o-Xylene			82.3		%		60-140	20-NOV-20
Toluene			93.7		%		60-140	20-NOV-20
EC-WT	**Soil**							
Batch	**R5296958**							
WG3450328-4	**DUP**	**WG3450328-3**						
Conductivity		0.242	0.228		mS/cm	6.0	20	24-NOV-20
WG3450328-2	**IRM**	**WT SAR4**						
Conductivity			89.1		%		70-130	24-NOV-20
WG3450689-1	**LCS**							
Conductivity			99.1		%		90-110	24-NOV-20
WG3450328-1	**MB**							
Conductivity			<0.0040		mS/cm		0.004	24-NOV-20
F1-HS-511-WT	**Soil**							
Batch	**R5290437**							
WG3447892-4	**DUP**	**WG3447892-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	19-NOV-20
WG3447892-2	**LCS**							
F1 (C6-C10)			88.6		%		80-120	19-NOV-20
WG3447892-1	**MB**							

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Soil**							
Batch R5290437								
WG3447892-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	19-NOV-20
Surrogate: 3,4-Dichlorotoluene			108.0		%		60-140	19-NOV-20
WG3447892-6 MS		**L2531070-2**						
F1 (C6-C10)			86.9		%		60-140	19-NOV-20
Batch R5290765								
WG3447145-4 DUP		**WG3447145-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	20-NOV-20
WG3447145-2 LCS								
F1 (C6-C10)			99.4		%		80-120	20-NOV-20
WG3447145-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	20-NOV-20
Surrogate: 3,4-Dichlorotoluene			116.2		%		60-140	20-NOV-20
WG3447145-6 MS		**L2530464-5**						
F1 (C6-C10)			97.5		%		60-140	20-NOV-20
F2-F4-511-WT	**Soil**							
Batch R5291582								
WG3447829-3 DUP		**WG3447829-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	20-NOV-20
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	20-NOV-20
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	20-NOV-20
WG3447829-2 LCS								
F2 (C10-C16)			103.9		%		80-120	20-NOV-20
F3 (C16-C34)			104.3		%		80-120	20-NOV-20
F4 (C34-C50)			104.8		%		80-120	20-NOV-20
WG3447829-1 MB								
F2 (C10-C16)			<10		ug/g		10	20-NOV-20
F3 (C16-C34)			<50		ug/g		50	20-NOV-20
F4 (C34-C50)			<50		ug/g		50	20-NOV-20
Surrogate: 2-Bromobenzotrifluoride			96.3		%		60-140	20-NOV-20
WG3447829-4 MS		**WG3447829-5**						
F2 (C10-C16)			99.4		%		60-140	20-NOV-20
F3 (C16-C34)			101.4		%		60-140	20-NOV-20
F4 (C34-C50)			102.1		%		60-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT	**Soil**							
Batch R5292716								
WG3447843-7 DUP		**WG3447843-6**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	23-NOV-20
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	23-NOV-20
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	23-NOV-20
WG3447843-2 LCS								
F2 (C10-C16)			89.3		%		80-120	20-NOV-20
F3 (C16-C34)			85.0		%		80-120	20-NOV-20
F4 (C34-C50)			68.3	LCS-L	%		80-120	20-NOV-20
WG3447843-1 MB								
F2 (C10-C16)			<10		ug/g		10	20-NOV-20
F3 (C16-C34)			<50		ug/g		50	20-NOV-20
F4 (C34-C50)			<50		ug/g		50	20-NOV-20
Surrogate: 2-Bromobenzotrifluoride			89.1		%		60-140	20-NOV-20
WG3447843-8 MS		**WG3447843-6**						
F2 (C10-C16)			97.0		%		60-140	23-NOV-20
F3 (C16-C34)			88.6		%		60-140	23-NOV-20
F4 (C34-C50)			75.0		%		60-140	23-NOV-20
Batch R5296980								
WG3450219-3 DUP		**WG3450219-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	24-NOV-20
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	24-NOV-20
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	24-NOV-20
WG3450219-2 LCS								
F2 (C10-C16)			100.6		%		80-120	24-NOV-20
F3 (C16-C34)			106.0		%		80-120	24-NOV-20
F4 (C34-C50)			110.9		%		80-120	24-NOV-20
WG3450219-1 MB								
F2 (C10-C16)			<10		ug/g		10	24-NOV-20
F3 (C16-C34)			<50		ug/g		50	24-NOV-20
F4 (C34-C50)			<50		ug/g		50	24-NOV-20
Surrogate: 2-Bromobenzotrifluoride			81.1		%		60-140	24-NOV-20
WG3450219-4 MS		**WG3450219-5**						
F2 (C10-C16)			98.3		%		60-140	24-NOV-20
F3 (C16-C34)			102.0		%		60-140	24-NOV-20
F4 (C34-C50)			107.2		%		60-140	24-NOV-20
F4G-ADD-511-WT	**Soil**							

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F4G-ADD-511-WT	**Soil**							
Batch R5297134								
WG3451247-2 LCS								
F4G-SG (GHH-Silica)			65.3		%		60-140	23-NOV-20
WG3451247-1 MB								
F4G-SG (GHH-Silica)			<250		ug/g		250	23-NOV-20
MET-200.2-CCMS-WT	**Soil**							
Batch R5297165								
WG3450325-2 CRM		**WT-SS-2**						
Antimony (Sb)			89.8		%		70-130	24-NOV-20
Arsenic (As)			96.5		%		70-130	24-NOV-20
Barium (Ba)			98.0		%		70-130	24-NOV-20
Beryllium (Be)			93.1		%		70-130	24-NOV-20
Boron (B)			7.1		mg/kg		3.5-13.5	24-NOV-20
Cadmium (Cd)			118.6		%		70-130	24-NOV-20
Chromium (Cr)			93.0		%		70-130	24-NOV-20
Cobalt (Co)			96.6		%		70-130	24-NOV-20
Copper (Cu)			97.2		%		70-130	24-NOV-20
Lead (Pb)			96.8		%		70-130	24-NOV-20
Molybdenum (Mo)			96.2		%		70-130	24-NOV-20
Nickel (Ni)			99.2		%		70-130	24-NOV-20
Selenium (Se)			0.12		mg/kg		0-0.34	24-NOV-20
Silver (Ag)			87.1		%		70-130	24-NOV-20
Thallium (Tl)			0.070		mg/kg		0.029-0.129	24-NOV-20
Uranium (U)			85.0		%		70-130	24-NOV-20
Vanadium (V)			96.1		%		70-130	24-NOV-20
Zinc (Zn)			96.2		%		70-130	24-NOV-20
WG3450325-6 DUP		**WG3450325-5**						
Antimony (Sb)		4.96	4.13		ug/g	18	30	24-NOV-20
Arsenic (As)		4.15	3.65		ug/g	13	30	24-NOV-20
Barium (Ba)		583	477		ug/g	20	40	24-NOV-20
Beryllium (Be)		0.15	0.12		ug/g	23	30	24-NOV-20
Boron (B)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	24-NOV-20
Cadmium (Cd)		2.05	1.63		ug/g	23	30	24-NOV-20
Chromium (Cr)		77.5	67.9		ug/g	13	30	24-NOV-20
Cobalt (Co)		5.97	4.89		ug/g	20	30	24-NOV-20
Copper (Cu)		270	238		ug/g	12	30	24-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5297165								
WG3450325-6 DUP		**WG3450325-5**						
Lead (Pb)		229	185		ug/g	21	40	24-NOV-20
Molybdenum (Mo)		3.92	3.26		ug/g	18	40	24-NOV-20
Nickel (Ni)		50.1	34.0	MES	ug/g	38	30	24-NOV-20
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	24-NOV-20
Silver (Ag)		0.15	0.12		ug/g	27	40	24-NOV-20
Thallium (Tl)		<0.050	<0.050	RPD-NA	ug/g	N/A	30	24-NOV-20
Uranium (U)		0.156	0.144		ug/g	7.6	30	24-NOV-20
Vanadium (V)		10.5	8.87		ug/g	17	30	24-NOV-20
Zinc (Zn)		275	229		ug/g	18	30	24-NOV-20
WG3450325-4 LCS								
Antimony (Sb)			98.8		%		80-120	24-NOV-20
Arsenic (As)			99.5		%		80-120	24-NOV-20
Barium (Ba)			99.2		%		80-120	24-NOV-20
Beryllium (Be)			89.5		%		80-120	24-NOV-20
Boron (B)			84.1		%		80-120	24-NOV-20
Cadmium (Cd)			95.8		%		80-120	24-NOV-20
Chromium (Cr)			98.6		%		80-120	24-NOV-20
Cobalt (Co)			95.6		%		80-120	24-NOV-20
Copper (Cu)			95.0		%		80-120	24-NOV-20
Lead (Pb)			95.0		%		80-120	24-NOV-20
Molybdenum (Mo)			95.5		%		80-120	24-NOV-20
Nickel (Ni)			96.2		%		80-120	24-NOV-20
Selenium (Se)			100.5		%		80-120	24-NOV-20
Silver (Ag)			96.6		%		80-120	24-NOV-20
Thallium (Tl)			95.0		%		80-120	24-NOV-20
Uranium (U)			84.1		%		80-120	24-NOV-20
Vanadium (V)			100.2		%		80-120	24-NOV-20
Zinc (Zn)			94.2		%		80-120	24-NOV-20
WG3450325-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	24-NOV-20
Arsenic (As)			<0.10		mg/kg		0.1	24-NOV-20
Barium (Ba)			<0.50		mg/kg		0.5	24-NOV-20
Beryllium (Be)			<0.10		mg/kg		0.1	24-NOV-20
Boron (B)			<5.0		mg/kg		5	24-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5297165								
WG3450325-1 MB								
Cadmium (Cd)			<0.020		mg/kg		0.02	24-NOV-20
Chromium (Cr)			<0.50		mg/kg		0.5	24-NOV-20
Cobalt (Co)			<0.10		mg/kg		0.1	24-NOV-20
Copper (Cu)			<0.50		mg/kg		0.5	24-NOV-20
Lead (Pb)			<0.50		mg/kg		0.5	24-NOV-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	24-NOV-20
Nickel (Ni)			<0.50		mg/kg		0.5	24-NOV-20
Selenium (Se)			<0.20		mg/kg		0.2	24-NOV-20
Silver (Ag)			<0.10		mg/kg		0.1	24-NOV-20
Thallium (Tl)			<0.050		mg/kg		0.05	24-NOV-20
Uranium (U)			<0.050		mg/kg		0.05	24-NOV-20
Vanadium (V)			<0.20		mg/kg		0.2	24-NOV-20
Zinc (Zn)			<2.0		mg/kg		2	24-NOV-20
Batch R5297301								
WG3450279-2 CRM		**WT-SS-2**						
Antimony (Sb)			104.4		%		70-130	24-NOV-20
Arsenic (As)			114.4		%		70-130	24-NOV-20
Barium (Ba)			111.0		%		70-130	24-NOV-20
Beryllium (Be)			111.3		%		70-130	24-NOV-20
Boron (B)			10.3		mg/kg		3.5-13.5	24-NOV-20
Cadmium (Cd)			102.2		%		70-130	24-NOV-20
Chromium (Cr)			114.4		%		70-130	24-NOV-20
Cobalt (Co)			108.9		%		70-130	24-NOV-20
Copper (Cu)			109.2		%		70-130	24-NOV-20
Lead (Pb)			106.8		%		70-130	24-NOV-20
Molybdenum (Mo)			110.2		%		70-130	24-NOV-20
Nickel (Ni)			108.0		%		70-130	24-NOV-20
Selenium (Se)			0.14		mg/kg		0-0.34	24-NOV-20
Silver (Ag)			103.3		%		70-130	24-NOV-20
Thallium (Tl)			0.078		mg/kg		0.029-0.129	24-NOV-20
Uranium (U)			97.4		%		70-130	24-NOV-20
Vanadium (V)			113.5		%		70-130	24-NOV-20
Zinc (Zn)			104.1		%		70-130	24-NOV-20
WG3450279-4 DUP		**L2530877-11**						

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5297301								
WG3450279-4 DUP		**L2530877-11**						
Antimony (Sb)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	24-NOV-20
Arsenic (As)		8.4	8.2		ug/g	2.7	30	24-NOV-20
Barium (Ba)		78.8	79.6		ug/g	1.1	40	24-NOV-20
Beryllium (Be)		0.58	0.56		ug/g	4.3	30	24-NOV-20
Boron (B)		12.7	12.2		ug/g	3.4	30	24-NOV-20
Cadmium (Cd)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	24-NOV-20
Chromium (Cr)		22.0	21.7		ug/g	1.6	30	24-NOV-20
Cobalt (Co)		11.7	11.2		ug/g	4.9	30	24-NOV-20
Copper (Cu)		17.3	16.9		ug/g	2.2	30	24-NOV-20
Lead (Pb)		9.6	9.7		ug/g	1.1	40	24-NOV-20
Molybdenum (Mo)		3.6	3.5		ug/g	1.4	40	24-NOV-20
Nickel (Ni)		25.2	24.7		ug/g	2.0	30	24-NOV-20
Selenium (Se)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	24-NOV-20
Silver (Ag)		<0.20	<0.20	RPD-NA	ug/g	N/A	40	24-NOV-20
Thallium (Tl)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	24-NOV-20
Uranium (U)		1.2	1.2		ug/g	0.8	30	24-NOV-20
Vanadium (V)		32.4	32.1		ug/g	1.0	30	24-NOV-20
Zinc (Zn)		51.0	50.8		ug/g	0.4	30	24-NOV-20
WG3450279-3 LCS								
Antimony (Sb)			105.4		%		80-120	24-NOV-20
Arsenic (As)			98.5		%		80-120	24-NOV-20
Barium (Ba)			101.5		%		80-120	24-NOV-20
Beryllium (Be)			96.4		%		80-120	24-NOV-20
Boron (B)			93.1		%		80-120	24-NOV-20
Cadmium (Cd)			97.6		%		80-120	24-NOV-20
Chromium (Cr)			97.5		%		80-120	24-NOV-20
Cobalt (Co)			95.9		%		80-120	24-NOV-20
Copper (Cu)			94.7		%		80-120	24-NOV-20
Lead (Pb)			98.1		%		80-120	24-NOV-20
Molybdenum (Mo)			97.9		%		80-120	24-NOV-20
Nickel (Ni)			95.3		%		80-120	24-NOV-20
Selenium (Se)			97.6		%		80-120	24-NOV-20
Silver (Ag)			98.3		%		80-120	24-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5297301								
WG3450279-3 LCS								
Thallium (Tl)			98.6		%		80-120	24-NOV-20
Uranium (U)			91.7		%		80-120	24-NOV-20
Vanadium (V)			99.3		%		80-120	24-NOV-20
Zinc (Zn)			95.1		%		80-120	24-NOV-20
WG3450279-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	24-NOV-20
Arsenic (As)			<0.10		mg/kg		0.1	24-NOV-20
Barium (Ba)			<0.50		mg/kg		0.5	24-NOV-20
Beryllium (Be)			<0.10		mg/kg		0.1	24-NOV-20
Boron (B)			<5.0		mg/kg		5	24-NOV-20
Cadmium (Cd)			<0.020		mg/kg		0.02	24-NOV-20
Chromium (Cr)			<0.50		mg/kg		0.5	24-NOV-20
Cobalt (Co)			<0.10		mg/kg		0.1	24-NOV-20
Copper (Cu)			<0.50		mg/kg		0.5	24-NOV-20
Lead (Pb)			<0.50		mg/kg		0.5	24-NOV-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	24-NOV-20
Nickel (Ni)			<0.50		mg/kg		0.5	24-NOV-20
Selenium (Se)			<0.20		mg/kg		0.2	24-NOV-20
Silver (Ag)			<0.10		mg/kg		0.1	24-NOV-20
Thallium (Tl)			<0.050		mg/kg		0.05	24-NOV-20
Uranium (U)			<0.050		mg/kg		0.05	24-NOV-20
Vanadium (V)			<0.20		mg/kg		0.2	24-NOV-20
Zinc (Zn)			<2.0		mg/kg		2	24-NOV-20
MOISTURE-WT	**Soil**							
Batch R5290559								
WG3448408-3 DUP		**L2530464-8**						
% Moisture		16.3	15.6		%	3.8	20	20-NOV-20
WG3448408-2 LCS								
% Moisture			100.0		%		90-110	20-NOV-20
WG3448408-1 MB								
% Moisture			<0.25		%		0.25	20-NOV-20
PAH-511-WT	**Soil**							

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5292577								
WG3447820-3 DUP		**WG3447820-5**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	20-NOV-20
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	20-NOV-20
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	20-NOV-20
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	20-NOV-20
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
WG3447820-2 LCS								
1-Methylnaphthalene			99.7		%		50-140	20-NOV-20
2-Methylnaphthalene			94.2		%		50-140	20-NOV-20
Acenaphthene			99.1		%		50-140	20-NOV-20
Acenaphthylene			97.6		%		50-140	20-NOV-20
Anthracene			97.4		%		50-140	20-NOV-20
Benzo(a)anthracene			100.4		%		50-140	20-NOV-20
Benzo(a)pyrene			98.1		%		50-140	20-NOV-20
Benzo(b)fluoranthene			104.5		%		50-140	20-NOV-20
Benzo(g,h,i)perylene			87.0		%		50-140	20-NOV-20
Benzo(k)fluoranthene			106.1		%		50-140	20-NOV-20
Chrysene			111.5		%		50-140	20-NOV-20
Dibenzo(ah)anthracene			79.1		%		50-140	20-NOV-20
Fluoranthene			96.7		%		50-140	20-NOV-20
Fluorene			94.0		%		50-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5292577								
WG3447820-2 LCS								
Indeno(1,2,3-cd)pyrene			89.4		%		50-140	20-NOV-20
Naphthalene			98.1		%		50-140	20-NOV-20
Phenanthrene			101.1		%		50-140	20-NOV-20
Pyrene			97.1		%		50-140	20-NOV-20
WG3447820-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	20-NOV-20
2-Methylnaphthalene			<0.030		ug/g		0.03	20-NOV-20
Acenaphthene			<0.050		ug/g		0.05	20-NOV-20
Acenaphthylene			<0.050		ug/g		0.05	20-NOV-20
Anthracene			<0.050		ug/g		0.05	20-NOV-20
Benzo(a)anthracene			<0.050		ug/g		0.05	20-NOV-20
Benzo(a)pyrene			<0.050		ug/g		0.05	20-NOV-20
Benzo(b)fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	20-NOV-20
Benzo(k)fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Chrysene			<0.050		ug/g		0.05	20-NOV-20
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	20-NOV-20
Fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Fluorene			<0.050		ug/g		0.05	20-NOV-20
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	20-NOV-20
Naphthalene			<0.013		ug/g		0.013	20-NOV-20
Phenanthrene			<0.046		ug/g		0.046	20-NOV-20
Pyrene			<0.050		ug/g		0.05	20-NOV-20
Surrogate: 2-Fluorobiphenyl			83.8		%		50-140	20-NOV-20
Surrogate: p-Terphenyl d14			86.5		%		50-140	20-NOV-20
WG3447820-4 MS		**WG3447820-5**						
1-Methylnaphthalene			90.2		%		50-140	20-NOV-20
2-Methylnaphthalene			84.6		%		50-140	20-NOV-20
Acenaphthene			93.0		%		50-140	20-NOV-20
Acenaphthylene			91.7		%		50-140	20-NOV-20
Anthracene			94.5		%		50-140	20-NOV-20
Benzo(a)anthracene			102.8		%		50-140	20-NOV-20
Benzo(a)pyrene			95.3		%		50-140	20-NOV-20
Benzo(b)fluoranthene			102.4		%		50-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5292577								
WG3447820-4 MS		**WG3447820-5**						
Benzo(g,h,i)perylene			87.9		%		50-140	20-NOV-20
Benzo(k)fluoranthene			96.6		%		50-140	20-NOV-20
Chrysene			101.9		%		50-140	20-NOV-20
Dibenzo(ah)anthracene			85.3		%		50-140	20-NOV-20
Fluoranthene			93.9		%		50-140	20-NOV-20
Fluorene			91.7		%		50-140	20-NOV-20
Indeno(1,2,3-cd)pyrene			91.7		%		50-140	20-NOV-20
Naphthalene			86.8		%		50-140	20-NOV-20
Phenanthrene			91.4		%		50-140	20-NOV-20
Pyrene			93.1		%		50-140	20-NOV-20
Batch R5296037								
WG3448261-3 DUP		**WG3448261-5**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	23-NOV-20
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	23-NOV-20
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	23-NOV-20
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	23-NOV-20
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
WG3448261-2 LCS								
1-Methylnaphthalene			90.2		%		50-140	20-NOV-20
2-Methylnaphthalene			86.2		%		50-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5296037								
WG3448261-2 LCS								
Acenaphthene			90.5		%		50-140	20-NOV-20
Acenaphthylene			95.8		%		50-140	20-NOV-20
Anthracene			89.1		%		50-140	20-NOV-20
Benzo(a)anthracene			93.9		%		50-140	20-NOV-20
Benzo(a)pyrene			89.2		%		50-140	20-NOV-20
Benzo(b)fluoranthene			85.7		%		50-140	20-NOV-20
Benzo(g,h,i)perylene			94.0		%		50-140	20-NOV-20
Benzo(k)fluoranthene			89.3		%		50-140	20-NOV-20
Chrysene			95.6		%		50-140	20-NOV-20
Dibenzo(ah)anthracene			99.0		%		50-140	20-NOV-20
Fluoranthene			87.0		%		50-140	20-NOV-20
Fluorene			87.8		%		50-140	20-NOV-20
Indeno(1,2,3-cd)pyrene			100.4		%		50-140	20-NOV-20
Naphthalene			88.3		%		50-140	20-NOV-20
Phenanthrene			88.3		%		50-140	20-NOV-20
Pyrene			86.7		%		50-140	20-NOV-20
WG3448261-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	20-NOV-20
2-Methylnaphthalene			<0.030		ug/g		0.03	20-NOV-20
Acenaphthene			<0.050		ug/g		0.05	20-NOV-20
Acenaphthylene			<0.050		ug/g		0.05	20-NOV-20
Anthracene			<0.050		ug/g		0.05	20-NOV-20
Benzo(a)anthracene			<0.050		ug/g		0.05	20-NOV-20
Benzo(a)pyrene			<0.050		ug/g		0.05	20-NOV-20
Benzo(b)fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	20-NOV-20
Benzo(k)fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Chrysene			<0.050		ug/g		0.05	20-NOV-20
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	20-NOV-20
Fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Fluorene			<0.050		ug/g		0.05	20-NOV-20
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	20-NOV-20
Naphthalene			<0.013		ug/g		0.013	20-NOV-20
Phenanthrene			<0.046		ug/g		0.046	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5296037								
WG3448261-1 MB								
Pyrene			<0.050		ug/g		0.05	20-NOV-20
Surrogate: 2-Fluorobiphenyl			77.8		%		50-140	20-NOV-20
Surrogate: p-Terphenyl d14			82.8		%		50-140	20-NOV-20
WG3448261-4 MS		**WG3448261-5**						
1-Methylnaphthalene			94.4		%		50-140	23-NOV-20
2-Methylnaphthalene			89.3		%		50-140	23-NOV-20
Acenaphthene			94.1		%		50-140	23-NOV-20
Acenaphthylene			95.5		%		50-140	23-NOV-20
Anthracene			91.1		%		50-140	23-NOV-20
Benzo(a)anthracene			93.1		%		50-140	23-NOV-20
Benzo(a)pyrene			92.1		%		50-140	23-NOV-20
Benzo(b)fluoranthene			91.9		%		50-140	23-NOV-20
Benzo(g,h,i)perylene			103.1		%		50-140	23-NOV-20
Benzo(k)fluoranthene			90.3		%		50-140	23-NOV-20
Chrysene			99.9		%		50-140	23-NOV-20
Dibenzo(ah)anthracene			110.3		%		50-140	23-NOV-20
Fluoranthene			90.2		%		50-140	23-NOV-20
Fluorene			90.0		%		50-140	23-NOV-20
Indeno(1,2,3-cd)pyrene			103.7		%		50-140	23-NOV-20
Naphthalene			91.8		%		50-140	23-NOV-20
Phenanthrene			93.3		%		50-140	23-NOV-20
Pyrene			90.3		%		50-140	23-NOV-20
Batch R5296510								
WG3448590-3 DUP		**WG3448590-5**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	24-NOV-20
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	24-NOV-20
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5296510								
WG3448590-3 DUP		**WG3448590-5**						
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	24-NOV-20
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	24-NOV-20
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
WG3448590-2 LCS								
1-Methylnaphthalene			90.2		%		50-140	24-NOV-20
2-Methylnaphthalene			85.8		%		50-140	24-NOV-20
Acenaphthene			89.8		%		50-140	24-NOV-20
Acenaphthylene			87.6		%		50-140	24-NOV-20
Anthracene			86.8		%		50-140	24-NOV-20
Benzo(a)anthracene			87.7		%		50-140	24-NOV-20
Benzo(a)pyrene			85.6		%		50-140	24-NOV-20
Benzo(b)fluoranthene			87.7		%		50-140	24-NOV-20
Benzo(g,h,i)perylene			82.7		%		50-140	24-NOV-20
Benzo(k)fluoranthene			92.6		%		50-140	24-NOV-20
Chrysene			97.2		%		50-140	24-NOV-20
Dibenzo(ah)anthracene			84.0		%		50-140	24-NOV-20
Fluoranthene			86.8		%		50-140	24-NOV-20
Fluorene			86.4		%		50-140	24-NOV-20
Indeno(1,2,3-cd)pyrene			84.2		%		50-140	24-NOV-20
Naphthalene			88.4		%		50-140	24-NOV-20
Phenanthrene			90.4		%		50-140	24-NOV-20
Pyrene			87.0		%		50-140	24-NOV-20
WG3448590-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	24-NOV-20
2-Methylnaphthalene			<0.030		ug/g		0.03	24-NOV-20
Acenaphthene			<0.050		ug/g		0.05	24-NOV-20
Acenaphthylene			<0.050		ug/g		0.05	24-NOV-20
Anthracene			<0.050		ug/g		0.05	24-NOV-20
Benzo(a)anthracene			<0.050		ug/g		0.05	24-NOV-20

Quality Control Report

Workorder: L2530806 Report Date: 26-NOV-20

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5296510								
WG3448590-1 MB								
Benzo(a)pyrene			<0.050		ug/g		0.05	24-NOV-20
Benzo(b)fluoranthene			<0.050		ug/g		0.05	24-NOV-20
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	24-NOV-20
Benzo(k)fluoranthene			<0.050		ug/g		0.05	24-NOV-20
Chrysene			<0.050		ug/g		0.05	24-NOV-20
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	24-NOV-20
Fluoranthene			<0.050		ug/g		0.05	24-NOV-20
Fluorene			<0.050		ug/g		0.05	24-NOV-20
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	24-NOV-20
Naphthalene			<0.013		ug/g		0.013	24-NOV-20
Phenanthrene			<0.046		ug/g		0.046	24-NOV-20
Pyrene			<0.050		ug/g		0.05	24-NOV-20
Surrogate: 2-Fluorobiphenyl			80.5		%		50-140	24-NOV-20
Surrogate: p-Terphenyl d14			86.9		%		50-140	24-NOV-20
WG3448590-4 MS		**WG3448590-5**						
1-Methylnaphthalene			97.3		%		50-140	24-NOV-20
2-Methylnaphthalene			92.9		%		50-140	24-NOV-20
Acenaphthene			97.9		%		50-140	24-NOV-20
Acenaphthylene			99.7		%		50-140	24-NOV-20
Anthracene			98.2		%		50-140	24-NOV-20
Benzo(a)anthracene			103.9		%		50-140	24-NOV-20
Benzo(a)pyrene			96.4		%		50-140	24-NOV-20
Benzo(b)fluoranthene			97.7		%		50-140	24-NOV-20
Benzo(g,h,i)perylene			94.7		%		50-140	24-NOV-20
Benzo(k)fluoranthene			95.2		%		50-140	24-NOV-20
Chrysene			103.9		%		50-140	24-NOV-20
Dibenzo(ah)anthracene			98.5		%		50-140	24-NOV-20
Fluoranthene			98.3		%		50-140	24-NOV-20
Fluorene			95.7		%		50-140	24-NOV-20
Indeno(1,2,3-cd)pyrene			98.4		%		50-140	24-NOV-20
Naphthalene			94.9		%		50-140	24-NOV-20
Phenanthrene			97.7		%		50-140	24-NOV-20
Pyrene			98.3		%		50-140	24-NOV-20
PEST-OC-511-WT	**Soil**							

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PEST-OC-511-WT	**Soil**							
Batch R5291403								
WG3447048-3 DUP		**WG3447048-5**						
Aldrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
a-chlordane		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
g-chlordane		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
op-DDD		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
pp-DDD		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
o,p-DDE		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
pp-DDE		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
op-DDT		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
pp-DDT		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Dieldrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Endosulfan I		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Endosulfan II		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Endrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
gamma-hexachlorocyclohexane		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-NOV-20
Heptachlor		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Heptachlor Epoxide		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Hexachlorobenzene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-NOV-20
Hexachlorobutadiene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-NOV-20
Hexachloroethane		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-NOV-20
Methoxychlor		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
WG3447048-2 LCS								
Aldrin			116.6		%		50-140	20-NOV-20
a-chlordane			94.5		%		50-140	20-NOV-20
g-chlordane			91.2		%		50-140	20-NOV-20
op-DDD			104.3		%		50-140	20-NOV-20
pp-DDD			105.8		%		50-140	20-NOV-20
o,p-DDE			84.8		%		50-140	20-NOV-20
pp-DDE			104.8		%		50-140	20-NOV-20
op-DDT			89.6		%		50-140	20-NOV-20
pp-DDT			65.8		%		50-140	20-NOV-20
Dieldrin			99.3		%		50-140	20-NOV-20
Endosulfan I			90.9		%		50-140	20-NOV-20
Endosulfan II			101.0		%		50-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PEST-OC-511-WT	**Soil**							
Batch R5291403								
WG3447048-2 LCS								
Endrin			147.9	LCS-H	%		50-140	20-NOV-20
gamma-hexachlorocyclohexane			83.7		%		50-140	20-NOV-20
Heptachlor			110.8		%		50-140	20-NOV-20
Heptachlor Epoxide			106.3		%		50-140	20-NOV-20
Hexachlorobenzene			85.6		%		50-140	20-NOV-20
Hexachlorobutadiene			79.8		%		50-140	20-NOV-20
Hexachloroethane			79.9		%		50-140	20-NOV-20
Methoxychlor			118.2		%		50-140	20-NOV-20
WG3447048-1 MB								
Aldrin			<0.020		ug/g		0.02	20-NOV-20
a-chlordane			<0.020		ug/g		0.02	20-NOV-20
g-chlordane			<0.020		ug/g		0.02	20-NOV-20
op-DDD			<0.020		ug/g		0.02	20-NOV-20
pp-DDD			<0.020		ug/g		0.02	20-NOV-20
o,p-DDE			<0.020		ug/g		0.02	20-NOV-20
pp-DDE			<0.020		ug/g		0.02	20-NOV-20
op-DDT			<0.020		ug/g		0.02	20-NOV-20
pp-DDT			<0.020		ug/g		0.02	20-NOV-20
Dieldrin			<0.020		ug/g		0.02	20-NOV-20
Endosulfan I			<0.020		ug/g		0.02	20-NOV-20
Endosulfan II			<0.020		ug/g		0.02	20-NOV-20
Endrin			<0.020		ug/g		0.02	20-NOV-20
gamma-hexachlorocyclohexane			<0.010		ug/g		0.01	20-NOV-20
Heptachlor			<0.020		ug/g		0.02	20-NOV-20
Heptachlor Epoxide			<0.020		ug/g		0.02	20-NOV-20
Hexachlorobenzene			<0.010		ug/g		0.01	20-NOV-20
Hexachlorobutadiene			<0.010		ug/g		0.01	20-NOV-20
Hexachloroethane			<0.010		ug/g		0.01	20-NOV-20
Methoxychlor			<0.020		ug/g		0.02	20-NOV-20
Surrogate: 2-Fluorobiphenyl			66.2		%		50-140	20-NOV-20
Surrogate: d14-Terphenyl			63.9		%		50-140	20-NOV-20
WG3447048-4 MS		**WG3447048-5**						
Aldrin			132.5		%		50-140	20-NOV-20
a-chlordane			93.7		%		50-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PEST-OC-511-WT	**Soil**							
Batch R5291403								
WG3447048-4	**MS**	**WG3447048-5**						
g-chlordane			90.7		%		50-140	20-NOV-20
op-DDD			103.6		%		50-140	20-NOV-20
pp-DDD			111.3		%		50-140	20-NOV-20
o,p-DDE			87.5		%		50-140	20-NOV-20
pp-DDE			108.7		%		50-140	20-NOV-20
op-DDT			88.8		%		50-140	20-NOV-20
pp-DDT			65.4		%		50-140	20-NOV-20
Dieldrin			95.1		%		50-140	20-NOV-20
Endosulfan I			89.3		%		50-140	20-NOV-20
Endosulfan II			102.0		%		50-140	20-NOV-20
Endrin			146.9	RRQC	%		50-140	20-NOV-20
gamma-hexachlorocyclohexane			90.8		%		50-140	20-NOV-20
Heptachlor			122.7		%		50-140	20-NOV-20
Heptachlor Epoxide			101.9		%		50-140	20-NOV-20
Hexachlorobenzene			93.1		%		50-140	20-NOV-20
Hexachlorobutadiene			83.1		%		50-140	20-NOV-20
Hexachloroethane			82.6		%		50-140	20-NOV-20
Methoxychlor			134.5		%		50-140	20-NOV-20

COMMENTS: RRQC: Analyte recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	**Soil**							
Batch R5295057								
WG3448241-1	**DUP**	**L2530806-7**						
pH		7.60	7.63	J	pH units	0.03	0.3	23-NOV-20
WG3449696-1	**LCS**							
pH			6.95		pH units		6.9-7.1	23-NOV-20
SAR-R511-WT	**Soil**							
Batch R5296809								
WG3450328-4	**DUP**	**WG3450328-3**						
Calcium (Ca)		3.58	3.90		mg/L	8.6	30	24-NOV-20
Sodium (Na)		22.5	20.2		mg/L	11	30	24-NOV-20
Magnesium (Mg)		<0.50	<0.50	RPD-NA	mg/L	N/A	30	24-NOV-20
WG3450328-2	**IRM**	**WT SAR4**						
Calcium (Ca)			96.3		%		70-130	24-NOV-20
Sodium (Na)			87.9		%		70-130	24-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-R511-WT	**Soil**							
Batch R5296809								
WG3450328-2 IRM		**WT SAR4**						
Magnesium (Mg)			96.6		%		70-130	24-NOV-20
WG3450328-5 LCS								
Calcium (Ca)			108.7		%		80-120	24-NOV-20
Sodium (Na)			101.6		%		80-120	24-NOV-20
Magnesium (Mg)			102.8		%		80-120	24-NOV-20
WG3450328-1 MB								
Calcium (Ca)			<0.50		mg/L		0.5	24-NOV-20
Sodium (Na)			<0.50		mg/L		0.5	24-NOV-20
Magnesium (Mg)			<0.50		mg/L		0.5	24-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Contact: JEN LAMBKE

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.
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
LCS-L	Lab Control Sample recovery was below ALS DQO. Reference Material and/or Matrix Spike results were acceptable. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
RRQC	Refer to report remarks for information regarding this QC result.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

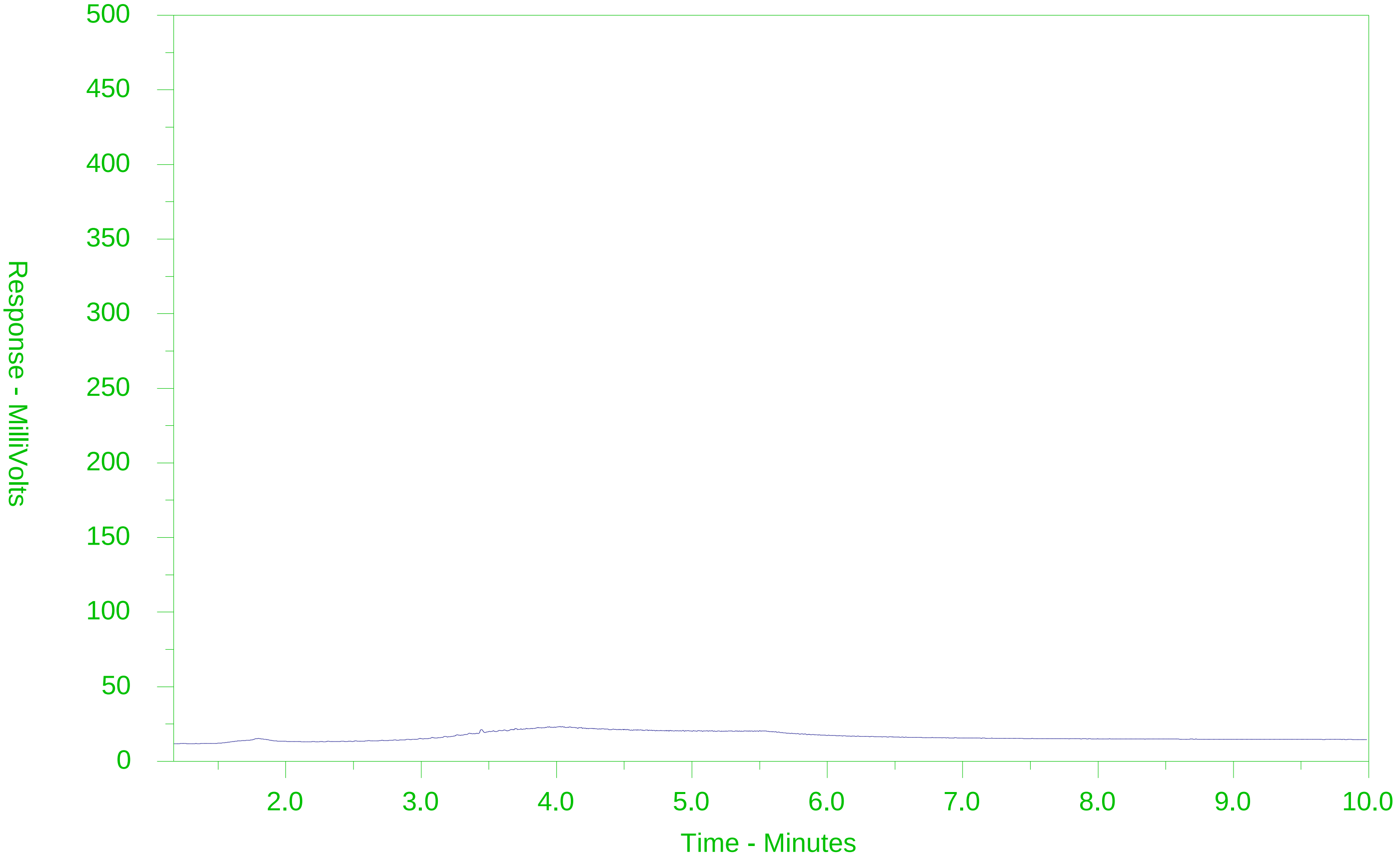
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where 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: L2530806-1
Client Sample ID: BH101-20 SS2



←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.

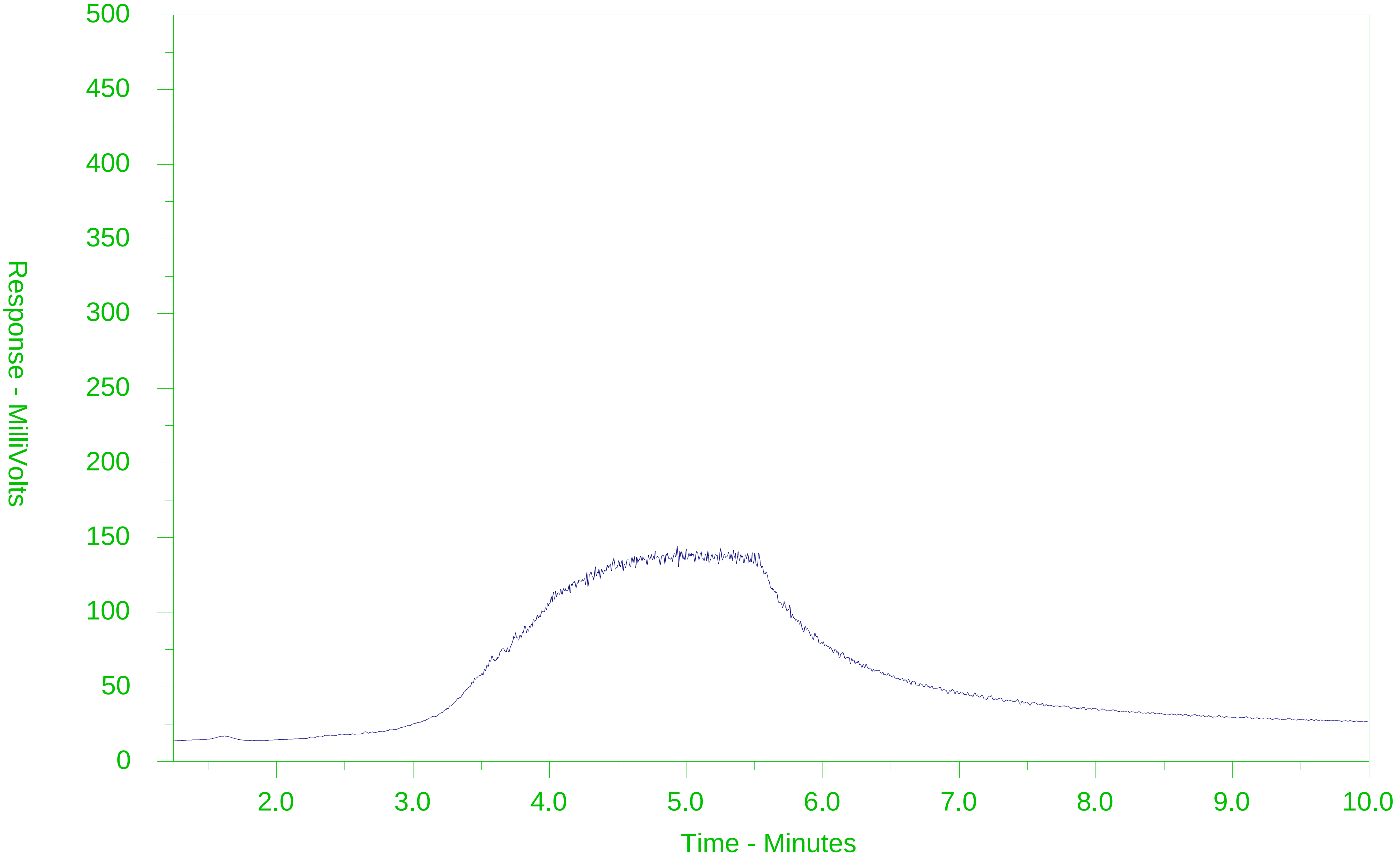
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-2
Client Sample ID: BH102-20 SS1



←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.

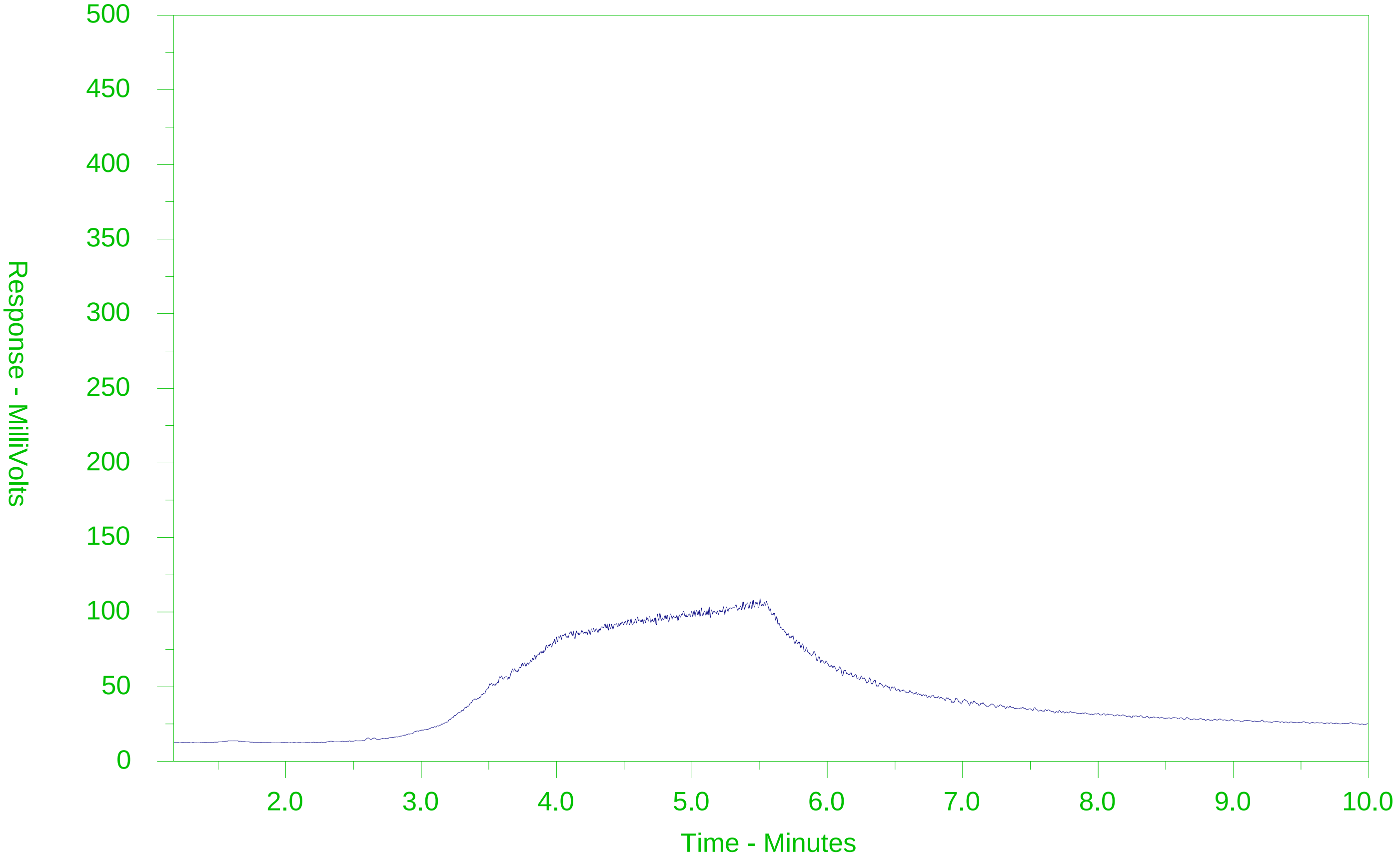
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-3
Client Sample ID: BH1002-20 SS1



←F2→	←	F3→	←F4→
nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 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.

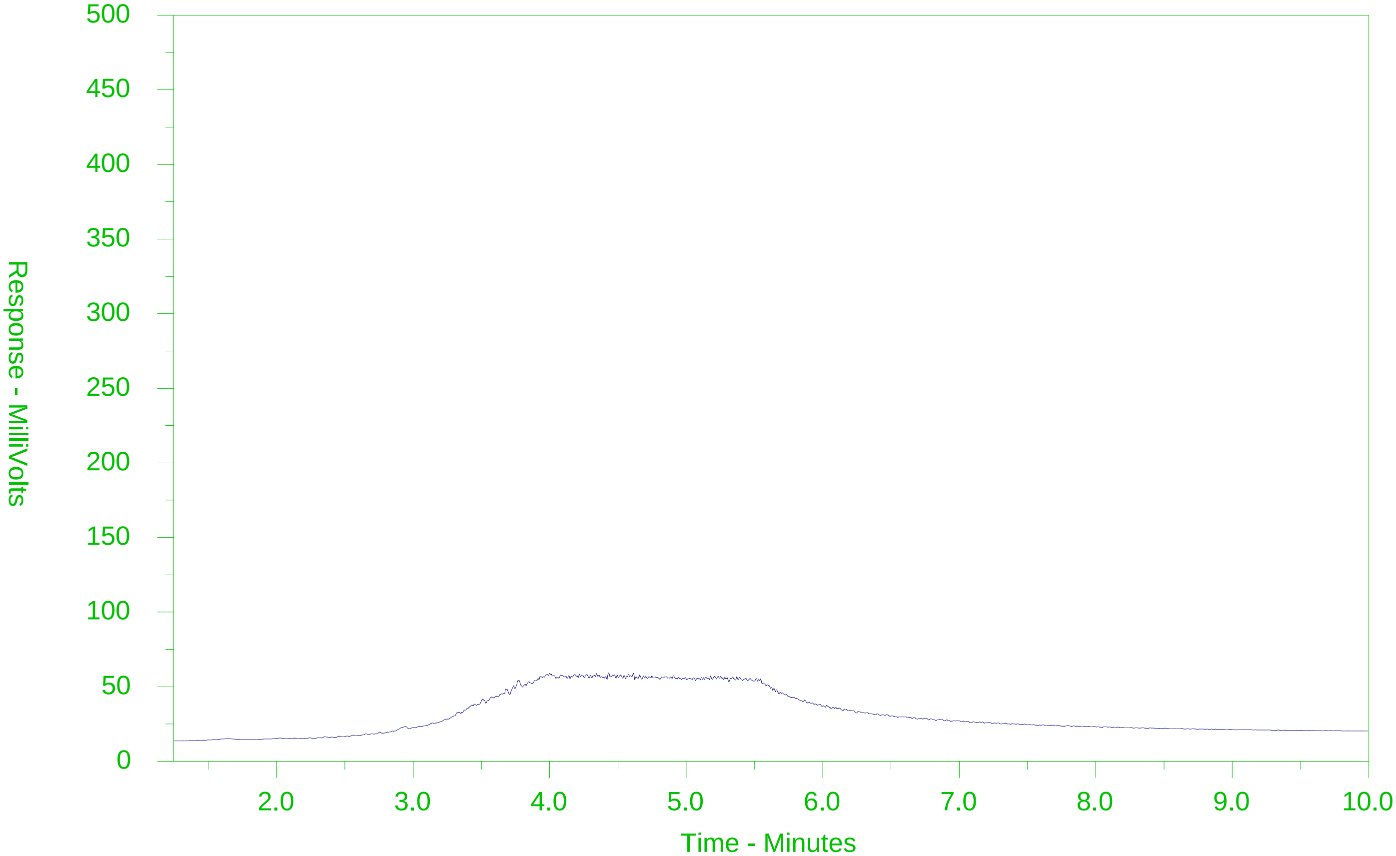
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-4
Client Sample ID: BH102-20 SS2B



←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.

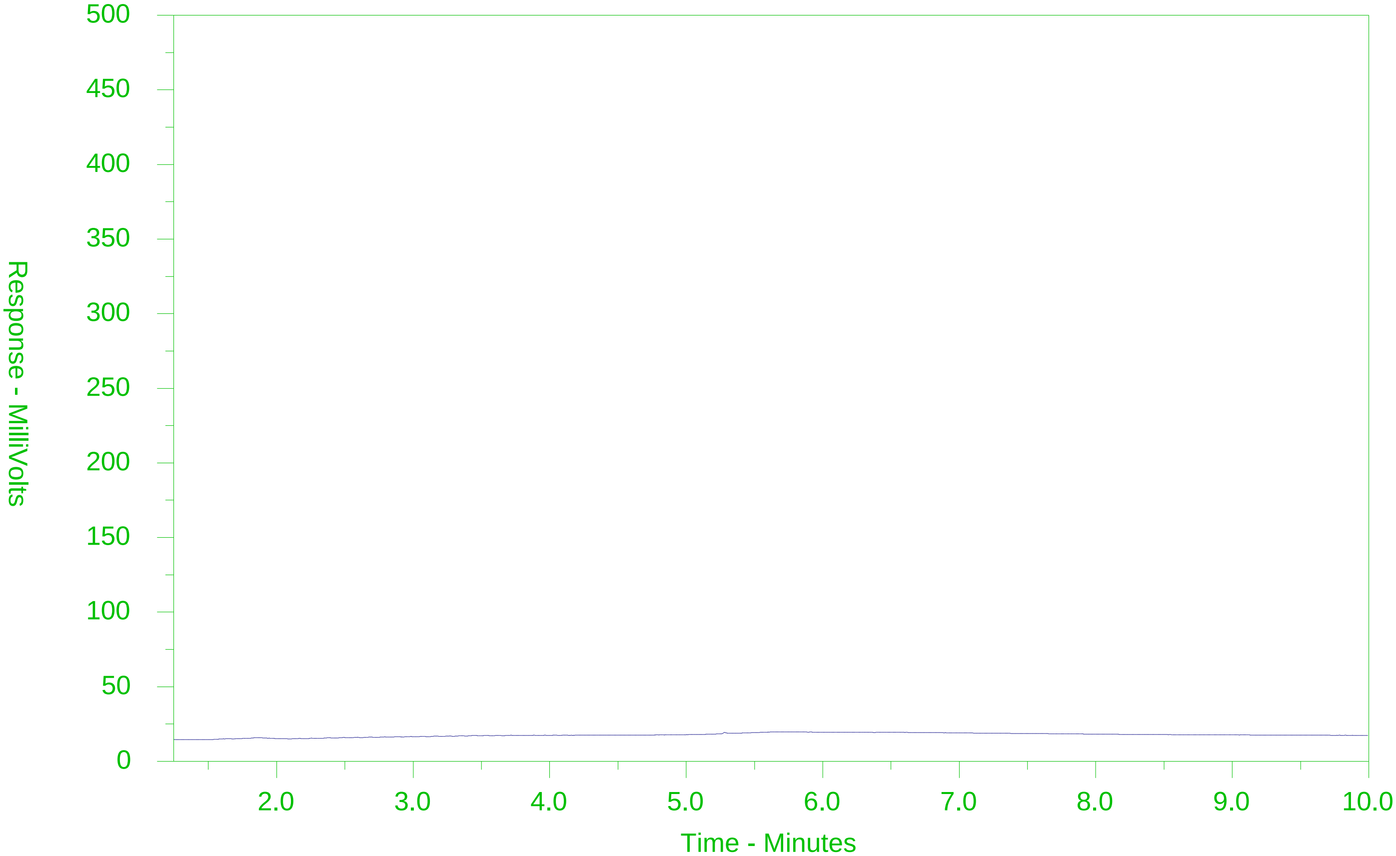
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-5
Client Sample ID: BH103-20 SS2



←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.

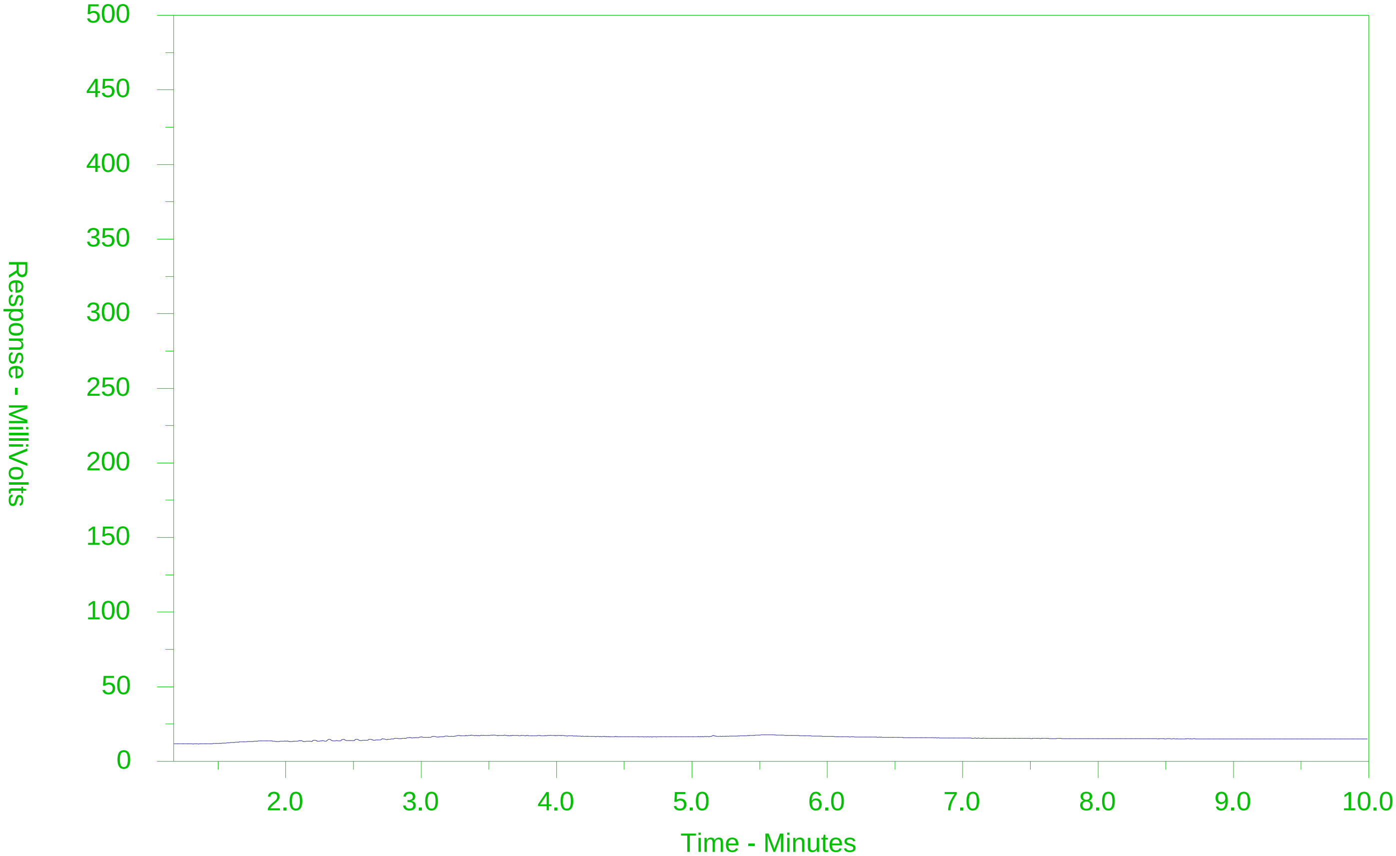
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-6
Client Sample ID: BH104-20 SS2



←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.

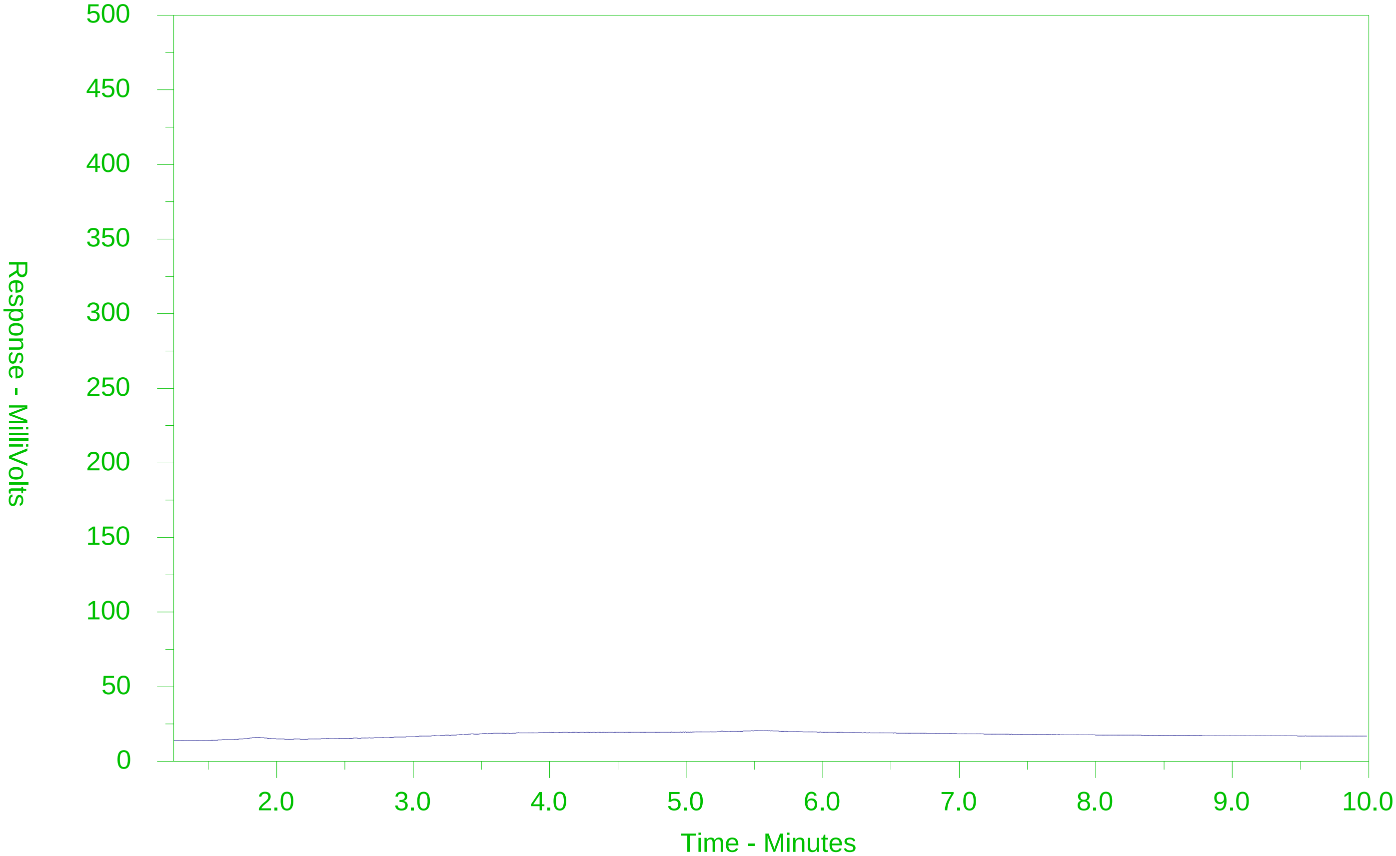
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-7
Client Sample ID: BH104-20 SS3



←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.

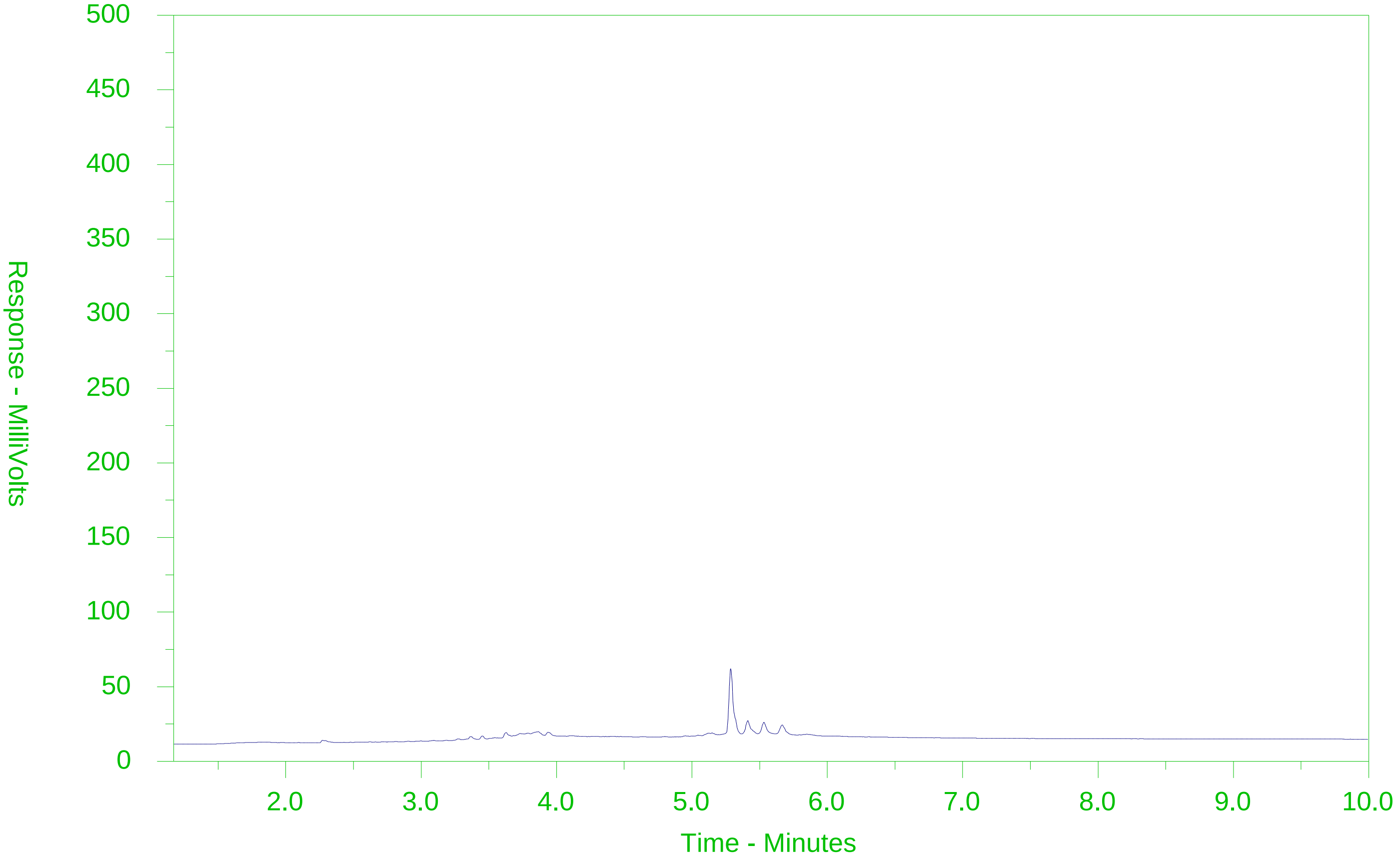
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-8
Client Sample ID: BH105-20 SA1



←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.

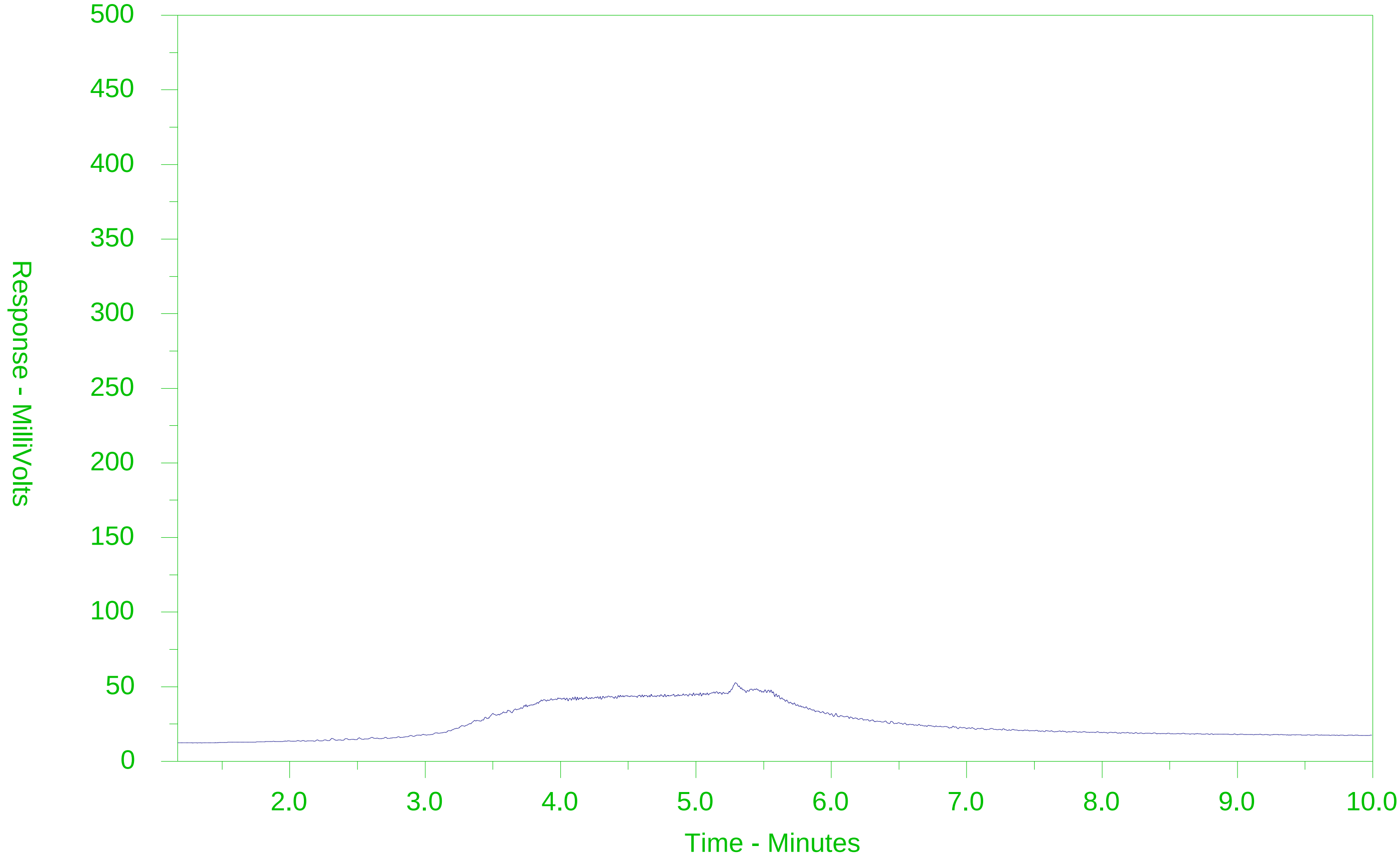
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-9
Client Sample ID: BH106-20 SA1



←F2→	←F3→		←F4→
nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 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.

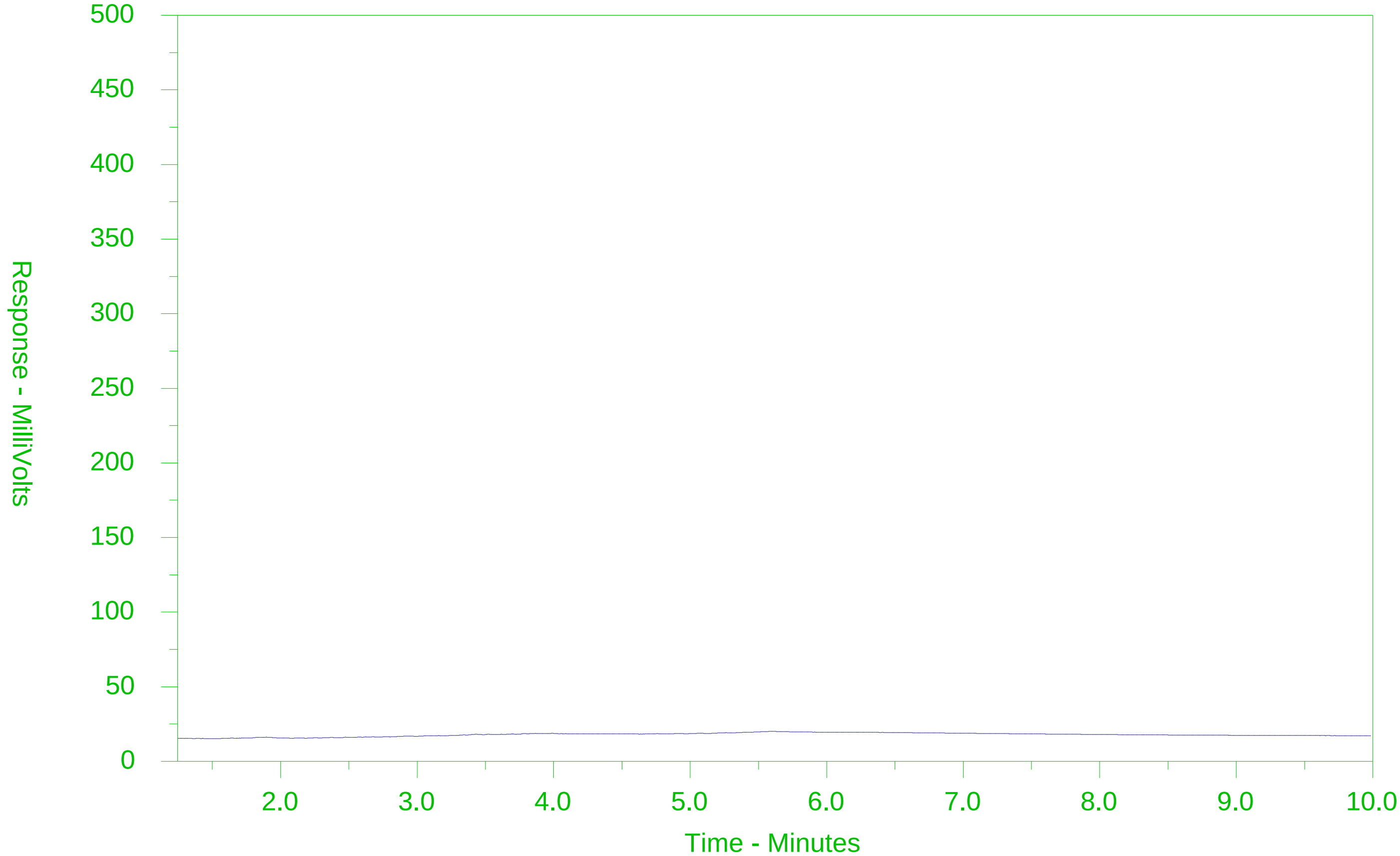
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-10
Client Sample ID: BH106-20 SA2



←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.

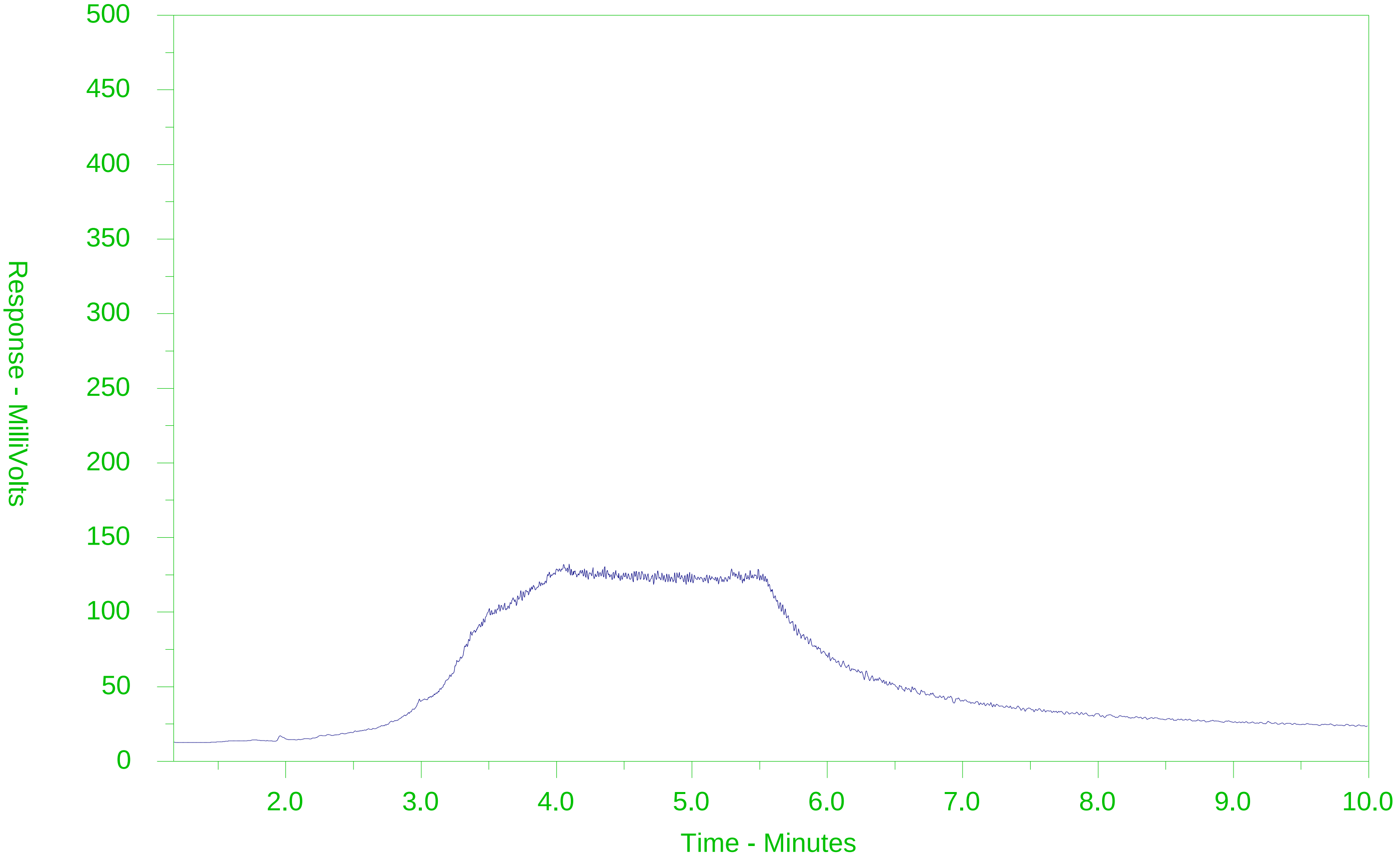
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-11
Client Sample ID: BH107-20 SS1



←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.

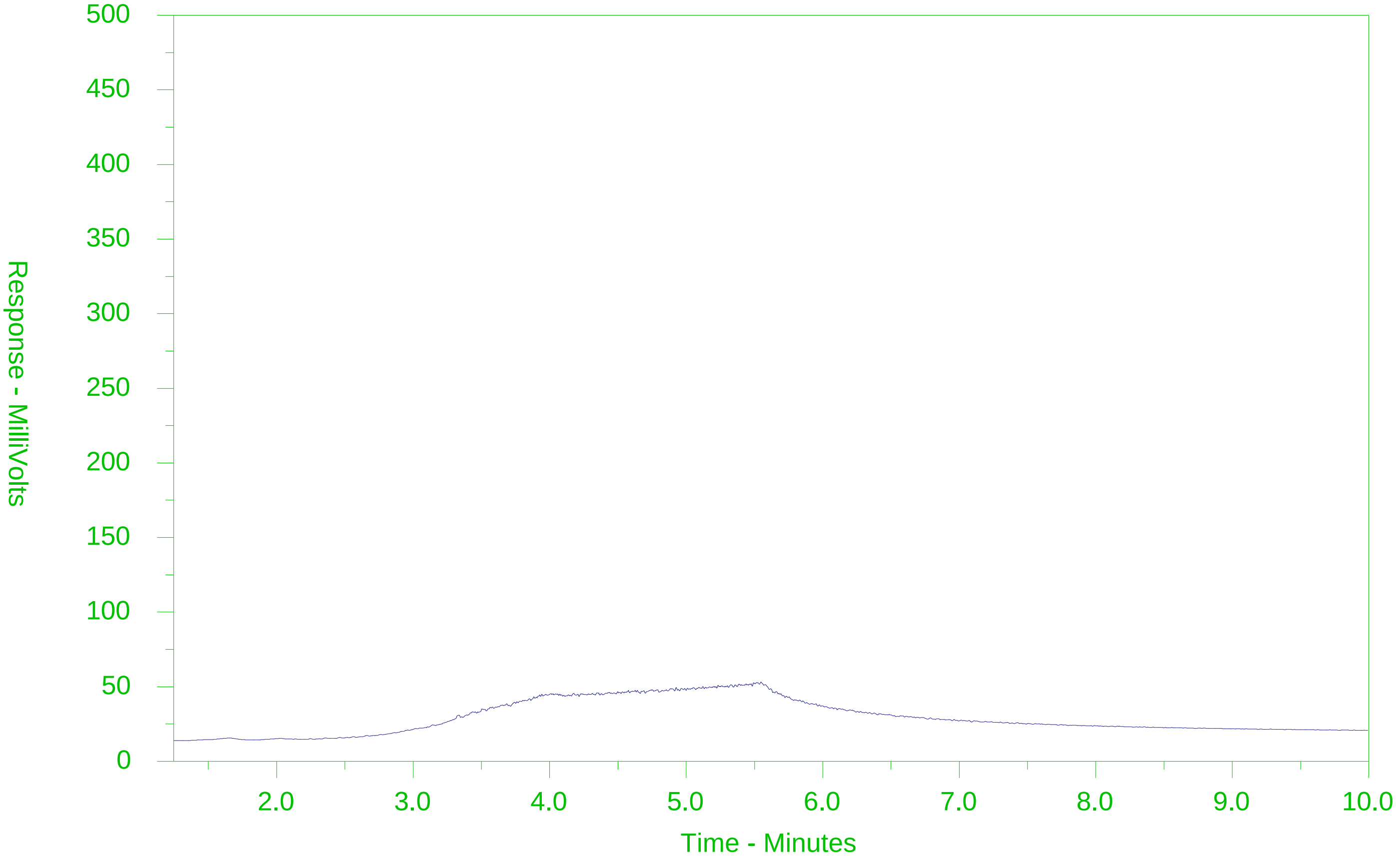
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-12
Client Sample ID: BH108-20 SA1



←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

L2530806-COFC

COC Number: 17 - 825494

Page 1 of 1

Report To	
Company	MTE
Contact	[illegible]
Phone	[illegible]
Street	
City/Province	Kitchener
Postal Code	
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 [X] EXCEL [X] EDD (DIGITAL)
Quality Control (QC) Report with Report	[X] Yes [ ] No
[X] Compare Results to Criteria on Report	
Select Distribution	[X] EMAIL [ ] MAIL [ ] FAX
Email 1 or Fax	[illegible]
Email 2	
Email 3	

Invoice Distribution	
Select Invoice Distribution	[X] EMAIL [ ] MAIL [ ] FAX
Email 1 or Fax	[illegible]
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: dd-mmm-yy hh:mm

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

Project Information

ALS Account # / Quote #	
Job #	47377-100 (Hewitt Lake)
PO / AFE	
LSD	
ALS Lab Work Order # (lab use only)	L2530806

Oil and Gas Required Fields (client use)

AFE/Cost Center	PO#
Major/Minor Code	Routing Code
Requisitioner	
Location	
ALS Contact	Emily H.
Sampler	M.H.D.

Analysis Request

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	NUMBER OF CONTAINERS	PHC F1-F4/BTEX	Metals	PAHs	SAR/EC	pH	OC Pesticides	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
1	BH101-20 SS2	17/11/20		Soil	3	✓	✓		✓				
2	BH102-20 SS1				3	✓	✓			✓			
3	BH102-20 SS3				3	✓	✓						
4	BH103-20 SS2B				3	✓	✓	✓					
5	BH103-20 SS2				3	✓	✓		✓				
6	BH104-20 SS2				3	✓	✓	✓	✓				
7	BH104-20 SS3				3	✓	✓	✓	✓	✓			
8	BH105-20 SA1				3	✓	✓				✓		
9	BH106-20 SA1				3	✓	✓		✓		✓		
10	BH106-20 SA2				3	✓	✓		✓	✓			
11	BH107-20 SS1				3	✓	✓	✓	✓				
12/13	BH108-20 SA2				3	✓	✓		✓				

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)

* Rush Sample

O. Reg 153 Table 1+2 RPI coarse

O. Reg 406 Table 2.1 RPI coarse

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen [ ] SIF Observations Yes [ ] No [ ]

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

Cooling Initiated [ ]

INITIAL COOLER TEMPERATURES °C | FINAL COOLER TEMPERATURES °C: 2.8

SHIPMENT RELEASE (client use)	INITIAL SHIPMENT RECEPTION (lab use only)	FINAL SHIPMENT RECEPTION (lab use only)
Released by: [signature] Date: Nov 18/20 Time: 11:15	Received by: Date: Time:	Received by: Sy Date: Nov 18 Time: 12:15 PM

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

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

MTE CONSULTANTS INC. (Kitchener)
ATTN: JEN LAMBKE
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Date Received: 18-NOV-20
Report Date: 26-NOV-20 13:36 (MT)
Version: FINAL REV. 3

Client Phone: 519-743-6500

Certificate of Analysis

Lab Work Order #: L2530806

Project P.O. #: NOT SUBMITTED
Job Reference: 47877-100 (HEART LAKE)
C of C Numbers: 17-825494
Legal Site Desc:

Emily Hansen
Account Manager

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-1	BH101-20 SS2								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL								
Physical Tests									
	Conductivity	1.36		0.0040	mS/cm	24-NOV-20	*0.57	1.4	*0.7
	% Moisture	11.7		0.25	%	20-NOV-20			
Saturated Paste Extractables									
	SAR	10.1		0.10	SAR	24-NOV-20	*2.4	12	*5
	Calcium (Ca)	34.5		0.50	mg/L	24-NOV-20			
	Magnesium (Mg)	2.40		0.50	mg/L	24-NOV-20			
	Sodium (Na)	228		0.50	mg/L	24-NOV-20			
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	9.7		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	67.7		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	0.73		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	5.0		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
	Chromium (Cr)	21.8		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	9.9		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	34.6		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	10.3		1.0	ug/g	24-NOV-20	120	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	22.2		1.0	ug/g	24-NOV-20	82	270	100
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	35.6		1.0	ug/g	24-NOV-20	86	86	86
	Zinc (Zn)	44.4		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds									
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.034	0.02
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	1.9	1.9
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	7.8	0.99
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20			
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20			
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
	Surrogate: 4-Bromofluorobenzene	113.8		50-140	%	20-NOV-20			
	Surrogate: 1,4-Difluorobenzene	113.0		50-140	%	20-NOV-20			
Hydrocarbons									
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	25	25
	F1-BTEX	<5.0		5.0	ug/g	20-NOV-20	25	25	25
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	26	10
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700	300
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300	2800
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	20-NOV-20			
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	85.1		60-140	%	20-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	105.3		60-140	%	20-NOV-20			

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* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-2	BH102-20 SS1								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Physical Tests									
	% Moisture	10.6		0.25	%	20-NOV-20			
	pH	8.00		0.10	pH units	23-NOV-20			
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	3.7		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	49.6		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	6.9		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
	Chromium (Cr)	16.9		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	4.6		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	14.8		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	25.7		1.0	ug/g	24-NOV-20	120	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	9.5		1.0	ug/g	24-NOV-20	82	270	100
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	25.2		1.0	ug/g	24-NOV-20	86	86	86
	Zinc (Zn)	79.3		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds									
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.034	0.02
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	1.9	1.9
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	7.8	0.99
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20			
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20			
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
	Surrogate: 4-Bromofluorobenzene	113.6		50-140	%	20-NOV-20			
	Surrogate: 1,4-Difluorobenzene	110.2		50-140	%	20-NOV-20			
Hydrocarbons									
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	25	25
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	25	25
	F2 (C10-C16)	<50	DLM	50	ug/g	24-NOV-20	**10	**26	**10
	F3 (C16-C34)	650	DLM	250	ug/g	24-NOV-20	*240	1700	*300
	F4 (C34-C50)	2270	DLM	250	ug/g	24-NOV-20	*120	3300	2800
	F4G-SG (GHH-Silica)	7680		250	ug/g	23-NOV-20	*120	*3300	*2800
	Total Hydrocarbons (C6-C50)	2910		360	ug/g	24-NOV-20			
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	71.8		60-140	%	24-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	87.1		60-140	%	20-NOV-20			
L2530806-3	BH1002-20 SS1								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Physical Tests									

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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

ALS Environmental

ANALYTICAL GUIDELINE REPORT

47877-100 (HEART LAKE)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-3	BH1002-20 SS1								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Physical Tests									
	% Moisture	8.36		0.25	%	20-NOV-20			
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	3.5		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	52.0		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	7.1		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
	Chromium (Cr)	18.9		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	4.6		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	15.8		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	26.3		1.0	ug/g	24-NOV-20	120	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	10.3		1.0	ug/g	24-NOV-20	82	270	100
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	27.2		1.0	ug/g	24-NOV-20	86	86	86
	Zinc (Zn)	67.8		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds									
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.034	0.02
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	1.9	1.9
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	7.8	0.99
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20			
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20			
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
	Surrogate: 4-Bromofluorobenzene	112.2		50-140	%	20-NOV-20			
	Surrogate: 1,4-Difluorobenzene	106.7		50-140	%	20-NOV-20			
Hydrocarbons									
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	25	25
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	25	25
	F2 (C10-C16)	<50	DLM	50	ug/g	24-NOV-20	**10	**26	**10
	F3 (C16-C34)	390	DLM	250	ug/g	24-NOV-20	*240	1700	*300
	F4 (C34-C50)	1390	DLM	250	ug/g	24-NOV-20	*120	3300	2800
	F4G-SG (GHH-Silica)	5620		250	ug/g	23-NOV-20	*120	*3300	*2800
	Total Hydrocarbons (C6-C50)	1780		360	ug/g	24-NOV-20			
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	85.5		60-140	%	24-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	93.5		60-140	%	20-NOV-20			
L2530806-4	BH102-20 SS2B								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Physical Tests									
	% Moisture	20.8		0.25	%	20-NOV-20			

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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-4	BH102-20 SS2B								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL								
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	4.9		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	105		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	0.79		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	6.4		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
	Chromium (Cr)	26.0		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	8.2		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	42.4		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	15.5		1.0	ug/g	24-NOV-20	120	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	20.5		1.0	ug/g	24-NOV-20	82	270	100
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	34.8		1.0	ug/g	24-NOV-20	86	86	86
	Zinc (Zn)	58.9		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds									
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.034	0.02
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	1.9	1.9
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	7.8	0.99
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20			
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20			
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
	Surrogate: 4-Bromofluorobenzene	105.5		50-140	%	20-NOV-20			
	Surrogate: 1,4-Difluorobenzene	102.5		50-140	%	20-NOV-20			
Hydrocarbons									
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	25	25
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	25	25
	F2 (C10-C16)	<10		10	ug/g	24-NOV-20	10	26	10
	F2-Naphth	<10		10	ug/g	24-NOV-20			
	F3 (C16-C34)	89		50	ug/g	24-NOV-20	240	1700	300
	F3-PAH	89		50	ug/g	24-NOV-20			
	F4 (C34-C50)	189		50	ug/g	24-NOV-20	*120	3300	2800
	F4G-SG (GHH-Silica)	790		250	ug/g	23-NOV-20	*120	3300	2800
	Total Hydrocarbons (C6-C50)	278		72	ug/g	24-NOV-20			
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	74.0		60-140	%	24-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	93.1		60-140	%	20-NOV-20			
Polycyclic Aromatic Hydrocarbons									
	Acenaphthene	<0.050		0.050	ug/g	20-NOV-20	0.072	15	0.093
	Acenaphthylene	<0.050		0.050	ug/g	20-NOV-20	0.093	0.093	14
	Anthracene	<0.050		0.050	ug/g	20-NOV-20	0.16	0.16	0.16
	Benzo(a)anthracene	<0.050		0.050	ug/g	20-NOV-20	0.36	1	0.5
	Benzo(a)pyrene	<0.050		0.050	ug/g	20-NOV-20	0.3	0.7	0.57

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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use
#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use
#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

ALS Environmental

ANALYTICAL GUIDELINE REPORT

47877-100 (HEART LAKE)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-4	BH102-20 SS2B								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Polycyclic Aromatic Hydrocarbons									
	Benzo(b)fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.47	7	5.7
	Benzo(g,h,i)perylene	<0.050		0.050	ug/g	20-NOV-20	0.68	13	6.6
	Benzo(k)fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.48	7	5.7
	Chrysene	<0.050		0.050	ug/g	20-NOV-20	2.8	14	7
	Dibenzo(ah)anthracene	<0.050		0.050	ug/g	20-NOV-20	0.1	0.7	0.57
	Fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.56	70	0.69
	Fluorene	<0.050		0.050	ug/g	20-NOV-20	0.12	6.8	6.8
	Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	20-NOV-20	0.23	0.76	0.38
	1+2-Methylnaphthalenes	<0.042		0.042	ug/g	20-NOV-20	0.59	8.7	0.92
	1-Methylnaphthalene	<0.030		0.030	ug/g	20-NOV-20	0.59	8.7	0.92
	2-Methylnaphthalene	<0.030		0.030	ug/g	20-NOV-20	0.59	8.7	0.92
	Naphthalene	<0.013		0.013	ug/g	20-NOV-20	0.09	1.8	0.59
	Phenanthrene	<0.046		0.046	ug/g	20-NOV-20	0.69	12	6.2
	Pyrene	<0.050		0.050	ug/g	20-NOV-20	1	70	70
	Surrogate: 2-Fluorobiphenyl	84.8		50-140	%	20-NOV-20			
	Surrogate: p-Terphenyl d14	94.4		50-140	%	20-NOV-20			
L2530806-5	BH103-20 SS2								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Physical Tests									
	Conductivity	1.61		0.0040	mS/cm	24-NOV-20	*0.57	*1.4	*0.7
	% Moisture	8.75		0.25	%	20-NOV-20			
Saturated Paste Extractables									
	SAR	89.2	SAR:M	0.10	SAR	24-NOV-20	*2.4	*12	*5
	Calcium (Ca)	0.94		0.50	mg/L	24-NOV-20			
	Magnesium (Mg)	<0.50		0.50	mg/L	24-NOV-20			
	Sodium (Na)	314		0.50	mg/L	24-NOV-20			
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	5.1		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	77.4		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	6.1		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
	Chromium (Cr)	16.0		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	9.3		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	32.6		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	7.3		1.0	ug/g	24-NOV-20	120	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	16.8		1.0	ug/g	24-NOV-20	82	270	100
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	25.7		1.0	ug/g	24-NOV-20			

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-5	BH103-20 SS2								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Metals									
							86	86	86
	Zinc (Zn)	42.9		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds									
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.034	0.02
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	1.9	1.9
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	7.8	0.99
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20			
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20			
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
	Surrogate: 4-Bromofluorobenzene	111.1		50-140	%	20-NOV-20			
	Surrogate: 1,4-Difluorobenzene	106.5		50-140	%	20-NOV-20			
Hydrocarbons									
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	25	25
	F1-BTEX	<5.0		5.0	ug/g	23-NOV-20	25	25	25
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	26	10
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700	300
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300	2800
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	23-NOV-20			
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	76.2		60-140	%	20-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	98.9		60-140	%	20-NOV-20			
L2530806-6	BH104-20 SS2								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Physical Tests									
	Conductivity	1.37		0.0040	mS/cm	24-NOV-20	*0.57	1.4	*0.7
	% Moisture	7.47		0.25	%	20-NOV-20			
Saturated Paste Extractables									
	SAR	12.6		0.10	SAR	24-NOV-20	*2.4	*12	*5
	Calcium (Ca)	14.4		0.50	mg/L	24-NOV-20			
	Magnesium (Mg)	7.69		0.50	mg/L	24-NOV-20			
	Sodium (Na)	239		0.50	mg/L	24-NOV-20			
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	3.6		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	47.6		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	<5.0		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
	Chromium (Cr)	9.9		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	4.9		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	29.5		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	8.4		1.0	ug/g	24-NOV-20	120	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	9.5		1.0	ug/g	24-NOV-20	82	270	100

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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-6	BH104-20 SS2								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL								
Metals									
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	18.5		1.0	ug/g	24-NOV-20	86	86	86
	Zinc (Zn)	35.1		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds									
	Benzene	<0.0068		0.0068	ug/g	20-NOV-20	0.02	0.034	0.02
	Ethylbenzene	<0.018		0.018	ug/g	20-NOV-20	0.05	1.9	1.9
	Toluene	<0.080		0.080	ug/g	20-NOV-20	0.2	7.8	0.99
	o-Xylene	<0.020		0.020	ug/g	20-NOV-20			
	m+p-Xylenes	<0.030		0.030	ug/g	20-NOV-20			
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
	Surrogate: 4-Bromofluorobenzene	120.7		50-140	%	20-NOV-20			
	Surrogate: 1,4-Difluorobenzene	119.6		50-140	%	20-NOV-20			
Hydrocarbons									
	F1 (C6-C10)	<5.0		5.0	ug/g	20-NOV-20	25	25	25
	F1-BTEX	<5.0		5.0	ug/g	23-NOV-20	25	25	25
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	26	10
	F2-Naphth	<10		10	ug/g	23-NOV-20			
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700	300
	F3-PAH	<50		50	ug/g	23-NOV-20			
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300	2800
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	23-NOV-20			
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	81.3		60-140	%	20-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	79.1		60-140	%	20-NOV-20			
Polycyclic Aromatic Hydrocarbons									
	Acenaphthene	<0.050		0.050	ug/g	20-NOV-20	0.072	15	0.093
	Acenaphthylene	<0.050		0.050	ug/g	20-NOV-20	0.093	0.093	14
	Anthracene	<0.050		0.050	ug/g	20-NOV-20	0.16	0.16	0.16
	Benzo(a)anthracene	<0.050		0.050	ug/g	20-NOV-20	0.36	1	0.5
	Benzo(a)pyrene	<0.050		0.050	ug/g	20-NOV-20	0.3	0.7	0.57
	Benzo(b)fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.47	7	5.7
	Benzo(g,h,i)perylene	<0.050		0.050	ug/g	20-NOV-20	0.68	13	6.6
	Benzo(k)fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.48	7	5.7
	Chrysene	<0.050		0.050	ug/g	20-NOV-20	2.8	14	7
	Dibenzo(ah)anthracene	<0.050		0.050	ug/g	20-NOV-20	0.1	0.7	0.57
	Fluoranthene	<0.050		0.050	ug/g	20-NOV-20	0.56	70	0.69
	Fluorene	<0.050		0.050	ug/g	20-NOV-20	0.12	6.8	6.8
	Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	20-NOV-20	0.23	0.76	0.38
	1+2-Methylnaphthalenes	<0.042		0.042	ug/g	23-NOV-20	0.59	8.7	0.92
	1-Methylnaphthalene	<0.030		0.030	ug/g	20-NOV-20	0.59	8.7	0.92
	2-Methylnaphthalene	<0.030		0.030	ug/g	20-NOV-20	0.59	8.7	0.92
	Naphthalene	<0.013		0.013	ug/g	20-NOV-20	0.09	1.8	0.59
	Phenanthrene	<0.046		0.046	ug/g	20-NOV-20	0.69	12	6.2

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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

47877-100 (HEART LAKE)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-6 BH104-20 SS2								
Sampled By: MATT D. on 17-NOV-20								
Matrix: SOIL						#1	#2	#3
Polycyclic Aromatic Hydrocarbons								
Pyrene	<0.050		0.050	ug/g	20-NOV-20	1	70	70
Surrogate: 2-Fluorobiphenyl	81.5		50-140	%	20-NOV-20			
Surrogate: p-Terphenyl d14	88.7		50-140	%	20-NOV-20			
L2530806-7 BH104-20 SS3								
Sampled By: MATT D. on 17-NOV-20								
Matrix: SOIL						#1	#2	#3
Physical Tests								
Conductivity	1.87		0.0040	mS/cm	24-NOV-20	*0.57	*1.4	*0.7
% Moisture	17.5		0.25	%	20-NOV-20			
pH	7.60		0.10	pH units	23-NOV-20			
Saturated Paste Extractables								
SAR	40.5		0.10	SAR	24-NOV-20	*2.4	*12	*5
Calcium (Ca)	4.11		0.50	mg/L	24-NOV-20			
Magnesium (Mg)	0.98		0.50	mg/L	24-NOV-20			
Sodium (Na)	352		0.50	mg/L	24-NOV-20			
Metals								
Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
Arsenic (As)	2.1		1.0	ug/g	24-NOV-20	18	18	18
Barium (Ba)	20.3		1.0	ug/g	24-NOV-20	220	670	390
Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8	4
Boron (B)	<5.0		5.0	ug/g	24-NOV-20	36	120	120
Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
Chromium (Cr)	6.8		1.0	ug/g	24-NOV-20	70	160	160
Cobalt (Co)	3.5		1.0	ug/g	24-NOV-20	21	80	22
Copper (Cu)	19.7		1.0	ug/g	24-NOV-20	92	230	140
Lead (Pb)	4.8		1.0	ug/g	24-NOV-20	120	120	120
Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
Nickel (Ni)	6.9		1.0	ug/g	24-NOV-20	82	270	100
Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33	23
Vanadium (V)	14.4		1.0	ug/g	24-NOV-20	86	86	86
Zinc (Zn)	22.7		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds								
Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.034	0.02
Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	1.9	1.9
Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	7.8	0.99
o-Xylene	<0.020		0.020	ug/g	19-NOV-20			
m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20			
Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
Surrogate: 4-Bromofluorobenzene	116.8		50-140	%	19-NOV-20			
Surrogate: 1,4-Difluorobenzene	113.0		50-140	%	19-NOV-20			
Hydrocarbons								
F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	25	25

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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-7	BH104-20 SS3								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL								
Hydrocarbons									
	F1-BTEX	<5.0		5.0	ug/g	23-NOV-20	25	25	25
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	26	10
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700	300
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300	2800
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	23-NOV-20			
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	63.8		60-140	%	20-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	97.7		60-140	%	19-NOV-20			
L2530806-8	BH105-20 SA1								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL								
Physical Tests									
	% Moisture	18.6		0.25	%	20-NOV-20			
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	5.2		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	115		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	0.95		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	6.6		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
	Chromium (Cr)	28.6		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	9.1		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	30.2		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	12.1		1.0	ug/g	24-NOV-20	120	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	25.2		1.0	ug/g	24-NOV-20	82	270	100
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	1.1		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	39.8		1.0	ug/g	24-NOV-20	86	86	86
	Zinc (Zn)	93.2		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds									
	Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.034	0.02
	Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	1.9	1.9
	Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	7.8	0.99
	o-Xylene	<0.020		0.020	ug/g	19-NOV-20			
	m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20			
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
	Surrogate: 4-Bromofluorobenzene	118.3		50-140	%	19-NOV-20			
	Surrogate: 1,4-Difluorobenzene	113.9		50-140	%	19-NOV-20			
Hydrocarbons									
	F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	25	25
	F1-BTEX	<5.0		5.0	ug/g	23-NOV-20	25	25	25

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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

47877-100 (HEART LAKE)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-8 BH105-20 SA1									
Sampled By: MATT D. on 17-NOV-20									
Matrix: SOIL							#1	#2	#3
Hydrocarbons									
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	26	10
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700	300
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300	2800
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	23-NOV-20			
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	76.9		60-140	%	20-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	95.2		60-140	%	19-NOV-20			
Organochlorine Pesticides									
	Aldrin	<0.020		0.020	ug/g	25-NOV-20	0.05	0.088	0.05
	gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	25-NOV-20	0.01	0.01	0.01
	a-chlordane	<0.020		0.020	ug/g	25-NOV-20			
	Chlordane (Total)	<0.028		0.028	ug/g	25-NOV-20	0.05	0.05	0.05
	g-chlordane	<0.020		0.020	ug/g	25-NOV-20			
	op-DDD	<0.020		0.020	ug/g	25-NOV-20			
	pp-DDD	<0.020		0.020	ug/g	25-NOV-20			
	Total DDD	<0.028		0.028	ug/g	25-NOV-20	0.05	4.6	3.3
	o,p-DDE	<0.020		0.020	ug/g	25-NOV-20			
	pp-DDE	<0.020		0.020	ug/g	25-NOV-20			
	Total DDE	<0.028		0.028	ug/g	25-NOV-20	0.05	0.52	0.26
	op-DDT	<0.020		0.020	ug/g	25-NOV-20			
	pp-DDT	<0.020		0.020	ug/g	25-NOV-20			
	Total DDT	<0.028		0.028	ug/g	25-NOV-20	1.4	1.4	1.4
	Dieldrin	<0.020		0.020	ug/g	25-NOV-20	0.05	0.088	0.05
	Endosulfan I	<0.020		0.020	ug/g	25-NOV-20			
	Endosulfan II	<0.020		0.020	ug/g	25-NOV-20			
	Endosulfan (Total)	<0.028		0.028	ug/g	25-NOV-20	0.04	0.3	0.04
	Endrin	<0.020		0.020	ug/g	25-NOV-20	0.04	0.04	0.04
	Heptachlor	<0.020		0.020	ug/g	25-NOV-20	0.05	0.072	0.072
	Heptachlor Epoxide	<0.020		0.020	ug/g	25-NOV-20	0.05	0.05	0.05
	Hexachlorobenzene	<0.010		0.010	ug/g	25-NOV-20	0.01	0.66	0.52
	Hexachlorobutadiene	<0.010		0.010	ug/g	25-NOV-20	0.01	0.01	0.01
	Hexachloroethane	<0.010		0.010	ug/g	25-NOV-20	0.01	0.13	0.01
	Methoxychlor	<0.020		0.020	ug/g	25-NOV-20	0.05	0.19	0.13
	Surrogate: 2-Fluorobiphenyl	68.8		50-140	%	25-NOV-20			
	Surrogate: d14-Terphenyl	61.5		50-140	%	25-NOV-20			
L2530806-9 BH106-20 SA1									
Sampled By: MATT D. on 17-NOV-20									
Matrix: SOIL							#1	#2	#3
Physical Tests									
	Conductivity	0.473		0.0040	mS/cm	24-NOV-20	0.57	1.4	0.7
	% Moisture	12.8		0.25	%	20-NOV-20			
Saturated Paste Extractables									
	SAR	6.54		0.10	SAR	24-NOV-20	*2.4	12	*5
	Calcium (Ca)	13.7		0.50	mg/L	24-NOV-20			
	Magnesium (Mg)	0.58		0.50	mg/L	24-NOV-20			

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-9	BH106-20 SA1								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL								
Saturated Paste Extractables									
	Sodium (Na)	90.9		0.50	mg/L	24-NOV-20			
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	3.5		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	53.9		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	5.6		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
	Chromium (Cr)	15.9		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	6.5		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	31.7		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	16.4		1.0	ug/g	24-NOV-20	120	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	13.4		1.0	ug/g	24-NOV-20	82	270	100
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	21.9		1.0	ug/g	24-NOV-20	86	86	86
	Zinc (Zn)	89.6		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds									
	Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.034	0.02
	Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	1.9	1.9
	Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	7.8	0.99
	o-Xylene	<0.020		0.020	ug/g	19-NOV-20			
	m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20			
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
	Surrogate: 4-Bromofluorobenzene	117.3		50-140	%	19-NOV-20			
	Surrogate: 1,4-Difluorobenzene	112.3		50-140	%	19-NOV-20			
Hydrocarbons									
	F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	25	25
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	25	25
	F2 (C10-C16)	<10		10	ug/g	24-NOV-20	10	26	10
	F3 (C16-C34)	<50		50	ug/g	24-NOV-20	240	1700	300
	F4 (C34-C50)	115		50	ug/g	24-NOV-20	120	3300	2800
	F4G-SG (GHH-Silica)	610		250	ug/g	23-NOV-20	*120	3300	2800
	Total Hydrocarbons (C6-C50)	115		72	ug/g	24-NOV-20			
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	81.7		60-140	%	24-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	97.5		60-140	%	19-NOV-20			
Organochlorine Pesticides									
	Aldrin	<0.020		0.020	ug/g	25-NOV-20	0.05	0.088	0.05
	gamma-hexachlorocyclohexane	<0.050	DLM	0.050	ug/g	25-NOV-20	**0.01	**0.01	**0.01
	a-chlordane	<0.020		0.020	ug/g	25-NOV-20			
	Chlordane (Total)	<0.028		0.028	ug/g	25-NOV-20	0.05	0.05	0.05
	g-chlordane	<0.020		0.020	ug/g	25-NOV-20			

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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-9	BH106-20 SA1								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Organochlorine Pesticides									
	op-DDD	<0.020		0.020	ug/g	25-NOV-20			
	pp-DDD	<0.020		0.020	ug/g	25-NOV-20			
	Total DDD	<0.028		0.028	ug/g	25-NOV-20	0.05	4.6	3.3
	o,p-DDE	<0.020		0.020	ug/g	25-NOV-20			
	pp-DDE	<0.020		0.020	ug/g	25-NOV-20			
	Total DDE	<0.028		0.028	ug/g	25-NOV-20	0.05	0.52	0.26
	op-DDT	<0.020		0.020	ug/g	25-NOV-20			
	pp-DDT	<0.020		0.020	ug/g	25-NOV-20			
	Total DDT	<0.028		0.028	ug/g	25-NOV-20	1.4	1.4	1.4
	Dieldrin	<0.020		0.020	ug/g	25-NOV-20	0.05	0.088	0.05
	Endosulfan I	<0.020		0.020	ug/g	25-NOV-20			
	Endosulfan II	<0.020		0.020	ug/g	25-NOV-20			
	Endosulfan (Total)	<0.028		0.028	ug/g	25-NOV-20	0.04	0.3	0.04
	Endrin	<0.020		0.020	ug/g	25-NOV-20	0.04	0.04	0.04
	Heptachlor	<0.020		0.020	ug/g	25-NOV-20	0.05	0.072	0.072
	Heptachlor Epoxide	<0.020		0.020	ug/g	25-NOV-20	0.05	0.05	0.05
	Hexachlorobenzene	<0.050	DLM	0.050	ug/g	25-NOV-20	**0.01	0.66	0.52
	Hexachlorobutadiene	<0.050	DLM	0.050	ug/g	25-NOV-20	**0.01	**0.01	**0.01
	Hexachloroethane	<0.050	DLM	0.050	ug/g	25-NOV-20	**0.01	0.13	**0.01
	Methoxychlor	<0.020		0.020	ug/g	25-NOV-20	0.05	0.19	0.13
	Surrogate: 2-Fluorobiphenyl	67.8		50-140	%	25-NOV-20			
	Surrogate: d14-Terphenyl	58.3		50-140	%	25-NOV-20			
L2530806-10	BH106-20 SA2								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Physical Tests									
	Conductivity	0.985		0.0040	mS/cm	24-NOV-20	*0.57	1.4	*0.7
	% Moisture	20.6		0.25	%	20-NOV-20			
	pH	7.34		0.10	pH units	23-NOV-20			
Saturated Paste Extractables									
	SAR	24.3	SAR:M	0.10	SAR	24-NOV-20	*2.4	*12	*5
	Calcium (Ca)	4.48		0.50	mg/L	24-NOV-20			
	Magnesium (Mg)	<0.50		0.50	mg/L	24-NOV-20			
	Sodium (Na)	187		0.50	mg/L	24-NOV-20			
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	2.0		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	15.8		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	<5.0		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
	Chromium (Cr)	7.7		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	3.1		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	13.1		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	3.8		1.0	ug/g	24-NOV-20	120	120	120

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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-10	BH106-20 SA2								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Metals									
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	6.1		1.0	ug/g	24-NOV-20	82	270	100
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	16.5		1.0	ug/g	24-NOV-20	86	86	86
	Zinc (Zn)	19.3		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds									
	Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.034	0.02
	Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	1.9	1.9
	Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	7.8	0.99
	o-Xylene	<0.020		0.020	ug/g	19-NOV-20			
	m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20			
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
	Surrogate: 4-Bromofluorobenzene	112.3		50-140	%	19-NOV-20			
	Surrogate: 1,4-Difluorobenzene	107.9		50-140	%	19-NOV-20			
Hydrocarbons									
	F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	25	25
	F1-BTEX	<5.0		5.0	ug/g	23-NOV-20	25	25	25
	F2 (C10-C16)	<10		10	ug/g	20-NOV-20	10	26	10
	F3 (C16-C34)	<50		50	ug/g	20-NOV-20	240	1700	300
	F4 (C34-C50)	<50		50	ug/g	20-NOV-20	120	3300	2800
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	23-NOV-20			
	Chrom. to baseline at nC50	YES			No Unit	20-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	72.7		60-140	%	20-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	83.1		60-140	%	19-NOV-20			
L2530806-11	BH107-20 SS1								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Physical Tests									
	Conductivity	0.127		0.0040	mS/cm	24-NOV-20	0.57	1.4	0.7
	% Moisture	9.13		0.25	%	20-NOV-20			
Saturated Paste Extractables									
	SAR	1.86	SAR:M	0.10	SAR	24-NOV-20	2.4	12	5
	Calcium (Ca)	5.85		0.50	mg/L	24-NOV-20			
	Magnesium (Mg)	<0.50		0.50	mg/L	24-NOV-20			
	Sodium (Na)	16.3		0.50	mg/L	24-NOV-20			
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	2.6		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	32.4		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	<5.0		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2

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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-11	BH107-20 SS1								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL								
Metals									
	Chromium (Cr)	17.4		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	3.7		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	42.8		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	25.7		1.0	ug/g	24-NOV-20	120	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	8.7		1.0	ug/g	24-NOV-20	82	270	100
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	20.9		1.0	ug/g	24-NOV-20	86	86	86
	Zinc (Zn)	66.0		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds									
	Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.034	0.02
	Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	1.9	1.9
	Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	7.8	0.99
	o-Xylene	<0.020		0.020	ug/g	19-NOV-20			
	m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20			
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
	Surrogate: 4-Bromofluorobenzene	137.4		50-140	%	19-NOV-20			
	Surrogate: 1,4-Difluorobenzene	135.1		50-140	%	19-NOV-20			
Hydrocarbons									
	F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	25	25
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	25	25
	F2 (C10-C16)	<20	DLM	20	ug/g	24-NOV-20	**10	26	**10
	F2-Naphth	<20		20	ug/g	24-NOV-20			
	F3 (C16-C34)	410	DLM	100	ug/g	24-NOV-20	*240	1700	*300
	F3-PAH	410		100	ug/g	24-NOV-20			
	F4 (C34-C50)	830	DLM	100	ug/g	24-NOV-20	*120	3300	2800
	F4G-SG (GHH-Silica)	3040		250	ug/g	23-NOV-20	*120	3300	*2800
	Total Hydrocarbons (C6-C50)	1240		140	ug/g	24-NOV-20			
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	81.0		60-140	%	24-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	88.8		60-140	%	19-NOV-20			
Polycyclic Aromatic Hydrocarbons									
	Acenaphthene	<0.050		0.050	ug/g	24-NOV-20	0.072	15	0.093
	Acenaphthylene	<0.050		0.050	ug/g	24-NOV-20	0.093	0.093	14
	Anthracene	<0.050		0.050	ug/g	24-NOV-20	0.16	0.16	0.16
	Benzo(a)anthracene	<0.050		0.050	ug/g	24-NOV-20	0.36	1	0.5
	Benzo(a)pyrene	<0.050		0.050	ug/g	24-NOV-20	0.3	0.7	0.57
	Benzo(b)fluoranthene	<0.050		0.050	ug/g	24-NOV-20	0.47	7	5.7
	Benzo(g,h,i)perylene	<0.050		0.050	ug/g	24-NOV-20	0.68	13	6.6
	Benzo(k)fluoranthene	<0.050		0.050	ug/g	24-NOV-20	0.48	7	5.7
	Chrysene	0.055		0.050	ug/g	24-NOV-20	2.8	14	7
	Dibenzo(ah)anthracene	<0.050		0.050	ug/g	24-NOV-20	0.1	0.7	0.57
	Fluoranthene	<0.050		0.050	ug/g	24-NOV-20	0.56	70	0.69

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Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-11	BH107-20 SS1								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Polycyclic Aromatic Hydrocarbons									
	Fluorene	<0.050		0.050	ug/g	24-NOV-20	0.12	6.8	6.8
	Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	24-NOV-20	0.23	0.76	0.38
	1+2-Methylnaphthalenes	<0.042		0.042	ug/g	24-NOV-20	0.59	8.7	0.92
	1-Methylnaphthalene	<0.030		0.030	ug/g	24-NOV-20	0.59	8.7	0.92
	2-Methylnaphthalene	<0.030		0.030	ug/g	24-NOV-20	0.59	8.7	0.92
	Naphthalene	<0.013		0.013	ug/g	24-NOV-20	0.09	1.8	0.59
	Phenanthrene	<0.046		0.046	ug/g	24-NOV-20	0.69	12	6.2
	Pyrene	<0.050		0.050	ug/g	24-NOV-20	1	70	70
	Surrogate: 2-Fluorobiphenyl	78.4		50-140	%	24-NOV-20			
	Surrogate: p-Terphenyl d14	92.8		50-140	%	24-NOV-20			
L2530806-12	BH108-20 SA1								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Physical Tests									
	Conductivity	0.363		0.0040	mS/cm	24-NOV-20	0.57	1.4	0.7
	% Moisture	14.8		0.25	%	20-NOV-20			
Saturated Paste Extractables									
	SAR	13.9	SAR:M	0.10	SAR	24-NOV-20	*2.4	*12	*5
	Calcium (Ca)	2.01		0.50	mg/L	24-NOV-20			
	Magnesium (Mg)	<0.50		0.50	mg/L	24-NOV-20			
	Sodium (Na)	71.8		0.50	mg/L	24-NOV-20			
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	2.4		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	24.8		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	<0.50		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	<5.0		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
	Chromium (Cr)	10.6		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	4.0		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	15.9		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	12.6		1.0	ug/g	24-NOV-20	120	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	8.4		1.0	ug/g	24-NOV-20	82	270	100
	Selenium (Se)	<1.0		1.0	ug/g	24-NOV-20	1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	<1.0		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	15.0		1.0	ug/g	24-NOV-20	86	86	86
	Zinc (Zn)	48.8		5.0	ug/g	24-NOV-20	290	340	340
Volatile Organic Compounds									
	Benzene	<0.0068		0.0068	ug/g	19-NOV-20	0.02	0.034	0.02
	Ethylbenzene	<0.018		0.018	ug/g	19-NOV-20	0.05	1.9	1.9
	Toluene	<0.080		0.080	ug/g	19-NOV-20	0.2	7.8	0.99

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2530806-12	BH108-20 SA1								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL								
Volatile Organic Compounds									
	o-Xylene	<0.020		0.020	ug/g	19-NOV-20			
	m+p-Xylenes	<0.030		0.030	ug/g	19-NOV-20			
	Xylenes (Total)	<0.050		0.050	ug/g	20-NOV-20	0.05	3	0.9
	Surrogate: 4-Bromofluorobenzene	110.1		50-140	%	19-NOV-20			
	Surrogate: 1,4-Difluorobenzene	106.8		50-140	%	19-NOV-20			
Hydrocarbons									
	F1 (C6-C10)	<5.0		5.0	ug/g	19-NOV-20	25	25	25
	F1-BTEX	<5.0		5.0	ug/g	24-NOV-20	25	25	25
	F2 (C10-C16)	<10		10	ug/g	24-NOV-20	10	26	10
	F3 (C16-C34)	56		50	ug/g	24-NOV-20	240	1700	300
	F4 (C34-C50)	126		50	ug/g	24-NOV-20	*120	3300	2800
	F4G-SG (GHH-Silica)	550		250	ug/g	23-NOV-20	*120	3300	2800
	Total Hydrocarbons (C6-C50)	181		72	ug/g	24-NOV-20			
	Chrom. to baseline at nC50	NO			No Unit	24-NOV-20			
	Surrogate: 2-Bromobenzotrifluoride	66.5		60-140	%	24-NOV-20			
	Surrogate: 3,4-Dichlorotoluene	89.2		60-140	%	19-NOV-20			
L2530806-13	BH108-20 SA2								
Sampled By:	MATT D. on 17-NOV-20								
Matrix:	SOIL						#1	#2	#3
Metals									
	Antimony (Sb)	<1.0		1.0	ug/g	24-NOV-20	1.3	40	7.5
	Arsenic (As)	6.1		1.0	ug/g	24-NOV-20	18	18	18
	Barium (Ba)	122		1.0	ug/g	24-NOV-20	220	670	390
	Beryllium (Be)	0.62		0.50	ug/g	24-NOV-20	2.5	8	4
	Boron (B)	6.8		5.0	ug/g	24-NOV-20	36	120	120
	Cadmium (Cd)	1.07		0.50	ug/g	24-NOV-20	1.2	1.9	1.2
	Chromium (Cr)	15.9		1.0	ug/g	24-NOV-20	70	160	160
	Cobalt (Co)	4.7		1.0	ug/g	24-NOV-20	21	80	22
	Copper (Cu)	35.7		1.0	ug/g	24-NOV-20	92	230	140
	Lead (Pb)	15.4		1.0	ug/g	24-NOV-20	120	120	120
	Molybdenum (Mo)	1.2		1.0	ug/g	24-NOV-20	2	40	6.9
	Nickel (Ni)	15.2		1.0	ug/g	24-NOV-20	82	270	100
	Selenium (Se)	1.6		1.0	ug/g	24-NOV-20	*1.5	5.5	2.4
	Silver (Ag)	<0.20		0.20	ug/g	24-NOV-20	0.5	40	20
	Thallium (Tl)	<0.50		0.50	ug/g	24-NOV-20	1	3.3	1
	Uranium (U)	1.7		1.0	ug/g	24-NOV-20	2.5	33	23
	Vanadium (V)	26.0		1.0	ug/g	24-NOV-20	86	86	86
	Zinc (Zn)	65.5		5.0	ug/g	24-NOV-20	290	340	340

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T1/T3.1-SOIL-RPIICC

#1: T1 - Soil - Res/Park/Inst/Ind/Com/Commu Property Use

#2: T3.1 - Volume Independent Soil - Ind/Com/Commu Property Use

#3: T3.1 - Volume Independent Soil - Res/Park/Inst Property Use

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
SAR:M	Reported SAR represents a maximum value. Actual SAR may be lower if both Ca and Mg were detectable.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

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).

CHLORDANE-T-CALC-WT	Soil	Chlordane Total sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

DDD-DDE-DDT-CALC-WT	Soil	DDD, DDE, DDT sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity 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).

ENDOSULFAN-T-CALC-WT	Soil	Endosulfan Total sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

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

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

Hydrocarbon results are expressed on a dry weight basis.

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

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then 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).

Reference Information

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

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

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).

F4G-ADD-511-WT	Soil	F4G SG-O.Reg 153/04 (July 2011)	MOE DECPH-E3398/CCME TIER 1

F4G, gravimetric analysis, is determined if the chromatogram does not return to baseline at or before C50. A soil sample is extracted with a solvent mix, the solvent is evaporated and the weight of the residue is determined.

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-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020B (mod)

Soil/sediment is dried, disaggregated, and sieved (2 mm). For tests intended to support Ontario regulations, the <2mm fraction is ground to pass through a 0.355 mm sieve. Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.

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	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking techniqueis used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by 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).

PEST-OC-511-WT	Soil	OC Pesticides-O.Reg 153/04 (July 2011)	SW846 8270 (511)

Soil sample is extracted in a solvent, after extraction a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

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	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

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).

Reference Information

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

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).

XYLENES-SUM-CALC-WT	Soil	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:

17-825494

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	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

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT	**Soil**							
Batch R5290437								
WG3447892-4 DUP		**WG3447892-3**						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	19-NOV-20
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	19-NOV-20
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-NOV-20
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	19-NOV-20
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	19-NOV-20
WG3447892-2 LCS								
Benzene			110.8		%		70-130	19-NOV-20
Ethylbenzene			102.8		%		70-130	19-NOV-20
m+p-Xylenes			103.9		%		70-130	19-NOV-20
o-Xylene			105.9		%		70-130	19-NOV-20
Toluene			107.6		%		70-130	19-NOV-20
WG3447892-1 MB								
Benzene			<0.0068		ug/g		0.0068	19-NOV-20
Ethylbenzene			<0.018		ug/g		0.018	19-NOV-20
m+p-Xylenes			<0.030		ug/g		0.03	19-NOV-20
o-Xylene			<0.020		ug/g		0.02	19-NOV-20
Toluene			<0.080		ug/g		0.08	19-NOV-20
Surrogate: 1,4-Difluorobenzene			121.1		%		50-140	19-NOV-20
Surrogate: 4-Bromofluorobenzene			126.4		%		50-140	19-NOV-20
WG3447892-5 MS		**WG3447892-3**						
Benzene			103.8		%		60-140	19-NOV-20
Ethylbenzene			94.9		%		60-140	19-NOV-20
m+p-Xylenes			96.7		%		60-140	19-NOV-20
o-Xylene			98.2		%		60-140	19-NOV-20
Toluene			100.3		%		60-140	19-NOV-20
Batch R5290765								
WG3447145-4 DUP		**WG3447145-3**						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	20-NOV-20
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	20-NOV-20
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	20-NOV-20
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	20-NOV-20
WG3447145-2 LCS								
Benzene			108.6		%		70-130	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT	**Soil**							
Batch R5290765								
WG3447145-2 LCS								
Ethylbenzene			86.0		%		70-130	20-NOV-20
m+p-Xylenes			90.6		%		70-130	20-NOV-20
o-Xylene			87.0		%		70-130	20-NOV-20
Toluene			91.4		%		70-130	20-NOV-20
WG3447145-1 MB								
Benzene			<0.0068		ug/g		0.0068	20-NOV-20
Ethylbenzene			<0.018		ug/g		0.018	20-NOV-20
m+p-Xylenes			<0.030		ug/g		0.03	20-NOV-20
o-Xylene			<0.020		ug/g		0.02	20-NOV-20
Toluene			<0.080		ug/g		0.08	20-NOV-20
Surrogate: 1,4-Difluorobenzene			113.4		%		50-140	20-NOV-20
Surrogate: 4-Bromofluorobenzene			97.1		%		50-140	20-NOV-20
WG3447145-5 MS		**WG3447145-3**						
Benzene			110.8		%		60-140	20-NOV-20
Ethylbenzene			87.6		%		60-140	20-NOV-20
m+p-Xylenes			91.7		%		60-140	20-NOV-20
o-Xylene			82.3		%		60-140	20-NOV-20
Toluene			93.7		%		60-140	20-NOV-20
EC-WT	**Soil**							
Batch R5296958								
WG3450328-4 DUP		**WG3450328-3**						
Conductivity		0.242	0.228		mS/cm	6.0	20	24-NOV-20
WG3450328-2 IRM		**WT SAR4**						
Conductivity			89.1		%		70-130	24-NOV-20
WG3450689-1 LCS								
Conductivity			99.1		%		90-110	24-NOV-20
WG3450328-1 MB								
Conductivity			<0.0040		mS/cm		0.004	24-NOV-20
F1-HS-511-WT	**Soil**							
Batch R5290437								
WG3447892-4 DUP		**WG3447892-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	19-NOV-20
WG3447892-2 LCS								
F1 (C6-C10)			88.6		%		80-120	19-NOV-20
WG3447892-1 MB								

ALS Environmental

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Soil**							
Batch	**R5290437**							
WG3447892-1	**MB**							
F1 (C6-C10)			<5.0		ug/g		5	19-NOV-20
Surrogate: 3,4-Dichlorotoluene			108.0		%		60-140	19-NOV-20
WG3447892-6	**MS**	**L2531070-2**						
F1 (C6-C10)			86.9		%		60-140	19-NOV-20
Batch	**R5290765**							
WG3447145-4	**DUP**	**WG3447145-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	20-NOV-20
WG3447145-2	**LCS**							
F1 (C6-C10)			99.4		%		80-120	20-NOV-20
WG3447145-1	**MB**							
F1 (C6-C10)			<5.0		ug/g		5	20-NOV-20
Surrogate: 3,4-Dichlorotoluene			116.2		%		60-140	20-NOV-20
WG3447145-6	**MS**	**L2530464-5**						
F1 (C6-C10)			97.5		%		60-140	20-NOV-20
F2-F4-511-WT	**Soil**							
Batch	**R5291582**							
WG3447829-3	**DUP**	**WG3447829-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	20-NOV-20
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	20-NOV-20
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	20-NOV-20
WG3447829-2	**LCS**							
F2 (C10-C16)			103.9		%		80-120	20-NOV-20
F3 (C16-C34)			104.3		%		80-120	20-NOV-20
F4 (C34-C50)			104.8		%		80-120	20-NOV-20
WG3447829-1	**MB**							
F2 (C10-C16)			<10		ug/g		10	20-NOV-20
F3 (C16-C34)			<50		ug/g		50	20-NOV-20
F4 (C34-C50)			<50		ug/g		50	20-NOV-20
Surrogate: 2-Bromobenzotrifluoride			96.3		%		60-140	20-NOV-20
WG3447829-4	**MS**	**WG3447829-5**						
F2 (C10-C16)			99.4		%		60-140	20-NOV-20
F3 (C16-C34)			101.4		%		60-140	20-NOV-20
F4 (C34-C50)			102.1		%		60-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT	**Soil**							
Batch R5292716								
WG3447843-7 DUP		**WG3447843-6**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	23-NOV-20
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	23-NOV-20
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	23-NOV-20
WG3447843-2 LCS								
F2 (C10-C16)			89.3		%		80-120	20-NOV-20
F3 (C16-C34)			85.0		%		80-120	20-NOV-20
F4 (C34-C50)			68.3	LCS-L	%		80-120	20-NOV-20
WG3447843-1 MB								
F2 (C10-C16)			<10		ug/g		10	20-NOV-20
F3 (C16-C34)			<50		ug/g		50	20-NOV-20
F4 (C34-C50)			<50		ug/g		50	20-NOV-20
Surrogate: 2-Bromobenzotrifluoride			89.1		%		60-140	20-NOV-20
WG3447843-8 MS		**WG3447843-6**						
F2 (C10-C16)			97.0		%		60-140	23-NOV-20
F3 (C16-C34)			88.6		%		60-140	23-NOV-20
F4 (C34-C50)			75.0		%		60-140	23-NOV-20
Batch R5296980								
WG3450219-3 DUP		**WG3450219-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	24-NOV-20
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	24-NOV-20
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	24-NOV-20
WG3450219-2 LCS								
F2 (C10-C16)			100.6		%		80-120	24-NOV-20
F3 (C16-C34)			106.0		%		80-120	24-NOV-20
F4 (C34-C50)			110.9		%		80-120	24-NOV-20
WG3450219-1 MB								
F2 (C10-C16)			<10		ug/g		10	24-NOV-20
F3 (C16-C34)			<50		ug/g		50	24-NOV-20
F4 (C34-C50)			<50		ug/g		50	24-NOV-20
Surrogate: 2-Bromobenzotrifluoride			81.1		%		60-140	24-NOV-20
WG3450219-4 MS		**WG3450219-5**						
F2 (C10-C16)			98.3		%		60-140	24-NOV-20
F3 (C16-C34)			102.0		%		60-140	24-NOV-20
F4 (C34-C50)			107.2		%		60-140	24-NOV-20
F4G-ADD-511-WT	**Soil**							

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F4G-ADD-511-WT	**Soil**							
Batch R5297134								
WG3451247-2 LCS								
F4G-SG (GHH-Silica)			65.3		%		60-140	23-NOV-20
WG3451247-1 MB								
F4G-SG (GHH-Silica)			<250		ug/g		250	23-NOV-20
MET-200.2-CCMS-WT	**Soil**							
Batch R5297165								
WG3450325-2 CRM		**WT-SS-2**						
Antimony (Sb)			89.8		%		70-130	24-NOV-20
Arsenic (As)			96.5		%		70-130	24-NOV-20
Barium (Ba)			98.0		%		70-130	24-NOV-20
Beryllium (Be)			93.1		%		70-130	24-NOV-20
Boron (B)			7.1		mg/kg		3.5-13.5	24-NOV-20
Cadmium (Cd)			118.6		%		70-130	24-NOV-20
Chromium (Cr)			93.0		%		70-130	24-NOV-20
Cobalt (Co)			96.6		%		70-130	24-NOV-20
Copper (Cu)			97.2		%		70-130	24-NOV-20
Lead (Pb)			96.8		%		70-130	24-NOV-20
Molybdenum (Mo)			96.2		%		70-130	24-NOV-20
Nickel (Ni)			99.2		%		70-130	24-NOV-20
Selenium (Se)			0.12		mg/kg		0-0.34	24-NOV-20
Silver (Ag)			87.1		%		70-130	24-NOV-20
Thallium (Tl)			0.070		mg/kg		0.029-0.129	24-NOV-20
Uranium (U)			85.0		%		70-130	24-NOV-20
Vanadium (V)			96.1		%		70-130	24-NOV-20
Zinc (Zn)			96.2		%		70-130	24-NOV-20
WG3450325-6 DUP		**WG3450325-5**						
Antimony (Sb)		4.96	4.13		ug/g	18	30	24-NOV-20
Arsenic (As)		4.15	3.65		ug/g	13	30	24-NOV-20
Barium (Ba)		583	477		ug/g	20	40	24-NOV-20
Beryllium (Be)		0.15	0.12		ug/g	23	30	24-NOV-20
Boron (B)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	24-NOV-20
Cadmium (Cd)		2.05	1.63		ug/g	23	30	24-NOV-20
Chromium (Cr)		77.5	67.9		ug/g	13	30	24-NOV-20
Cobalt (Co)		5.97	4.89		ug/g	20	30	24-NOV-20
Copper (Cu)		270	238		ug/g	12	30	24-NOV-20

ALS Environmental

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5297165								
WG3450325-6 DUP		**WG3450325-5**						
Lead (Pb)		229	185		ug/g	21	40	24-NOV-20
Molybdenum (Mo)		3.92	3.26		ug/g	18	40	24-NOV-20
Nickel (Ni)		50.1	34.0	MES	ug/g	38	30	24-NOV-20
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	24-NOV-20
Silver (Ag)		0.15	0.12		ug/g	27	40	24-NOV-20
Thallium (Tl)		<0.050	<0.050	RPD-NA	ug/g	N/A	30	24-NOV-20
Uranium (U)		0.156	0.144		ug/g	7.6	30	24-NOV-20
Vanadium (V)		10.5	8.87		ug/g	17	30	24-NOV-20
Zinc (Zn)		275	229		ug/g	18	30	24-NOV-20
WG3450325-4 LCS								
Antimony (Sb)			98.8		%		80-120	24-NOV-20
Arsenic (As)			99.5		%		80-120	24-NOV-20
Barium (Ba)			99.2		%		80-120	24-NOV-20
Beryllium (Be)			89.5		%		80-120	24-NOV-20
Boron (B)			84.1		%		80-120	24-NOV-20
Cadmium (Cd)			95.8		%		80-120	24-NOV-20
Chromium (Cr)			98.6		%		80-120	24-NOV-20
Cobalt (Co)			95.6		%		80-120	24-NOV-20
Copper (Cu)			95.0		%		80-120	24-NOV-20
Lead (Pb)			95.0		%		80-120	24-NOV-20
Molybdenum (Mo)			95.5		%		80-120	24-NOV-20
Nickel (Ni)			96.2		%		80-120	24-NOV-20
Selenium (Se)			100.5		%		80-120	24-NOV-20
Silver (Ag)			96.6		%		80-120	24-NOV-20
Thallium (Tl)			95.0		%		80-120	24-NOV-20
Uranium (U)			84.1		%		80-120	24-NOV-20
Vanadium (V)			100.2		%		80-120	24-NOV-20
Zinc (Zn)			94.2		%		80-120	24-NOV-20
WG3450325-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	24-NOV-20
Arsenic (As)			<0.10		mg/kg		0.1	24-NOV-20
Barium (Ba)			<0.50		mg/kg		0.5	24-NOV-20
Beryllium (Be)			<0.10		mg/kg		0.1	24-NOV-20
Boron (B)			<5.0		mg/kg		5	24-NOV-20

Quality Control Report

Workorder: L2530806 Report Date: 26-NOV-20

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5297165								
WG3450325-1 MB								
Cadmium (Cd)			<0.020		mg/kg		0.02	24-NOV-20
Chromium (Cr)			<0.50		mg/kg		0.5	24-NOV-20
Cobalt (Co)			<0.10		mg/kg		0.1	24-NOV-20
Copper (Cu)			<0.50		mg/kg		0.5	24-NOV-20
Lead (Pb)			<0.50		mg/kg		0.5	24-NOV-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	24-NOV-20
Nickel (Ni)			<0.50		mg/kg		0.5	24-NOV-20
Selenium (Se)			<0.20		mg/kg		0.2	24-NOV-20
Silver (Ag)			<0.10		mg/kg		0.1	24-NOV-20
Thallium (Tl)			<0.050		mg/kg		0.05	24-NOV-20
Uranium (U)			<0.050		mg/kg		0.05	24-NOV-20
Vanadium (V)			<0.20		mg/kg		0.2	24-NOV-20
Zinc (Zn)			<2.0		mg/kg		2	24-NOV-20
Batch R5297301								
WG3450279-2 CRM		**WT-SS-2**						
Antimony (Sb)			104.4		%		70-130	24-NOV-20
Arsenic (As)			114.4		%		70-130	24-NOV-20
Barium (Ba)			111.0		%		70-130	24-NOV-20
Beryllium (Be)			111.3		%		70-130	24-NOV-20
Boron (B)			10.3		mg/kg		3.5-13.5	24-NOV-20
Cadmium (Cd)			102.2		%		70-130	24-NOV-20
Chromium (Cr)			114.4		%		70-130	24-NOV-20
Cobalt (Co)			108.9		%		70-130	24-NOV-20
Copper (Cu)			109.2		%		70-130	24-NOV-20
Lead (Pb)			106.8		%		70-130	24-NOV-20
Molybdenum (Mo)			110.2		%		70-130	24-NOV-20
Nickel (Ni)			108.0		%		70-130	24-NOV-20
Selenium (Se)			0.14		mg/kg		0-0.34	24-NOV-20
Silver (Ag)			103.3		%		70-130	24-NOV-20
Thallium (Tl)			0.078		mg/kg		0.029-0.129	24-NOV-20
Uranium (U)			97.4		%		70-130	24-NOV-20
Vanadium (V)			113.5		%		70-130	24-NOV-20
Zinc (Zn)			104.1		%		70-130	24-NOV-20
WG3450279-4 DUP		**L2530877-11**						

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5297301								
WG3450279-4 DUP		**L2530877-11**						
Antimony (Sb)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	24-NOV-20
Arsenic (As)		8.4	8.2		ug/g	2.7	30	24-NOV-20
Barium (Ba)		78.8	79.6		ug/g	1.1	40	24-NOV-20
Beryllium (Be)		0.58	0.56		ug/g	4.3	30	24-NOV-20
Boron (B)		12.7	12.2		ug/g	3.4	30	24-NOV-20
Cadmium (Cd)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	24-NOV-20
Chromium (Cr)		22.0	21.7		ug/g	1.6	30	24-NOV-20
Cobalt (Co)		11.7	11.2		ug/g	4.9	30	24-NOV-20
Copper (Cu)		17.3	16.9		ug/g	2.2	30	24-NOV-20
Lead (Pb)		9.6	9.7		ug/g	1.1	40	24-NOV-20
Molybdenum (Mo)		3.6	3.5		ug/g	1.4	40	24-NOV-20
Nickel (Ni)		25.2	24.7		ug/g	2.0	30	24-NOV-20
Selenium (Se)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	24-NOV-20
Silver (Ag)		<0.20	<0.20	RPD-NA	ug/g	N/A	40	24-NOV-20
Thallium (Tl)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	24-NOV-20
Uranium (U)		1.2	1.2		ug/g	0.8	30	24-NOV-20
Vanadium (V)		32.4	32.1		ug/g	1.0	30	24-NOV-20
Zinc (Zn)		51.0	50.8		ug/g	0.4	30	24-NOV-20
WG3450279-3 LCS								
Antimony (Sb)			105.4		%		80-120	24-NOV-20
Arsenic (As)			98.5		%		80-120	24-NOV-20
Barium (Ba)			101.5		%		80-120	24-NOV-20
Beryllium (Be)			96.4		%		80-120	24-NOV-20
Boron (B)			93.1		%		80-120	24-NOV-20
Cadmium (Cd)			97.6		%		80-120	24-NOV-20
Chromium (Cr)			97.5		%		80-120	24-NOV-20
Cobalt (Co)			95.9		%		80-120	24-NOV-20
Copper (Cu)			94.7		%		80-120	24-NOV-20
Lead (Pb)			98.1		%		80-120	24-NOV-20
Molybdenum (Mo)			97.9		%		80-120	24-NOV-20
Nickel (Ni)			95.3		%		80-120	24-NOV-20
Selenium (Se)			97.6		%		80-120	24-NOV-20
Silver (Ag)			98.3		%		80-120	24-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R5297301								
WG3450279-3 LCS								
Thallium (Tl)			98.6		%		80-120	24-NOV-20
Uranium (U)			91.7		%		80-120	24-NOV-20
Vanadium (V)			99.3		%		80-120	24-NOV-20
Zinc (Zn)			95.1		%		80-120	24-NOV-20
WG3450279-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	24-NOV-20
Arsenic (As)			<0.10		mg/kg		0.1	24-NOV-20
Barium (Ba)			<0.50		mg/kg		0.5	24-NOV-20
Beryllium (Be)			<0.10		mg/kg		0.1	24-NOV-20
Boron (B)			<5.0		mg/kg		5	24-NOV-20
Cadmium (Cd)			<0.020		mg/kg		0.02	24-NOV-20
Chromium (Cr)			<0.50		mg/kg		0.5	24-NOV-20
Cobalt (Co)			<0.10		mg/kg		0.1	24-NOV-20
Copper (Cu)			<0.50		mg/kg		0.5	24-NOV-20
Lead (Pb)			<0.50		mg/kg		0.5	24-NOV-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	24-NOV-20
Nickel (Ni)			<0.50		mg/kg		0.5	24-NOV-20
Selenium (Se)			<0.20		mg/kg		0.2	24-NOV-20
Silver (Ag)			<0.10		mg/kg		0.1	24-NOV-20
Thallium (Tl)			<0.050		mg/kg		0.05	24-NOV-20
Uranium (U)			<0.050		mg/kg		0.05	24-NOV-20
Vanadium (V)			<0.20		mg/kg		0.2	24-NOV-20
Zinc (Zn)			<2.0		mg/kg		2	24-NOV-20
MOISTURE-WT	**Soil**							
Batch R5290559								
WG3448408-3 DUP		**L2530464-8**						
% Moisture		16.3	15.6		%	3.8	20	20-NOV-20
WG3448408-2 LCS								
% Moisture			100.0		%		90-110	20-NOV-20
WG3448408-1 MB								
% Moisture			<0.25		%		0.25	20-NOV-20
PAH-511-WT	**Soil**							

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5292577								
WG3447820-3 DUP		**WG3447820-5**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	20-NOV-20
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	20-NOV-20
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	20-NOV-20
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	20-NOV-20
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-NOV-20
WG3447820-2 LCS								
1-Methylnaphthalene			99.7		%		50-140	20-NOV-20
2-Methylnaphthalene			94.2		%		50-140	20-NOV-20
Acenaphthene			99.1		%		50-140	20-NOV-20
Acenaphthylene			97.6		%		50-140	20-NOV-20
Anthracene			97.4		%		50-140	20-NOV-20
Benzo(a)anthracene			100.4		%		50-140	20-NOV-20
Benzo(a)pyrene			98.1		%		50-140	20-NOV-20
Benzo(b)fluoranthene			104.5		%		50-140	20-NOV-20
Benzo(g,h,i)perylene			87.0		%		50-140	20-NOV-20
Benzo(k)fluoranthene			106.1		%		50-140	20-NOV-20
Chrysene			111.5		%		50-140	20-NOV-20
Dibenzo(ah)anthracene			79.1		%		50-140	20-NOV-20
Fluoranthene			96.7		%		50-140	20-NOV-20
Fluorene			94.0		%		50-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5292577								
WG3447820-2 LCS								
Indeno(1,2,3-cd)pyrene			89.4		%		50-140	20-NOV-20
Naphthalene			98.1		%		50-140	20-NOV-20
Phenanthrene			101.1		%		50-140	20-NOV-20
Pyrene			97.1		%		50-140	20-NOV-20
WG3447820-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	20-NOV-20
2-Methylnaphthalene			<0.030		ug/g		0.03	20-NOV-20
Acenaphthene			<0.050		ug/g		0.05	20-NOV-20
Acenaphthylene			<0.050		ug/g		0.05	20-NOV-20
Anthracene			<0.050		ug/g		0.05	20-NOV-20
Benzo(a)anthracene			<0.050		ug/g		0.05	20-NOV-20
Benzo(a)pyrene			<0.050		ug/g		0.05	20-NOV-20
Benzo(b)fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	20-NOV-20
Benzo(k)fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Chrysene			<0.050		ug/g		0.05	20-NOV-20
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	20-NOV-20
Fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Fluorene			<0.050		ug/g		0.05	20-NOV-20
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	20-NOV-20
Naphthalene			<0.013		ug/g		0.013	20-NOV-20
Phenanthrene			<0.046		ug/g		0.046	20-NOV-20
Pyrene			<0.050		ug/g		0.05	20-NOV-20
Surrogate: 2-Fluorobiphenyl			83.8		%		50-140	20-NOV-20
Surrogate: p-Terphenyl d14			86.5		%		50-140	20-NOV-20
WG3447820-4 MS		**WG3447820-5**						
1-Methylnaphthalene			90.2		%		50-140	20-NOV-20
2-Methylnaphthalene			84.6		%		50-140	20-NOV-20
Acenaphthene			93.0		%		50-140	20-NOV-20
Acenaphthylene			91.7		%		50-140	20-NOV-20
Anthracene			94.5		%		50-140	20-NOV-20
Benzo(a)anthracene			102.8		%		50-140	20-NOV-20
Benzo(a)pyrene			95.3		%		50-140	20-NOV-20
Benzo(b)fluoranthene			102.4		%		50-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5292577								
WG3447820-4 MS		**WG3447820-5**						
Benzo(g,h,i)perylene			87.9		%		50-140	20-NOV-20
Benzo(k)fluoranthene			96.6		%		50-140	20-NOV-20
Chrysene			101.9		%		50-140	20-NOV-20
Dibenzo(ah)anthracene			85.3		%		50-140	20-NOV-20
Fluoranthene			93.9		%		50-140	20-NOV-20
Fluorene			91.7		%		50-140	20-NOV-20
Indeno(1,2,3-cd)pyrene			91.7		%		50-140	20-NOV-20
Naphthalene			86.8		%		50-140	20-NOV-20
Phenanthrene			91.4		%		50-140	20-NOV-20
Pyrene			93.1		%		50-140	20-NOV-20
Batch R5296037								
WG3448261-3 DUP		**WG3448261-5**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	23-NOV-20
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	23-NOV-20
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	23-NOV-20
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	23-NOV-20
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	23-NOV-20
WG3448261-2 LCS								
1-Methylnaphthalene			90.2		%		50-140	20-NOV-20
2-Methylnaphthalene			86.2		%		50-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5296037								
WG3448261-2 LCS								
Acenaphthene			90.5		%		50-140	20-NOV-20
Acenaphthylene			95.8		%		50-140	20-NOV-20
Anthracene			89.1		%		50-140	20-NOV-20
Benzo(a)anthracene			93.9		%		50-140	20-NOV-20
Benzo(a)pyrene			89.2		%		50-140	20-NOV-20
Benzo(b)fluoranthene			85.7		%		50-140	20-NOV-20
Benzo(g,h,i)perylene			94.0		%		50-140	20-NOV-20
Benzo(k)fluoranthene			89.3		%		50-140	20-NOV-20
Chrysene			95.6		%		50-140	20-NOV-20
Dibenzo(ah)anthracene			99.0		%		50-140	20-NOV-20
Fluoranthene			87.0		%		50-140	20-NOV-20
Fluorene			87.8		%		50-140	20-NOV-20
Indeno(1,2,3-cd)pyrene			100.4		%		50-140	20-NOV-20
Naphthalene			88.3		%		50-140	20-NOV-20
Phenanthrene			88.3		%		50-140	20-NOV-20
Pyrene			86.7		%		50-140	20-NOV-20
WG3448261-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	20-NOV-20
2-Methylnaphthalene			<0.030		ug/g		0.03	20-NOV-20
Acenaphthene			<0.050		ug/g		0.05	20-NOV-20
Acenaphthylene			<0.050		ug/g		0.05	20-NOV-20
Anthracene			<0.050		ug/g		0.05	20-NOV-20
Benzo(a)anthracene			<0.050		ug/g		0.05	20-NOV-20
Benzo(a)pyrene			<0.050		ug/g		0.05	20-NOV-20
Benzo(b)fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	20-NOV-20
Benzo(k)fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Chrysene			<0.050		ug/g		0.05	20-NOV-20
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	20-NOV-20
Fluoranthene			<0.050		ug/g		0.05	20-NOV-20
Fluorene			<0.050		ug/g		0.05	20-NOV-20
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	20-NOV-20
Naphthalene			<0.013		ug/g		0.013	20-NOV-20
Phenanthrene			<0.046		ug/g		0.046	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5296037								
WG3448261-1 MB								
Pyrene			<0.050		ug/g		0.05	20-NOV-20
Surrogate: 2-Fluorobiphenyl			77.8		%		50-140	20-NOV-20
Surrogate: p-Terphenyl d14			82.8		%		50-140	20-NOV-20
WG3448261-4 MS		**WG3448261-5**						
1-Methylnaphthalene			94.4		%		50-140	23-NOV-20
2-Methylnaphthalene			89.3		%		50-140	23-NOV-20
Acenaphthene			94.1		%		50-140	23-NOV-20
Acenaphthylene			95.5		%		50-140	23-NOV-20
Anthracene			91.1		%		50-140	23-NOV-20
Benzo(a)anthracene			93.1		%		50-140	23-NOV-20
Benzo(a)pyrene			92.1		%		50-140	23-NOV-20
Benzo(b)fluoranthene			91.9		%		50-140	23-NOV-20
Benzo(g,h,i)perylene			103.1		%		50-140	23-NOV-20
Benzo(k)fluoranthene			90.3		%		50-140	23-NOV-20
Chrysene			99.9		%		50-140	23-NOV-20
Dibenzo(ah)anthracene			110.3		%		50-140	23-NOV-20
Fluoranthene			90.2		%		50-140	23-NOV-20
Fluorene			90.0		%		50-140	23-NOV-20
Indeno(1,2,3-cd)pyrene			103.7		%		50-140	23-NOV-20
Naphthalene			91.8		%		50-140	23-NOV-20
Phenanthrene			93.3		%		50-140	23-NOV-20
Pyrene			90.3		%		50-140	23-NOV-20
Batch R5296510								
WG3448590-3 DUP		**WG3448590-5**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	24-NOV-20
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	24-NOV-20
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5296510								
WG3448590-3 DUP		**WG3448590-5**						
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	24-NOV-20
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	24-NOV-20
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-NOV-20
WG3448590-2 LCS								
1-Methylnaphthalene			90.2		%		50-140	24-NOV-20
2-Methylnaphthalene			85.8		%		50-140	24-NOV-20
Acenaphthene			89.8		%		50-140	24-NOV-20
Acenaphthylene			87.6		%		50-140	24-NOV-20
Anthracene			86.8		%		50-140	24-NOV-20
Benzo(a)anthracene			87.7		%		50-140	24-NOV-20
Benzo(a)pyrene			85.6		%		50-140	24-NOV-20
Benzo(b)fluoranthene			87.7		%		50-140	24-NOV-20
Benzo(g,h,i)perylene			82.7		%		50-140	24-NOV-20
Benzo(k)fluoranthene			92.6		%		50-140	24-NOV-20
Chrysene			97.2		%		50-140	24-NOV-20
Dibenzo(ah)anthracene			84.0		%		50-140	24-NOV-20
Fluoranthene			86.8		%		50-140	24-NOV-20
Fluorene			86.4		%		50-140	24-NOV-20
Indeno(1,2,3-cd)pyrene			84.2		%		50-140	24-NOV-20
Naphthalene			88.4		%		50-140	24-NOV-20
Phenanthrene			90.4		%		50-140	24-NOV-20
Pyrene			87.0		%		50-140	24-NOV-20
WG3448590-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	24-NOV-20
2-Methylnaphthalene			<0.030		ug/g		0.03	24-NOV-20
Acenaphthene			<0.050		ug/g		0.05	24-NOV-20
Acenaphthylene			<0.050		ug/g		0.05	24-NOV-20
Anthracene			<0.050		ug/g		0.05	24-NOV-20
Benzo(a)anthracene			<0.050		ug/g		0.05	24-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R5296510								
WG3448590-1 MB								
Benzo(a)pyrene			<0.050		ug/g		0.05	24-NOV-20
Benzo(b)fluoranthene			<0.050		ug/g		0.05	24-NOV-20
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	24-NOV-20
Benzo(k)fluoranthene			<0.050		ug/g		0.05	24-NOV-20
Chrysene			<0.050		ug/g		0.05	24-NOV-20
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	24-NOV-20
Fluoranthene			<0.050		ug/g		0.05	24-NOV-20
Fluorene			<0.050		ug/g		0.05	24-NOV-20
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	24-NOV-20
Naphthalene			<0.013		ug/g		0.013	24-NOV-20
Phenanthrene			<0.046		ug/g		0.046	24-NOV-20
Pyrene			<0.050		ug/g		0.05	24-NOV-20
Surrogate: 2-Fluorobiphenyl			80.5		%		50-140	24-NOV-20
Surrogate: p-Terphenyl d14			86.9		%		50-140	24-NOV-20
WG3448590-4 MS		**WG3448590-5**						
1-Methylnaphthalene			97.3		%		50-140	24-NOV-20
2-Methylnaphthalene			92.9		%		50-140	24-NOV-20
Acenaphthene			97.9		%		50-140	24-NOV-20
Acenaphthylene			99.7		%		50-140	24-NOV-20
Anthracene			98.2		%		50-140	24-NOV-20
Benzo(a)anthracene			103.9		%		50-140	24-NOV-20
Benzo(a)pyrene			96.4		%		50-140	24-NOV-20
Benzo(b)fluoranthene			97.7		%		50-140	24-NOV-20
Benzo(g,h,i)perylene			94.7		%		50-140	24-NOV-20
Benzo(k)fluoranthene			95.2		%		50-140	24-NOV-20
Chrysene			103.9		%		50-140	24-NOV-20
Dibenzo(ah)anthracene			98.5		%		50-140	24-NOV-20
Fluoranthene			98.3		%		50-140	24-NOV-20
Fluorene			95.7		%		50-140	24-NOV-20
Indeno(1,2,3-cd)pyrene			98.4		%		50-140	24-NOV-20
Naphthalene			94.9		%		50-140	24-NOV-20
Phenanthrene			97.7		%		50-140	24-NOV-20
Pyrene			98.3		%		50-140	24-NOV-20
PEST-OC-511-WT	**Soil**							

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PEST-OC-511-WT	**Soil**							
Batch R5291403								
WG3447048-3 DUP		**WG3447048-5**						
Aldrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
a-chlordane		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
g-chlordane		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
op-DDD		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
pp-DDD		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
o,p-DDE		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
pp-DDE		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
op-DDT		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
pp-DDT		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Dieldrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Endosulfan I		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Endosulfan II		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Endrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
gamma-hexachlorocyclohexane		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-NOV-20
Heptachlor		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Heptachlor Epoxide		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
Hexachlorobenzene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-NOV-20
Hexachlorobutadiene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-NOV-20
Hexachloroethane		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-NOV-20
Methoxychlor		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-NOV-20
WG3447048-2 LCS								
Aldrin			116.6		%		50-140	20-NOV-20
a-chlordane			94.5		%		50-140	20-NOV-20
g-chlordane			91.2		%		50-140	20-NOV-20
op-DDD			104.3		%		50-140	20-NOV-20
pp-DDD			105.8		%		50-140	20-NOV-20
o,p-DDE			84.8		%		50-140	20-NOV-20
pp-DDE			104.8		%		50-140	20-NOV-20
op-DDT			89.6		%		50-140	20-NOV-20
pp-DDT			65.8		%		50-140	20-NOV-20
Dieldrin			99.3		%		50-140	20-NOV-20
Endosulfan I			90.9		%		50-140	20-NOV-20
Endosulfan II			101.0		%		50-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PEST-OC-511-WT	**Soil**							
Batch R5291403								
WG3447048-2 LCS								
Endrin			147.9	LCS-H	%		50-140	20-NOV-20
gamma-hexachlorocyclohexane			83.7		%		50-140	20-NOV-20
Heptachlor			110.8		%		50-140	20-NOV-20
Heptachlor Epoxide			106.3		%		50-140	20-NOV-20
Hexachlorobenzene			85.6		%		50-140	20-NOV-20
Hexachlorobutadiene			79.8		%		50-140	20-NOV-20
Hexachloroethane			79.9		%		50-140	20-NOV-20
Methoxychlor			118.2		%		50-140	20-NOV-20
WG3447048-1 MB								
Aldrin			<0.020		ug/g		0.02	20-NOV-20
a-chlordane			<0.020		ug/g		0.02	20-NOV-20
g-chlordane			<0.020		ug/g		0.02	20-NOV-20
op-DDD			<0.020		ug/g		0.02	20-NOV-20
pp-DDD			<0.020		ug/g		0.02	20-NOV-20
o,p-DDE			<0.020		ug/g		0.02	20-NOV-20
pp-DDE			<0.020		ug/g		0.02	20-NOV-20
op-DDT			<0.020		ug/g		0.02	20-NOV-20
pp-DDT			<0.020		ug/g		0.02	20-NOV-20
Dieldrin			<0.020		ug/g		0.02	20-NOV-20
Endosulfan I			<0.020		ug/g		0.02	20-NOV-20
Endosulfan II			<0.020		ug/g		0.02	20-NOV-20
Endrin			<0.020		ug/g		0.02	20-NOV-20
gamma-hexachlorocyclohexane			<0.010		ug/g		0.01	20-NOV-20
Heptachlor			<0.020		ug/g		0.02	20-NOV-20
Heptachlor Epoxide			<0.020		ug/g		0.02	20-NOV-20
Hexachlorobenzene			<0.010		ug/g		0.01	20-NOV-20
Hexachlorobutadiene			<0.010		ug/g		0.01	20-NOV-20
Hexachloroethane			<0.010		ug/g		0.01	20-NOV-20
Methoxychlor			<0.020		ug/g		0.02	20-NOV-20
Surrogate: 2-Fluorobiphenyl			66.2		%		50-140	20-NOV-20
Surrogate: d14-Terphenyl			63.9		%		50-140	20-NOV-20
WG3447048-4 MS		**WG3447048-5**						
Aldrin			132.5		%		50-140	20-NOV-20
a-chlordane			93.7		%		50-140	20-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PEST-OC-511-WT	**Soil**							
Batch R5291403								
WG3447048-4	**MS**	**WG3447048-5**						
g-chlordane			90.7		%		50-140	20-NOV-20
op-DDD			103.6		%		50-140	20-NOV-20
pp-DDD			111.3		%		50-140	20-NOV-20
o,p-DDE			87.5		%		50-140	20-NOV-20
pp-DDE			108.7		%		50-140	20-NOV-20
op-DDT			88.8		%		50-140	20-NOV-20
pp-DDT			65.4		%		50-140	20-NOV-20
Dieldrin			95.1		%		50-140	20-NOV-20
Endosulfan I			89.3		%		50-140	20-NOV-20
Endosulfan II			102.0		%		50-140	20-NOV-20
Endrin			146.9	RRQC	%		50-140	20-NOV-20
gamma-hexachlorocyclohexane			90.8		%		50-140	20-NOV-20
Heptachlor			122.7		%		50-140	20-NOV-20
Heptachlor Epoxide			101.9		%		50-140	20-NOV-20
Hexachlorobenzene			93.1		%		50-140	20-NOV-20
Hexachlorobutadiene			83.1		%		50-140	20-NOV-20
Hexachloroethane			82.6		%		50-140	20-NOV-20
Methoxychlor			134.5		%		50-140	20-NOV-20
COMMENTS: RRQC: Analyte recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.								
PH-WT	**Soil**							
Batch R5295057								
WG3448241-1	**DUP**	**L2530806-7**						
pH		7.60	7.63	J	pH units	0.03	0.3	23-NOV-20
WG3449696-1	**LCS**							
pH			6.95		pH units		6.9-7.1	23-NOV-20
SAR-R511-WT	**Soil**							
Batch R5296809								
WG3450328-4	**DUP**	**WG3450328-3**						
Calcium (Ca)		3.58	3.90		mg/L	8.6	30	24-NOV-20
Sodium (Na)		22.5	20.2		mg/L	11	30	24-NOV-20
Magnesium (Mg)		<0.50	<0.50	RPD-NA	mg/L	N/A	30	24-NOV-20
WG3450328-2	**IRM**	**WT SAR4**						
Calcium (Ca)			96.3		%		70-130	24-NOV-20
Sodium (Na)			87.9		%		70-130	24-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-R511-WT	**Soil**							
Batch R5296809								
WG3450328-2 IRM		**WT SAR4**						
Magnesium (Mg)			96.6		%		70-130	24-NOV-20
WG3450328-5 LCS								
Calcium (Ca)			108.7		%		80-120	24-NOV-20
Sodium (Na)			101.6		%		80-120	24-NOV-20
Magnesium (Mg)			102.8		%		80-120	24-NOV-20
WG3450328-1 MB								
Calcium (Ca)			<0.50		mg/L		0.5	24-NOV-20
Sodium (Na)			<0.50		mg/L		0.5	24-NOV-20
Magnesium (Mg)			<0.50		mg/L		0.5	24-NOV-20

Quality Control Report

Workorder: L2530806 Report Date: 26-NOV-20

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Contact: JEN LAMBKE

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.
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
LCS-L	Lab Control Sample recovery was below ALS DQO. Reference Material and/or Matrix Spike results were acceptable. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
RRQC	Refer to report remarks for information regarding this QC result.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

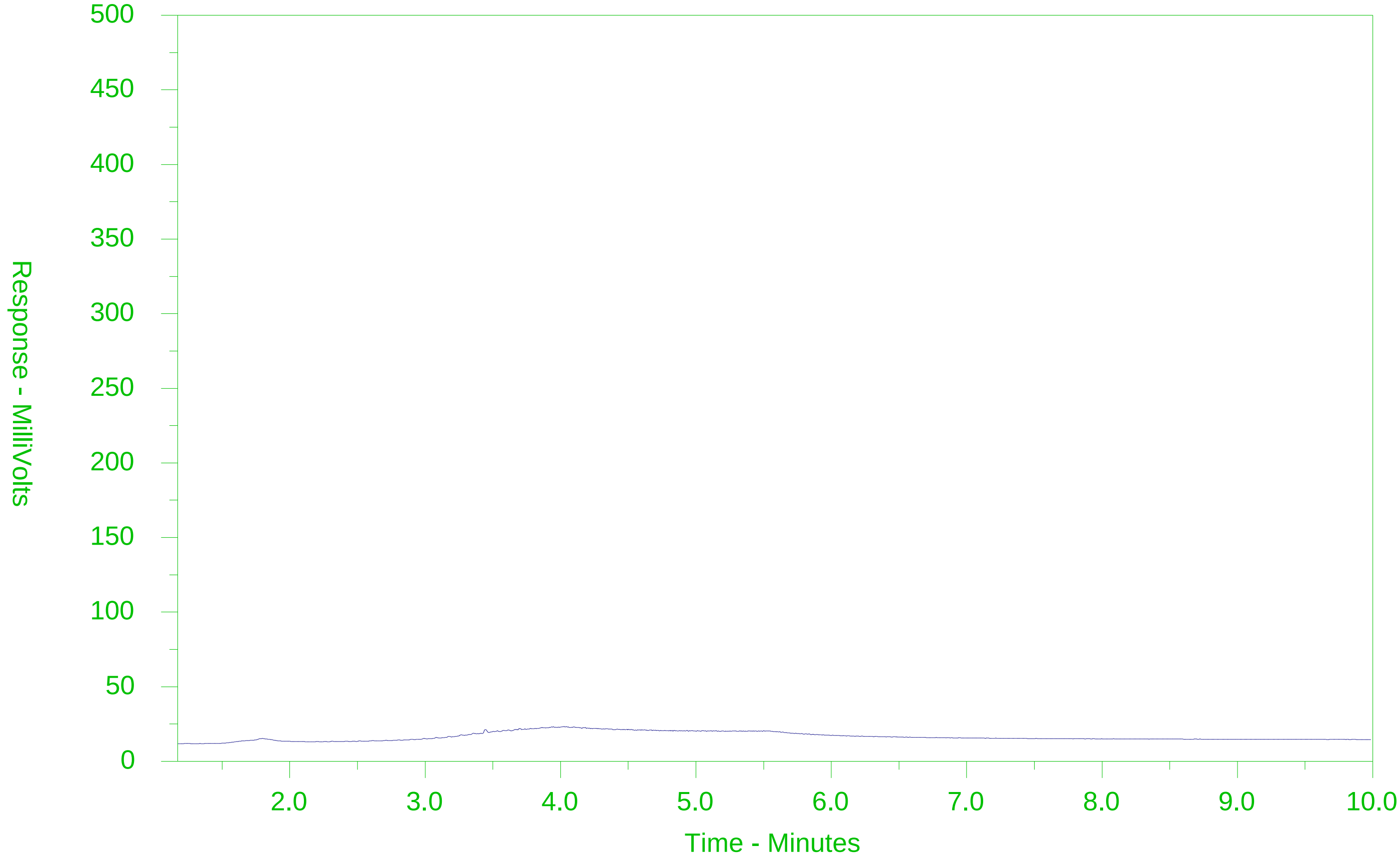
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where 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: L2530806-1
Client Sample ID: BH101-20 SS2



←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.

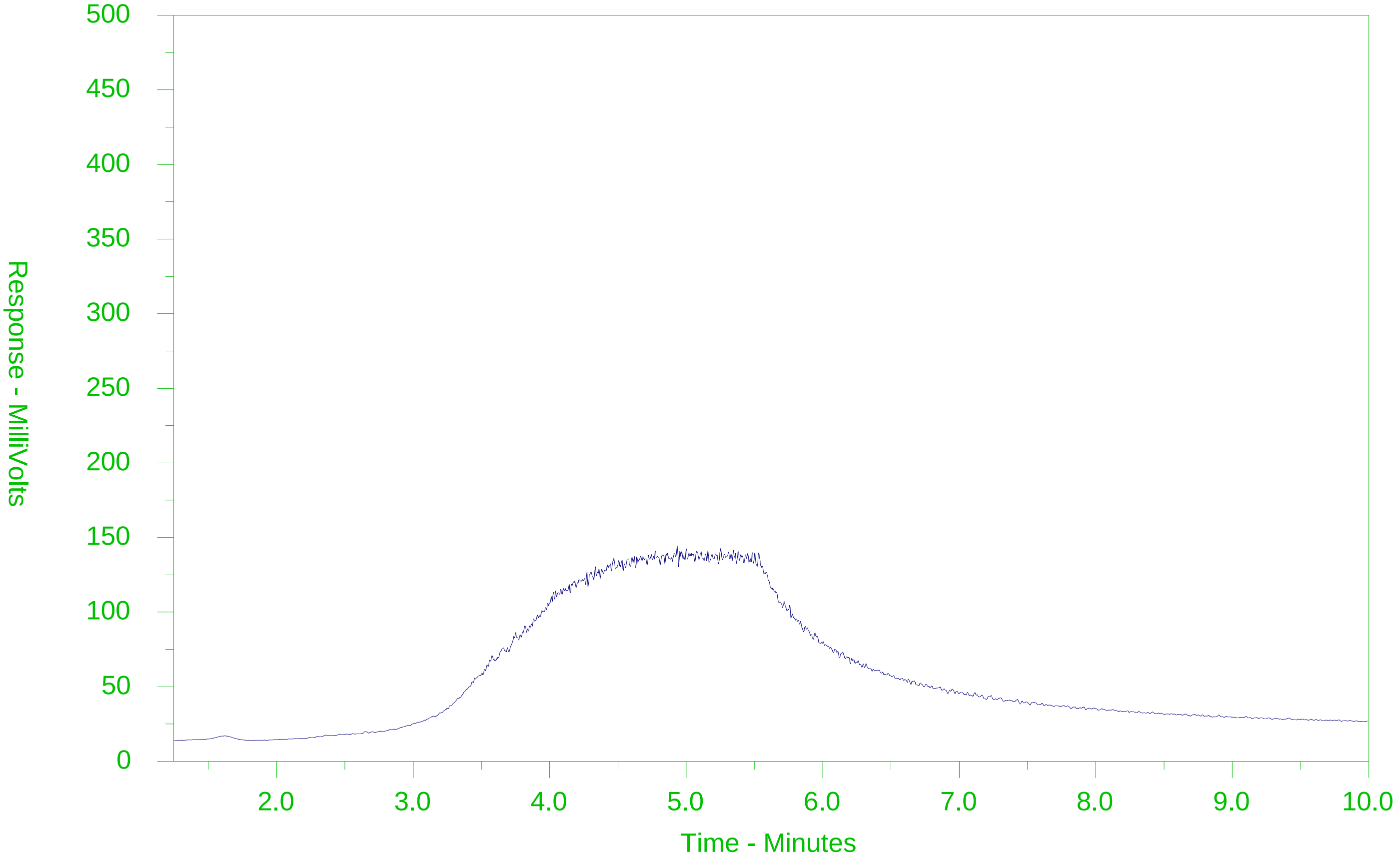
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-2
Client Sample ID: BH102-20 SS1



←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.

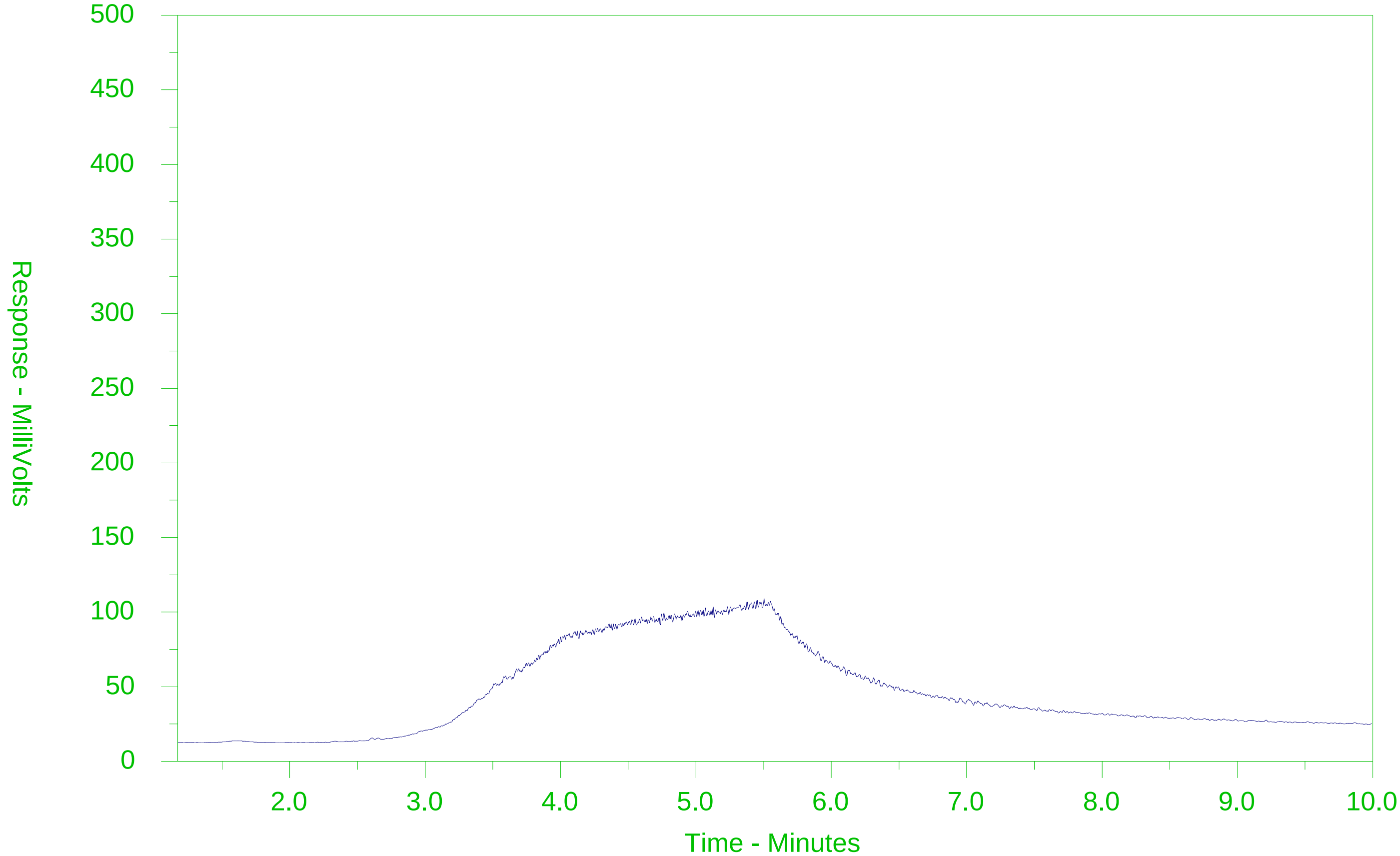
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-3
Client Sample ID: BH1002-20 SS1



←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.

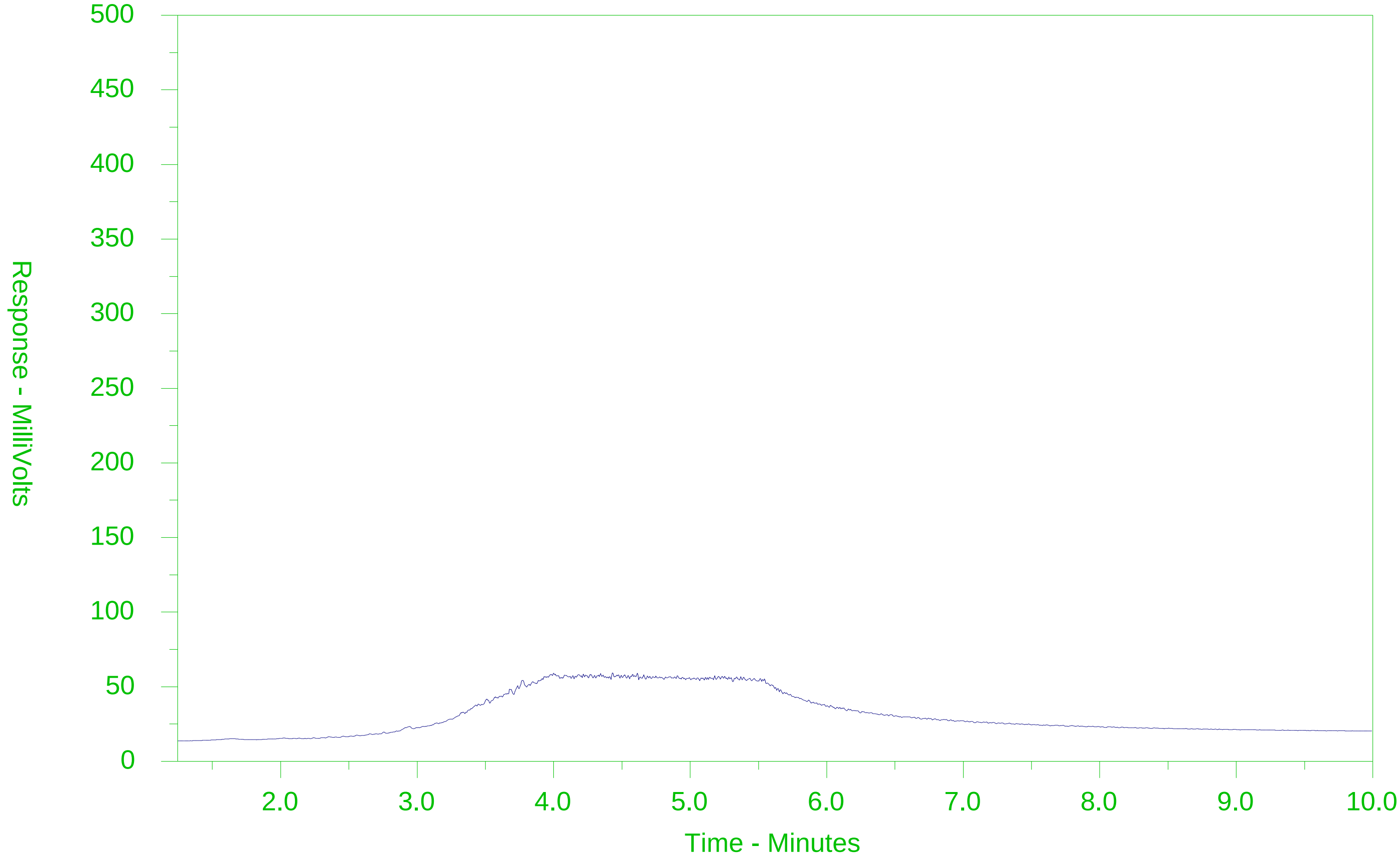
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-4
Client Sample ID: BH102-20 SS2B



←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.

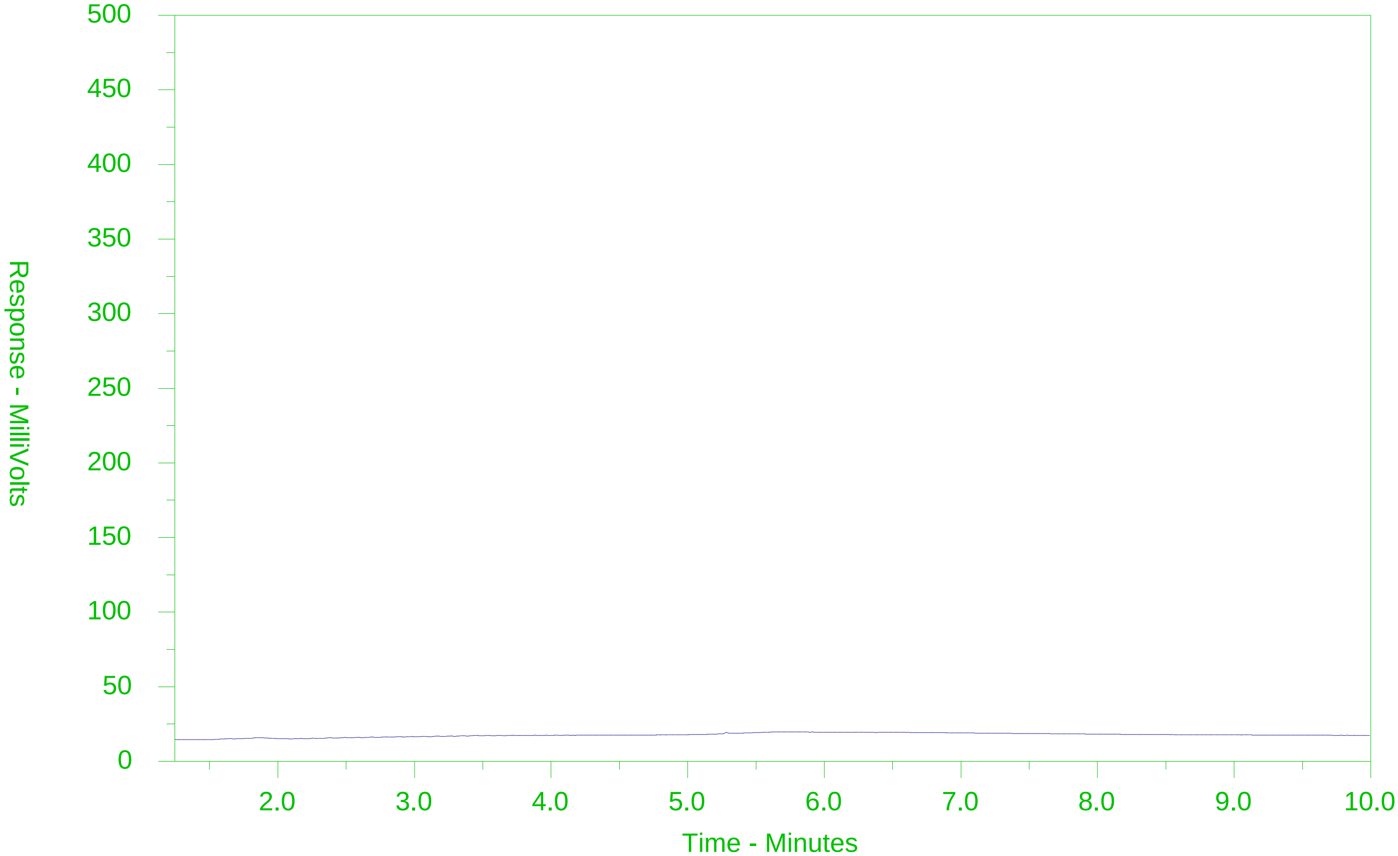
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-5
Client Sample ID: BH103-20 SS2



←F2→	←F3→		←F4→
nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 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.

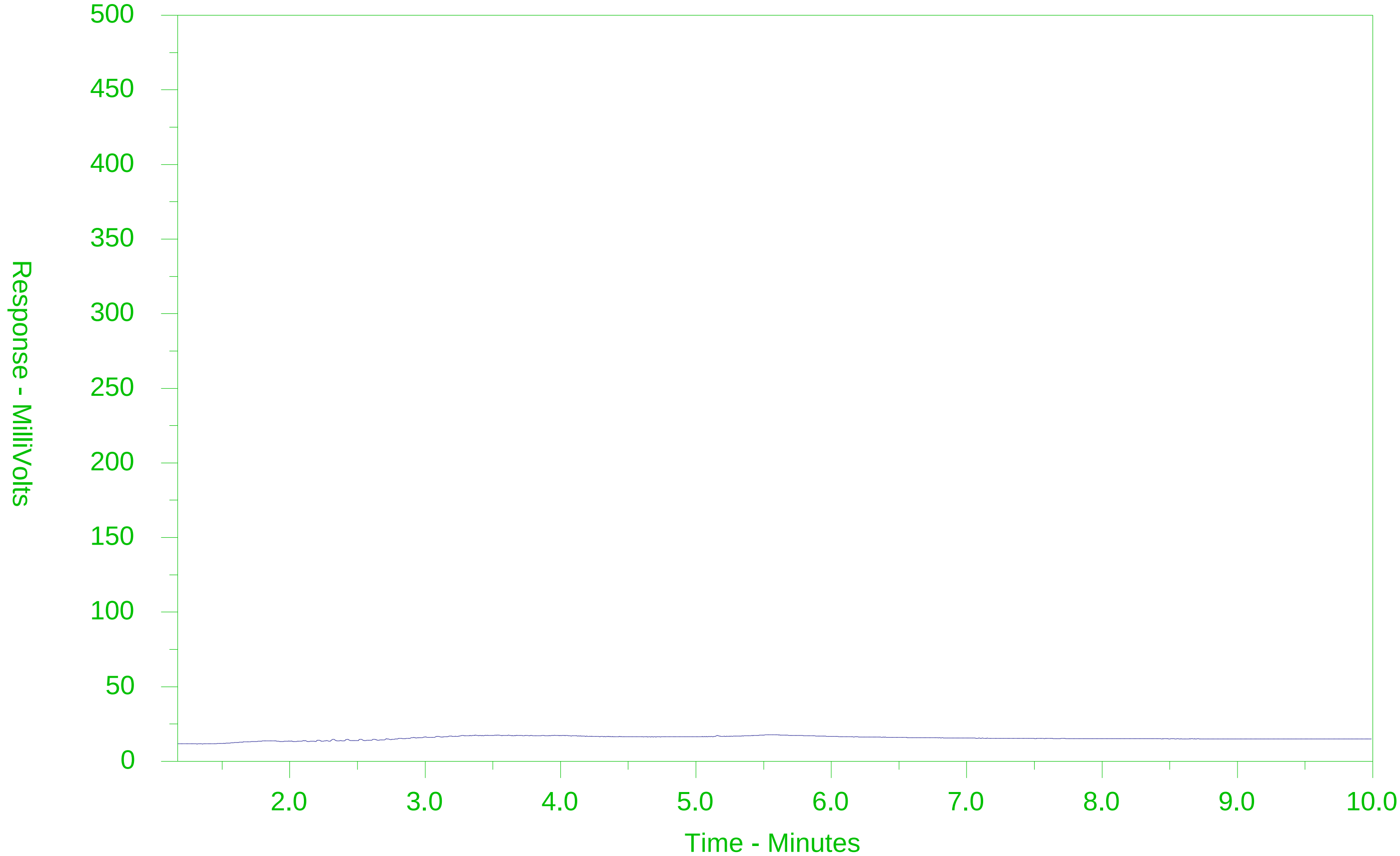
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-6
Client Sample ID: BH104-20 SS2



←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.

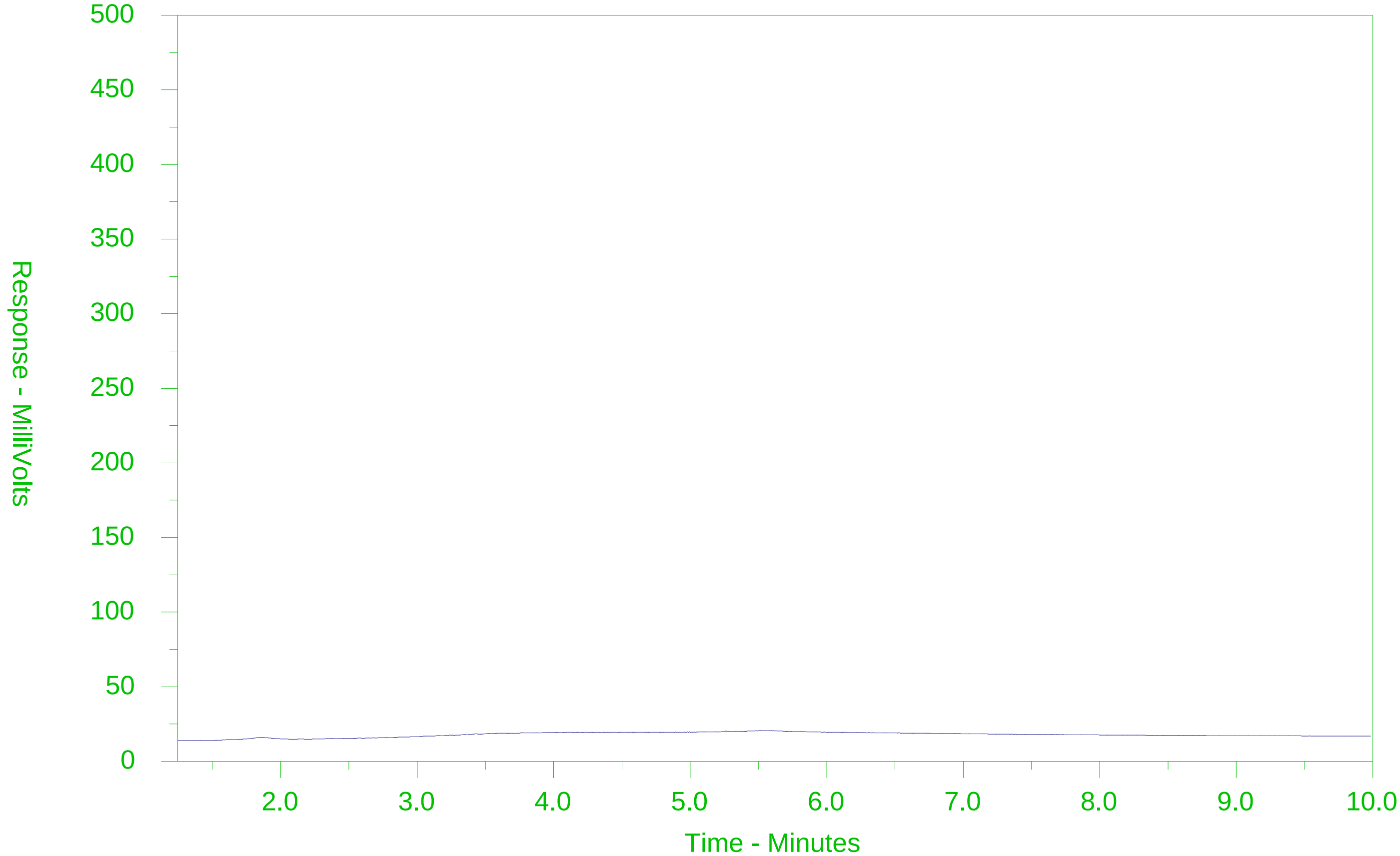
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-7
Client Sample ID: BH104-20 SS3



←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.

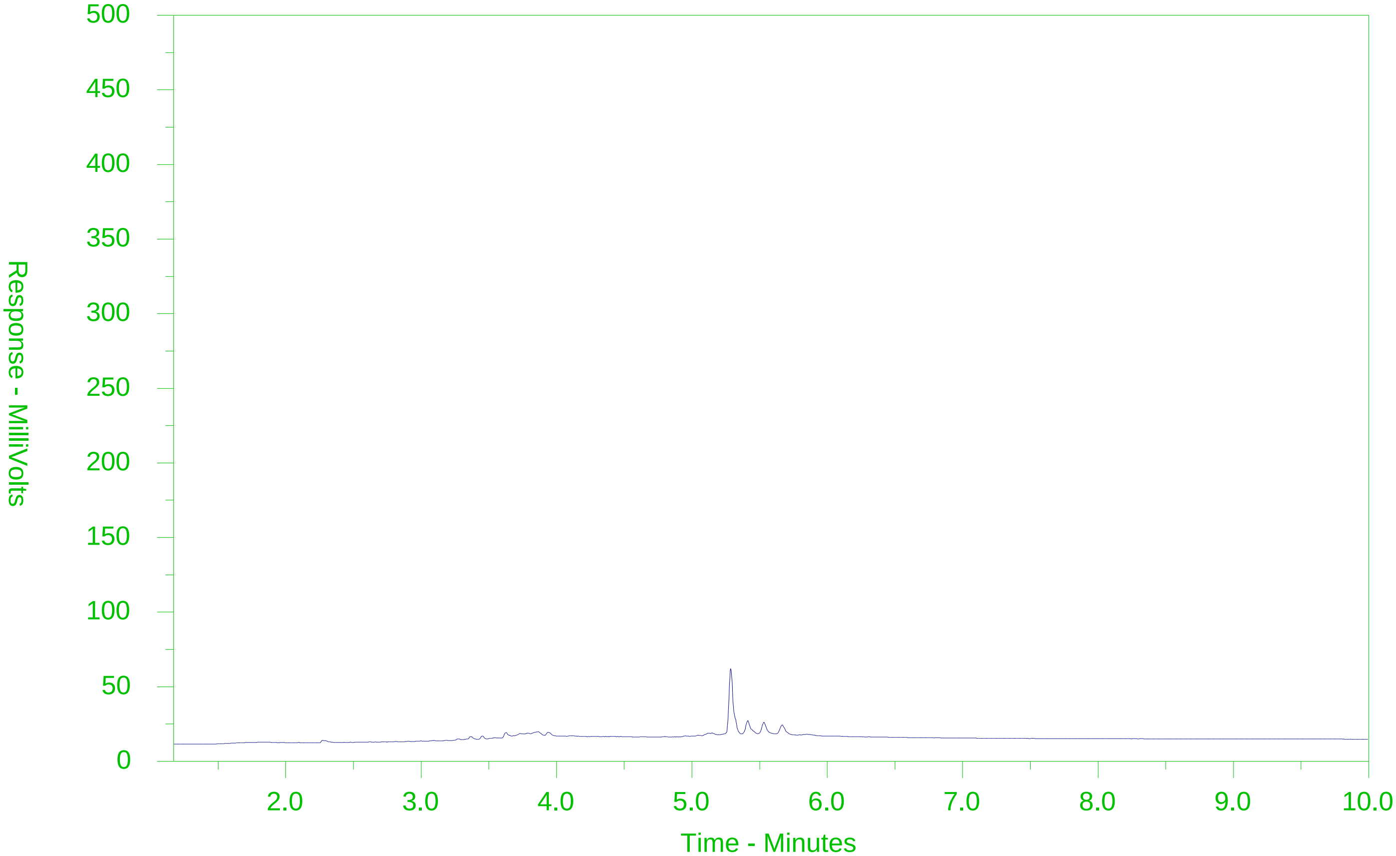
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-8
Client Sample ID: BH105-20 SA1



←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.

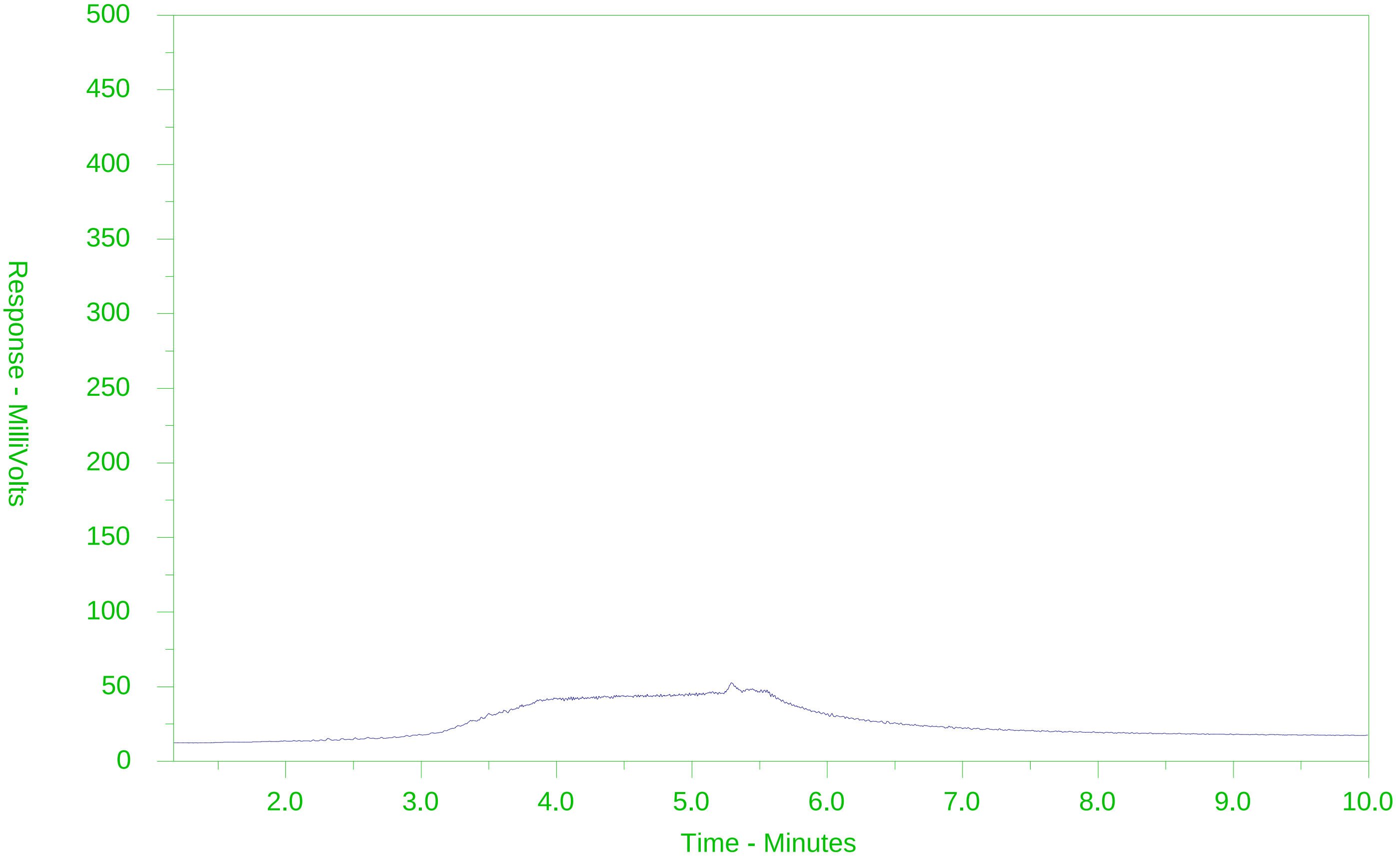
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-9
Client Sample ID: BH106-20 SA1



←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.

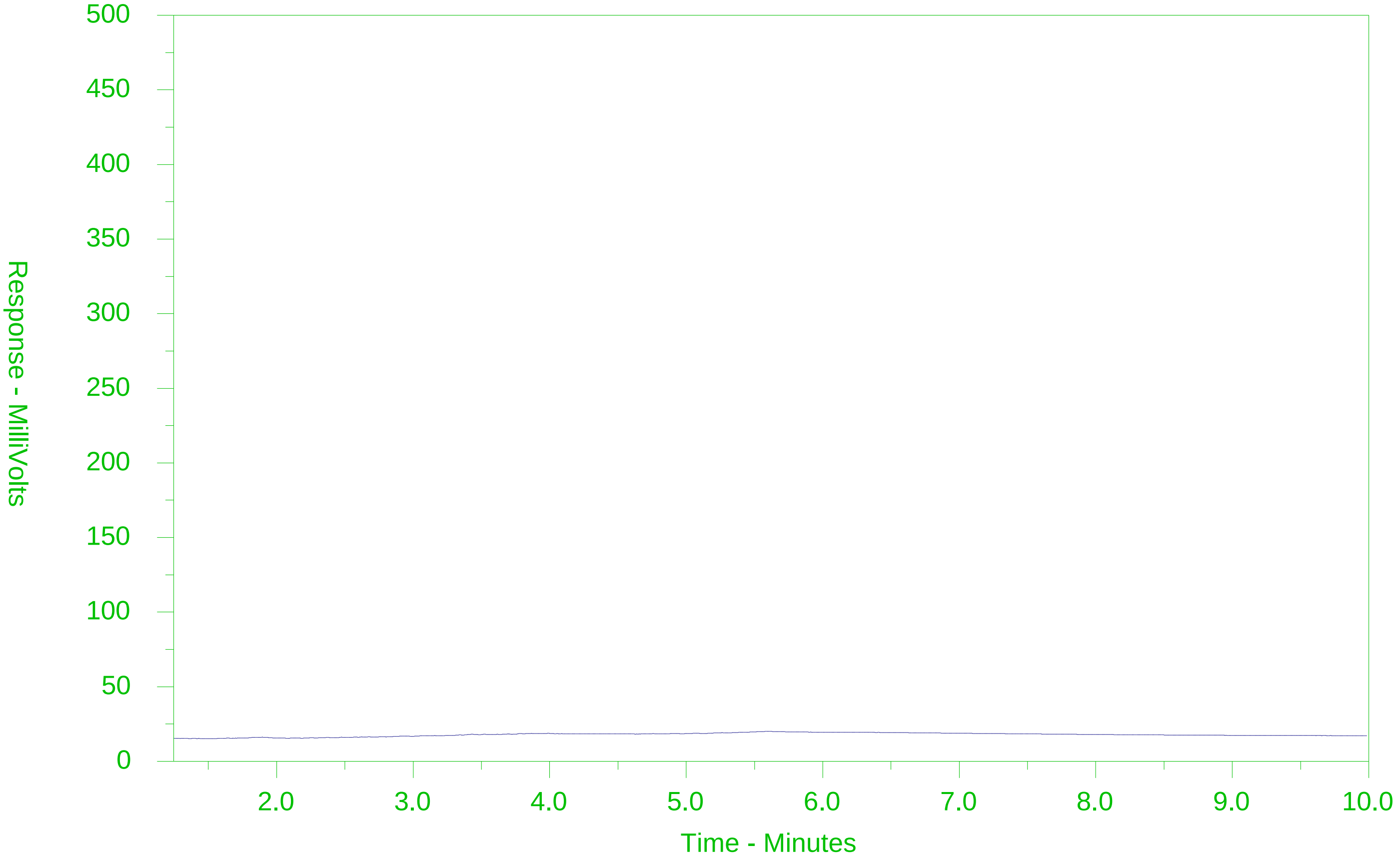
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-10
Client Sample ID: BH106-20 SA2



←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.

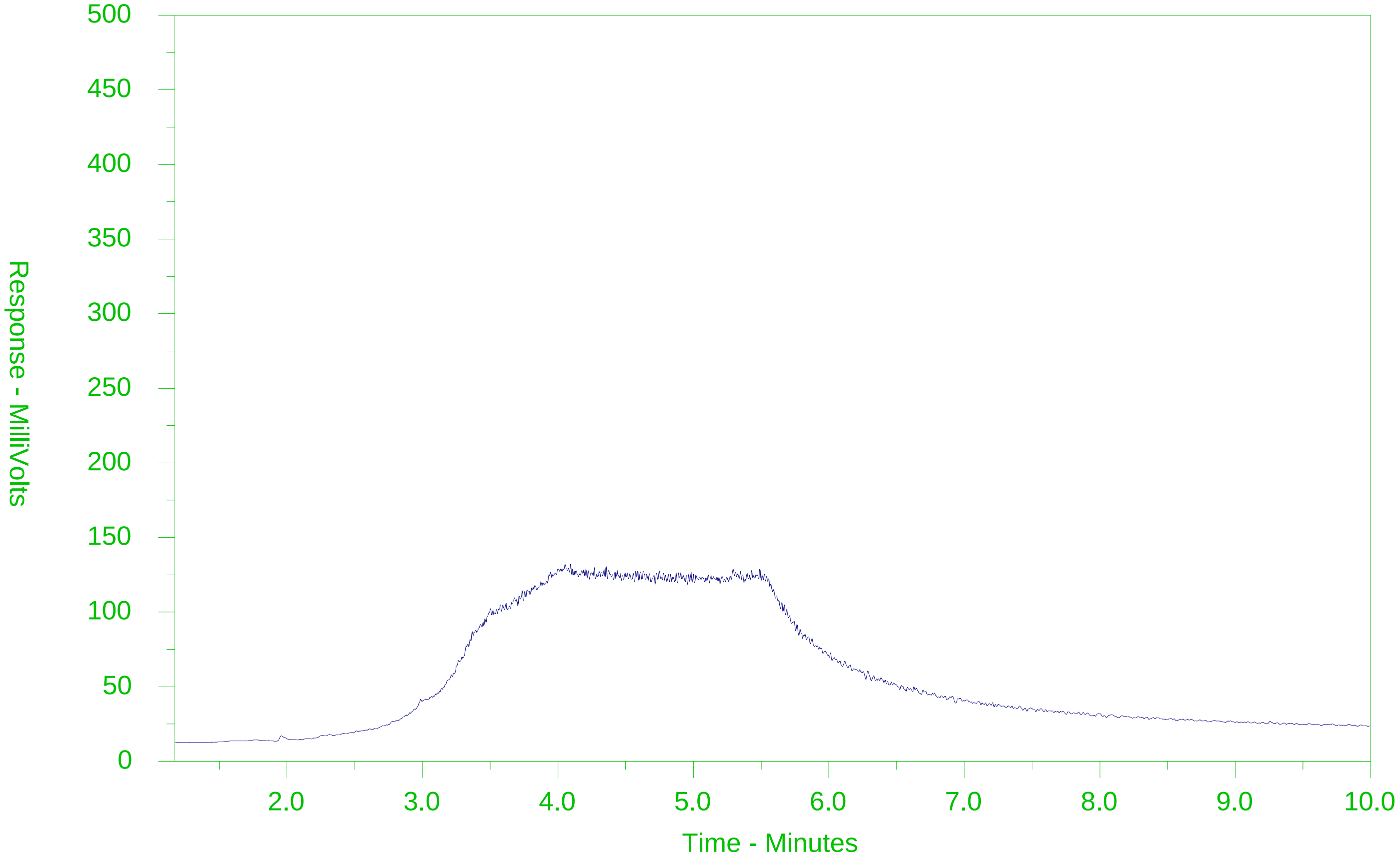
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-11
Client Sample ID: BH107-20 SS1



←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.

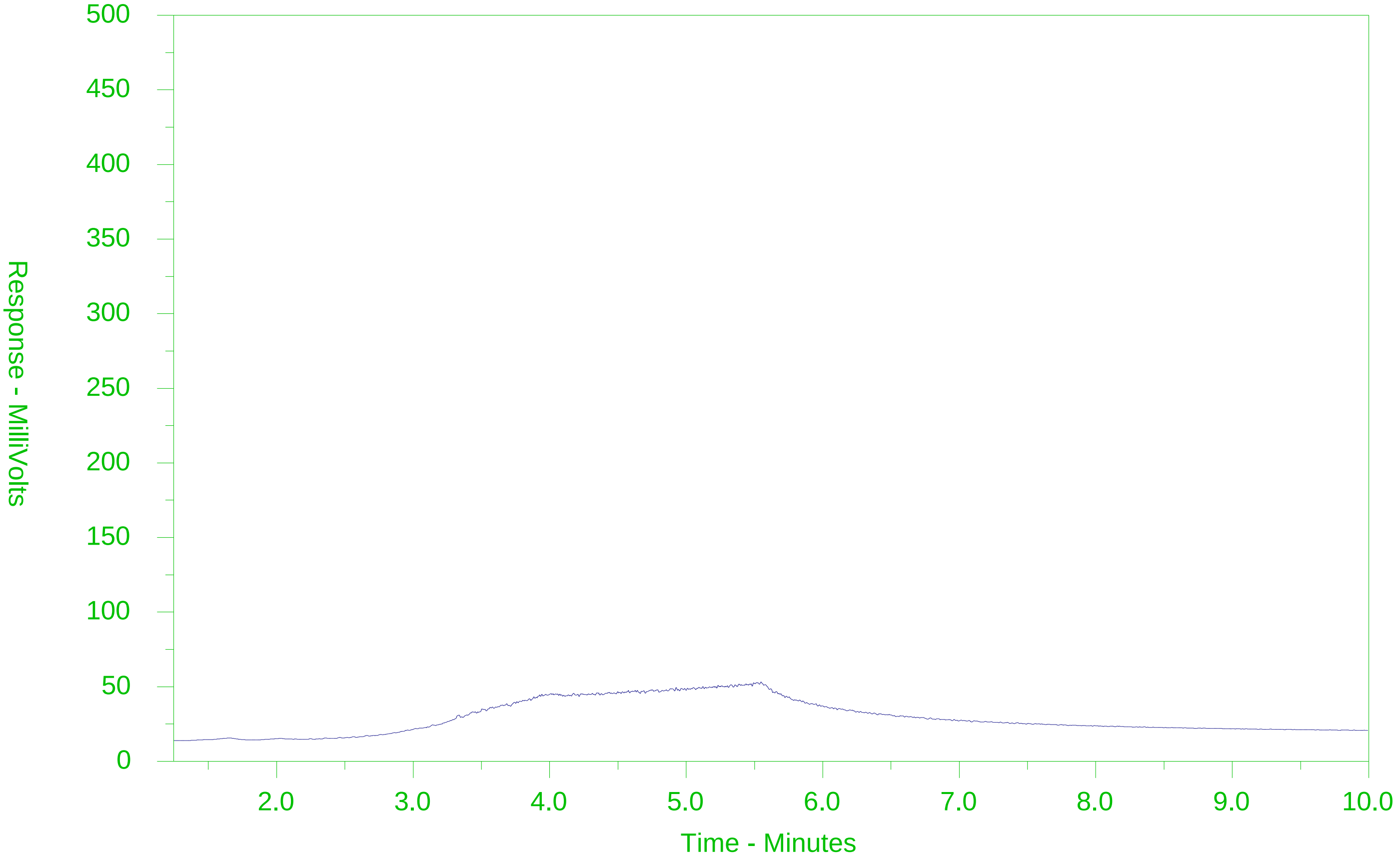
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-12
Client Sample ID: BH108-20 SA1



←F2→	←F3→		←F4→
nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 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

L2530806-COFC

COC Number: 17 - 825494

Page 1 of 1

Report To	
Company	MTE
Contact	[illegible]
Phone	[illegible]
Street	
City/Province	Kitchener
Postal Code	
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 [X] EXCEL [X] EDD (DIGITAL)
Quality Control (QC) Report with Report	[X] 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	[illegible]
Email 2	
Email 3	

Invoice Distribution	
Select Invoice Distribution	[X] EMAIL [ ] MAIL [ ] FAX
Email 1 or Fax	[illegible]
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		Emergency	
4 day [P4-20%] [ ]		1 Business day [E - 100%]	
3 day [P3-25%] [ ]		Same Day, Weekend or Statutory holiday [E2 -200%	
2 day [P2-50%] [ ]		(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 #: Y7877-100 (Hewl Lake)

PO / AFE

LSD

ALS Lab Work Order # (lab use only): L2530806

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Contact: Emily H.

Sampler: [illegible]

Analysis Request

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	Number of Containers	PHC F1-F4/BTEX	Metals	PAHs	SAR/EC	pH	OC Pesticides	Samples on Hold	Suspected Hazard (see Special Instructions)
1	BH101-20 SS2	17/11/20		Soil	3	✓	✓		✓				
2	BH102-20 SS1				3	✓	✓			✓			
3	BH103-20 SS1				3	✓	✓						
4	BH102-20 SS2B				3	✓	✓	✓					
5	BH103-20 SS2				3	✓	✓		✓				
6	BH104-20 SS2				3	✓	✓	✓	✓				
7	BH104-20 SS3				3	✓	✓		✓	✓			
8	BH105-20 SA1				3	✓	✓				✓		
9	BH106-20 SA1				3	✓	✓		✓		✓		
10	BH106-20 SA2				3	✓	✓		✓	✓			
11	BH107-20 SS1				3	✓	✓	✓	✓				
12/13	BH108-20 SA2				3	✓	✓		✓				

Drinking Water (DW) Samples¹ (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)

* Rush Sample

O. Reg 153 Table 1 + 2 [illegible] - coarse

O. Reg 406 Table 2.1 [illegible] - coarse

Sample Condition as Received (lab use only)

Frozen [ ] SIF Observations Yes [ ] No [ ]

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

Cooling Initiated [ ]

Initial Cooler Temperatures °C:

Final Cooler Temperatures °C: 2.8

Shipment Release (client use)	Initial Shipment Reception (lab use only)	Final Shipment Reception (lab use only)
Released by: [signature] Date: Nov 18/20 Time: 11:10	Received by: Date: Time:	Received by: [signature] Date: Nov 18 Time: 12:15 PM

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

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

MTE CONSULTANTS INC. (Kitchener)
ATTN: JEN LAMBKE
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Date Received: 18-NOV-20
Report Date: 03-DEC-20 08:24 (MT)
Version: FINAL REV. 5

Client Phone: 519-743-6500

Certificate of Analysis

Lab Work Order #: L2530806
Project P.O. #: NOT SUBMITTED
Job Reference: 47877-100 (HEART LAKE)
C of C Numbers: 17-825494
Legal Site Desc:

Comments: ADDITIONAL 26-NOV-20 14:08

Emily Hansen
Account Manager

ANALYTICAL GUIDELINE REPORT

47877-100 (HEART LAKE)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-8 BH105-20 SA1							
Sampled By: MATT D. on 17-NOV-20							
Matrix: SOIL						#1	#2
Sample Preparation							
Initial pH	9.07		0.10	pH units	28-NOV-20		
Final pH	8.43		0.10	pH units	28-NOV-20		
SPLP Metals							
Antimony (Sb)	<5.0		5.0	ug/L	30-NOV-20		
Arsenic (As)	<5.0		5.0	ug/L	30-NOV-20		
Barium (Ba)	<100		100	ug/L	30-NOV-20	4600	4600
Beryllium (Be)	<2.0		2.0	ug/L	30-NOV-20	11	11
Boron (B)	<500		500	ug/L	30-NOV-20		
Cadmium (Cd)	<0.10		0.10	ug/L	30-NOV-20		0.5
Chromium (Cr)	<5.0		5.0	ug/L	30-NOV-20	130	130
Cobalt (Co)	<2.0		2.0	ug/L	30-NOV-20	10	10
Copper (Cu)	<10		10	ug/L	30-NOV-20	14	14
Lead (Pb)	<2.0		2.0	ug/L	30-NOV-20		
Molybdenum (Mo)	<10		10	ug/L	30-NOV-20		1500
Nickel (Ni)	<20		20	ug/L	30-NOV-20	78	78
Selenium (Se)	<1.0		1.0	ug/L	30-NOV-20	10	10
Silver (Ag)	<0.25		0.25	ug/L	30-NOV-20	0.3	0.3
Thallium (Tl)	<0.80		0.80	ug/L	30-NOV-20		80
Uranium (U)	<15		15	ug/L	30-NOV-20	20	20
Vanadium (V)	<5.0		5.0	ug/L	30-NOV-20		
Zinc (Zn)	<30		30	ug/L	30-NOV-20	180	180
L2530806-12 BH108-20 SA1							
Sampled By: MATT D. on 17-NOV-20							
Matrix: SOIL						#1	#2
Sample Preparation							
Initial pH	9.54		0.10	pH units	28-NOV-20		
Final pH	8.92		0.10	pH units	28-NOV-20		
SPLP Metals							
Antimony (Sb)	<5.0		5.0	ug/L	30-NOV-20		
Arsenic (As)	<5.0		5.0	ug/L	30-NOV-20		
Barium (Ba)	<100		100	ug/L	30-NOV-20	4600	4600
Beryllium (Be)	<2.0		2.0	ug/L	30-NOV-20	11	11
Boron (B)	<500		500	ug/L	30-NOV-20		
Cadmium (Cd)	<0.10		0.10	ug/L	30-NOV-20		0.5
Chromium (Cr)	<5.0		5.0	ug/L	30-NOV-20	130	130
Cobalt (Co)	<2.0		2.0	ug/L	30-NOV-20	10	10
Copper (Cu)	<10		10	ug/L	30-NOV-20	14	14
Lead (Pb)	<2.0		2.0	ug/L	30-NOV-20		
Molybdenum (Mo)	<10		10	ug/L	30-NOV-20		1500
Nickel (Ni)	<20		20	ug/L	30-NOV-20	78	78
Selenium (Se)	<1.0		1.0	ug/L	30-NOV-20	10	10
Silver (Ag)	<0.25		0.25	ug/L	30-NOV-20	0.3	0.3
Thallium (Tl)	<0.80		0.80	ug/L	30-NOV-20		80
Uranium (U)	<15		15	ug/L	30-NOV-20	20	20
Vanadium (V)	<5.0		5.0	ug/L	30-NOV-20		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T3.1-LEACHATE

#1: T3.1 - Leachate Screening Levels - Res/Park/Inst Property Use **#2: T3.1 - Leachate Screening Levels - Ind/Com/Commu Property Use**

ANALYTICAL GUIDELINE REPORT

47877-100 (HEART LAKE)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2530806-12	BH108-20 SA1							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
SPLP Metals								
	Zinc (Zn)	<30		30	ug/L	30-NOV-20	180	180
L2530806-13	BH108-20 SA2							
Sampled By:	MATT D. on 17-NOV-20							
Matrix:	SOIL						#1	#2
Sample Preparation								
	Initial pH	7.30		0.10	pH units	28-NOV-20		
	Final pH	7.79		0.10	pH units	28-NOV-20		
SPLP Metals								
	Antimony (Sb)	<5.0		5.0	ug/L	30-NOV-20		
	Arsenic (As)	<5.0		5.0	ug/L	30-NOV-20		
	Barium (Ba)	<100		100	ug/L	30-NOV-20	4600	4600
	Beryllium (Be)	<2.0		2.0	ug/L	30-NOV-20	11	11
	Boron (B)	<500		500	ug/L	30-NOV-20		
	Cadmium (Cd)	<0.10		0.10	ug/L	30-NOV-20		0.5
	Chromium (Cr)	<5.0		5.0	ug/L	30-NOV-20	130	130
	Cobalt (Co)	<2.0		2.0	ug/L	30-NOV-20	10	10
	Copper (Cu)	<10		10	ug/L	30-NOV-20	14	14
	Lead (Pb)	<2.0		2.0	ug/L	30-NOV-20		
	Molybdenum (Mo)	<10		10	ug/L	30-NOV-20		1500
	Nickel (Ni)	<20		20	ug/L	30-NOV-20	78	78
	Selenium (Se)	<1.0		1.0	ug/L	30-NOV-20	10	10
	Silver (Ag)	<0.25		0.25	ug/L	30-NOV-20	0.3	0.3
	Thallium (Tl)	<0.80		0.80	ug/L	30-NOV-20		80
	Uranium (U)	<15		15	ug/L	30-NOV-20	20	20
	Vanadium (V)	<5.0		5.0	ug/L	30-NOV-20		
	Zinc (Zn)	<30		30	ug/L	30-NOV-20	180	180

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 406/19 - Excess Soils - 19 November 2019 = [Suite] - ON-406-T3.1-LEACHATE

#1: T3.1 - Leachate Screening Levels - Res/Park/Inst Property Use **#2: T3.1 - Leachate Screening Levels - Ind/Com/Commu Property Use**

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

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).

CHLORDANE-T-CALC-WT	Soil	Chlordane Total sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

DDD-DDE-DDT-CALC-WT	Soil	DDD, DDE, DDT sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity 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).

ENDOSULFAN-T-CALC-WT	Soil	Endosulfan Total sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

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

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

Hydrocarbon results are expressed on a dry weight basis.

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

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then 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).

Reference Information

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

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

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).

F4G-ADD-511-WT	Soil	F4G SG-O.Reg 153/04 (July 2011)	MOE DECPH-E3398/CCME TIER 1

F4G, gravimetric analysis, is determined if the chromatogram does not return to baseline at or before C50. A soil sample is extracted with a solvent mix, the solvent is evaporated and the weight of the residue is determined.

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).

LEACH-MSPLP-WT	Waste	Modified SPLP Extraction	E9003

A Sample (100g) of soil is leached for 18 +/- 2 hours with 2.0 liters of splp leaching fluid #2 (pH = 5). For the analysis of metals, the leachate is filtered through a 0.45um filter using a metals free filtering system prior to digestion and analysis.

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020B (mod)

Soil/sediment is dried, disaggregated, and sieved (2 mm). For tests intended to support Ontario regulations, the <2mm fraction is ground to pass through a 0.355 mm sieve. Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.

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).

MET-SPLP-WT	Waste	SPLP Leachable Metals	EPA 200.8

An extract produced by the Synthetic Precipitation Leaching Procedure (SPLP) as per EPA 1312 or Ontario MECP E9003 is analyzed by Collision/Reaction Cell ICPMS. The extract is filtered through a 0.6 to 0.8 micron glass fibre filter for Method 1312 or through a 0.45um filter for Method E9003.

METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking techniqueis used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by 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).

PEST-OC-511-WT	Soil	OC Pesticides-O.Reg 153/04 (July 2011)	SW846 8270 (511)

Soil sample is extracted in a solvent, after extraction a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

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).

Reference Information

PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

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).

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

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).

XYLENES-SUM-CALC-WT	Soil	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:

17-825494

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	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

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SPLP-WT	**Waste**							
Batch R5299718								
WG3453778-4 DUP		**WG3453778-3**						
Antimony (Sb)		<5.0	<5.0	RPD-NA	ug/L	N/A	25	30-NOV-20
Arsenic (As)		<5.0	<5.0	RPD-NA	ug/L	N/A	25	30-NOV-20
Barium (Ba)		<100	<100	RPD-NA	ug/L	N/A	25	30-NOV-20
Beryllium (Be)		<2.0	<2.0	RPD-NA	ug/L	N/A	25	30-NOV-20
Boron (B)		<500	<500	RPD-NA	ug/L	N/A	25	30-NOV-20
Cadmium (Cd)		<0.10	<0.10	RPD-NA	ug/L	N/A	25	30-NOV-20
Chromium (Cr)		<5.0	<5.0	RPD-NA	ug/L	N/A	25	30-NOV-20
Cobalt (Co)		<2.0	<2.0	RPD-NA	ug/L	N/A	25	30-NOV-20
Copper (Cu)		<10	<10	RPD-NA	ug/L	N/A	25	30-NOV-20
Lead (Pb)		<2.0	<2.0	RPD-NA	ug/L	N/A	25	30-NOV-20
Molybdenum (Mo)		<10	<10	RPD-NA	ug/L	N/A	25	30-NOV-20
Nickel (Ni)		<20	<20	RPD-NA	ug/L	N/A	25	30-NOV-20
Selenium (Se)		<1.0	<1.0	RPD-NA	ug/L	N/A	25	30-NOV-20
Silver (Ag)		<0.25	<0.25	RPD-NA	ug/L	N/A	25	30-NOV-20
Thallium (Tl)		<0.80	<0.80	RPD-NA	ug/L	N/A	25	30-NOV-20
Uranium (U)		<15	<15	RPD-NA	ug/L	N/A	25	30-NOV-20
Vanadium (V)		<5.0	<5.0	RPD-NA	ug/L	N/A	25	30-NOV-20
Zinc (Zn)		<30	<30	RPD-NA	ug/L	N/A	25	30-NOV-20
WG3453778-2 LCS								
Antimony (Sb)			107.3		%		70-130	30-NOV-20
Arsenic (As)			99.2		%		70-130	30-NOV-20
Barium (Ba)			102.9		%		70-130	30-NOV-20
Beryllium (Be)			94.9		%		70-130	30-NOV-20
Boron (B)			102.5		%		70-130	30-NOV-20
Cadmium (Cd)			100.2		%		70-130	30-NOV-20
Chromium (Cr)			99.6		%		70-130	30-NOV-20
Cobalt (Co)			100.5		%		70-130	30-NOV-20
Copper (Cu)			96.5		%		70-130	30-NOV-20
Lead (Pb)			98.7		%		70-130	30-NOV-20
Molybdenum (Mo)			103.6		%		70-130	30-NOV-20
Nickel (Ni)			98.0		%		70-130	30-NOV-20
Selenium (Se)			96.7		%		70-130	30-NOV-20
Silver (Ag)			102.2		%		70-130	30-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SPLP-WT	**Waste**							
Batch R5299718								
WG3453778-2 LCS								
Thallium (Tl)			100.2		%		70-130	30-NOV-20
Uranium (U)			95.8		%		70-130	30-NOV-20
Vanadium (V)			100.8		%		70-130	30-NOV-20
Zinc (Zn)			97.7		%		70-130	30-NOV-20
WG3453778-1 MB								
Antimony (Sb)			<5.0		ug/L		5	30-NOV-20
Arsenic (As)			<5.0		ug/L		5	30-NOV-20
Barium (Ba)			<100		ug/L		100	30-NOV-20
Beryllium (Be)			<2.0		ug/L		2	30-NOV-20
Boron (B)			<500		ug/L		500	30-NOV-20
Cadmium (Cd)			<0.10		ug/L		0.1	30-NOV-20
Chromium (Cr)			<5.0		ug/L		5	30-NOV-20
Cobalt (Co)			<2.0		ug/L		2	30-NOV-20
Copper (Cu)			<10		ug/L		10	30-NOV-20
Lead (Pb)			<2.0		ug/L		2	30-NOV-20
Molybdenum (Mo)			<10		ug/L		10	30-NOV-20
Nickel (Ni)			<20		ug/L		20	30-NOV-20
Selenium (Se)			<1.0		ug/L		1	30-NOV-20
Silver (Ag)			<0.25		ug/L		0.25	30-NOV-20
Thallium (Tl)			<0.80		ug/L		0.8	30-NOV-20
Uranium (U)			<15		ug/L		15	30-NOV-20
Vanadium (V)			<5.0		ug/L		5	30-NOV-20
Zinc (Zn)			<30		ug/L		30	30-NOV-20
WG3453778-5 MS		**WG3453778-3**						
Antimony (Sb)			108.7		%		50-140	30-NOV-20
Arsenic (As)			101.3		%		50-140	30-NOV-20
Barium (Ba)			109.2		%		50-140	30-NOV-20
Beryllium (Be)			99.6		%		50-140	30-NOV-20
Boron (B)			110.8		%		50-140	30-NOV-20
Cadmium (Cd)			98.6		%		50-140	30-NOV-20
Chromium (Cr)			100.9		%		50-140	30-NOV-20
Cobalt (Co)			104.0		%		50-140	30-NOV-20
Copper (Cu)			97.8		%		50-140	30-NOV-20
Lead (Pb)			106.2		%		50-140	30-NOV-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SPLP-WT	**Waste**							
Batch R5299718								
WG3453778-5 MS		**WG3453778-3**						
Molybdenum (Mo)			107.0		%		50-140	30-NOV-20
Nickel (Ni)			100.3		%		50-140	30-NOV-20
Selenium (Se)			98.9		%		50-140	30-NOV-20
Silver (Ag)			126.1		%		50-140	30-NOV-20
Thallium (Tl)			102.6		%		50-140	30-NOV-20
Uranium (U)			100.2		%		70-130	30-NOV-20
Vanadium (V)			103.6		%		50-140	30-NOV-20
Zinc (Zn)			97.7		%		50-140	30-NOV-20

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
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

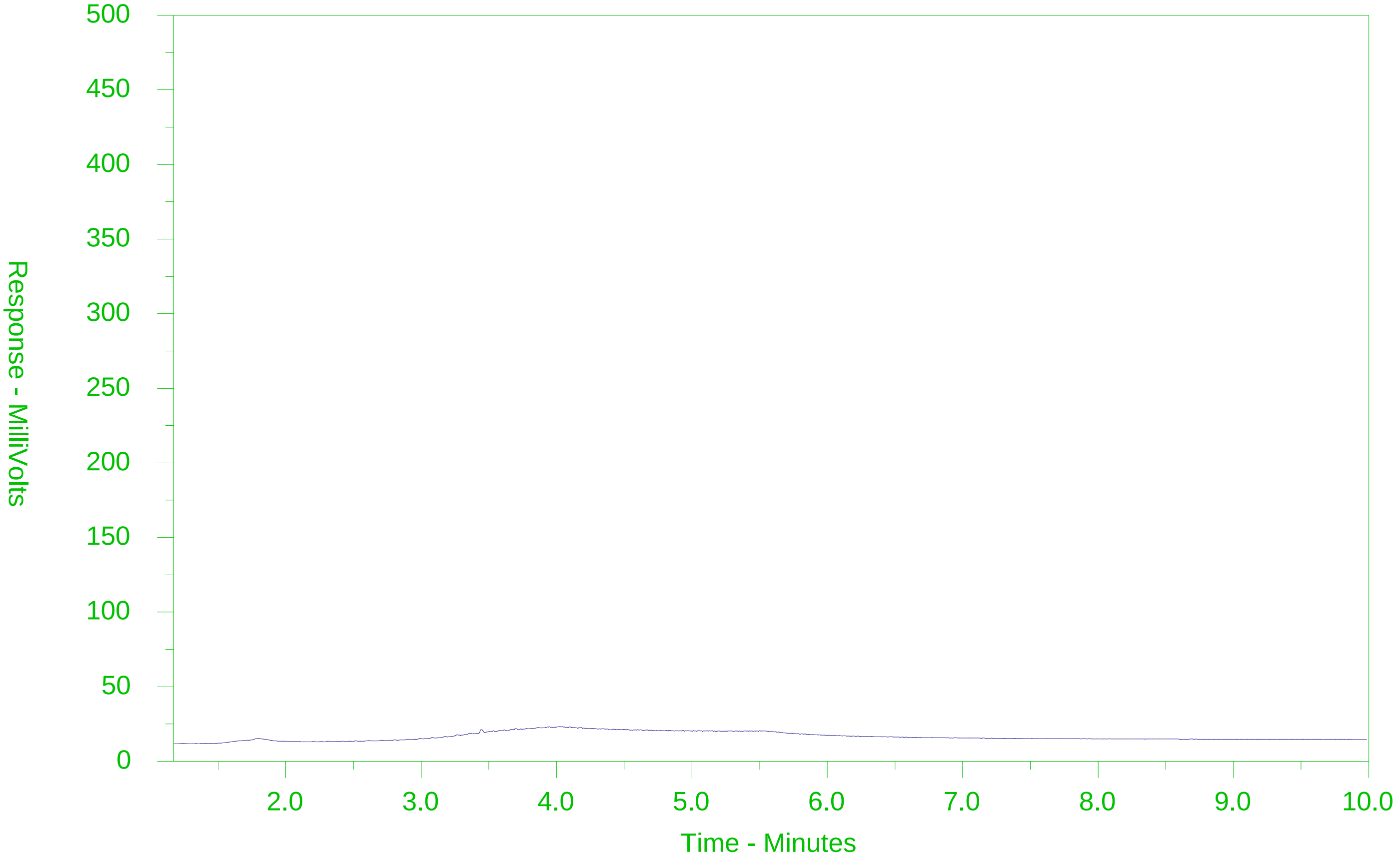
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where 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: L2530806-1
Client Sample ID: BH101-20 SS2



←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.

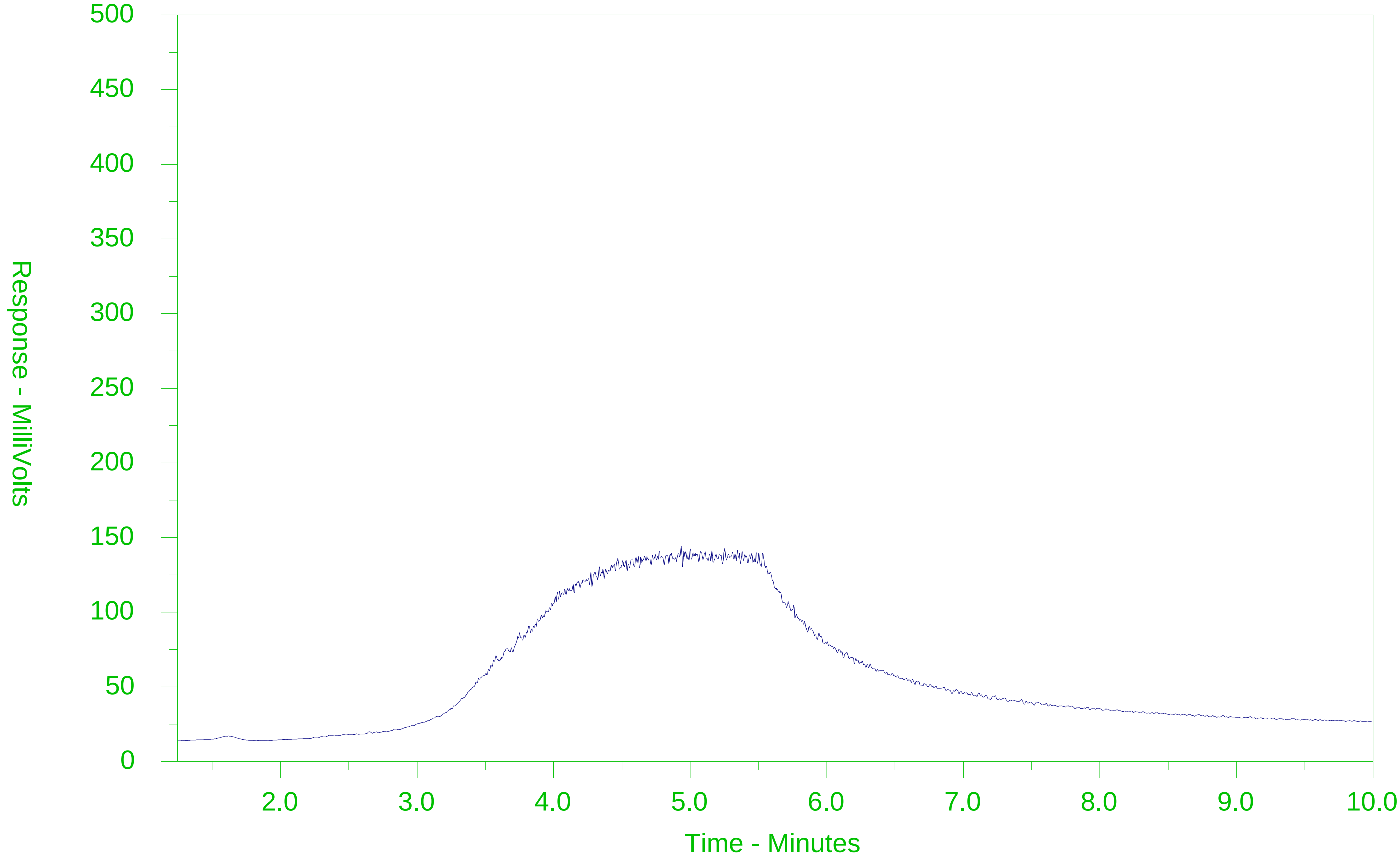
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-2
Client Sample ID: BH102-20 SS1



←F2→	←F3→		←F4→
nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 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.

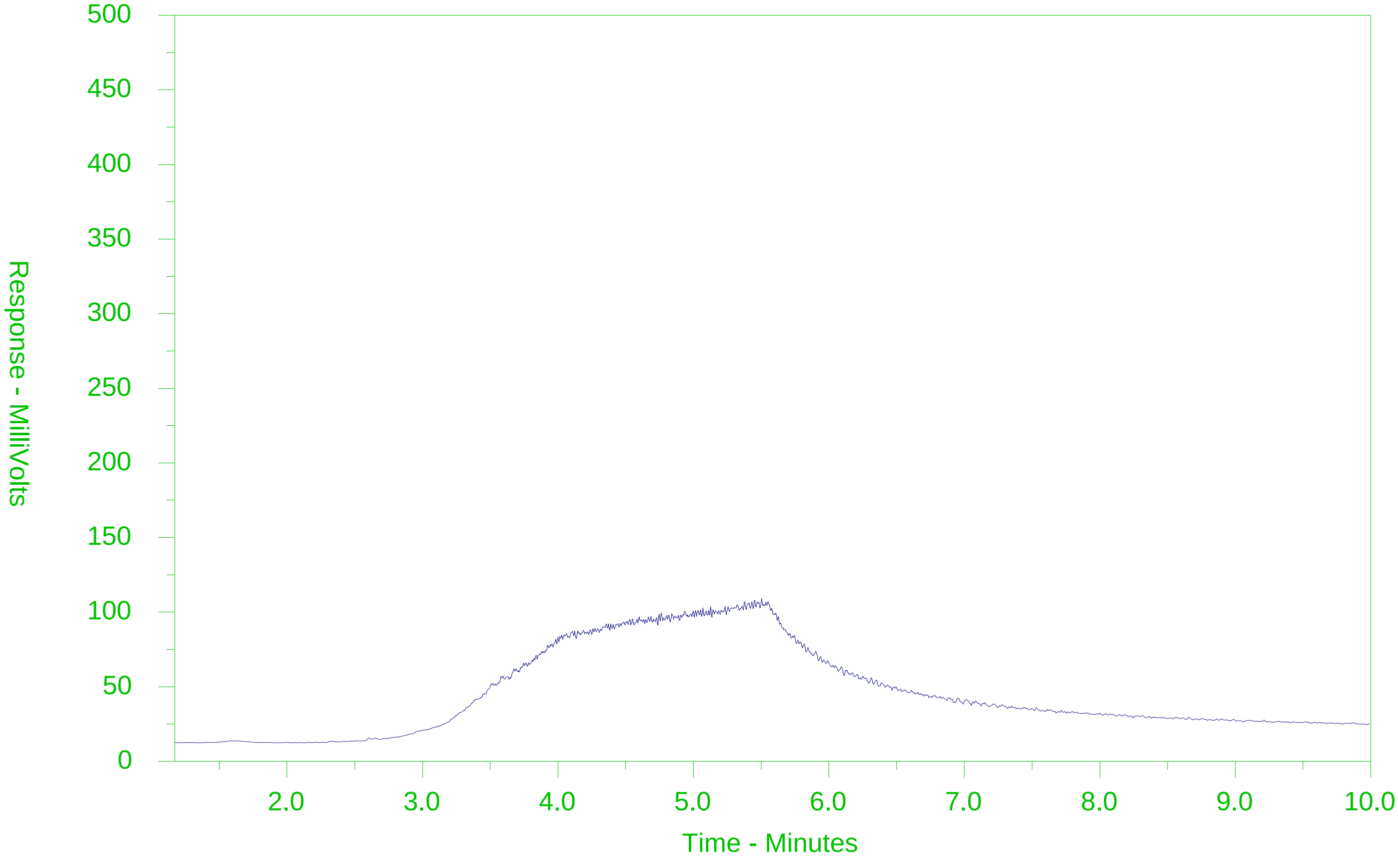
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-3
Client Sample ID: BH1002-20 SS1



←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.

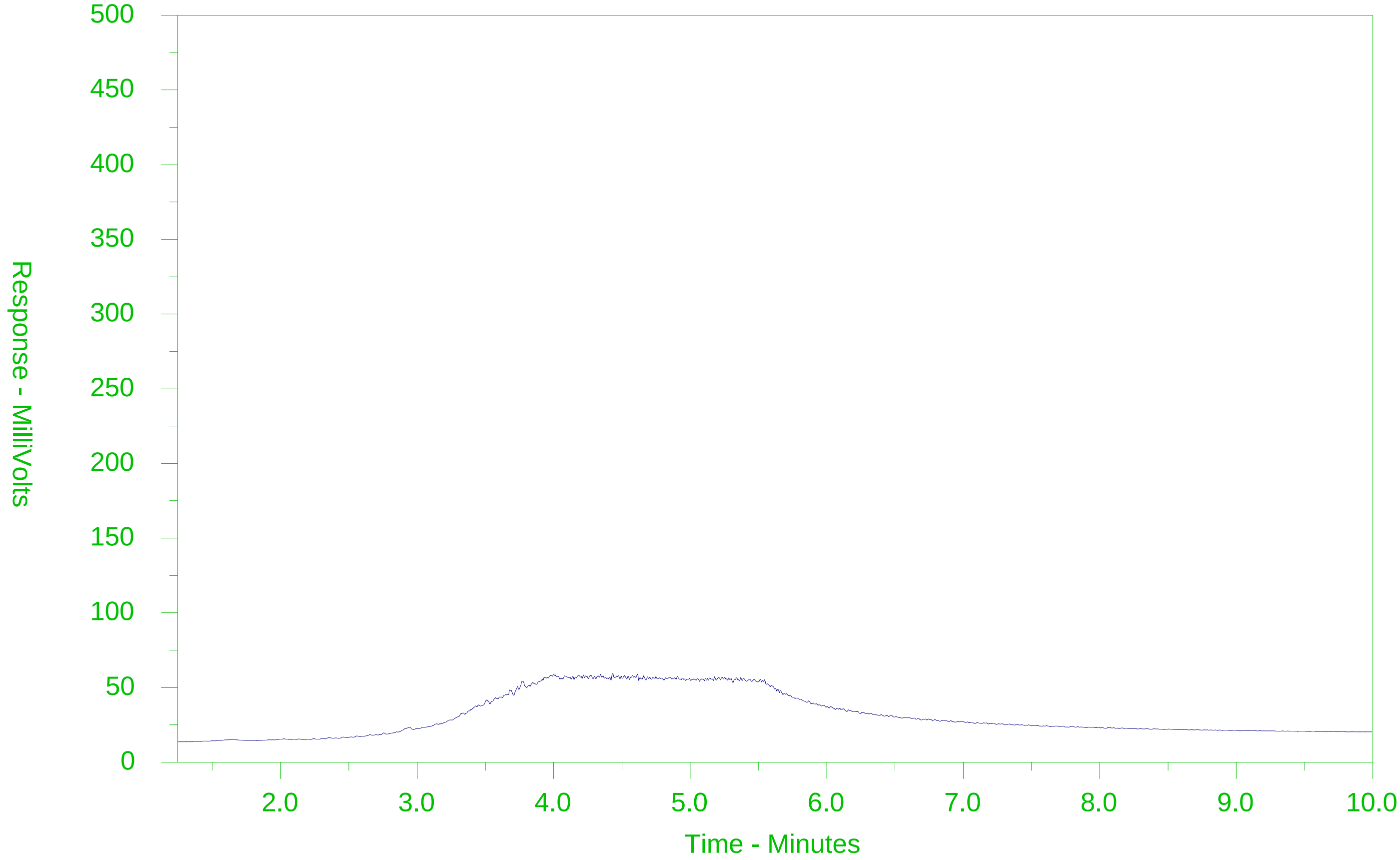
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-4
Client Sample ID: BH102-20 SS2B



←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.

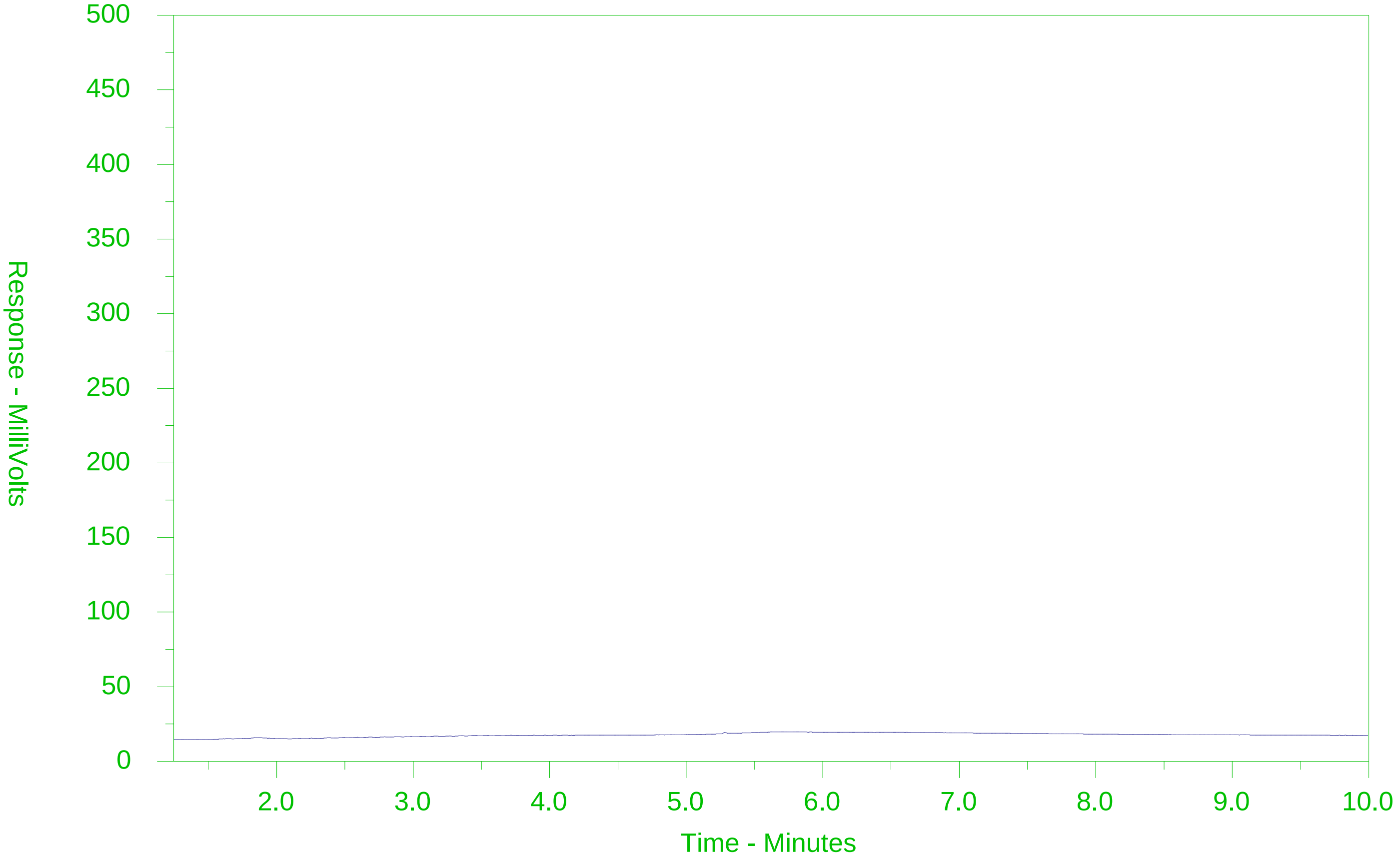
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-5
Client Sample ID: BH103-20 SS2



←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.

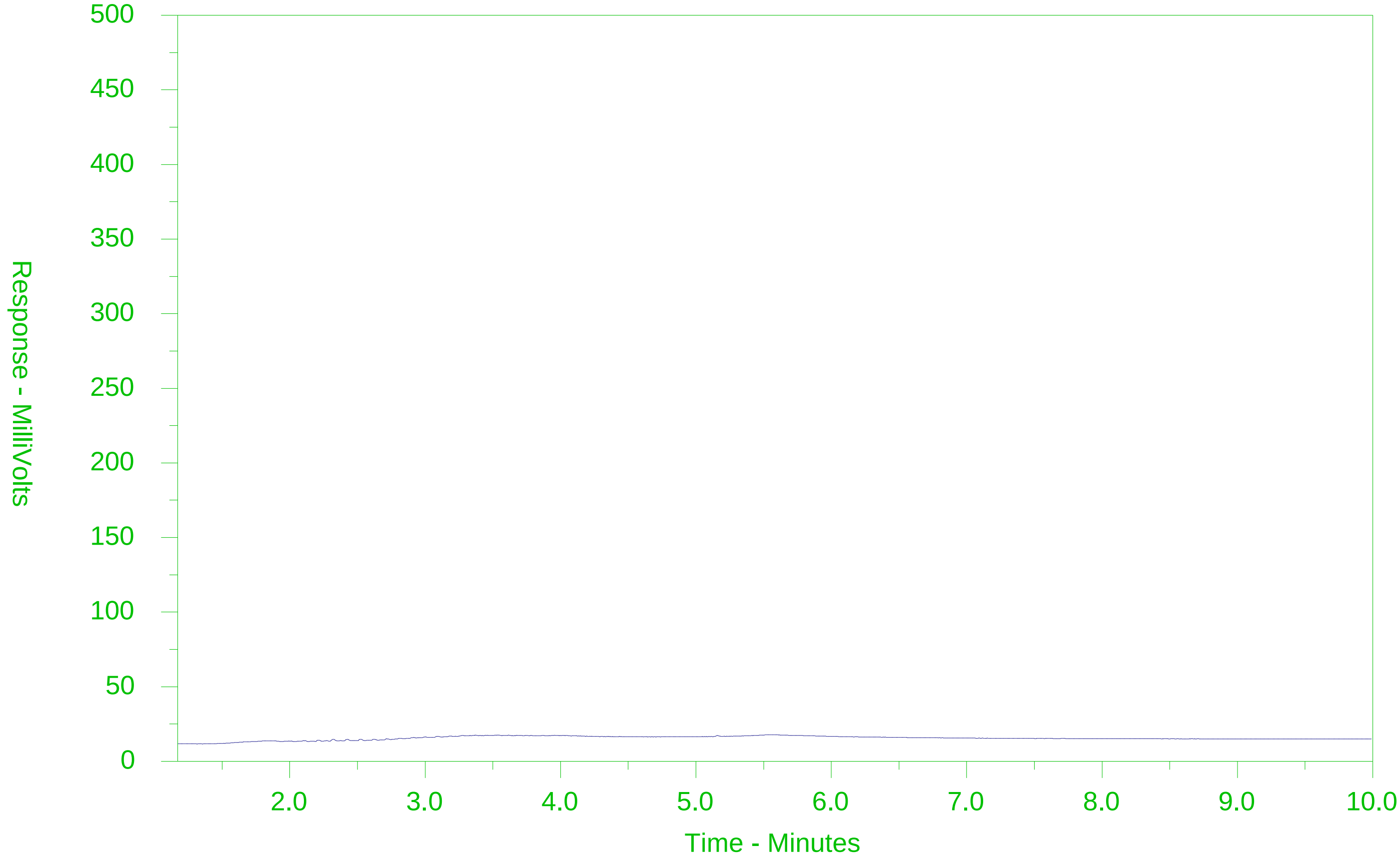
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-6
Client Sample ID: BH104-20 SS2



←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.

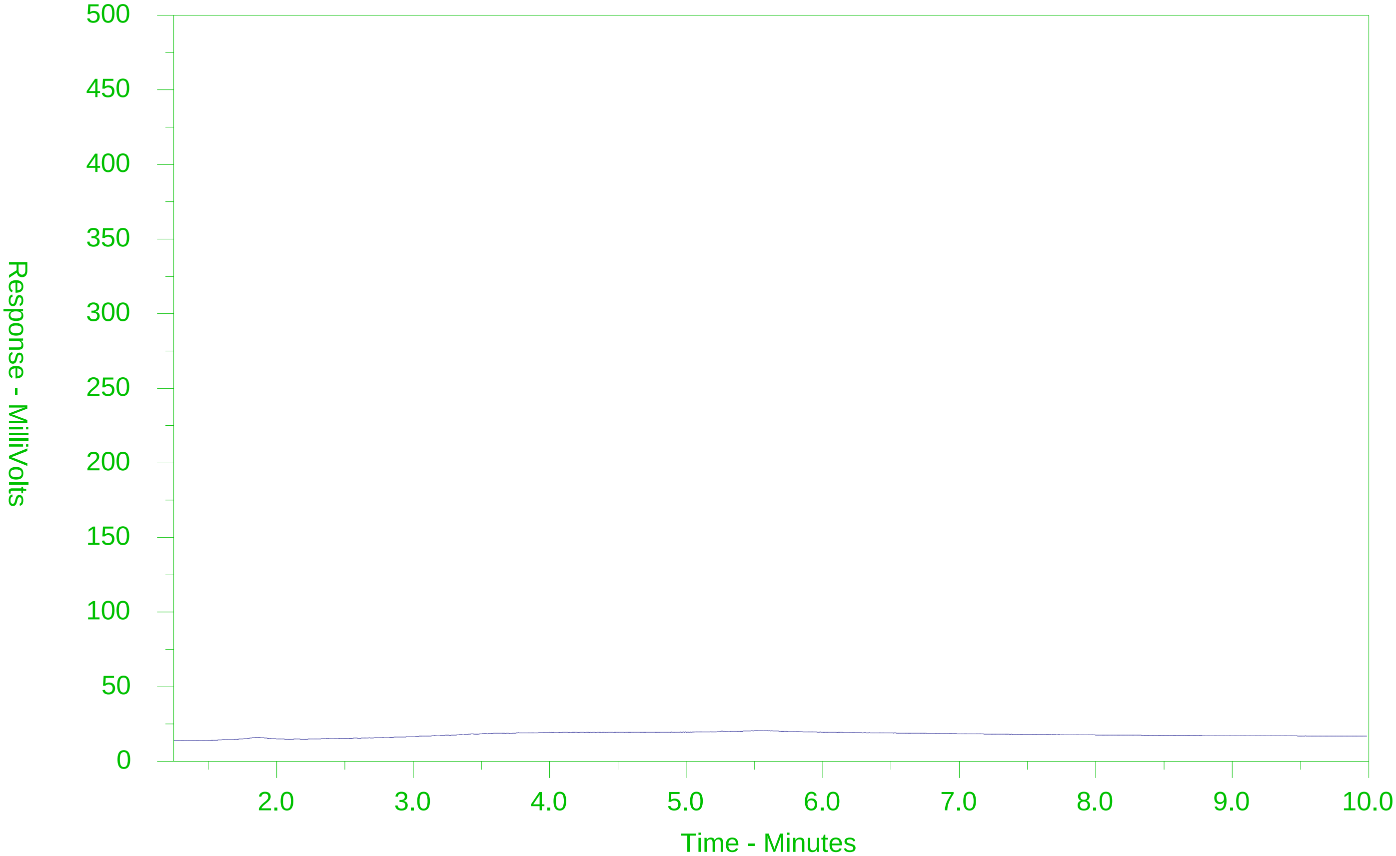
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-7
Client Sample ID: BH104-20 SS3



←F2→	←	F3→	←F4→
nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 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.

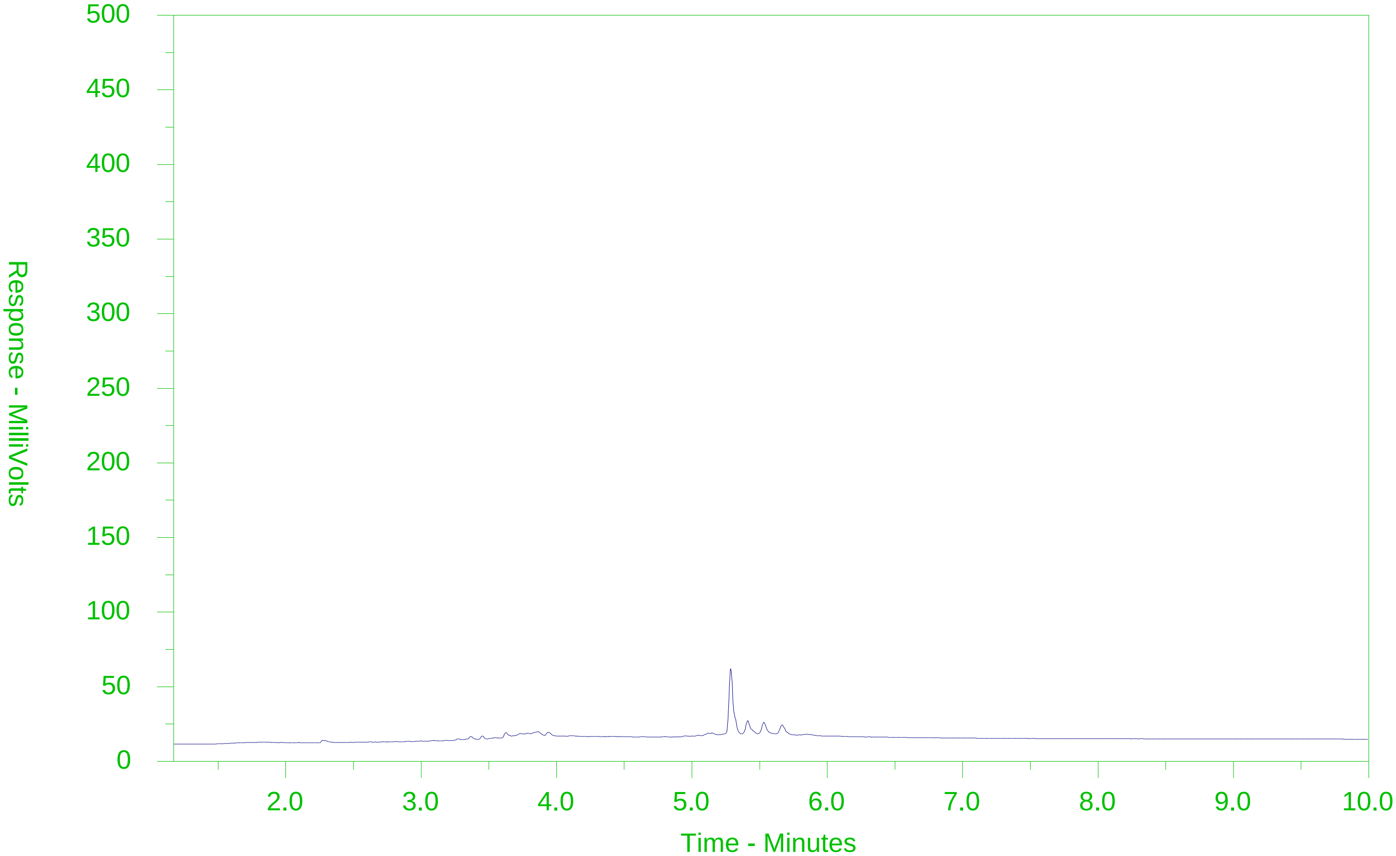
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-8
Client Sample ID: BH105-20 SA1



←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.

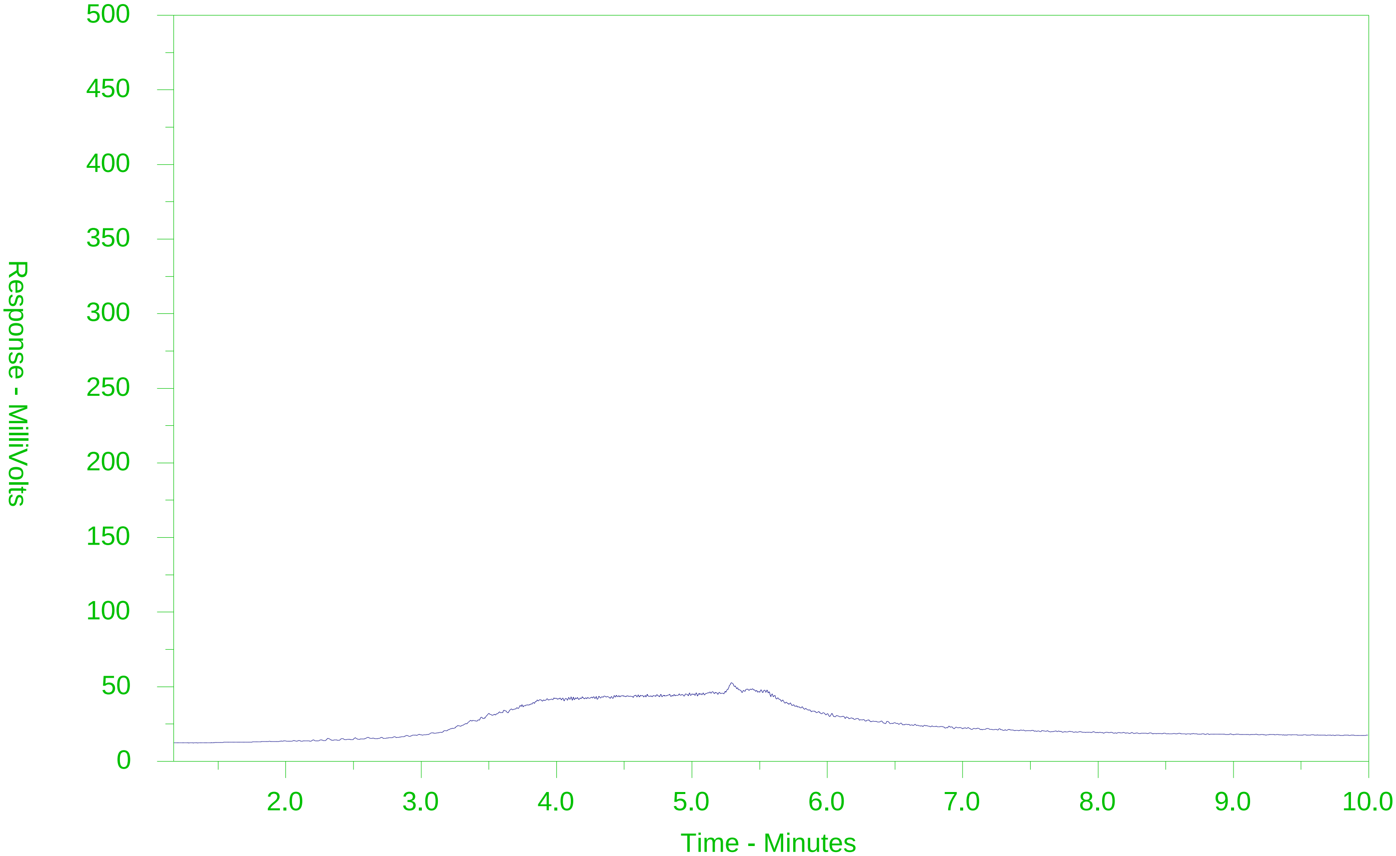
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-9
Client Sample ID: BH106-20 SA1



←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.

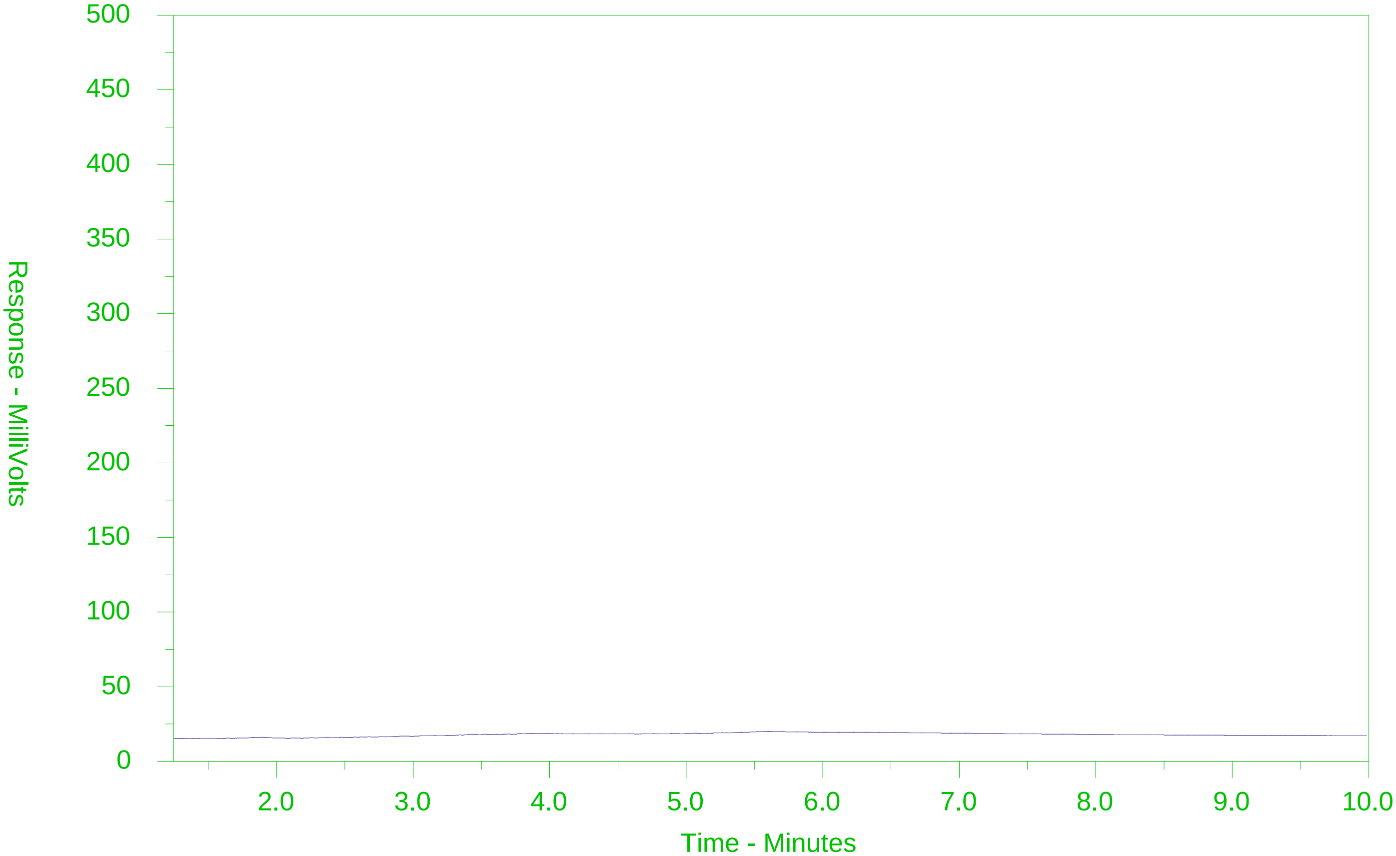
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-10
Client Sample ID: BH106-20 SA2



←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.

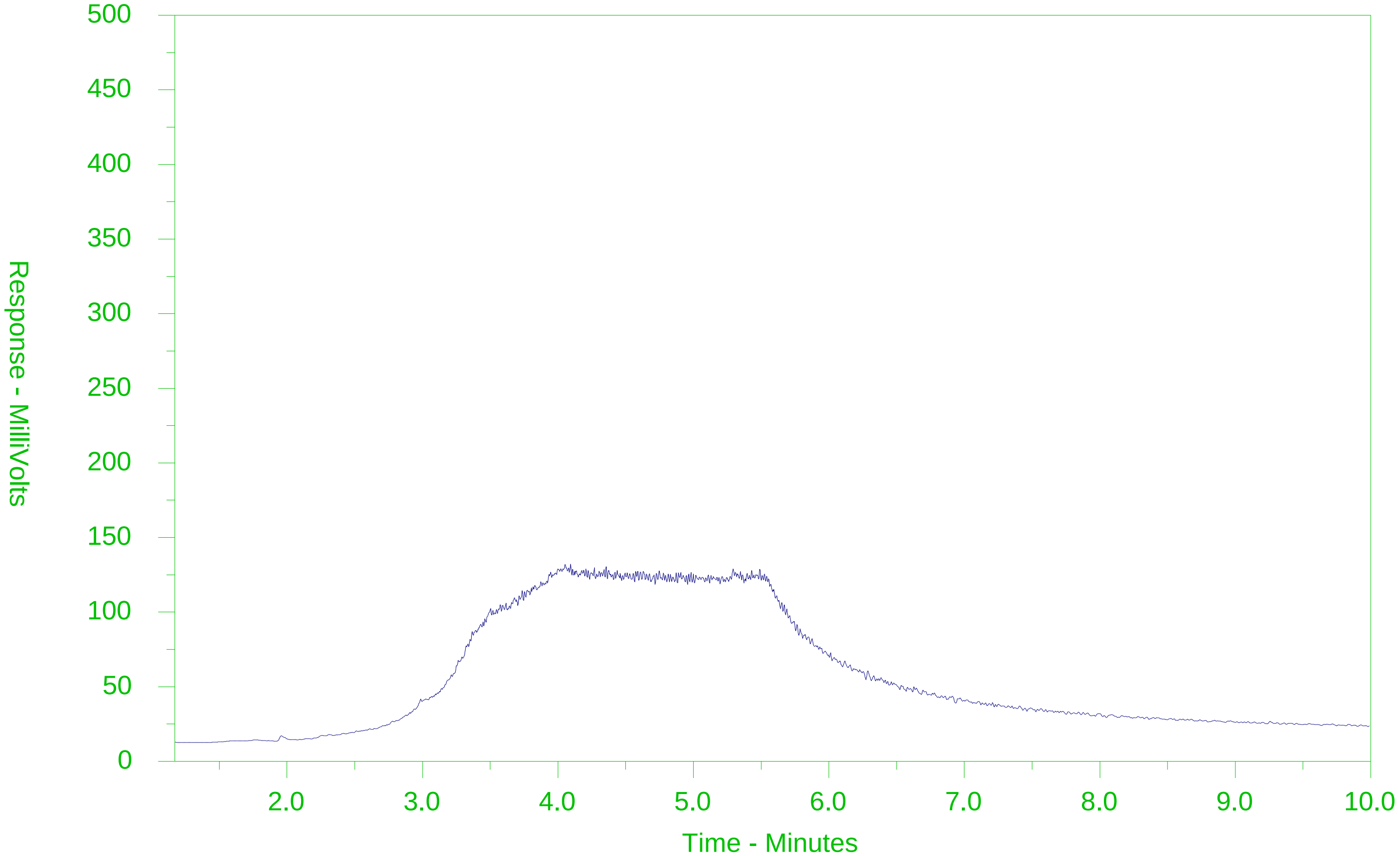
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-11
Client Sample ID: BH107-20 SS1



←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.

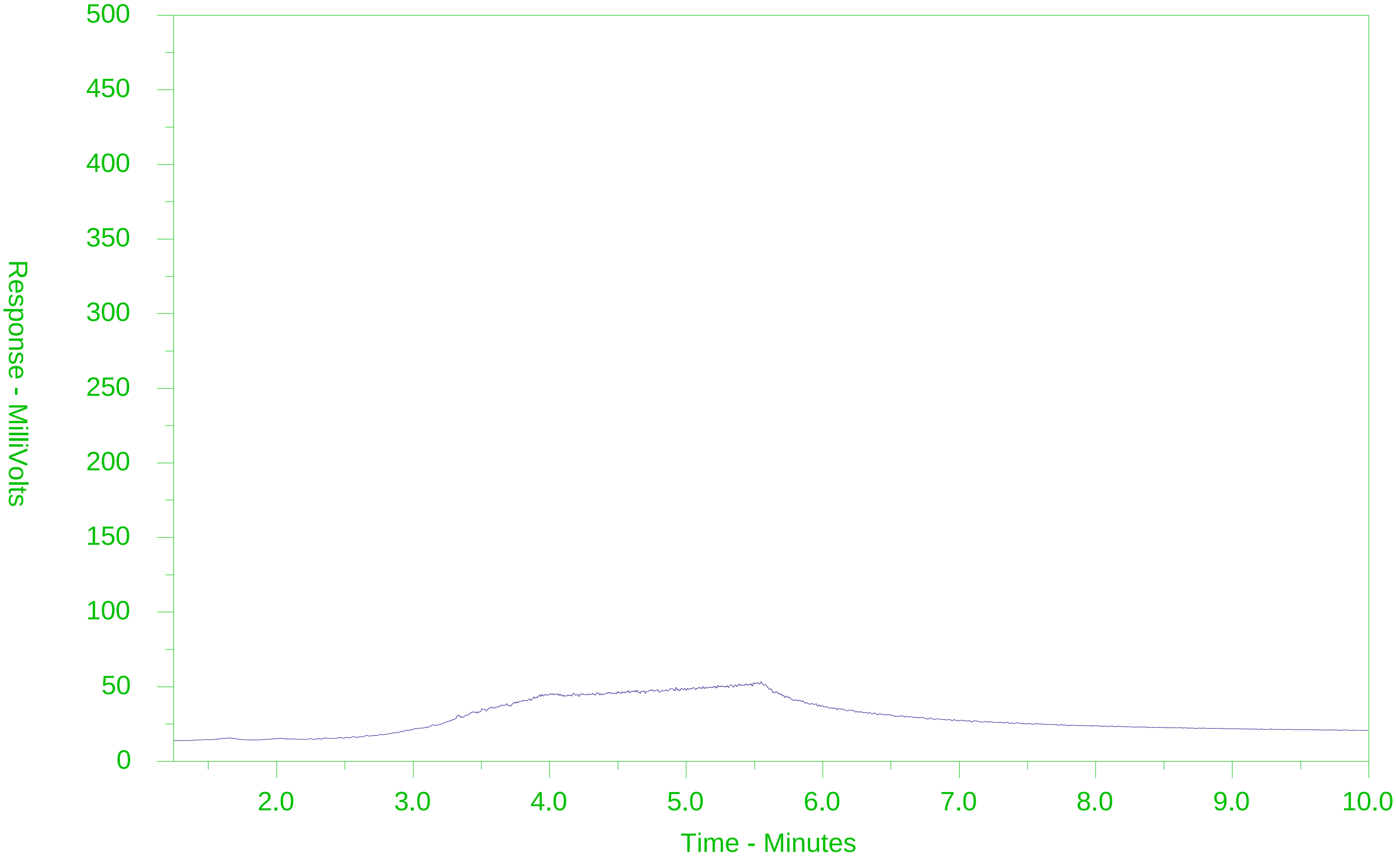
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2530806-12
Client Sample ID: BH108-20 SA1



←F2→	←F3→		←F4→
nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 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

L2530806-COFC

COC Number: 17 - 825494

Page 1 of 1

Report To	
Company	MTE
Contact	[illegible]
Phone	[illegible]
Street	
City/Province	Kitchener
Postal Code	
Invoice To	Same as Report To: Yes
Company	
Contact	

Report Format / Distribution: PDF, EXCEL, EDD; Quality Control (QC) Report with Report: Yes; Select Distribution: EMAIL

Email 1: [illegible]

Select Service Level Below — Regular [R]: X

Invoice Distribution — Select Invoice Distribution: EMAIL

Email 1 or Fax: [illegible]

Project Information

ALS Account # / Quote #: Q73777-[illegible] (Head Lake)

Job #:

PO / AFE:

LSD:

ALS Lab Work Order # (lab use only): L2530806

ALS Contact: Emily H.

Sampler: M / H D

Analysis Request

ALS Sample # (lab use only)	Sample Identification and/or Coordinates	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Number of Containers	PHC F1-F4/BTEX	Metals	PAHs	VOC/OC	pH	OC Pesticides
1	BH101-2u SS2	17/11/[illegible]		Soil	3	✓	✓		✓		
2	BH102-2u SS1				3	✓	✓			✓	
3	BH102-2u SS3				3	✓	✓				
4	BH103-2u SS2B				3	✓	✓	✓			
5	BH103-2u SS2				3	✓	✓		✓		
6	BH104-2u SS2				3	✓	✓	✓	✓		
7	BH104-2u SS3				3	✓	✓	✓	✓	✓	
8	BH105-2u SA1				3	✓	✓				✓
9	BH106-2u SA1				3	✓	✓		✓		✓
10	BH106-2u SA2				3	✓	✓		✓	✓	
11	BH107-2u SS1				3	✓	✓	✓	✓		
12 / 13	BH[illegible]				3	✓	✓		✓		

SAMPLES ON HOLD

Drinking Water (DW) Samples (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

* Paid Sample
O. Reg 153 Table 1+2 [illegible] coarse
O. Reg 406 Table 2.1 [illegible] coarse

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen / Ice Packs / Ice Cubes / Cooling Initiated; SIF Observations Yes / No; Custody seal intact Yes / No

Final Cooler Temperatures °C: 2.8

SHIPMENT RELEASE (client use) — Released by: [signature] Date: Nov 18/20 Time: [illegible]

INITIAL SHIPMENT RECEPTION (lab use only) — Received by: Date: Time:

FINAL SHIPMENT RECEPTION (lab use only) — Received by: [signature] Date: Nov 18 Time: 12:15pm

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

MTE CONSULTANTS INC. (Kitchener)
ATTN: JEN LAMBKE
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Date Received: 27-NOV-20
Report Date: 03-DEC-20 14:18 (MT)
Version: FINAL

Client Phone: 519-743-6500

Certificate of Analysis

Lab Work Order #: L2534350

Project P.O. #: NOT SUBMITTED
Job Reference: 47877-100 (HEART LAKE TCLP)
C of C Numbers:
Legal Site Desc:

Emily Hansen
Account Manager

47877-100 (HEART LAKE TCLP)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L2534350-1	BH102-20 SS1						
Sampled By:	MATT D. on 17-NOV-20						
Matrix:	SOIL						
Sample Preparation							
	Initial pH	9.60		0.10	pH units	01-DEC-20	
	Final pH	5.78		0.10	pH units	01-DEC-20	
TCLP Extractables							
	Aroclor 1242	<0.00020		0.00020	mg/L	02-DEC-20	
	Aroclor 1248	<0.00020		0.00020	mg/L	02-DEC-20	
	Aroclor 1254	<0.00020		0.00020	mg/L	02-DEC-20	
	Aroclor 1260	<0.00020		0.00020	mg/L	02-DEC-20	
	Cyanide, Weak Acid Diss	<0.10		0.10	mg/L	01-DEC-20	20
	Fluoride (F)	<10		10	mg/L	02-DEC-20	150.0
	Nitrate and Nitrite as N	<4.0		4.0	mg/L	02-DEC-20	1000
	Nitrate-N	<2.0		2.0	mg/L	02-DEC-20	
	Nitrite-N	<2.0		2.0	mg/L	02-DEC-20	
	Total PCBs	<0.00040		0.00040	mg/L	02-DEC-20	0.3
TCLP Metals							
	Arsenic (As)	<0.050		0.050	mg/L	01-DEC-20	2.5
	Barium (Ba)	<0.50		0.50	mg/L	01-DEC-20	100
	Boron (B)	<2.5		2.5	mg/L	01-DEC-20	500
	Cadmium (Cd)	<0.0050		0.0050	mg/L	01-DEC-20	0.5
	Chromium (Cr)	<0.050		0.050	mg/L	01-DEC-20	5.0
	Lead (Pb)	<0.025		0.025	mg/L	01-DEC-20	5.0
	Mercury (Hg)	<0.00010		0.00010	mg/L	01-DEC-20	0.1
	Selenium (Se)	<0.025		0.025	mg/L	01-DEC-20	1.0
	Silver (Ag)	<0.0050		0.0050	mg/L	01-DEC-20	5.0
	Uranium (U)	<0.25		0.25	mg/L	01-DEC-20	10
TCLP VOCs							
	1,1-Dichloroethylene	<0.025		0.025	mg/L	02-DEC-20	1.4
	1,2-Dichlorobenzene	<0.025		0.025	mg/L	02-DEC-20	20.0
	1,2-Dichloroethane	<0.025		0.025	mg/L	02-DEC-20	0.5
	1,4-Dichlorobenzene	<0.025		0.025	mg/L	02-DEC-20	0.5
	Benzene	<0.025		0.025	mg/L	02-DEC-20	0.5
	Carbon tetrachloride	<0.025		0.025	mg/L	02-DEC-20	0.5
	Chlorobenzene	<0.025		0.025	mg/L	02-DEC-20	8
	Chloroform	<0.10		0.10	mg/L	02-DEC-20	10
	Dichloromethane	<0.50		0.50	mg/L	02-DEC-20	5.0
	Methyl Ethyl Ketone	<1.0		1.0	mg/L	02-DEC-20	200.0
	Tetrachloroethylene	<0.025		0.025	mg/L	02-DEC-20	3
	Trichloroethylene	<0.025		0.025	mg/L	02-DEC-20	5
	Vinyl chloride	<0.050		0.050	mg/L	02-DEC-20	0.2
	Surrogate: 4-Bromofluorobenzene	108.7		70-130	%	02-DEC-20	
Volatile Organic Compounds							
	Surrogate: 1,4-Difluorobenzene	97.2		70-130	%	02-DEC-20	
Polychlorinated Biphenyls							
	Surrogate: Decachlorobiphenyl	85.4		50-150	%	02-DEC-20	
	Surrogate: Tetrachloro-m-xylene	87.5		50-150	%	02-DEC-20	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Ministry of the Environment, General Waste Control Regulation No. 347/90

#1: Ontario Ministry of the Environment, General Waste Control Regulation No. 347/90

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
CN-TCLP-WT	Waste	Cyanide for O. Reg 347	APHA 4500CN I

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fiber filter. The extract is then analyzed using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

F-TCLP-WT	Waste	Fluoride (F) for O. Reg 347	EPA 300.1

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fiber filter. The extract is then analyzed using procedures adapted from EPA 300.1 and is analyzed by Ion Chromatography with conductivity and/or UV detection.

HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	EPA 1631E

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using atomic absorption spectrophotometry (EPA 1631E).

LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 6020B

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020B).

N2N3-TCLP-WT	Waste	Nitrate/Nitrite-N for O. Reg 347	EPA 300.1

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fiber filter. The extract is then analyzed using procedures adapted from EPA 300.1 and is analyzed by Ion Chromatography with conductivity and/or UV detection.

PCB-TCLP-WT	Waste	PCBs for O. Reg 347	SW846 8270
VOC-TCLP-WT	Waste	VOC for O. Reg 347	SW846 8260

A sample of waste is leached in a zero headspace extractor at 30–2 rpm for 18–2.0 hours with the appropriate leaching solution. After tumbling the leachate is analyzed directly by headspace technology, followed by GC/MS using internal standard quantitation.

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

Chain of Custody numbers:

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

Reference Information

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

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TCLP-WT	**Waste**							
Batch R5301851								
WG3454803-3 DUP		**L2533745-1**						
Cyanide, Weak Acid Diss		<0.10	<0.10	RPD-NA	mg/L	N/A	50	01-DEC-20
WG3454803-2 LCS								
Cyanide, Weak Acid Diss			104.3		%		70-130	01-DEC-20
WG3454803-1 MB								
Cyanide, Weak Acid Diss			<0.10		mg/L		0.1	01-DEC-20
WG3454803-4 MS		**L2533745-1**						
Cyanide, Weak Acid Diss			102.8		%		50-140	01-DEC-20
F-TCLP-WT	**Waste**							
Batch R5304756								
WG3455760-3 DUP		**L2533745-1**						
Fluoride (F)		<10	<10	RPD-NA	mg/L	N/A	30	02-DEC-20
WG3455760-2 LCS								
Fluoride (F)			96.7		%		70-130	02-DEC-20
WG3455760-1 MB								
Fluoride (F)			<10		mg/L		10	02-DEC-20
WG3455760-4 MS		**L2533745-1**						
Fluoride (F)			95.6		%		50-150	02-DEC-20
HG-TCLP-WT	**Waste**							
Batch R5300328								
WG3454617-3 DUP		**L2533073-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	01-DEC-20
WG3454617-2 LCS								
Mercury (Hg)			101.0		%		70-130	01-DEC-20
WG3454617-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	01-DEC-20
WG3454617-4 MS		**L2533073-1**						
Mercury (Hg)			104.7		%		50-140	01-DEC-20
MET-TCLP-WT	**Waste**							
Batch R5300521								
WG3454645-4 DUP		**WG3454645-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	01-DEC-20
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	50	01-DEC-20
Boron (B)		<2.5	<2.5	RPD-NA	mg/L	N/A	50	01-DEC-20
Barium (Ba)		0.69	0.68		mg/L	1.1	50	01-DEC-20
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	01-DEC-20
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	50	01-DEC-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R5300521								
WG3454645-4 DUP		**WG3454645-3**						
Lead (Pb)		<0.025	<0.025	RPD-NA	mg/L	N/A	50	01-DEC-20
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	50	01-DEC-20
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	50	01-DEC-20
WG3454645-2 LCS								
Silver (Ag)			97.4		%		70-130	01-DEC-20
Arsenic (As)			96.6		%		70-130	01-DEC-20
Boron (B)			95.9		%		70-130	01-DEC-20
Barium (Ba)			98.5		%		70-130	01-DEC-20
Cadmium (Cd)			96.7		%		70-130	01-DEC-20
Chromium (Cr)			97.0		%		70-130	01-DEC-20
Lead (Pb)			93.9		%		70-130	01-DEC-20
Selenium (Se)			93.1		%		70-130	01-DEC-20
Uranium (U)			91.2		%		70-130	01-DEC-20
WG3454645-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	01-DEC-20
Arsenic (As)			<0.050		mg/L		0.05	01-DEC-20
Boron (B)			<2.5		mg/L		2.5	01-DEC-20
Barium (Ba)			<0.50		mg/L		0.5	01-DEC-20
Cadmium (Cd)			<0.0050		mg/L		0.005	01-DEC-20
Chromium (Cr)			<0.050		mg/L		0.05	01-DEC-20
Lead (Pb)			<0.025		mg/L		0.025	01-DEC-20
Selenium (Se)			<0.025		mg/L		0.025	01-DEC-20
Uranium (U)			<0.25		mg/L		0.25	01-DEC-20
WG3454645-5 MS		**WG3454645-3**						
Silver (Ag)			126.2		%		50-140	01-DEC-20
Arsenic (As)			107.8		%		50-140	01-DEC-20
Boron (B)			113.5		%		50-140	01-DEC-20
Barium (Ba)			108.3		%		50-140	01-DEC-20
Cadmium (Cd)			105.5		%		50-140	01-DEC-20
Chromium (Cr)			106.5		%		50-140	01-DEC-20
Lead (Pb)			108.3		%		50-140	01-DEC-20
Selenium (Se)			104.4		%		50-140	01-DEC-20
Uranium (U)			104.0		%		50-140	01-DEC-20
N2N3-TCLP-WT	**Waste**							

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
N2N3-TCLP-WT	**Waste**							
Batch R5304756								
WG3455760-3 DUP		**L2533745-1**						
Nitrate-N		<2.0	<2.0	RPD-NA	mg/L	N/A	25	02-DEC-20
Nitrite-N		<2.0	<2.0	RPD-NA	mg/L	N/A	25	02-DEC-20
WG3455760-2 LCS								
Nitrate-N			97.8		%		70-130	02-DEC-20
Nitrite-N			99.1		%		70-130	02-DEC-20
WG3455760-1 MB								
Nitrate-N			<2.0		mg/L		2	02-DEC-20
Nitrite-N			<2.0		mg/L		2	02-DEC-20
WG3455760-4 MS		**L2533745-1**						
Nitrate-N			99.2		%		50-150	02-DEC-20
Nitrite-N			100.1		%		50-150	02-DEC-20
PCB-TCLP-WT	**Waste**							
Batch R5302841								
WG3454963-6 DUP		**WG3454963-3**						
Aroclor 1242		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	02-DEC-20
Aroclor 1248		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	02-DEC-20
Aroclor 1254		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	02-DEC-20
Aroclor 1260		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	02-DEC-20
WG3454963-2 LCS								
Aroclor 1242			85.4		%		65-130	02-DEC-20
Aroclor 1248			82.7		%		65-130	02-DEC-20
Aroclor 1254			84.6		%		65-130	02-DEC-20
Aroclor 1260			79.5		%		65-130	02-DEC-20
WG3454963-1 MB								
Aroclor 1242			<0.00020		mg/L		0.0002	02-DEC-20
Aroclor 1248			<0.00020		mg/L		0.0002	02-DEC-20
Aroclor 1254			<0.00020		mg/L		0.0002	02-DEC-20
Aroclor 1260			<0.00020		mg/L		0.0002	02-DEC-20
Surrogate: Decachlorobiphenyl			102.4		%		50-150	02-DEC-20
Surrogate: Tetrachloro-m-xylene			89.3		%		50-150	02-DEC-20
WG3454963-8 MB								
Aroclor 1242			<0.00020		mg/L		0.0002	02-DEC-20
Aroclor 1248			<0.00020		mg/L		0.0002	02-DEC-20
Aroclor 1254			<0.00020		mg/L		0.0002	02-DEC-20
Aroclor 1260			<0.00020		mg/L		0.0002	02-DEC-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PCB-TCLP-WT	**Waste**							
Batch R5302841								
WG3454963-8 MB								
Surrogate: Decachlorobiphenyl			94.6		%		50-150	02-DEC-20
Surrogate: Tetrachloro-m-xylene			93.9		%		50-150	02-DEC-20
WG3454963-7 MS		**WG3454963-3**						
Aroclor 1242			78.2		%		50-150	02-DEC-20
Aroclor 1254			76.7		%		50-150	02-DEC-20
Aroclor 1260			71.6		%		50-150	02-DEC-20
VOC-TCLP-WT	**Waste**							
Batch R5301919								
WG3455082-1 LCS								
1,1-Dichloroethylene			121.9		%		70-130	02-DEC-20
1,2-Dichlorobenzene			103.2		%		70-130	02-DEC-20
1,2-Dichloroethane			121.0		%		70-130	02-DEC-20
1,4-Dichlorobenzene			109.8		%		70-130	02-DEC-20
Benzene			114.1		%		70-130	02-DEC-20
Carbon tetrachloride			120.8		%		60-140	02-DEC-20
Chlorobenzene			97.8		%		70-130	02-DEC-20
Chloroform			132.2	LCS-ND	%		70-130	02-DEC-20
Dichloromethane			122.9		%		70-130	02-DEC-20
Methyl Ethyl Ketone			108.9		%		50-150	02-DEC-20
Tetrachloroethylene			110.7		%		70-130	02-DEC-20
Trichloroethylene			112.7		%		70-130	02-DEC-20
Vinyl chloride			107.9		%		60-130	02-DEC-20
WG3455082-2 MB								
1,1-Dichloroethylene			<0.025		mg/L		0.025	02-DEC-20
1,2-Dichlorobenzene			<0.025		mg/L		0.025	02-DEC-20
1,2-Dichloroethane			<0.025		mg/L		0.025	02-DEC-20
1,4-Dichlorobenzene			<0.025		mg/L		0.025	02-DEC-20
Benzene			<0.025		mg/L		0.025	02-DEC-20
Carbon tetrachloride			<0.025		mg/L		0.025	02-DEC-20
Chlorobenzene			<0.025		mg/L		0.025	02-DEC-20
Chloroform			<0.10		mg/L		0.1	02-DEC-20
Dichloromethane			<0.50		mg/L		0.5	02-DEC-20
Methyl Ethyl Ketone			<1.0		mg/L		1	02-DEC-20
Tetrachloroethylene			<0.025		mg/L		0.025	02-DEC-20

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Contact: JEN LAMBKE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-TCLP-WT	**Waste**							
Batch R5301919								
WG3455082-2 MB								
Trichloroethylene			<0.025		mg/L		0.025	02-DEC-20
Vinyl chloride			<0.050		mg/L		0.05	02-DEC-20
Surrogate: 1,4-Difluorobenzene			99.1		%		70-130	02-DEC-20
Surrogate: 4-Bromofluorobenzene			106.8		%		70-130	02-DEC-20
WG3455082-3 MS		**L2534561-1**						
1,1-Dichloroethylene			123.9		%		50-140	02-DEC-20
1,2-Dichlorobenzene			103.1		%		50-140	02-DEC-20
1,2-Dichloroethane			121.8		%		50-140	02-DEC-20
1,4-Dichlorobenzene			107.0		%		50-140	02-DEC-20
Benzene			116.6		%		50-140	02-DEC-20
Carbon tetrachloride			124.8		%		50-140	02-DEC-20
Chlorobenzene			98.0		%		50-140	02-DEC-20
Chloroform			135.8		%		50-140	02-DEC-20
Dichloromethane			125.3		%		50-140	02-DEC-20
Methyl Ethyl Ketone			112.7		%		50-140	02-DEC-20
Tetrachloroethylene			107.6		%		50-140	02-DEC-20
Trichloroethylene			114.3		%		50-140	02-DEC-20
Vinyl chloride			112.3		%		50-140	02-DEC-20

Quality Control Report

Workorder: L2534350 Report Date: 03-DEC-20

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Contact: JEN LAMBKE

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
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2534305-COFC

COC Number: 17 -

Page

Report To	
Company	VTF
Contact	Jon Lambke
Phone	
Street	
City/Province	
Postal Code	
Invoice To	Same as Report To [ ] 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 [x] Yes [ ] No

Select Distribution: [x] Email [ ] Mail [ ] Fax

Email 1 or Fax

Email 2

Email 3

Invoice Distribution

Select Invoice Distribution: [ ] Email [ ] Mail [ ] Fax

Email 1 or Fax: same as above

Email 2

Project Information

ALS Account # / Quote #:

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center:

PO#

Major/Minor Code:

Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only): L2534305

ALS Contact: Emily

Sampler:

Regular [R]

4 day [P4-20%] [ ]

3 day [P3-25%] [ ]

2 day [P2-50%] [ ]

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:

Analysis Request

NUMBER OF CONTAINERS

SAMPLES ON HOLD

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

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

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

[redacted]

Are samples taken from a Regulated DW System? [ ] Yes [ ] No

Are samples for human consumption/ use? [ ] Yes [ ] No

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen [ ] SIF Observations Yes [ ] No [ ]

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

Cooling Initiated [ ]

INITIAL COOLER TEMPERATURES °C

FINAL COOLER TEMPERATURES °C

7.8

SHIPMENT RELEASE (client use)

[redacted]

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Nov 27 Time: 11:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Appendix E

Excess Soil Procedures

Unexpected / Suspected Contamination

Rejected Loads at Reuse Site

Procedure Title:	**Procedure for Handling Unexpected Impacted Soil During Excavation, if encountered**	*Date Issued:*	January 2022
		Revision No.:	0
Authorizer:	Project Leader or Operator of a Project Area	*Date Revised:*	N/A

1 PURPOSE

To comply with Section 23 of Ontario Regulation 406/19 with a written procedure outlining the steps that must occur if any unexpected and suspected soil contamination is encountered during any excavation within the Project Area.

2 SCOPE

As required under section 23 of O. Reg 406/19, this written procedure applies to any personnel acting on behalf of the Project Leader or the Operator of the Project Area and indicates what must occur "*if any person working in the Project Area makes an observation during soil excavation within the Project Area, including any visual or olfactory observation, that suggests that the soil being excavated may be affected by the discharge of a contaminant"* (e.g. staining, odour, deleterious debris).

3 DEFINITIONS

Contaminant of Potential Environmental Concern – the potential for one or more contaminants to be located on, in, or under a property at a concentration above the applicable standard

Excess Soil – means soil, or soil mixed with rock, that has been excavated as part of the project and removed from the project area for the project.

Excess Soil Regulation – known as *Ontario Regulation 406/19: On-Site and Excess Soil Management*.

MECP – means the Ontario Ministry of the Environment, Conservation and Parks (formerly MOECC and MOE).

O.Reg 153/04 – refers to Ontario Regulation 153/04, Records of Site Condition – Part XV.1 of the Act

Project Area – means, in respect of a project, a single property or adjoining properties on which the project is carried out.

Project Leader – means, in respect of a project, the person or persons who are ultimately responsible for making decisions relating to the planning and implementation of the project.

Qualified Person – means, a person who meets the qualifications to be a qualified person for the purposes of conducting or supervising a phase one or phase two environmental site assessment, and completing the certifications that must be completed in a record of site condition, if:

- the person holds a license, limited license or temporary license under the *Professional Engineers Act;* or
- the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary member or limited member of the Association of Professional Geoscientists of Ontario.

Soil Rules – the documents entitled "Rules for Soil Management and Excess Soil Quality Standards". This document is a provision of the Excess Soil Regulation and requires compliance where indicated. This document also references the Excess Soil Quality Standards.

4 RESPONSIBILITY

The Project Leader or the Operator of the Project Area is responsible for ensuring that this procedure is followed in the event that unexpected soil impacts are encountered during excavation within the Project Area.

5 PROCEDURE for Handling Unexpected and Suspected Impacted Soil During Excavation

As stipulated in **Section 23** of the Excess Soil Regulation 406/19, a procedure must be developed in the event that unexpected soil impacts are encountered during excavation within the Project Area.

<u>The Project Leader or the Operator of the Project Area shall ensure the following:</u>

1. All soil excavations in the immediate work area must immediately cease upon the observation of impacted or potentially impacted soil being made.
2. The Project Leader or the Operator of the Project Area must immediately be notified of the observation.

Project Leader Representative Name:	Phone #:

3. The Project Leader or the Operator of the Project Area, upon being notified of the observation, must, before allowing the excavation to resume, ensure that all necessary steps are taken to ensure that:
   a. Advice of the **Project Leader's/Contractors Qualified Person (QP)*** is obtained regarding what next steps are necessary, and in consultation with the ***<u>Project Leader's QP</u>*,** advise on whether any of documents required under the regulation require revision (update) as a result of the observation.
   b. The extent of the work area that is affected by a contaminant must be determined. This includes an inspection of the suspect soil to determine appropriate sampling, handling and/or disposal requirements.
   c. That the Contractor and the Constructor have in-place proper worker health and safety procedures and environmental controls to protect workers, engineers and visitors in the work area and limit access to the work area from unauthorized persons.
   d. All excavated soil that is affected by a contaminant is identified and is segregated from other excavated soil in the Project Area. All such segregated soil should be covered with plastic sheeting placed below and above the stockpile.
   e. All segregated stockpiles must not exceed 2,500m^3 each, and must be placed greater than 30 m from a water body, unless any exemptions under the Soil Rules apply (Section 4(ii)).

f. Sampling frequency from each stockpile must be completed in accordance with Table 2 of Schedule E, O.Reg. 153/04, Minimum Stockpile Sampling Frequency. At a minimum, each soil sample must be analyzed for petroleum hydrocarbons (PHCs), metals and hydrides, sodium adsorption ratio (SAR) and electrical conductivity (EC). In addition, any contaminant of potential concern identified during the assessment of past uses (or equivalent) must also be analyzed.

g. Leachate analysis for required contaminants as outlined in the Soil Rules.

h. Soil excavation should not resume in the affected work area until the Project Leader directs that excavation may resume.

i. Any excess soil from that portion of the Project Area is disposed of in accordance with the Excess Soil Regulation, including disposal at a licensed facility.

REFERENCES

Ontario Ministry of the Environment, Conservations and Parks, 2019. *Environmental Protection Act.* Ontario Regulation 406/19 (On-Site and Excess Soil Management).

Ontario Ministry of the Environment, Conservations and Parks, “Rules for Soil Management and Excess Soil Quality Standards”, December 8, 2020.

Revision Log

Revision Date	Revision Number	Summary of Changes

Procedure Title:	**Procedure for Rejected Loads at Intended Reuse Site**	*Date Issued:*	May 2022
		Revision No.:	0
Authorizer:	Project Leader or Operator of a Project Area	*Date Revised:*	N/A

1 PURPOSE

To comply with Section 13 2 (2) of Ontario Regulation 406/19 and Section 4(6) of the Soil Rules with a written procedure outlining the steps that must occur if any load of excess soil is rejected at an intended reuse site.

2 SCOPE

As required under Section 13 of O. Reg 406/19, this written procedure applies to any personnel acting on behalf of the Project Leader or the Operator of the Project Area and indicates *"measures to be implemented in the event that the excess soil cannot be deposited"* at the intended reuse site.

3 DEFINITIONS

Excess Soil – means soil, or soil mixed with rock, that has been excavated as part of the project and removed from the project area for the project.

Excess Soil Regulation – known as *Ontario Regulation 406/19: On-Site and Excess Soil Management*.

MECP – means the Ontario Ministry of the Environment, Conservation and Parks (formerly MOECC and MOE).

O.Reg 153/04 – refers to Ontario Regulation 153/04, Records of Site Condition – Part XV.1 of the Act

Project Area – means, in respect of a project, a single property or adjoining properties on which the project is carried out.

Project Leader – means, in respect of a project, the person or persons who are ultimately responsible for making decisions relating to the planning and implementation of the project.

Qualified Person – means, a person who meets the qualifications to be a qualified person for the purposes of conducting or supervising a phase one or phase two environmental site assessment, and completing the certifications that must be completed in a record of site condition, if:

- the person holds a license, limited license or temporary license under the *Professional Engineers Act;* or
- the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary member or limited member of the Association of Professional Geoscientists of Ontario.

Soil Rules – the documents entitled "Rules for Soil Management and Excess Soil Quality Standards". This document is a provision of the Excess Soil Regulation and requires compliance where indicated. This document also references the Excess Soil Quality Standards.

4 RESPONSIBILITY

The Project Leader or the Operator of the Project Area is responsible for ensuring that this procedure is followed in the event that any load of excess soil is rejected at an intended reuse site.

5 PROCEDURE for Rejected Loads at Intended Re-use Site

The Contractor may encounter two scenarios related to rejected loads at an intended reuse site. If any load is rejected at the intended reuse site, the hauler shall immediately notify the Contractor who shall notify the Contractor Administrator and Project Leader. The Contractor/Contractor's hauler shall also adhere to the following.

Contractor Representative Name:	Ph. #:
Project Leader Representative Name:	Ph. #:

1) Load rejected at gate of intended receiving site, before load is dumped
   In such an event, the hauler shall immediately notify the Contractor who shall notify the Contractor Administrator and Project Leader that the truck will be returning directly to the Project Area with a rejected load. The Contractor shall ensure that the hauler does not attempt to dispose of the rejected load on another property.

   The Project Leader will allow the truck to return to the Project Area to be dumped and retained in a designated area set up by the Contractor. The designated area shall be set up with fencing and plastic tarping both under and over the soil pile(s).

2) Load rejected after dumping at intended receiving site
   In such an event, the hauler shall immediately notify the Contractor who shall notify the Contractor Administrator and Project Leader that a load has been rejected after dumping. The Contractor shall provide suitable equipment and labour to excavate, load, and remove the rejected material from the receiver's property in a timely manner.

   The Project Leader will allow the load/truck to return to the Project Area to be dumped and retained in a designated area set up by the Contractor as outlined in 1) above.

Assessment by Project Leader: Any material that has been rejected and returned to the Project Area, and placed in the designated area shall be examined and tested by the Project Leader's QP to determine an alternative receiving site or licensed facility.

REFERENCES

Ontario Ministry of the Environment, Conservations and Parks, 2019. *Environmental Protection Act.* Ontario Regulation 406/19 (On-Site and Excess Soil Management).

Ontario Ministry of the Environment, Conservations and Parks, “Rules for Soil Management and Excess Soil Quality Standards”, December 8, 2020.

Revision Log

Revision Date	Revision Number	Summary of Changes

Appendix H

Phase I Environmental Site Assessment

MTE Consultants Inc.

December 2020

Heart Lake Road & Countryside Drive

Phase I Environmental Site Assessment

Project Location:
Heart Lake Road & Countryside Drive, Brampton, ON

Prepared for:
City of Brampton
2 Wellington Street West, Brampton, ON L6Y 4R2

Prepared by:
MTE Consultants
520 Bingemans Centre Drive
Kitchener, ON N2B 3X9

December 15, 2020

MTE File No.: 47877-100

Engineers, Scientists, Surveyors.

Contents

Figures

Appendices

Executive Summary

MTE Consultants Inc. (MTE) was retained by the Corporation of the City of Brampton to complete a Phase I Environmental Site Assessment (ESA) for the intersection at Heart Lake Road and Countryside Drive in Brampton, Ontario (the “Site” or the “Intersection”).

Based on a review of historical aerial photographs, the Site has been used as an intersection since at least 1946. The Intersection is owned by the Corporation of the City of Brampton. The Phase I ESA was completed for due diligence purposes in advance of reconstruction of the Intersection.

MTE reviewed information for the Site and properties within 250 m of the Intersection (representing the “Phase I Study Area”), including aerial photographs, geology and hydrogeological records and mapping, Ministry of the Environment, Conservation and Parks (“MECP”) database records and previous reports.

Based on the findings of this Phase I ESA, no evidence of actual contamination in connection with the Site or surrounding properties was identified. However, the following potential environmental concerns were identified on the Site:

- **Potential Importation of Fill of Unknown Quality:** Fill materials of unknown quality may have been imported to the Site for use during the construction of Heart Lake Road and Countryside Drive, due to the lower elevation of the wetland areas adjacent to Site.

Based on the above, soil sampling should be completed in advance of road reconstruction activities to assess soil quality for potential excess soil management, which would be legislated under Ontario Regulation 406/19. This could be completed in conjunction with a geotechnical investigation for the Site.

This report does not assess geotechnical aspects of the Site, compliance with municipal by-laws or permits, or features of the natural environment.

1.0 Introduction

1.1 Site Description

MTE Consultants Inc. (MTE) was retained by the Corporation of the City of Brampton to complete a Phase I Environmental Site Assessment (ESA) for the intersection at Heart Lake Road and Countryside Drive in Brampton, Ontario (the “Site” or the “Intersection”). Refer to **Figure 1** for the Site location and **Figure 2** for the Site features.

The Site is owned by the Corporation of the City of Brampton and has been used as an intersection since at least 1946. MTE understands the Corporation of the City of Brampton intends to have the Intersection reconstructed.

1.2 Scope of Work

The purpose of the Phase I ESA is to identify potential environmental concerns on or near the Site that may affect soil or groundwater quality. Authorization to proceed with the project was received from the Corporation of the City of Brampton, following acceptance of MTE’s submission related to Request for Proposal Call No. RFP2020-082. The assignment was completed by MTE according to Reference Number 47877-100. The report has been issued to the Corporation of the City of Brampton for due diligence purposes in advance of reconstruction of the Heart Lake Road and Countryside Drive intersection.

The Phase I ESA meets the requirements of Canadian Standards Association (CSA) document Z768-01 (R2016) and was completed with consideration toward the methodology of Ontario Regulation 153/04 (as amended). Tasks performed for this assignment included:

- Review of environmental information including published and online records from the Ministry of the Environment, Conservation and Parks (MECP)*, Ministry of Natural Resources and Forestry (MNRF), Environment Canada, Technical Standards and Safety Authority (TSSA), the City of Brampton, and the Regional Municipality of Peel for information related to the Site and Phase I Study Area (as described in **Section 1.3**);
- Review of available previous environmental reports for the Site and Phase I Study Area;
- Review of physical setting information including aerial photographs, topographic maps, and geologic reference materials related to the Site and Phase I Study Area;
- Review of an Environmental Risk Information Services Ltd. (ERIS) database report for the Site and surrounding properties;
- Review of published municipal directories and Fire Insurance Plans (FIPs) applicable for the area, where available;
- Interview with a person knowledgeable of the Site for information about the Site and its uses;
- Site visit and inspection of the Site and surrounding lands;
- Preparation of a photographic log of the Site;
- Assessment of information collected for the Site and Study Area; and
- Preparation of this summary report of findings and recommendations.

**The Ontario Ministry of the Environment, Conservation and Parks (MECP) was previously the Ontario Ministry of the Environment (MOE) and the Ontario Ministry of the Environment and Climate Change (MOECC).*

1.3 Methodology

The Phase I Study Area includes the Site, as well as properties located wholly or partially within approximately 250 metres (m) from the Intersection, as shown on **Figure 1**. MTE conducted research and collected available information that was reasonably accessible for the Site and Phase I Study Area, through the following methods:

- Written correspondence with regulatory agencies;
- Research and review of publicly available information through on-line databases;
- Interviews by MTE staff with persons knowledgeable about the Site;
- In-person reconnaissance of the Site by MTE staff; and
- Review of available written records, maps, figures, and reports applicable to the Site and Phase I Study Area.

MTE has compiled a report of findings for use by the Corporation of the City of Brampton that has been prepared under the supervision of Mr. Sean Anderson, P. Eng., QP_{ESA}. The qualifications of Mr. Anderson and Ms. Frances Heather, B.Sc., M.Sc., (who compiled the report) are included in **Section 6.0**.

2.0 Records

2.1 Historical Background

Based on the records review, the Site has been a municipal intersection right-of-way since at least 1946. There is no evidence of any former buildings at the Site. The Site is owned by the Corporation of the City of Brampton and first received surface treatment in 1987.

2.2 Topographical, Geological and Hydrogeological Setting

The UTM coordinates of the centre of the Site were obtained from Google Earth and are approximately 597,247 m east and 4,844,229 m north (zone 17T).

An Ontario Base Map (OBM) from the Ministry of Natural Resources and Forestry (MNRF) was reviewed to reference the land features and uses in the area. OBM No. 10 17 5900 48000 was published in 2002 and is based on unspecified aerial photography. The Site appeared to consist of a roadway surrounded by open space (inferred agricultural lands), roadways, wooded areas, wetlands, waterbodies, and a watercourse. Ground surface elevations at the Site were approximately 253 metres above sea level (masl). A copy of the OBM is provided in **Appendix A**.

The Site is located within the broad physiographic region known as the Peel Plain, which comprises approximately 777 km^2 (300 square miles) across the central portions of the Regional Municipalities of York, Peel, and Halton. The Plain consists of a level to undulating tract of clay soils, with a gradual and fairly uniform slope toward Lake Ontario (*Chapman and Putnam*, 1984). The underlying geological material consists of glaciolacustrine deposits including sand, gravelly sand with gravel, near-shore and beach deposits.

Bedrock is not anticipated to be near surface and includes Upper Ordovician formations of shale, limestone, dolostone and siltstone (Ministry of Northern Development and Mines, 1991).

2.3 Aerial Photographs

Aerial photographs for the Site and Phase I Study Area were reviewed for the period 1946 to 2019 in approximately ten-year intervals (where available at a reasonable scale). Aerial photographs from 1946, 1954, and 1988 were ordered through ERIS. Photos from 1960 to 1985 were available through MTE archives. The 2004 to 2019 photos were available through the City of Brampton online mapping. Selected aerial photographs are included in **Appendix A**. Due to the scale and clarity of several aerial photographs, specific observations are limited.

Year(s)	Aerial Photograph Description
1946	The Site comprises the T-shaped intersection right-of-way. The surrounding land use appears to comprise agricultural lands and wooded areas. There appears to be an inferred farming operation, including structures, further west of the Phase I Study Area. There appears to be a waterbody to the south of the Phase I Study Area.
1954	The Site and Phase I Study Area appear relatively unchanged from the 1946 aerial photograph.
1960	The Site appears relatively unchanged from the 1954 aerial photograph. There appears to be a new roadway southeast of the Phase I Study Area. The remaining Phase I Study Area and surrounding lands appear to be relatively unchanged.
1970	The Site appears relatively unchanged from the 1960 aerial photograph. There appears to be a new roadway and a parking area constructed south of the Phase I Study Area. The remaining Phase I Study Area appears relatively unchanged from the 1960 aerial photograph.
1985	The Site and Phase I Study Area appear relatively unchanged from the 1970 aerial photograph. There appears to be inferred residential dwellings constructed southwest of the Phase I Study Area.
1988	The Site and Phase I Study Area appear relatively unchanged from the 1985 aerial photograph.
2004	The Site and Phase I Study Area appear relatively unchanged from the 1988 aerial photograph.
2015	The Site and Phase I Study Area appear relatively unchanged from the 2004 aerial photograph. Highway 410 and residential dwellings appear to have been constructed to the northeast of the Phase I Study Area.
2019	The Site and Phase I Study Area appear relatively unchanged from the 2015 aerial photograph.

Based on the review of aerial photographs, the Site has been used as an intersection right-of-way since at least 1946. No buildings were observed on the Site in the historical aerial photographs.

The surrounding properties comprised mostly woodland and agricultural use, with an inferred parking area associated with the Heart Lake Conservation Park in the south portion of the Phase I Study Area.

2.4 Municipal Directories

MTE contacted the Brampton Library, Four Corners branch, on October 19, 2020 to inquire about City of Brampton Municipal Directories available for the Site and surrounding properties. A representative from the Brampton Library provided directory information for selected addresses on Heart Lake Road in the Phase I Study Area for the period 1995 to 2001. The property located south of the Site at 10818 Heart Lake Road is listed as the Heart Lake Conservation Park for 1995, 1998 and 2001. The remaining listings for surrounding properties were primarily residential and therefore do not represent an environmental concern to the Site. Results of the records search can be found in **Appendix C.**

2.5 Fire Insurance Plans

Fire Insurance Plans (FIPs) were developed between 1875 and 1923 and were revised in some areas until the 1970s. FIPs typically illustrate building construction, occupancy and potential fire hazards and may provide information regarding environmental concerns such as storage tanks, transformers, boilers and electrical rooms.

A search of the Catalogue of Canadian Fire Insurance Plans 1875-1975 indicated that FIPs are not available for the Site and Phase I Study Area.

2.6 Environmental Risk Information Services (ERIS) Report

MTE contacted ERIS, an environmental database and information service company, to request a search of selected government (federal and provincial) and private records for information pertaining to the Site and surrounding properties.

The ERIS report identified one record for the Site consisting of an ERIS Historical Search, which does not represent a potential environmental concern to the Site.

The ERIS report identified 24 records for the Phase I Study Area, including 11 Water Well Information System records.

The remaining 13 records were related to the municipal address 10818 Heart Lake Road, which is associated with the Heart Lake Conservation Park located south of Site, and included:

- Records of hazardous waste generation related to light fuels, oil skimmings and sludges, petroleum distillates, and waste oil and lubricants (between 1992 and 2005);
- Record of a spill in 2008 of approximately 50 litres of hydraulic oil leaking from a pipe or a hose that caused potential soil contamination; and
- Records related to two (2) 2,270 litre capacity steel, single-wall UST commercial fuel oil tanks, installed in 2007.

Based on the locations of the office, boathouse, gatehouse, and other features at 10818 Heart Lake Road, and observations during the Site inspection, it is unlikely that the activities described in the records above occurred within 250 metres of the Site. Therefore, none of the records appear to represent a significant environmental concern to the Site.

The report also identified unplottable records pertaining to approvals for municipal and private water/sewage works, a leak of natural gas to air, a spill of diesel fuel from a motor vehicle on Countryside Drive, a pesticide limited vendor, and a hazardous waste generator of waste oils and lubricants. None of the unplottable records appear to represent a significant environmental concern to the Site.

A copy of the ERIS report dated September 18, 2020 is provided in **Appendix B**.

2.7 Environmental Regulatory Agencies and Utilities

MTE consulted and reviewed available records with applicable regulatory agencies, as summarized below. Copies of the search results and records are maintained on file with MTE. Pertinent records are included in **Appendix C.**

Provincial

Technical Standards and Safety Authority (TSSA): The TSSA was contacted for electronic database information concerning underground storage tanks (USTs) or aboveground storage tanks (ASTs) for surrounding properties with available municipal addresses.

An email response was received on October 2, 2020 indicating that no electronic records from 1990 and beyond were found for the subject addresses.

MECP Freedom of Information (FOI): A written request could not be filed with the MECP Freedom of Information (FOI) Office for information regarding environmental concerns on file for the Site, as the MECP requires a municipal address and there is no municipal address associated with the Intersection.

MECP Inventory of Coal Gasification Plants, Coal Tars & Related Tars, Waste Disposal Inventory, and Ontario PCB Inventory

MTE completed an electronic listing query from the following historical databases using the Site UTM coordinates and a search radius of 1000m.

> **MECP Inventory of Coal Gasification Plant Waste Sites in Ontario (April 1987):** The Site has not been used for the gasification of coal. No coal gasification plants were identified at the Site or within 1000 m of the Site.
>
> **MECP Inventory of Industrial Sites Producing Coal Tars and Related Tars in Ontario:** The production and use of coal or other tars has not taken place at the Site or within 1000 m of the Site.
>
> **MECP Waste Disposal Inventory:** There are no ‘active’ or ‘closed’ landfills registered on the Site or within 1000 m of the Site.
>
> **MECP PCB Storage Sites:** No PCB Storage Sites were identified at the Site or within 1000 m of the Site.

MECP Access Environment: MTE reviewed the MECP online Access Environment database for any Certificate of Approval (C of A), Environmental Activity and Sector Registry (EASR) and Environmental Compliance Approval (ECA) records for the Site or properties within the Phase I Study Area. No records were found for the Site or Phase I Study Area.

MECP Environmental Registry: MTE reviewed the Environmental Registry online platform. No records were found for the Site or Phase I Study Area.

MECP Brownfield Environmental Site Registry: MTE searched the Brownfield Environmental Site Registry for any Records of Site Condition (RSCs) filed within 250 m of the Site. No RSC records were identified for the Site.

The following RSC records were identified in the Study Area:

- RSC # 46911 was filed for the lands to the east of the intersection of Heart Lake Road and Countryside Drive on April 20, 2009. It appears that soil samples were collected from the RSC property for analysis of metals, organochloride pesticides, electrical conductivity, and sodium adsorption ratio. No elevated concentrations of these compounds in soil were reported. It does not appear that groundwater was investigated.
- RSC #225896 for the lands to the north of the Intersection of Heart Lake Road and Countryside Drive was filed on August 12, 2019. Soil samples were collected from the RSC property for analysis of OC pesticides to investigate potential impacts from historical agricultural purposes. No contaminants were identified in soil. Groundwater was not investigated.

The RSC records for surrounding properties described above do not appear to represent an environmental concern to the Site.

MECP Hazardous Waste Information Network (HWIN): MTE searched the HWIN online database for any active registrations for the Site and properties within the Phase I Study Area. Historical HWIN listings were also reviewed as part of the ERIS report.

There were no HWIN records for the Site or Phase I Study Area.

MECP Water Well Records Inventory: The MECP Well Record database is a web-based system that provides water well information including the well depth, date of completion, and location. A review of the MECP online database identified well records within the Phase I Study Area identifying the general stratigraphy as a mix of sand, gravel, and clay above shale bedrock, which was encountered at depths ranging from approximately 36 to 39 metres below ground surface (mbgs).

Federal

Environment Canada National Pollution Release Inventory (NPRI): The NPRI requires companies to report information on releases and transfers of pollutants to the Government of Canada on an annual basis. MTE reviewed the NPRI for information pertaining to the Site and Phase I Study Area. No records were listed for the Site or within the Phase I Study Area.

Federal Contaminated Sites Inventory: MTE reviewed the inventory for any Federal Contaminated Sites located on-Site or within the Phase I Study Area. Based on a review of the inventory, neither the Site nor surrounding properties were listed.

2.8 Company Records

There are no active industrial/commercial operations at the Site and therefore no company records exist.

2.9 Previous Environmental Reports

MTE completed a cursory review of the following previous Class Environmental Assessment (EA) report. A summary of pertinent information relevant to the Intersection is provided below. A copy of the report is maintained on file with MTE.

***Environmental Study Report, Countryside Drive Class Environmental Assessment Heart Lake Road to Clarkway Drive, Brampton, Ontario* dated November 14, 2005 prepared by Trow Associates Inc. for the City of Brampton**

The report was completed for Countryside Drive, from Heart Lake Road to Clarkway Drive, which is inclusive of the Site and partially inclusive of the Phase I Study Area. The following pertinent information was noted:

- Generally, the surrounding area along Countryside Drive comprises of agricultural land and subdivisions.
- Wetlands and marsh areas are present near Countryside Drive, including a provincially significant wetland that is part of the Heart Lake Wetland Complex.
- Wild life in the study area of the EA consists of common species of birds, mammals, amphibians and reptiles.
- A preliminary geotechnical investigation was completed as part of the EA Report, and the soil stratigraphy is generally described as asphalt surface underlain by variable fill (clay, silt, gravel, and organic matter) underlain by native clayey silt till or silty clay till. Some of the boreholes were underlain by shale bedrock at depths of 2.9 to 6.1 mbgs.
- There were no staining or odours noted in the Trow Associates Inc. borehole logs.

2.10 Other Regulatory Agencies

2.10.1 Ministry of Natural Resources and Forestry (MNRF)

MTE reviewed the MNRF online Natural Heritage mapping for information related to natural heritage features, ANSIs, Provincially Significant Wetlands (PSWs) and species-at-risk that may be present within the limits of the Site or Phase I Study Area.

- The Phase I Study Area contains Provincially Significant Wetlands;
- The Phase I Study Area contains woodland;
- The Site and Phase I Study Area do not contain a Natural Core Area;
- The Phase I Study Area does contain Areas of Natural and Scientific Interest; and
- There were no threatened or endangered species listed in the NHIC database for the Site.

Based on the above, the Site is considered sensitive according to O. Reg. 153/04.

2.10.2 City of Brampton

<u>Official Plan</u>

MTE reviewed the City of Brampton Official Plan (consolidated September 2020), for information regarding important natural and cultural resources for the Site or within the Phase I Study Area.

The Official Plan is a public document which establishes a policy framework for public and private sector decisions regarding development and the provision of community infrastructure and services, immediate and long-term land use, social and economic matters within the City.

Information pertaining to the Site and Phase I Study Area is as follows:

- The lands to the south and east of the Site are located within an open space system;

- The lands to the south and east of the Site are located within a Provincially Significant Wetland;
- The lands to the east of the Site are located within a woodland; and
- The lands to the south of the Site are located within an Area of Natural and Scientific Interest (Life Science and Earth Science).

Based on the above, the Site is considered sensitive according to O. Reg. 153/04.

2.10.3 Regional Municipality of Peel

Information Request

An Environmental Records search request was filed with the Regional Municipality of Peel on November 9, 2020 for information pertaining to the intersection of Heart Lake Road and Countryside Drive.

A letter response (via e-mail) dated November 11, 2020 was received and included the following information in response to the request:

- No records were found related to any violations, infractions or outstanding order under Wastewater Bylaw 53-2010 and the former Sewer Use Bylaws 90-90 and 9-75.
- One spill event is listed for Countryside Drive between Heart Lake Road and Dixie Road. Used motor oil was spilled in the ditch of Countryside Drive on May 10, 2004. The City of Brampton applied oil absorbent pads, booms and straw bails to contain the oil. The City of Brampton hired Fielding Emergency Response to clean up the spill. Fielding Emergency response decanted approximately 200 litres of oil into a drum and used absorbent pads to clean the remaining oil in the ditch. The contaminated soil was excavated by the City of Brampton and disposed of by Fielding Emergency Response.

Based on the above, no environmental concerns were identified for the Site. A copy of the response is provided in **Appendix C.**

Official Plan

MTE reviewed the Regional Municipality of Peel's *"Regional Official Plan"* (ROP), consolidated December 2018, for information regarding important natural and cultural resources at the Site and surrounding lands.

The ROP is a public document which establishes a policy framework for public and private sector decisions regarding immediate and long-term land use, servicing, transportation, infrastructure investment and economic matters within the Region.

Information pertaining to the Site and surrounding areas is as follows:

- The Phase I Study Area is partially located within a Core Area of the Greenlands System (Schedule A);
- The Site is not located within a Prime Agricultural Area (Schedule B);
- The Site is not located within a Mineral Aggregate Resources Area (Schedule C); and
- The Site is not located within the boundaries of the Oak Ridges Moraine (Schedule D1).

3.0 Site Reconnaissance and Interview

3.1 Site Visit

A Site visit was completed on October 2, 2020 by Mr. Sean Anderson, P.Eng., QP_{ESA} of MTE. Weather conditions were clear and the temperature was approximately 15°C. The Inspection Report and photographs taken of the Site and adjacent properties at the time of the inspection are included in **Appendix D**. A brief summary is presented below.

The Site is a municipal intersection right-of-way consisting of Heart Lake Road and Countryside Drive. Plastic “Animex” fencing was present at the time of the inspection along the perimeter of the wetlands adjacent to the Site. Catch basins were present along the curbs of Countryside Drive. Overhead hydro and telecommunication lines were present above the Intersection.

There was no evidence of staining or stressed vegetation on the Site. There was no evidence of past placement of solid waste at the Site.

MTE did not observe any evidence of water supply wells or septic systems at the Site.

The Site is bordered to the north by a soil berm and an ongoing land development project with evidence of earthworks.

The adjacent lands to the east and south of the Site comprise of low-lying wetland.

The adjacent lands to the south of the Site comprise of wetland and a wooded area. Further to the south is a portion of the Heart Lake Conservation Park.

3.2 Interview

MTE conducted a telephone interview on October 21, 2020 with Mr. Mario Goolsarran, Senior Project Engineer for the City of Brampton, who has 4 years of familiarity with the Site. The completed interview questionnaire is provided in **Appendix D**.

The Site is owned by the Corporation of the City of Brampton. The roadways on Site were first constructed with surface treatment in 1987. Existing utility services at the Site include overhead hydro and catch basins along Countryside Drive. There is a possible water main in the Intersection, and possible sewer lines on Countryside Drive. No other utility services are present on the Site.

According to Mr. Goolsarran, there are no current or former industrial activities on the Site and there is no chemical or fuel storage. Salt application occurs at the Site by City of Brampton staff or contractors in the winter months. There is no salt or other de-icing chemicals stored at the Site. Mr. Goolsarran is not aware of any illegal dumping or waste that has been brought to and deposited on the Site. According to Mr. Goolsarran, historical placement of fill likely occurred during road construction, due to the native soil at the Site consisting of peat.

Reportedly, there are no issues with drainage, flooding or ponding on the Site. Mr. Goolsarran suggested that due to the swamp features present at the adjacent Heart Lake Conservation Park, there is the potential for localized flooding. There have been no complaints from or in regards to any neighbouring properties.

4.0 Evaluation of Phase I ESA Finds

4.1 Site History and Description

Based on the review of historical aerial photographs, the Site has been used as an intersection since at least 1946. The Site is owned by the Corporation of the City of Brampton and first received surface treatment in 1987.

4.2 Building Structures

There are currently no buildings on Site.

4.3 Utility Services

4.3.1 Stormwater/Water Well/Wastewater/Sewage Disposal

There are existing catch basins along the curbs of Countryside Drive. There was no other evidence of stormwater, water wells, or wastewater services observed on the Site.

4.3.2 Electricity, Heating and Cooling

There are no structures on the Site and therefore no heating or cooling systems were present.

4.3.3 Drains and Sumps

There are no structures on the Site and therefore no drains or sumps were present.

4.3.4 Pits and Lagoons

MTE did not observe any pits or lagoons on the Site.

4.3.5 Mechanical/Hydraulic Equipment

MTE did not observe any mechanical or hydraulic lift equipment on the Site.

4.4 Aboveground and Underground Storage Tanks (ASTs/USTs)

At the time of the Site visit, MTE did not observe evidence of current ASTs or USTs on the Site. No evidence of existing or historical ASTs or USTs at the Site was identified during the Phase I ESA interview and records review.

4.5 Chemical Use and Storage

MTE did not observe any evidence of chemical use or storage on the Site.

4.6 Solid Waste

MTE did not observe any evidence of solid waste disposal on the Site.

4.7 Hazardous and Liquid Waste

MTE did not observe any evidence of hazardous or liquid waste being stored on the Site.

4.8 Unidentified Substances or Odours

MTE did not observe any unidentified substances on the Site and no odours were detected at the time of the Site inspection.

4.9 Fill Materials

MTE did not observe any evidence of fill berms or embankments on the Site. A berm was observed adjacent to the Site to the north. Fill materials may have been placed on the Site during the construction of Heart Lake Road and Countryside Drive, as the intersection is at a higher elevation than the surrounding low-lying wetlands.

4.10 Air Emissions

MTE did not observe any air emission sources at the Site during the inspection. There are no records of Certificates of Approval or Environmental Compliance Approvals for the Site.

4.11 Fires

MTE did not observe any evidence of former fires or open burning at the Site.

4.12 Spills and Releases

MTE did not observe any evidence of spills at the Site.

4.13 Stained Materials or Stressed Vegetation

MTE did not observe any evidence of surface staining or indications of stressed vegetation at the Site.

4.14 Flooding and Drainage

Surface water is expected to be directed towards the off-Site wetlands. No environmental concerns pertaining to surface drainage were observed during the Site visit.

4.15 Special Attention Items

4.15.1 Asbestos Containing Materials (ACMs)

Asbestos is defined as a designated substance under the Ontario Occupational Health and Safety Act (OHSA). Friable asbestos-containing materials (ACM) were discontinued from use in the early 1980s.

There are no structures on the Site and therefore no concerns related to ACMs.

4.15.2 Lead Based Paint

Lead can typically be found in paint in older buildings. Lead was banned from products in the early 1970s and is considered a designated substance under the OHSA.

There are no structures on the Site and therefore no concerns related to lead-based paint.

4.15.3 Ozone Depleting Substances (ODS)

In Ontario, the use of ODSs such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) (common refrigerants) are regulated under O. Reg. 463/10 *Ozone Depleting Substances and Other Halocarbons*. This regulation banned the use of large refrigeration equipment and chillers containing CFCs after January 1, 2012, and requires the handling and servicing of equipment containing ODSs to be completed by a ODS certified contractor.

There are no structures on the Site and therefore no concerns related to ODS.

4.15.4 Polychlorinated Biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) were historically used as a dielectric fluid (non-conductor) in electrical equipment, as well as in other specialized equipment such as heat exchangers and hydraulic systems. The import, manufacture, sale and re-use of PCBs were made illegal in Canada in 1977.

There are no structures or transformers on the Site and therefore no concerns related to PCBs.

4.15.5 Urea Formaldehyde Foam Insulation (UFFI)

UFFI insulation was mainly used in Canada from about 1975 to 1978, when financial incentives were offered by the government to upgrade home insulation levels. Use of the insulation was banned in December 1980.

There are no structures on the Site and therefore no concerns related to UFFI.

4.15.6 Water Staining/Mould

There are no structures on the Site and therefore no concerns related to water staining/mould in building materials.

4.15.7 Radon Gas

Radon is a naturally occurring radioactive gas emitted from the breakdown of uranium in soil and rock. Radon may enter a building through cracks or other openings in a building foundation. There are no current buildings at the Site. No testing for radon was performed at the Site during the Phase I ESA.

4.16 Surrounding Properties

Surrounding lands were observed from accessible areas of the Site and public roadways during the Site visit. Surrounding land uses are shown on **Figure 1** and are summarized as follows:

Bearing	Description
North	The Site is bordered to the north by an ongoing land development project with evidence of earthworks.
East	The Site is bordered to the east by a wetland.
South	The Site is bordered to the south by a wetland.
West	The Site is bordered the west by a wetland and a wooded area.

5.0 Conclusions

The Phase I ESA was completed for due diligence purposes in advance of reconstruction of the intersection at Heart Lake Road and Countryside Drive in Brampton, Ontario.

Based on the review of historical aerial photographs, the Site has been used as an intersection since at least 1946. The Intersection is owned by the Corporation of the City of Brampton.

MTE reviewed information for the Site and properties within 250 m of the Intersection (representing the "Phase I Study Area"), including aerial photographs, geology and hydrogeological records and mapping, Ministry of the Environment, Conservation and Parks ("MECP") database records and previous reports.

Based on the findings of this Phase I ESA, no evidence of actual contamination in connection with the Site or surrounding properties was identified. However, the following potential environmental concerns were identified on the Site and surrounding properties:

- **Potential Importation of Fill of Unknown Quality:** Fill materials of unknown quality may have been imported to the Site for use during the construction of Heart Lake Road and Countryside Drive, due to the lower elevation of the wetland areas adjacent to Site.

Based on the above, soil sampling should be completed in advance of road reconstruction activities to assess soil quality for potential excess soil management, which would be legislated under Ontario Regulation 406/19. This could be completed in conjunction with a geotechnical investigation for the Site.

This report does not assess geotechnical aspects of the Site, compliance with municipal by-laws or permits, or features of the natural environment.

6.0 Qualifications of Assessors

As required by CSA Standard Z768-01 (R2016), an appropriate combination of formal education, skills, experience and training is required in order to provide a technically sound and rational Phase I ESA. The key participants involved in performing the components of the Phase I ESA are Mr. Sean Anderson, P. Eng., QP_{ESA} and Ms. Frances Heather, B.Sc., M.Sc.

Mr. Anderson is a licensed Professional Engineer in the Province of Ontario, and a Qualified Person for Environmental Site Assessment as defined in Ontario Regulation 153/04 (as amended). He is a graduate of the University of Waterloo in Environmental Engineering (Water Resources Option). Mr. Anderson has completed courses in Spill Response, Construction Site Safety and WHMIS. He has completed the Hazardous Wastes Operations and Emergency Response (29 CFR 1910) training (40-hour course) in accordance with the US Department of Labour's Occupational Safety & Health Administration (OSHA). He has over ten years of experience in the environmental consulting industry that includes project management, site inspections, regulatory and public liaison, historical records reviews, co-ordination of field activities with contractors, drilling supervision, soil identification and sampling, hydrogeological interpretations, monitoring well sampling, soil vapour sampling, data compilation, report preparation and remediation planning.

Ms. Heather is a graduate from the University of Waterloo with a Bachelor's of Science in Biochemistry and Lakehead University with a Master of Science in Environmental Engineering. She has obtained her Ontario College Graduate Certificate in Environmental Engineering Applications at Conestoga College. She has five months of experience in the environmental consulting industry that includes: site assessment and investigations, soil and groundwater sampling, drilling supervision, surface soil sampling and report preparation.

7.0 Limitations

Services performed by **MTE Consultants Inc.** (MTE) were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the Environmental Engineering & Consulting profession. No other warranty or representation expressed or implied as to the accuracy of the information, conclusions or recommendations is included or intended in this report.

This report was completed for the sole use of MTE and the Client. No other parties may rely upon this report without the written permission of MTE. This report was completed in accordance with the Scope of Work referred to in Section 1.2 and meets the mandatory requirements of CAN/CSA-Z768-01. As such, this report may not deal with all issues potentially applicable to the site and may omit issues, which are or may be of interest to the reader. MTE makes no representation that the present report has dealt with any and all of the important features, including any or all important environmental features, except as provided in the Scope of Work. All findings and conclusions presented in this report are based on site conditions, as they existed during the time period of the investigation. In addition, MTE has relied on information provided by the persons interviewed as part of this study (identified herein) as being accurate and representative. This report is not intended to be exhaustive in scope or to imply a risk-free facility.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based upon it, are the responsibility of such third parties. MTE accepts no responsibility for liabilities incurred by or damages, if any, suffered by any third party as a result of decisions made or actions taken, based upon this report. Others with interest in the site should undertake their own investigations and studies to determine how or if the condition affects them or their plans.

It should be recognized that the passage of time may affect the views, conclusions and recommendations (if any) provided in this report because environmental conditions of a property can change. Should additional or new information become available, MTE recommends that it be brought to our attention in order that we may re-assess the contents of this report.

All of which is respectfully submitted,

MTE Consultants Inc.

DRAFT

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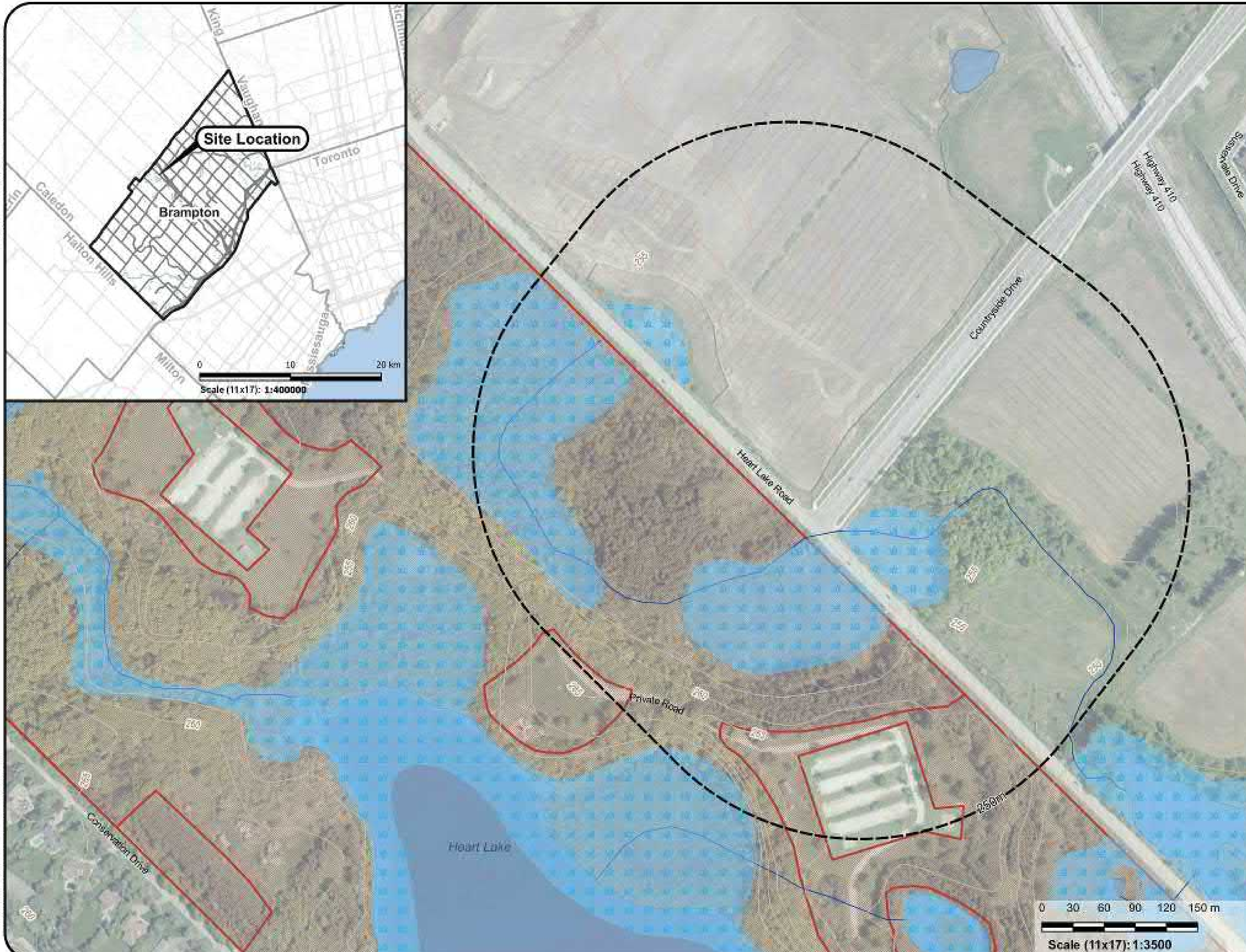
8.0 List of References and Sources of Information

The following list of references and sources were reviewed for the purposes of preparing the report:

Applicable Section	Reference / Source	Date
All	Canadian Standards Association Z768-01 "Phase I – Environmental Site Assessments"	November 2001 Updated April 2003 Reaffirmed 2016
2.2	Ontario Base Map, Ministry of Natural Resources 10 17 5900 48000	No date (Published 2002)
2.2	Chapman and Putnam. The Physiography of Southern Ontario, 3rd Edition.	1984
2.2	Ontario Ministry of Northern Development and Mines. Bedrock Geology of Ontario, Southern Sheet. Scale 1:1,000,000.	1991
2.3	ERIS Aerial Photographs	1946, 1954, 1988
2.3	MTE Archives	1960, 1970, 1985
2.3	City of Brampton GIS Online Mapping	2004, 2015, 2019
2.4	Municipal Directories- Brampton Library Archives	October 19, 2020 (date of correspondence)
2.5	Dubreuil, L. and C. Woods, Catalogue of Canadian Fire Insurance Plans 1875-1975	2002
2.6	ERIS Report Number- 20291500065	September 18, 2020 (date of report)
2.7	Technical Standards and Safety Authority – Fuel Safety Division inquiry	October 2, 2020 (date of response)
2.7	Ontario Ministry of the Environment, "Inventory of Coal Gasification Plant Waste Sites in Ontario"	April 1987, Reprinted February 1989
2.7	Ontario Ministry of the Environment, Inventory of Industrial Sites Producing or Using Coal Tar and Related Tars in Ontario	November 1988
2.7	Ontario Ministry of the Environment, "PCB Site Inventory System 2000"	July 2000
2.7	Ontario Ministry of the Environment, "Waste Disposal Site Inventory"	June 1991
2.7	Ontario Ministry of the Environment, Conservation and Parks, Access Environment	October 5, 2020 (date of search)
2.7	Ontario Ministry of the Environment, Environmental Registry (website)	October 2, 2020 (date of search)
2.7	Ontario Ministry of the Environment, Brownfields Environmental Site Registry 2004-2011	September 23, 2020 (date of search)
2.7	Ontario Ministry of the Environment, Brownfields Environmental Site Registry since 2011	September 23, 2020 (date of search)
2.7	Ontario Ministry of the Environment, Brownfields Environmental Site Registry	September 23, 2020 (date of search)
2.7	Ontario Ministry of the Environment, Hazardous Waste Information Network	October 2, 2020 (date of search)
2.7	Ministry of Ontario, Well Records	October 15, 2020 (date of search)

Applicable Section	Reference / Source	Date
2.7	National Pollutant Release Inventory (December 1992)	October 2, 2020 (date of search)
2.7	Federally Contaminated Sites, Treasury Board of Canada (website)	September 23, 2020 (date of search)
2.10.1	Ministry of Natural Resources and Forestry Natural Heritage Map	October 2, 2020 (date of search)
2.10.2	City of Brampton Official Plan	Consolidated September 2020
2.10.3	Regional Municipality of Peel Official Plan	Consolidated December 2018

Figures



NORTH

PROJECT NORTH

Legend

- 250m Study Area
- 5m Contours
- Provincally Significant Wetland
- Waterbody
- Water Courses
- ANSI

Data sources:

Contains information licensed under the Open Government License Ontario.

Greater Toronto Area (GTA) Orthophotography Project 2013.
Source: Data provided by Ontario Ministry of Natural Resources and Forestry
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Project CRS: NAD83 / UTM zone 17N

MTE
Engineers,Scientists, Surveyors
Ph. (519) 743-6500

Client
The Corporation of the City of Brampton

Project
Phase I ESA

Site
Heart Lake Road and Countryside Drive, Brampton, ON

Title
Site Location Map

Reviewed By	SCA		
Prepared By	SAR	Project No	47877-100
Drawn By	FLH	Figure No	1
Date	December 2020		

Project No: 47877-100 P:\P47877\100\47877-100_ESA1.qgz

ESA1.1

December 14, 2020 - 17:17 - Plotted By: SRedekker

N
NORTH

N
PROJECT NORTH

Legend

- Watercourse
- Provincially Significant Wetland
- ANSI
- 5m Contours

Data Sources:

Contains information licensed under the Open Government License Ontario

Greater Toronto Area (GTA) Orthophotography Project 2013
Source: Data provided by Ontario Ministry of Natural Resources and Forestry
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0 10 20 30 40 50 m

Scale (11x17): 1:1500

Project CRS: NAD83 / UTM zone 17N

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Client
The Corporation of the City of Brampton

Project
Phase I ESA

Site
Heart Lake Road and Countryside Drive, Brampton, ON

Title
Site Features

Reviewed By	SCA		
Prepared By	SWR	Project No	47877-100
Drawn By	FLH	Figure No	2
Date	December 2020		

Project No: 47877-100 P:\P47877\100\47877-100_ESA1.qgz
ESA1.2
December 14, 2020 - 17:16 - Plotted By: SRedaier

Appendix A

Maps and Aerial Photographs

N
NORTH

N
PROJECT NORTH

Legend

250m Study Area

Data Sources:

National Air Photo Library Ottawa A16997-87 1960

0 40 80 120 160 200 m

Scale (11x17): 1:5000

Project CRS: NAD83 / UTM zone 17N

MTE

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Client

The Corporation of the City of Brampton

Project

Phase I ESA

Site

Heart Lake Road and Countryside Drive, Brampton, ON

Title

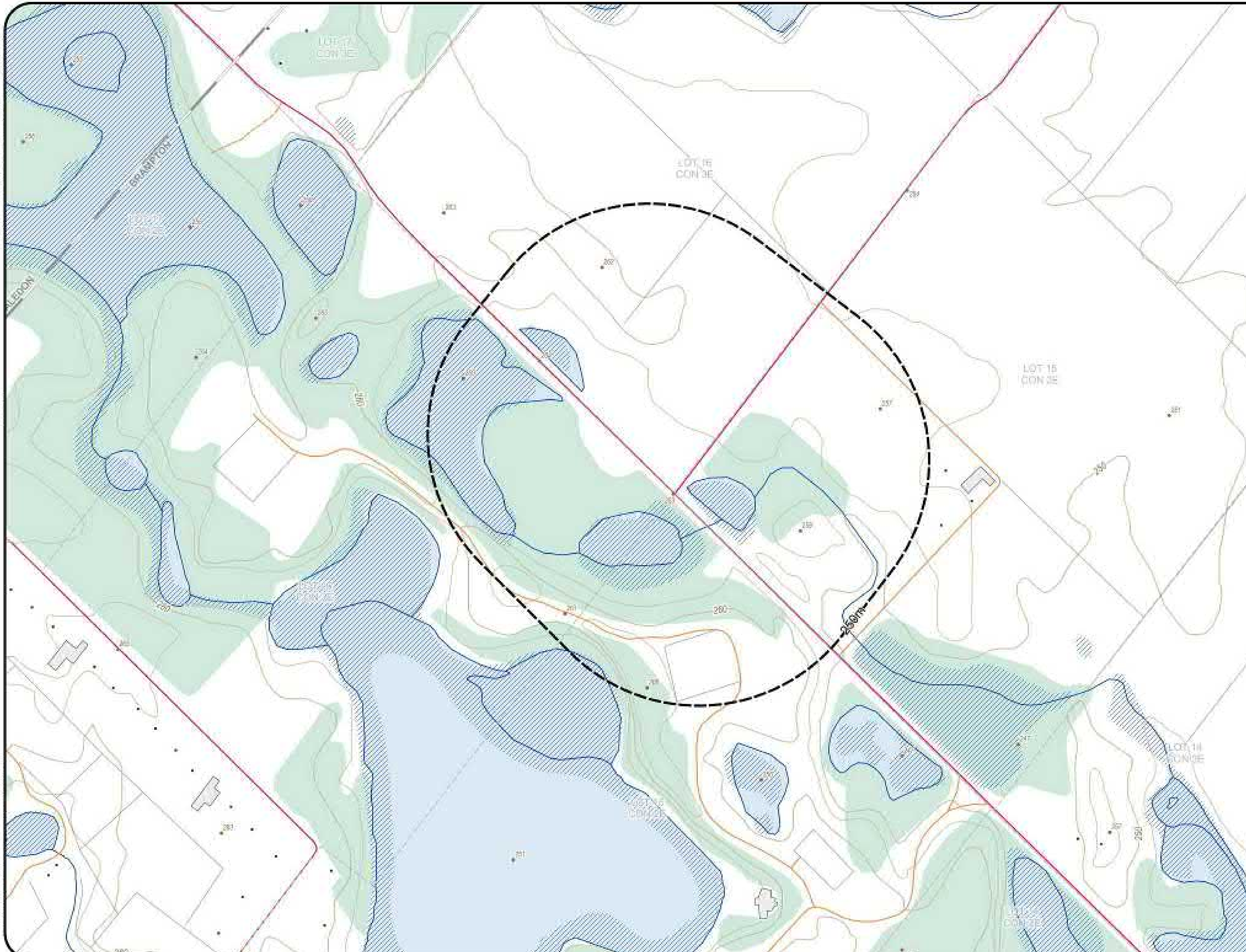
1960 Aerial Photograph

Reviewed By:	SCA		
Prepared By:	SMR	Project No:	47877-100
Drawn By:	FLH	Figure No:	A
Date:	December 2020		

Project No: 47877-100

API 1960

December 15, 2020 - 13:45 - Plotted By: SRedaer



N
NORTH

N
PROJECT NORTH

Legend

- 250m Study Area
- Spot Height
- Building
- Building to Scale
- Lower Tier Municipality
- Lot
- Miscellaneous Line
- Transport Line

Road
- Primary
- Secondary
- Tertiary

Contour
- Major
- Minor
- Wetland
- Waterbody
- Watercourse
- Wooded Area

Data Sources:

Contains information licensed under the Open Government License Ontario

0 40 80 120 160 200 m

Scale (11x17): 1:5000

MTE

Engineers, Scientists, Surveyors

Client: The Corporation of the City of Brampton

Project: Phase I ESA

Site: Heart Lake Road and Countryside Drive, Brampton, ON

Title: **OBM**

Reviewed By	SCA		
Prepared By	SMR	Project No	47877-100
Drawn By	FLH	Figure No	A
Date	December 2020		

Project No: 47877-100 P:\P47877\100\47877-100_ESA1.qgz

API 1985

December 15, 2020 - 13:45 - Plotted By: SRedaker

N
NORTH

N
PROJECT NORTH

Legend

250m Study Area

Data Sources:

National Air Photo Library Ottawa A31404-117 1985

0 40 80 120 160 200 m

Scale (11x17): 1:5000

Project CRS: NAD83 / UTM zone 17N

MTE

Engineers,Scientists, Surveyors

Ph. (519) 743-6500

Client

The Corporation of the City of Brampton

Project

Phase I ESA

Site

Heart Lake Road and Countryside Drive, Brampton, ON

Title

1985 Aerial Photograph

Reviewed By:	SEA		
Prepared By:	SWR	Project No:	47877-100
Drawn By:	FLH	Figure No:	A
Date:	December 2020		

N

NORTH

N

PROJECT NORTH

Legend

250m Study Area

Data Sources:

City of Brampton 2004

0 40 80 120 160 200 m

Scale (11x17): 1:5000

Project CRS: NAD83 / UTM zone 17N

MTE

Engineers, Scientists, Surveyors

Ph. (519) 743-6500

Client

The Corporation of the City of Brampton

Project

Phase I ESA

Site

Heart Lake Road and Countryside Drive, Brampton, ON

Title

2004 Aerial Photograph

Reviewed By	SCA		
Prepared By	SWR	Project No	47677-100
Drawn By	FLH	Figure No	A
Date	December 2020		

Project No: 47677-100 P:\P47677\100\47677-100_ESA1.qgz

AP1 2004

December 15, 2020 - 13:45 - Plotted By: SRadner

N

NORTH

N

PROJECT NORTH

Legend

250m Study Area

Data Sources:

City of Brampton 2015

0 40 80 120 160 200 m

Scale (11x17): 1:5000

Project CRS: NAD83 / UTM zone 17N

MTE

Engineers, Scientists, Surveyors

Ph. (519) 743-6500

Client

The Corporation of the City of Brampton

Project

Phase I ESA

Site

Heart Lake Road and Countryside Drive, Brampton, ON

Title

2015 Aerial Photograph

Reviewed By	SEA		
Prepared By	SWR	Project No	47877-100
Drawn By	FLH	Figure No	A
Date	December 2020		

Project No: 47877-100 P:\P\47877\100\47877-100_ESA1.qgz

AP1 2015

December 15, 2020 - 13:46 - Plotted By: SRedsmer

Appendix B

ERIS Report

MTE

DATABASE REPORT

Project Property:	*Heart Lake Road and Countryside Drive* *Heart Lake Road and Countryside Drive* *Brampton ON*
Project No:	*47877-100*
Report Type:	*Standard Report*
Order No:	*20291500065*
Requested by:	*MTE Consultants Inc.*
Date Completed:	*September 18, 2020*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

Table of Contents

Executive Summary

Property Information:

Project Property:	*Heart Lake Road and Countryside Drive* *Heart Lake Road and Countryside Drive Brampton ON*
Project No:	*47877-100*

Coordinates:

Latitude:	*43.7448905*
Longitude:	*-79.7923779*
UTM Northing:	*4,844,247.61*
UTM Easting:	*597,234.24*
UTM Zone:	*17T*

Elevation:	*820 FT* *249.80 M*

Order Information:

Order No:	*20291500065*
Date Requested:	*September 15, 2020*
Requested by:	*MTE Consultants Inc.*
Report Type:	*Standard Report*

Historical/Products:

Aerial Photographs	*Aerials - National Collection*

Executive Summary: Report Summary

Database	Name	Searched	Project Property	Within 0.25 km	Total
AAGR	***Abandoned Aggregate Inventory***	*Y*	*0*	*0*	*0*
AGR	***Aggregate Inventory***	*Y*	*0*	*0*	*0*
AMIS	***Abandoned Mine Information System***	*Y*	*0*	*0*	*0*
ANDR	***Anderson's Waste Disposal Sites***	*Y*	*0*	*0*	*0*
AST	***Aboveground Storage Tanks***	*Y*	*0*	*0*	*0*
AUWR	***Automobile Wrecking & Supplies***	*Y*	*0*	*0*	*0*
BORE	***Borehole***	*Y*	*0*	*0*	*0*
CA	***Certificates of Approval***	*Y*	*0*	*1*	*1*
CDRY	***Dry Cleaning Facilities***	*Y*	*0*	*0*	*0*
CFOT	***Commercial Fuel Oil Tanks***	*Y*	*0*	*2*	*2*
CHEM	***Chemical Register***	*Y*	*0*	*0*	*0*
CNG	***Compressed Natural Gas Stations***	*Y*	*0*	*0*	*0*
COAL	***Inventory of Coal Gasification Plants and Coal Tar Sites***	*Y*	*0*	*0*	*0*
CONV	***Compliance and Convictions***	*Y*	*0*	*0*	*0*
CPU	***Certificates of Property Use***	*Y*	*0*	*0*	*0*
DELISTED TANK	***Delisted Fuel Tanks***	*Y*	*0*	*2*	*2*
DRL	***Drill Hole Database***	*Y*	*0*	*0*	*0*
EASR	***Environmental Activity and Sector Registry***	*Y*	*0*	*0*	*0*
EBR	***Environmental Registry***	*Y*	*0*	*0*	*0*
ECA	***Environmental Compliance Approval***	*Y*	*0*	*1*	*1*
EEM	***Environmental Effects Monitoring***	*Y*	*0*	*0*	*0*
EHS	***ERIS Historical Searches***	*Y*	*1*	*0*	*1*
EIIS	***Environmental Issues Inventory System***	*Y*	*0*	*0*	*0*
EMHE	***Emergency Management Historical Event***	*Y*	*0*	*0*	*0*
EPAR	***Environmental Penalty Annual Report***	*Y*	*0*	*0*	*0*
EXP	***List of Expired Fuels Safety Facilities***	*Y*	*0*	*0*	*0*
FCON	***Federal Convictions***	*Y*	*0*	*0*	*0*
FCS	***Contaminated Sites on Federal Land***	*Y*	*0*	*0*	*0*
FOFT	***Fisheries & Oceans Fuel Tanks***	*Y*	*0*	*0*	*0*
FRST	***Federal Identification Registry for Storage Tank Systems (FIRSTS)***	*Y*	*0*	*0*	*0*
FST	***Fuel Storage Tank***	*Y*	*0*	*2*	*2*
FSTH	***Fuel Storage Tank - Historic***	*Y*	*0*	*0*	*0*
GEN	***Ontario Regulation 347 Waste Generators Summary***	*Y*	*0*	*4*	*4*
GHG	***Greenhouse Gas Emissions from Large Facilities***	*Y*	*0*	*0*	*0*
HINC	***TSSA Historic Incidents***	*Y*	*0*	*0*	*0*
IAFT	***Indian & Northern Affairs Fuel Tanks***	*Y*	*0*	*0*	*0*

Database	Name	Searched	Project Property	Within 0.25 km	Total
INC	***Fuel Oil Spills and Leaks***	*Y*	*0*	*0*	*0*
LIMO	***Landfill Inventory Management Ontario***	*Y*	*0*	*0*	*0*
MINE	***Canadian Mine Locations***	*Y*	*0*	*0*	*0*
MNR	***Mineral Occurrences***	*Y*	*0*	*0*	*0*
NATE	***National Analysis of Trends in Emergencies System (NATES)***	*Y*	*0*	*0*	*0*
NCPL	***Non-Compliance Reports***	*Y*	*0*	*0*	*0*
NDFT	***National Defense & Canadian Forces Fuel Tanks***	*Y*	*0*	*0*	*0*
NDSP	***National Defense & Canadian Forces Spills***	*Y*	*0*	*0*	*0*
NDWD	***National Defence & Canadian Forces Waste Disposal Sites***	*Y*	*0*	*0*	*0*
NEBI	***National Energy Board Pipeline Incidents***	*Y*	*0*	*0*	*0*
NEBP	***National Energy Board Wells***	*Y*	*0*	*0*	*0*
NEES	***National Environmental Emergencies System (NEES)***	*Y*	*0*	*0*	*0*
NPCB	***National PCB Inventory***	*Y*	*0*	*0*	*0*
NPRI	***National Pollutant Release Inventory***	*Y*	*0*	*0*	*0*
OGWE	***Oil and Gas Wells***	*Y*	*0*	*0*	*0*
OOGW	***Ontario Oil and Gas Wells***	*Y*	*0*	*0*	*0*
OPCB	***Inventory of PCB Storage Sites***	*Y*	*0*	*0*	*0*
ORD	***Orders***	*Y*	*0*	*0*	*0*
PAP	***Canadian Pulp and Paper***	*Y*	*0*	*0*	*0*
PCFT	***Parks Canada Fuel Storage Tanks***	*Y*	*0*	*0*	*0*
PES	***Pesticide Register***	*Y*	*0*	*0*	*0*
PINC	***Pipeline Incidents***	*Y*	*0*	*0*	*0*
PRT	***Private and Retail Fuel Storage Tanks***	*Y*	*0*	*0*	*0*
PTTW	***Permit to Take Water***	*Y*	*0*	*0*	*0*
REC	***Ontario Regulation 347 Waste Receivers Summary***	*Y*	*0*	*0*	*0*
RSC	***Record of Site Condition***	*Y*	*0*	*0*	*0*
RST	***Retail Fuel Storage Tanks***	*Y*	*0*	*0*	*0*
SCT	***Scott's Manufacturing Directory***	*Y*	*0*	*0*	*0*
SPL	***Ontario Spills***	*Y*	*0*	*1*	*1*
SRDS	***Wastewater Discharger Registration Database***	*Y*	*0*	*0*	*0*
TANK	***Anderson's Storage Tanks***	*Y*	*0*	*0*	*0*
TCFT	***Transport Canada Fuel Storage Tanks***	*Y*	*0*	*0*	*0*
VAR	***Variances for Abandonment of Underground Storage Tanks***	*Y*	*0*	*0*	*0*
WDS	***Waste Disposal Sites - MOE CA Inventory***	*Y*	*0*	*0*	*0*
WDSH	***Waste Disposal Sites - MOE 1991 Historical Approval Inventory***	*Y*	*0*	*0*	*0*
WWIS	***Water Well Information System***	*Y*	*0*	*11*	*11*
		Total:	*1*	*24*	*25*

Executive Summary: Site Report Summary - Project Property

Map Key	*DB*	*Company/Site Name*	*Address*	*Dir/Dist (m)*	*Elev diff (m)*	*Page Number*
1	EHS		Heart Lake Road and Countryside Drive Brampton ON	-/0.0	-0.23	16

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
2	WWIS		lot 16 con 2 ON ***Well ID:*** 6929089	W/48.7	0.05	16
3	WWIS		ON ***Well ID:*** 7205653	E/104.5	-1.40	18
4	WWIS		HAERT LAKE RD lot 16 con 3 ON ***Well ID:*** 7337072	N/123.5	1.06	18
5	WWIS		lot 15 con 2 ON ***Well ID:*** 4901204	SSE/140.8	0.88	19
6	WWIS		lot 15 con 2 ON ***Well ID:*** 7199756	WSW/178.6	-2.64	22
7	WWIS		lot 15 con 2 ON ***Well ID:*** 4901205	WSW/183.1	-2.80	24
8	WWIS		lot 16 con 2 ON ***Well ID:*** 4901215	WSW/189.9	-2.81	30
9	WWIS		HEARTLAKE EMPLOYMENT LANDS Brampton ON ***Well ID:*** 7282208	ENE/194.1	1.06	34
10	WWIS		HEATLAKE EMPLOYMENT LANDS Brampton ON ***Well ID:*** 7282209	NE/196.1	1.06	36
10	WWIS		COUNTRYSIDE & HEARTLAKE RD. BRAMPTON ON ***Well ID:*** 7334436	NE/196.1	1.06	38
11	WWIS		lot 16 con 2 ON ***Well ID:*** 4901210	WNW/202.5	-0.05	40
12	GEN	METROPOLITAN TORONTO & REGION	HEART LAKE CONSERVATION AREA 10818 HEART LAKE ROAD BRAMPTON ON L6T 3S1	S/229.2	12.00	43

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
12	GEN	METROPOLITAN TORONTO & REGION 25-392	CONS. AUTH.C/O 5 SHOREHAM DR. DOWNSVIEW HEART LAKE C.S. 10818 HEART LAKE RD. BRAMPTON ON L6T 3S1	S/229.2	12.00	44
12	GEN	METROPOLITAN TORONTO AND	HEART LAKE CONSERVATION AREA 10818 HEART LAKE ROAD BRAMPTON ON L6T 3S1	S/229.2	12.00	44
12	GEN	TORONTO AND REGION CONSERVATION AUTHORITY	10818 HEART LAKE RD. BRAMPTON ON L6Z 0B3	S/229.2	12.00	44
12	DTNK	Toronto and Region Conservation	10818 Heart Lake Rd BRAMPTON ON L6Z 0B3	S/229.2	12.00	45
12	DTNK	Toronto and Region Conservation	10818 Heart Lake Rd BRAMPTON ON L6Z 0B3	S/229.2	12.00	45
12	SPL	Rose Trucking - 207052 Ontario Ltd. <UNOFFICIAL>	9574 Gore Road; 10818 Heart Lake Road Brampton; Brampton ON	S/229.2	12.00	46
12	CA	Toronto and Region Conservation Authority	10818 Heart Lake Rd Brampton ON L6Z 0B3	S/229.2	12.00	46
12	CFOT	TORONTO AND REGION CONSERVATION	10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA ON	S/229.2	12.00	46
12	CFOT	TORONTO AND REGION CONSERVATION	10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA ON	S/229.2	12.00	47
12	ECA	Toronto and Region Conservation Authority	10818 Heart Lake Rd Brampton ON M3N 1S4	S/229.2	12.00	47
12	FST	TORONTO AND REGION CONSERVATION	10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA ON	S/229.2	12.00	48
12	FST	TORONTO AND REGION CONSERVATION	10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA ON	S/229.2	12.00	48

Executive Summary: Summary By Data Source

CA - Certificates of Approval

A search of the CA database, dated 1985-Oct 30, 2011* has found that there are 1 CA site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
Toronto and Region Conservation Authority	10818 Heart Lake Rd Brampton ON L6Z 0B3	S	229.16	12

CFOT - Commercial Fuel Oil Tanks

A search of the CFOT database, dated Jul 31, 2020 has found that there are 2 CFOT site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
TORONTO AND REGION CONSERVATION	10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA ON	S	229.16	12
TORONTO AND REGION CONSERVATION	10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA ON	S	229.16	12

DELISTED TANK - Delisted Fuel Tanks

A search of the DELISTED TANK database, dated Jul 31, 2020 has found that there are 2 DELISTED TANK site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
Toronto and Region Conservation	10818 Heart Lake Rd BRAMPTON ON L6Z 0B3	S	229.16	12
Toronto and Region Conservation	10818 Heart Lake Rd BRAMPTON ON L6Z 0B3	S	229.16	12

ECA - Environmental Compliance Approval

A search of the ECA database, dated Oct 2011-Aug 31, 2020 has found that there are 1 ECA site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
Toronto and Region Conservation Authority	10818 Heart Lake Rd Brampton ON M3N 1S4	S	229.16	12

EHS - ERIS Historical Searches

A search of the EHS database, dated 1999-Jul 31, 2020 has found that there are 1 EHS site(s) within approximately 0.25 kilometers of the project property.

Lower Elevation	Address	Direction	Distance (m)	Map Key
	Heart Lake Road and Countryside Drive Brampton ON	-	0.00	1

FST - Fuel Storage Tank

A search of the FST database, dated Jul 31, 2020 has found that there are 2 FST site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
TORONTO AND REGION CONSERVATION	10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA ON	S	229.16	12
TORONTO AND REGION CONSERVATION	10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA ON	S	229.16	12

GEN - Ontario Regulation 347 Waste Generators Summary

A search of the GEN database, dated 1986-Jul 31, 2020 has found that there are 4 GEN site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
METROPOLITAN TORONTO & REGION	HEART LAKE CONSERVATION AREA 10818 HEART LAKE ROAD BRAMPTON ON L6T 3S1	S	229.16	12
TORONTO AND REGION CONSERVATION AUTHORITY	10818 HEART LAKE RD. BRAMPTON ON L6Z 0B3	S	229.16	12
METROPOLITAN TORONTO AND	HEART LAKE CONSERVATION AREA 10818 HEART LAKE ROAD BRAMPTON ON L6T 3S1	S	229.16	12

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
METROPOLITAN TORONTO & REGION 25-392	CONS. AUTH.C/O 5 SHOREHAM DR. DOWNSVIEW HEART LAKE C.S. 10818 HEART LAKE RD. BRAMPTON ON L6T 3S1	S	229.16	12

SPL - Ontario Spills

A search of the SPL database, dated 1988-Nov 2019 has found that there are 1 SPL site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
Rose Trucking - 207052 Ontario Ltd. <UNOFFICIAL>	9574 Gore Road; 10818 Heart Lake Road Brampton; Brampton ON	S	229.16	12

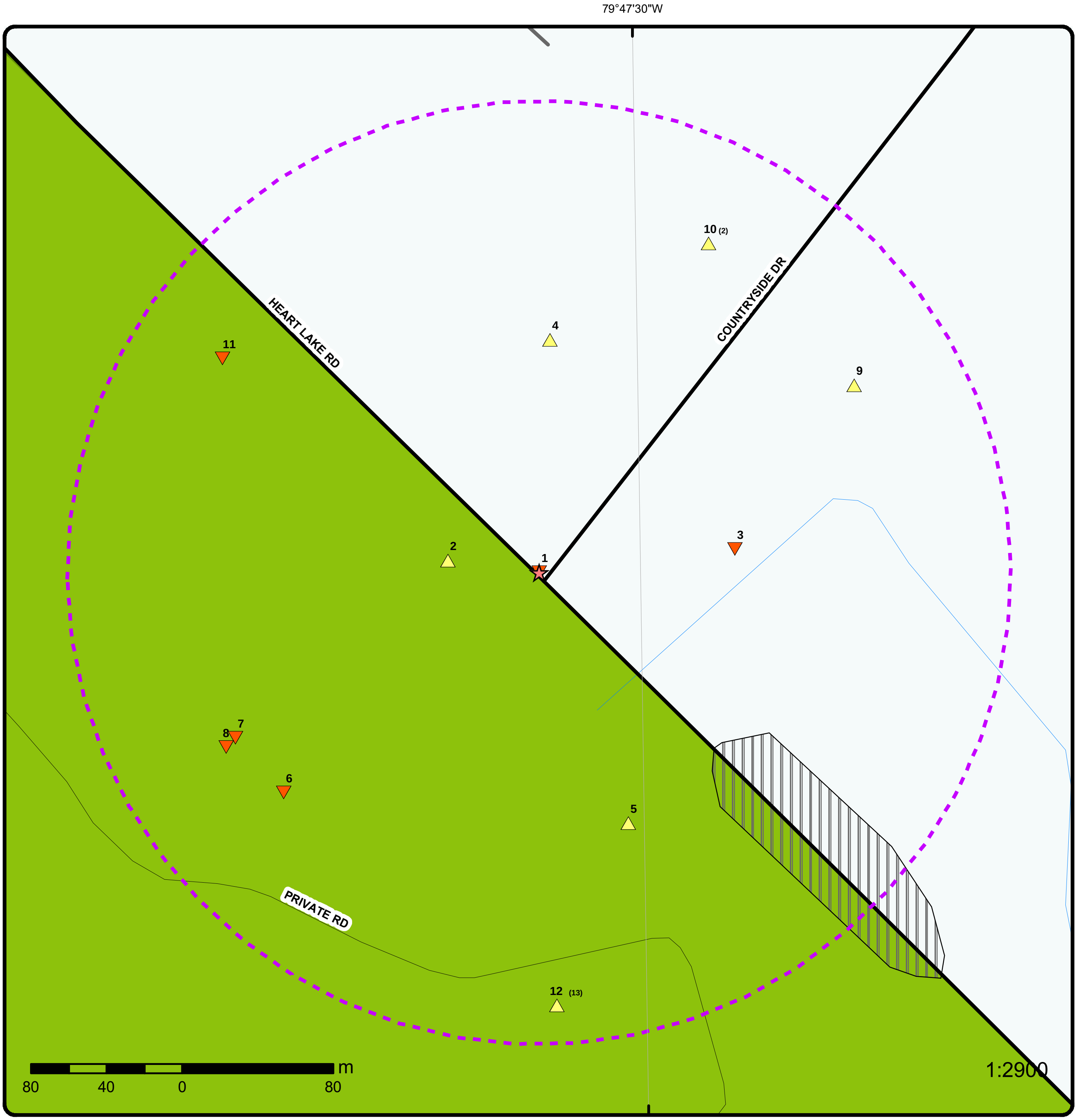
WWIS - Water Well Information System

A search of the WWIS database, dated Apr 30, 2020 has found that there are 11 WWIS site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
	lot 16 con 2 ON ***Well ID:*** 6929089	W	48.66	2
	HAERT LAKE RD lot 16 con 3 ON ***Well ID:*** 7337072	N	123.53	4
	lot 15 con 2 ON ***Well ID:*** 4901204	SSE	140.78	5
	HEARTLAKE EMPLOYMENT LANDS Brampton ON ***Well ID:*** 7282208	ENE	194.13	9
	HEATLAKE EMPLOYMENT LANDS Brampton ON ***Well ID:*** 7282209	NE	196.13	10
	COUNTRYSIDE & HEARTLAKE RD. BRAMPTON ON	NE	196.13	10

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
	Well ID: 7334436			

Lower Elevation	Address	Direction	Distance (m)	Map Key
	ON ***Well ID:*** 7205653	E	104.50	3
	lot 15 con 2 ON ***Well ID:*** 7199756	WSW	178.57	6
	lot 15 con 2 ON ***Well ID:*** 4901205	WSW	183.07	7
	lot 16 con 2 ON ***Well ID:*** 4901215	WSW	189.86	8
	lot 16 con 2 ON ***Well ID:*** 4901210	WNW	202.47	11

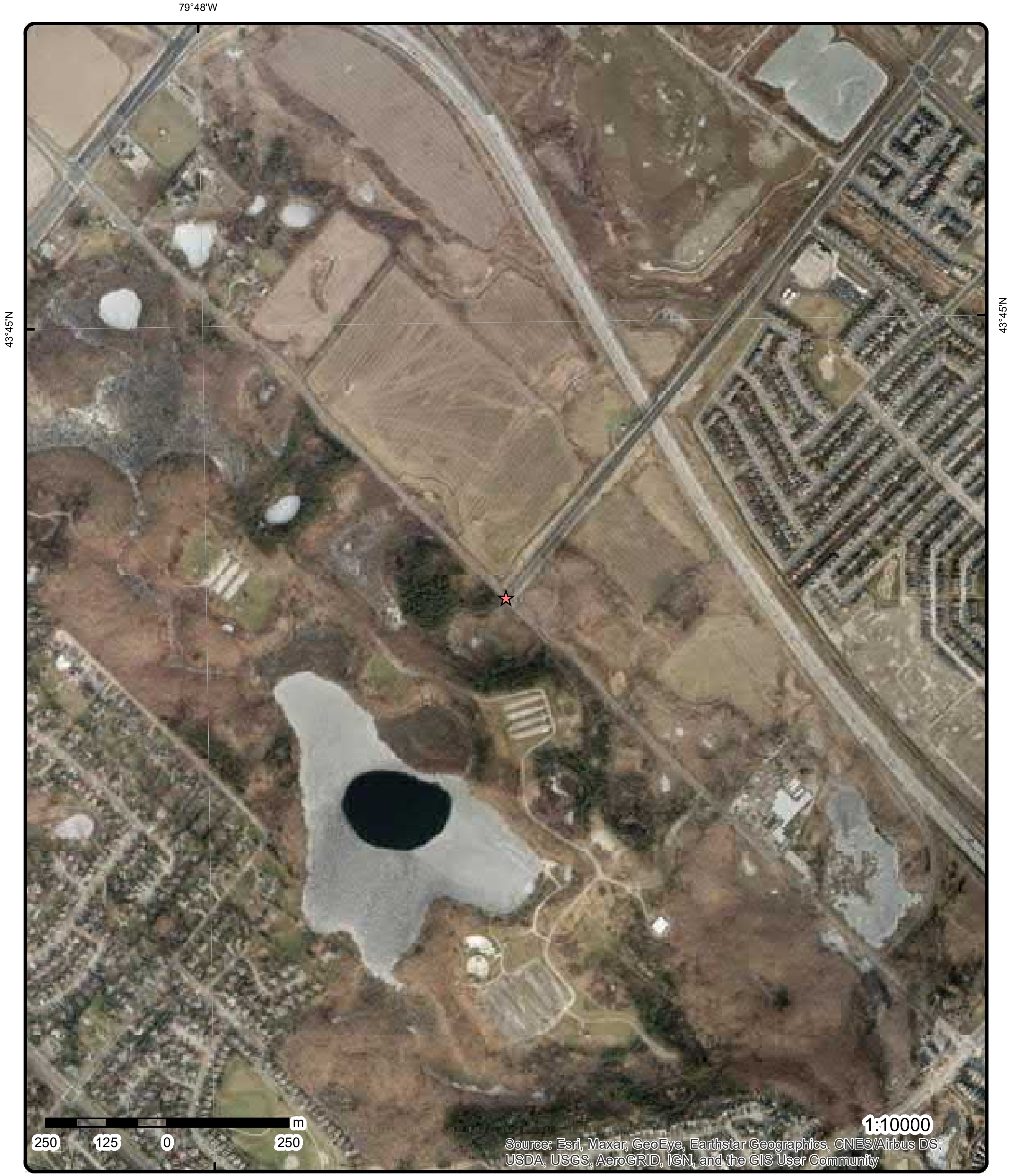


Map : 0.25 Kilometer Radius

Order Number: 20291500065
Address: Heart Lake Road and Countryside Drive, Brampton, ON

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Expressway
- Principal Highway
- Secondary Highway
- Major Road
- Local road
- Trail
- Proposed Road
- Ferry Route/Ice Road
- Industrial and Resource - Regions
- Main Line
- Sidetrack
- Transit Line
- Abandoned Line
- National Park
- Provincial or Territorial Park
- Other Park
- Golf Course or Driving Range
- Park or Sports Field
- Other Recreation Area

Source: © 2015 DMTI Spatial Inc.



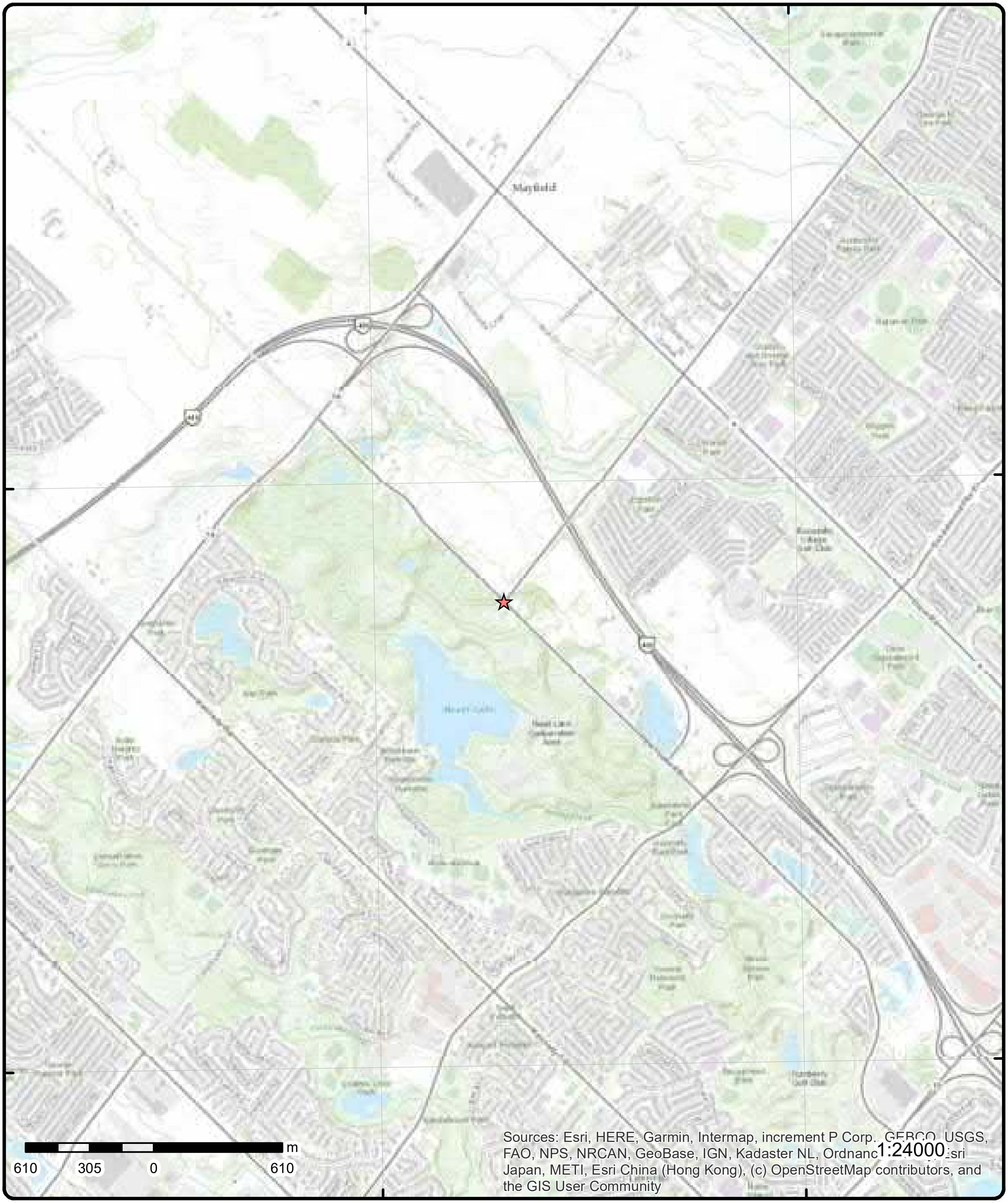
Aerial

Year: 2018

Order Number: 20291500065

Address: Heart Lake Road and Countryside Drive, Brampton, ON

Source: ESRI World Imagery



Topographic Map

Order Number: 20291500065

Address: Heart Lake Road and Countryside Drive, ON

Source: ESRI World Topographic Map

Detail Report

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	1 of 1	-/0.0	249.6 / -0.23	Heart Lake Road and Countryside Drive Brampton ON	EHS

Order No:	20100315001	**Nearest Intersection:**	
Status:	C	**Municipality:**	
Report Type:	Custom Report	**Client Prov/State:**	ON
Report Date:	3/23/2010	**Search Radius (km):**	0.25
Date Received:	3/15/2010	**X:**	-694444.444444
Previous Site Name:		**Y:**	1
Lot/Building Size:			
Additional Info Ordered:			

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
2	1 of 1	W/48.7	249.8 / 0.05	lot 16 con 2 ON	WWIS

Well ID:	6929089	**Data Entry Status:**	
Construction Date:		**Data Src:**	
Primary Water Use:		**Date Received:**	7/7/2005
Sec. Water Use:		**Selected Flag:**	Yes
Final Well Status:	Abandoned-Quality	**Abandonment Rec:**	Yes
Water Type:		**Contractor:**	4011
Casing Material:		**Form Version:**	3
Audit No:	Z30254	**Owner:**	
Tag:		**Street Name:**	
Construction Method:		**County:**	PEEL
Elevation (m):		**Municipality:**	BRAMPTON CITY (TORONTO GORE)
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	016
Well Depth:		**Concession:**	02
Overburden/Bedrock:		**Concession Name:**	CON
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/692\6929089.pdf

Bore Hole Information

Bore Hole ID:	11328058	**Elevation:**	251.969573
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:	_	**East83:**	597186
Code OB Desc:	No formation data	**North83:**	4844254
Open Hole:		**Org CS:**	UTM83
Cluster Kind:		**UTMRC:**	4
Date Completed:	6/15/2005	**UTMRC Desc:**	margin of error : 30 m - 100 m
Remarks:		**Location Method:**	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			

Source Revision Comment:	
Supplier Comment:	

Annular Space/Abandonment Sealing Record

Plug ID:	933272114
Layer:	2
Plug From:	2.6
Plug To:	2.88
Plug Depth UOM:	m

Annular Space/Abandonment Sealing Record

Plug ID:	933272115
Layer:	1
Plug From:	0
Plug To:	2.6
Plug Depth UOM:	m

Method of Construction & Well Use

Method Construction ID:	966929089
Method Construction Code:	
Method Construction:	
Other Method Construction:	

Pipe Information

Pipe ID:	11342913
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930873048
Layer:	1
Material:	
Open Hole or Material:	
Depth From:	0
Depth To:	6
Casing Diameter:	1.21
Casing Diameter UOM:	cm
Casing Depth UOM:	m

Results of Well Yield Testing

Pump Test ID:	11353326
Pump Set At:	
Static Level:	2.7
Final Level After Pumping:	
Recommended Pump Depth:	
Pumping Rate:	
Flowing Rate:	
Recommended Pump Rate:	
Levels UOM:	m
Rate UOM:	LPM
Water State After Test Code:	

Water State After Test:
Pumping Test Method:
Pumping Duration HR:
Pumping Duration MIN:
Flowing:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
3	1 of 1	E/104.5	248.4 / -1.40	ON	WWIS

Well ID:	7205653	**Data Entry Status:**	Yes
Construction Date:		**Data Src:**	
Primary Water Use:		**Date Received:**	7/31/2013
Sec. Water Use:		**Selected Flag:**	Yes
Final Well Status:		**Abandonment Rec:**	
Water Type:		**Contractor:**	7230
Casing Material:		**Form Version:**	8
Audit No:	C20273	**Owner:**	
Tag:	A139150	**Street Name:**	
Construction Method:		**County:**	PEEL
Elevation (m):		**Municipality:**	BRAMPTON CITY (CHINGUACOUSY)
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	
Well Depth:		**Concession:**	
Overburden/Bedrock:		**Concession Name:**	
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/720\7205653.pdf

Bore Hole Information

Bore Hole ID:	1004478982	**Elevation:**	247.85205
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:		**East83:**	597338
Code OB Desc:		**North83:**	4844260
Open Hole:		**Org CS:**	UTM83
Cluster Kind:		**UTMRC:**	4
Date Completed:	3/22/2013	**UTMRC Desc:**	margin of error : 30 m - 100 m
Remarks:		**Location Method:**	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
4	1 of 1	N/123.5	250.9 / 1.06	HAERT LAKE RD lot 16 con 3 ON	WWIS

Well ID:	7337072	**Data Entry Status:**	Yes
Construction Date:		**Data Src:**	
Primary Water Use:		**Date Received:**	7/10/2019
Sec. Water Use:		**Selected Flag:**	Yes
Final Well Status:	0	**Abandonment Rec:**	Yes
Water Type:		**Contractor:**	7644
Casing Material:		**Form Version:**	7
Audit No:	Z314978	**Owner:**	
Tag:		**Street Name:**	HAERT LAKE RD
Construction Method:		**County:**	PEEL

Elevation (m):		**Municipality:**	BRAMPTON CITY (CHINGUACOUSY)
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	016
Well Depth:		**Concession:**	03
Overburden/Bedrock:		**Concession Name:**	HS E
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/733\7337072.pdf

Bore Hole Information

Bore Hole ID:	1007520900	**Elevation:**	
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:		**East83:**	597240
Code OB Desc:		**North83:**	4844371
Open Hole:		**Org CS:**	UTM83
Cluster Kind:		**UTMRC:**	4
Date Completed:	5/22/2019	**UTMRC Desc:**	margin of error : 30 m - 100 m
Remarks:		**Location Method:**	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Annular Space/Abandonment Sealing Record

Plug ID:	1008001535
Layer:	1
Plug From:	0
Plug To:	30
Plug Depth UOM:	ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
5	1 of 1	SSE/140.8	250.7 / 0.88	lot 15 con 2 ON	WWIS

Well ID:	4901204	**Data Entry Status:**	
Construction Date:		**Data Src:**	1
Primary Water Use:	Not Used	**Date Received:**	2/13/1961
Sec. Water Use:	0	**Selected Flag:**	Yes
Final Well Status:	Test Hole	**Abandonment Rec:**	
Water Type:		**Contractor:**	2801
Casing Material:		**Form Version:**	1
Audit No:		**Owner:**	
Tag:		**Street Name:**	
Construction Method:		**County:**	PEEL
Elevation (m):		**Municipality:**	BRAMPTON CITY (CHINGUACOUSY)
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	015
Well Depth:		**Concession:**	02
Overburden/Bedrock:		**Concession Name:**	HS E
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/490\4901204.pdf

Bore Hole Information

Bore Hole ID:	10316050	**Elevation:**	250.441772
DP2BR:	119	**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:	r	**East83:**	597281.5
Code OB Desc:	Bedrock	**North83:**	4844115
Open Hole:		**Org CS:**	
Cluster Kind:		**UTMRC:**	9
Date Completed:	2/4/1960	**UTMRC Desc:**	unknown UTM
Remarks:		**Location Method:**	p9
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932033187
Layer:	3
Color:	
General Color:	
Mat1:	05
Most Common Material:	CLAY
Mat2:	09
Mat2 Desc:	MEDIUM SAND
Mat3:	11
Mat3 Desc:	GRAVEL
Formation Top Depth:	6
Formation End Depth:	66
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033191
Layer:	7
Color:	
General Color:	
Mat1:	17
Most Common Material:	SHALE
Mat2:	
Mat2 Desc:	
Mat3:	
Mat3 Desc:	
Formation Top Depth:	119
Formation End Depth:	129
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033185
Layer:	1
Color:	
General Color:	

Mat1:	02
Most Common Material:	TOPSOIL
Mat2:	
Mat2 Desc:	
Mat3:	
Mat3 Desc:	
Formation Top Depth:	0
Formation End Depth:	2
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033186
Layer:	2
Color:	
General Color:	
Mat1:	05
Most Common Material:	CLAY
Mat2:	
Mat2 Desc:	
Mat3:	
Mat3 Desc:	
Formation Top Depth:	2
Formation End Depth:	6
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033188
Layer:	4
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	06
Mat2 Desc:	SILT
Mat3:	11
Mat3 Desc:	GRAVEL
Formation Top Depth:	66
Formation End Depth:	85
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033189
Layer:	5
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	
Mat3 Desc:	
Formation Top Depth:	85
Formation End Depth:	91
Formation End Depth UOM:	ft

Overburden and Bedrock

Materials Interval

Formation ID:	932033190
Layer:	6
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	05
Mat3 Desc:	CLAY
Formation Top Depth:	91
Formation End Depth:	119
Formation End Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	964901204
Method Construction Code:	2
Method Construction:	Rotary (Convent.)
Other Method Construction:	

Pipe Information

Pipe ID:	10864620
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930522556
Layer:	1
Material:	
Open Hole or Material:	
Depth From:	
Depth To:	
Casing Diameter:	5
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
6	1 of 1	WSW/178.6	247.2 / -2.64	lot 15 con 2 ON	WWIS

Well ID:	7199756	**Data Entry Status:**	
Construction Date:		**Data Src:**	
Primary Water Use:		**Date Received:**	4/2/2013
Sec. Water Use:		**Selected Flag:**	Yes
Final Well Status:	0	**Abandonment Rec:**	Yes
Water Type:		**Contractor:**	3406
Casing Material:		**Form Version:**	7
Audit No:	Z127266	**Owner:**	
Tag:		**Street Name:**	
Construction Method:		**County:**	PEEL
Elevation (m):		**Municipality:**	BRAMPTON CITY (CHINGUACOUSY)
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	015
Well Depth:		**Concession:**	02
Overburden/Bedrock:		**Concession Name:**	HS E
Pump Rate:		**Easting NAD83:**	

Static Water Level:		***Northing NAD83:***	
Flowing (Y/N):		***Zone:***	
Flow Rate:		***UTM Reliability:***	
Clear/Cloudy:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/719\7199756.pdf

Bore Hole Information

Bore Hole ID:	1004270712	***Elevation:***	250.412628
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:		***East83:***	597099
Code OB Desc:		***North83:***	4844131
Open Hole:		***Org CS:***	UTM83
Cluster Kind:		***UTMRC:***	4
Date Completed:	4/16/2012	***UTMRC Desc:***	margin of error : 30 m - 100 m
Remarks:		***Location Method:***	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Annular Space/Abandonment Sealing Record

Plug ID:	1004791655
Layer:	3
Plug From:	14.9
Plug To:	0
Plug Depth UOM:	m

Annular Space/Abandonment Sealing Record

Plug ID:	1004791653
Layer:	1
Plug From:	22.9
Plug To:	16.5
Plug Depth UOM:	m

Annular Space/Abandonment Sealing Record

Plug ID:	1004791654
Layer:	2
Plug From:	16.5
Plug To:	14.9
Plug Depth UOM:	m

Method of Construction & Well Use

Method Construction ID:	1004791652
Method Construction Code:	
Method Construction:	
Other Method Construction:	

Pipe Information

Pipe ID: 1004791646
Casing No: 0
Comment:
Alt Name:

Construction Record - Casing

Casing ID: 1004791650
Layer:
Material:
Open Hole or Material:
Depth From:
Depth To:
Casing Diameter:
Casing Diameter UOM: cm
Casing Depth UOM: m

Construction Record - Screen

Screen ID: 1004791651
Layer:
Slot:
Screen Top Depth:
Screen End Depth:
Screen Material:
Screen Depth UOM: m
Screen Diameter UOM: cm
Screen Diameter:

Water Details

Water ID: 1004791649
Layer:
Kind Code:
Kind:
Water Found Depth:
Water Found Depth UOM: m

Hole Diameter

Hole ID: 1004791648
Diameter:
Depth From:
Depth To:
Hole Depth UOM: m
Hole Diameter UOM: cm

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
7	1 of 1	WSW/183.1	247.0 / -2.80	lot 15 con 2 ON	WWIS

Well ID:	4901205	**Data Entry Status:**	
Construction Date:		**Data Src:**	1
Primary Water Use:	Not Used	**Date Received:**	2/13/1961
Sec. Water Use:	0	**Selected Flag:**	Yes
Final Well Status:	Test Hole	**Abandonment Rec:**	
Water Type:		**Contractor:**	2801
Casing Material:		**Form Version:**	1
Audit No:		**Owner:**	
Tag:		**Street Name:**	
Construction Method:		**County:**	PEEL
Elevation (m):		**Municipality:**	BRAMPTON CITY (CHINGUACOUSY)

Elevation Reliability:		***Site Info:***	
Depth to Bedrock:		***Lot:***	015
Well Depth:		***Concession:***	02
Overburden/Bedrock:		***Concession Name:***	HS E
Pump Rate:		***Easting NAD83:***	
Static Water Level:		***Northing NAD83:***	
Flowing (Y/N):		***Zone:***	
Flow Rate:		***UTM Reliability:***	
Clear/Cloudy:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/490\4901205.pdf

Bore Hole Information

Bore Hole ID:	10316051	***Elevation:***	247.400466
DP2BR:	127	***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:	r	***East83:***	597073.5
Code OB Desc:	Bedrock	***North83:***	4844160
Open Hole:		***Org CS:***	
Cluster Kind:		***UTMRC:***	9
Date Completed:	2/10/1960	***UTMRC Desc:***	unknown UTM
Remarks:		***Location Method:***	p9
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932033194
Layer:	3
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	05
Mat2 Desc:	CLAY
Mat3:	12
Mat3 Desc:	STONES
Formation Top Depth:	29
Formation End Depth:	35
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033192
Layer:	1
Color:	
General Color:	
Mat1:	02
Most Common Material:	TOPSOIL
Mat2:	
Mat2 Desc:	
Mat3:	
Mat3 Desc:	
Formation Top Depth:	0
Formation End Depth:	1
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033193
Layer:	2
Color:	
General Color:	
Mat1:	05
Most Common Material:	CLAY
Mat2:	09
Mat2 Desc:	MEDIUM SAND
Mat3:	11
Mat3 Desc:	GRAVEL
Formation Top Depth:	1
Formation End Depth:	29
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033197
Layer:	6
Color:	
General Color:	
Mat1:	05
Most Common Material:	CLAY
Mat2:	09
Mat2 Desc:	MEDIUM SAND
Mat3:	11
Mat3 Desc:	GRAVEL
Formation Top Depth:	51
Formation End Depth:	55
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033201
Layer:	10
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	
Mat3 Desc:	
Formation Top Depth:	110
Formation End Depth:	113
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033200
Layer:	9
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	06

Mat2 Desc:	SILT
Mat3:	11
Mat3 Desc:	GRAVEL
Formation Top Depth:	87
Formation End Depth:	110
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033196
Layer:	5
Color:	
General Color:	
Mat1:	08
Most Common Material:	FINE SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	05
Mat3 Desc:	CLAY
Formation Top Depth:	47
Formation End Depth:	51
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033202
Layer:	11
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	05
Mat3 Desc:	CLAY
Formation Top Depth:	113
Formation End Depth:	120
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033199
Layer:	8
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	05
Mat3 Desc:	CLAY
Formation Top Depth:	80
Formation End Depth:	87
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033204

Layer: 13
Color:
General Color:
Mat1: 17
Most Common Material: SHALE
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 127
Formation End Depth: 132
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932033203
Layer: 12
Color:
General Color:
Mat1: 05
Most Common Material: CLAY
Mat2: 11
Mat2 Desc: GRAVEL
Mat3:
Mat3 Desc:
Formation Top Depth: 120
Formation End Depth: 127
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932033195
Layer: 4
Color:
General Color:
Mat1: 09
Most Common Material: MEDIUM SAND
Mat2: 11
Mat2 Desc: GRAVEL
Mat3:
Mat3 Desc:
Formation Top Depth: 35
Formation End Depth: 47
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932033198
Layer: 7
Color:
General Color:
Mat1: 09
Most Common Material: MEDIUM SAND
Mat2: 11
Mat2 Desc: GRAVEL
Mat3: 05
Mat3 Desc: CLAY
Formation Top Depth: 55
Formation End Depth: 80
Formation End Depth UOM: ft

Method of Construction & Well Use

Method Construction ID:	964901205
Method Construction Code:	2
Method Construction:	Rotary (Convent.)
Other Method Construction:	

Pipe Information

Pipe ID:	10864621
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930522557
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	69
Casing Diameter:	2
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933359094
Layer:	1
Slot:	
Screen Top Depth:	69
Screen End Depth:	89
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	2

Results of Well Yield Testing

Pump Test ID:	994901205
Pump Set At:	
Static Level:	12
Final Level After Pumping:	15
Recommended Pump Depth:	
Pumping Rate:	32
Flowing Rate:	
Recommended Pump Rate:	
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	1
Pumping Duration HR:	6
Pumping Duration MIN:	0
Flowing:	No

Water Details

Water ID:	933789175
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	35
Water Found Depth UOM:	ft

8	1 of 1	WSW/189.9	247.0 / -2.81	lot 16 con 2 ON	WWIS

Well ID:	4901215	**Data Entry Status:**	
Construction Date:		**Data Src:**	1
Primary Water Use:	Municipal	**Date Received:**	5/18/1962
Sec. Water Use:	0	**Selected Flag:**	Yes
Final Well Status:	Water Supply	**Abandonment Rec:**	
Water Type:		**Contractor:**	2801
Casing Material:		**Form Version:**	1
Audit No:		**Owner:**	
Tag:		**Street Name:**	
Construction Method:		**County:**	PEEL
Elevation (m):		**Municipality:**	BRAMPTON CITY (CHINGUACOUSY)
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	016
Well Depth:		**Concession:**	02
Overburden/Bedrock:		**Concession Name:**	HS E
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/490\4901215.pdf

Bore Hole Information

Bore Hole ID:	10316061	**Elevation:**	247.410614
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:	o	**East83:**	597068.5
Code OB Desc:	Overburden	**North83:**	4844155
Open Hole:		**Org CS:**	
Cluster Kind:		**UTMRC:**	5
Date Completed:	10/23/1961	**UTMRC Desc:**	margin of error : 100 m - 300 m
Remarks:		**Location Method:**	p5
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932033261
Layer:	8
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	

Mat3 Desc:	
Formation Top Depth:	67
Formation End Depth:	73
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033259
Layer:	6
Color:	
General Color:	
Mat1:	10
Most Common Material:	COARSE SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	
Mat3 Desc:	
Formation Top Depth:	53
Formation End Depth:	62
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033262
Layer:	9
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	05
Mat3 Desc:	CLAY
Formation Top Depth:	73
Formation End Depth:	83
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033256
Layer:	3
Color:	
General Color:	
Mat1:	08
Most Common Material:	FINE SAND
Mat2:	
Mat2 Desc:	
Mat3:	
Mat3 Desc:	
Formation Top Depth:	20
Formation End Depth:	32
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033260
Layer:	7
Color:	

General Color:
Mat1: 10
Most Common Material: COARSE SAND
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 62
Formation End Depth: 67
Formation End Depth UOM: ft

<u>Overburden and Bedrock Materials Interval</u>

Formation ID: 932033255
Layer: 2
Color:
General Color:
Mat1: 05
Most Common Material: CLAY
Mat2: 09
Mat2 Desc: MEDIUM SAND
Mat3: 11
Mat3 Desc: GRAVEL
Formation Top Depth: 1
Formation End Depth: 20
Formation End Depth UOM: ft

<u>Overburden and Bedrock Materials Interval</u>

Formation ID: 932033258
Layer: 5
Color:
General Color:
Mat1: 10
Most Common Material: COARSE SAND
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 42
Formation End Depth: 53
Formation End Depth UOM: ft

<u>Overburden and Bedrock Materials Interval</u>

Formation ID: 932033254
Layer: 1
Color:
General Color:
Mat1: 02
Most Common Material: TOPSOIL
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 0
Formation End Depth: 1
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID:	932033257
Layer:	4
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	
Mat3 Desc:	
Formation Top Depth:	32
Formation End Depth:	42
Formation End Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	964901215
Method Construction Code:	1
Method Construction:	Cable Tool
Other Method Construction:	

Pipe Information

Pipe ID:	10864631
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930522572
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	20
Casing Diameter:	22
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Casing

Casing ID:	930522573
Layer:	2
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	54
Casing Diameter:	12
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933359101
Layer:	1
Slot:	006
Screen Top Depth:	54

Screen End Depth: 74
Screen Material:
Screen Depth UOM: ft
Screen Diameter UOM: inch
Screen Diameter: 12

Results of Well Yield Testing

Pump Test ID: 994901215
Pump Set At:
Static Level: 14
Final Level After Pumping: 38
Recommended Pump Depth:
Pumping Rate: 600
Flowing Rate:
Recommended Pump Rate:
Levels UOM: ft
Rate UOM: GPM
Water State After Test Code: 1
Water State After Test: CLEAR
Pumping Test Method: 1
Pumping Duration HR: 99
Pumping Duration MIN: 0
Flowing: No

Water Details

Water ID: 933789186
Layer: 1
Kind Code: 1
Kind: FRESH
Water Found Depth: 54
Water Found Depth UOM: ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
9	1 of 1	ENE/194.1	250.9 / 1.06	HEARTLAKE EMPLOYMENT LANDS Brampton ON	WWIS

Well ID:	7282208	**Data Entry Status:**	
Construction Date:		**Data Src:**	
Primary Water Use:	Test Hole	**Date Received:**	2/28/2017
Sec. Water Use:		**Selected Flag:**	Yes
Final Well Status:	Test Hole	**Abandonment Rec:**	
Water Type:		**Contractor:**	7383
Casing Material:		**Form Version:**	7
Audit No:	Z241685	**Owner:**	
Tag:	A211984	**Street Name:**	HEARTLAKE EMPLOYMENT LANDS
Construction Method:		**County:**	PEEL
Elevation (m):		**Municipality:**	BRAMPTON CITY (CHINGUACOUSY)
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	
Well Depth:		**Concession:**	
Overburden/Bedrock:		**Concession Name:**	
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/728\7282208.pdf

Bore Hole Information

Bore Hole ID:	1006361306	***Elevation:***	252.944854
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:		***East83:***	597401
Code OB Desc:		***North83:***	4844347
Open Hole:		***Org CS:***	UTM83
Cluster Kind:		***UTMRC:***	4
Date Completed:	9/23/2016	***UTMRC Desc:***	margin of error : 30 m - 100 m
Remarks:		***Location Method:***	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID: 1006614280
Layer: 1
Color:
General Color:
Mat1: 28
Most Common Material: SAND
Mat2: 34
Mat2 Desc: TILL
Mat3:
Mat3 Desc:
Formation Top Depth: 0
Formation End Depth:
Formation End Depth UOM: ft

Annular Space/Abandonment Sealing Record

Plug ID: 1006614287
Layer: 1
Plug From: 0
Plug To: 14
Plug Depth UOM: ft

Annular Space/Abandonment Sealing Record

Plug ID: 1006614288
Layer: 2
Plug From: 14
Plug To: 25
Plug Depth UOM: ft

Method of Construction & Well Use

Method Construction ID: 1006614286
Method Construction Code: 6
Method Construction: Boring
Other Method Construction:

Pipe Information

Pipe ID: 1006614279

Casing No: 0
Comment:
Alt Name:

Construction Record - Casing

Casing ID:	1006614283
Layer:	1
Material:	5
Open Hole or Material:	PLASTIC
Depth From:	0
Depth To:	15
Casing Diameter:	2
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	1006614284
Layer:	1
Slot:	10
Screen Top Depth:	15
Screen End Depth:	25
Screen Material:	5
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	2.375

Water Details

Water ID:	1006614282
Layer:	
Kind Code:	
Kind:	
Water Found Depth:	
Water Found Depth UOM:	ft

Hole Diameter

Hole ID:	1006614281
Diameter:	6
Depth From:	0
Depth To:	25
Hole Depth UOM:	ft
Hole Diameter UOM:	inch

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
10	1 of 2	NE/196.1	250.9 / 1.06	HEATLAKE EMPLOYMENT LANDS Brampton ON	WWIS

Well ID:	7282209	**Data Entry Status:**	
Construction Date:		**Data Src:**	
Primary Water Use:	Test Hole	**Date Received:**	2/28/2017
Sec. Water Use:		**Selected Flag:**	Yes
Final Well Status:	Test Hole	**Abandonment Rec:**	
Water Type:		**Contractor:**	7383
Casing Material:		**Form Version:**	7
Audit No:	Z241684	**Owner:**	
Tag:	A211985	**Street Name:**	HEATLAKE EMPLOYMENT LANDS
Construction Method:		**County:**	PEEL
Elevation (m):		**Municipality:**	BRAMPTON CITY (CHINGUACOUSY)
Elevation Reliability:		**Site Info:**	
Depth to Bedrock:		**Lot:**	

Well Depth:		**Concession:**	
Overburden/Bedrock:		**Concession Name:**	
Pump Rate:		**Easting NAD83:**	
Static Water Level:		**Northing NAD83:**	
Flowing (Y/N):		**Zone:**	
Flow Rate:		**UTM Reliability:**	
Clear/Cloudy:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/728\7282209.pdf

Bore Hole Information

Bore Hole ID:	1006361312	**Elevation:**	255.303802
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:		**East83:**	597324
Code OB Desc:		**North83:**	4844422
Open Hole:		**Org CS:**	UTM83
Cluster Kind:		**UTMRC:**	4
Date Completed:	9/23/2016	**UTMRC Desc:**	margin of error : 30 m - 100 m
Remarks:		**Location Method:**	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	1006614290
Layer:	1
Color:	
General Color:	
Mat1:	28
Most Common Material:	SAND
Mat2:	34
Mat2 Desc:	TILL
Mat3:	
Mat3 Desc:	
Formation Top Depth:	0
Formation End Depth:	
Formation End Depth UOM:	ft

Annular Space/Abandonment Sealing Record

Plug ID:	1006614298
Layer:	2
Plug From:	24
Plug To:	35
Plug Depth UOM:	ft

Annular Space/Abandonment Sealing Record

Plug ID:	1006614297
Layer:	1
Plug From:	0
Plug To:	24
Plug Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	1006614296
Method Construction Code:	6
Method Construction:	Boring
Other Method Construction:	

Pipe Information

Pipe ID:	1006614289
Casing No:	0
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	1006614293
Layer:	1
Material:	5
Open Hole or Material:	PLASTIC
Depth From:	0
Depth To:	25
Casing Diameter:	2
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	1006614294
Layer:	1
Slot:	10
Screen Top Depth:	25
Screen End Depth:	35
Screen Material:	5
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	2.375

Water Details

Water ID:	1006614292
Layer:	
Kind Code:	
Kind:	
Water Found Depth:	
Water Found Depth UOM:	ft

Hole Diameter

Hole ID:	1006614291
Diameter:	6
Depth From:	0
Depth To:	35
Hole Depth UOM:	ft
Hole Diameter UOM:	inch

10	*2 of 2*	*NE/196.1*	*250.9 / 1.06*	*COUNTRYSIDE & HEARTLAKE RD. BRAMPTON ON*	*WWIS*

Well ID:	7334436	***Data Entry Status:***	
Construction Date:		***Data Src:***	
Primary Water Use:		***Date Received:***	6/10/2019
Sec. Water Use:		***Selected Flag:***	Yes
Final Well Status:	0	***Abandonment Rec:***	Yes
Water Type:		***Contractor:***	7644
Casing Material:		***Form Version:***	7
Audit No:	Z311632	***Owner:***	
Tag:	A211985	***Street Name:***	COUNTRYSIDE & HEARTLAKE RD.
Construction Method:		***County:***	PEEL
Elevation (m):		***Municipality:***	BRAMPTON CITY (CHINGUACOUSY)
Elevation Reliability:		***Site Info:***	
Depth to Bedrock:		***Lot:***	
Well Depth:		***Concession:***	
Overburden/Bedrock:		***Concession Name:***	
Pump Rate:		***Easting NAD83:***	
Static Water Level:		***Northing NAD83:***	
Flowing (Y/N):		***Zone:***	
Flow Rate:		***UTM Reliability:***	
Clear/Cloudy:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/733\7334436.pdf

Bore Hole Information

Bore Hole ID:	1007471280	***Elevation:***	
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:		***East83:***	597324
Code OB Desc:		***North83:***	4844422
Open Hole:		***Org CS:***	UTM83
Cluster Kind:		***UTMRC:***	4
Date Completed:		***UTMRC Desc:***	margin of error : 30 m - 100 m
Remarks:		***Location Method:***	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Method of Construction & Well Use

Method Construction ID:	1007961496
Method Construction Code:	
Method Construction:	
Other Method Construction:	

Pipe Information

Pipe ID:	1007961490
Casing No:	0
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	1007961494
Layer:	
Material:	
Open Hole or Material:	

Depth From:
Depth To:
Casing Diameter:
Casing Diameter UOM: inch
Casing Depth UOM: ft

Construction Record - Screen

Screen ID: 1007961495
Layer:
Slot:
Screen Top Depth:
Screen End Depth:
Screen Material:
Screen Depth UOM: ft
Screen Diameter UOM: inch
Screen Diameter:

Water Details

Water ID: 1007961493
Layer:
Kind Code:
Kind:
Water Found Depth:
Water Found Depth UOM: ft

Hole Diameter

Hole ID: 1007961492
Diameter:
Depth From:
Depth To:
Hole Depth UOM: ft
Hole Diameter UOM: inch

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
11	1 of 1	WNW/202.5	249.8 / -0.05	lot 16 con 2 ON	WWIS

Well ID:	4901210	***Data Entry Status:***	
Construction Date:		***Data Src:***	1
Primary Water Use:	Not Used	***Date Received:***	2/13/1961
Sec. Water Use:	0	***Selected Flag:***	Yes
Final Well Status:	Test Hole	***Abandonment Rec:***	
Water Type:		***Contractor:***	2801
Casing Material:		***Form Version:***	1
Audit No:		***Owner:***	
Tag:		***Street Name:***	
Construction Method:		***County:***	PEEL
Elevation (m):		***Municipality:***	BRAMPTON CITY (CHINGUACOUSY)
Elevation Reliability:		***Site Info:***	
Depth to Bedrock:		***Lot:***	016
Well Depth:		***Concession:***	02
Overburden/Bedrock:		***Concession Name:***	HS E
Pump Rate:		***Easting NAD83:***	
Static Water Level:		***Northing NAD83:***	
Flowing (Y/N):		***Zone:***	
Flow Rate:		***UTM Reliability:***	
Clear/Cloudy:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/490\4901210.pdf

Bore Hole Information

Bore Hole ID:	10316056	***Elevation:***	250.719863
DP2BR:	121	***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:	r	***East83:***	597066.5
Code OB Desc:	Bedrock	***North83:***	4844361
Open Hole:		***Org CS:***	
Cluster Kind:		***UTMRC:***	9
Date Completed:	2/19/1960	***UTMRC Desc:***	unknown UTM
Remarks:		***Location Method:***	p9
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932033229
Layer:	1
Color:	
General Color:	
Mat1:	02
Most Common Material:	TOPSOIL
Mat2:	
Mat2 Desc:	
Mat3:	
Mat3 Desc:	
Formation Top Depth:	0
Formation End Depth:	1
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033234
Layer:	6
Color:	
General Color:	
Mat1:	17
Most Common Material:	SHALE
Mat2:	
Mat2 Desc:	
Mat3:	
Mat3 Desc:	
Formation Top Depth:	121
Formation End Depth:	126
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033231
Layer:	3
Color:	
General Color:	
Mat1:	05
Most Common Material:	CLAY
Mat2:	06
Mat2 Desc:	SILT

Mat3:	09
Mat3 Desc:	MEDIUM SAND
Formation Top Depth:	7
Formation End Depth:	93
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033233
Layer:	5
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	05
Mat3 Desc:	CLAY
Formation Top Depth:	104
Formation End Depth:	121
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033230
Layer:	2
Color:	
General Color:	
Mat1:	05
Most Common Material:	CLAY
Mat2:	09
Mat2 Desc:	MEDIUM SAND
Mat3:	
Mat3 Desc:	
Formation Top Depth:	1
Formation End Depth:	7
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	932033232
Layer:	4
Color:	
General Color:	
Mat1:	09
Most Common Material:	MEDIUM SAND
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	05
Mat3 Desc:	CLAY
Formation Top Depth:	93
Formation End Depth:	104
Formation End Depth UOM:	ft

Method of Construction & Well Use

Method Construction ID:	964901210
Method Construction Code:	2

Method Construction:	Rotary (Convent.)
Other Method Construction:	

Pipe Information

Pipe ID:	10864626
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930522564
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	94
Casing Diameter:	2
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Screen

Screen ID:	933359099
Layer:	1
Slot:	
Screen Top Depth:	94
Screen End Depth:	105
Screen Material:	
Screen Depth UOM:	ft
Screen Diameter UOM:	inch
Screen Diameter:	2

Water Details

Water ID:	933789180
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	94
Water Found Depth UOM:	ft

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
12	1 of 13	S/229.2	261.8 / 12.00	METROPOLITAN TORONTO & REGION HEART LAKE CONSERVATION AREA 10818 HEART LAKE ROAD BRAMPTON ON L6T 3S1	GEN

Generator No:	ON0651311	**PO Box No:**	
Status:		**Country:**	
Approval Years:	92,93,97,98	**Choice of Contact:**	
Contam. Facility:		**Co Admin:**	
MHSW Facility:		**Phone No Admin:**	
SIC Code:	8364		
SIC Description:	REC./CULTURE ADMIN.		

Detail(s)

Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Waste Class: 252
Waste Class Desc: WASTE OILS & LUBRICANTS

12	2 of 13	S/229.2	261.8 / 12.00	METROPOLITAN TORONTO & REGION 25-392 CONS. AUTH.C/O 5 SHOREHAM DR. DOWNSVIEW HEART LAKE C.S. 10818 HEART LAKE RD. BRAMPTON ON L6T 3S1	GEN

Generator No: ON0651311
Status:
Approval Years: 94,95,96
Contam. Facility:
MHSW Facility:
SIC Code: 8364
SIC Description: REC./CULTURE ADMIN.

PO Box No:
Country:
Choice of Contact:
Co Admin:
Phone No Admin:

Detail(s)

Waste Class: 213
Waste Class Desc: PETROLEUM DISTILLATES

Waste Class: 252
Waste Class Desc: WASTE OILS & LUBRICANTS

12	3 of 13	S/229.2	261.8 / 12.00	METROPOLITAN TORONTO AND HEART LAKE CONSERVATION AREA 10818 HEART LAKE ROAD BRAMPTON ON L6T 3S1	GEN

Generator No: ON0651311
Status:
Approval Years: 99,00,01
Contam. Facility:
MHSW Facility:
SIC Code: 8364
SIC Description: REC./CULTURE ADMIN.

PO Box No:
Country:
Choice of Contact:
Co Admin:
Phone No Admin:

Detail(s)

Waste Class: 213
Waste Class Desc: PETROLEUM DISTILLATES

Waste Class: 252
Waste Class Desc: WASTE OILS & LUBRICANTS

12	4 of 13	S/229.2	261.8 / 12.00	TORONTO AND REGION CONSERVATION AUTHORITY 10818 HEART LAKE RD. BRAMPTON ON L6Z 0B3	GEN

Generator No: ON3238649
Status:
Approval Years: 05
Contam. Facility:
MHSW Facility:
SIC Code: 913150
SIC Description: Municipal Regulatory Services

PO Box No:
Country:
Choice of Contact:
Co Admin:
Phone No Admin:

Detail(s)

Waste Class: 221
Waste Class Desc: LIGHT FUELS

Waste Class: 251
Waste Class Desc: OIL SKIMMINGS & SLUDGES

12	5 of 13	S/229.2	261.8 / 12.00	Toronto and Region Conservation 10818 Heart Lake Rd BRAMPTON ON L6Z 0B3	DTNK

Delisted Commercial Fuel Oil Tanks

Licence No:
Registration No: 200204-1718
Posse File No:
Posse Reg No:
Instance No:
Status Name:
Tank Type:
Tank Size: 2270 L
Tank Material: Steel
Tk Age (as of 05/1992): n/a
Tank Address: 10818 Heart Lake Rd
Distributor: Chalmers
Contact Name: c/o William Jewell
Contact Address: 5 Shoreham Dr
Contact Address2:
Contact Suite:
Contact City: Downsview
Contact Prov: ON
Contact Postal: M3N 1S4
Comments:

Facility Type:
Letter Sent:
Corrosion Protection:
Fuel Type:
Province:
Nbr:
Instance Type:
Original Source: CFOT
Record Date: Up to Apr 2013

12	6 of 13	S/229.2	261.8 / 12.00	Toronto and Region Conservation 10818 Heart Lake Rd BRAMPTON ON L6Z 0B3	DTNK

Delisted Commercial Fuel Oil Tanks

Licence No:
Registration No: 200204-1721
Posse File No:
Posse Reg No:
Instance No:
Status Name:
Tank Type:
Tank Size: 2270 L
Tank Material: Steel
Tk Age (as of 05/1992): n/a
Tank Address: 10818 Heart Lake Rd
Distributor: Chalmers
Contact Name: c/o William Jewell
Contact Address: 5 Shoreham Dr
Contact Address2:
Contact Suite:
Contact City: Downsview
Contact Prov: ON
Contact Postal: M3N 1S4
Comments:

Facility Type:
Letter Sent:
Corrosion Protection:
Fuel Type:
Province:
Nbr:
Instance Type:
Original Source: CFOT
Record Date: Up to Apr 2013

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
12	7 of 13	S/229.2	261.8 / 12.00	**Rose Trucking - 207052 Ontario Ltd. <UNOFFICIAL>** **9574 Gore Road; 10818 Heart Lake Road** **Brampton; Brampton ON**	SPL

Ref No:	2543-7L4NUC	**Discharger Report:**	
Site No:		**Material Group:**	
Incident Dt:		**Health/Env Conseq:**	
Year:		**Client Type:**	
Incident Cause:	Pipe Or Hose Leak	**Sector Type:**	Other Motor Vehicle
Incident Event:		**Agency Involved:**	
Contaminant Code:	15	**Nearest Watercourse:**	
Contaminant Name:	HYDRAULIC OIL	**Site Address:**	
Contaminant Limit 1:		**Site District Office:**	Halton-Peel; Halton-Peel
Contam Limit Freq 1:		**Site Postal Code:**	
Contaminant UN No 1:		**Site Region:**	
Environment Impact:	Confirmed	**Site Municipality:**	Brampton; Brampton
Nature of Impact:	Soil Contamination	**Site Lot:**	
Receiving Medium:		**Site Conc:**	
Receiving Env:		**Northing:**	
MOE Response:	Deferred Field Response	**Easting:**	
Dt MOE Arvl on Scn:	11/6/2008	**Site Geo Ref Accu:**	
MOE Reported Dt:	11/5/2008	**Site Map Datum:**	
Dt Document Closed:		**SAC Action Class:**	Land Spills
Incident Reason:	Spill	**Source Type:**	

Site Name: Tractor Trailer<UNOFFICIAL>; Accross the road from Heart Lake Conservation Area<UNOFFICIAL>
Site County/District:
Site Geo Ref Meth:
Incident Summary: Rose Trucking: 50L Hydraulic Oil to Grnd, Cln
Contaminant Qty: 50 L

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
12	8 of 13	S/229.2	261.8 / 12.00	**Toronto and Region Conservation Authority** **10818 Heart Lake Rd** **Brampton ON L6Z 0B3**	CA

Certificate #: 5186-875GUH
Application Year: 2010
Issue Date: 7/21/2010
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
12	9 of 13	S/229.2	261.8 / 12.00	**TORONTO AND REGION CONSERVATION** **10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA** **ON**	CFOT

Licence No:		**Item Description:**	Fuel Oil Tank
Registration No:		**Instance Type:**	FS Fuel Oil Tank
Posse File No:		**Facility Type:**	FS Fuel Oil Tank
Posse Reg No:		**Fuel Type:**	Fuel Oil
Status Name:		**Distributor:**	
Tank Type:	Single Wall UST	**Letter Sent:**	

Tank Size:	2270	***Comments:***	
Tank Material:	Steel	***Corrosion Protect:***	
Instance No:	48142729	***Province:***	
Inst Creation Date:	3/14/2007	***Nbr:***	
Inst Install Date:	3/14/2007	***Context:***	FS Fuel Oil Tank
Item:	FS FUEL OIL TANK		
Tank Age (as of 05/1992):			
Device Installed Location:	10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA		
Description:	NULL		
Contact Name:			
Contact Address:			
Contact Address2:			
Contact Suite:			
Contact City:			
Contact Prov:			
Contact Postal:			

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
12	***10 of 13***	***S/229.2***	***261.8 / 12.00***	***TORONTO AND REGION CONSERVATION 10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA ON***	***CFOT***

Licence No:		***Item Description:***	Fuel Oil Tank
Registration No:		***Instance Type:***	FS Fuel Oil Tank
Posse File No:		***Facility Type:***	FS Fuel Oil Tank
Posse Reg No:		***Fuel Type:***	Fuel Oil
Status Name:		***Distributor:***	
Tank Type:	Single Wall UST	***Letter Sent:***	
Tank Size:	2270	***Comments:***	
Tank Material:	Steel	***Corrosion Protect:***	
Instance No:	48142730	***Province:***	
Inst Creation Date:	3/14/2007	***Nbr:***	
Inst Install Date:	3/14/2007	***Context:***	FS Fuel Oil Tank
Item:	FS FUEL OIL TANK		
Tank Age (as of 05/1992):			
Device Installed Location:	10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA		
Description:	NULL		
Contact Name:			
Contact Address:			
Contact Address2:			
Contact Suite:			
Contact City:			
Contact Prov:			
Contact Postal:			

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
12	***11 of 13***	***S/229.2***	***261.8 / 12.00***	***Toronto and Region Conservation Authority 10818 Heart Lake Rd Brampton ON M3N 1S4***	***ECA***

Approval No:	5186-875GUH	***MOE District:***	Halton-Peel
Approval Date:	2010-07-21	***City:***	
Status:	Approved	***Longitude:***	-79.79808
Record Type:	ECA	***Latitude:***	43.747654
Link Source:	IDS	***Geometry X:***	
SWP Area Name:	Toronto	***Geometry Y:***	
Approval Type:	ECA-MUNICIPAL AND PRIVATE SEWAGE WORKS		
Project Type:	MUNICIPAL AND PRIVATE SEWAGE WORKS		
Address:	10818 Heart Lake Rd		
Full Address:			
Full PDF Link:	https://www.accessenvironment.ene.gov.on.ca/instruments/1330-83CSX2-14.pdf		

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
12	12 of 13	S/229.2	261.8 / 12.00	TORONTO AND REGION CONSERVATION 10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA ON	FST

Instance No:	48142730	**Manufacturer:**	NULL
Status:	Active	**Serial No:**	NULL
Cont Name:		**Ulc Standard:**	NULL
Instance Type:		**Quantity:**	1
Item:		**Unit of Measure:**	EA
Item Description:	Fuel Oil Tank	**Fuel Type:**	
Tank Type:	Single Wall UST	**Fuel Type2:**	
Install Date:	3/14/2007	**Fuel Type3:**	
Install Year:	NULL	**Piping Steel:**	
Years in Service:	4.1	**Piping Galvanized:**	
Model:	NULL	**Tanks Single Wall St:**	
Description:	NULL	**Piping Underground:**	
Capacity:	2270	**Num Underground:**	
Tank Material:	Steel	**Panam Related:**	NULL
Corrosion Protect:	NULL	**Panam Venue:**	NULL
Overfill Protect:			

Facility Type: FS FUEL OIL TANK
Parent Facility Type:
Facility Location: 10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA
Device Installed Location:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
12	13 of 13	S/229.2	261.8 / 12.00	TORONTO AND REGION CONSERVATION 10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA ON	FST

Instance No:	48142729	**Manufacturer:**	NULL
Status:	Active	**Serial No:**	NULL
Cont Name:		**Ulc Standard:**	NULL
Instance Type:		**Quantity:**	1
Item:		**Unit of Measure:**	EA
Item Description:	Fuel Oil Tank	**Fuel Type:**	
Tank Type:	Single Wall UST	**Fuel Type2:**	
Install Date:	3/14/2007	**Fuel Type3:**	
Install Year:	NULL	**Piping Steel:**	
Years in Service:	4.1	**Piping Galvanized:**	
Model:	NULL	**Tanks Single Wall St:**	
Description:	NULL	**Piping Underground:**	
Capacity:	2270	**Num Underground:**	
Tank Material:	Steel	**Panam Related:**	NULL
Corrosion Protect:	NULL	**Panam Venue:**	NULL
Overfill Protect:			

Facility Type: FS FUEL OIL TANK
Parent Facility Type:
Facility Location: 10818 HEART LAKE RD BRAMPTON L6Z 4S2 ON CA
Device Installed Location:

Unplottable Summary

Total: 21 Unplottable sites

DB	Company Name/Site Name	Address	City	Postal
CA	The Corporation of the City of Brampton	Countryside Dr	Brampton ON	
CA	Thorn Bush Land Development Inc.	Part of the West Half of Lot 15, Concession 3	Brampton ON	
CA	BRAMPTON CITY	COUNTRYSIDE DR. COMPOST SITE	BRAMPTON CITY ON	
CA	REG. MUN. OF PEEL	HEART LAKE RD.	BRAMPTON CITY ON	
CA	R.M. OF PEEL	COUNTRYSIDE DR.	BRAMPTON CITY ON	
CA	BRAMPTON CITY	COUNTRYSIDE DR. COMPOST SITE	BRAMPTON CITY ON	
CA	MANAGEMENT BOARD SECRETARIAT	HEART LAKE RD. SEW. LIFT STA.	BRAMPTON CITY ON	
CA	846456 ONTARIO LTD.	HEART LAKE RD./STREETS A-E	BRAMPTON CITY ON	
CA	The Corporation of the City of Brampton	Countryside Dr	Brampton ON	
CA	Crupi Enterprises Inc.	Heart Lake Road	Brampton ON	
CA	The Corporation of the City of Brampton	Heart Lake Road	Brampton ON	
CA	Mattamy (Fletcher's North) Limited	Part of Lot 15, Concession 3	Brampton ON	
CA	Heart Lake Road Developers Group Inc.	Heart Lake Road	Brampton ON	
CA	R.M. OF PEEL	COUNTRYSIDE DR.	BRAMPTON CITY ON	
CA	846456 ONTARIO LTD.	HEART LAKE RD/A. DONNELLY SUB.	BRAMPTON CITY ON	
ECA	Thorn Bush Land Development Inc.	Part of the West Half of Lot 15, Concession 3	Brampton ON	M1W 3Z4
GEN	FRANCESCHINI BROS. AGGREGATES LTD.	HEART LAKE ROAD NORTH - BRAMPTON C/O 2531 CAWTHRA ROAD	MISSISSAUGA ON	L5A 2W7
PES	LAKESIDE GARDEN CENTRE (C#02/2002)	RR 4, HEART LAKE RD	BRAMPTON ON	L6T 3S1

PES	LAKESIDE GARDEN CENTRE (C#91761)	R.R. #4, HEART LAKE ROAD	BRAMPTON ON
SPL	Enbridge Gas Distribution Inc.	SW corner of Heart Lake & Copperfield Dr	Brampton ON
SPL		Countryside Drive	Brampton ON

Unplottable Report

Site: ***The Corporation of the City of Brampton***
Countryside Dr Brampton ON

Database: ***CA***

Certificate #:	2207-8BXJBE
Application Year:	2010
Issue Date:	12/18/2010
Approval Type:	Municipal and Private Sewage Works
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***Thorn Bush Land Development Inc.***
Part of the West Half of Lot 15, Concession 3 Brampton ON

Database: ***CA***

Certificate #:	0735-65JPWX
Application Year:	2004
Issue Date:	10/8/2004
Approval Type:	Municipal and Private Sewage Works
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***BRAMPTON CITY***
COUNTRYSIDE DR. COMPOST SITE BRAMPTON CITY ON

Database: ***CA***

Certificate #:	3-0466-94-000
Application Year:	94
Issue Date:	8/30/94
Approval Type:	Municipal sewage
Status:	Application Cancelled
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***REG. MUN. OF PEEL***
HEART LAKE RD. BRAMPTON CITY ON

Database: ***CA***

Certificate #:	7-0461-85-006
Application Year:	85

Issue Date: 7/4/85
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***R.M. OF PEEL***
COUNTRYSIDE DR. BRAMPTON CITY ON

Database: ***CA***

Certificate #: 7-1802-87-
Application Year: 87
Issue Date: 12/3/1987
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***BRAMPTON CITY***
COUNTRYSIDE DR. COMPOST SITE BRAMPTON CITY ON

Database: ***CA***

Certificate #: 3-0466-94-
Application Year: 94
Issue Date: 5/31/1994
Approval Type: Municipal sewage
Status: Cancelled
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***MANAGEMENT BOARD SECRETARIAT***
HEART LAKE RD. SEW. LIFT STA. BRAMPTON CITY ON

Database: ***CA***

Certificate #: 3-0055-94-
Application Year: 94
Issue Date: 2/24/1994
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***846456 ONTARIO LTD.***
HEART LAKE RD./STREETS A-E   BRAMPTON CITY ON

Database: ***CA***

Certificate #: 7-0777-93-
Application Year: 93
Issue Date: 9/7/1993
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***The Corporation of the City of Brampton***
Countryside Dr   Brampton ON

Database: ***CA***

Certificate #: 2679-83CJH6
Application Year: 2010
Issue Date: 3/29/2010
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***Crupi Enterprises Inc.***
Heart Lake Road   Brampton ON

Database: ***CA***

Certificate #: 3815-5TLRDK
Application Year: 2003
Issue Date: 11/26/2003
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***The Corporation of the City of Brampton***
Heart Lake Road   Brampton ON

Database: ***CA***

Certificate #: 6306-6W2RCJ
Application Year: 2006
Issue Date: 12/8/2006
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:

Contaminants:
Emission Control:

Site: ***Mattamy (Fletcher's North) Limited***
Part of Lot 15, Concession 3 Brampton ON

Database: ***CA***

Certificate #: 9079-5R8HKW
Application Year: 2003
Issue Date: 11/6/2003
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***Heart Lake Road Developers Group Inc.***
Heart Lake Road Brampton ON

Database: ***CA***

Certificate #: 9921-6X9QAG
Application Year: 2007
Issue Date: 1/11/2007
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***R.M. OF PEEL***
COUNTRYSIDE DR. BRAMPTON CITY ON

Database: ***CA***

Certificate #: 7-0294-88-
Application Year: 88
Issue Date: 3/29/1988
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***846456 ONTARIO LTD.***
HEART LAKE RD/A. DONNELLY SUB. BRAMPTON CITY ON

Database: ***CA***

Certificate #: 3-0979-93-
Application Year: 93
Issue Date: 9/7/1993
Approval Type: Municipal sewage
Status: Approved
Application Type:

Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***Thorn Bush Land Development Inc.***
Part of the West Half of Lot 15, Concession 3 Brampton ON M1W 3Z4

Database: ***ECA***

Approval No:	0735-65JPWX	***MOE District:***	
Approval Date:	2004-10-08	***City:***	
Status:	Approved	***Longitude:***	
Record Type:	ECA	***Latitude:***	
Link Source:	IDS	***Geometry X:***	
SWP Area Name:		***Geometry Y:***	
Approval Type:	ECA-MUNICIPAL AND PRIVATE SEWAGE WORKS		
Project Type:	MUNICIPAL AND PRIVATE SEWAGE WORKS		
Address:	Part of the West Half of Lot 15, Concession 3		
Full Address:			
Full PDF Link:	https://www.accessenvironment.ene.gov.on.ca/instruments/4195-65JHZ9-14.pdf		

Site: ***FRANCESCHINI BROS. AGGREGATES LTD.***
HEART LAKE ROAD NORTH - BRAMPTON C/O 2531 CAWTHRA ROAD MISSISSAUGA ON L5A 2W7

Database: ***GEN***

Generator No:	ON0570602	***PO Box No:***	
Status:		***Country:***	
Approval Years:	86,87,88,89,90	***Choice of Contact:***	
Contam. Facility:		***Co Admin:***	
MHSW Facility:		***Phone No Admin:***	
SIC Code:	0821		
SIC Description:	SAND & GRAVEL PITS		

Detail(s)

Waste Class: 252
Waste Class Desc: WASTE OILS & LUBRICANTS

Site: ***LAKESIDE GARDEN CENTRE (C#02/2002)***
RR 4, HEART LAKE RD BRAMPTON ON L6T 3S1

Database: ***PES***

Detail Licence No:	23-01-01986-0	***Operator Box:***	
Licence No:	01986	***Operator Class:***	
Status:		***Operator No:***	
Approval Date:		***Operator Type:***	
Report Source:		***Oper Area Code:***	
Licence Type:	Limited Vendor	***Oper Phone No:***	
Licence Type Code:	23	***Operator Ext:***	
Licence Class:	01	***Operator Lot:***	
Licence Control:	0	***Oper Concession:***	
Latitude:		***Operator Region:***	3
Longitude:		***Operator District:***	
Lot:		***Operator County:***	49
Concession:		***Op Municipality:***	
Region:	3	***Post Office Box:***	
District:		***MOE District:***	
County:	49	***SWP Area Name:***	
Trade Name:			
PDF Link:			

Site: ***LAKESIDE GARDEN CENTRE (C#91761)***
R.R. #4, HEART LAKE ROAD BRAMPTON ON

Database: ***PES***

Detail Licence No:		***Operator Box:***	
Licence No:		***Operator Class:***	
Status:		***Operator No:***	
Approval Date:		***Operator Type:***	
Report Source:		***Oper Area Code:***	
Licence Type:	Vendor	***Oper Phone No:***	
Licence Type Code:		***Operator Ext:***	
Licence Class:		***Operator Lot:***	
Licence Control:		***Oper Concession:***	
Latitude:		***Operator Region:***	
Longitude:		***Operator District:***	
Lot:		***Operator County:***	
Concession:		***Op Municipality:***	
Region:		***Post Office Box:***	
District:		***MOE District:***	
County:		***SWP Area Name:***	
Trade Name:			
PDF Link:			

Site: ***Enbridge Gas Distribution Inc.***
SW corner of Heart Lake & Copperfield Dr Brampton ON

Database: ***SPL***

Ref No:	5421-95TQ5M	***Discharger Report:***	
Site No:		***Material Group:***	
Incident Dt:	15-MAR-13	***Health/Env Conseq:***	
Year:		***Client Type:***	
Incident Cause:	Leak/Break	***Sector Type:***	Valve/Fitting/Piping
Incident Event:		***Agency Involved:***	
Contaminant Code:	35	***Nearest Watercourse:***	
Contaminant Name:	NATURAL GAS (METHANE)	***Site Address:***	SW corner of Heart Lake & Copperfield Dr
Contaminant Limit 1:		***Site District Office:***	
Contam Limit Freq 1:		***Site Postal Code:***	
Contaminant UN No 1:		***Site Region:***	
Environment Impact:	Confirmed	***Site Municipality:***	Brampton
Nature of Impact:	Air Pollution	***Site Lot:***	
Receiving Medium:		***Site Conc:***	
Receiving Env:		***Northing:***	
MOE Response:	Referral to others	***Easting:***	
Dt MOE Arvl on Scn:		***Site Geo Ref Accu:***	
MOE Reported Dt:	15-MAR-13	***Site Map Datum:***	
Dt Document Closed:	23-MAR-13	***SAC Action Class:***	TSSA - Fuel Safety Branch - Hydrocarbon Fuel Release/Spill
Incident Reason:	Operator/Human Error	***Source Type:***	
Site Name:	Main Damage<UNOFFICIAL>		
Site County/District:			
Site Geo Ref Meth:			
Incident Summary:	TSSA FSB: 4" main damaged yesterday		
Contaminant Qty:	0 other - see incident description		

Site:
Countryside Drive Brampton ON

Database: ***SPL***

Ref No:	0655-78L9DN	***Discharger Report:***	
Site No:		***Material Group:***	Oil
Incident Dt:		***Health/Env Conseq:***	
Year:		***Client Type:***	
Incident Cause:	Other Transport Accident	***Sector Type:***	Other Motor Vehicle
Incident Event:		***Agency Involved:***	
Contaminant Code:	13	***Nearest Watercourse:***	
Contaminant Name:	DIESEL FUEL	***Site Address:***	
Contaminant Limit 1:		***Site District Office:***	
Contam Limit Freq 1:		***Site Postal Code:***	
Contaminant UN No 1:		***Site Region:***	
Environment Impact:	Not Anticipated	***Site Municipality:***	Brampton
Nature of Impact:	Soil Contamination; Surface Water Pollution; Vegetation Damage	***Site Lot:***	
Receiving Medium:	Land & Water	***Site Conc:***	

Receiving Env:		***Northing:***	
MOE Response:	No Field Response	***Easting:***	
Dt MOE Arvl on Scn:		***Site Geo Ref Accu:***	
MOE Reported Dt:	11/3/2007	***Site Map Datum:***	
Dt Document Closed:	11/14/2007	***SAC Action Class:***	
Incident Reason:	Spill	***Source Type:***	

Site Name:	MVA<UNOFFICIAL>
Site County/District:	
Site Geo Ref Meth:	
Incident Summary:	truck rollover, fuel and oil to ground and ditch, contained
Contaminant Qty:	13.63 l

Appendix: Database Descriptions

*Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. **Note:** Databases denoted with " * " indicates that the database will no longer be updated. See the individual database description for more information.*

Abandoned Aggregate Inventory: Provincial AAGR

The MAAP Program maintains a database of abandoned pits and quarries. Please note that the database is only referenced by lot and concession and city/town location. The database provides information regarding the location, type, size, land use, status and general comments.*

Government Publication Date: Sept 2002*

Aggregate Inventory: Provincial AGR

The Ontario Ministry of Natural Resources maintains a database of all active pits and quarries. The database provides information regarding the registered owner/operator, location name, operation type, approval type, and maximum annual tonnage.

Government Publication Date: Up to Sep 2019

Abandoned Mine Information System: Provincial AMIS

The Abandoned Mines Information System contains data on known abandoned and inactive mines located on both Crown and privately held lands. The information was provided by the Ministry of Northern Development and Mines (MNDM), with the following disclaimer: "the database provided has been compiled from various sources, and the Ministry of Northern Development and Mines makes no representation and takes no responsibility that such information is accurate, current or complete". Reported information includes official mine name, status, background information, mine start/end date, primary commodity, mine features, hazards and remediation.

Government Publication Date: 1800-Oct 2018

Anderson's Waste Disposal Sites: Private ANDR

The information provided in this database was collected by examining various historical documents which aimed to characterize the likely position of former waste disposal sites from 1860 to present. The research initiative behind the creation of this database was to identify those sites that are missing from the Ontario MOE Waste Disposal Site Inventory, as well as to provide revisions and corrections to the positions and descriptions of sites currently listed in the MOE inventory. In addition to historic waste disposal facilities, the database also identifies certain auto wreckers and scrap yards that have been extrapolated from documentary sources. Please note that the data is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.

Government Publication Date: 1860s-Present

Aboveground Storage Tanks: Provincial AST

Historical listing of aboveground storage tanks made available by the Department of Natural Resources and Forestry. Includes tanks used to hold water or petroleum. This dataset has been retired as of September 25, 2014 and will no longer be updated.

Government Publication Date: May 31, 2014

Automobile Wrecking & Supplies: Private AUWR

This database provides an inventory of known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Government Publication Date: 1999-Jan 31, 2020

Borehole: Provincial BORE

A borehole is the generalized term for any narrow shaft drilled in the ground, either vertically or horizontally. The information here includes geotechnical investigations or environmental site assessments, mineral exploration, or as a pilot hole for installing piers or underground utilities. Information is from many sources such as the Ministry of Transportation (MTO) boreholes from engineering reports and projects from the 1950 to 1990's in Southern Ontario. Boreholes from the Ontario Geological Survey (OGS) including The Urban Geology Analysis Information System (UGAIS) and the York Peel Durham Toronto (YPDT) database of the Conservation Authority Moraine Coalition. This database will include fields such as location, stratigraphy, depth, elevation, year drilled, etc. For all water well data or oil and gas well data for Ontario please refer to WWIS and OOGW.

Government Publication Date: 1875-Jul 2018

Certificates of Approval: Provincial CA

This database contains the following types of approvals: Air & Noise, Industrial Sewage, Municipal & Private Sewage, Waste Management Systems and Renewable Energy Approvals. The MOE in Ontario states that any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste, must have a Certificate of Approval before it can operate lawfully. Fields include approval number, business name, address, approval date, approval type and status. This database will no longer be updated, as CofA's have been replaced by either Environmental Activity and Sector Registry (EASR) or Environmental Compliance Approval (ECA). Please refer to those individual databases for any information after Oct.31, 2011.

Government Publication Date: 1985-Oct 30, 2011*

Dry Cleaning Facilities: Federal CDRY

List of dry cleaning facilities made available by Environment and Climate Change Canada. Environment and Climate Change Canada's Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations (SOR/2003-79) are intended to reduce releases of tetrachloroethylene to the environment from dry cleaning facilities.
Environment and Climate Change Canada cites the coronavirus pandemic as an explanation for delays in releasing data pursuant to requests.

Government Publication Date: Jan 2004-Dec 2017

Commercial Fuel Oil Tanks: Provincial CFOT

Locations of commercial underground fuel oil tanks. This is not a comprehensive or complete inventory of commercial fuel tanks in the province; this listing is a copy of records of registered commercial underground fuel oil tanks obtained under Access to Public Information.
Note that the following types of tanks do not require registration: waste oil tanks in apartments, office buildings, residences, etc.; aboveground gas or diesel tanks. Records are not verified for accuracy or completeness.

Government Publication Date: Jul 31, 2020

Chemical Register: Private CHEM

This database includes information from both a one time study conducted in 1992 and private source and is a listing of facilities that manufacture or distribute chemicals. The production of these chemical substances may involve one or more chemical reactions and/or chemical separation processes (i.e. fractionation, solvent extraction, crystallization, etc.).

Government Publication Date: 1999-Jan 31, 2020

Compressed Natural Gas Stations: Private CNG

Canada has a network of public access compressed natural gas (CNG) refuelling stations. These stations dispense natural gas in compressed form at 3,000 pounds per square inch (psi), the pressure which is allowed within the current Canadian codes and standards. The majority of natural gas refuelling is located at existing retail gasoline that have a separate refuelling island for natural gas. This list of stations is made available by the Canadian Natural Gas Vehicle Alliance.

Government Publication Date: Dec 2012 - Jun 2020

Inventory of Coal Gasification Plants and Coal Tar Sites: Provincial COAL

This inventory includes both the "Inventory of Coal Gasification Plant Waste Sites in Ontario-April 1987" and the Inventory of Industrial Sites Producing or Using Coal Tar and Related Tars in Ontario-November 1988) collected by the MOE. It identifies industrial sites that produced and continue to produce or use coal tar and other related tars. Detailed information is available and includes: facility type, size, land use, information on adjoining properties, soil condition, site operators/occupants, site description, potential environmental impacts and historic maps available. This was a one-time inventory.*

Government Publication Date: Apr 1987 and Nov 1988*

Compliance and Convictions: Provincial CONV

This database summarizes the fines and convictions handed down by the Ontario courts beginning in 1989. Companies and individuals named here have been found guilty of environmental offenses in Ontario courts of law.

Government Publication Date: 1989-Dec 2019

Certificates of Property Use: Provincial CPU

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all CPU's on the registry such as (EPA s. 168.6) - Certificate of Property Use.

Government Publication Date: 1994-Jul 31, 2020

Delisted Fuel Tanks: Provincial DELISTED TANK

List of fuel storage tank sites that were once found in - and have since been removed from - the list of fuel storage tanks made available by the regulatory agency under Access to Public Information.

Government Publication Date: Jul 31, 2020

Drill Hole Database: Provincial DRL

The Ontario Drill Hole Database contains information on more than 113,000 percussion, overburden, sonic and diamond drill holes from assessment files on record with the department of Mines and Minerals. Please note that limited data is available for southern Ontario, as it was the last area to be completed. The database was created when surveys submitted to the Ministry were converted in the Assessment File Research Image Database (AFRI) project. However, the degree of accuracy (coordinates) as to the exact location of drill holes is dependent upon the source document submitted to the MNDM. Levels of accuracy used to locate holes are: centering on the mining claim; a sketch of the mining claim; a 1:50,000 map; a detailed company map; or from submitted a "Report of Work".

Government Publication Date: 1886 - Sep 2019

Environmental Activity and Sector Registry: Provincial EASR

On October 31, 2011, a smarter, faster environmental approvals system came into effect in Ontario. The EASR allows businesses to register certain activities with the ministry, rather than apply for an approval. The registry is available for common systems and processes, to which preset rules of operation can be applied. The EASR is currently available for: heating systems, standby power systems and automotive refinishing. Businesses whose activities aren't subject to the EASR may apply for an ECA (Environmental Compliance Approval), Please see our ECA database.

Government Publication Date: Oct 2011-Aug 31, 2020

Environmental Registry: Provincial EBR

The Environmental Registry lists proposals, decisions and exceptions regarding policies, Acts, instruments, or regulations that could significantly affect the environment. Through the Registry, thirteen provincial ministries notify the public of upcoming proposals and invite their comments. For example, if a local business is requesting a permit, license, or certificate of approval to release substances into the air or water; these are notified on the registry. Data includes: Approval for discharge into the natural environment other than water (i.e. Air) - EPA s. 9, Approval for sewage works - OWRA s. 53(1), and EPA s. 27 - Approval for a waste disposal site. For information regarding Permit to Take Water (PTTW), Certificate of Property Use (CPU) and (ORD) Orders please refer to those individual databases.

Government Publication Date: 1994-Jul 31, 2020

Environmental Compliance Approval: Provincial ECA

On October 31, 2011, a smarter, faster environmental approvals system came into effect in Ontario. In the past, a business had to apply for multiple approvals (known as certificates of approval) for individual processes and pieces of equipment. Today, a business either registers itself, or applies for a single approval, depending on the types of activities it conducts. Businesses whose activities aren't subject to the EASR may apply for an ECA. A single ECA addresses all of a business's emissions, discharges and wastes. Separate approvals for air, noise and waste are no longer required. This database will also include Renewable Energy Approvals. For certificates of approval prior to Nov 1st, 2011, please refer to the CA database. For all Waste Disposal Sites please refer to the WDS database.

Government Publication Date: Oct 2011-Aug 31, 2020

Environmental Effects Monitoring: Federal EEM

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Government Publication Date: 1992-2007*

ERIS Historical Searches: Private EHS

ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Government Publication Date: 1999-Jul 31, 2020

Environmental Issues Inventory System: Federal EIIS

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Government Publication Date: 1992-2001*

Emergency Management Historical Event: Provincial EMHE

List of locations of historical occurrences of emergency events, including those assigned to the Ministry of Natural Resources by Order-In-Council (OIC) under the Emergency Management and Civil Protection Act, as well as events where MNR provided requested emergency response assistance. Many of these events will have involved community evacuations, significant structural loss, and/or involvement of MNR emergency response staff. These events fall into one of ten (10) type categories: Dam Failure; Drought / Low Water; Erosion; Flood; Forest Fire; Soil and Bedrock Instability; Petroleum Resource Center Event, EMO Requested Assistance, Continuity of Operations Event, Other Requested Assistance. EMHE record details are reproduced by ERIS under License with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2017.

Government Publication Date: Dec 31, 2016

Environmental Penalty Annual Report: Provincial EPAR

This database contains data from Ontario's annual environmental penalty report published by the Ministry of the Environment and Climate Change. These reports provide information on environmental penalties for land or water violations issued to companies in one of the nine industrial sectors covered by the Municipal Industrial Strategy for Abatement (MISA) regulations.

Government Publication Date: Jan 1, 2011 - Dec 31, 2019

List of Expired Fuels Safety Facilities: Provincial EXP

List of facilities and tanks for which there was once a fuel registration. This is not a comprehensive or complete inventory of expired tanks/tank facilities in the province; this listing is a copy of previously registered tanks and facilities obtained under Access to Public Information. Includes private fuel outlets, bulk plants, fuel oil tanks, gasoline stations, marinas, propane filling stations, liquid fuel tanks, piping systems, etc; includes tanks which have been removed from the ground.

Notes: registration was not required for private fuel underground/aboveground storage tanks prior to January 1990, nor for furnace oil tanks prior to May 1, 2002; registration is not required for waste oil tanks in apartments, office buildings, residences, etc., or aboveground gas or diesel tanks. Records are not verified for accuracy or completeness.

Government Publication Date: Jul 31, 2020

Federal Convictions: Federal FCON

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Government Publication Date: 1988-Jun 2007*

Contaminated Sites on Federal Land: Federal FCS

The Federal Contaminated Sites Inventory includes information on known federal contaminated sites under the custodianship of departments, agencies and consolidated Crown corporations as well as those that are being or have been investigated to determine whether they have contamination arising from past use that could pose a risk to human health or the environment. The inventory also includes non-federal contaminated sites for which the Government of Canada has accepted some or all financial responsibility. It does not include sites where contamination has been caused by, and which are under the control of, enterprise Crown corporations, private individuals, firms or other levels of government. Includes fire training sites and sites at which Per- and Polyfluoroalkyl Substances (PFAS) are a concern.

Government Publication Date: Jun 2000-Apr 2020

Fisheries & Oceans Fuel Tanks: Federal FOFT

Fisheries & Oceans Canada maintains an inventory of aboveground & underground fuel storage tanks located on Fisheries & Oceans property or controlled by DFO. Our inventory provides information on the site name, location, tank owner, tank operator, facility type, storage tank location, tank contents & capacity, and date of tank installation.

Government Publication Date: 1964-Sep 2019

Federal Identification Registry for Storage Tank Systems (FIRSTS): Federal FRST

A list of federally regulated Storage tanks from the Federal Identification Registry for Storage Tank Systems (FIRSTS). FIRSTS is Environment and Climate Change Canada's database of storage tank systems subject to the Storage Tank for Petroleum Products and Allied Petroleum Products Regulations. The main objective of the Regulations is to prevent soil and groundwater contamination from storage tank systems located on federal and aboriginal lands. Storage tank systems that do not have a valid identification number displayed in a readily visible location on or near the storage tank system may be refused product delivery.

Government Publication Date: May 31, 2018

Fuel Storage Tank: Provincial FST

List of registered private and retail fuel storage tanks. This is not a comprehensive or complete inventory of private and retail fuel storage tanks in the province; this listing is a copy of registered private and retail fuel storage tanks, obtained under Access to Public Information.

Notes: registration was not required for private fuel underground/aboveground storage tanks prior to January 1990, nor for furnace oil tanks prior to May 1, 2002; registration is not required for waste oil tanks in apartments, office buildings, residences, etc., or aboveground gas or diesel tanks. Records are not verified for accuracy or completeness.

Government Publication Date: Jul 31, 2020

Fuel Storage Tank - Historic: Provincial FSTH

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks. Public records of private fuel storage tanks are only available since the registration became effective in September 1989. This information is now collected by the Technical Standards and Safety Authority.

Government Publication Date: Pre-Jan 2010*

Ontario Regulation 347 Waste Generators Summary: Provincial GEN

Regulation 347 of the Ontario EPA defines a waste generation site as any site, equipment and/or operation involved in the production, collection, handling and/or storage of regulated wastes. A generator of regulated waste is required to register the waste generation site and each waste produced, collected, handled, or stored at the site. This database contains the registration number, company name and address of registered generators including the types of hazardous wastes generated. It includes data on waste generating facilities such as: drycleaners, waste treatment and disposal facilities, machine shops, electric power distribution etc. This information is a summary of all years from 1986 including the most currently available data. Some records may contain, within the company name, the phrase "See & Use..." followed by a series of letters and numbers. This occurs when one company is amalgamated with or taken over by another registered company. The number listed as "See & Use", refers to the new ownership and the other identification number refers to the original ownership. This phrase serves as a link between the 2 companies until operations have been fully transferred.

Government Publication Date: 1986-Jul 31, 2020

Greenhouse Gas Emissions from Large Facilities: Federal GHG

List of greenhouse gas emissions from large facilities made available by Environment Canada. Greenhouse gas emissions in kilotonnes of carbon dioxide equivalents (kt CO2 eq).

Government Publication Date: 2013-Dec 2017

TSSA Historic Incidents: Provincial HINC

List of historic incidences of spills and leaks of diesel, fuel oil, gasoline, natural gas, propane, and hydrogen recorded by the TSSA in their previous incident tracking system. The TSSA's Fuels Safety Program administers the Technical Standards & Safety Act 2000, providing fuel-related safety services associated with the safe transportation, storage, handling and use of fuels such as gasoline, diesel, propane, natural gas and hydrogen. Under this Act, the TSSA regulates fuel suppliers, storage facilities, transport trucks, pipelines, contractors and equipment or appliances that use fuels. Records are not verified for accuracy or completeness. This is not a comprehensive or complete inventory of historical fuel spills and leaks in the province. This listing is a copy of the data captured at one moment in time and is hence limited by the record date provided here.

Government Publication Date: 2006-June 2009*

Indian & Northern Affairs Fuel Tanks: Federal IAFT

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

Government Publication Date: 1950-Aug 2003*

Fuel Oil Spills and Leaks: Provincial INC

Listing of spills and leaks of diesel, fuel oil, gasoline, natural gas, propane, and hydrogen reported to the Spills Action Centre (SAC). This is not a comprehensive or complete inventory of fuel-related leaks, spills, and incidents in the province; this listing in a copy of incidents reported to the SAC, obtained under Access to Public Information. Includes incidents from fuel-related hazards such as spills, fires, and explosions. Records are not verified for accuracy or completeness.

Government Publication Date: Jul 31, 2020

Landfill Inventory Management Ontario: Provincial LIMO

The Landfill Inventory Management Ontario (LIMO) database is updated every year, as the Ministry of the Environment, Conservation and Parks compiles new and updated information. Includes small and large landfills currently operating as well as those which are closed and historic. Operators of larger landfills provide landfill information for the previous operating year to the ministry for LIMO including: estimated amount of total waste received, landfill capacity, estimated total remaining landfill capacity, fill rates, engineering designs, reporting and monitoring details, size of location, service area, approved waste types, leachate of site treatment, contaminant attenuation zone and more. The small landfills include information such as site owner, site location and certificate of approval # and status.

Government Publication Date: Feb 28, 2019

Canadian Mine Locations: Private MINE

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Government Publication Date: 1998-2009*

Mineral Occurrences: Provincial MNR

In the early 70's, the Ministry of Northern Development and Mines created an inventory of approximately 19,000 mineral occurrences in Ontario, in regard to metallic and industrial minerals, as well as some information on building stones and aggregate deposits. Please note that the "Horizontal Positional Accuracy" is approximately +/- 200 m. Many reference elements for each record were derived from field sketches using pace or chain/tape measurements against claim posts or topographic features in the area. The primary limiting factor for the level of positional accuracy is the scale of the source material. The testing of horizontal accuracy of the source materials was accomplished by comparing the plan metric (X and Y) coordinates of that point with the coordinates of the same point as defined from a source of higher accuracy.

Government Publication Date: 1846-Jan 2020

National Analysis of Trends in Emergencies System (NATES): Federal NATE

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

Government Publication Date: 1974-1994*

Non-Compliance Reports: Provincial NCPL

The Ministry of the Environment provides information about non-compliant discharges of contaminants to air and water that exceed legal allowable limits, from regulated industrial and municipal facilities. A reported non-compliance failure may be in regard to a Control Order, Certificate of Approval, Sectoral Regulation or specific regulation/act.

Government Publication Date: Dec 31, 2018

National Defense & Canadian Forces Fuel Tanks: Federal NDFT

The Department of National Defense and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

Government Publication Date: Up to May 2001*

National Defense & Canadian Forces Spills: Federal NDSP

The Department of National Defense and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

Government Publication Date: Mar 1999-Apr 2018

National Defence & Canadian Forces Waste Disposal Sites: Federal NDWD

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

Government Publication Date: 2001-Apr 2007*

National Energy Board Pipeline Incidents: Federal NEBI

Locations of pipeline incidents from 2008 to present, made available by the Canada Energy Regulator (CER) - previously the National Energy Board (NEB). Includes incidents reported under the Onshore Pipeline Regulations and the Processing Plant Regulations related to pipelines under federal jurisdiction, does not include incident data related to pipelines under provincial or territorial jurisdiction.

Government Publication Date: 2008-Mar 31, 2020

National Energy Board Wells: Federal NEBP

The NEBW database contains information on onshore & offshore oil and gas wells that are outside provincial jurisdiction(s) and are thereby regulated by the National Energy Board. Data is provided regarding the operator, well name, well ID No./UWI, status, classification, well depth, spud and release date.

Government Publication Date: 1920-Feb 2003*

National Environmental Emergencies System (NEES): Federal NEES

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for previous Environment Canada spill datasets. NEES is composed of the historic datasets ' or Trends ' which dates from approximately 1974 to present. NEES Trends is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

Government Publication Date: 1974-2003*

National PCB Inventory: Federal NPCB

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. Federal out-of-service PCB containing equipment and PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites. Some addresses provided may be Head Office addresses and are not necessarily the location of where the waste is being used or stored.

Government Publication Date: 1988-2008*

National Pollutant Release Inventory: Federal NPRI

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers for recycling for more than 300 listed substances.

Government Publication Date: 1993-May 2017

Oil and Gas Wells: Private OGWE

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickle's database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Government Publication Date: 1988-May 31, 2020

Ontario Oil and Gas Wells: Provincial OOGW

In 1998, the MNR handed over to the Ontario Oil, Gas and Salt Resources Corporation, the responsibility of maintaining a database of oil and gas wells drilled in Ontario. The OGSR Library has over 20,000+ wells in their database. Information available for all wells in the ERIS database include well owner/operator, location, permit issue date, and well cap date, license No., status, depth and the primary target (rock unit) of the well being drilled. All geology/stratigraphy table information, plus all water table information is also provide for each well record.

Government Publication Date: 1800-Jun 2020

Inventory of PCB Storage Sites: Provincial OPCB

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of PCB storage sites within the province. Ontario Regulation 11/82 (Waste Management - PCB) and Regulation 347 (Generator Waste Management) under the Ontario EPA requires the registration of inactive PCB storage equipment and/or disposal sites of PCB waste with the Ontario Ministry of Environment. This database contains information on: 1) waste quantities; 2) major and minor sites storing liquid or solid waste; and 3) a waste storage inventory.

Government Publication Date: 1987-Oct 2004; 2012-Dec 2013

Orders: Provincial ORD

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all Orders on the registry such as (EPA s. 17) - Order for remedial work, (EPA s. 18) - Order for preventative measures, (EPA s. 43) - Order for removal of waste and restoration of site, (EPA s. 44) - Order for conformity with Act for waste disposal sites, (EPA s. 136) - Order for performance of environmental measures.

Government Publication Date: 1994-Jul 31, 2020

Canadian Pulp and Paper: Private PAP

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Government Publication Date: 1999, 2002, 2004, 2005, 2009-2014

Parks Canada Fuel Storage Tanks: Federal PCFT

Canadian Heritage maintains an inventory of known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Government Publication Date: 1920-Jan 2005*

Pesticide Register: Provincial PES

The Ontario Ministry of the Environment and Climate Change maintains a database of licensed operators and vendors of registered pesticides.

Government Publication Date: Oct 2011-Aug 31, 2020

Pipeline Incidents: Provincial PINC

List of pipeline incidents (strikes, leaks, spills). This is not a comprehensive or complete inventory of pipeline incidents in the province; this listing in an historical copy of records previously obtained under Access to Public Information. Records are not verified for accuracy or completeness.
The coronavirus pandemic is cited by the agency responsible for tank regulations and data as an explanation for delays in releasing data pursuant to requests.

Government Publication Date: Feb 28, 2017

Private and Retail Fuel Storage Tanks: Provincial PRT

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks and licensed retail fuel outlets. This database includes an inventory of locations that have gasoline, oil, waste oil, natural gas and/or propane storage tanks on their property. The MCCR no longer collects this information. This information is now collected by the Technical Standards and Safety Authority (TSSA).

Government Publication Date: 1989-1996*

Permit to Take Water: Provincial PTTW

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all PTTW's on the registry such as OWRA s. 34 - Permit to take water.

Government Publication Date: 1994-Jul 31, 2020

Ontario Regulation 347 Waste Receivers Summary: Provincial REC

Part V of the Ontario Environmental Protection Act ("EPA") regulates the disposal of regulated waste through an operating waste management system or a waste disposal site operated or used pursuant to the terms and conditions of a Certificate of Approval or a Provisional Certificate of Approval. Regulation 347 of the Ontario EPA defines a waste receiving site as any site or facility to which waste is transferred by a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents registered receivers of regulated wastes, identified by registration number, company name and address, and includes receivers of waste such as: landfills, incinerators, transfer stations, PCB storage sites, sludge farms and water pollution control plants. This information is a summary of all years from 1986 including the most currently available data.

Government Publication Date: 1986-2016

Record of Site Condition: Provincial RSC

The Record of Site Condition (RSC) is part of the Ministry of the Environment's Brownfields Environmental Site Registry. Protection from environmental cleanup orders for property owners is contingent upon documentation known as a record of site condition (RSC) being filed in the Environmental Site Registry. In order to file an RSC, the property must have been properly assessed and shown to meet the soil, sediment and groundwater standards appropriate for the use (such as residential) proposed to take place on the property. The Record of Site Condition Regulation (O. Reg. 153/04) details requirements related to site assessment and clean up.
RSCs filed after July 1, 2011 will also be included as part of the new (O.Reg. 511/09).

Government Publication Date: 1997-Sept 2001, Oct 2004-Jul 2020

Retail Fuel Storage Tanks: Private RST

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks.

Government Publication Date: 1999-Jan 31, 2020

Scott's Manufacturing Directory: Private SCT

Scott's Directories is a data bank containing information on over 200,000 manufacturers across Canada. Even though Scott's listings are voluntary, it is the most comprehensive database of Canadian manufacturers available. Information concerning a company's address, plant size, and main products are included in this database.

Government Publication Date: 1992-Mar 2011*

Ontario Spills: Provincial SPL

List of spills and incidents made available the Ministry of the Environment, Conservation and Parks. This database identifies information such as location (approximate), type and quantity of contaminant, date of spill, environmental impact, cause, nature of impact, etc. Information from 1988-2002 was part of the ORIS (Occurrence Reporting Information System). The SAC (Spills Action Centre) handles all spills reported in Ontario. Regulations for spills in Ontario are part of the MOE's Environmental Protection Act, Part X.
The Ministry of the Environment, Conservation and Parks cites the coronavirus pandemic as an explanation for delays in releasing data pursuant to requests.

Government Publication Date: 1988-Nov 2019

Wastewater Discharger Registration Database: Provincial SRDS

Information under this heading is combination of the following 2 programs. The Municipal/Industrial Strategy for Abatement (MISA) division of the Ontario Ministry of Environment maintained a database of all direct dischargers of toxic pollutants within nine sectors including: Electric Power Generation; Mining; Petroleum Refining; Organic Chemicals; Inorganic Chemicals; Pulp & Paper; Metal Casting; Iron & Steel; and Quarries. All sampling information is now collected and stored within the Sample Result Data Store (SRDS).

Government Publication Date: 1990-Dec 31, 2017

Anderson's Storage Tanks: Private TANK

The information provided in this database was collected by examining various historical documents, which identified the location of former storage tanks, containing substances such as fuel, water, gas, oil, and other various types of miscellaneous products. Information is available in regard to business operating at tank site, tank location, permit year, permit & installation type, no. of tanks installed & configuration and tank capacity. Data contained within this database pertains only to the city of Toronto and is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.

Government Publication Date: 1915-1953*

Transport Canada Fuel Storage Tanks: Federal TCFT

List of fuel storage tanks currently or previously owned or operated by Transport Canada. This inventory also includes tanks on The Pickering Lands, which refers to 7,530 hectares (18,600 acres) of land in Pickering, Markham, and Uxbridge owned by the Government of Canada since 1972; properties on this land has been leased by the government since 1975, and falls under the Site Management Policy of Transport Canada, but is administered by Public Works and Government Services Canada. This inventory provides information on the site name, location, tank age, capacity and fuel type.

Government Publication Date: 1970-Aug 2018

Variances for Abandonment of Underground Storage Tanks: Provincial VAR

Listing of variances granted for storage tank abandonment. This is not a comprehensive or complete inventory of tank abandonment variances in the province; this listing is a copy of tank abandonment variance records previously obtained under Access to Public Information. In Ontario, registered underground storage tanks must be removed within two years of disuse; if removal of a tank is not feasible, an application may be sought for a variance from this code requirement.
Records are not verified for accuracy or completeness.

Government Publication Date: Jul 31, 2020

Waste Disposal Sites - MOE CA Inventory: Provincial WDS

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of known open (active or inactive) and closed disposal sites in the Province of Ontario. Active sites maintain a Certificate of Approval, are approved to receive and are receiving waste. Inactive sites maintain Certificate(s) of Approval but are not receiving waste. Closed sites are not receiving waste. The data contained within this database was compiled from the MOE's Certificate of Approval database. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number. All new Environmental Compliance Approvals handed out after Oct 31, 2011 for Waste Disposal Sites will still be found in this database.

Government Publication Date: Oct 2011-Aug 31, 2020

Waste Disposal Sites - MOE 1991 Historical Approval Inventory: Provincial WDSH

In June 1991, the Ontario Ministry of Environment, Waste Management Branch, published the "June 1991 Waste Disposal Site Inventory", of all known active and closed waste disposal sites as of October 30st, 1990. For each "active" site as of October 31st 1990, information is provided on site location, site/CA number, waste type, site status and site classification. For each "closed" site as of October 31st 1990, information is provided on site location, site/CA number, closure date and site classification. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number.

Government Publication Date: Up to Oct 1990*

Water Well Information System: Provincial WWIS

This database describes locations and characteristics of water wells found within Ontario in accordance with Regulation 903. It includes such information as coordinates, construction date, well depth, primary and secondary use, pump rate, static water level, well status, etc. Also included are detailed stratigraphy information, approximate depth to bedrock and the approximate depth to the water table.

Government Publication Date: Apr 30, 2020

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

Appendix C

Records Review

Municipal Address		1995	1996	1997	1998	2001
Heart Lake Road	10818	Heart Lake Conservation Area	no listing	no listing	Heart Lake Conservation Area	Heart Lake Conservation Area
	10881	no listing	Mallany, H	Mallany, H	Mallany, H	Mallany, H
	11900	Rayner, G	Rayner, G	no listing	no listing	Rayner, G

MINISTRY OF ENVIRONMENT
INVENTORY OF COAL GASIFICATION PLANT WASTE SITES IN ONTARIO
INVENTORY OF INDUSTRIAL SITES PRODUCING OR USING COAL TAR AND RELATED TARS IN ONTARIO

MOECC REGION: Southwestern
SITE EASTING: 597,238 mE
SITE NORTHING: 4,844,244 mN
SEARCH RADIUS: 1,000 m

DISTANCE AWAY FROM SITE (m)	COUNTY	MUNICIPALITY	COMPANY NAME / OPERATOR / OWNER (IN DATE ORDER WHERE APPLICABLE)	SITE ADDRESS / LOCATION	EAST	NORTH	OPERATION YEARS	TYPE (primary/inital)	INVENTORY REFERENCE

There are no locations that meet your search criteria

MINISTRY OF ENVIRONMENT WASTE DISPOSAL SITE INVENTORY, JUNE 1991
REGIONAL INVENTORY OF ACTIVE WASTE DISPOSAL SITES

MOECC REGION: Southwestern
SITE EASTING: 597,238 mE
SITE NORTHING: 4,844,244 mN
SEARCH RADIUS: 1,000 m

DISTANCE AWAY	SITE			LOT			UTM COORDINATES											
FROM SITE (m)	NO	COUNTY	MUNICIPALITY	OR STREET NO	CONCESSION	NTS	ZONE	EAST	NORTH	D	C	O	H	L	MH	SS	STAT'S	CLASS

There are no locations that meet your search criteria

MINISTRY OF ENVIRONMENT WASTE DISPOSAL SITE INVENTORY, JUNE 1991
REGIONAL INVENTORY OF CLOSED WASTE DISPOSAL SITES

MOECC REGION: Southwestern
SITE EASTING: 597,238 mE
SITE NORTHING: 4,844,244 mN
SEARCH RADIUS: 1,000 m

DISTANCE AWAY	SITE			LOT		UTM COORDINATES				DATE CLOSED			
FROM SITE (m)	NO	COUNTY	MUNICIPALITY	OR STREET NO	CONCESSION	NTS	ZONE	EAST	NORTH	YEAR	MONTH	DAY	CLASS

There are no locations that meet your search criteria

MINISTRY OF ENVIRONMENT
ONTARIO INVENTORY OF PCB STORAGE SITES

MOECC REGION: Southwestern
MUNICIPAL REGION/COUNTY: Peel
SITE EASTING: 597,238 mN
SITE NORTHING: 4,844,244 mN
SEARCH RADIUS: 1,000 m

DISTANCE AWAY FROM SITE (m)	COUNTY	MUNICIPALITY	COMPANY	SITE NUMBER	SITE ADDRESS	EAST	NORTH	MINOR	MAJOR
						There are no locations that meet your search criteria			

Region of Peel
working with you

Public Works

3515 Wolfedale Rd.
Mississauga, ON
L5C 1V8
tel: 905-791-7800

peelregion.ca

November 9, 2020
File: WP PA-02.02

MTE More Than Engineering
520 Bingemans Centre Drive
Kitchener, ONT N2B 3X9

ATTENTION: Frances Heather

Dear Miss Heather:

SUBJECT: Heart Lake Road and Countryside Drive, Brampton
Your File: N/A

The Environmental Control Section, Wastewater Division, Public Works Department, Regional Municipality of Peel is responsible for the enforcement of Wastewater Bylaw 53-2010.

We have reviewed our records with regards to the above intersection and find that we do not have a record of any violations, infractions or outstanding orders under Wastewater Bylaw 53-2010 and the former Sewer Use By-laws 90-90 and 9-75.

There is one (1) spill event for the above intersection listed in our files.

For information pertaining to waste disposal sites within the Region of Peel, a copy of this request is being forwarded to Sara Basile of the Infrastructure, Waste Management (905-791-7800, Ext. 4891). You can also contact the Ministry of the Environment Halton/Peel district office (1-800-335-5906 or 905-319-3847) for more information.

For information pertaining to storm water By-law issues, a copy of this request is being forwarded to Enforcement and By-Law Services, City of Brampton, Municipal Enforcement Division (905-458-3424, Ext. 63225).

Although a careful review of the records in the custody of the Environmental Control Section has been conducted in response to your request, the Region of Peel makes no warranties or representations, express or implied, concerning the accuracy, reliability or completeness of the information contained in this letter. All information from these records is being provided on an "as is" basis, and the responsibility for any consequences of using the information for any purpose whatsoever rests with the person who has requested it.

Region of Peel
working with you

Public Works

3515 Wolfedale Rd.
Mississauga, ON
L5C 1V8
tel: 905-791-7800

peelregion.ca

If you have any questions, please feel free to contact me at (905) 791-7800, Ext. 3104.

Yours truly,

Kevin Parkes
Inspector
Environmental Control Section
Wastewater Division
Public Works Department

KP/CS

cc: Sara Basile, Infrastructure, Waste Management, Regional Municipality of Peel

Enforcement and By-Law Services, Municipal Enforcement Division, City of Brampton

Environmental Control Incident Report

Customer Service # : 196143

Date: yyyy-mm-dd

[X] Spill [ ] Complaint 2004 06 10 Incident # 04 - 237

Location	Countryside Drive between Dixie and Heartlake, Brampton
Material/Amount	460 Litres used motor oil
Reported By	City of Brampton
	(905) 458 - 4686

Resource	Dispatched	Arrival	Departure	Off Duty
Tim Robinson	10 : 25	10 : 40	14 : 30	15 : 00
	:	:	:	:
	:	:	:	:

Investigation/Action/Status

I received a call from the City of Brampton that there was some used motor oil in the ditch on Country Side Dr. between Heartlake Road and Dixie Road in Brampton. When I arrived there was a large quantity of oil along with oil absorbent pads, booms, and straw bales in the ditch to contain the oil. The containment was taken care of by the City of Brampton. There was no one on site when I arrived. After approximately 10 minutes several Brampton Works employees arrived. They had contained the oil and picked up 23 - 20 litre containers of oil on their truck. I advised them that they were not allowed to transport the oil. They then removed the oil from their truck. I advised Ron Browning of the City of Brampton that they should hire a cleanup contractor to clean up the spill. They hired Fielding Emergency Response. Fielding decanted 200 litre of oil into the drum and the remaining oil in the ditch was absorbed with pads. The contaminated soil was excavated by a City of Brampton Excavator and Fielding transported the soil to a proper disposal site.

Vehicle 1	Vehicle 2
Owner	Owner
Address	Address
Insurance Co.	Insurance Co.
Policy No. Plate No.	Policy No. Plate No.

Owner	Controller
Name City of Brampton	Name
Address	Address
Telephone No. 458-4686	Telephone No.

Billing [x] No [ ] Owner [ ] Controller

Reg.: 4 OT: ______ DT: ______ km: 34

Region Materials & Services: Bags of sorbant [ ] Absorb. Pads [ ] Absorb. Pillows [ ]

Lge. Booms [ ] Sml. Booms [ ] Other: ______

Contracted Services [ ] No ______

Agencies Notified: Date/Time/Initial Contact: Date/Time/Initial Contact:

[x] MOE	______	[ ] City of Mississauga	______
[x] City of Brampton	______	[ ] Town of Caledon	______
[ ] South Peel	______	[ ] Peel Health	______
[ ] City of Toronto/Member	______	[ ] Credit Valley Conservation	______
[ ] Toronto Reg.Conser.	______	[ ] Halton Reg.Conser.	______
[ ] Environment Canada	______	[ ] TSSA/Fuel Safety	______
[ ] Other	______		

Councillors Notified: ______ Staff Notified: ______

Clean-up/Disposal

[x] Owner [ ] Carrier [ ] Tennant [ ] Region [ ] Other ______

Disposal Method: ______

Emergency Generator No.: ______

Restoration Required: ______

Prepared By: Tim Robinson

Inspector, EC: ______

Date: yyyy-mm-dd

2004 | 05 | 10

Danielle Maddock

From: Public Information Services <publicinformationservices@tssa.org>
Sent: Friday, October 2, 2020 10:05 AM
To: Frances Heather
Subject: RE: TSSA Information Request

Hello,

Thank you for your request for confirmation of public information.

We confirm that there are no records in our database of any fuel storage tanks, elevating devices and boilers/pressure vessels at the subject address.

For a further search in our archives please complete our release of public information form found at https://www.tssa.org/en/about-tssa/release-of-public-information.aspx?_mid_=392 and email the completed form to publicinformationservices@tssa.org along the appropriate fee. TSSA's fee schedule can be found at: https://www.tssa.org/en/about-tssa/resources/Documents/Public-Information-Fee-Schedule_Jan_2018.pdf. Fees are payable with a credit card (Visa or MasterCard).

Although TSSA believes the information provided pursuant to your request is accurate, please note that TSSA does not warrant this information in any way whatsoever.

Please refrain from sending documents to head office and only submit your requests electronically via email along with credit card payment. We are all working remotely and mailing in applications with cheques will lengthen the overall processing time.

Kind regards,

Roxana

Public Information Agent
Facilities and Business Services
345 Carlingview Drive
Toronto, Ontario M9W 6N9
Tel: +1-416-734-6222 | Fax: +1-416-734-3568 | E-Mail: publicinformationservices@tssa.org
www.tssa.org

From: Frances Heather
Sent: October 2, 2020 8:54 AM
To: Public Information Services
Subject: TSSA Information Request

[CAUTION]: This email originated outside the organisation.
Please do not click links or open attachments unless you recognise the source of this email and know the content is safe.

Good morning,

I would like to enquire if TSSA has any records for the following properties:

- 10818 Heartlake Road, Brampton ON
- 10881 Heartlake Road, Brampton ON
- 11900 Heartlake Road, Brampton ON
- 3731 Mayfield Drive, Brampton ON

Thank you,
Frances Heather

Frances Heather, B.Sc., M.Sc. | Environmental Scientist
MTE Consultants Inc.
T: 519-743-6500 x1374 | FHeather@mte85.com
520 Bingemans Centre Drive, Kitchener, Ontario N2B 3X9
www.mte85.com | Twitter | LinkedIn | Instagram | Facebook

COVID-19 Update: We remain operational and are currently available by email and phone, however, our offices are closed. Staff that are required to visit job sites or perform field work are required to follow MTE health and safety policies and procedures, as well as additional COVID-19 protocols, which can be viewed here.

Appendix D

Interview, Inspection Records and Photographic Log

MTE

Note to interview candidate: please provide responses to each question, or note if unknown or not applicable as case may be. If needed, additional comments can be provided on last page.

Site Address:	Heart Lake Road and Countryside Drive, Brampton	**MTE File No.:**	47877-100
		Date:	October 21, 2020

MTE Representative: Sean Anderson, P.Eng. & Frances Heather

Name of Interview Candidate: Mario Goolsarran, P.Eng.

Title of Interview Candidate: Senior Project Manager, Infrastructure Planning, City of Brampton

Relationship to the Site: Representative of site owner

Years Familiar with the Site: 4 years

Section 1: Owner and Tenant Information

1.1 Who is/are the current owner(s) of the Site?
Please provide years or ownership and full legal names (if known).

City of Brampton

1.2 Who is/are the current tenant(s) of the Site?
Please provide a brief description of operations and years or occupancy.

Municipal roadway

1.3 When was the Site first developed and by whom? ☐ Unknown

(Mario to confirm)

1.4 Who is/are the previous owner(s) of the Site?
Please provide years of ownership and full legal names (if known) ■ Unknown

1.5 Who is/are the previous tenant(s) of the Site?
Please provide years of occupation and a brief description of operations. ■ Unknown

Section 2: Building Information

2.1 Are there existing or former buildings at the Site?

☐ Yes ☒ No

If yes, list and indicate former or existing buildings including year(s) of construction/demolition, construction type, etc.

2.2 Are there any floor plans or engineering drawings for existing or former buildings?

☐ Yes ☐ No ☐ Unknown ☒ Not Applicable

If yes, please provide.

2.3 Are there any major ongoing or previous renovations to the existing building(s)?

☐ Yes ☐ No ☐ Unknown ☒ Not Applicable

If yes, describe

2.4 Have any additions been constructed on the existing building(s)?

☐ Yes ☐ No ☐ Unknown ☒ Not Applicable

If yes, describe.

2.5 Are there heating systems associated with the building(s)?

☐ Yes ☐ No ☒ Not Applicable

If yes, describe fuel source, type of heating systems, and any waste products. (e.g., combustion gases or ash).

2.6 Are there any current or former heating systems that use fuel oil (furnace oil) as a fuel source?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

2.7 Are there cooling systems associated with the buildings(s)?

☐ Yes ☒ No ☐ Unknown

If yes, describe fuel source, type of cooling systems, and any associated ozone- depleting materials.

2.8 Are there any loading docks or shipping/receiving bays?

☐ Yes ☒ No

If yes, describe.

2.9 Are there any former or current roof leaks?

☐ Yes ☐ No ☐ Unknown ☒ Not Applicable

If yes, describe.

2.10 Are there any sumps in the building(s)?

☐ Yes ☐ No ☐ Unknown ☒ Not Applicable

If yes, describe the sump pump discharge.

2.11 Are there any areas of mould/water damage in the building(s)?

☐ Yes ☐ No ☐ Unknown ☒ Not Applicable

If yes, describe.

2.12 Are there any concerns related to indoor air quality in the building(s)?

☐ Yes ☐ No ☐ Unknown ☒ Not Applicable

If yes, describe.

2.13 Has testing for radon gas been completed in any building(s) at the Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

2.14 Are there any asbestos, lead, urea foam formaldehyde insulation (UFFI) or PCB-containing materials in the building(s), or any previous activities involving the removal of these substances?

☐ Yes ☐ No ☒ Not Applicable

If yes, describe.

Section 3: Site Services

3.1 Are any underground utility drawings available for the Site?

☒ Yes ☐ No ☐ Unknown

If yes, describe.

Existing utility drawings have been provided to MTE as part of current EA study.

3.2 Are there any easements on the Site (e.g., right-of-way, utility easements related to hydro, gas, telephone, etc.)?

☒ Yes ☐ No ☐ Unknown

If yes, describe.

Overhead hydro.

3.3 Are there back-up generators or emergency power systems at the Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe fuel source

3.4 What type of potable water supply is available at the Site?

☐ Municipal ☐ Private ☒ None

If private, describe water supply wells (number, locations, screen depths) and provide any available well logs or testing information.

Possible watermain in road.

3.5 Is a water treatment system present at the Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe and provide any available testing information and/or regulatory approvals.

3.6 What type of wastewater (sewage) system is available at the Site?

☐ Municipal ☐ Private ☒ None

If private, describe locations of septic bed and tank, and provide any available permits or testing information.

No sewer lines on Heart Lake Road. Possible sewer lines on Countryside Road.

3.7 Is any pre-treatment of wastewater performed at the Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

3.8 Are there any stormwater management ponds at the Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe location.

3.9 Are there any catchbasins at the Site?

☒ Yes ☐ No ☐ Unknown

If yes, describe locations and discharge.

Existing catchbasins on Countryside Road portion of the Site.

3.10 Are there any problems with Site drainage (e.g., basement flooding, surface water ponding, flooding, etc.)?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

Adjacent to Heart Lake Conservation Area, which includes some swamp features that may be subject to localized flooding.

3.11 Are there any electrical transformers located on the Site?

☒ Yes ☐ No ☐ Unknown

If yes, who owns them, do they contain PCBs, have they been tested?

Possible transformers related to overhead hydro service at the Site.

3.12 Are there any existing or former rail lines/spurs on the Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

Section 4: Site Operations

4.1 Are any plans or drawings available showing areas of production, manufacturing, chemical or waste storage in the buildings or premises?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

4.2 Are any process, production and maintenance documents available related to site operations?

☐ Yes ☒ No ☐ Unknown

If yes, please provide.

4.3 Are there any current or previous agricultural activities on the Site?

☐ Yes ☐ No ☒ Unknown

If yes, approximately what years, what crops, and what pesticides were applied?

4.4 Are there any pesticides/herbicides/sludge applications at the Site?

☐ Yes ☐ No ☒ Unknown

If yes, when, and what products were used?

4.5 Are there any current or former vehicle maintenance, auto body or machine shop operations at the Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe how the waste liquid fluids are/were handled?

4.6 Is there any hydraulic lift equipment (e.g., in-ground vehicle hoists, elevators) on the Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

4.7 Is there any former or current equipment, vehicle or plant floor wash down at the Site?

☐ Yes ☐ No ☒ Unknown

If yes, describe.

4.8 Were there any fires at the Site (e.g., building fires, waste incineration, brush fires, etc.)?

☐ Yes ☐ No ☒ Unknown

If yes, describe.

4.9 Are there any former or current dust control activities at the Site?

☐ Yes ☒ No ☐ Unknown

If yes, list dust control methods and products used.

4.10 Has salt or any other de-icing chemical ever been used for winter maintenance of walkways or parking areas?

☒ Yes ☐ No ☐ Unknown

If yes, describe product used, storage and application practices.

Yes, salt applied to road by City of Brampton staff or contractors.

Section 5: Fuel Storage and Handling

5.1 Are there any aboveground or underground fuel storage tanks located on Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe type, construction material, secondary containment, size, age, contents of each, and provide any testing and/or TSSA registration information.

5.2 Were any aboveground or underground fuel storage tanks removed in the past?

☐ Yes ☐ No ☒ Unknown

If yes, describe type, construction material, secondary containment, size, contents of each, date(s) of removal, details of removal.

Please provide any available reports related to tank removal and confirmatory testing.

5.3 Are there any current or former fuel pumps or fuelling systems on the Site?

☐ Yes ☐ No ☒ Unknown

If yes, describe.

5.4 Are there any jerry cans, drums or totes containing fuel/oil/lubricants on Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

Section 6: Waste Oils, Chemicals, Liquid Wastes, Solid Wastes

6.1 Are any waste oils generated and/or stored on Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe waste storage locations and disposal practices.

6.2 Are there any oil-water separators and/or floor drains at the Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe location, installation date, source of incoming liquid and effluent discharge location.

6.3 Are any chemicals or solvents stored or used at the Site?

☐ Yes ☒ No ☐ Unknown

If yes, provide an inventory of chemicals, and describe chemical usage and chemical storage areas.

6.4 Are Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS) available for any chemical compounds used on the Site?

☐ Yes ☒ No ☐ Unknown

If yes, provide a complete list of chemical compounds with MSDS or SDS.

6.5 Are any liquid industrial wastes generated at the Site?

☐ Yes ☐ No ☒ Unknown

If yes, how are they disposed?

6.6 Are waste management records available for the Site, including current and historical waste storage locations and waste generator and waste receiver information maintained pursuant to Regulation 347?

☐ Yes ☐ No ☒ Unknown

If yes, please describe and provide copies of relevant records.

6.7 Are solid wastes (e.g., scrap, household waste, recycling) generated on-Site?

☐ Yes ☐ No ☒ Unknown

If yes, describe storage and disposal practices.

6.8 Are batteries (non-household type) used on the Site?

☐ Yes ☐ No ☒ Unknown

If yes, describe storage and disposal practices.

6.9 Has any liquid or solid waste been dumped, placed or buried on the Site?

☐ Yes ☐ No ☒ Unknown

If yes, describe.

6.10 Has any soil (fill, gravel, topsoil, etc.) been brought to and deposited on the Site (for construction, grading, filling low areas, berms, etc.)?

☒ Yes ☐ No ☐ Unknown

If yes, describe.

Likely historical fill placement to construct road. Native soil likely consists of peat.

Section 7: Spills

7.1 Are there any records of spills (e.g., chemical, oil) or records of discharges of contaminants?

☐ Yes ☐ No ☒ Unknown

If yes, describe.

Please Contact Peel Region
Alyssa Accardo
(Acting) Manager, Environmental Control
Wastewater Division
Public Works
Region of Peel
Alyssa.Accardo@peelregion.ca
T. 905-791-7800 ext. 4614

7.2 Are spill prevention and contingency plans available (e.g., secondary containment measures, spill kits, spill response training for employees)?

☐ Yes ☐ No ☒ Unknown

If yes, describe.

Section 8: Environmental Compliance

8.1 Is there any known or suspected soil and/or groundwater contamination at the Site?

☐ Yes ☐ No ☒ Unknown

If yes, describe.

Contact Peel Region

8.2 Are there any contaminant discharges from the Site to the natural environment (e.g., stack emissions, fugitive air emissions)?

☐ Yes ☒ No ☐ Unknown

If yes, describe emissions contaminants, type, and operations.

8.3 Is the Site operating under and in accordance with an Environmental Compliance Approval (formerly Certificate of Approval)?

☐ Yes ☒ No ☐ Unknown

If yes, please describe and provide an Environmental Compliance Approval (ECA) number.

8.4 Is there a Joint Health and Safety Committee?

☒ Yes ☐ No ☐ Unknown

If yes, do they have any outstanding environmental concerns?

JHSC for City of Brampton

8.5 Are there any current or former regulatory compliance issues (such as zoning, labour or environment) related to the Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

8.6 Are there any previous environmental reports, environmental audit reports or environmental monitoring data (including data created in response to an order or request of the Ministry of the Environment, Conservation and Parks) available for the Site?

☐ Yes ☐ No ☒ Unknown

If yes, please provide.

8.7 Are there any geotechnical reports for building/development available?

☒ Yes ☐ No ☐ Unknown

If yes, please provide.

8.8 Are there any property appraisal or insurance inspection reports available?

☐ Yes ☒ No ☐ Unknown

If yes, please provide.

8.9 Are there any existing monitoring wells on the Site?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

8.10 Are there any regulatory permits and records available related to potential environmental concerns?

☒ Yes ☐ No ☐ Unknown

If yes, describe.

Consultation with TRCA will be required for reconstruction due to close proximity to Heart Lake Conservation Area lands.

8.11 Have any other inspections occurred on the Site (i.e., Ministry of Labour, Ministry of the Environment, Conservation and Parks, Municipality, Insurance Agency, etc.)?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

8.12 Are there any problems with the neighbouring properties such as chemical storage, contamination, etc.?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

8.13 Are there any noise or odour problems related to the Site or surrounding neighbouring properties?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

Section 9: Additional Information

9.1 Is there another person we should contact for additional information?

☐ Yes ☒ No ☐ Unknown

If yes, please provide contact information.

9.2 Do you have any additional comments pertaining to the Site (environmental, operations, historical information)?

☒ Yes ☐ No

If yes, describe.

Previous EA for Countryside Drive was completed in 2005 and does not appear to have considered Phase 1 ESA. This will be required as part of the current EA

Consultation with TRCA should be conducted to understand their environmental concerns, and Peel Region should be contacted for information on previous spills (Mario to provide contact).

City records indicate that the subject intersection was first constructed with surface treatment in 1987.

The above information is a true representation of my knowledge of the Site and operations. I understand that this information will be reviewed by MTE and compiled in the Environmental Site Assessment report.

Signature of Interview Candidate: mario.goolsarran@brampton.ca Digitally signed by: mario.goolsarran@brampton.ca DN: CN = mario.goolsarran@brampton.ca Date: 2020.10.21 11:27:38 -04'00'

Environmental Site Assessment Inspection Form

Site Address:	Heart Lake Road and Countryside Drive, Brampton	**MTE File No.:**	47877-100
		Date/Time:	Oct. 2, 2020 (12:00-12:30)

MTE Representative: Sean Anderson, P.Eng.

Name of Site Contact: N/A

Weather Conditions: Clear, 15 degree Celcius

Section 1: Site Setting, Occupant Information, and Operations

Provide a sketch in the space below (or attach a site plan) showing topographic conditions and locations of structures, fuel storage tanks, watercourses, ditches, standing water, parking facilities, evidence of asphalt or floor repairs, roads, rights-of-way, and lagoons on or adjacent to the Site.

Refer to Figure 2 of Phase I ESA

1.1 Who is/are the current occupant(s)/tenant(s) of the Site?
Provide a brief description of operations and housekeeping observed during the inspection.

Municipal intersection right-of-way

1.2 What is the current type of property use (check all that apply)?

☐ Commercial use	☐ Industrial use
☒ Community use	☐ Residential use
☐ Institutional use	☐ Parkland use
☐ Agricultural or other use	☐ Vacant (confirm last known use)

1.3 Was any evidence observed of the following operations at the Site?

Agricultural / Potential Pesticide Use	☐ Yes	☒ No
Bulk liquid dispensing (e.g., gasoline outlet)	☐ Yes	☒ No
Dry Cleaning (Depot or Facility)	☐ Yes	☒ No
Machine Shop	☐ Yes	☒ No
Manufacturing	☐ Yes	☒ No
Rail yards, tracks and spurs	☐ Yes	☒ No
Vehicle maintenance or repairs	☐ Yes	☒ No
Waste Treatment, Disposal, or Recycling	☐ Yes	☒ No

Section 2: Building Information and Special Attention Items

2.1 Are there existing buildings at the Site?

☐ Yes ☒ No

If yes, list the existing buildings and describe observed uses, construction type, additions, etc.

2.2 Was any evidence observed of loading docks or shipping/receiving bays?

☐ Yes ☒ No

If yes, describe.

2.3 Was any evidence observed of pits or other similar floor openings or depressions?

☐ Yes ☒ No

If yes, describe.

2.4 Was any evidence observed of heating systems associated with the building(s)?

☐ Yes ☒ No

Fuel source: ☐ Natural Gas ☐ Fuel Oil ☐ Electric ☐ Other (describe below)

2.5 Was any evidence observed of mould/water damage or roof leaks in the building(s)?

☐ Yes ☒ No

If yes, describe.

2.6 Was any evidence noted of odours or other concerns related to indoor air quality?

☐ Yes ☒ No

If yes, please describe.

2.7 Was any evidence observed of the following suspected asbestos-containing material?

Building Insulation	☐ Yes	☒ No
Transite wall board, siding, or roof panels	☐ Yes	☒ No
Pipe Wrap/Insulation	☐ Yes	☒ No
Boiler Insulation	☐ Yes	☒ No
Tank Linings	☐ Yes	☒ No
Ceiling Tiles	☐ Yes	☒ No
Floor Tiles	☐ Yes	☒ No
Plaster	☐ Yes	☒ No
Expansion Joint	☐ Yes	☒ No
Thermal Insulation	☐ Yes	☒ No
Spray Fire-Proofing	☐ Yes	☒ No

If yes to any of the above, describe the location and condition.

2.8 Was any evidence observed of potential PCB-containing equipment, including transformers, florescent light ballasts/capacitors?

☐ Yes ☒ No

If yes, describe.

2.9 Was any evidence observed of potential lead-containing materials in the building(s), including interior/exterior paint or lead pipes?

☐ Yes ☒ No

If yes, describe.

2.10 Was any evidence observed of potential ozone-depleting substances (for example, refrigeration or air conditioning equipment in place before 1998)?

☐ Yes ☒ No

If yes, describe.

2.11 Was any evidence observed of potential UFFI-containing materials in the building(s)?

☐ Yes ☒ No

If yes, describe.

2.12 Was any evidence observed of potential major or persistent sources of noise and/or vibration, odours, or electric and magnetic fields (e.g., high voltage power lines)?

☐ Yes ☒ No

If yes, describe.

Section 3: Site Services

3.1 Was any evidence observed of the following site services (check all that apply)?

Potable Water Supply	☐ Municipal	☐ Private Well	☒ None
Wastewater (sewage) system	☐ Municipal	☐ Septic System	☒ None
Stormwater management ponds	☐ Yes	☒ No	
Catch basins	☒ Yes	☐ No	
Electricity Service	☐ Underground	☒ Overhead	☐ None
Telecommunication Service	☐ Underground	☒ Overhead	☐ None
Natural Gas Service	☐ Underground	☒ None	

If applicable, describe on-Site water supply wells (and any treatment systems) and/or septic systems.

Existing catch basins along curbs of Countryside Drive.
Overhead hydro/telecommunication lines above intersection.

3.2 Was any evidence observed of back-up generators or emergency power systems?

☐ Yes ☒ No

If yes, describe fuel source.

MTE

3.3 Was any evidence observed of potential drainage issues (e.g., floodplain, surface water ponding, flooding, etc.)?

☐ Yes ☒ No

If yes, describe.

Section 4: Site Operations

4.1 Was any evidence observed of hydraulic equipment (e.g., in-ground vehicle hoists, elevators, loading docks, cranes, presses, compactors) on the Site?

☐ Yes ☒ No

If yes, describe.

4.2 Was any evidence observed of equipment, vehicle or plant floor wash down at the Site?

☐ Yes ☒ No

If yes, describe.

4.3 Was any evidence observed of fires (e.g., building fires, waste incineration, brush fires, etc.)?

☐ Yes ☒ No

If yes, describe.

4.4 Was any evidence observed of dust control activities at the Site?

☐ Yes ☒ No

If yes, list dust control methods and products used.

4.5 Was any evidence observed of salt or any other de-icing chemical storage or application?

☐ Yes ☒ No

If yes, describe product(s) observed, storage and application practices.

Section 5: Fuel Storage and Handling

5.1 Was any evidence observed of existing aboveground or underground fuel storage tanks observed at the Site?

☐ Yes ☒ No

If yes, describe type and contents, any observations related to construction material, secondary containment, rusting, or surface spills, and any label information regarding capacity, year, spill containment type, etc.

5.2 Was any evidence observed of former aboveground or underground fuel storage tanks removed in the past (e.g., fill or vent pipes, copper fuel lines, boiler room pipe openings)?

☐ Yes ☒ No

If yes, describe.

5.3 Was any evidence observed of fuel pumps or fueling systems on the Site?

☐ Yes ☒ No

If yes, describe.

5.4 Was any evidence observed of jerry cans, drums or totes containing fuel/oil/lubricants?

☐ Yes ☒ No

If yes, describe.

Section 6: Waste Oils, Chemicals, Liquid Wastes, Solid Wastes

6.1 Was any evidence observed of waste oils or liquid industrial wastes?

☐ Yes ☒ No

If yes, describe locations of waste oil tanks or drums, and any evidence of spills or leaks.

6.2 Was any evidence observed of oil-water separators, sumps, and/or floor drains at the Site?

☐ Yes ☒ No

If yes, describe location, suspected source of incoming liquid, and effluent discharge location.

6.3 Was any evidence observed of chemicals, solvents, unidentified substances, or hazardous materials (e.g. mercury or nuclear gauges) stored or used at the Site, including washbasins?

☐ Yes ☒ No

If yes, provide an inventory of substances, obtain copies of Safety Data Sheets SDS) where available, and describe usage and storage practices.

6.4 Was any evidence observed of the following solid waste storage practices?

Refuse dumpsters/bins	☐ Yes	☒ No
Recycling dumpsters/bins	☐ Yes	☒ No
Drums	☐ Yes	☒ No
Waste piles	☐ Yes	☒ No
Illegal dumping	☐ Yes	☒ No
Surface impoundment	☐ Yes	☒ No
Scrap metals	☐ Yes	☒ No
Batteries (non-household type)	☐ Yes	☒ No
Other	☐ Yes	☒ No

If yes to any of the above, describe storage practices and locations on the Site.

6.5 Was any evidence observed of past placement of solid waste or soil (fill, gravel, topsoil, etc.) including stockpiles?

☐ Yes ☐ No

If yes, describe suspected purpose (e.g., grading, filling low areas, berms, etc.).

Possible past placement of fill to raise grade of roadway. Wetlands to the east and south/west of the intersection are at a lower grade than the Site.

Section 7: Spills

7.1 Was any evidence observed of spills (e.g., chemical, oil), discharges of contaminants at the Site, or run-off from adjacent properties, including staining, stressed vegetation, etc.?

☐ Yes ☒ No

If yes, describe.

Section 8: Environmental Compliance

8.1 Was any evidence observed of contaminant discharges from the Site to the natural environment (e.g., stack emissions, fugitive air emissions)?

☐ Yes ☒ No

If yes, describe emissions contaminants, type, and operations.

8.2 Was any evidence observed of existing wells on the Site (e.g., water supply wells, monitoring wells, gas wells)?

☐ Yes ☒ No

If yes, describe, including reference to available online well records.

Section 9: Study Area

9.1 Who is/are the current occupant(s)/tenant(s) of the adjacent property to the north of the Site? Provide a brief description of operations and housekeeping observed during the inspection.

Ongoing land development project with evidence of earthworks.

9.2 Who is/are the current occupant(s)/tenant(s) of the adjacent property to the east of the Site? Provide a brief description of operations and housekeeping observed during the inspection.

Wetland.

9.3 Who is/are the current occupant(s)/tenant(s) of the adjacent property to the south of the Site? Provide a brief description of operations and housekeeping observed during the inspection.

Wetland.

9.4 Who is/are the current occupant(s)/tenant(s) of the adjacent property to the west of the Site? Provide a brief description of operations and housekeeping observed during the inspection.

Wetland and wooded area.

9.5 Was any evidence observed of water bodies, wetlands, or potential environmentally sensitive areas within 30 metres of the Site?

☒ Yes ☐ No

If yes, describe.

Adjacent wetlands to the east and south/west of the intersection.

Section 10: Additional Information

10.1 Were there any limitations to the inspection (e.g., snow cover, inaccessible areas, inaccessible roof, locked rooms, etc.)?

☐ Yes ☒ No ☐ Unknown

If yes, describe.

10.2 Do you have any additional comments pertaining to the Site (environmental, operations, historical information)?

☐ Yes ☒ No

If yes, describe.

Signature of MTE Representative: Completed electronically by Sean Anderson, P.Eng.

Photograph No. 1 – Southeast-facing view of the Site depicting Heart Lake Road.

Photograph No. 2 – South-facing view of the Site.

Photograph No. 3 – South-facing view of the Site, depicting Countryside Drive.

Photograph No. 4 – South-facing overview of the Site.

Photograph No. 5 –Southwest-facing view of a soil berm associated with an ongoing land development project on the adjacent property to the north of the Intersection.

Photograph No. 6- Northeast-facing view of Countryside Drive.

Photograph No. 7- South-facing view of Heart Lake Road and the wetland to the south.

Photograph No. 8- East-facing of the wetland to the east of Site.

Photograph No. 9- North-facing view of Countryside Drive.

Photograph No. 10- West-facing view of the Intersection.

Photograph No. 11- **Northeast-facing view of the Site, depicting Countryside Drive.**

Appendix I

Transportation and Traffic Analysis Report

Paradigm Transportation Solutions Limited

April 2021

MTE

Transportation and Traffic Analysis Report

Environmental Assessment Study for Heart Lake Road and Countryside Drive Intersection

ptsl.com

Paradigm Transportation Solutions Limited

April 2021
200333

Project Summary

Project Number
200333

April 2021

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Transportation and Traffic Analysis Report
Heart Lake Road & Countryside Drive

Signing Licencee/Engineer, P.Eng.

Disclaimer

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Version 1.0.0

Executive Summary

Context

The City of Brampton (the City) conducted a function and design review of the Heart Lake Road corridor between Sandalwood Parkway East and Mayfield Road (November 2019). The study recommended various improvements for the Heart Lake Road corridor including upgrades to the Heart Lake Road/Countryside Drive intersection. A roundabout was proposed for further investigation as part of an overall traffic calming scheme for the Heart Lake Road corridor.

Paradigm Transportation Solutions Limited (Paradigm) was retained to undertake and complete the transportation engineering analysis to investigate and determine the feasibility of implementation of potential improvements, including but not limited to a roundabout at the intersection of Heart Lake Road/Countryside Drive.

Conclusions

The conclusions of the transportation and traffic analysis are as follows:

- Under base year conditions intersections within study area are characterized by acceptable delays and demands within capacity.

  Exceptions are noted at Heart Lake Road with Countryside Drive, the Highway 410 Southbound Off-Ramp, and Sandalwood Parkway.

  At these locations several critical movements are identified. Specifically, at the subject focus intersection of Heart Lake Road/Countryside Drive, the westbound left turn movement is reported to operate over-capacity. The poor operations are noted to be further exacerbated under future 2031 and 2041 traffic conditions.
- A review of the five-year collision history (2015 to 2019 inclusive) indicates there were no fatal collisions recorded.

  Heart Lake Road with Countryside Drive and Sandalwood Parkway were identified as two locations with a high collision frequency. The majority of reported collisions were found to be single motor vehicle collisions related to driver error/behaviour and not a function of the roadway or intersection design.

  At the subject focus intersection of Heart Lake Road/ Countryside Drive the reported number of correctible collisions to warrant the consideration of traffic signal control are just short of meeting the threshold criteria.

- A sight distance review was conducted for the Heart Lake Road/Countryside Drive intersection where it was confirmed there is more than adequate approach and departure sight distance available.

  It is noted even with the adequate sight distance available a high frequency of collisions was occurring. The reported collisions were determined to be attributed to aggressive driver behaviour. This resulting situation correlates with the poor operations during the peak hours stemming from a lack of gaps within the traffic stream along Heart Lake Road leading to drivers taking increased risk and more aggressive manoeuvres.

  Based upon these findings it alludes the current intersection traffic control warrants improvement.

- The intersection of Heart Lake Road/Countryside Drive was found to fall just short of meeting threshold criteria for the consideration of traffic signal control under base year traffic conditions. Under 2031 and 2041 traffic conditions the intersection meets the signal justification criteria.

  Under traffic signal control the intersection is reported to operate at acceptable levels of service and well within capacity under 2041 traffic conditions.

- In addition to traffic signal control to mitigate the poor operations, roundabout control was investigated. It was determined Heart Lake Road/Countryside Drive would be suitable for roundabout implementation.

  Three roundabout configurations were investigated where it was determined a single-lane roundabout with single lane entry on the northbound and southbound approaches along with dual lane entry on the westbound approach would operate at acceptable levels of service and well within capacity under 2041 traffic conditions.

  The feasibility of implementing an appropriately sized facility within the right-of-way will need to be confirmed from a detailed design perspective.

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Appendices

Figures

Tables

1 Introduction

1.1 Background

The City of Brampton (the City) conducted a function and design review of the Heart Lake Road corridor between Sandalwood Parkway East and Mayfield Road (November 2019). The study recommended various improvements for the Heart Lake Road corridor including upgrades to the Heart Lake Road/Countryside Drive intersection. A roundabout was proposed for further investigation as part of an overall traffic calming scheme for the Heart Lake Road corridor.

Paradigm Transportation Solutions Limited (Paradigm) was retained to undertake and complete the transportation engineering analysis to investigate and determine the feasibility of implementation of potential improvements, including but not limited to a roundabout at the intersection of Heart Lake Road/Countryside Drive.

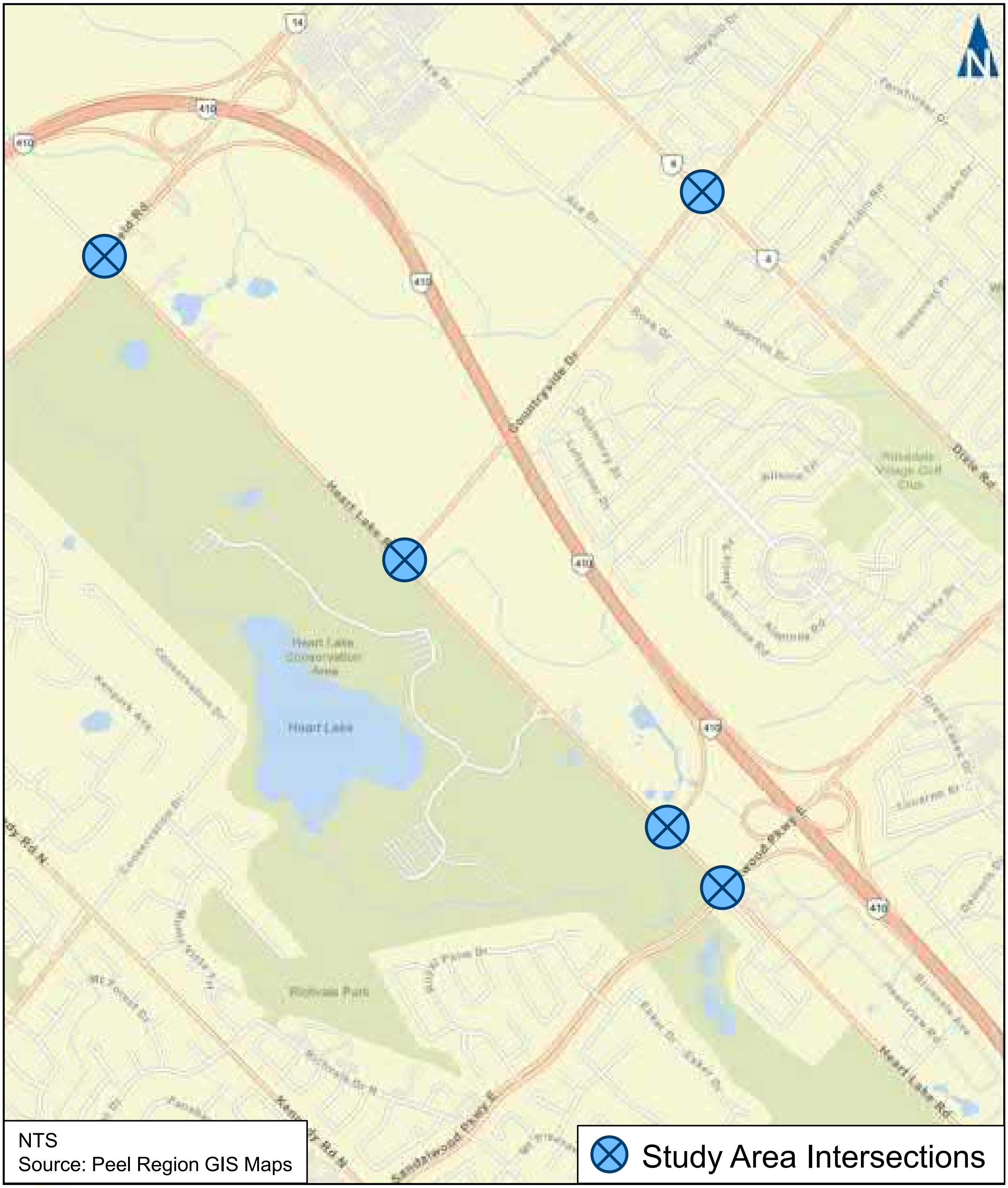
1.2 Purpose and Scope

As part of this Transportation Analysis Report, analysis was conducted for existing and future operations within a study area encompassing five intersections. The study area comprises the intersections of Heart Lake Road with Mayfield Road, Countryside Drive, the Highway 410 Off-Ramp, and Sandalwood Parkway. Additionally, the intersection of Countryside Drive with Dixie Road. **Figure 1.1** illustrates the study area.

The objectives of this report are as follows:

- Review all available background documents, and identify relevant information;
- Analyze the operations of the existing transportation facilities within the study area;
- Develop traffic forecasts for 2031 and 2041 horizon years, representing the horizon years consistent with the City EMME model;
- Identify existing and future operational and safety deficiencies; and
- Identify applicable operational and safety improvements.

The analysis within this report has been carried out in general accordance with the City of Brampton's "Traffic Impact and Parking Study Terms of Reference", April 2019.



Study Area

Figure 1.1

1.3 Traffic Data

This study was initiated and authored amidst the COVID-19 global pandemic. As a result, unexpected obstacles were encountered which impacted the ability to collect new traffic data. The Province of Ontario implemented restrictions for day-to-day activities in response to the global pandemic. Restrictions included the closure of non-essential businesses and social distancing measures to curb the spread of the virus (i.e., lockdown and stay-at-home precautions). As a result, typical traffic volumes and travel patterns have been impacted. The collection of new turning movement counts would not provide an accurate reflection of typical conditions in the study area.

City staff provided all available traffic data. Intersection count data was not available for the following locations:

- Mayfield Road and Heart Lake Road;
- Countryside Drive and Dixie Road; and
- Heart Lake Road and Highway 410 Off-Ramp.

City staff offered direction regarding the noted gaps in the traffic data. To fill the voids of the existing study area intersection count data, Paradigm undertook turning movement counts on 19 November 2020.

In addition, traffic volumes were extracted from the November 2019 Stantec *Function and Design Review*[1] report. Furthermore, City staff also undertook a count at the Heart Lake Road/Countryside Drive intersection on 09 March 2021, further discussion is provided in Section 2.5.

The City also provided the following traffic data:

- EMME model plots for 2011 (base year), and future 2031 and 2041 horizon years;
- Signal timing data for all signalized study area intersections; and
- Collision data for intersections and mid-block locations within the study area for the five-year period of 2015 – 2019.

Appendix A contains the traffic data for reference.

1 Prepared by Stantec for the City of Brampton, *Function and Design Review of Heart Lake Road Corridor*, November 2019.

2 Existing Conditions

2.1 Land Use

West of Heart Lake Road, the land uses are identified as open space encompassing the Heart Lake Conservation park. The areas east of Heart Lake Road are currently undeveloped open space, with portions of industrial land uses south of Mayfield Road and residential land uses south of Countryside Drive.

2.2 Roads and Traffic Control

The characteristics of the roads and intersections in vicinity of the subject site are described below. Reference was made to the *City of Brampton Official Plan*[2].

- **Heart Lake Road** is a north-south two-lane minor arterial road with a posted maximum speed limit of 60 km/h. South of Mayfield Road, Heart Lake Road operates under the jurisdiction of the City of Brampton, whereas north of Mayfield Road it operates under the jurisdiction of the Town of Caledon. Between Mayfield Road and Sandalwood Parkway, the roadway provides a two-lane cross-section with one travel lane in each direction. South of Sandalwood Parkway a four-lane cross-section with two travel lanes in each direction is provided.

  Heart Lake Road currently provides 3.5-metre lane widths with a 2-metre gravel shoulder on either side of the road. Solid white edge of pavement markings are provided along the corridor. Centreline markings vary from single solid yellow, single dashed yellow, double solid yellow, and double with solid and dashed marks throughout the corridor. Roadside illumination is provided along the east side of the roadway in sporadic locations mainly in the vicinity of intersections.

  Adjacent to the gravel shoulders, Heart Lake Road has ditching and vegetation along both sides throughout roadway corridor.

  Vegetation in vicinity to the Highway 410 southbound off-ramp is noted to obstruct sight lines for drivers approaching Heart Lake Road.

  Countryside Drive is an east-west four-lane minor arterial road with a posted maximum speed limit of 70 km/h operating under the jurisdiction of the City of Brampton. Countryside Drive provides 3.5-metre travel lane widths.

2 *City of Brampton Official Plan, Schedule B: City Road Hierarchy*, Office Consolidation September 2020.

An urban cross-section with curb and gutter is provided along the roadway.

Countryside Drive forms “tee” intersection at Heart Lake Road with stop control provided on the westbound Heart Lake Road approach. Separate left and right turn lanes are provided on the westbound approach, along with an auxiliary right turn lane on the northbound approach.

- **Highway 410** is a north-south Provincial highway operating under the jurisdiction of the Ministry of Transportation, Ontario (MTO). The off-ramp has a posted advisory speed limit of 60 km/h. The approach to Heart Lake Road provides a two-lane cross-section with 3.5-metre lane widths.

  The southbound off-ramp forms a stop-controlled intersection with Heart Lake Road.

  Dixie Road is a north-south major arterial road with a posted maximum speed limit of 70 km/h operating under the jurisdiction of Peel Region. The roadway provides a two-lane cross-section north of Countryside Drive and a four-lane cross-section south of Countryside Drive. Dixie Road provides 3.5-metre-wide travel lanes with a 5-metre-wide raised median south of Countryside Drive. The roadway provides an urban cross-section with curb and gutter are provided along side the roadway.

  Dixie Road forms a signalized intersection with Countryside Drive. Auxiliary left turn lanes are provided on all intersection approaches and auxiliary right turn lanes are provided on the eastbound, westbound, and northbound intersection approaches.

- **Mayfield Road** is an east-west six-lane major arterial with a posted maximum speed limit of 80 km/h operating under the jurisdiction of Peel Region.

  Mayfield Road provides 3.7-metre lanes with a 1.7-metre raised median both immediately east and immediately west of Heart Lake Road.

  The roadway provides an urban cross-section with curb and gutter are provided along side the roadway.

  Mayfield Road forms a signalized intersection with Heart Lake Road. Auxiliary left and right turn lanes are provided on all intersection approaches.

- **Sandalwood Parkway** is an east-west six-lane major arterial road with a posted maximum speed limit of 60 km/h operating under the jurisdiction of the City of Brampton.

Sandalwood Parkway has 3.5-metre lanes with a 2-metre raised median immediately east and immediately west of Heart Lake Road. The median width east of Heart Lake Road is maintained at 2 metres beyond the bridge over Highway 410, while the median west of Heart Leak Road expands to 5 metres.

Curb and gutter are provided along the outside border of both outside lanes throughout the study area. Yellow lane markings are painted around the centre median, while white striped lane lines separate the same direction travel lanes in each direction.

Sandalwood Parkway forms a signalized intersection with Heart Lake Road. Auxiliary left and right turn lanes are provided on all intersection approaches.

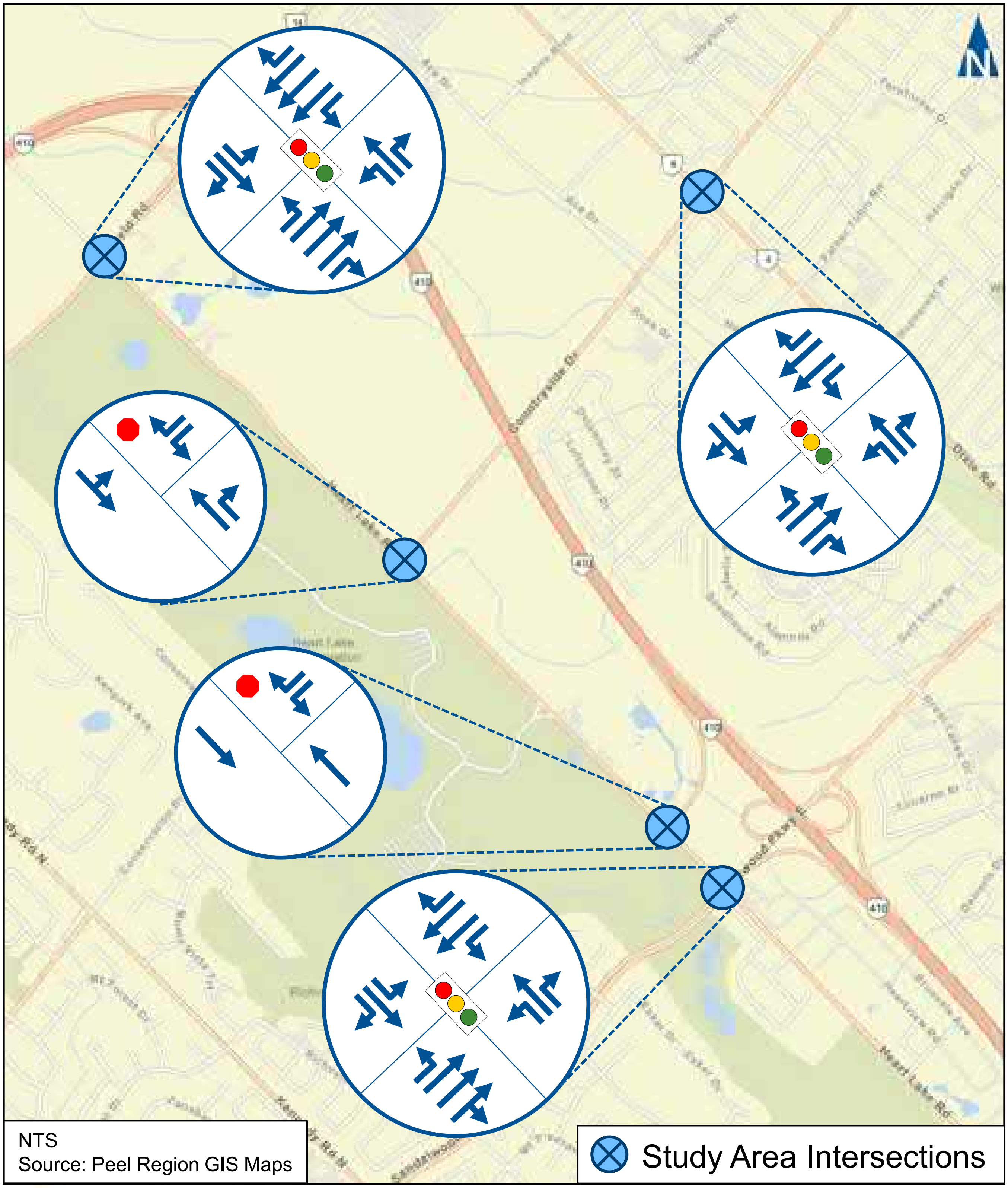
Figure 2.1 illustrates the existing lane arrangements and traffic control devices.

2.3 Transit

Brampton Transit provides bus transit service throughout the study area. At the time of writing, transit route information described were noted to be operating on reduced/altered service schedules due to the ongoing COVID-19 pandemic.

The Heart Lake Road corridor is served by a mixture of local and regional transit services, primarily centered along Hurontario Street and Bovaird Drive. Based on current information posted on the Brampton Transit website, the study area is served by the following routes:

- **Route 18 – Dixie** provides service between Inspire Boulevard east of Dixie Road and the intersection of Meyerside Drive/Dixie Road. Service is provided seven days a week with the nearest stop being located along Dixie Road south of Dolbyhill Drive. Weekday service operates between 4:19 AM and 10:35 PM with headways between 3 and 12 minutes during the morning and afternoon peak periods. Saturday service operates from 5:38 AM to 8:43 PM with headways in the order of 30 minutes during the morning peak period and in the order of 20 minutes for the remainder of the service day. Sunday service operates from 6:45 AM to 7:16 PM with headways in the order of 30 minutes.
- **Route 19 – Fernforest** provides service between the Bramalea Terminal and Ross Drive south of Countryside Drive. Service is provided on weekdays only with several stops located along Countryside Drive. Weekday service operates from 5:10 AM to 7:58 PM with 40-minutes headways during the morning and afternoon peak hours.



Existing Lane Configurations and Traffic Control

Figure 2.1

- **Route 23 - Sandalwood** provides service between the Highway 50 Zum Queen Station Stop and Mount Pleasant Village – Route 23 Stop. Weekday service operates from 4:10 AM to 1:04 AM with 20-minute headways during the morning and afternoon peak hours. Saturday service operates from 5:15 AM to 11:00 PM with headways in the order of 30 minutes. Sunday service is also offered from 7:00 AM to 11:03 PM with headways in the order of 30 minutes.
- **Route 208 – Mayfield** provides service between the Bramalea Terminal and Mayfield Secondary School. Weekday service operates from 7:25 AM to 7:45 AM and 10:49 AM to 11:09 AM. This route provides service only to and from Mayfield Secondary School.

2.4 Active Transportation

2.4.1 Cycling

Countryside Drive is identified as a multi-use pathway, beginning approximately 30 metres west of Ross Drive and continuing east beyond Dixie Road to Goreway Drive[3]. The multi-use path is located along the south side of Countryside Drive before transitioning to the north side east of Bramalea Drive.

Dixie Road provides a multi-use pathway along the west side of the roadway from south of Countryside Drive. The multi-use pathway transitions to a recreational trail approximately 600 metres south of Countryside Drive at Naperton Drive.

The Esker Lake Trail is a City recreational trail located parallel to and west of Heart Lake Road. The path begins at Mayfield Road and continues south through the Heart Lake Conservation Park, crosses over Sandalwood Parkway approximately 170 metres west of Heart Lake Road and connects to a signed route along Heart Lake Road south of its intersection with Copperfield Road.

A boulevard bike path is provided along both sides of Sandalwood Parkway east of Heart Lake Road.

2.4.2 Walking

Sidewalks are provided along the west side of Heart Lake Road south of Sandalwood Parkway; however, sidewalks are not provided along the Heart Lake Road corridor between Mayfield Drive and Sandalwood Parkway.

[3] City of Brampton, “Brampton Cycling Map”.

Countryside Drive provides sidewalks along both sides of the road throughout the study area. The sidewalk along the south is approximately 2.5 metres-wide, while along the north the sidewalk is approximately 1.5 metres wide. West of Ross Drive, a buffer of approximately 5.0 metres between the vehicle travel lanes and the sidewalk is provided. The exception is for portion of the roadway on the bridge crossing Highway 410 where sidewalks are directly adjacent to the vehicle travel lanes. Aforementioned in Section 2.4.1, sidewalk on the south side transitions to a multi-use path for both cyclists and pedestrians approximately 30 metres west of Ross Drive. A delineated crosswalk is provided across the east intersection leg at the intersection of Heart Lake Road/Countryside Drive.

Sandalwood Parkway provides a 1.5-metre wide sidewalk along both sides of the road. The intersection of Heart Lake Road/Sandalwood Parkway provides delineated ladder crosswalks and pedestrian signal heads with countdown timers at all approaches. Also, a pedestrian refuge island is provided at the southwest quadrant of the intersection.

South of Countryside Drive, a 3.5-metre multi-use trail is provided along the west side of Dixie Road, while a 2.5-metre sidewalk is provided along the east side. The intersection of Countryside Drive/Dixie Road provides delineated ladder crosswalks and pedestrian signal heads at all approaches.

East of Heart Lake Road, Mayfield Road has a 1.5-metre sidewalk along both sides of the road. A 2.5-metre buffer is provided between the sidewalks and the vehicle travel lanes. West of Heart Lake Road, Mayfield Road has a 2.5-metre sidewalk along the south with no buffer between the sidewalk and vehicle travel lane. The sidewalk terminates 70 metres west of Heart Lake Road. The intersection of Heart Lake Road and Mayfield Road provides painted ladder crosswalks and pedestrian signal heads with countdown timers at all approaches.

2.5 Traffic Volumes

2.5.1 Intersection Volumes

As agreed with City of Brampton staff, the latest and most appropriate turning movement count (TMC) data for use would include the City’s 2018 TMC at the Heart Lake Road intersections with Countryside Drive and Sandalwood Parkway.

For the remainder of the study area intersections, City staff agreed the next most applicable data for use would be the Paradigm collected 2020 data. However, upon a detailed review by Paradigm and as confirmed with City staff, the AM peak hour counts were deemed to be atypical and not appropriate for use. City staff agreed the Paradigm collected data were to be used for the PM peak hour, whereas, the historical Stantec's intersection count data would be used for the AM peak hour.

The traffic forecasts were submitted to City staff for interim review. Following the review City staff advised the originally provided 2018 TMC for the intersection of Heart Lake Road/Countryside Drive was identified as abnormally high. Staff noted the volume discrepancy was likely a function of adjacent parallel road construction activities when the count was collected. In response, City staff completed a new count at this location in March 2021 for use, advising to apply a 20% factor at this count location to increase volumes to account for COVID conditions.

Table 2.1 summarizes the traffic data used at each study area intersection.

TABLE 2.1: EXISTING TRAFFIC DATA

Intersection	Traffic Count	
	AM Peak Hour	PM Peak Hour
Heart Lake Road/ Mayfield Road	Extracted from 2019 Stantec Report	Paradigm Collected November 2020
Heart Lake Road/ Countryside Drive	City of Brampton Updated March 2021 Count	City of Brampton Updated March 2021 Count
Countryside Drive/ Dixie Road	Extracted from 2019 Stantec Report	Paradigm Collected November 2020
Heart Lake Road/ Highway 410 Off-Ramp	Extracted from 2019 Stantec Report	Paradigm Collected November 2020
Heart Lake Road/ Sandalwood Parkway	City of Brampton Collected October 2018	City of Brampton Collected October 2018

AM Peak Hour Volumes

The traffic data extracted from the 2019 Stantec report were determined to be dated 2016. The 2016 volumes were grown to match the adjacent intersection locations counts using annually compounded growth rates calculated from the City's EMME model plots. The volumes upstream and downstream from the Heart Lake Road intersections with Countryside Driveway and Sandalwood Parkway were balanced with the internal network volumes (i.e., the volumes along Countryside Drive west of Dixie Road were balanced with the volumes east of Heart Lake Road).

PM Peak Hour Volumes

The data utilized to represent base year PM peak hour volumes were the 2020/2021 data and therefore were considered representative of base year conditions.

Figure 2.2A and **Figure 2.2B** illustrate the base year AM and PM peak hour traffic volumes, respectively.

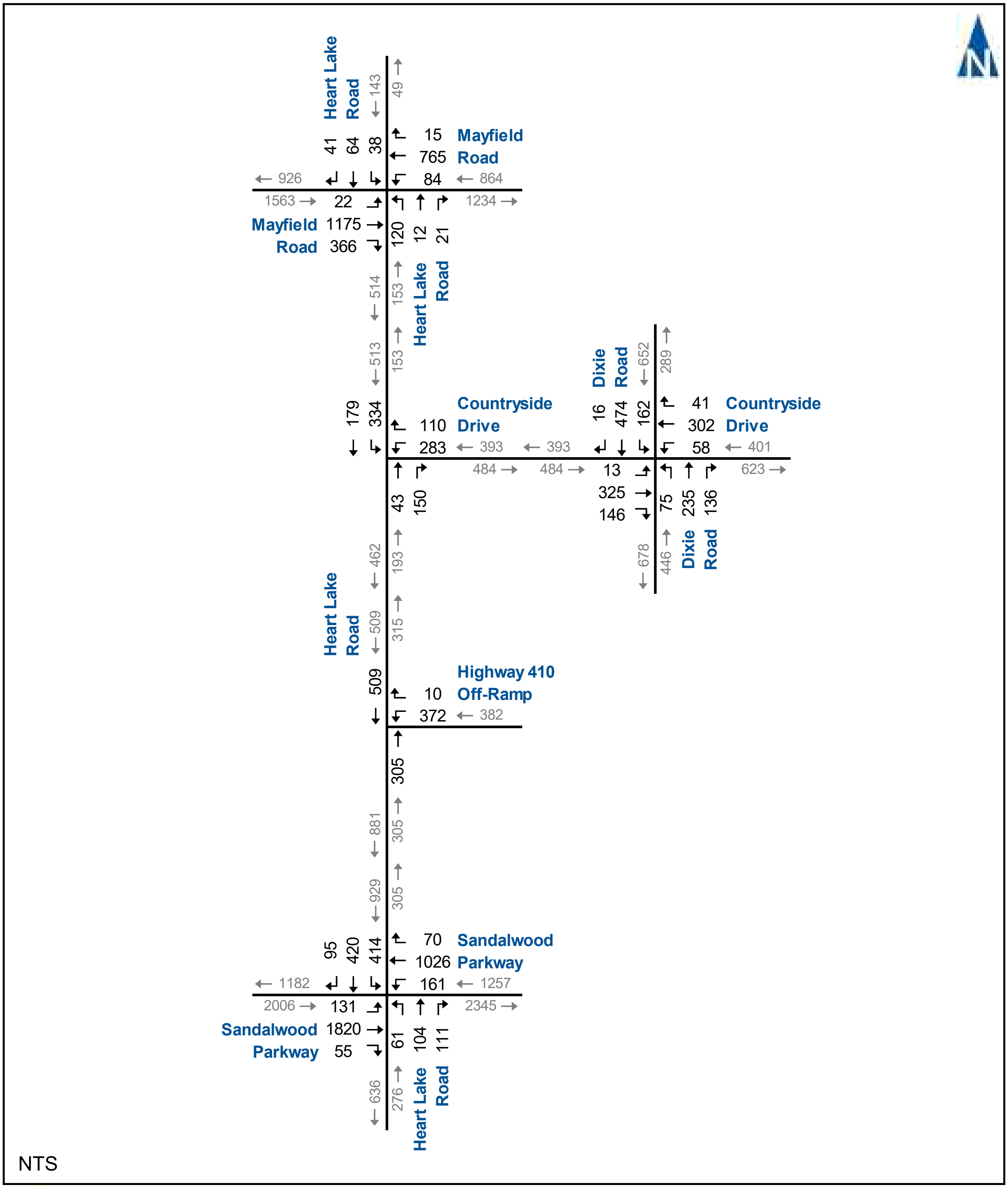
2.5.2 Corridor Traffic Volumes

The average two-way daily traffic along the Heart Lake Road and Countryside Drive corridors is reported to range between 7,500 – 10,300 vehicles and 11,930 – 16,440 vehicles, respectively.

The planning level daily capacity of a two-lane roadway with left turn lanes is estimated to be 18,300 vehicles per day (based on a level-of-service D/E threshold per the Highway Capacity Manual).

The planning level daily capacity of a four-lane roadway with left turn lanes is estimated to be 36,800 vehicles per day (based on a level-of-service D/E threshold per the Highway Capacity Manual).

This indicates Heart Lake Road and Countryside Drive both currently provide the appropriate number of lanes and sufficient capacity for an acceptable level of service under base year conditions.

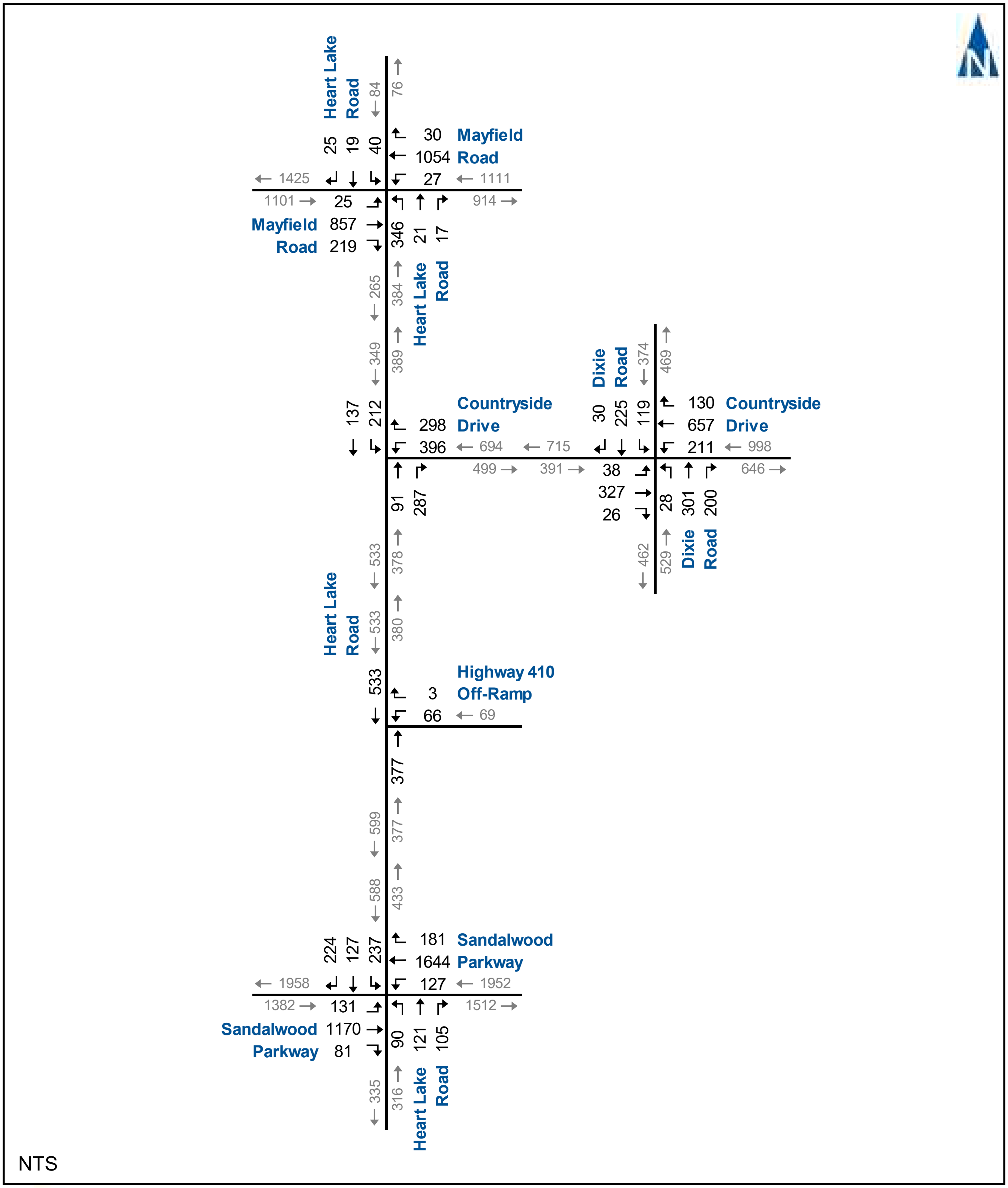


paradigm TRANSPORTATION SOLUTIONS LIMITED

Base Year Traffic Volumes
AM Peak Hour

Transportation Analysis Report
200333

Figure 2.2A



Base Year Traffic Volumes PM Peak Hour

Figure 2.2B

2.6 Analysis Methodology

Intersection level of service (LOS) is a recognized method of quantifying the average delay experienced by drivers at intersections. It is based on the delay related to the number of vehicles desiring to make a through or turning movement, compared to the estimated capacity for that movement. The capacity is based on several criteria including, but not limited to, vehicle headways, intersection geometry, vehicle composition, opposing traffic flows, and for signalized intersections, signal timing.

The LOS criteria for unsignalized intersections are somewhat different from the criteria used for signalized intersections, primarily because different transportation facilities create different driver perceptions. The expectation is that a signalized intersection is designed to carry higher volumes of traffic and experience greater delay than that of an unsignalized intersection.

Table 2.2 summarizes the LOS criteria for signalized and unsignalized intersections. The highest possible rating is LOS A, in which the average total delay is equal or less than 10 seconds per vehicles. When the average delay exceeds 80 seconds for signalized intersections, 50 seconds for unsignalized intersections or when the volume-to-capacity ratio is greater than 1.00, the movement is classified as LOS F and improvements are usually implemented, if they are feasible. LOS E is generally used as a guideline for the determination of road improvement needs on through lanes, while LOS F may be acceptable for left-turn movements at peak times, depending on capacity and safety considerations.

TABLE 2.2: VEHICLE LEVEL OF SERVICE DEFINITIONS

Level of Service (LOS)	Signalized Intersection Average Control Delay (seconds per vehicle)	Unsignalized Intersection Average Control Delay (seconds per vehicle)
A	0 – 10	0 – 10
B	> 10 – 20	> 10 - 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 - 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

Capacity is evaluated in terms of the ratio of demand flow to capacity with an at-capacity condition represented by a volume-to-capacity (V/C) ratio of 1.00 (i.e., volume demands equals capacity). While the LOS and v/c for each movement are related, they are calculated independently. Therefore, it is possible to have a poor intersection level of service associated with a low v/c ratio or a good level of service associated with a high v/c ratio. The designation LOS F does not automatically imply that the volume demands at an intersection or on a specific movement exceed the theoretical capacity, nor does a LOS better than E automatically imply that unused capacity is available.

The City of Brampton Traffic Impact and Parking Study Terms of Reference[4] identifies critical operating conditions as follows:

- V/C ratios for overall intersections operations, through movements or shared through/turning movements increase to 0.90 or above;
- V/C ratios for exclusive turning movements increase to 1.00 or above; and
- 95th percentile queue lengths for an individual movement are projected to exceed available turning lane storage.

An operational analysis was conducted at the study area intersections for the AM and PM peak hours using Synchro software, which implements the methods of the Highway Capacity Manual. The key parameters used in the analysis include:

- Existing lane configurations;
- Heavy vehicle percentages derived from existing traffic count data, where available. The default 2.0% was used where detailed data was unavailable;
- Intersection peak hour factor (PHF) of 1.00;
- Pedestrian volumes derived from existing traffic count data, if available;
- Signal timing data for all signalized intersections as provided by City staff; and
- Synchro default values for all other inputs.

2.7 Traffic Operations

This section documents operational deficiencies and constraints, if any, experienced by drivers at the intersections within the study area. The operational deficiencies and constraints identified at this stage will be fundamental to the process of defining remedial measures.

---

4 City of Brampton, “Traffic Impact and Parking Study Terms of Reference”, April 2019.

Table 2.3 summarizes the weekday AM and PM peak hour intersection operations including LOS, delay, V/C ratios, and 95th percentile queue lengths. Critical movements are highlighted.

Under base year conditions the majority of the study area intersections are reported to operate at acceptable levels of service and within capacity. All reported queues would be accommodated by the provided storage. No vehicle queues would encroach back to adjacent intersections. The following exceptions are noted:

- Heart Lake Road/Countryside Drive
  - The westbound left turn movement is reported to operate over-capacity under both the AM and PM peak hours.
- Heart Lake Road/Highway 410 Southbound Off-Ramp
  - The westbound left turn movement is reported to operate over-capacity under the AM peak hour; and
  - All movements operate at acceptable levels of service and within capacity under the PM peak hour.
- Heart Lake Road/Sandalwood Parkway
  - Under the AM peak hour, the overall intersection is reported to be operating at a near-capacity condition (V/C = 0.97)

    Additionally, the westbound left and southbound through movements are reported to be approaching capacity (V/C = 0.87 and 0.90, respectively).

    The southbound left turn movement is reported to operate slightly over-capacity (V/C = 1.05) and the 95th percentile queue would exceed the available storage blocking the adjacent through lane.
  - Under the PM peak hour, the westbound through movement is reported to be approaching capacity (V/C = 0.93).
  - It is noted under base year conditions, the southbound left turn volumes under the AM peak hour satisfy the volume threshold (i.e., 300 vehicles per hour) for consideration of dual left turn lanes based upon Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads guidance. This intersection could easily accommodate a dual left turn movement since the second left turn lane is physically provided in the field, but the current pavement markings prohibit its use.

Appendix B contains the detailed Synchro analysis outputs for reference.

TABLE 2.3: BASE YEAR TRAFFIC OPERATIONS

Intersection	Approach/ Movement		AM Peak Hour LOS[1]	AM Delay[2]	AM V/C[3]	AM Q[4]	PM Peak Hour LOS[1]	PM Delay[2]	PM V/C[3]	PM Q[4]
Heart Lake Road & Mayfield Road *Signalized*	***Overall Intersection***		***B***	***16***	***0.38***	***-***	***C***	***23***	***0.49***	***-***
	EB	Left	B	10	0.08	8	B	19	0.11	13
		Triple Thru	B	13	0.36	84	C	21	0.34	83
		Right	B	12	0.23	15	B	18	0.13	18
	WB	Left	A	7	0.5	15	B	14	0.08	10
		Triple Thru	A	7	0.21	41	B	17	0.37	90
		Right	A	6	0.01	< 1	B	14	0.02	2
	NB	Left	D	50	0.43	44	D	38	0.63	84
		Thru	D	46	0.03	8	C	29	0.03	8
		Right	D	45	0.01	< 1	C	29	0.01	< 1
	SB	Left	E	66	0.43	23	E	66	0.48	23
		Thru	E	69	0.54	34	E	61	0.17	13
		Right	E	62	0.03	2	E	59	0.02	< 1
Heart Lake Road & Countryside Drive *Unsignalized*	WB	Left	F	158	1.18	107	F	116	1.11	119
		Right	A	9	0.11	3	B	10	0.31	11
	NB	Thru	Unopposed Movement				Unopposed Movement			
		Right	Unopposed Movement				Unopposed Movement			
	SB	Left/Thru	A	6	0.24	8	A	6	0.18	5
Countryside Drive & Dixie Road *Signalized*	***Overall Intersection***		***B***	***14***	***0.46***	***-***	***B***	***16***	***0.48***	***-***
	EB	Left	B	17	0.05	5	B	17	0.19	10
		Dual Thru	B	18	0.37	26	B	17	0.29	25
		Right	B	17	0.11	12	B	15	0.02	3
	WB	Left	B	18	0.22	14	C	25	0.67	44
		Dual Thru	B	18	0.34	24	B	19	0.58	50
		Right	B	17	0.03	6	B	16	0.08	10
	NB	Left	A	9	0.19	11	A	10	0.05	7
		Thru	A	9	0.24	25	B	12	0.35	51
		Right	A	8	0.08	7	B	10	0.13	12
	SB	Left	A	9	0.27	20	B	11	0.23	24
		Thru/Right	B	11	0.51	56	B	12	0.29	42
Heart Lake Road & Hwy 410 *Unsignalized*	WB	Left	F	107	1.08	111	C	20	0.22	7
		Right	A	< 1	0.00	< 1	A	< 1	0.00	< 1
	NB	Thru	Unopposed Movement				Unopposed Movement			
	SB	Thru	Unopposed Movement				Unopposed Movement			
Heart Lake Road & Sandalwood Parkway *Signalized*	***Overall Intersection***		***D***	***45***	***0.97***	***-***	***D***	***40***	***0.79***	***-***
	EB	Left	B	20	0.46	33	E	70	0.81	62
		Dual Thru-Thru/Right	C	34	0.78	226	C	27	0.50	115
	WB	Left	R	73	0.87	87	C	20	0.50	28
		Dual Thru	C	28	0.59	167	D	48	0.93	307
		Right	B	19	0.05	11	C	23	0.17	29
	NB	Left	D	43	0.37	23	D	39	0.23	35
		Thru	D	47	0.25	44	D	46	0.24	51
		Right	D	45	0.07	16	D	43	0.07	16

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	V/C[3]	Q[4]	LOS[1]	Delay[2]	V/C[3]	Q[4]
	SB	Left	F	108	1.05	176	D	46	0.57	84
		Thru	E	73	0.90	173	D	46	0.25	53
		Right	D	42	0.13	24	D	46	0.21	35

[1] Level of Service; [2] Average vehicle delay, seconds; [3] Volume to capacity ratio; [4] 95th percentile queue, metres

3 Safety Review

A safety performance review has been undertaken as part of this assessment with the purpose of establishing the safety performance at the subject Heart Lake Road/Countryside Drive intersection and nearby adjacent intersections and roadway segments. This safety review is intended to be complementary to the operational analysis.

The safety performance review consists of two parts. The first is a review of available collision data to identify any trends or patterns that could suggest a safety or operational deficiency in the existing road or intersection configurations. The second part is a thorough analysis of factors affecting safety performance as noted by an experienced transportation engineer conducted during an in-field visit, which includes a review of configuration/geometry, visibility, and roadside conditions.

The collision review focuses on the collision history and possible causes and any obvious safety deficiencies that could be identified through in-field observations, aerial photographs, and/or topographic plan drawings. The trends and patterns of collisions (and related potential causes) through analysis details concerns and issues that were further investigated in the field. An understanding of noted issues provides beneficial information necessary for selecting applicable traffic safety countermeasures.

3.1 Collision Analysis

3.1.1 Overall Summary

Collision data along with the associated turning movement count data for each intersection and mid-block section along the Heart Lake Road corridor were reviewed. Collision data was provided by the City of Brampton for the period of January 2015 – December 2019.

Collision summary tables have been developed to isolate possible trends, such as collision type, location, and severity. Specific findings for intersections and mid-block sections are discussed in subsequent sections. **Figure 3.1** illustrates the locations and number of collisions along the Heart Lake Road corridor. **Appendix C** contains the detailed analysis tables for each intersection and mid-block location.

Based upon a review of the provided data, a total of 186 collisions were reported, with 140 collisions reported occurring at intersections and 46 occurring at mid-block locations within the study area.

Table 3.1 and **Table 3.2** provide an overall summary of all intersection collisions and mid-block collisions that occurred within the study area network for the most recent five-year period.

TABLE 3.1: SUMMARY OF INTERSECTION COLLSIONS

Intersection	Average Number of Collisions Per Year
Heart Lake Road at Sandalwood Parkway	22.4
Heart Lake Road at Countryside Drive	5.2
Countryside Drive at Ross Drive	0.2

TABLE 3.2: SUMMARY OF MID-BLOCK COLLISIONS

Roadway Segment	Average Number of Collisions Per Year
Sandalwood Parkway between Heart Lake Road and Glover Gate-Royal Palm Drive	8.8
Countryside Drive between Dixie Road and Ace Drive-Naperton Drive	0.4

The average number of yearly collisions at the intersections of Heart Lake Road with Countryside Drive and Sandalwood Parkway are determined to be high and indicates these intersections are collision-prone due to the high frequency. The number of reported collisions occurring at both of these locations were found to be consistent over the five-year data period examined.

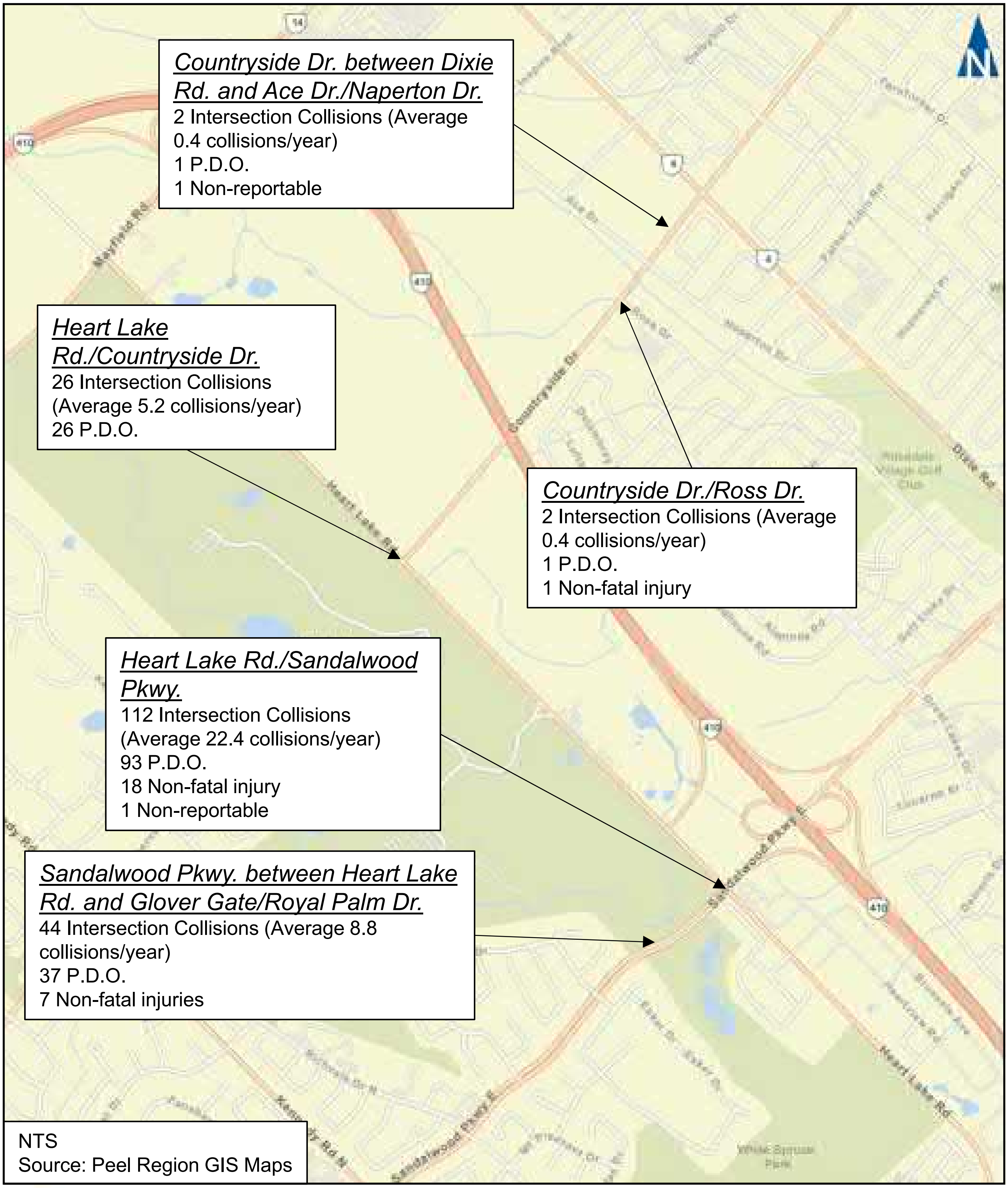
Similarly, the average number of yearly collisions along Sandalwood Parkway between Glover Gate/Royal Palm Drive and Heart Lake Road are considered to be high.

The results indicate the majority of collisions that occurred during the analyzed data period were mainly “Turning Movement” and “Rear-end” collisions which were predominately reported during the evening between 6:00 PM – 9:00 PM on dry road surface conditions. Further review of the detailed collision reports reveals the majority of the collisions were related to driver error and not necessarily a function of the roadway or intersection designs.

The identified impact types infer that aggressive driving behaviour may be the potential cause for several of the collisions. Based upon notes included within the collision reports, common driver actions included failing to yield right-of-way, improper turns, following too closely, disobeying traffic control, and speeding.

In summary, the collision incidences are considerably high at the intersections of Heart Lake Road/Sandalwood Parkway and Heart Lake Road/Countryside Drive. The reported collisions were not typically severe in nature with the majority being property damage only, a nominal amount of non-fatal injury collisions, and no fatal collisions.

Further investigation of each intersection and mid-block location has been undertaken and is discussed in the subsequent sections to determine the potential issues and causes for the reported collisions.



Collision Locations

Figure 3.1

3.1.2 Intersection Collisions

Table 3.3 provides a summary of any identifiable key patterns and trends for the intersection collisions. The locations with the highest number of reported collisions include Heart Lake Road at Countryside Drive and Sandalwood Parkway. It is noted Sandalwood Parkway is a signalized intersection.

The intersection of Heart Lake Road/Sandalwood Parkway experienced the highest number of collisions (112) over the data period examined. At this intersection the most common collision impact type identified was "turning movement" (52 collisions, or 46% of the total) and "rear-end" was the next most reported impact type (33 collisions, or 29% of the total). Further investigation of the collision data and details for this intersection location indicates the majority of the turning movement collisions were attributable to motorists making improper turns as the result of aggressive driving behaviour (i.e., more susceptible to taking risks).

The intersection of Heart Lake Road/Countryside Drive experienced 26 collisions over the data period examined, with the most common impact type reported being "single motor vehicle" (SMV) collisions (10 collisions, or 38% of the total). A closer analysis of the collision data for this intersection location indicates that the SMV collisions do not have an attributable feature, but rather they occur due to different event and/or environmental conditions (i.e., influence of a wild animal, slippery road conditions, disobeying traffic control, etc.). "Rear-end" collisions were the second most reported impact type (7 collisions, or 27% of the total). When examining the combination of 17 collisions that are described as "SMV" or "rear-end", 11 of the 17 collisions, or 65%, are attributable to aggressive driving behaviour such as following too closely or disobeying traffic control.

At the other intersections and mid-block segments within the study area the reported collision data is generally unremarkable, with no identifiable trends or patterns evident.

According to the Ontario Traffic Manual (OTM) Book 12 Traffic Signals, an intersection would require an average of at least five "correctible" collisions per year over a three-year period to justify the installation of traffic signals. This approach focuses only on the type of collision that could be prevented by traffic signals controlling the right-of-way, which includes angle and turning movement collisions. The types of collisions that are excluded are rear-end, approach, sideswipe, single motor vehicle, and collisions classified as "other".

The unsignalized stop-controlled side street intersection of Heart Lake Road/Countryside Drive was reviewed to determine whether the reported collisions would warrant consideration for the installation of traffic signals. It is concluded that traffic signals would not be warranted based upon the reported number of collisions at this location; however, it is noted that the number of angle and turning movement collisions are just below the noted criteria for consideration. From a safety perspective, there is sufficient rationale for the consideration of traffic signal control at this location.

TABLE 3.3: INTERSECTION COLLISIONS: JANUARY 2015 – DECEMBER 2019

Heart Lake Road Intersection with:	Collision Types/Trends and Patterns/Notable Location Attributes
Heart Lake Road/ Countryside Drive	▪ Total of 26 collisions (average 5.2 collisions per year); ▪ 10 SMV collisions (38%), 7 rear-end collisions (27%), 5 angle collisions (19%), and 4 turning movement collisions (15%) were recorded; and ▪ No fatal collisions, no non-fatal injury collisions, and 26 property damage only collisions (100%).
Heart Lake Road/ Sandalwood Parkway	▪ Total of 112 collisions (average 22.4 collisions per year); ▪ 52 turning movement collisions (46%), 33 rear-end collisions (29%), 8 angle collisions (7%), 7 SMV other collisions (6%), 6 sideswipe collisions (5%), 3 approaching collisions (3%), and 2 “other” collisions (2%) were recorded; and ▪ No fatal collisions, 18 non-fatal injury collisions (16%), 93 property damage only collisions (83%), and 1 non-reportable (1%).
Countryside Drive/ Ross Drive	▪ Total of 2 collisions (average 0.4 collisions per year); ▪ 1 turning movement collision (50%) and 1 angle collision (50%) were recorded; and ▪ No fatal collisions, 1 non-fatal injury collision (50%), and 1 property damage only collision (50%).

3.1.3 Mid-Block Collisions

Table 3.4 provides a summary of any key patterns and trends for the mid-block collision locations.

At the mid-block locations, the total number and average number of collisions are low and are generally unremarkable with no trends or patterns evident. The most notable location is the section of Sandalwood Parkway between Glover Gate-Royal Palm Drive and Heart Lake Road, where a total of 44 collisions were reported. Of these collisions, 25 were reported to have occurred in non-dry roadway conditions (i.e., wet, ice, slush, or snow). Of the 25 collisions that occurred in non-dry conditions, 15 collisions were a result of a loss of control, while the remaining 10 collisions were a results of aggressive driving behaviour, which was either speeding or following too close in this case.

Of the 44 collisions, a total of 22 collisions are attributable to aggressive driving behaviour, such as speeding, following too close, failing to yield the right-of-way, or improper lane changes. However, it is noted within this mid-block section there is a horizontal curve, which could create loss of vehicle control when paired with poor roadway conditions and aggressive driving.

TABLE 3.4: MID-BLOCK COLLISIONS: JANUARY 2015 – DECEMBER 2019

Road Section:	Collision Types/Trends and Patterns/Notable Location Attributes
Sandalwood Parkway between Heart Lake Road and Glover Gate-Royal Palm Drive	▪ Total of 44 collisions (average 8.8 collisions per year); ▪ 15 rear-end collisions (34%), 13 SMV other collisions (30%), 9 sideswipe collisions (20%), 5 approaching collisions (11%), and 1 angle collision (2%) were recorded; and ▪ No fatal collisions, 7 non-fatal injury collisions (16%), and 37 property damage only collisions (84%).
Countryside Drive between Dixie Road and Ace Drive-Naperton Drive	▪ Total of 2 collisions (average 0.4 collisions per year); ▪ 1 SMV collision (50%) and 1 sideswipe (50%) were recorded; and ▪ No fatal collisions, no non-fatal injury collisions, 1 property damage only collision (50%), and 1 non-reportable collision (50%).

3.2 Sight Distance Review

The sight distance at the stop-controlled intersection of Heart Lake Road/Countryside Drive has been assessed via an in-depth field review in addition to an accompanying desktop review. The assessment has been carried out based on the methodology contained in the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads[5].

Sight distance requirements were considered for vehicles departing from Countryside Drive (departure sight distance) and for vehicles approaching Countryside Drive (approach sight distance). The following object heights were utilized in the field measurements:

- Driver Eye Height: 1.05 metres;
- Top of Car: 1.30 metres (for departure sight distance, height of approaching vehicle); and
- Vehicle Headlight or Tail/Brake Light: 0.60 metres (for approach stopping sight distance, height of vehicle/target object).

The main measurements for departing traffic were taken from approximately 5.0 metres back from the existing edge of pavement for vehicles departing, representing the position of a driver/vehicle performing a turning movement.

The main measurements for approaching traffic were taken from within the centre of either travel lane on Heart Lake Road, assuming a vehicle position perpendicular to Countryside Drive.

The sight distance requirements are based upon a design speed of 70 km/h (10 km/h above the posted maximum limit of 60 km/h).

Table 3.5 summarizes the required sight distances for a design speed of 70 km/h.

5 Transportation Association of Canada, *Geometric Design Guide for Canadian Road*, June 2017.

TABLE 3.5: REQUIRED SIGHT DISTANCE CRITERIA

Sight Distance Criteria	Sight Distance Requirement
	Design Speed (70 km/h)
Minimum Departure (Left Turn) Sight Distance[1]	150.0 metres
Minimum Departure (Right Turn) Sight Distance[2]	130.0 metres
Minimum Stopping Sight Distance[3]	105.0 metres

Notes:
[1]TAC Guide, Table 9.9.4: Design Intersection Sight Distance – Case B1, Left Turn from Stop
[2]TAC Guide, Table 9.9.6: Design Intersection Sight Distance – Case B2, Right Turn from Stop
[3]TAC Guide, Table 2.5.2: Stopping Sight Distance on Level Roadways for Automobiles

3.2.1 Departure Sight Distance Review

The departure sight distance represents the minimum distance required for a vehicle to safely enter the major roadway and complete a turning movement without significantly impeding traffic flow or providing the opportunity for conflict.

In design, the departure sight distance is measured from the standard driver eye height (1.05 metres) located on the crossing road, from a position located approximately 5.0 metres back from the travelled potion of the intersection roadway (i.e., edge of pavement) to a target top of car height of 1.30 metres above the roadway surface. **Table 3.6** summarizes the available and TAC recommended sight distances for a departing left-turn and right-turn movement across a two-lane road with a 70 km/h design speed.

TABLE 3.6: DEPARTURE SIGHT DISTANCE ANALYSIS SUMMARY

Departure Movement	Available Sight Distance Measured (m)		TAC Requirement	Requirements Met?
	Direction	Distance		
Heart Lake Road/Countryside Drive				
Left-Turn Movement	Looking Right	410	150	Yes
	Looking Left	330	150	Yes
Right-Turn Movement	Looking Right	-	N/A	N/A
	Looking Left	340	130	Yes

The required sight distance is met for turning movements departing Countryside Drive in both directions. It is noted the available sight distance would satisfy situations where vehicles are travelling at higher speeds (more than 100 km/h) along Heart Lake Road and vehicles departing from Countryside Drive can perform turning movements safely without being overtaken or impeding approaching traffic.

3.2.2 Approach Sight Distance Review

For vehicles approaching Countryside Drive, the minimum stopping sight distance is the distance required for the approaching vehicle to stop safely and avoid a collision. Stopping sight distance is the sum of the distance travelled by a motorist during the perception and reaction time and the braking distance. Stopping sight distance is measured from the standard driver eye height of 1.05 metres to a fixed object 0.60 metres off the surface of the roadway.

Table 3.7 summarizes the available and TAC recommended minimum sight distances. Stopping sight distance requirements are met for northbound and southbound approaching vehicles.

TABLE 3.7: APPROACH SIGHT DISTANCE ANALYSIS SUMMARY

Approach Direction	Available Sight Distance Measured (m)	TAC Sight Distance Requirement (m)	Requirements Met?
Heart Lake Road/Countryside Drive			
Northbound	330	105	Yes
Southbound	410	105	Yes

3.2.3 Sight Line Obstructions

Based upon the field investigation conducted, potential sight line obstructions observed when looking to the left and to the right from Countryside Drive exist due to existing vegetation and may potentially impact and obstruct sight lines.

The potential obstructions can be satisfactorily resolved through landscaping, trimming and upkeep of the overgrown vegetation in vicinity of the intersection.

Approach sight triangles were also considered to ensure in the event a motorist departing from Countryside Drive does not stop or yield prior to approaching Heart Lake Road, such that there are adequate sight lines to minimize the potential for a collision. It was assumed an approaching vehicle on Heart Lake Road would be travelling at a design speed of 70 km/h and the vehicle approaching from Countryside Drive would be travelling at 15 km/h. The distance travelled in 3.0 seconds for the approaching vehicles would be 60.0 metres and 15.0 metres, respectively.

Based upon the approach sight distance assessment, there would be clear sight lines within the immediate proximity of the Countryside Drive intersection approach.

3.3 Safety Performance Summary

Based upon the most recent five-year collision data there are consistent year to year number of reported collisions at the Heart Lake Road/Countryside Drive intersection. The majority of reported collisions were found to be single motor vehicle collisions related to the driver and determined not to be a function of the roadway or intersection design.

This is further validated from the sight distance review conducted. Sight distance is available for approaching and departing vehicles exceeds guideline requirements for safe operations.

However, it is noted that the number of reported “correctible” collisions are just shy of the threshold criteria to warrant the consideration of traffic signal control based on collisions alone. Regardless, from an operational perspective the preceding analysis indicates the Countryside Drive westbound left turn movement under stop control operates at an over-capacity condition and would be mitigated through traffic signal control.

Furthermore, the reported collisions are attributed to aggressive driver behaviour. This resulting situation correlates with the poor operations during the peak hours stemming from a lack of gaps within the traffic stream along Heart Lake Road leading to drivers taking increased risk and more aggressive manoeuvres.

4 Traffic Forecasting

This section documents the approach to forecast intersection turning movement volumes for horizon years 2031 and 2041. The developed growth rates are based on provided EMME modelling outputs and traffic count data obtained.

The City provided EMME model plots for the 2011 (base year), and 2031 and 2041 (future year) horizons which captured all roadway sections including the subject study area segments and adjacent roadways. Specifically, model output plots of link volumes, roadway capacity, number of lanes, and speed were provided for the AM and PM peak hours.

The provided EMME model output plots have been utilized to determine applicable growth rates to generate future traffic volume forecasts.

4.1 Future Growth

4.1.1 Background Growth

Traffic growth rates for each planning horizon for the study area intersections have been developed from the EMME model output link volumes. For this analysis, the land use and population and employment assumptions of the current traffic model are deemed to be representative of the planned growth in the study area and the City at large. The calculated growth rates will be utilized and applied to the base year traffic volumes derived to estimate the future traffic forecasts.

Applicable roadway link volumes for the AM and PM peak hours were assessed. The data was analyzed on an individual road-by-road basis, as well examining the overall growth for all study area roadway links.

Table 4.1 summarizes the calculated annual compounded growth rates, sorted by overall study area as well as on a roadway-by-roadway basis. It should be noted that although the volumes are provided by direction in the EMME model plots, the two-way volumes (i.e., total volume on each segment) are the values summarized in the table.

Appendix D contains the analysis worksheets for reference.

TABLE 4.1: CALCULATED GROWTH RATES

Roadway	Percentage Growth per Annum			
	2011 – 2031		2031 – 2041	
	AM	PM	AM	PM
Countryside Drive	4.3%	5.4%	-0.4%	-0.7%
Heart Lake Road	3.3%	5.5%	1.0%	1.1%
Highway 410 Off-Ramp	22.2%	11.5%	9.3%	5.8%
Mayfield Road	1.1%	1.8%	0.5%	0.7%
Sandalwood Parkway	2.9%	2.8%	0.7%	0.2%
Dixie Road	4.4%	4.7%	2.0%	2.0%
Overall Study Area	***2.9%***	***4.0%***	***0.6%***	***0.6%***
Overall Average Rate	***3.45%***		***0.6%***	

The calculated annual growth rates indicate significant growth is expected to occur along the study area roads up to the 2031 horizon. In reviewing link volumes between 2031 and 2041 it is noted that growth reaches a plateau, as is typical. High growth cannot be sustained for such long periods, and it was determined growth occurring between 2031 and 2041 follows a lower rate. For the overall study area roadways, a 0.6% per annum growth rate was calculated between 2031 and 2041. City staff have confirmed that the corridor growth rates calculated between 2011 – 2031 are reflective of the proposed developments situated on the east side of Heart Lake Road, north and south of Countryside Drive.

To develop the 2031 traffic forecasts, the calculated overall average rate has been applied to the derived base year traffic volumes.

To develop the 2041 traffic forecasts, the calculated overall average rate has been applied to the 2031 traffic volumes.

4.1.2 Other Area Developments

The City of Brampton staff advised of one applicable development for consideration for the future horizons. The following development was identified to be included within the future traffic forecasts:

- Countryside Village Neighbourhood 601: 401 townhomes and 78 apartment units with 7,534 ft^2 of ground floor retail.

Supporting documentation with relevant site traffic assignments for the Countryside Village Neighbourhood 601 was provided by City staff.

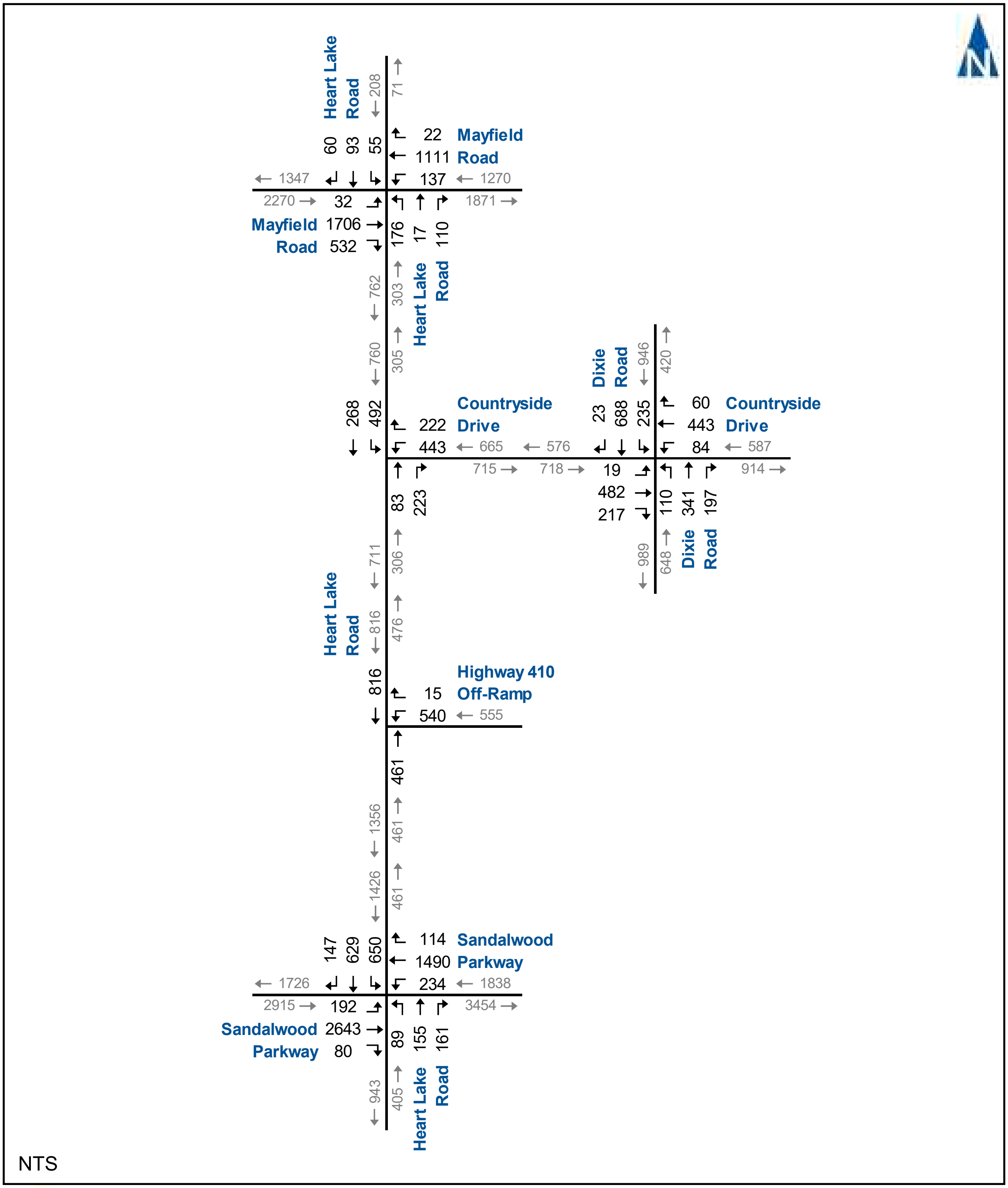
Appendix D contains the other area development site traffic component of the traffic forecasts for reference.

4.2 Future Traffic Volumes

The aforementioned growth rates were applied to base year traffic volumes to develop the future 2031 and 2041 traffic forecasts. The other area development (Countryside Village Neighbourhood 601) was also accounted within the forecasts for the 2031 and 2041 horizon years assuming build-out and occupancy by 2031.

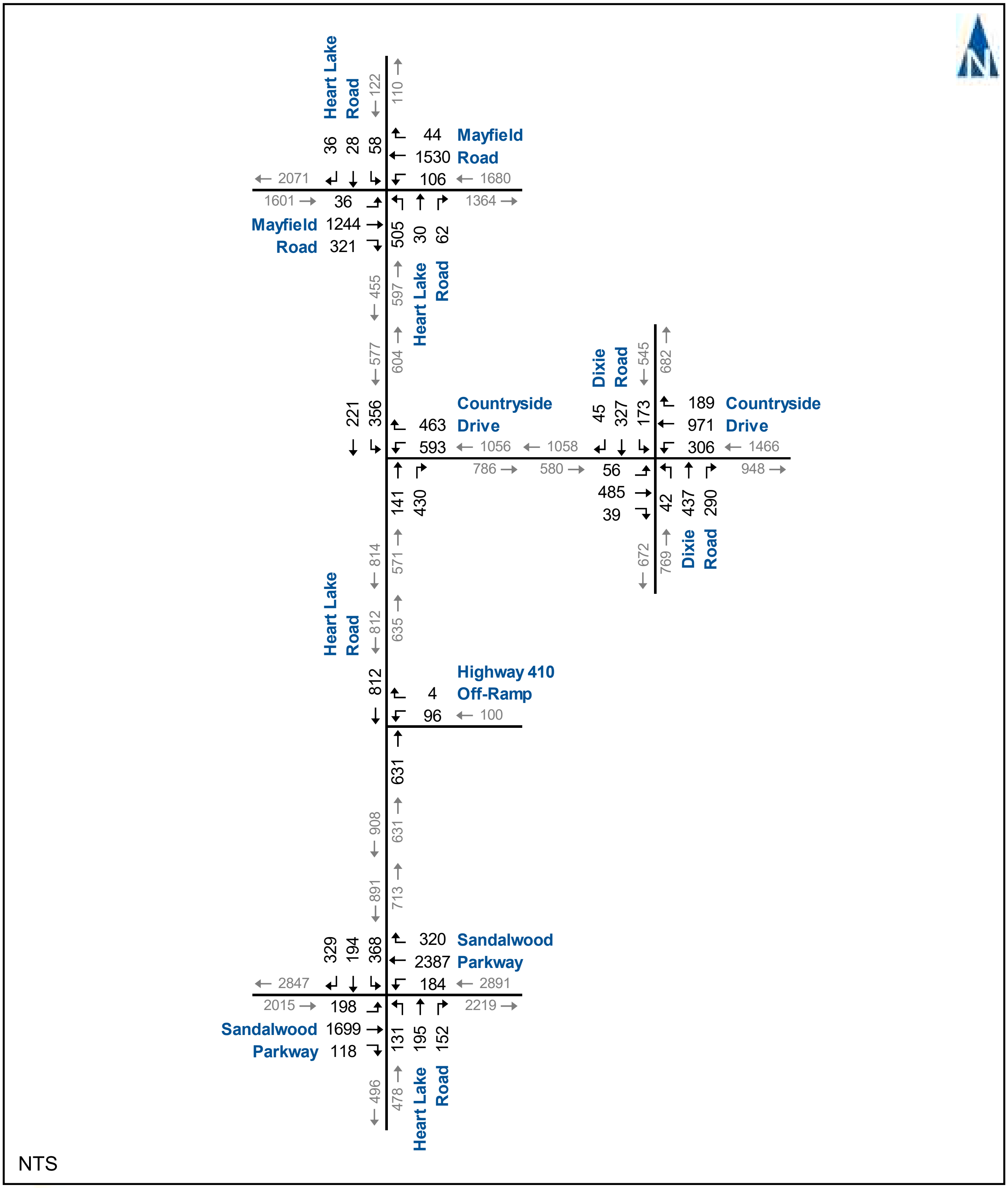
Figure 4.1A and **Figure 4.1B** illustrate the 2031 traffic forecasts for the AM and PM peak hours, respectively.

Figure 4.2A and **Figure 4.2B** illustrate the 2041 traffic forecasts for the AM and PM peak hours, respectively.



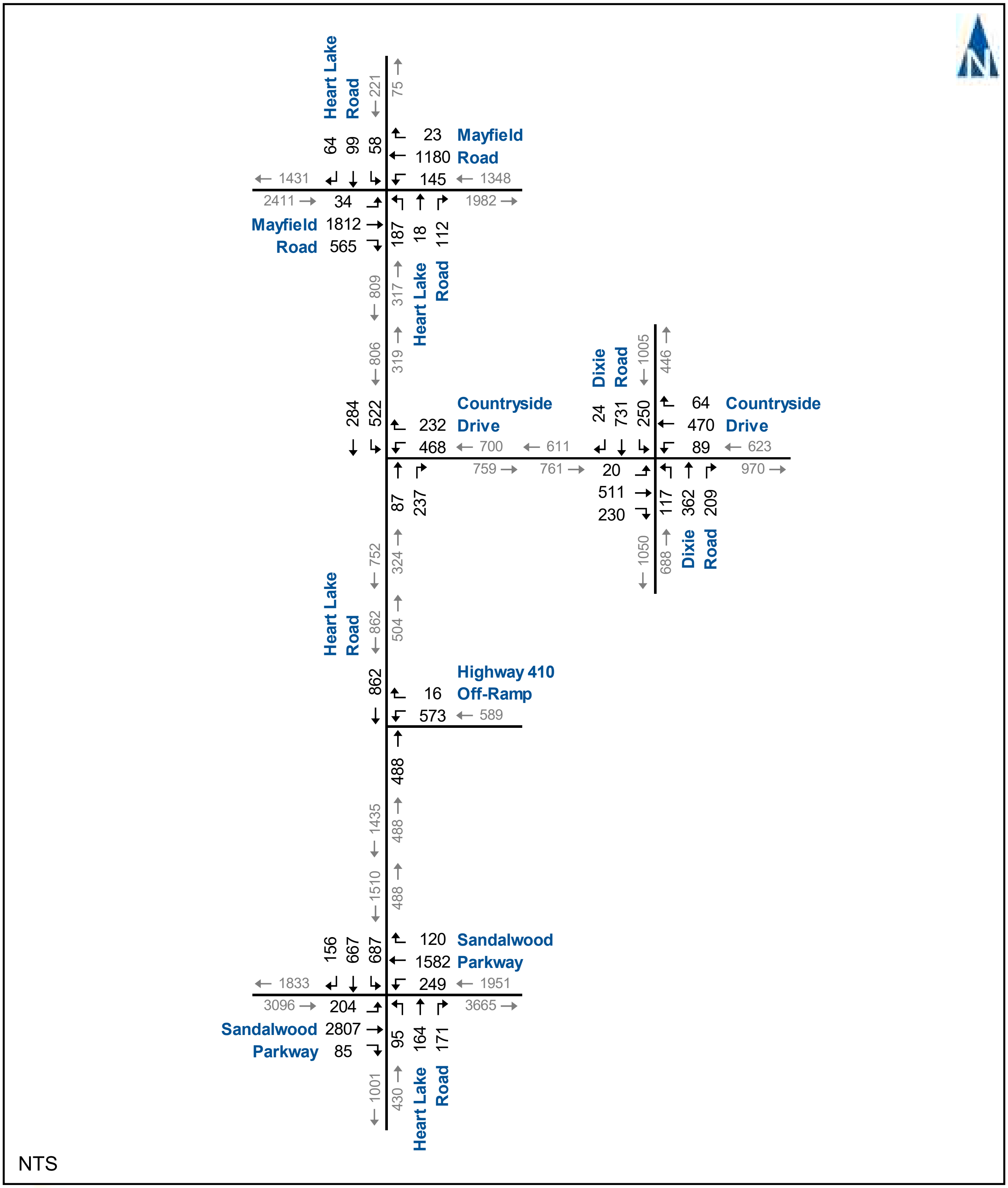
2031 Traffic Volumes
AM Peak Hour

Figure 4.1A



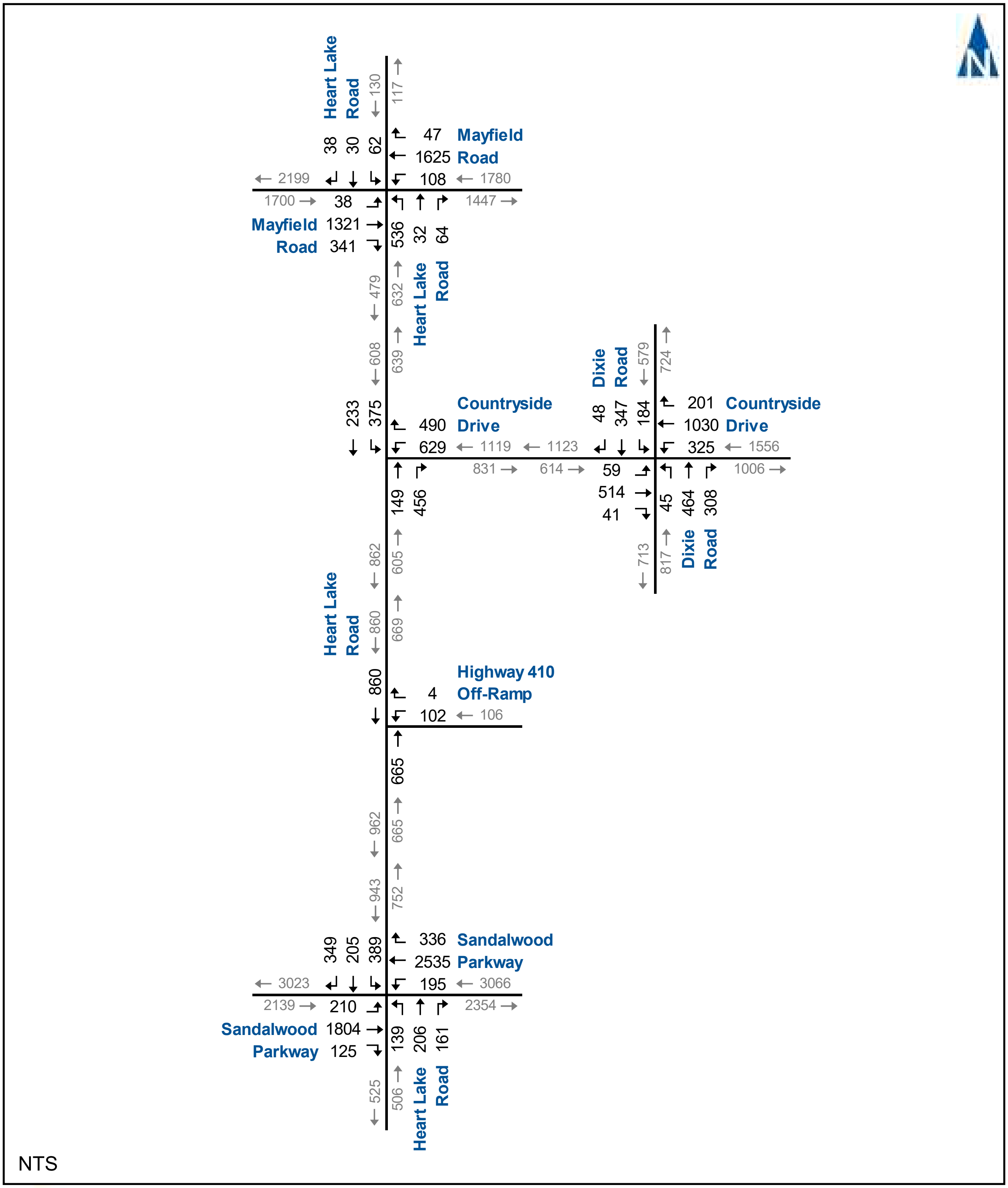
2031 Traffic Volumes
PM Peak Hour

Figure 4.1B



2041 Traffic Volumes AM Peak Hour

Figure 4.2A



2041 Traffic Volumes PM Peak Hour

Figure 4.2B

5 Future Operations

5.1 Road Network

Based upon a review of the 2015 Brampton Transportation Master Plan, the following planned roadway improvements were identified and accounted for within our analysis:

- Sandalwood Parkway:
  - Widening to 6-lanes between Hurontario Street and Heart Lake Road with an anticipated timeframe of 2024.

5.2 2031 Traffic Operations

To assess operating conditions for the 2031 horizon, an operational analysis was undertaken using the same methodology, parameters, and traffic control devices as in the analysis of base year conditions. The exception would be the optimization of signal timing phases and splits to ensure best operations for all movements.

Note that further improvements to intersections other than the intersection of Heart Lake Road/Countryside Drive is outside of the scope of work for this study. However, high-level discussion is provided of applicable mitigation measures.

Further improvements for the subject intersection of Heart Lake Road/Countryside Drive are discussed in **Section 6**.

Table 5.1 summarizes the operational analysis results including level-of-service (LOS), average vehicle delay in seconds, volume-to-capacity (v/c) ratio, and 95th percentile queue length in metres for the 2031 horizon year. Critical movements are highlighted in yellow.

Appendix E contains the Synchro analysis outputs for reference.

Under 2031 traffic conditions the majority of the study area intersections are forecast to continue operating at acceptable levels of service and within capacity. All reported queues would be accommodated by the provided storage. No vehicle queues would encroach back to adjacent intersections.

The previously identified critical movements and poorly operating intersections under base year conditions are forecast to continue operating poorly. Further exacerbated under future conditions. The following is noted:

- Heart Lake Road/Countryside Drive
  - The westbound left turn movement is reported to operate over-capacity under both the AM and PM peak hours.

- Heart Lake Road/Highway 410 Southbound Off-Ramp
  - The westbound left turn movement is reported to operate over-capacity under the AM peak hour; and
  - All movements operate at acceptable levels of service and within capacity under the PM peak hour.
  - To mitigate the poor forecast operational performance, upgrading the traffic control from unsignalized stop control to traffic signal control is warranted for consideration. The intersection would meet spacing criteria as it is located approximately 250.0 metres north of the signalized Heart Lake Road/Sandalwood Parkway intersection.

    Furthermore, it is noted the forecast 2031 volumes would satisfy the Ontario Traffic Manual (OTM) Book 12 – Traffic Signals Justification warrant criteria for consideration of traffic signal control.

- Heart Lake Road/Sandalwood Parkway
  - Under the AM peak hour, the overall intersection is forecast to operate over-capacity (V/C =1.43).

    The eastbound left and southbound through movements are reported to be approaching capacity (V/C = 0.89 and 0.98, respectively).

    The eastbound shared through/right movement, westbound left turn movement, and southbound left turn movement are forecast to operate over-capacity (V/C = 1.29, 1.44, and 1.39, respectively).

    The 95th percentile queues for the eastbound left, and westbound left turn movements would be accommodated within the available storage. The southbound left turn queue would exceed the available storage and potentially block the adjacent through lane.
  - Under the PM peak hour, the overall intersection is forecast to operate over-capacity (V/C =1.14).

    The eastbound left, westbound left, westbound, shared through/right movement, and southbound left turn movement are forecast to operate over-capacity (V/C = 1.19, 1.06, 1.08, and 1.05, respectively).

The 95th percentile queues for the eastbound left, and westbound left turn movements would be accommodated within the available storage. The southbound left turn queue would exceed the available storage and potentially block the adjacent through lane.

- As noted under base year conditions, the southbound left turn volumes under the AM peak hour satisfy the volume threshold (i.e., 300 vehicles per hour) for consideration of dual left turn lanes based upon Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads guidance. This intersection could easily accommodate a dual left turn movement since the second left turn lane is physically provided in the field, but the current pavement markings prohibit its use.

  No further intersection geometric improvements are identified as the intersection is considered built-out, as all intersection approaches currently provide auxiliary left and right turn lanes.

TABLE 5.1: 2031 TRAFFIC OPERATIONS

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	V/C[3]	Q[4]	LOS[1]	Delay[2]	V/C[3]	Q[4]
Heart Lake Road & Mayfield Road *Signalized*	***Overall Intersection***		***C***	***21***	***0.59***	***-***	***C***	***30***	***0.71***	***-***
	EB	Left	B	15	0.12	11	D	37	0.37	18
		Triple Thru	C	21	0.59	138	c	31	0.58	107
		Right	B	18	0.33	17	c	26	0.20	17
	WB	Left	B	18	0.55	31	c	21	0.45	22
		Triple Thru	A	10	0.32	55	c	24	0.58	110
		Right	A	8	0.01	< 1	B	17	0.03	42
	NB	Left	D	48	0.54	65	D	43	0.81	206
		Thru	D	42	0.04	11	C	26	0.04	13
		Right	D	42	0.10	20	C	26	0.04	10
	SB	Left	E	63	0.45	30	E	70	0.59	30
		Thru	E	66	0.57	44	E	60	0.21	17
		Right	E	58	0.04	10	E	58	0.02	< 1
Heart Lake Road & Countryside Drive *Unsignalized*	WB	Left	F	> 50	4.23	>200	F	> 50	3.76	>200
		Right	A	10	0.23	7	B	13	0.51	24
	NB	Thru	Unopposed Movement				Unopposed Movement			
		Right	Unopposed Movement				Unopposed Movement			
	SB	Left/Thru	A	8	0.39	15	A	8	0.36	13
Countryside Drive & Dixie Road *Signalized*	***Overall Intersection***		***B***	***16***	***0.67***	***-***	***C***	***20***	***0.74***	***-***
	EB	Left	B	17	0.08	6	B	16	0.33	14
		Dual Thru	B	20	0.53	38	B	15	0.31	34
		Right	B	19	0.44	33	B	13	0.02	5
	WB	Left	B	19	0.37	19	C	33	0.82	75
		Dual Thru	B	19	0.49	35	B	18	0.61	76
		Right	B	17	0.04	7	B	14	0.14	12
	NB	Left	B	18	0.50	26	B	17	0.13	15
		Thru	A	10	0.36	41	C	24	0.61	127
		Right	A	8	0.12	9	B	17	0.18	19
	SB	Left	B	12	0.45	35	C	33	0.66	72
		Thru/Right	B	17	0.75	115	C	22	0.52	97
Heart Lake Road & Hwy 410 *Unsignalized*	WB	Left	F	> 50	3.23	>200	F	> 50	0.75	35
		Right	A	< 1	0.00	< 1	A	< 1	0.00	< 1
	NB	Thru	Unopposed Movement				Unopposed Movement			
	SB	Thru	Unopposed Movement				Unopposed Movement			
Heart Lake Road & Sandalwood Parkway *Signalized*	***Overall Intersection***		***F***	***132***	***1.43***	***-***	***E***	***71***	***1.14***	***-***
	EB	Left	F	81	0.89	93	F	185	1.19	118
		Dual Thru-Thru/Right	F	179	1.29	451	C	34	0.73	191
	WB	Left	F	276	1.44	149	F	133	1.06	102
		Dual Thru-Thru/Right	D	46	0.81	197	F	85	1.08	395
	NB	Left	E	74	0.79	42	D	42	0.39	48
		Thru	D	48	0.32	64	D	51	0.40	80
		Right	D	45	0.14	25	D	46	0.17	30

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	V/C[3]	Q[4]	LOS[1]	Delay[2]	V/C[3]	Q[4]
	SB	Left	F	253	1.39	359	F	119	1.05	178
		Thru	E	80	0.98	288	D	51	0.39	79
		Right	D	36	0.17	33	D	54	0.50	86

[1] Level of Service; [2] Average vehicle delay, seconds; [3] Volume to capacity ratio; [4] 95th percentile queue, metres

5.3 2041 Traffic Operations

To assess operating conditions for the 2041 horizon, an operational analysis was undertaken using the same methodology, parameters, and traffic control devices as in the analysis of the 2031 horizon conditions. The exception would be the optimization of signal timing phases and splits to ensure best operations for all movements.

Note that further improvements to intersections other than the intersection of Heart Lake Road/Countryside Drive is outside of the scope of work for this study. However, high-level discussion is provided of applicable mitigation measures.

Further improvements for the subject intersection of Heart Lake Road/Countryside Drive are discussed in **Section 6**.

Table 5.2 summarizes the operational analysis results including level of service (LOS), average vehicle delay in seconds, volume-to-capacity (v/c) ratio, and 95th percentile queue length in metres for the 2041 horizon year. Critical movements are highlighted in yellow.

Appendix F contains the Synchro analysis outputs for reference.

Similar to the 2031 analysis, with the addition on the nominal anticipated growth between 2031 and 2041 the study area intersection operations would be slightly exacerbated.

The previously identified critical movements and poorly operating intersections under 2031 traffic conditions are forecast to continue operating poorly under 2041 traffic conditions. The following is noted:

- Heart Lake Road/Countryside Drive
  - The westbound left turn movement is reported to operate over-capacity under both the AM and PM peak hours.
- Countryside Drive/Dixie Road
  - Under the PM peak hour, the overall intersection is identified as a critical movement (V/C = 0.86). However, this is not deemed a critical issue as it forecast to operate within capacity.

    Similarly, the westbound and southbound left turn movements are identified as critical movements (V/C = 0.86) but are noted to operate within capacity.
  - No mitigation measures are identified to be required at this intersection.

- Heart Lake Road/Highway 410 Southbound Off-Ramp
  - The westbound left turn movement is reported to operate over-capacity under both the AM and PM peak hour; and
  - To mitigate the poor forecast operational performance, upgrading the traffic control from unsignalized stop control to traffic signal control is warranted for consideration. The intersection would meet spacing criteria as it is located approximately 250.0 metres north of the signalized Heart Lake Road/Sandalwood Parkway intersection.

    Furthermore, it is noted the forecast 2041 volumes would satisfy the Ontario Traffic Manual (OTM) Book 12 – Traffic Signals Justification warrant criteria for consideration of traffic signal control.
- Heart Lake Road/Sandalwood Parkway
  - Under the AM peak hour, the overall intersection is forecast to operate over-capacity (V/C =1.43).

    The eastbound left and westbound shared through/right movements are reported to be approaching capacity (V/C = 0.91 and 0.87, respectively).

    The eastbound shared through/right movement, westbound left turn movement, southbound left turn, and southbound through movements are forecast to operate over-capacity (V/C = 1.38, 1.45, 1.51, and 1.04, respectively).

    The 95th percentile queues for the eastbound left turn movement would be accommodated within the available storage. The westbound left and southbound left turn queues would exceed the available storage and potentially block the adjacent through lane.
  - Under the PM peak hour, the overall intersection is forecast to operate over-capacity (V/C =1.18).

    The westbound left turn movement is reported to be approaching capacity (V/C = 0.88).

    The eastbound left, westbound left, westbound shared through/right movement, and southbound left turn movement are forecast to operate over-capacity (V/C = 1.26, 1.18, and 1.08, respectively).

    The 95th percentile queues for the westbound left turn movement would be accommodated within the available storage. The eastbound left and southbound left turn queues would exceed the available storage and potentially block the adjacent through lane.

- As noted under base year conditions, the southbound left turn volumes under the AM peak hour satisfy the volume threshold (i.e., 300 vehicles per hour) for consideration of dual left turn lanes based upon Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads guidance. This intersection could easily accommodate a dual left turn movement since the second left turn lane is physically provided in the field, but the current pavement markings prohibit its use.

  No further intersection geometric improvements are identified as the intersection is considered built-out, as all intersection approaches currently provide auxiliary left and right turn lanes.

TABLE 5.2: 2041 TRAFFIC OPERATIONS

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	V/C[3]	Q[4]	LOS[1]	Delay[2]	V/C[3]	Q[4]
Heart Lake Road & Mayfield Road *Signalized*	***Overall Intersection***		***C***	***22***	***0.64***	***-***	***C***	***31***	***0.76***	***-***
	EB	Left	B	16	0.14	11	D	37	0.40	18
		Triple Thru	C	22	0.63	138	C	29	0.58	105
		Right	B	18	0.35	16	C	23	0.21	16
	WB	Left	C	24	0.55	37	B	20	0.46	19
		Triple Thru	A	9	0.34	50	C	22	0.59	106
		Right	A	7	0.01	< 1	B	15	0.03	4
	NB	Left	D	52	0.63	80	E	63	0.94	249
		Thru	D	43	0.04	12	C	28	0.05	15
		Right	D	44	0.12	23	C	28	0.04	11
	SB	Left	E	63	0.46	31	E	71	0.61	32
		Thru	E	66	0.59	47	E	59	0.22	18
		Right	E	58	0.04	11	E	58	0.02	1
Heart Lake Road & Countryside Drive *Unsignalized*	WB	Left	F	> 50	5.26	>200	F	> 50	4.56	>200
		Right	A	10	0.24	7	B	14	0.54	27
	NB	Thru	Unopposed Movement				Unopposed Movement			
		Right	Unopposed Movement				Unopposed Movement			
	SB	Left/Thru	A	8	0.42	17	A	9	0.39	15
Countryside Drive & Dixie Road *Signalized*	***Overall Intersection***		***B***	***17***	***0.71***	***-***	***C***	***23***	***0.86***	***-***
	EB	Left	B	17	0.08	6	B	16	0.35	16
		Dual Thru	B	20	0.55	40	B	14	0.31	37
		Right	B	19	0.48	36	B	12	0.03	5
	WB	Left	B	19	0.41	20	D	37	0.86	87
		Dual Thru	B	19	0.51	37	B	18	0.62	82
		Right	B	16	0.04	8	B	13	0.17	16
	NB	Left	C	27	0.64	37	B	19	0.17	16
		Thru	B	10	0.38	45	C	28	0.68	140
		Right	A	8	0.13	9	B	19	0.19	19
	SB	Left	B	13	0.50	40	E	58	0.86	84
		Thru/Right	B	19	0.80	142	C	25	0.58	105
Heart Lake Road & Hwy 410 *Unsignalized*	WB	Left	F	> 50	3.89	>200	F	> 50	0.93	47
		Right	A	< 1	0.00	< 1	A	< 1	0.00	< 1
	NB	Thru	Unopposed Movement				Unopposed Movement			
	SB	Thru	Unopposed Movement				Unopposed Movement			
Heart Lake Road & Sandalwood Parkway *Signalized*	***Overall Intersection***		***F***	***158***	***1.48***	***-***	***F***	***91***	***1.18***	***-***
	EB	Left	F	85	0.91	99	F	207	1.26	129
		Dual Thru-Thru/Right	F	220	1.38	493	D	43	0.84	232
	WB	Left	F	281	1.45	157	F	81	0.88	92
		Dual Thru-Thru/Right	D	51	0.87	214	F	125	1.18	445
	NB	Left	F	87	0.85	48	D	41	0.40	50
		Thru	D	47	0.33	68	D	51	0.42	84
		Right	D	45	0.15	26	D	47	0.19	34

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	V/C[3]	Q[4]	LOS[1]	Delay[2]	V/C[3]	Q[4]
	SB	Left	F	286	1.51	391	F	123	1.08	190
		Thru	F	97	1.04	319	D	50	0.40	83
		Right	D	36	0.19	36	D	54	0.52	91

[1] Level of Service; [2] Average vehicle delay, seconds; [3] Volume to capacity ratio; [4] 95th percentile queue, metres

6 Mitigation Measures

The operations of the subject Heart Lake Road/Countryside Drive intersection indicated over-capacity movements under base year and future traffic conditions.

The mitigation measures within this section will focus on potential improvements for the intersection of Heart Lake Road/Countryside Drive. Although the other intersections within the study area are forecast to operate poorly in the horizon years analyses, examining improvements at these intersections is outside the scope of this study.

6.1 Auxiliary Left-Turn Lane

The Ministry of Transportation of Ontario's *Design Supplement to the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads*[6] provides guidance on the assessment of and/or need for auxiliary left-turn lanes at unsignalized intersections.

The southbound left-turn movement at the intersection of Heart Lake Road/Countryside Drive was assessed using the nomographs to determine the need for left-turn lanes on a two-lane undivided highway with a design speed of 70 km/h.

Table 6.1 summarizes the warrant results.

TABLE 6.1: LEFT-TURN LANE WARRANT SUMMARY

Analysis Horizon	Left-Turn Lane Required?	
	AM Peak Hour	PM Peak Hour
Base Year	Yes	Yes
2031	Yes	Yes
2041	Yes	Yes

The warrant analysis concludes an auxiliary left-turn lane is warranted at the unsignalized intersection of Heart Lake Road/Countryside Drive.

Appendix G contains the left-turn lane nomographs.

[6] Transportation Association of Canada, *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads – Appendix 9A*, Ministry of Transportation of Ontario, 2017.

6.2 Traffic Signal Control

The current stop-control intersection of Heart Lake Road/Countryside Drive was investigated to determine whether the future traffic forecasts volumes would warrant the installation of traffic signal control.

The warrant analysis was conducted in accordance with the methodology outlined in the Ontario Traffic Manual (OTM) Book 12 – Traffic Signals, using Justification 7 which is based on projected volumes.

It is noted that under base year traffic conditions the traffic volumes are just under the threshold criteria to warrant the consideration of traffic signal control.

The analysis indicates that traffic signal control would be warranted for installation under 2031 and 2041 traffic conditions.

Appendix H contains the detailed warrant worksheets for reference.

6.2.1 Traffic Operations

An operational analysis was conducted for 2031 and 2041 horizons for the intersection of Heart Lake Road/Countryside Drive with a traffic signal control implemented. Along with signal control, the intersection was analyzed with the provision of an auxiliary southbound left turn lane.

Table 6.2 summarizes the operational analysis results with the mitigative measures implemented. The results include level of service (LOS), average vehicle delay in seconds, volume-to-capacity (v/c) ratio, and 95th percentile queue length in metres for the 2031 and 2041 horizon years. Critical movements are highlighted in yellow.

All movements at the intersection of Heart Lake Road/Countryside Drive are forecast to operate within capacity and with acceptable delays.

Appendix I contains the Synchro analysis outputs for reference.

TABLE 6.2: HEART LAKE ROAD AT COUNTRYSIDE DRIVE OPERATIONS – TRAFFIC SIGNAL CONTROL

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	V/C[3]	Q[4]	LOS[1]	Delay[2]	V/C[3]	Q[4]
2031 Horizon Year Traffic Operations										
Heart Lake Road & Countryside Drive *Signalized*	***Overall Intersection***		***C***	***25***	***0.68***	***-***	***C***	***24***	***0.68***	***-***
	WB	Left	C	32	0.67	111	C	28	0.68	153
		Right	C	21	0.14	15	B	19	0.29	17
	NB	Thru	C	34	0.21	28	D	48	0.43	52
		Right	C	33	0.14	19	A	9	0.30	22
	SB	Left	C	21	0.65	89	C	32	0.64	89
		Thru	B	15	0.28	47	C	25	0.30	56
2041 Horizon Year Traffic Operations										
Heart Lake Road & Countryside Drive *Signalized*	***Overall Intersection***		***C***	***26***	***0.71***	***-***	***C***	***25***	***0.72***	***-***
	WB	Left	C	33	0.71	119	C	31	0.74	170
		Right	C	22	0.15	15	B	20	0.31	18
	NB	Thru	D	36	0.24	29	D	50	0.48	56
		Right	C	35	0.15	20	B	10	0.33	29
	SB	Left	C	22	0.68	96	C	32	0.66	93
		Thru	B	15	0.30	49	C	25	0.31	58

6.3 Roundabout

An initial screening of the intersection of Heart Lake Road/Countryside Drive was undertaken to determine if a roundabout would be feasible for implementation. Roundabouts are typically not recommended for implementation under the following circumstances:

- On roadways with typical daily volumes greater than 20,000 vehicles per day; or
- On sections of roadways where circulatory flow between an entry point and the next exit point is greater than 1,800 vehicles per hour; or
- At intersections with right-of-way constraints.

Based upon the above criteria, the Heart Lake Road/Countryside Drive intersection does not meet any of the criteria. As such, further investigation of a roundabout was pursued.

Screening was completed to determine at a planning level, whether a single-lane roundabout or a multi-lane roundabout would be required. A review of Ministry of Transportation, Ontario (MTO), Region of Waterloo, and the Region of Peel roundabout screening tools were undertaken. Use of the MTO Roundabout Feasibility Initial Screening Tool Version 1.0 identified the capacity guidelines for multi-lane entries as follows:

- Entry flow + circulating flow < 1,400 vph, single-lane entry likely sufficient;
- 1,400 vph < entry flow + circulating flow < 2,200 vph, two-lane entry likely sufficient; and
- Entry flow + circulating flow > 2,200 vph, consider three-lane entry.

Table 6.3 summarizes the results of the screening for the ultimate (2041) horizon traffic volumes. **Appendix J** contains the detailed roundabout screening tool analysis for reference.

TABLE 6.3: ROUNDABOUT SCREENING RESULTS

Intersection Leg	Number of Lanes Required		
	Entry	Circulating	Exit
North	1	1	1
South	1	1 – 2	1
East	1	1 – 2	1

The results of the screening indicate the following:

- All intersection approaches would be adequately served by a single lane entry;
- Roundabout exits would be adequately served by a single lane exit; and
- A partial portion of the roundabout may require two circulating lanes.

It is noted the capacity guidelines for single lane circulatory is 900 – 1,200 vph. The circulating volumes for the south and east legs are noted to be slightly above the 1,200 vph threshold under 2041 traffic conditions.

Under the existing roadway configuration, the east leg of the Heart Lake Road/Countryside Drive intersection has a four-lane cross-section. That is, two approach lanes and two receiving lanes. Therefore, consideration for a dual entry was accounted for on this approach. While the northbound approach provides a two lanes approach as well, a single lane approach was investigated to minimize the size of roundabout for assessment.

Table 6.4 summarizes the following roundabout configurations investigated and analyzed.

TABLE 6.4: ROUNDABOUT CONFIGURATIONS

Option	Circulating Lanes	Westbound Approach	Northbound Approach	Southbound Approach
1	Single Circulating lane	Single lane entry	Single lane entry	Single lane entry
2	Single Circulating lane	Dual lane entry	Single lane entry	Single lane entry
3	Partial dual circulating lanes	Dual lane entry	Single lane entry	Single lane entry

6.3.1 Traffic Operations

An ARCADY roundabout operational analysis was undertaken for the three roundabout configurations for the future forecast 2031 and 2041 traffic conditions. **Table 6.5 – 6.10** summarizes the operational results. **Appendix K** contains the ARCADY analysis outputs for reference.

Based upon the operational results, it is determined that Option 1 can be eliminated as a potential roundabout configuration. The single circulating lane with single lane entries on all intersection approaches will result in the westbound (east leg – Countryside Drive) approach approaching capacity under the 2031 and 2041 traffic conditions.

Option 2 confirms a roundabout with a single circulating lane, dual entry on the westbound (east leg – Countryside Drive) approach, and single lane entry on the northbound and southbound approaches will operate at acceptable levels of service and well within capacity under future traffic conditions.

Option 3 generates similar results to Option 2, with operations slightly improved with the additional partial dual circulating lane portion. However, based upon the results of Option 2, the necessity of a dual circulating lane portion is confirmed not to be required.

TABLE 6.5: 2031 ROUNDABOUT OPERATIONS – OPTION 1

Analysis Period	Intersection Approach	Queue (PCE)	Delay (sec)	V/C	Overall LOS	Intersection Delay (sec)
AM Peak Hour	North Leg	10	15.3	0.78	B	10.1
	South Leg	1	5.2	0.32		
	East Leg	1	6.4	0.56		
PM Peak Hour	North Leg	2	10.6	0.65	C	19.6
	South Leg	< 1	7.3	0.56		
	East Leg	37	31.2	0.92		

TABLE 6.6: 2031 ROUNDABOUT OPERATIONS – OPTION 2

Analysis Period	Intersection Approach	Queue (PCE)	Delay (sec)	V/C	Overall LOS	Intersection Delay (sec)
AM Peak Hour	North Leg	10	15.3	0.78	A	9.4
	South Leg	1	5.2	0.32		
	East Leg	1	4.5	0.37		
PM Peak Hour	North Leg	2	10.7	0.65	A	7.6
	South Leg	< 1	7.3	0.56		
	East Leg	< 1	6.0	0.52		

TABLE 6.7: 2031 ROUNDABOUT OPERATIONS – OPTION 3

Analysis Period	Intersection Approach	Queue (PCE)	Delay (sec)	V/C	Overall LOS	Intersection Delay (sec)
AM Peak Hour	North Leg	10	15.3	0.78	A	8.8
	South Leg	1	5.2	0.32		
	East Leg	1	3.0	0.37		
PM Peak Hour	North Leg	2	10.7	0.65	A	7.0
	South Leg	< 1	7.3	0.56		
	East Leg	2	4.9	0.61		

TABLE 6.8: 2041 ROUNDABOUT OPERATIONS – OPTION 1

Analysis Period	Intersection Approach	Queue (PCE)	Delay (sec)	V/C	Overall LOS	Intersection Delay (sec)
AM Peak Hour	North Leg	17	20.9	0.84	B	12.8
	South Leg	1	5.5	0.35		
	East Leg	1	6.9	0.59		
PM Peak Hour	North Leg	4	12.5	0.70	D	32.2
	South Leg	1	8.1	0.60		
	East Leg	72	55.9	0.98		

TABLE 6.9: 2041 ROUNDABOUT OPERATIONS – OPTION 2

Analysis Period	Intersection Approach	Queue (PCE)	Delay (sec)	V/C	Overall LOS	Intersection Delay (sec)
AM Peak Hour	North Leg	17	20.9	0.84	B	12.0
	South Leg	1	5.5	0.35		
	East Leg	1	4.7	0.40		
PM Peak Hour	North Leg	5	12.8	0.70	A	8.5
	South Leg	1	8.1	0.60		
	East Leg	1	6.4	0.55		

TABLE 6.10: 2041 ROUNDABOUT OPERATIONS – OPTION 3

Analysis Period	Intersection Approach	Queue (PCE)	Delay (sec)	V/C	Overall LOS	Intersection Delay (sec)
AM Peak Hour	North Leg	17	20.9	0.84	B	11.4
	South Leg	1	5.5	0.35		
	East Leg	1	3.1	0.40		
PM Peak Hour	North Leg	5	12.8	0.70	A	8.1
	South Leg	1	8.1	0.60		
	East Leg	2	5.5	0.65		

6.4 Summary of Mitigation Measures

The preceding analysis confirms that upgrading from stop-control to either traffic signal control or roundabout control would be warranted and would improve and mitigate the forecast poor operations under future traffic conditions.

Regarding roundabout control, the feasibility of implementing an appropriated sized facility within the right-of-way will need to be confirmed from a detailed design perspective.

7 Conclusions

The conclusions of the transportation and traffic analysis are as follows:

- Under base year conditions intersections within study area are characterized by acceptable delays and demands within capacity.

  Exceptions are noted at Heart Lake Road with Countryside Drive, the Highway 410 Southbound Off-Ramp, and Sandalwood Parkway.

  At these locations several critical movements are identified. Specifically, at the subject focus intersection of Heart Lake Road/Countryside Drive, the westbound left turn movement is reported to operate over-capacity. The poor operations are noted to be further exacerbated under future 2031 and 2041 traffic conditions.

- A review of the five-year collision history (2015 to 2019 inclusive) indicates there were no fatal collisions recorded.

  Heart Lake Road with Countryside Drive and Sandalwood Parkway were identified as two locations with a high collision frequency. The majority of reported collisions were found to be single motor vehicle collisions related to driver error/behaviour and not a function of the roadway or intersection design.

  At the subject focus intersection of Heart Lake Road/ Countryside Drive the reported number of correctible collisions to warrant the consideration of traffic signal control are just short of meeting the threshold criteria.

- A sight distance review was conducted for the Heart Lake Road/Countryside Drive intersection where it was confirmed there is more than adequate approach and departure sight distance available.

  It is noted even with the adequate sight distance available a high frequency of collisions was occurring. The reported collisions were determined to be attributed to aggressive driver behaviour. This resulting situation correlates with the poor operations during the peak hours stemming from a lack of gaps within the traffic stream along Heart Lake Road leading to drivers taking increased risk and more aggressive manoeuvres.

  Based upon these findings it alludes the current intersection traffic control warrants improvement.

- The intersection of Heart Lake Road/Countryside Drive was found to fall just short of meeting threshold criteria for the consideration of traffic signal control under base year traffic conditions. Under 2031 and 2041 traffic conditions the intersection meets the signal justification criteria.

Under traffic signal control the intersection is reported to operate at acceptable levels of service and well within capacity under 2041 traffic conditions.

- In addition to traffic signal control to mitigate the poor operations, roundabout control was investigated. It was determined Heart Lake Road/Countryside Drive would be suitable for roundabout implementation.

  Three roundabout configurations were investigated where it was determined a single-lane roundabout with single lane entry on the northbound and southbound approaches along with dual lane entry on the westbound approach would operate at acceptable levels of service and well within capacity under 2041 traffic conditions.

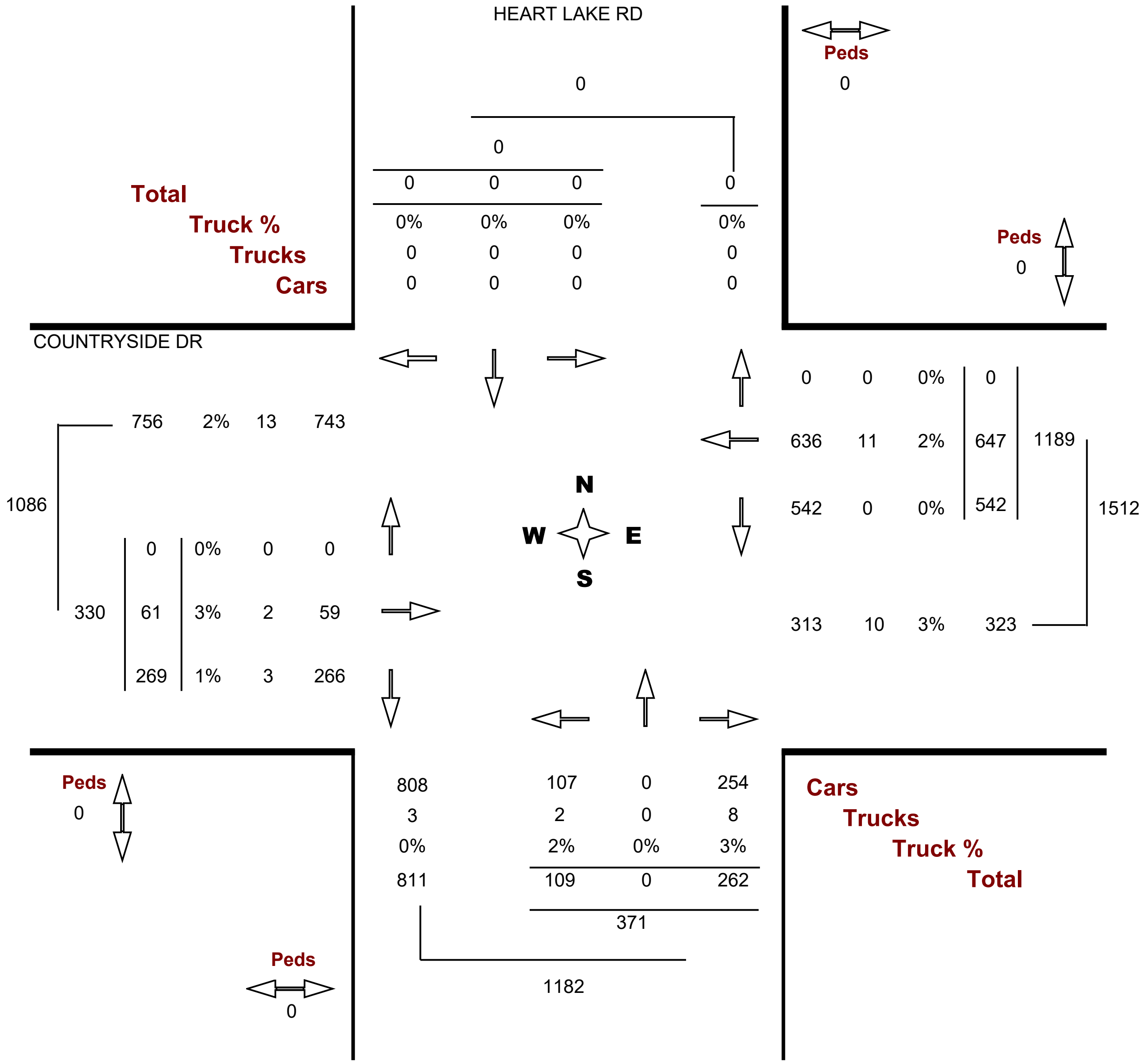
  The feasibility of implementing an appropriately sized facility within the right-of-way will need to be confirmed from a detailed design perspective.

Appendix A

Traffic Data

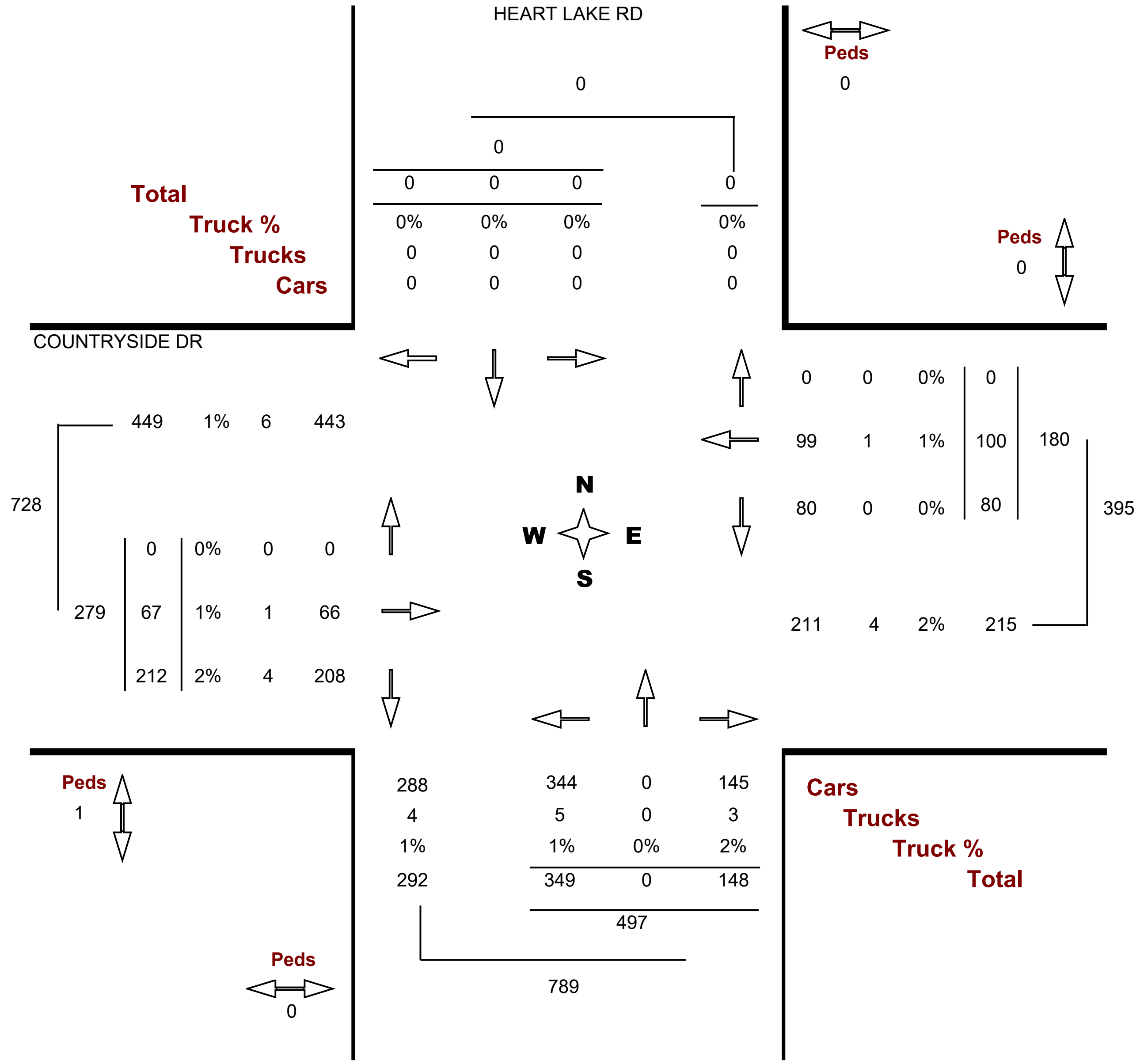
Turning Movements Report - AM Period

Location.......	COUNTRYSIDE DR @ HEART LAKE RD	**GeoID.......**	2298
Municipality.	Brampton	**Count Date.**	Wednesday, 13 June, 2018
Traffic Cont.	Stop sign	**Count Time.**	07:00 AM — 09:00 AM
Major Dir.....	North south	**Peak Hour..**	07:30 AM — 08:30 AM



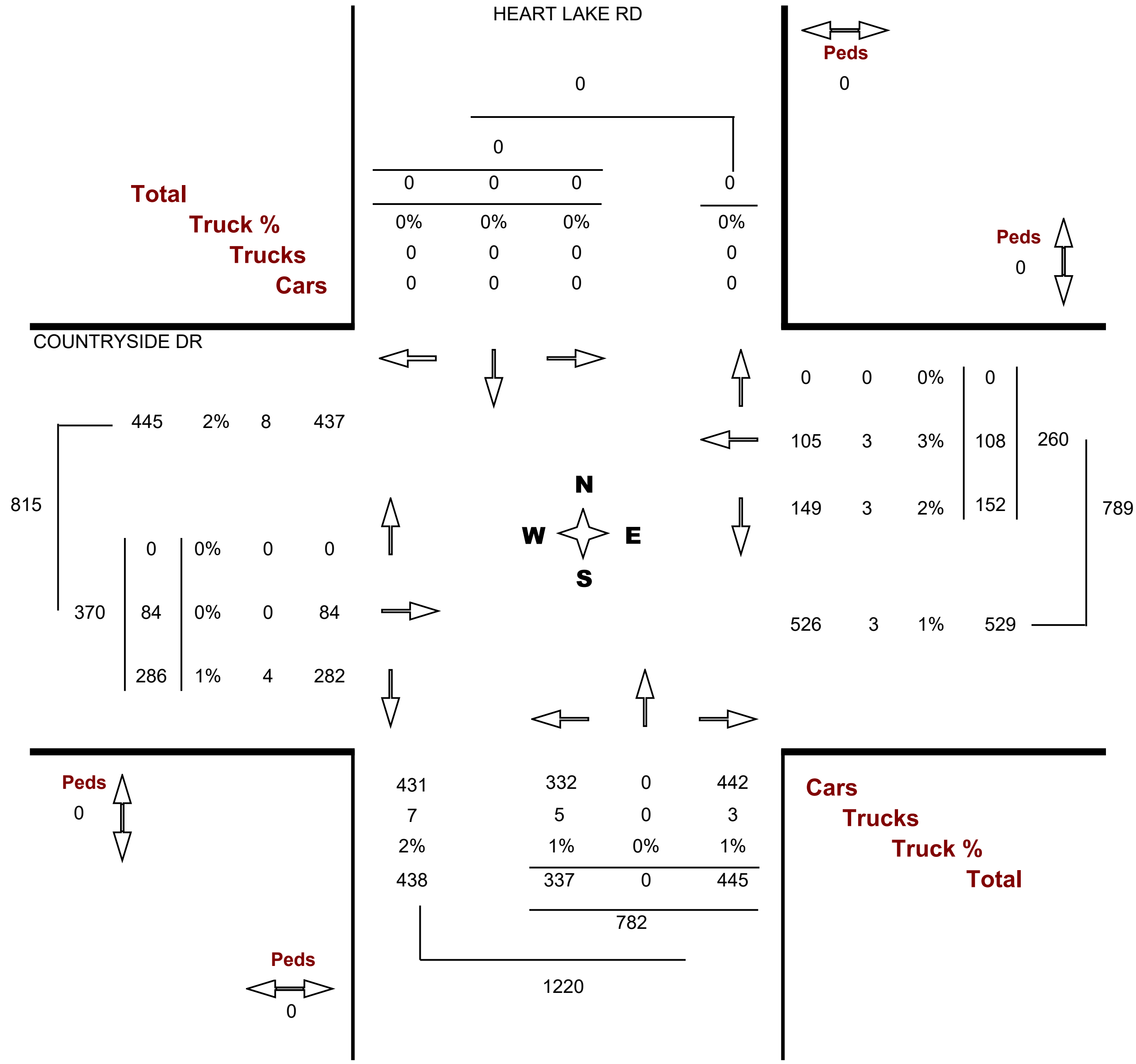
Turning Movements Report - MD Period

Location.......	COUNTRYSIDE DR @ HEART LAKE RD	**GeoID.......**	2298
Municipality.	Brampton	**Count Date.**	Wednesday, 13 June, 2018
Traffic Cont.	Stop sign	**Count Time.**	11:00 AM — 02:00 PM
Major Dir.....	North south	**Peak Hour..**	12:45 PM — 01:45 PM



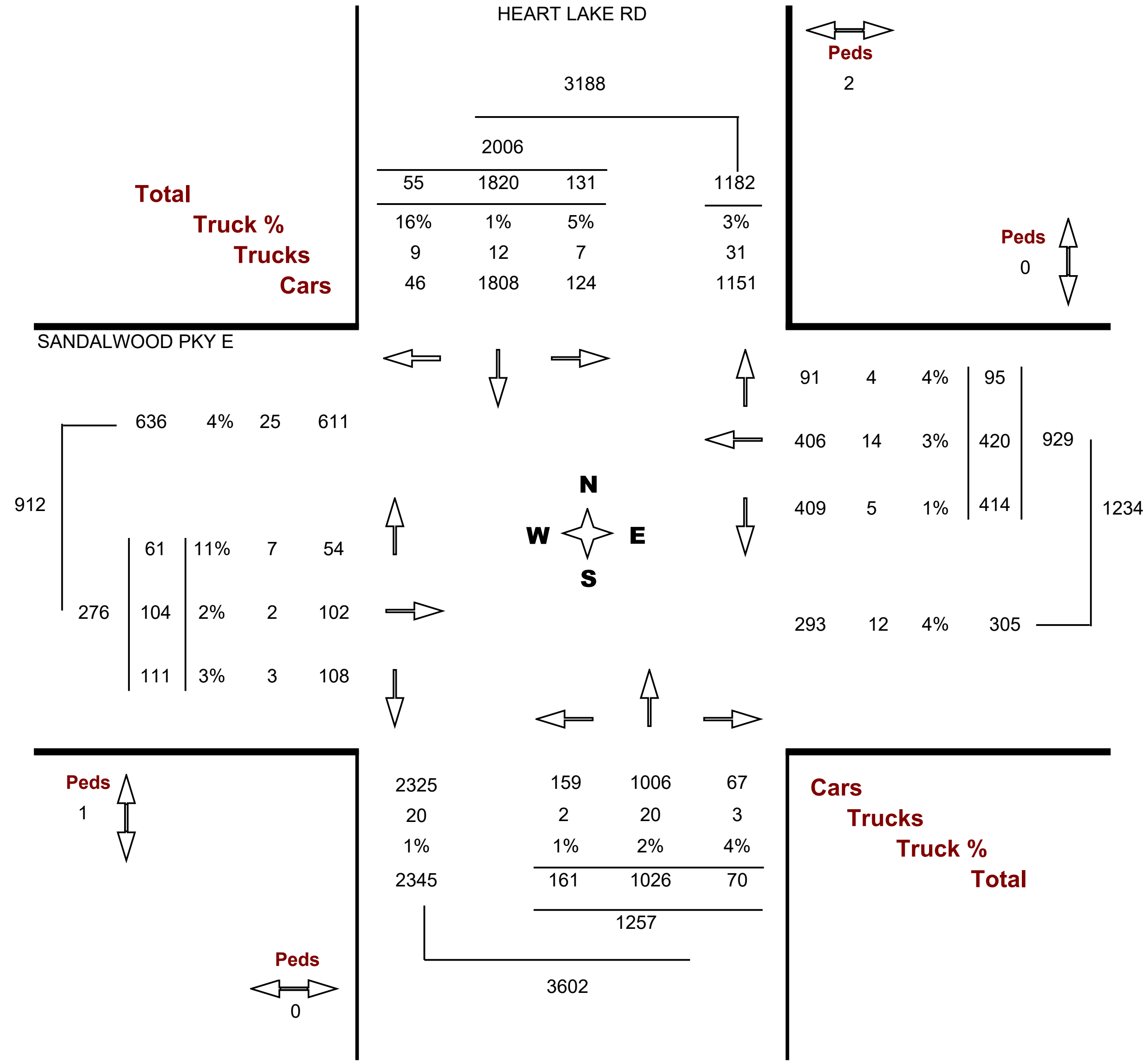
Turning Movements Report - PM Period

Location.......	COUNTRYSIDE DR @ HEART LAKE RD	**GeoID.......**	2298
Municipality.	Brampton	**Count Date.**	Wednesday, 13 June, 2018
Traffic Cont.	Stop sign	**Count Time.**	03:00 PM — 06:00 PM
Major Dir.....	North south	**Peak Hour..**	04:15 PM — 05:15 PM



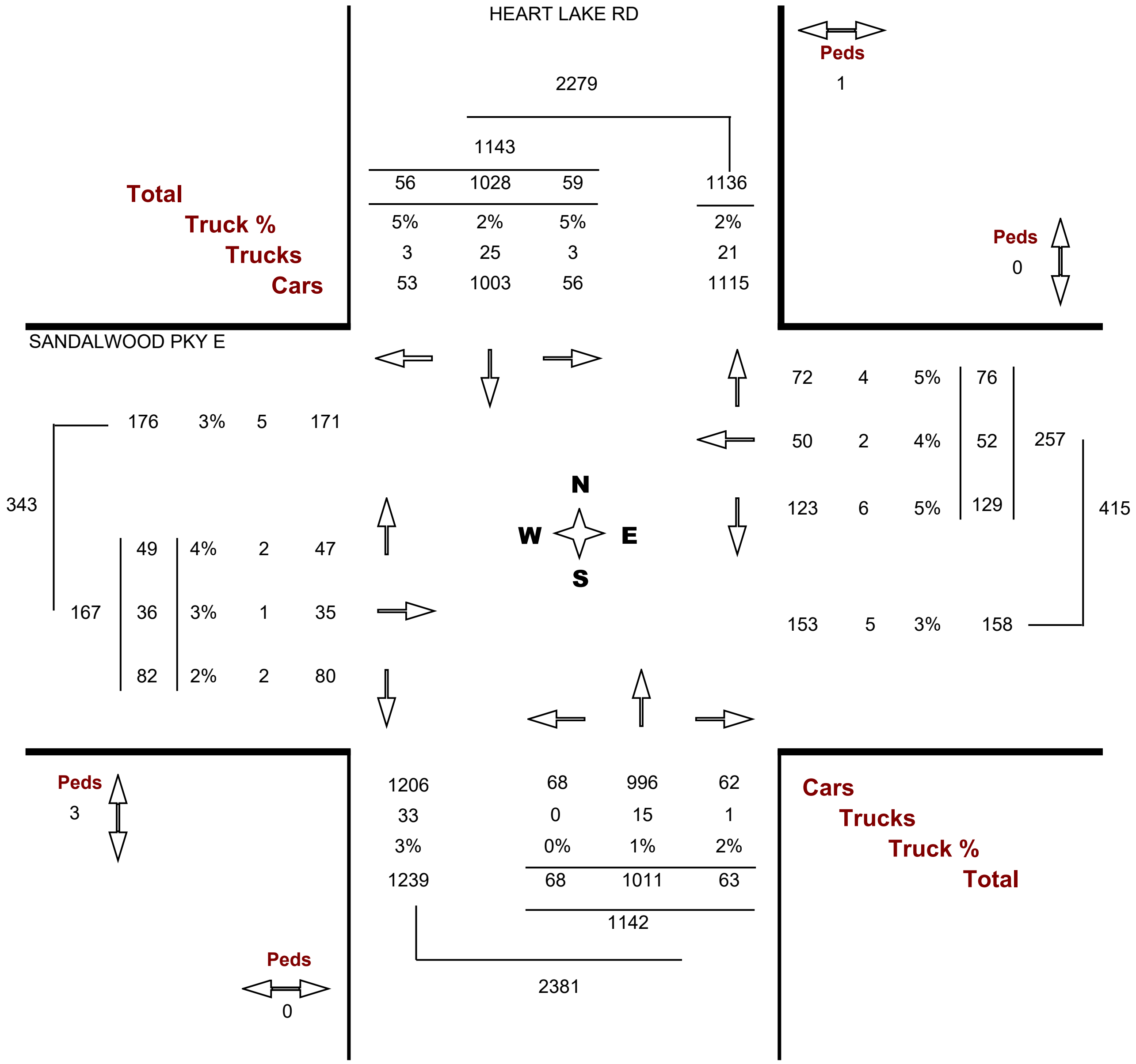
Turning Movements Report - AM Period

Location....... HEART LAKE RD @ SANDALWOOD PKY E
GeoID....... 4134
Municipality. Brampton
Count Date. Tuesday, 23 October, 2018
Traffic Cont. Traffic signal
Count Time. 07:00 AM — 09:00 AM
Major Dir..... None
Peak Hour.. 07:30 AM — 08:30 AM



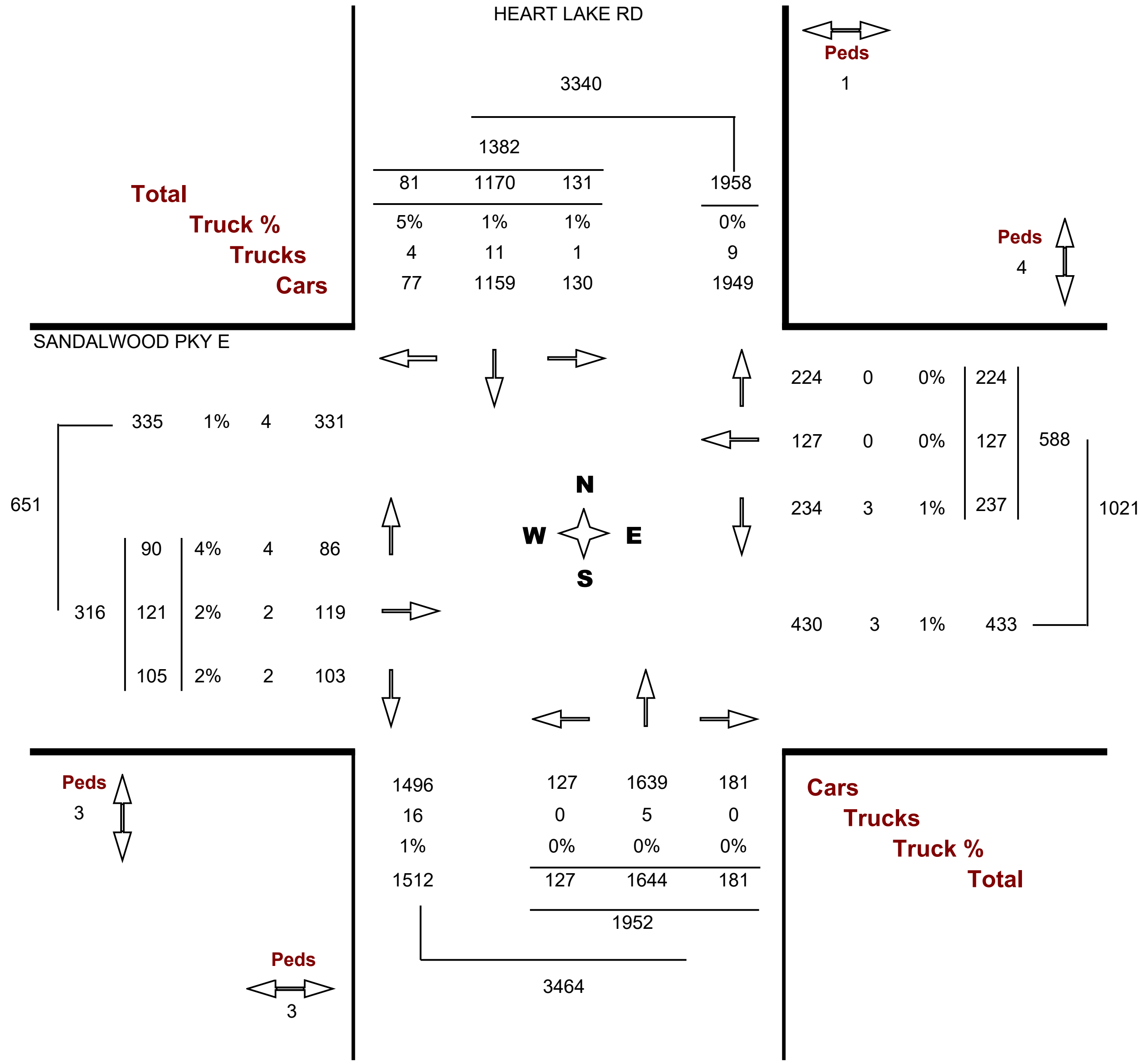
Turning Movements Report - MD Period

Location.......	HEART LAKE RD @ SANDALWOOD PKY E	**GeoID.......**	4134
Municipality.	Brampton	**Count Date.**	Tuesday, 23 October, 2018
Traffic Cont.	Traffic signal	**Count Time.**	11:00 AM — 02:00 PM
Major Dir.....	None	**Peak Hour..**	01:00 PM — 02:00 PM



Turning Movements Report - PM Period

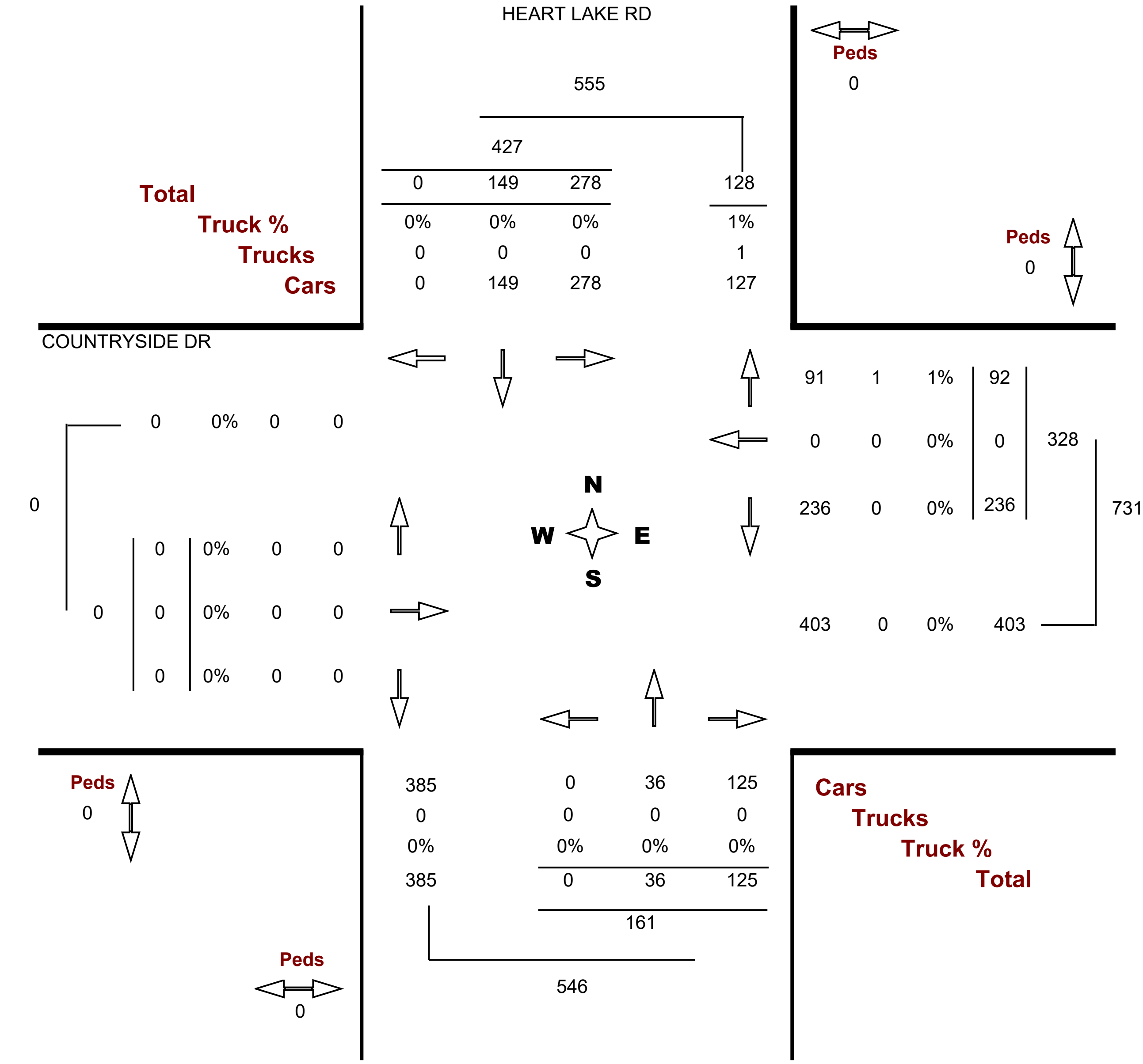
Location.......	HEART LAKE RD @ SANDALWOOD PKY E	**GeoID.......**	4134
Municipality.	Brampton	**Count Date.**	Tuesday, 23 October, 2018
Traffic Cont.	Traffic signal	**Count Time.**	03:00 PM — 06:00 PM
Major Dir.....	None	**Peak Hour..**	05:00 PM — 06:00 PM



Turning Movements Report - AM Period

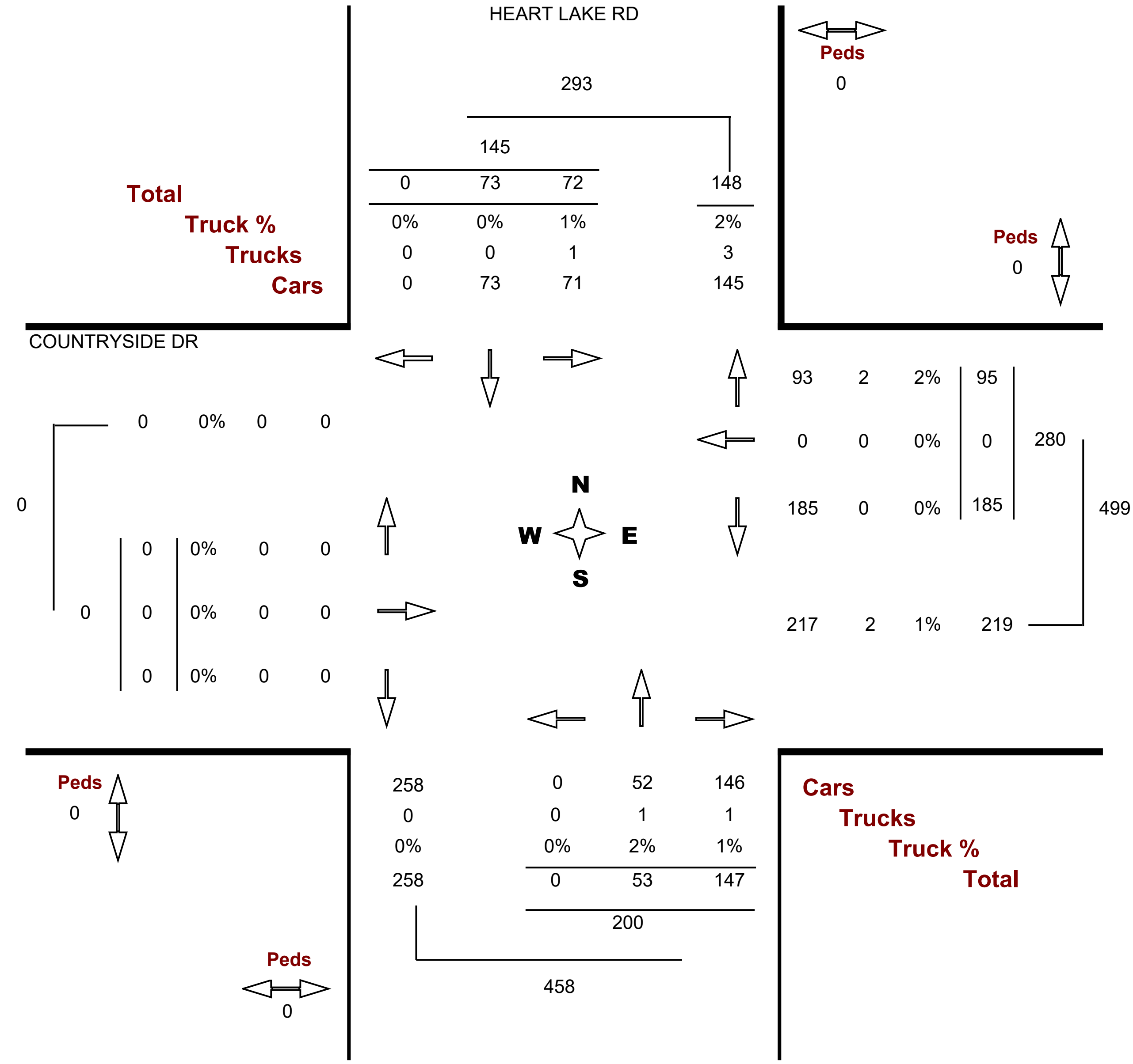
Location....... COUNTRYSIDE DR @ HEART LAKE RD
Municipality. Brampton
Traffic Cont. Stop sign
Major Dir..... North south

GeoID....... 2298
Count Date. Tuesday, 09 March, 2021
Count Time. 07:00 AM — 09:00 AM
Peak Hour.. 07:30 AM — 08:30 AM



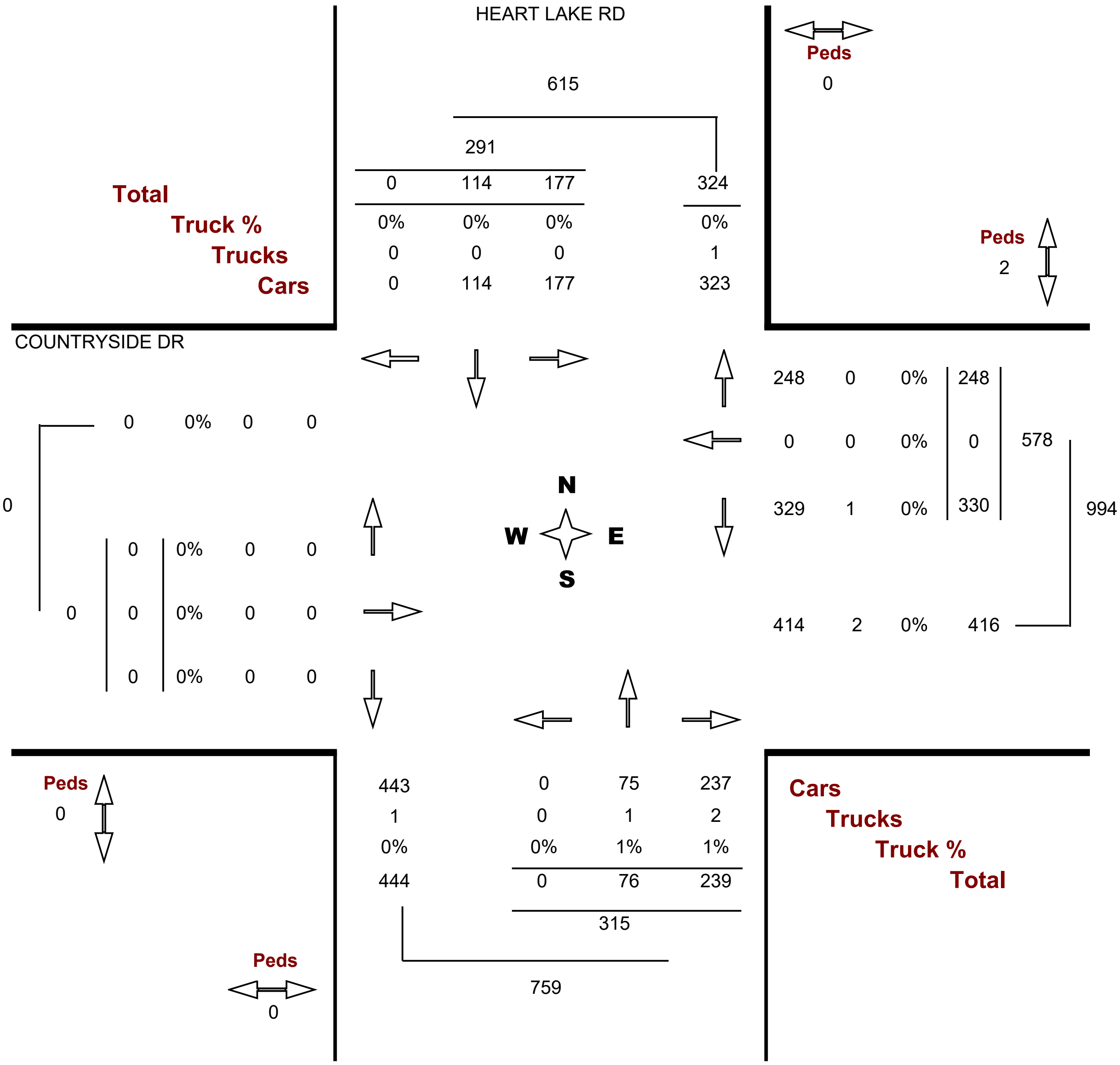
Turning Movements Report - MD Period

Location....... COUNTRYSIDE DR @ HEART LAKE RD
GeoID....... 2298
Municipality. Brampton
Count Date. Tuesday, 09 March, 2021
Traffic Cont. Stop sign
Count Time. 11:00 AM — 02:00 PM
Major Dir..... North south
Peak Hour.. 01:00 PM — 02:00 PM



Turning Movements Report - PM Period

Location.......	COUNTRYSIDE DR @ HEART LAKE RD	**GeoID.......**	2298
Municipality.	Brampton	**Count Date.**	Tuesday, 09 March, 2021
Traffic Cont.	Stop sign	**Count Time.**	03:00 PM — 06:00 PM
Major Dir.....	North south	**Peak Hour..**	03:45 PM — 04:45 PM



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Dixie Road
Site Code: 200333
Start Date: 11/19/2020

Turning Movement Data

	Countryside Drive						Countryside Drive						Dixie Road						Dixie Road						
	Eastbound						Westbound						Northbound						Southbound						
Start Time	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:00 AM	2	87	5	0	0	94	27	54	9	0	0	90	0	20	18	0	0	38	24	52	5	0	1	81	303
7:15 AM	4	77	6	0	0	87	42	55	13	0	1	110	1	18	19	0	0	38	20	62	4	0	0	86	321
7:30 AM	2	90	11	0	0	103	49	82	21	0	1	152	4	19	23	0	1	46	23	53	2	0	1	78	379
7:45 AM	6	86	16	0	0	108	43	71	36	0	1	150	4	31	17	0	0	52	27	85	6	0	1	118	428
Hourly Total	14	340	38	0	0	392	161	262	79	0	3	502	9	88	77	0	1	174	94	252	17	0	3	363	1431
8:00 AM	7	95	14	0	0	116	57	83	22	0	2	162	4	27	26	0	0	57	34	69	10	0	0	113	448
8:15 AM	4	88	12	0	0	104	32	57	21	0	1	110	4	36	26	0	0	66	29	64	5	0	0	98	378
8:30 AM	3	84	4	0	0	91	45	94	24	0	0	163	2	22	25	0	1	49	33	63	6	0	0	102	405
8:45 AM	6	86	3	0	0	95	44	83	15	0	1	142	0	35	14	0	2	49	24	49	2	0	0	75	361
Hourly Total	20	353	33	0	0	406	178	317	82	0	4	577	10	120	91	0	3	221	120	245	23	0	0	388	1592
9:00 AM	12	55	4	0	0	71	33	78	21	0	0	132	6	28	20	0	0	54	13	42	5	0	0	60	317
9:15 AM	3	51	5	0	0	59	28	54	19	0	1	101	0	22	20	0	2	42	23	40	10	0	0	73	275
9:30 AM	5	44	4	0	0	53	22	62	10	1	0	95	1	21	19	0	1	41	11	37	1	0	0	49	238
9:45 AM	0	53	1	0	0	54	32	56	14	0	0	102	3	38	24	0	3	65	20	48	7	0	0	75	296
Hourly Total	20	203	14	0	0	237	115	250	64	1	1	430	10	109	83	0	6	202	67	167	23	0	0	257	1126
10:00 AM	4	44	3	0	0	51	27	49	20	0	0	96	2	21	20	0	1	43	7	29	7	0	0	43	233
10:15 AM	4	48	3	0	0	55	18	58	6	0	1	82	1	26	31	0	0	58	13	32	10	0	1	55	250
10:30 AM	7	56	4	0	0	67	28	70	7	0	0	105	1	28	21	0	2	50	10	31	5	0	0	46	268
10:45 AM	7	32	2	0	2	41	33	53	11	0	10	97	6	29	25	0	0	60	16	44	8	0	2	68	266
Hourly Total	22	180	12	0	2	214	106	230	44	0	11	380	10	104	97	0	3	211	46	136	30	0	3	212	1017
11:00 AM	5	51	4	0	0	60	30	49	17	0	2	96	2	27	36	0	0	65	19	44	8	0	0	71	292
11:15 AM	3	48	3	0	1	54	29	67	14	0	0	110	6	31	23	0	0	60	14	45	10	0	2	69	293
11:30 AM	3	27	0	0	0	30	35	57	14	0	0	106	2	27	18	0	0	47	12	32	7	0	0	51	234
11:45 AM	3	35	4	0	0	42	30	55	11	0	0	96	1	33	24	0	0	58	11	29	5	0	0	45	241
Hourly Total	14	161	11	0	1	186	124	228	56	0	2	408	11	118	101	0	0	230	56	150	30	0	2	236	1060
12:00 PM	7	39	4	0	0	50	26	67	15	0	0	108	4	35	33	0	0	72	22	30	7	0	0	59	289
12:15 PM	6	60	2	0	0	68	28	65	19	0	0	112	1	30	29	0	0	60	19	40	1	0	0	60	300
12:30 PM	6	60	4	0	0	70	23	60	20	0	0	103	2	31	28	0	0	61	18	47	5	0	0	70	304
12:45 PM	9	44	3	0	1	56	23	58	15	0	0	96	0	40	23	0	0	63	21	46	7	0	0	74	289
Hourly Total	28	203	13	0	1	244	100	250	69	0	0	419	7	136	113	0	0	256	80	163	20	0	0	263	1182
1:00 PM	6	39	2	0	0	47	31	76	10	0	1	117	2	32	24	0	1	58	22	33	9	0	1	64	286
1:15 PM	9	34	2	1	0	46	23	61	16	0	0	100	2	28	26	0	0	56	19	34	7	0	0	60	262
1:30 PM	7	41	2	0	0	50	24	60	20	0	0	104	1	33	25	0	0	59	14	39	3	0	0	56	269
1:45 PM	8	46	2	0	0	56	28	81	20	0	0	129	5	29	30	0	2	64	21	41	7	0	0	69	318
Hourly Total	30	160	8	1	0	199	106	278	66	0	1	450	10	122	105	0	3	237	76	147	26	0	1	249	1135

2:00 PM	5	56	2	0	0	63	29	74	21	0	1	124	6	33	40	0	0	79	18	55	10	0	0	83	349
2:15 PM	2	65	8	0	0	75	34	84	23	0	0	141	8	45	30	0	1	83	22	39	9	0	0	70	369
2:30 PM	5	82	2	0	0	89	33	93	22	0	0	148	5	44	37	0	1	86	17	42	7	0	0	66	389
2:45 PM	8	73	4	0	0	85	38	117	16	0	0	171	4	61	38	0	1	103	12	46	8	0	0	66	425
Hourly Total	20	276	16	0	0	312	134	368	82	0	1	584	23	183	145	0	3	351	69	182	34	0	0	285	1532
3:00 PM	5	71	1	0	0	77	41	119	19	0	1	179	7	56	37	0	2	100	18	61	9	0	0	88	444
3:15 PM	6	72	4	0	0	82	41	139	27	0	0	207	14	66	38	0	0	118	14	54	12	0	0	80	487
3:30 PM	11	103	4	0	1	118	41	132	41	0	0	214	5	90	39	0	0	134	28	51	4	0	1	83	549
3:45 PM	13	93	6	0	0	112	43	126	28	0	0	197	12	58	55	0	1	125	22	38	11	0	2	71	505
Hourly Total	35	339	15	0	1	389	166	516	115	0	1	797	38	270	169	0	3	477	82	204	36	0	3	322	1985
4:00 PM	9	89	3	0	0	101	45	143	28	0	0	216	7	64	36	0	1	107	23	36	10	0	1	69	493
4:15 PM	8	97	8	0	1	113	41	143	28	0	3	212	11	73	41	0	2	125	26	51	4	0	0	81	531
4:30 PM	9	77	0	0	0	86	34	151	43	0	0	228	6	92	42	0	3	140	20	44	6	0	1	70	524
4:45 PM	12	81	7	0	2	100	53	168	42	0	0	263	8	61	29	0	2	98	16	55	6	0	2	77	538
Hourly Total	38	344	18	0	3	400	173	605	141	0	3	919	32	290	148	0	8	470	85	186	26	0	4	297	2086
5:00 PM	13	71	5	0	3	89	53	164	34	0	1	251	6	85	55	0	0	146	41	50	5	0	2	96	582
5:15 PM	4	97	5	0	0	106	52	166	33	0	1	251	5	78	59	0	1	142	28	56	15	0	0	99	598
5:30 PM	9	78	9	0	0	96	53	159	21	0	0	233	9	77	57	0	0	143	34	64	4	0	0	102	574
5:45 PM	3	95	4	0	0	102	45	153	23	0	0	221	7	55	47	0	0	109	20	43	7	0	0	70	502
Hourly Total	29	341	23	0	3	393	203	642	111	0	2	956	27	295	218	0	1	540	123	213	31	0	2	367	2256
6:00 PM	4	56	7	0	1	67	47	148	21	0	0	216	8	59	35	0	0	102	25	39	9	0	1	73	458
6:15 PM	7	64	7	0	0	78	33	105	15	0	0	153	4	57	46	0	0	107	20	42	5	0	0	67	405
6:30 PM	5	59	3	0	0	67	38	109	19	0	0	166	5	58	35	0	1	98	33	36	10	0	0	79	410
6:45 PM	7	70	3	1	0	81	30	106	23	0	0	159	5	48	35	0	0	88	20	38	6	0	0	64	392
Hourly Total	23	249	20	1	1	293	148	468	78	0	0	694	22	222	151	0	1	395	98	155	30	0	1	283	1665
Grand Total	293	3149	221	2	12	3665	1714	4414	987	1	29	7116	209	2057	1498	0	32	3764	996	2200	326	0	19	3522	18067
Approach %	8.0	85.9	6.0	0.1	-	-	24.1	62.0	13.9	0.0	-	-	5.6	54.6	39.8	0.0	-	-	28.3	62.5	9.3	0.0	-	-	-
Total %	1.6	17.4	1.2	0.0	-	20.3	9.5	24.4	5.5	0.0	-	39.4	1.2	11.4	8.3	0.0	-	20.8	5.5	12.2	1.8	0.0	-	19.5	-
Motorcycles	0	0	1	0	-	1	0	1	0	0	-	1	0	0	2	0	-	2	1	3	0	0	-	4	8
% Motorcycles	0.0	0.0	0.5	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.1	-	-	0.1	0.1	0.1	0.0	-	-	0.1	0.0
Cars & Light Goods	280	3055	209	2	-	3546	1598	4326	969	1	-	6894	201	1911	1420	0	-	3532	962	2100	317	0	-	3379	17351
% Cars & Light Goods	95.6	97.0	94.6	100.0	-	96.8	93.2	98.0	98.2	100.0	-	96.9	96.2	92.9	94.8	-	-	93.8	96.6	95.5	97.2	-	-	95.9	96.0
Buses	9	62	8	0	-	79	89	50	7	0	-	146	8	89	35	0	-	132	11	34	6	0	-	51	408
% Buses	3.1	2.0	3.6	0.0	-	2.2	5.2	1.1	0.7	0.0	-	2.1	3.8	4.3	2.3	-	-	3.5	1.1	1.5	1.8	-	-	1.4	2.3
Single-Unit Trucks	4	32	3	0	-	39	24	29	10	0	-	63	0	48	29	0	-	77	15	46	3	0	-	64	243
% Single-Unit Trucks	1.4	1.0	1.4	0.0	-	1.1	1.4	0.7	1.0	0.0	-	0.9	0.0	2.3	1.9	-	-	2.0	1.5	2.1	0.9	-	-	1.8	1.3
Articulated Trucks	0	0	0	0	-	0	3	8	1	0	-	12	0	9	11	0	-	20	7	17	0	0	-	24	56
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.2	0.2	0.1	0.0	-	0.2	0.0	0.4	0.7	-	-	0.5	0.7	0.8	0.0	-	-	0.7	0.3
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.1	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	12.5	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	12	-	-	-	-	-	29	-	-	-	-	-	28	-	-	-	-	-	19	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	87.5	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Dixie Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 3

Dixie Road [N]

Out	In	Total
0	4	4
3160	3379	6539
105	51	156
62	64	126
10	24	34
3337	**3522**	**6859**

R	T	L	U	P
0	3	1	0	0
317	2100	962	0	0
6	34	11	0	0
3	46	15	0	0
0	17	7	0	19
326	**2200**	**996**	**0**	**19**

Countryside Drive [W]

Out	In	Total
1	1	2
4846	3546	8392
64	79	143
32	39	71
8	0	8
4951	**3665**	**8616**

U	L	T	R	P
0	0	0	1	0
2	280	3055	209	0
0	9	62	8	0
0	4	32	3	0
0	0	0	0	12
2	**293**	**3149**	**221**	**12**

11/19/2020 7:00 AM
Ending At
11/19/2020 7:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Countryside Drive [E]

Out	In	Total
3	1	4
5438	6894	12332
108	146	254
76	63	139
19	12	31
5644	**7116**	**12760**

R	T	L	U	P
0	1	0	0	0
969	4326	1598	1	0
7	50	89	0	0
10	29	24	0	0
1	8	3	0	29
987	**4414**	**1714**	**1**	**29**

U	L	T	R	P
0	0	0	2	0
0	201	1911	1420	0
0	8	89	35	0
0	0	48	29	0
0	0	9	12	32
0	**209**	**2057**	**1498**	**32**

Out	In	Total
4	2	6
3907	3532	7439
131	132	263
73	77	150
20	21	41
4135	**3764**	**7899**

Dixie Road [S]

Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Dixie Road
Site Code: 200333
Start Date: 11/19/2020

Turning Movement Peak Hour Data (7:45 AM)

Start Time	Countryside Drive Eastbound						Countryside Drive Westbound						Dixie Road Northbound						Dixie Road Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:45 AM	6	86	16	0	0	108	43	71	36	0	1	150	4	31	17	0	0	52	27	85	6	0	1	118	428
8:00 AM	7	95	14	0	0	116	57	83	22	0	2	162	4	27	26	0	0	57	34	69	10	0	0	113	448
8:15 AM	4	88	12	0	0	104	32	57	21	0	1	110	4	36	26	0	0	66	29	64	5	0	0	98	378
8:30 AM	3	84	4	0	0	91	45	94	24	0	0	163	2	22	25	0	1	49	33	63	6	0	0	102	405
Total	20	353	46	0	0	419	177	305	103	0	4	585	14	116	94	0	1	224	123	281	27	0	1	431	1659
Approach %	4.8	84.2	11.0	0.0	-	-	30.3	52.1	17.6	0.0	-	-	6.3	51.8	42.0	0.0	-	-	28.5	65.2	6.3	0.0	-	-	-
Total %	1.2	21.3	2.8	0.0	-	25.3	10.7	18.4	6.2	0.0	-	35.3	0.8	7.0	5.7	0.0	-	13.5	7.4	16.9	1.6	0.0	-	26.0	-
PHF	0.714	0.929	0.719	0.000	-	0.903	0.776	0.811	0.715	0.000	-	0.897	0.875	0.806	0.904	0.000	-	0.848	0.904	0.826	0.675	0.000	-	0.913	0.926
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	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
Cars & Light Goods	19	341	42	0	-	402	160	297	99	0	-	556	12	95	81	0	-	188	120	271	25	0	-	416	1562
% Cars & Light Goods	95.0	96.6	91.3	-	-	95.9	90.4	97.4	96.1	-	-	95.0	85.7	81.9	86.2	-	-	83.9	97.6	96.4	92.6	-	-	96.5	94.2
Buses	1	11	3	0	-	15	15	3	3	0	-	21	2	16	7	0	-	25	2	6	2	0	-	10	71
% Buses	5.0	3.1	6.5	-	-	3.6	8.5	1.0	2.9	-	-	3.6	14.3	13.8	7.4	-	-	11.2	1.6	2.1	7.4	-	-	2.3	4.3
Single-Unit Trucks	0	1	1	0	-	2	2	4	0	0	-	6	0	3	4	0	-	7	0	2	0	0	-	2	17
% Single-Unit Trucks	0.0	0.3	2.2	-	-	0.5	1.1	1.3	0.0	-	-	1.0	0.0	2.6	4.3	-	-	3.1	0.0	0.7	0.0	-	-	0.5	1.0
Articulated Trucks	0	0	0	0	-	0	0	1	1	0	-	2	0	2	2	0	-	4	1	2	0	0	-	3	9
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.3	1.0	-	-	0.3	0.0	1.7	2.1	-	-	1.8	0.8	0.7	0.0	-	-	0.7	0.5
Bicycles on Road	0	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	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	1	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Dixie Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 5

Peak Hour Data

11/19/2020 7:45 AM
Ending At
11/19/2020 8:45 AM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Dixie Road [N]

Out	In	Total
0	0	0
213	416	629
20	10	30
3	2	5
3	3	6
239	**431**	**670**

R	T	L	U	P
0	0	0	0	0
25	271	120	0	0
2	6	2	0	0
0	2	0	0	0
0	2	1	0	1
27	**281**	**123**	**0**	**1**

Countryside Drive [W]

Out	In	Total
0	0	0
334	402	736
7	15	22
4	2	6
1	0	1
346	**419**	**765**

U	L	T	R	P
0	0	0	0	0
0	19	341	42	0
0	1	11	3	0
0	0	1	1	0
0	0	0	0	0
0	**20**	**353**	**46**	**0**

Countryside Drive [E]

Out	In	Total
0	0	0
542	556	1098
20	21	41
5	6	11
3	2	5
570	**585**	**1155**

R	T	L	U	P
0	0	0	0	0
99	297	160	0	0
3	3	15	0	0
0	4	2	0	0
1	1	0	0	4
103	**305**	**177**	**0**	**4**

Dixie Road [S]

U	L	T	R	P
0	0	0	0	0
0	12	95	81	0
0	2	16	7	0
0	0	3	4	0
0	0	2	2	1
0	**14**	**116**	**94**	**1**

Out	In	Total
0	0	0
473	188	661
24	25	49
5	7	12
2	4	6
504	**224**	**728**

Turning Movement Peak Hour Data Plot (7:45 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Dixie Road
Site Code: 200333
Start Date: 11/19/2020

Turning Movement Peak Hour Data (12:00 PM)

Start Time	Countryside Drive Eastbound						Countryside Drive Westbound						Dixie Road Northbound						Dixie Road Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
12:00 PM	7	39	4	0	0	50	26	67	15	0	0	108	4	35	33	0	0	72	22	30	7	0	0	59	289
12:15 PM	6	60	2	0	0	68	28	65	19	0	0	112	1	30	29	0	0	60	19	40	1	0	0	60	300
12:30 PM	6	60	4	0	0	70	23	60	20	0	0	103	2	31	28	0	0	61	18	47	5	0	0	70	304
12:45 PM	9	44	3	0	1	56	23	58	15	0	0	96	0	40	23	0	0	63	21	46	7	0	0	74	289
Total	28	203	13	0	1	244	100	250	69	0	0	419	7	136	113	0	0	256	80	163	20	0	0	263	1182
Approach %	11.5	83.2	5.3	0.0	-	-	23.9	59.7	16.5	0.0	-	-	2.7	53.1	44.1	0.0	-	-	30.4	62.0	7.6	0.0	-	-	-
Total %	2.4	17.2	1.1	0.0	-	20.6	8.5	21.2	5.8	0.0	-	35.4	0.6	11.5	9.6	0.0	-	21.7	6.8	13.8	1.7	0.0	-	22.3	-
PHF	0.778	0.846	0.813	0.000	-	0.871	0.893	0.933	0.863	0.000	-	0.935	0.438	0.850	0.856	0.000	-	0.889	0.909	0.867	0.714	0.000	-	0.889	0.972
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	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
Cars & Light Goods	26	198	12	0	-	236	96	246	68	0	-	410	7	128	104	0	-	239	78	154	20	0	-	252	1137
% Cars & Light Goods	92.9	97.5	92.3	-	-	96.7	96.0	98.4	98.6	-	-	97.9	100.0	94.1	92.0	-	-	93.4	97.5	94.5	100.0	-	-	95.8	96.2
Buses	0	2	0	0	-	2	3	0	0	0	-	3	0	3	2	0	-	5	1	2	0	0	-	3	13
% Buses	0.0	1.0	0.0	-	-	0.8	3.0	0.0	0.0	-	-	0.7	0.0	2.2	1.8	-	-	2.0	1.3	1.2	0.0	-	-	1.1	1.1
Single-Unit Trucks	2	3	1	0	-	6	1	3	1	0	-	5	0	5	5	0	-	10	0	6	0	0	-	6	27
% Single-Unit Trucks	7.1	1.5	7.7	-	-	2.5	1.0	1.2	1.4	-	-	1.2	0.0	3.7	4.4	-	-	3.9	0.0	3.7	0.0	-	-	2.3	2.3
Articulated Trucks	0	0	0	0	-	0	0	1	0	0	-	1	0	0	2	0	-	2	1	1	0	0	-	2	5
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.2	0.0	0.0	1.8	-	-	0.8	1.3	0.6	0.0	-	-	0.8	0.4
Bicycles on Road	0	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	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Dixie Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 7

Peak Hour Data

11/19/2020 12:00 PM
Ending At
11/19/2020 1:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Dixie Road [N]

	Out	In	Total
Motorcycles	0	0	0
Cars & Light Goods	222	252	474
Buses	3	3	6
Single-Unit Trucks	8	6	14
Other	0	2	2
Total	**233**	**263**	**496**

	R	T	L	U	P
Motorcycles	0	0	0	0	0
Cars & Light Goods	20	154	78	0	0
Buses	0	2	1	0	0
Single-Unit Trucks	0	6	0	0	0
Other	0	1	1	0	0
Total	**20**	**163**	**80**	**0**	**0**

Countryside Drive [W]

	Out	In	Total
Motorcycles	0	0	0
Cars & Light Goods	273	236	509
Buses	0	2	2
Single-Unit Trucks	3	6	9
Other	1	0	1
Total	**277**	**244**	**521**

	U	L	T	R	P
Motorcycles	0	0	0	0	0
Cars & Light Goods	0	26	198	12	0
Buses	0	0	2	0	0
Single-Unit Trucks	0	2	3	1	0
Other	0	0	0	0	1
Total	**0**	**28**	**203**	**13**	**1**

Countryside Drive [E]

	Out	In	Total
Motorcycles	0	0	0
Cars & Light Goods	380	410	790
Buses	5	3	8
Single-Unit Trucks	8	5	13
Other	3	1	4
Total	**396**	**419**	**815**

	R	T	L	U	P
Motorcycles	0	0	0	0	0
Cars & Light Goods	68	246	96	0	0
Buses	0	0	3	0	0
Single-Unit Trucks	1	3	1	0	0
Other	0	1	0	0	0
Total	**69**	**250**	**100**	**0**	**0**

Dixie Road [S]

	U	L	T	R	P
Motorcycles	0	0	0	0	0
Cars & Light Goods	0	7	128	104	0
Buses	0	0	3	2	0
Single-Unit Trucks	0	0	5	5	0
Other	0	0	0	2	0
Total	**0**	**7**	**136**	**113**	**0**

	Out	In	Total
Motorcycles	0	0	0
Cars & Light Goods	262	239	501
Buses	5	5	10
Single-Unit Trucks	8	10	18
Other	1	2	3
Total	**276**	**256**	**532**

Turning Movement Peak Hour Data Plot (12:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Dixie Road
Site Code: 200333
Start Date: 11/19/2020

Turning Movement Peak Hour Data (4:45 PM)

	Countryside Drive Eastbound						Countryside Drive Westbound						Dixie Road Northbound						Dixie Road Southbound						
Start Time	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
4:45 PM	12	81	7	0	2	100	53	168	42	0	0	263	8	61	29	0	2	98	16	55	6	0	2	77	538
5:00 PM	13	71	5	0	3	89	53	164	34	0	1	251	6	85	55	0	0	146	41	50	5	0	2	96	582
5:15 PM	4	97	5	0	0	106	52	166	33	0	1	251	5	78	59	0	1	142	28	56	15	0	0	99	598
5:30 PM	9	78	9	0	0	96	53	159	21	0	0	233	9	77	57	0	0	143	34	64	4	0	0	102	574
Total	38	327	26	0	5	391	211	657	130	0	2	998	28	301	200	0	3	529	119	225	30	0	4	374	2292
Approach %	9.7	83.6	6.6	0.0	-	-	21.1	65.8	13.0	0.0	-	-	5.3	56.9	37.8	0.0	-	-	31.8	60.2	8.0	0.0	-	-	-
Total %	1.7	14.3	1.1	0.0	-	17.1	9.2	28.7	5.7	0.0	-	43.5	1.2	13.1	8.7	0.0	-	23.1	5.2	9.8	1.3	0.0	-	16.3	-
PHF	0.731	0.843	0.722	0.000	-	0.922	0.995	0.978	0.774	0.000	-	0.949	0.778	0.885	0.847	0.000	-	0.906	0.726	0.879	0.500	0.000	-	0.917	0.958
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	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
Cars & Light Goods	38	319	26	0	-	383	201	654	129	0	-	984	28	286	198	0	-	512	118	216	29	0	-	363	2242
% Cars & Light Goods	100.0	97.6	100.0	-	-	98.0	95.3	99.5	99.2	-	-	98.6	100.0	95.0	99.0	-	-	96.8	99.2	96.0	96.7	-	-	97.1	97.8
Buses	0	2	0	0	-	2	7	0	0	0	-	7	0	7	0	0	-	7	1	0	1	0	-	2	18
% Buses	0.0	0.6	0.0	-	-	0.5	3.3	0.0	0.0	-	-	0.7	0.0	2.3	0.0	-	-	1.3	0.8	0.0	3.3	-	-	0.5	0.8
Single-Unit Trucks	0	6	0	0	-	6	3	2	1	0	-	6	0	6	1	0	-	7	0	7	0	0	-	7	26
% Single-Unit Trucks	0.0	1.8	0.0	-	-	1.5	1.4	0.3	0.8	-	-	0.6	0.0	2.0	0.5	-	-	1.3	0.0	3.1	0.0	-	-	1.9	1.1
Articulated Trucks	0	0	0	0	-	0	0	1	0	0	-	1	0	2	1	0	-	3	0	2	0	0	-	2	6
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	-	-	0.1	0.0	0.7	0.5	-	-	0.6	0.0	0.9	0.0	-	-	0.5	0.3
Bicycles on Road	0	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	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	5	-	-	-	-	-	2	-	-	-	-	-	3	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Dixie Road
Site Code: 200333
Start Date: 11/19/2020

Dixie Road [N]

Out	In	Total
0	0	0
453	363	816
7	2	9
7	7	14
2	2	4
469	**374**	**843**

R	T	L	U	P
0	0	0	0	0
29	216	118	0	0
1	0	1	0	0
0	7	0	0	0
0	2	0	0	4
30	**225**	**119**	**0**	**4**

Countryside Drive [W]

Out	In	Total
0	0	0
711	383	1094
1	2	3
2	6	8
1	0	1
715	**391**	**1106**

U	L	T	R	P
0	0	0	0	0
0	38	319	26	0
0	0	2	0	0
0	0	6	0	0
0	0	0	0	5
0	**38**	**327**	**26**	**5**

Peak Hour Data

11/19/2020 4:45 PM
Ending At
11/19/2020 5:45 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

R	T	L	U	P
0	0	0	0	0
129	654	201	0	0
0	0	7	0	0
1	2	3	0	0
0	1	0	0	2
130	**657**	**211**	**0**	**2**

Countryside Drive [E]

Out	In	Total
0	0	0
635	984	1619
3	7	10
7	6	13
1	1	2
646	**998**	**1644**

U	L	T	R	P
0	0	0	0	0
0	28	286	198	0
0	0	7	0	0
0	0	6	1	0
0	0	2	1	3
0	**28**	**301**	**200**	**3**

Out	In	Total
0	0	0
443	512	955
7	7	14
10	7	17
2	3	5
462	**529**	**991**

Dixie Road [S]

Turning Movement Peak Hour Data Plot (4:45 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Dixie Road
Site Code: 200333
Start Date: 11/19/2020

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 1

Turning Movement Data

	Countryside Drive					Heart Lake Road					Heart Lake Road					
	Westbound					Northbound					Southbound					
Start Time	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
7:00 AM	44	13	0	0	57	3	38	0	0	41	55	24	0	0	79	177
7:15 AM	51	20	0	0	71	3	41	1	0	45	52	19	0	0	71	187
7:30 AM	62	27	0	0	89	8	39	0	0	47	76	34	0	0	110	246
7:45 AM	63	34	0	0	97	13	36	0	0	49	79	43	0	0	122	268
Hourly Total	220	94	0	0	314	27	154	1	0	182	262	120	0	0	382	878
8:00 AM	60	30	0	0	90	5	45	0	0	50	70	37	0	0	107	247
8:15 AM	51	31	0	0	82	8	41	0	0	49	71	30	0	0	101	232
8:30 AM	71	28	0	0	99	12	33	0	0	45	63	34	0	0	97	241
8:45 AM	76	22	0	0	98	7	33	0	0	40	55	23	0	0	78	216
Hourly Total	258	111	0	0	369	32	152	0	0	184	259	124	0	0	383	936
9:00 AM	66	20	0	0	86	4	34	0	0	38	24	24	0	0	48	172
9:15 AM	59	11	0	0	70	5	24	0	0	29	25	18	0	0	43	142
9:30 AM	59	21	0	0	80	10	39	0	0	49	16	18	0	0	34	163
9:45 AM	49	22	0	0	71	8	31	0	0	39	21	19	0	0	40	150
Hourly Total	233	74	0	0	307	27	128	0	0	155	86	79	0	0	165	627
10:00 AM	49	15	0	0	64	9	22	0	0	31	26	16	0	0	42	137
10:15 AM	46	24	0	0	70	8	25	0	0	33	25	18	0	0	43	146
10:30 AM	63	11	0	0	74	8	29	0	0	37	31	22	0	0	53	164
10:45 AM	37	29	0	0	66	9	24	0	0	33	16	25	0	0	41	140
Hourly Total	195	79	0	0	274	34	100	0	0	134	98	81	0	0	179	587
11:00 AM	53	13	0	0	66	10	45	0	0	55	22	22	0	0	44	165
11:15 AM	61	26	0	0	87	7	36	0	0	43	22	17	0	0	39	169
11:30 AM	52	17	0	0	69	16	12	0	0	28	14	14	0	0	28	125
11:45 AM	56	13	0	0	69	9	25	0	0	34	14	18	0	0	32	135
Hourly Total	222	69	0	0	291	42	118	0	0	160	72	71	0	0	143	594
12:00 PM	50	18	0	0	68	12	29	0	0	41	15	27	0	0	42	151
12:15 PM	51	25	0	0	76	10	28	0	0	38	34	10	0	0	44	158
12:30 PM	37	23	0	0	60	7	45	0	0	52	24	11	0	0	35	147
12:45 PM	51	19	1	0	71	13	30	0	0	43	24	15	0	1	39	153
Hourly Total	189	85	1	0	275	42	132	0	0	174	97	63	0	1	160	609
1:00 PM	66	18	0	0	84	16	32	0	0	48	24	24	0	0	48	180
1:15 PM	44	25	0	0	69	12	30	0	0	42	10	28	0	0	38	149
1:30 PM	56	19	1	0	76	11	37	0	0	48	20	21	0	0	41	165
1:45 PM	65	38	0	0	103	18	35	0	0	53	35	18	0	0	53	209
Hourly Total	231	100	1	0	332	57	134	0	0	191	89	91	0	0	180	703
2:00 PM	50	28	0	0	78	18	37	0	0	55	28	16	0	0	44	177

2:15 PM	75	34	0	0	109	12	58	0	0	70	43	16	0	0	59	238
2:30 PM	71	38	0	0	109	18	68	0	0	86	34	18	0	0	52	247
2:45 PM	74	48	0	0	122	16	47	0	0	63	41	18	0	0	59	244
Hourly Total	270	148	0	0	418	64	210	0	0	274	146	68	0	0	214	906
3:00 PM	83	52	0	0	135	11	66	0	0	77	31	26	0	0	57	269
3:15 PM	99	76	0	0	175	17	56	0	0	73	41	12	0	0	53	301
3:30 PM	86	60	0	0	146	23	72	0	0	95	55	23	0	0	78	319
3:45 PM	83	71	0	0	154	21	57	0	0	78	38	36	0	0	74	306
Hourly Total	351	259	0	0	610	72	251	0	0	323	165	97	0	0	262	1195
4:00 PM	101	66	0	0	167	18	77	0	0	95	34	28	0	0	62	324
4:15 PM	97	88	0	0	185	14	79	0	0	93	39	23	0	0	62	340
4:30 PM	88	78	0	0	166	21	61	0	0	82	44	35	0	0	79	327
4:45 PM	92	83	0	0	175	17	72	0	0	89	50	26	0	0	76	340
Hourly Total	378	315	0	0	693	70	289	0	0	359	167	112	0	0	279	1331
5:00 PM	82	88	0	0	170	19	65	0	0	84	37	18	0	0	55	309
5:15 PM	97	91	0	0	188	14	76	0	0	90	38	27	0	0	65	343
5:30 PM	90	89	0	0	179	16	64	0	0	80	42	21	0	0	63	322
5:45 PM	88	68	0	0	156	16	75	0	0	91	36	24	0	0	60	307
Hourly Total	357	336	0	0	693	65	280	0	0	345	153	90	0	0	243	1281
6:00 PM	96	80	0	0	176	22	66	0	0	88	30	21	0	0	51	315
6:15 PM	77	53	0	0	130	16	58	0	0	74	35	18	0	0	53	257
6:30 PM	71	52	0	0	123	12	49	0	0	61	33	15	0	0	48	232
6:45 PM	67	48	1	0	116	11	59	0	0	70	37	18	0	0	55	241
Hourly Total	311	233	1	0	545	61	232	0	0	293	135	72	0	0	207	1045
Grand Total	3215	1903	3	0	5121	593	2180	1	0	2774	1729	1068	0	1	2797	10692
Approach %	62.8	37.2	0.1	-	-	21.4	78.6	0.0	-	-	61.8	38.2	0.0	-	-	-
Total %	30.1	17.8	0.0	-	47.9	5.5	20.4	0.0	-	25.9	16.2	10.0	0.0	-	26.2	-
Motorcycles	0	1	0	-	1	4	0	0	-	4	1	2	0	-	3	8
% Motorcycles	0.0	0.1	0.0	-	0.0	0.7	0.0	0.0	-	0.1	0.1	0.2	-	-	0.1	0.1
Cars & Light Goods	3151	1862	3	-	5016	571	2116	1	-	2688	1684	1034	0	-	2718	10422
% Cars & Light Goods	98.0	97.8	100.0	-	97.9	96.3	97.1	100.0	-	96.9	97.4	96.8	-	-	97.2	97.5
Buses	33	25	0	-	58	10	38	0	-	48	29	24	0	-	53	159
% Buses	1.0	1.3	0.0	-	1.1	1.7	1.7	0.0	-	1.7	1.7	2.2	-	-	1.9	1.5
Single-Unit Trucks	26	11	0	-	37	6	26	0	-	32	15	6	0	-	21	90
% Single-Unit Trucks	0.8	0.6	0.0	-	0.7	1.0	1.2	0.0	-	1.2	0.9	0.6	-	-	0.8	0.8
Articulated Trucks	5	4	0	-	9	0	0	0	-	0	0	1	0	-	1	10
% Articulated Trucks	0.2	0.2	0.0	-	0.2	0.0	0.0	0.0	-	0.0	0.0	0.1	-	-	0.0	0.1
Bicycles on Road	0	0	0	-	0	2	0	0	-	2	0	1	0	-	1	3
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.3	0.0	0.0	-	0.1	0.0	0.1	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 3

11/19/2020 7:00 AM
Ending At
11/19/2020 7:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

Out	In	Total
5	3	8
2433	2718	5151
35	53	88
17	21	38
6	2	8
2496	**2797**	**5293**

T	L	U	P
2	1	0	0
1034	1684	0	0
24	29	0	0
6	15	0	0
2	0	0	1
1068	**1729**	**0**	**1**

Countryside Drive [E]

Out	In	Total
1	1	2
3803	5016	8819
67	58	125
41	37	78
0	9	9
3912	**5121**	**9033**

R	L	U	P
1	0	0	0
1862	3151	3	0
25	33	0	0
11	26	0	0
4	5	0	0
1903	**3215**	**3**	**0**

U	T	R	P
0	4	0	0
1	571	2116	0
0	10	38	0
0	6	26	0
0	2	0	0
1	**593**	**2180**	**0**

Out	In	Total
2	4	6
4186	2688	6874
57	48	105
32	32	64
7	2	9
4284	**2774**	**7058**

Heart Lake Road [S]

Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Countryside Drive Westbound					Heart Lake Road Northbound					Heart Lake Road Southbound					
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
7:30 AM	62	27	0	0	89	8	39	0	0	47	76	34	0	0	110	246
7:45 AM	63	34	0	0	97	13	36	0	0	49	79	43	0	0	122	268
8:00 AM	60	30	0	0	90	5	45	0	0	50	70	37	0	0	107	247
8:15 AM	51	31	0	0	82	8	41	0	0	49	71	30	0	0	101	232
Total	236	122	0	0	358	34	161	0	0	195	296	144	0	0	440	993
Approach %	65.9	34.1	0.0	-	-	17.4	82.6	0.0	-	-	67.3	32.7	0.0	-	-	-
Total %	23.8	12.3	0.0	-	36.1	3.4	16.2	0.0	-	19.6	29.8	14.5	0.0	-	44.3	-
PHF	0.937	0.897	0.000	-	0.923	0.654	0.894	0.000	-	0.975	0.937	0.837	0.000	-	0.902	0.926
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	226	116	0	-	342	32	154	0	-	186	286	138	0	-	424	952
% Cars & Light Goods	95.8	95.1	-	-	95.5	94.1	95.7	-	-	95.4	96.6	95.8	-	-	96.4	95.9
Buses	7	4	0	-	11	1	5	0	-	6	10	6	0	-	16	33
% Buses	3.0	3.3	-	-	3.1	2.9	3.1	-	-	3.1	3.4	4.2	-	-	3.6	3.3
Single-Unit Trucks	3	2	0	-	5	1	2	0	-	3	0	0	0	-	0	8
% Single-Unit Trucks	1.3	1.6	-	-	1.4	2.9	1.2	-	-	1.5	0.0	0.0	-	-	0.0	0.8
Articulated Trucks	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	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% 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 Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 5

Peak Hour Data

11/19/2020 7:30 AM
Ending At
11/19/2020 8:30 AM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

	Out	In	Total
Motorcycles	0	0	0
Cars & Light Goods	148	424	572
Buses	5	16	21
Single-Unit Trucks	3	0	3
Other	0	0	0
Total	**156**	**440**	**596**

	T	L	U	P
Motorcycles	0	0	0	0
Cars & Light Goods	138	286	0	0
Buses	6	10	0	0
Single-Unit Trucks	0	0	0	0
Other	0	0	0	0
Total	**144**	**296**	**0**	**0**

Countryside Drive [E]

	Out	In	Total
Motorcycles	0	0	0
Cars & Light Goods	440	342	782
Buses	15	11	26
Single-Unit Trucks	2	5	7
Other	0	0	0
Total	**457**	**358**	**815**

	R	L	U	P
Motorcycles	0	0	0	0
Cars & Light Goods	116	226	0	0
Buses	4	7	0	0
Single-Unit Trucks	2	3	0	0
Other	0	0	0	0
Total	**122**	**236**	**0**	**0**

Heart Lake Road [S]

	U	T	R	P
Motorcycles	0	0	0	0
Cars & Light Goods	0	32	154	0
Buses	0	1	5	0
Single-Unit Trucks	0	1	2	0
Other	0	0	0	0
Total	**0**	**34**	**161**	**0**

	Out	In	Total
Motorcycles	0	0	0
Cars & Light Goods	364	186	550
Buses	13	6	19
Single-Unit Trucks	3	3	6
Other	0	0	0
Total	**380**	**195**	**575**

Turning Movement Peak Hour Data Plot (7:30 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 6

Turning Movement Peak Hour Data (1:00 PM)

Start Time	Countryside Drive Westbound					Heart Lake Road Northbound					Heart Lake Road Southbound					
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
1:00 PM	66	18	0	0	84	16	32	0	0	48	24	24	0	0	48	180
1:15 PM	44	25	0	0	69	12	30	0	0	42	10	28	0	0	38	149
1:30 PM	56	19	1	0	76	11	37	0	0	48	20	21	0	0	41	165
1:45 PM	65	38	0	0	103	18	35	0	0	53	35	18	0	0	53	209
Total	231	100	1	0	332	57	134	0	0	191	89	91	0	0	180	703
Approach %	69.6	30.1	0.3	-	-	29.8	70.2	0.0	-	-	49.4	50.6	0.0	-	-	-
Total %	32.9	14.2	0.1	-	47.2	8.1	19.1	0.0	-	27.2	12.7	12.9	0.0	-	25.6	-
PHF	0.875	0.658	0.250	-	0.806	0.792	0.905	0.000	-	0.901	0.636	0.813	0.000	-	0.849	0.841
Motorcycles	0	0	0	-	0	2	0	0	-	2	0	0	0	-	0	2
% Motorcycles	0.0	0.0	0.0	-	0.0	3.5	0.0	-	-	1.0	0.0	0.0	-	-	0.0	0.3
Cars & Light Goods	226	99	1	-	326	55	130	0	-	185	87	91	0	-	178	689
% Cars & Light Goods	97.8	99.0	100.0	-	98.2	96.5	97.0	-	-	96.9	97.8	100.0	-	-	98.9	98.0
Buses	2	1	0	-	3	0	0	0	-	0	1	0	0	-	1	4
% Buses	0.9	1.0	0.0	-	0.9	0.0	0.0	-	-	0.0	1.1	0.0	-	-	0.6	0.6
Single-Unit Trucks	3	0	0	-	3	0	4	0	-	4	1	0	0	-	1	8
% Single-Unit Trucks	1.3	0.0	0.0	-	0.9	0.0	3.0	-	-	2.1	1.1	0.0	-	-	0.6	1.1
Articulated Trucks	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	0.0	-	-	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
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020

Peak Hour Data

11/19/2020 1:00 PM
Ending At
11/19/2020 2:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

Out	In	Total
2	0	2
154	178	332
1	1	2
0	1	1
0	0	0
157	**180**	**337**

T	L	U	P
0	0	0	0
91	87	0	0
0	1	0	0
0	1	0	0
0	0	0	0
91	**89**	**0**	**0**

Countryside Drive [E]

Out	In	Total
0	0	0
218	326	544
1	3	4
5	3	8
0	0	0
224	**332**	**556**

R	L	U	P
0	0	0	0
99	226	1	0
1	2	0	0
0	3	0	0
0	0	0	0
100	**231**	**1**	**0**

Heart Lake Road [S]

U	T	R	P
0	2	0	0
0	55	130	0
0	0	0	0
0	0	4	0
0	0	0	0
0	**57**	**134**	**0**

Out	In	Total
0	2	2
317	185	502
2	0	2
3	4	7
0	0	0
322	**191**	**513**

Turning Movement Peak Hour Data Plot (1:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 8

Turning Movement Peak Hour Data (4:00 PM)

Start Time	Countryside Drive Westbound					Heart Lake Road Northbound					Heart Lake Road Southbound					
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
4:00 PM	101	66	0	0	167	18	77	0	0	95	34	28	0	0	62	324
4:15 PM	97	88	0	0	185	14	79	0	0	93	39	23	0	0	62	340
4:30 PM	88	78	0	0	166	21	61	0	0	82	44	35	0	0	79	327
4:45 PM	92	83	0	0	175	17	72	0	0	89	50	26	0	0	76	340
Total	378	315	0	0	693	70	289	0	0	359	167	112	0	0	279	1331
Approach %	54.5	45.5	0.0	-	-	19.5	80.5	0.0	-	-	59.9	40.1	0.0	-	-	-
Total %	28.4	23.7	0.0	-	52.1	5.3	21.7	0.0	-	27.0	12.5	8.4	0.0	-	21.0	-
PHF	0.936	0.895	0.000	-	0.936	0.833	0.915	0.000	-	0.945	0.835	0.800	0.000	-	0.883	0.979
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.9	-	-	0.4	0.1
Cars & Light Goods	377	311	0	-	688	67	281	0	-	348	164	105	0	-	269	1305
% Cars & Light Goods	99.7	98.7	-	-	99.3	95.7	97.2	-	-	96.9	98.2	93.8	-	-	96.4	98.0
Buses	1	1	0	-	2	2	5	0	-	7	1	3	0	-	4	13
% Buses	0.3	0.3	-	-	0.3	2.9	1.7	-	-	1.9	0.6	2.7	-	-	1.4	1.0
Single-Unit Trucks	0	2	0	-	2	1	3	0	-	4	2	2	0	-	4	10
% Single-Unit Trucks	0.0	0.6	-	-	0.3	1.4	1.0	-	-	1.1	1.2	1.8	-	-	1.4	0.8
Articulated Trucks	0	1	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Articulated Trucks	0.0	0.3	-	-	0.1	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.9	-	-	0.4	0.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Countryside Drive & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 9

Heart Lake Road [N]		
Out	In	Total
0	1	1
378	269	647
3	4	7
3	4	7
1	1	2
385	**279**	**664**

1	0	0	0
105	164	0	0
3	1	0	0
2	2	0	0
1	0	0	0
112	**167**	**0**	**0**
T	L	U	P

Peak Hour Data

11/19/2020 4:00 PM
Ending At
11/19/2020 5:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

R	**315**	1	2	1	311	0
L	**378**	0	0	1	377	0
U	**0**	0	0	0	0	0
P	**0**	0	0	0	0	0

456	0	5	6	445	0	Out	Countryside Drive [E]
693	1	2	2	688	0	In	
1149	1	7	8	1133	0	Total	

U	T	R	P
0	0	0	0
0	67	281	0
0	2	5	0
0	1	3	0
0	0	0	0
0	**70**	**289**	**0**

1	0	1
482	348	830
4	7	11
2	4	6
1	0	1
490	**359**	**849**
Out	In	Total
Heart Lake Road [S]		

Turning Movement Peak Hour Data Plot (4:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Heart Lake Road & Highway 410 Off Ramp
Site Code: 200333
Start Date: 11/19/2020

Turning Movement Data

Start Time	Highway 410 Off Ramp Westbound					Heart Lake Road Northbound					Heart Lake Road Southbound					
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
7:00 AM	12	0	0	0	12	44	0	0	0	44	0	72	0	0	72	128
7:15 AM	18	2	0	0	20	45	0	0	0	45	0	69	0	0	69	134
7:30 AM	20	0	0	0	20	51	0	0	0	51	0	98	0	0	98	169
7:45 AM	20	1	0	0	21	57	0	0	0	57	0	107	0	0	107	185
Hourly Total	70	3	0	0	73	197	0	0	0	197	0	346	0	0	346	616
8:00 AM	10	1	0	0	11	53	0	0	0	53	0	95	0	0	95	159
8:15 AM	12	1	0	0	13	50	0	0	0	50	0	82	0	0	82	145
8:30 AM	11	0	0	0	11	52	0	0	0	52	0	105	0	0	105	168
8:45 AM	9	1	0	0	10	50	0	0	0	50	0	107	0	0	107	167
Hourly Total	42	3	0	0	45	205	0	0	0	205	0	389	0	0	389	639
9:00 AM	7	0	0	0	7	43	0	0	0	43	0	89	0	0	89	139
9:15 AM	8	0	0	1	8	37	0	0	0	37	0	83	0	0	83	128
9:30 AM	12	2	0	0	14	49	0	0	0	49	0	72	0	0	72	135
9:45 AM	15	1	0	0	16	46	0	0	0	46	0	73	0	0	73	135
Hourly Total	42	3	0	1	45	175	0	0	0	175	0	317	0	0	317	537
10:00 AM	10	1	0	0	11	35	0	0	0	35	0	77	0	0	77	123
10:15 AM	13	0	0	0	13	47	0	0	0	47	0	72	0	0	72	132
10:30 AM	12	2	0	0	14	45	0	0	0	45	0	90	0	0	90	149
10:45 AM	13	1	0	0	14	32	0	0	0	32	0	65	0	0	65	111
Hourly Total	48	4	0	0	52	159	0	0	0	159	0	304	0	0	304	515
11:00 AM	12	2	0	0	14	61	0	0	0	61	0	83	0	0	83	158
11:15 AM	16	1	0	0	17	51	0	0	0	51	0	77	0	0	77	145
11:30 AM	12	0	0	0	12	39	0	0	0	39	0	79	0	0	79	130
11:45 AM	15	2	0	0	17	36	0	0	0	36	0	74	0	0	74	127
Hourly Total	55	5	0	0	60	187	0	0	0	187	0	313	0	0	313	560
12:00 PM	20	0	0	0	20	49	0	0	0	49	0	80	0	0	80	149
12:15 PM	10	2	0	0	12	50	0	0	0	50	0	74	0	0	74	136
12:30 PM	17	1	0	0	18	60	0	0	0	60	0	61	0	0	61	139
12:45 PM	20	3	0	0	23	57	0	0	0	57	0	67	0	0	67	147
Hourly Total	67	6	0	0	73	216	0	0	0	216	0	282	0	0	282	571
1:00 PM	7	1	0	0	8	54	0	0	0	54	0	101	0	0	101	163
1:15 PM	22	2	0	0	24	56	0	0	0	56	0	77	0	0	77	157
1:30 PM	12	0	0	0	12	61	0	0	0	61	0	87	0	0	87	160
1:45 PM	16	3	0	0	19	76	0	0	0	76	0	95	0	0	95	190
Hourly Total	57	6	0	0	63	247	0	0	0	247	0	360	0	0	360	670
2:00 PM	10	1	0	0	11	74	0	0	0	74	0	85	0	0	85	170

2:15 PM	12	0	0	0	12	92	0	0	0	92	0	94	0	0	94	198
2:30 PM	17	1	0	0	18	107	0	0	0	107	0	102	0	0	102	227
2:45 PM	11	3	0	0	14	82	0	0	0	82	0	95	0	0	95	191
Hourly Total	50	5	0	0	55	355	0	0	0	355	0	376	0	0	376	786
3:00 PM	12	0	0	0	12	85	0	0	0	85	0	118	0	0	118	215
3:15 PM	7	0	0	0	7	93	0	0	0	93	0	112	0	0	112	212
3:30 PM	11	1	0	0	12	95	0	0	0	95	0	121	0	0	121	228
3:45 PM	12	2	0	0	14	100	0	0	0	100	0	115	0	0	115	229
Hourly Total	42	3	0	0	45	373	0	0	0	373	0	466	0	0	466	884
4:00 PM	19	0	0	0	19	94	0	0	0	94	0	141	0	0	141	254
4:15 PM	11	2	0	0	13	96	0	0	0	96	0	125	0	0	125	234
4:30 PM	19	0	0	0	19	90	0	1	0	91	0	130	0	0	130	240
4:45 PM	17	1	0	0	18	97	0	0	0	97	0	137	0	0	137	252
Hourly Total	66	3	0	0	69	377	0	1	0	378	0	533	0	0	533	980
5:00 PM	20	5	0	0	25	87	0	0	0	87	0	100	0	0	100	212
5:15 PM	19	0	0	0	19	85	0	2	0	87	0	128	0	0	128	234
5:30 PM	19	2	0	0	21	85	0	0	0	85	0	124	0	0	124	230
5:45 PM	15	2	0	0	17	89	0	0	0	89	0	111	0	0	111	217
Hourly Total	73	9	0	0	82	346	0	2	0	348	0	463	0	0	463	893
6:00 PM	20	0	0	0	20	88	0	0	0	88	0	122	0	0	122	230
6:15 PM	17	2	0	0	19	76	0	0	0	76	0	104	0	0	104	199
6:30 PM	18	2	0	0	20	64	0	0	0	64	0	87	0	0	87	171
6:45 PM	10	1	0	0	11	66	0	0	0	66	0	87	0	0	87	164
Hourly Total	65	5	0	0	70	294	0	0	0	294	0	400	0	0	400	764
Grand Total	677	55	0	1	732	3131	0	3	0	3134	0	4549	0	0	4549	8415
Approach %	92.5	7.5	0.0	-	-	99.9	0.0	0.1	-	-	0.0	100.0	0.0	-	-	-
Total %	8.0	0.7	0.0	-	8.7	37.2	0.0	0.0	-	37.2	0.0	54.1	0.0	-	54.1	-
Motorcycles	0	0	0	-	0	5	0	0	-	5	0	2	0	-	2	7
% Motorcycles	0.0	0.0	-	-	0.0	0.2	-	0.0	-	0.2	-	0.0	-	-	0.0	0.1
Cars & Light Goods	651	52	0	-	703	3027	0	2	-	3029	0	4436	0	-	4436	8168
% Cars & Light Goods	96.2	94.5	-	-	96.0	96.7	-	66.7	-	96.6	-	97.5	-	-	97.5	97.1
Buses	7	0	0	-	7	48	0	0	-	48	0	57	0	-	57	112
% Buses	1.0	0.0	-	-	1.0	1.5	-	0.0	-	1.5	-	1.3	-	-	1.3	1.3
Single-Unit Trucks	17	3	0	-	20	47	0	1	-	48	0	44	0	-	44	112
% Single-Unit Trucks	2.5	5.5	-	-	2.7	1.5	-	33.3	-	1.5	-	1.0	-	-	1.0	1.3
Articulated Trucks	2	0	0	-	2	4	0	0	-	4	0	9	0	-	9	15
% Articulated Trucks	0.3	0.0	-	-	0.3	0.1	-	0.0	-	0.1	-	0.2	-	-	0.2	0.2
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	-	0.0	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Heart Lake Road & Highway 410 Off Ramp
Site Code: 200333
Start Date: 11/19/2020

Heart Lake Road [N]

Out	In	Total
5	2	7
3079	4436	7515
48	57	105
50	44	94
4	10	14
3186	**4549**	**7735**

T	L	U	P
2	0	0	0
4436	0	0	0
57	0	0	0
44	0	0	0
10	0	0	0
4549	**0**	**0**	**0**

Highway 410 Off Ramp [E]

Out	In	Total
0	0	0
0	703	703
0	7	7
0	20	20
0	2	2
0	**732**	**732**

R	L	U	P
0	0	0	0
52	651	0	0
0	7	0	0
3	17	0	0
0	2	0	1
55	**677**	**0**	**1**

11/19/2020 7:00 AM
Ending At
11/19/2020 7:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

U	T	R	P
0	5	0	0
2	3027	0	0
0	48	0	0
1	47	0	0
0	4	0	0
3	**3131**	**0**	**0**

Out	In	Total
2	5	7
5089	3029	8118
64	48	112
62	48	110
12	4	16
5229	**3134**	**8363**

Heart Lake Road [S]

Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Heart Lake Road & Highway 410 Off Ramp
Site Code: 200333
Start Date: 11/19/2020

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Highway 410 Off Ramp Westbound					Heart Lake Road Northbound					Heart Lake Road Southbound					
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
7:30 AM	20	0	0	0	20	51	0	0	0	51	0	98	0	0	98	169
7:45 AM	20	1	0	0	21	57	0	0	0	57	0	107	0	0	107	185
8:00 AM	10	1	0	0	11	53	0	0	0	53	0	95	0	0	95	159
8:15 AM	12	1	0	0	13	50	0	0	0	50	0	82	0	0	82	145
Total	62	3	0	0	65	211	0	0	0	211	0	382	0	0	382	658
Approach %	95.4	4.6	0.0	-	-	100.0	0.0	0.0	-	-	0.0	100.0	0.0	-	-	-
Total %	9.4	0.5	0.0	-	9.9	32.1	0.0	0.0	-	32.1	0.0	58.1	0.0	-	58.1	-
PHF	0.775	0.750	0.000	-	0.774	0.925	0.000	0.000	-	0.925	0.000	0.893	0.000	-	0.893	0.889
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	-	-	0.0	0.0	-	-	-	0.0	-	0.0	-	-	0.0	0.0
Cars & Light Goods	61	3	0	-	64	200	0	0	-	200	0	364	0	-	364	628
% Cars & Light Goods	98.4	100.0	-	-	98.5	94.8	-	-	-	94.8	-	95.3	-	-	95.3	95.4
Buses	0	0	0	-	0	6	0	0	-	6	0	13	0	-	13	19
% Buses	0.0	0.0	-	-	0.0	2.8	-	-	-	2.8	-	3.4	-	-	3.4	2.9
Single-Unit Trucks	1	0	0	-	1	4	0	0	-	4	0	4	0	-	4	9
% Single-Unit Trucks	1.6	0.0	-	-	1.5	1.9	-	-	-	1.9	-	1.0	-	-	1.0	1.4
Articulated Trucks	0	0	0	-	0	1	0	0	-	1	0	1	0	-	1	2
% Articulated Trucks	0.0	0.0	-	-	0.0	0.5	-	-	-	0.5	-	0.3	-	-	0.3	0.3
Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Heart Lake Road & Highway 410 Off Ramp
Site Code: 200333
Start Date: 11/19/2020

Peak Hour Data

11/19/2020 7:30 AM
Ending At
11/19/2020 8:30 AM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

Out	In	Total
0	0	0
203	364	567
6	13	19
4	4	8
1	1	2
214	**382**	**596**

T	L	U	P
0	0	0	0
364	0	0	0
13	0	0	0
4	0	0	0
1	0	0	0
382	**0**	**0**	**0**

Highway 410 Off Ramp [E]

Out	In	Total
0	0	0
0	64	64
0	0	0
0	1	1
0	0	0
0	**65**	**65**

R	L	U	P
0	0	0	0
3	61	0	0
0	0	0	0
0	1	0	0
0	0	0	0
3	**62**	**0**	**0**

Heart Lake Road [S]

U	T	R	P
0	0	0	0
0	200	0	0
0	6	0	0
0	4	0	0
0	1	0	0
0	**211**	**0**	**0**

Out	In	Total
0	0	0
425	200	625
13	6	19
5	4	9
1	1	2
444	**211**	**655**

Turning Movement Peak Hour Data Plot (7:30 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Turning Movement Peak Hour Data (1:00 PM)

Start Time	Highway 410 Off Ramp Westbound					Heart Lake Road Northbound					Heart Lake Road Southbound					
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
1:00 PM	7	1	0	0	8	54	0	0	0	54	0	101	0	0	101	163
1:15 PM	22	2	0	0	24	56	0	0	0	56	0	77	0	0	77	157
1:30 PM	12	0	0	0	12	61	0	0	0	61	0	87	0	0	87	160
1:45 PM	16	3	0	0	19	76	0	0	0	76	0	95	0	0	95	190
Total	57	6	0	0	63	247	0	0	0	247	0	360	0	0	360	670
Approach %	90.5	9.5	0.0	-	-	100.0	0.0	0.0	-	-	0.0	100.0	0.0	-	-	-
Total %	8.5	0.9	0.0	-	9.4	36.9	0.0	0.0	-	36.9	0.0	53.7	0.0	-	53.7	-
PHF	0.648	0.500	0.000	-	0.656	0.813	0.000	0.000	-	0.813	0.000	0.891	0.000	-	0.891	0.882
Motorcycles	0	0	0	-	0	2	0	0	-	2	0	0	0	-	0	2
% Motorcycles	0.0	0.0	-	-	0.0	0.8	-	-	-	0.8	-	0.0	-	-	0.0	0.3
Cars & Light Goods	56	6	0	-	62	239	0	0	-	239	0	354	0	-	354	655
% Cars & Light Goods	98.2	100.0	-	-	98.4	96.8	-	-	-	96.8	-	98.3	-	-	98.3	97.8
Buses	0	0	0	-	0	0	0	0	-	0	0	2	0	-	2	2
% Buses	0.0	0.0	-	-	0.0	0.0	-	-	-	0.0	-	0.6	-	-	0.6	0.3
Single-Unit Trucks	1	0	0	-	1	6	0	0	-	6	0	4	0	-	4	11
% Single-Unit Trucks	1.8	0.0	-	-	1.6	2.4	-	-	-	2.4	-	1.1	-	-	1.1	1.6
Articulated Trucks	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	-	0.0	-	-	0.0	0.0
Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Heart Lake Road & Highway 410 Off Ramp
Site Code: 200333
Start Date: 11/19/2020
Page No: 7

Heart Lake Road [N]

Out	In	Total
2	0	2
245	354	599
0	2	2
6	4	10
0	0	0
253	**360**	**613**

T	L	U	P
0	0	0	0
354	0	0	0
2	0	0	0
4	0	0	0
0	0	0	0
360	**0**	**0**	**0**

Peak Hour Data

11/19/2020 1:00 PM
Ending At
11/19/2020 2:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Highway 410 Off Ramp [E]

Out	In	Total
0	0	0
0	62	62
0	0	0
0	1	1
0	0	0
0	**63**	**63**

R	L	U	P
0	0	0	0
6	56	0	0
0	0	0	0
0	1	0	0
0	0	0	0
6	**57**	**0**	**0**

U	T	R	P
0	2	0	0
0	239	0	0
0	0	0	0
0	6	0	0
0	0	0	0
0	**247**	**0**	**0**

Heart Lake Road [S]

Out	In	Total
0	2	2
410	239	649
2	0	2
5	6	11
0	0	0
417	**247**	**664**

Turning Movement Peak Hour Data Plot (1:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Heart Lake Road & Highway 410 Off Ramp
Site Code: 200333
Start Date: 11/19/2020

Turning Movement Peak Hour Data (4:00 PM)

	Highway 410 Off Ramp					Heart Lake Road					Heart Lake Road					
	Westbound					Northbound					Southbound					
Start Time	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Int. Total
4:00 PM	19	0	0	0	19	94	0	0	0	94	0	141	0	0	141	254
4:15 PM	11	2	0	0	13	96	0	0	0	96	0	125	0	0	125	234
4:30 PM	19	0	0	0	19	90	0	1	0	91	0	130	0	0	130	240
4:45 PM	17	1	0	0	18	97	0	0	0	97	0	137	0	0	137	252
Total	66	3	0	0	69	377	0	1	0	378	0	533	0	0	533	980
Approach %	95.7	4.3	0.0	-	-	99.7	0.0	0.3	-	-	0.0	100.0	0.0	-	-	-
Total %	6.7	0.3	0.0	-	7.0	38.5	0.0	0.1	-	38.6	0.0	54.4	0.0	-	54.4	-
PHF	0.868	0.375	0.000	-	0.908	0.972	0.000	0.250	-	0.974	0.000	0.945	0.000	-	0.945	0.965
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1
% Motorcycles	0.0	0.0	-	-	0.0	0.0	-	0.0	-	0.0	-	0.2	-	-	0.2	0.1
Cars & Light Goods	63	3	0	-	66	367	0	1	-	368	0	527	0	-	527	961
% Cars & Light Goods	95.5	100.0	-	-	95.7	97.3	-	100.0	-	97.4	-	98.9	-	-	98.9	98.1
Buses	2	0	0	-	2	6	0	0	-	6	0	4	0	-	4	12
% Buses	3.0	0.0	-	-	2.9	1.6	-	0.0	-	1.6	-	0.8	-	-	0.8	1.2
Single-Unit Trucks	1	0	0	-	1	4	0	0	-	4	0	1	0	-	1	6
% Single-Unit Trucks	1.5	0.0	-	-	1.4	1.1	-	0.0	-	1.1	-	0.2	-	-	0.2	0.6
Articulated Trucks	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	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Heart Lake Road & Highway 410 Off Ramp
Site Code: 200333
Start Date: 11/19/2020

Peak Hour Data

11/19/2020 4:00 PM
Ending At
11/19/2020 5:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

Out	In	Total
0	1	1
370	527	897
6	4	10
4	1	5
0	0	0
380	**533**	**913**

T	L	U	P
1	0	0	0
527	0	0	0
4	0	0	0
1	0	0	0
0	0	0	0
533	**0**	**0**	**0**

Highway 410 Off Ramp [E]

Out	In	Total
0	0	0
0	66	66
0	2	2
0	1	1
0	0	0
0	**69**	**69**

R	L	U	P
0	0	0	0
3	63	0	0
0	2	0	0
0	1	0	0
0	0	0	0
3	**66**	**0**	**0**

U	T	R	P
0	0	0	0
1	367	0	0
0	6	0	0
0	4	0	0
0	0	0	0
1	**377**	**0**	**0**

Out	In	Total
1	0	1
591	368	959
6	6	12
2	4	6
0	0	0
600	**378**	**978**

Heart Lake Road [S]

Turning Movement Peak Hour Data Plot (4:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Mayfield Road & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 1

Turning Movement Data

Start Time	Mayfield Road Eastbound						Mayfield Road Westbound						Heart Lake Road Northbound						Heart Lake Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	1	226	67	0	0	294	4	107	0	0	0	111	13	0	1	0	0	14	5	1	0	0	0	6	425
7:15 AM	2	194	63	0	0	259	2	134	5	0	0	141	23	2	2	0	0	27	5	4	3	0	0	12	439
7:30 AM	4	233	94	0	0	331	12	116	2	0	0	130	29	5	2	0	0	36	7	5	0	0	0	12	509
7:45 AM	6	275	101	0	0	382	13	136	4	0	0	153	33	1	6	0	0	40	7	10	2	0	0	19	594
Hourly Total	13	928	325	0	0	1266	31	493	11	0	0	535	98	8	11	0	0	117	24	20	5	0	0	49	1967
8:00 AM	5	208	88	0	0	301	9	153	3	4	0	169	33	5	1	0	1	39	3	4	6	0	0	13	522
8:15 AM	1	240	89	0	0	330	8	116	7	0	0	131	32	3	5	0	0	40	8	6	4	0	0	18	519
8:30 AM	3	233	85	0	0	321	7	141	5	0	0	153	31	2	6	0	0	39	7	4	1	0	0	12	525
8:45 AM	5	211	61	0	0	277	6	104	3	0	0	113	31	2	4	0	0	37	7	3	2	0	0	12	439
Hourly Total	14	892	323	0	0	1229	30	514	18	4	0	566	127	12	16	0	1	155	25	17	13	0	0	55	2005
9:00 AM	4	205	42	0	0	251	5	108	6	0	0	119	15	0	5	0	0	20	11	3	4	0	0	18	408
9:15 AM	2	189	37	0	0	228	5	125	7	0	0	137	16	2	4	0	0	22	9	5	4	0	0	18	405
9:30 AM	2	181	20	0	0	203	6	95	5	0	0	106	17	3	4	0	0	24	9	2	2	0	0	13	346
9:45 AM	1	185	38	0	0	224	3	110	2	0	0	115	28	4	3	0	0	35	6	4	1	0	0	11	385
Hourly Total	9	760	137	0	0	906	19	438	20	0	0	477	76	9	16	0	0	101	35	14	11	0	0	60	1544
10:00 AM	4	162	32	0	0	198	5	94	3	0	0	102	20	1	3	0	0	24	4	2	3	0	0	9	333
10:15 AM	1	178	36	0	0	215	4	101	2	0	0	107	28	4	5	0	0	37	10	5	3	0	0	18	377
10:30 AM	4	202	41	0	0	247	3	114	4	0	0	121	15	2	3	0	0	20	1	4	2	0	0	7	395
10:45 AM	3	180	34	0	0	217	3	140	5	0	0	148	30	3	7	0	0	40	8	7	5	0	0	20	425
Hourly Total	12	722	143	0	0	877	15	449	14	0	0	478	93	10	18	0	0	121	23	18	13	0	0	54	1530
11:00 AM	0	164	38	0	0	202	5	111	8	0	0	124	19	0	3	0	0	22	4	2	1	0	0	7	355
11:15 AM	7	154	35	0	0	196	1	124	2	0	0	127	36	0	5	0	0	41	8	2	1	0	0	11	375
11:30 AM	1	170	31	0	0	202	1	115	6	0	0	122	22	2	7	0	0	31	1	2	3	0	0	6	361
11:45 AM	4	154	30	0	0	188	3	136	4	1	0	144	16	1	8	0	0	25	4	3	2	0	0	9	366
Hourly Total	12	642	134	0	0	788	10	486	20	1	0	517	93	3	23	0	0	119	17	9	7	0	0	33	1457
12:00 PM	2	153	33	0	0	188	7	136	0	0	0	143	24	2	3	0	0	29	5	2	4	0	0	11	371
12:15 PM	2	135	37	0	0	174	4	134	4	0	0	142	25	3	3	0	0	31	6	1	1	0	0	8	355
12:30 PM	2	169	25	0	0	196	5	129	7	0	0	141	27	1	4	0	0	32	7	5	0	0	0	12	381
12:45 PM	2	159	35	0	0	196	2	115	3	1	0	121	23	5	3	0	0	31	12	2	3	0	0	17	365
Hourly Total	8	616	130	0	0	754	18	514	14	1	0	547	99	11	13	0	0	123	30	10	8	0	0	48	1472
1:00 PM	3	176	36	0	0	215	6	135	3	0	0	144	22	4	6	0	0	32	2	4	0	0	0	6	397
1:15 PM	1	170	29	0	0	200	4	150	6	0	0	160	33	5	3	0	0	41	8	8	1	0	0	17	418
1:30 PM	9	172	31	1	0	213	8	121	5	0	0	134	27	3	4	0	0	34	11	2	3	0	0	16	397
1:45 PM	5	153	46	0	0	204	4	156	7	0	0	167	39	4	7	0	0	50	7	4	3	0	1	14	435
Hourly Total	18	671	142	1	0	832	22	562	21	0	0	605	121	16	20	0	0	157	28	18	7	0	1	53	1647

2:00 PM	1	185	37	0	0	223	3	124	8	0	0	135	27	5	5	0	0	37	6	2	2	0	0	10	405
2:15 PM	4	197	53	0	0	254	4	156	8	0	0	168	48	4	3	0	0	55	6	3	1	0	0	10	487
2:30 PM	4	175	44	0	0	223	5	187	2	0	0	194	37	7	8	0	0	52	4	4	1	1	0	10	479
2:45 PM	3	179	51	0	0	233	4	193	7	0	0	204	59	5	5	0	0	69	7	4	1	0	0	12	518
Hourly Total	12	736	185	0	0	933	16	660	25	0	0	701	171	21	21	0	0	213	23	13	5	1	0	42	1889
3:00 PM	8	173	47	0	0	228	4	188	2	1	0	195	55	4	3	0	0	62	3	3	5	0	0	11	496
3:15 PM	6	216	47	0	0	269	5	242	6	0	0	253	71	9	3	0	0	83	1	4	7	0	0	12	617
3:30 PM	6	210	64	0	0	280	9	218	4	0	0	231	73	10	3	0	0	86	9	2	4	0	0	15	612
3:45 PM	3	204	71	1	0	279	8	232	13	2	0	255	71	4	12	0	0	87	9	4	9	0	0	22	643
Hourly Total	23	803	229	1	0	1056	26	880	25	3	0	934	270	27	21	0	0	318	22	13	25	0	0	60	2368
4:00 PM	5	195	46	0	0	246	6	233	9	0	0	248	82	8	5	0	0	95	12	6	6	0	0	24	613
4:15 PM	7	195	58	0	0	260	4	235	5	0	0	244	93	8	5	0	0	106	14	2	6	0	0	22	632
4:30 PM	6	208	57	0	0	271	8	241	7	0	0	256	70	6	4	0	0	80	9	6	9	0	0	24	631
4:45 PM	10	219	69	0	0	298	7	262	8	0	0	277	98	5	2	0	0	105	16	7	7	0	0	30	710
Hourly Total	28	817	230	0	0	1075	25	971	29	0	0	1025	343	27	16	0	0	386	51	21	28	0	0	100	2586
5:00 PM	3	210	44	0	0	257	7	275	8	1	0	291	95	7	5	0	0	107	7	1	5	0	0	13	668
5:15 PM	6	220	49	0	0	275	5	276	7	0	0	288	83	3	6	0	0	92	8	5	4	0	0	17	672
5:30 PM	4	177	54	0	0	235	3	258	8	0	0	269	98	3	6	0	0	107	4	3	7	0	0	14	625
5:45 PM	5	190	50	0	0	245	6	268	12	0	0	286	80	4	1	0	0	85	5	4	9	0	0	18	634
Hourly Total	18	797	197	0	0	1012	21	1077	35	1	0	1134	356	17	18	0	0	391	24	13	25	0	0	62	2599
6:00 PM	4	186	38	0	0	228	8	263	6	0	0	277	86	7	6	0	0	99	2	6	6	0	0	14	618
6:15 PM	2	168	44	0	0	214	5	260	8	0	0	273	73	3	1	0	0	77	4	3	5	0	0	12	576
6:30 PM	2	147	43	0	0	192	8	255	5	0	0	268	59	2	4	0	0	65	3	3	3	0	0	9	534
6:45 PM	3	153	48	0	0	204	3	254	9	0	0	266	55	0	2	0	0	57	0	2	4	0	0	6	533
Hourly Total	11	654	173	0	0	838	24	1032	28	0	0	1084	273	12	13	0	0	298	9	14	18	0	0	41	2261
Grand Total	178	9038	2348	2	0	11566	257	8076	260	10	0	8603	2120	173	206	0	1	2499	311	180	165	1	1	657	23325
Approach %	1.5	78.1	20.3	0.0	-	-	3.0	93.9	3.0	0.1	-	-	84.8	6.9	8.2	0.0	-	-	47.3	27.4	25.1	0.2	-	-	-
Total %	0.8	38.7	10.1	0.0	-	49.6	1.1	34.6	1.1	0.0	-	36.9	9.1	0.7	0.9	0.0	-	10.7	1.3	0.8	0.7	0.0	-	2.8	-
Motorcycles	2	2	0	0	-	4	0	1	0	0	-	1	0	4	0	0	-	4	0	2	1	0	-	3	12
% Motorcycles	1.1	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	2.3	0.0	-	-	0.2	0.0	1.1	0.6	0.0	-	0.5	0.1
Cars & Light Goods	164	8467	2281	2	-	10914	249	7570	240	10	-	8069	2074	163	201	0	-	2438	283	174	158	1	-	616	22037
% Cars & Light Goods	92.1	93.7	97.1	100.0	-	94.4	96.9	93.7	92.3	100.0	-	93.8	97.8	94.2	97.6	-	-	97.6	91.0	96.7	95.8	100.0	-	93.8	94.5
Buses	3	132	47	0	-	182	5	136	2	0	-	143	30	3	2	0	-	35	3	0	4	0	-	7	367
% Buses	1.7	1.5	2.0	0.0	-	1.6	1.9	1.7	0.8	0.0	-	1.7	1.4	1.7	1.0	-	-	1.4	1.0	0.0	2.4	0.0	-	1.1	1.6
Single-Unit Trucks	9	277	19	0	-	305	2	242	14	0	-	258	15	2	3	0	-	20	24	3	2	0	-	29	612
% Single-Unit Trucks	5.1	3.1	0.8	0.0	-	2.6	0.8	3.0	5.4	0.0	-	3.0	0.7	1.2	1.5	-	-	0.8	7.7	1.7	1.2	0.0	-	4.4	2.6
Articulated Trucks	0	160	0	0	-	160	1	127	4	0	-	132	1	0	0	0	-	1	1	0	0	0	-	1	294
% Articulated Trucks	0.0	1.8	0.0	0.0	-	1.4	0.4	1.6	1.5	0.0	-	1.5	0.0	0.0	0.0	-	-	0.0	0.3	0.0	0.0	0.0	-	0.2	1.3
Bicycles on Road	0	0	1	0	-	1	0	0	0	0	-	0	0	1	0	0	-	1	0	1	0	0	-	1	3
% Bicycles on Road	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.6	0.0	-	-	0.0	0.0	0.6	0.0	0.0	-	0.2	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Mayfield Road & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 3

11/19/2020 7:00 AM
Ending At
11/19/2020 7:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

Out	In	Total
6	3	9
568	616	1184
8	7	15
25	29	54
5	2	7
612	**657**	**1269**

R	T	L	U	P
1	2	0	0	0
158	174	283	1	0
4	0	3	0	0
2	3	24	0	0
0	1	1	0	1
165	**180**	**311**	**1**	**1**

Mayfield Road [W]

Out	In	Total
2	4	6
9804	10914	20718
170	182	352
259	305	564
128	161	289
10363	**11566**	**21929**

U	L	T	R	P
0	2	2	0	0
2	164	8467	2281	0
0	3	132	47	0
0	9	277	19	0
0	0	160	1	0
2	**178**	**9038**	**2348**	**0**

Mayfield Road [E]

Out	In	Total
2	1	3
8961	8069	17030
137	143	280
304	258	562
161	132	293
9565	**8603**	**18168**

R	T	L	U	P
0	1	0	0	0
240	7570	249	10	0
2	136	5	0	0
14	242	2	0	0
4	127	1	0	0
260	**8076**	**257**	**10**	**0**

U	L	T	R	P
0	0	4	0	0
0	2074	163	201	0
0	30	3	2	0
0	15	2	3	0
0	1	1	0	1
0	**2120**	**173**	**206**	**1**

Out	In	Total
2	4	6
2704	2438	5142
52	35	87
24	20	44
3	2	5
2785	**2499**	**5284**

Heart Lake Road [S]

Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Turning Movement Peak Hour Data (7:45 AM)

Start Time	Mayfield Road Eastbound						Mayfield Road Westbound						Heart Lake Road Northbound						Heart Lake Road Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:45 AM	6	275	101	0	0	382	13	136	4	0	0	153	33	1	6	0	0	40	7	10	2	0	0	19	594
8:00 AM	5	208	88	0	0	301	9	153	3	4	0	169	33	5	1	0	1	39	3	4	6	0	0	13	522
8:15 AM	1	240	89	0	0	330	8	116	7	0	0	131	32	3	5	0	0	40	8	6	4	0	0	18	519
8:30 AM	3	233	85	0	0	321	7	141	5	0	0	153	31	2	6	0	0	39	7	4	1	0	0	12	525
Total	15	956	363	0	0	1334	37	546	19	4	0	606	129	11	18	0	1	158	25	24	13	0	0	62	2160
Approach %	1.1	71.7	27.2	0.0	-	-	6.1	90.1	3.1	0.7	-	-	81.6	7.0	11.4	0.0	-	-	40.3	38.7	21.0	0.0	-	-	-
Total %	0.7	44.3	16.8	0.0	-	61.8	1.7	25.3	0.9	0.2	-	28.1	6.0	0.5	0.8	0.0	-	7.3	1.2	1.1	0.6	0.0	-	2.9	-
PHF	0.625	0.869	0.899	0.000	-	0.873	0.712	0.892	0.679	0.250	-	0.896	0.977	0.550	0.750	0.000	-	0.988	0.781	0.600	0.542	0.000	-	0.816	0.909
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	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
Cars & Light Goods	14	908	347	0	-	1269	34	483	17	4	-	538	122	10	18	0	-	150	23	24	13	0	-	60	2017
% Cars & Light Goods	93.3	95.0	95.6	-	-	95.1	91.9	88.5	89.5	100.0	-	88.8	94.6	90.9	100.0	-	-	94.9	92.0	100.0	100.0	-	-	96.8	93.4
Buses	1	21	15	0	-	37	2	18	0	0	-	20	5	0	0	0	-	5	0	0	0	0	-	0	62
% Buses	6.7	2.2	4.1	-	-	2.8	5.4	3.3	0.0	0.0	-	3.3	3.9	0.0	0.0	-	-	3.2	0.0	0.0	0.0	-	-	0.0	2.9
Single-Unit Trucks	0	20	1	0	-	21	1	33	2	0	-	36	2	1	0	0	-	3	2	0	0	0	-	2	62
% Single-Unit Trucks	0.0	2.1	0.3	-	-	1.6	2.7	6.0	10.5	0.0	-	5.9	1.6	9.1	0.0	-	-	1.9	8.0	0.0	0.0	-	-	3.2	2.9
Articulated Trucks	0	7	0	0	-	7	0	12	0	0	-	12	0	0	0	0	-	0	0	0	0	0	-	0	19
% Articulated Trucks	0.0	0.7	0.0	-	-	0.5	0.0	2.2	0.0	0.0	-	2.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.9
Bicycles on Road	0	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	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Mayfield Road & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 5

Peak Hour Data

11/19/2020 7:45 AM
Ending At
11/19/2020 8:45 AM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

Out	In	Total
0	0	0
41	60	101
1	0	1
3	2	5
0	0	0
45	**62**	**107**

R	T	L	U	P
0	0	0	0	0
13	24	23	0	0
0	0	0	0	0
0	0	2	0	0
0	0	0	0	0
13	**24**	**25**	**0**	**0**

Mayfield Road [W]

Out	In	Total
0	0	0
618	1269	1887
23	37	60
35	21	56
12	7	19
688	**1334**	**2022**

U	L	T	R	P
0	0	0	0	0
0	14	908	347	0
0	1	21	15	0
0	0	20	1	0
0	0	7	0	0
0	**15**	**956**	**363**	**0**

Mayfield Road [E]

Out	In	Total
0	0	0
953	538	1491
21	20	41
22	36	58
7	12	19
1003	**606**	**1609**

R	T	L	U	P
0	0	0	0	0
17	483	34	4	0
0	18	2	0	0
2	33	1	0	0
0	12	0	0	0
19	**546**	**37**	**4**	**0**

U	L	T	R	P
0	0	0	0	0
0	122	10	18	0
0	5	0	0	0
0	2	1	0	0
0	0	0	0	1
0	**129**	**11**	**18**	**1**

Out	In	Total
0	0	0
405	150	555
17	5	22
2	3	5
0	0	0
424	**158**	**582**

Heart Lake Road [S]

Turning Movement Peak Hour Data Plot (7:45 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Mayfield Road & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 6

Turning Movement Peak Hour Data (1:00 PM)

	Mayfield Road						Mayfield Road						Heart Lake Road						Heart Lake Road						
	Eastbound						Westbound						Northbound						Southbound						
Start Time	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
1:00 PM	3	176	36	0	0	215	6	135	3	0	0	144	22	4	6	0	0	32	2	4	0	0	0	6	397
1:15 PM	1	170	29	0	0	200	4	150	6	0	0	160	33	5	3	0	0	41	8	8	1	0	0	17	418
1:30 PM	9	172	31	1	0	213	8	121	5	0	0	134	27	3	4	0	0	34	11	2	3	0	0	16	397
1:45 PM	5	153	46	0	0	204	4	156	7	0	0	167	39	4	7	0	0	50	7	4	3	0	1	14	435
Total	18	671	142	1	0	832	22	562	21	0	0	605	121	16	20	0	0	157	28	18	7	0	1	53	1647
Approach %	2.2	80.6	17.1	0.1	-	-	3.6	92.9	3.5	0.0	-	-	77.1	10.2	12.7	0.0	-	-	52.8	34.0	13.2	0.0	-	-	-
Total %	1.1	40.7	8.6	0.1	-	50.5	1.3	34.1	1.3	0.0	-	36.7	7.3	1.0	1.2	0.0	-	9.5	1.7	1.1	0.4	0.0	-	3.2	-
PHF	0.500	0.953	0.772	0.250	-	0.967	0.688	0.901	0.750	0.000	-	0.906	0.776	0.800	0.714	0.000	-	0.785	0.636	0.563	0.583	0.000	-	0.779	0.947
Motorcycles	1	0	0	0	-	1	0	0	0	0	-	0	0	2	0	0	-	2	0	1	0	0	-	1	4
% Motorcycles	5.6	0.0	0.0	0.0	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	12.5	0.0	-	-	1.3	0.0	5.6	0.0	-	-	1.9	0.2
Cars & Light Goods	14	633	140	1	-	788	22	528	20	0	-	570	120	14	20	0	-	154	25	16	7	0	-	48	1560
% Cars & Light Goods	77.8	94.3	98.6	100.0	-	94.7	100.0	94.0	95.2	-	-	94.2	99.2	87.5	100.0	-	-	98.1	89.3	88.9	100.0	-	-	90.6	94.7
Buses	0	2	1	0	-	3	0	2	0	0	-	2	1	0	0	0	-	1	1	0	0	0	-	1	7
% Buses	0.0	0.3	0.7	0.0	-	0.4	0.0	0.4	0.0	-	-	0.3	0.8	0.0	0.0	-	-	0.6	3.6	0.0	0.0	-	-	1.9	0.4
Single-Unit Trucks	3	27	1	0	-	31	0	20	0	0	-	20	0	0	0	0	-	0	1	0	0	0	-	1	52
% Single-Unit Trucks	16.7	4.0	0.7	0.0	-	3.7	0.0	3.6	0.0	-	-	3.3	0.0	0.0	0.0	-	-	0.0	3.6	0.0	0.0	-	-	1.9	3.2
Articulated Trucks	0	9	0	0	-	9	0	12	1	0	-	13	0	0	0	0	-	0	1	0	0	0	-	1	23
% Articulated Trucks	0.0	1.3	0.0	0.0	-	1.1	0.0	2.1	4.8	-	-	2.1	0.0	0.0	0.0	-	-	0.0	3.6	0.0	0.0	-	-	1.9	1.4
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Bicycles on Road	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	5.6	0.0	-	-	1.9	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Mayfield Road & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 7

Peak Hour Data

11/19/2020 1:00 PM
Ending At
11/19/2020 2:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

Out	In	Total
3	1	4
48	48	96
0	1	1
3	1	4
1	2	3
55	**53**	**108**

R	T	L	U	P
0	1	0	0	0
7	16	25	0	0
0	0	1	0	0
0	0	1	0	0
0	1	1	0	1
7	**18**	**28**	**0**	**1**

Mayfield Road [W]

Out	In	Total
0	1	1
656	788	1444
3	3	6
20	31	51
12	9	21
691	**832**	**1523**

U	L	T	R	P
0	1	0	0	0
1	14	633	140	0
0	0	2	1	0
0	3	27	1	0
0	0	9	0	0
1	**18**	**671**	**142**	**0**

Mayfield Road [E]

Out	In	Total
0	0	0
678	570	1248
3	2	5
28	20	48
10	13	23
719	**605**	**1324**

R	T	L	U	P
0	0	0	0	0
20	528	22	0	0
0	2	0	0	0
0	20	0	0	0
1	12	0	0	0
21	**562**	**22**	**0**	**0**

U	L	T	R	P
0	0	2	0	0
0	120	14	20	0
0	1	0	0	0
0	0	0	0	0
0	0	0	0	0
0	**121**	**16**	**20**	**0**

Out	In	Total
1	2	3
178	154	332
1	1	2
1	0	1
1	0	1
182	**157**	**339**

Heart Lake Road [S]

Turning Movement Peak Hour Data Plot (1:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Mayfield Road & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020

Turning Movement Peak Hour Data (4:30 PM)

	Mayfield Road Eastbound						Mayfield Road Westbound						Heart Lake Road Northbound						Heart Lake Road Southbound						
Start Time	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
4:30 PM	6	208	57	0	0	271	8	241	7	0	0	256	70	6	4	0	0	80	9	6	9	0	0	24	631
4:45 PM	10	219	69	0	0	298	7	262	8	0	0	277	98	5	2	0	0	105	16	7	7	0	0	30	710
5:00 PM	3	210	44	0	0	257	7	275	8	1	0	291	95	7	5	0	0	107	7	1	5	0	0	13	668
5:15 PM	6	220	49	0	0	275	5	276	7	0	0	288	83	3	6	0	0	92	8	5	4	0	0	17	672
Total	25	857	219	0	0	1101	27	1054	30	1	0	1112	346	21	17	0	0	384	40	19	25	0	0	84	2681
Approach %	2.3	77.8	19.9	0.0	-	-	2.4	94.8	2.7	0.1	-	-	90.1	5.5	4.4	0.0	-	-	47.6	22.6	29.8	0.0	-	-	-
Total %	0.9	32.0	8.2	0.0	-	41.1	1.0	39.3	1.1	0.0	-	41.5	12.9	0.8	0.6	0.0	-	14.3	1.5	0.7	0.9	0.0	-	3.1	-
PHF	0.625	0.974	0.793	0.000	-	0.924	0.844	0.955	0.938	0.250	-	0.955	0.883	0.750	0.708	0.000	-	0.897	0.625	0.679	0.694	0.000	-	0.700	0.944
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	1
% Motorcycles	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	4.0	-	-	1.2	0.0
Cars & Light Goods	24	805	219	0	-	1048	27	1019	29	1	-	1076	344	21	17	0	-	382	38	18	24	0	-	80	2586
% Cars & Light Goods	96.0	93.9	100.0	-	-	95.2	100.0	96.7	96.7	100.0	-	96.8	99.4	100.0	100.0	-	-	99.5	95.0	94.7	96.0	-	-	95.2	96.5
Buses	0	1	0	0	-	1	0	4	0	0	-	4	0	0	0	0	-	0	0	0	0	0	-	0	5
% Buses	0.0	0.1	0.0	-	-	0.1	0.0	0.4	0.0	0.0	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Single-Unit Trucks	1	24	0	0	-	25	0	17	0	0	-	17	1	0	0	0	-	1	2	1	0	0	-	3	46
% Single-Unit Trucks	4.0	2.8	0.0	-	-	2.3	0.0	1.6	0.0	0.0	-	1.5	0.3	0.0	0.0	-	-	0.3	5.0	5.3	0.0	-	-	3.6	1.7
Articulated Trucks	0	27	0	0	-	27	0	14	1	0	-	15	1	0	0	0	-	1	0	0	0	0	-	0	43
% Articulated Trucks	0.0	3.2	0.0	-	-	2.5	0.0	1.3	3.3	0.0	-	1.3	0.3	0.0	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	1.6
Bicycles on Road	0	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	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Mayfield Road & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020

Peak Hour Data

11/19/2020 4:30 PM
Ending At
11/19/2020 5:30 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

Out	In	Total
0	1	1
74	80	154
0	0	0
1	3	4
1	0	1
76	**84**	**160**

R	T	L	U	P
1	0	0	0	0
24	18	38	0	0
0	0	0	0	0
0	1	2	0	0
0	0	0	0	0
25	**19**	**40**	**0**	**0**

Mayfield Road [W]

Out	In	Total
1	0	1
1387	1048	2435
4	1	5
18	25	43
15	27	42
1425	**1101**	**2526**

U	L	T	R	P
0	0	0	0	0
0	24	805	219	0
0	0	1	0	0
0	1	24	0	0
0	0	27	0	0
0	**25**	**857**	**219**	**0**

Mayfield Road [E]

Out	In	Total
0	0	0
861	1076	1937
1	4	5
26	17	43
27	15	42
915	**1112**	**2027**

R	T	L	U	P
0	0	0	0	0
29	1019	27	1	0
0	4	0	0	0
0	17	0	0	0
1	14	0	0	0
30	**1054**	**27**	**1**	**0**

Heart Lake Road [S]

U	L	T	R	P
0	0	0	0	0
0	344	21	17	0
0	0	0	0	0
0	1	0	0	0
0	1	0	0	0
0	**346**	**21**	**17**	**0**

Out	In	Total
0	0	0
264	382	646
0	0	0
1	1	2
0	1	1
265	**384**	**649**

Turning Movement Peak Hour Data Plot (4:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Sandalwood Parkway East & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 1

Turning Movement Data

	Sandalwood Parkway Eas						Sandalwood Parkway East						Heart Lake Road						Heart Lake Road						
	Eastbound						Westbound						Northbound						Southbound						
Start Time	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:00 AM	22	374	3	0	0	399	7	136	13	0	0	156	1	10	13	0	0	24	48	15	20	1	0	84	663
7:15 AM	26	381	6	0	0	413	5	183	7	0	0	195	5	13	10	0	1	28	59	22	21	0	0	102	738
7:30 AM	31	435	9	0	0	475	13	185	8	1	0	207	7	12	13	0	1	32	71	25	23	0	0	119	833
7:45 AM	24	397	10	0	2	431	18	230	16	0	0	264	11	18	22	0	0	51	66	32	28	0	0	126	872
Hourly Total	103	1587	28	0	2	1718	43	734	44	1	0	822	24	53	58	0	2	135	244	94	92	1	0	431	3106
8:00 AM	23	339	14	0	0	376	22	157	16	0	0	195	19	14	16	0	1	49	62	31	25	0	0	118	738
8:15 AM	20	402	19	0	0	441	11	219	15	1	0	246	20	13	21	0	1	54	53	26	23	0	0	102	843
8:30 AM	26	370	19	0	1	415	22	206	13	0	0	241	14	15	13	0	1	42	55	35	25	1	0	116	814
8:45 AM	22	311	9	0	0	342	15	158	11	0	0	184	16	14	14	0	2	44	77	21	29	0	1	127	697
Hourly Total	91	1422	61	0	1	1574	70	740	55	1	0	866	69	56	64	0	5	189	247	113	102	1	1	463	3092
9:00 AM	22	305	19	0	0	346	14	137	9	1	0	161	11	12	7	0	0	30	42	21	30	0	0	93	630
9:15 AM	16	297	19	0	2	332	12	124	11	1	0	148	8	13	20	0	0	41	51	19	28	0	0	98	619
9:30 AM	24	246	17	0	0	287	10	121	13	2	0	146	18	9	16	0	1	43	45	16	31	0	0	92	568
9:45 AM	27	251	13	0	0	291	17	169	8	0	0	194	10	11	15	0	0	36	53	11	29	0	0	93	614
Hourly Total	89	1099	68	0	2	1256	53	551	41	4	0	649	47	45	58	0	1	150	191	67	118	0	0	376	2431
10:00 AM	18	242	13	0	0	273	7	145	11	1	0	164	9	5	11	0	0	25	52	17	24	0	0	93	555
10:15 AM	24	249	11	0	1	284	9	137	16	1	0	163	10	8	11	0	1	29	49	14	22	0	0	85	561
10:30 AM	22	227	16	0	1	265	12	185	12	1	0	210	17	10	13	0	0	40	65	28	22	0	0	115	630
10:45 AM	12	264	15	0	0	291	20	182	11	2	0	215	16	12	15	0	0	43	40	18	22	0	0	80	629
Hourly Total	76	982	55	0	2	1113	48	649	50	5	0	752	52	35	50	0	1	137	206	77	90	0	0	373	2375
11:00 AM	19	232	10	0	3	261	7	186	23	2	0	218	13	18	13	0	3	44	61	14	23	0	0	98	621
11:15 AM	22	246	10	0	3	278	11	193	9	1	1	214	12	18	17	0	0	47	60	20	24	0	1	104	643
11:30 AM	9	204	22	0	1	235	20	206	13	3	0	242	10	14	18	1	0	43	54	17	22	0	1	93	613
11:45 AM	16	234	15	0	0	265	13	195	10	1	0	219	8	9	15	1	0	33	46	24	23	0	0	93	610
Hourly Total	66	916	57	0	7	1039	51	780	55	7	1	893	43	59	63	2	3	167	221	75	92	0	2	388	2487
12:00 PM	16	214	15	0	1	245	16	217	20	0	0	253	19	13	15	0	1	47	48	18	38	0	0	104	649
12:15 PM	22	231	21	0	2	274	14	211	12	5	1	242	14	16	14	0	0	44	57	16	22	0	1	95	655
12:30 PM	27	243	13	0	2	283	23	220	15	0	0	258	12	18	13	0	0	43	40	19	23	0	0	82	666
12:45 PM	23	258	16	0	1	297	16	212	15	1	0	244	24	19	14	0	0	57	42	25	29	0	0	96	694
Hourly Total	88	946	65	0	6	1099	69	860	62	6	1	997	69	66	56	0	1	191	187	78	112	0	1	377	2664
1:00 PM	13	232	10	0	1	255	14	227	23	0	0	264	16	18	12	0	1	46	55	16	32	0	0	103	668
1:15 PM	12	265	20	0	0	297	14	239	25	1	0	279	16	18	10	0	0	44	47	22	26	0	0	95	715
1:30 PM	22	253	13	0	1	288	18	233	20	1	0	272	17	22	23	0	1	62	59	16	32	0	0	107	729
1:45 PM	23	288	22	0	0	333	20	248	36	2	0	306	13	20	27	0	0	60	51	27	39	0	0	117	816
Hourly Total	70	1038	65	0	2	1173	66	947	104	4	0	1121	62	78	72	0	2	212	212	81	129	0	0	422	2928

2:00 PM	19	256	12	0	0	287	14	260	29	2	0	305	13	19	21	0	0	53	50	16	29	1	0	96	741
2:15 PM	29	299	20	0	0	348	17	287	39	0	0	343	18	22	15	0	2	55	44	35	36	0	0	115	861
2:30 PM	32	314	16	0	0	362	14	282	46	1	1	343	12	28	17	0	1	57	60	28	32	0	1	120	882
2:45 PM	22	289	18	0	0	329	33	334	40	0	1	407	21	23	31	1	1	76	53	28	31	0	1	112	924
Hourly Total	102	1158	66	0	0	1326	78	1163	154	3	2	1398	64	92	84	1	4	241	207	107	128	1	2	443	3408
3:00 PM	25	313	20	0	1	358	24	329	26	2	0	381	26	24	17	0	3	67	49	33	38	0	1	120	926
3:15 PM	38	268	11	0	3	317	20	345	24	1	0	390	23	33	22	0	2	78	48	35	51	0	1	134	919
3:30 PM	36	316	22	0	0	374	19	373	28	1	2	421	14	30	16	1	3	61	41	27	52	0	5	120	976
3:45 PM	29	265	18	0	0	312	25	377	41	0	0	443	15	29	25	0	0	69	50	35	41	0	0	126	950
Hourly Total	128	1162	71	0	4	1361	88	1424	119	4	2	1635	78	116	80	1	8	275	188	130	182	0	7	500	3771
4:00 PM	33	290	16	0	0	339	18	338	26	0	0	382	13	33	25	0	1	71	74	30	69	0	1	173	965
4:15 PM	40	330	26	0	3	396	20	361	35	1	0	417	21	19	21	0	0	61	52	20	54	0	0	126	1000
4:30 PM	35	282	16	0	3	333	31	363	21	2	1	417	11	36	25	2	3	74	60	30	67	0	1	157	981
4:45 PM	40	311	16	0	4	367	20	355	29	1	0	405	25	30	23	0	0	78	57	32	62	0	1	151	1001
Hourly Total	148	1213	74	0	10	1435	89	1417	111	4	1	1621	70	118	94	2	4	284	243	112	252	0	3	607	3947
5:00 PM	30	309	22	0	0	361	29	392	31	1	0	453	25	22	33	0	0	80	34	33	50	0	0	117	1011
5:15 PM	37	258	17	0	2	312	27	379	29	0	0	435	22	21	31	0	0	74	65	32	60	0	0	157	978
5:30 PM	38	271	22	0	0	331	27	405	25	1	1	458	25	23	17	1	0	66	42	36	59	0	1	137	992
5:45 PM	25	263	26	0	1	314	29	372	35	1	1	437	19	21	20	0	0	60	40	31	56	0	0	127	938
Hourly Total	130	1101	87	0	3	1318	112	1548	120	3	2	1783	91	87	101	1	0	280	181	132	225	0	1	538	3919
6:00 PM	24	215	22	0	0	261	21	360	36	0	0	417	18	30	21	0	0	69	48	37	61	0	0	146	893
6:15 PM	29	250	21	0	0	300	26	357	29	1	0	413	17	19	24	1	2	61	37	31	40	0	0	108	882
6:30 PM	21	234	17	0	1	272	21	298	22	2	0	343	31	19	23	0	0	73	46	24	39	0	0	109	797
6:45 PM	25	241	17	0	1	283	29	339	25	2	0	395	16	16	19	0	0	51	47	19	38	0	0	104	833
Hourly Total	99	940	77	0	2	1116	97	1354	112	5	0	1568	82	84	87	1	2	254	178	111	178	0	0	467	3405
Grand Total	1190	13564	774	0	41	15528	864	12167	1027	47	9	14105	751	889	867	8	33	2515	2505	1177	1700	3	17	5385	37533
Approach %	7.7	87.4	5.0	0.0	-	-	6.1	86.3	7.3	0.3	-	-	29.9	35.3	34.5	0.3	-	-	46.5	21.9	31.6	0.1	-	-	-
Total %	3.2	36.1	2.1	0.0	-	41.4	2.3	32.4	2.7	0.1	-	37.6	2.0	2.4	2.3	0.0	-	6.7	6.7	3.1	4.5	0.0	-	14.3	-
Motorcycles	0	3	1	0	-	4	0	3	2	0	-	5	0	1	0	0	-	1	2	1	0	0	-	3	13
% Motorcycles	0.0	0.0	0.1	-	-	0.0	0.0	0.0	0.2	0.0	-	0.0	0.0	0.1	0.0	0.0	-	0.0	0.1	0.1	0.0	0.0	-	0.1	0.0
Cars & Light Goods	1153	13167	725	0	-	15045	839	11843	994	47	-	13723	707	855	847	8	-	2417	2442	1144	1651	3	-	5240	36425
% Cars & Light Goods	96.9	97.1	93.7	-	-	96.9	97.1	97.3	96.8	100.0	-	97.3	94.1	96.2	97.7	100.0	-	96.1	97.5	97.2	97.1	100.0	-	97.3	97.0
Buses	23	173	45	0	-	241	16	162	6	0	-	184	35	21	12	0	-	68	12	23	29	0	-	64	557
% Buses	1.9	1.3	5.8	-	-	1.6	1.9	1.3	0.6	0.0	-	1.3	4.7	2.4	1.4	0.0	-	2.7	0.5	2.0	1.7	0.0	-	1.2	1.5
Single-Unit Trucks	14	191	3	0	-	208	9	145	23	0	-	177	9	12	6	0	-	27	39	6	20	0	-	65	477
% Single-Unit Trucks	1.2	1.4	0.4	-	-	1.3	1.0	1.2	2.2	0.0	-	1.3	1.2	1.3	0.7	0.0	-	1.1	1.6	0.5	1.2	0.0	-	1.2	1.3
Articulated Trucks	0	30	0	0	-	30	0	13	2	0	-	15	0	0	2	0	-	2	10	2	0	0	-	12	59
% Articulated Trucks	0.0	0.2	0.0	-	-	0.2	0.0	0.1	0.2	0.0	-	0.1	0.0	0.0	0.2	0.0	-	0.1	0.4	0.2	0.0	0.0	-	0.2	0.2
Bicycles on Road	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	1	0	0	-	1	2
% Bicycles on Road	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	0.1	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	4	-	-	-	-	-	0	-	-	-	-	-	8	-	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	-	9.8	-	-	-	-	-	0.0	-	-	-	-	-	24.2	-	-	-	-	-	17.6	-	-
Pedestrians	-	-	-	-	37	-	-	-	-	-	9	-	-	-	-	-	25	-	-	-	-	-	14	-	-
% Pedestrians	-	-	-	-	90.2	-	-	-	-	-	100.0	-	-	-	-	-	75.8	-	-	-	-	-	82.4	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Sandalwood Parkway East & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 3

Heart Lake Road [N]

Out	In	Total
3	3	6
3005	5240	8245
50	64	114
49	65	114
2	13	15
3109	**5385**	**8494**

R	T	L	U	P
0	1	2	0	0
1651	1144	2442	3	0
29	23	12	0	0
20	6	39	0	0
0	3	10	0	17
1700	**1177**	**2505**	**3**	**17**

Sandalwood Parkway Eas[

Out	In	Total
3	4	7
14201	15045	29246
226	241	467
174	208	382
14	30	44
14618	**15528**	**30146**

U	L	T	R	P
0	0	3	1	0
0	1153	13167	725	0
0	23	173	45	0
0	14	191	3	0
0	0	30	0	41
0	**1190**	**13564**	**774**	**41**

11/19/2020 7:00 AM
Ending At
11/19/2020 7:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Sandalwood Parkway East [

Out	In	Total
5	5	10
16503	13723	30226
197	184	381
236	177	413
42	16	58
16983	**14105**	**31088**

R	T	L	U	P
2	3	0	0	0
994	11843	839	47	0
6	162	16	0	0
23	145	9	0	0
2	14	0	0	9
1027	**12167**	**864**	**47**	**9**

U	L	T	R	P
0	0	1	0	0
8	707	855	847	0
0	35	21	12	0
0	9	12	6	0
0	0	0	2	33
8	**751**	**889**	**867**	**33**

Out	In	Total
2	1	3
2716	2417	5133
84	68	152
18	27	45
3	2	5
2823	**2515**	**5338**

Heart Lake Road [S]

Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Sandalwood Parkway East & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 4

Turning Movement Peak Hour Data (7:30 AM)

	Sandalwood Parkway Eas						Sandalwood Parkway East						Heart Lake Road						Heart Lake Road						
	Eastbound						Westbound						Northbound						Southbound						
Start Time	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
7:30 AM	31	435	9	0	0	475	13	185	8	1	0	207	7	12	13	0	1	32	71	25	23	0	0	119	833
7:45 AM	24	397	10	0	2	431	18	230	16	0	0	264	11	18	22	0	0	51	66	32	28	0	0	126	872
8:00 AM	23	339	14	0	0	376	22	157	16	0	0	195	19	14	16	0	1	49	62	31	25	0	0	118	738
8:15 AM	20	402	19	0	0	441	11	219	15	1	0	246	20	13	21	0	1	54	53	26	23	0	0	102	843
Total	98	1573	52	0	2	1723	64	791	55	2	0	912	57	57	72	0	3	186	252	114	99	0	0	465	3286
Approach %	5.7	91.3	3.0	0.0	-	-	7.0	86.7	6.0	0.2	-	-	30.6	30.6	38.7	0.0	-	-	54.2	24.5	21.3	0.0	-	-	-
Total %	3.0	47.9	1.6	0.0	-	52.4	1.9	24.1	1.7	0.1	-	27.8	1.7	1.7	2.2	0.0	-	5.7	7.7	3.5	3.0	0.0	-	14.2	-
PHF	0.790	0.904	0.684	0.000	-	0.907	0.727	0.860	0.859	0.500	-	0.864	0.713	0.792	0.818	0.000	-	0.861	0.887	0.891	0.884	0.000	-	0.923	0.942
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	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
Cars & Light Goods	96	1545	44	0	-	1685	60	740	52	2	-	854	53	50	67	0	-	170	250	105	91	0	-	446	3155
% Cars & Light Goods	98.0	98.2	84.6	-	-	97.8	93.8	93.6	94.5	100.0	-	93.6	93.0	87.7	93.1	-	-	91.4	99.2	92.1	91.9	-	-	95.9	96.0
Buses	2	19	8	0	-	29	4	35	1	0	-	40	4	5	4	0	-	13	0	7	6	0	-	13	95
% Buses	2.0	1.2	15.4	-	-	1.7	6.3	4.4	1.8	0.0	-	4.4	7.0	8.8	5.6	-	-	7.0	0.0	6.1	6.1	-	-	2.8	2.9
Single-Unit Trucks	0	6	0	0	-	6	0	15	1	0	-	16	0	2	1	0	-	3	1	2	2	0	-	5	30
% Single-Unit Trucks	0.0	0.4	0.0	-	-	0.3	0.0	1.9	1.8	0.0	-	1.8	0.0	3.5	1.4	-	-	1.6	0.4	1.8	2.0	-	-	1.1	0.9
Articulated Trucks	0	3	0	0	-	3	0	1	1	0	-	2	0	0	0	0	-	0	1	0	0	0	-	1	6
% Articulated Trucks	0.0	0.2	0.0	-	-	0.2	0.0	0.1	1.8	0.0	-	0.2	0.0	0.0	0.0	-	-	0.0	0.4	0.0	0.0	-	-	0.2	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	0
% Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	33.3	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	66.7	-	-	-	-	-	-	-	-

paradigm

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Sandalwood Parkway East & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020

Peak Hour Data

11/19/2020 7:30 AM
Ending At
11/19/2020 8:30 AM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

Out	In	Total
0	0	0
198	446	644
8	13	21
3	5	8
1	1	2
210	**465**	**675**

R	T	L	U	P
0	0	0	0	0
91	105	250	0	0
6	7	0	0	0
2	2	1	0	0
0	0	1	0	0
99	**114**	**252**	**0**	**0**

Sandalwood Parkway Eas[

Out	In	Total
0	0	0
884	1685	2569
45	29	74
17	6	23
1	3	4
947	**1723**	**2670**

U	L	T	R	P
0	0	0	0	0
0	96	1545	44	0
0	2	19	8	0
0	0	6	0	0
0	0	3	0	2
0	**98**	**1573**	**52**	**2**

Sandalwood Parkway East [

Out	In	Total
0	0	0
1864	854	2718
23	40	63
8	16	24
4	2	6
1899	**912**	**2811**

R	T	L	U	P
0	0	0	0	0
52	740	60	2	0
1	35	4	0	0
1	15	0	0	0
1	1	0	0	0
55	**791**	**64**	**2**	**0**

U	L	T	R	P
0	0	0	0	0
0	53	50	67	0
0	4	5	4	0
0	0	2	1	0
0	0	0	0	3
0	**57**	**57**	**72**	**3**

Out	In	Total
0	0	0
209	170	379
19	13	32
2	3	5
0	0	0
230	**186**	**416**

Heart Lake Road [S]

Turning Movement Peak Hour Data Plot (7:30 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Sandalwood Parkway East & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 6

Turning Movement Peak Hour Data (1:00 PM)

Start Time	Sandalwood Parkway Eas Eastbound						Sandalwood Parkway East Westbound						Heart Lake Road Northbound						Heart Lake Road Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
1:00 PM	13	232	10	0	1	255	14	227	23	0	0	264	16	18	12	0	1	46	55	16	32	0	0	103	668
1:15 PM	12	265	20	0	0	297	14	239	25	1	0	279	16	18	10	0	0	44	47	22	26	0	0	95	715
1:30 PM	22	253	13	0	1	288	18	233	20	1	0	272	17	22	23	0	1	62	59	16	32	0	0	107	729
1:45 PM	23	288	22	0	0	333	20	248	36	2	0	306	13	20	27	0	0	60	51	27	39	0	0	117	816
Total	70	1038	65	0	2	1173	66	947	104	4	0	1121	62	78	72	0	2	212	212	81	129	0	0	422	2928
Approach %	6.0	88.5	5.5	0.0	-	-	5.9	84.5	9.3	0.4	-	-	29.2	36.8	34.0	0.0	-	-	50.2	19.2	30.6	0.0	-	-	-
Total %	2.4	35.5	2.2	0.0	-	40.1	2.3	32.3	3.6	0.1	-	38.3	2.1	2.7	2.5	0.0	-	7.2	7.2	2.8	4.4	0.0	-	14.4	-
PHF	0.761	0.901	0.739	0.000	-	0.881	0.825	0.955	0.722	0.500	-	0.916	0.912	0.886	0.667	0.000	-	0.855	0.898	0.750	0.827	0.000	-	0.902	0.897
Motorcycles	0	0	0	0	-	0	0	0	2	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	2
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	1.9	0.0	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Cars & Light Goods	66	1002	63	0	-	1131	66	925	101	4	-	1096	57	77	70	0	-	204	207	81	124	0	-	412	2843
% Cars & Light Goods	94.3	96.5	96.9	-	-	96.4	100.0	97.7	97.1	100.0	-	97.8	91.9	98.7	97.2	-	-	96.2	97.6	100.0	96.1	-	-	97.6	97.1
Buses	0	7	2	0	-	9	0	6	0	0	-	6	2	0	0	0	-	2	0	0	2	0	-	2	19
% Buses	0.0	0.7	3.1	-	-	0.8	0.0	0.6	0.0	0.0	-	0.5	3.2	0.0	0.0	-	-	0.9	0.0	0.0	1.6	-	-	0.5	0.6
Single-Unit Trucks	4	23	0	0	-	27	0	14	1	0	-	15	3	1	2	0	-	6	5	0	3	0	-	8	56
% Single-Unit Trucks	5.7	2.2	0.0	-	-	2.3	0.0	1.5	1.0	0.0	-	1.3	4.8	1.3	2.8	-	-	2.8	2.4	0.0	2.3	-	-	1.9	1.9
Articulated Trucks	0	6	0	0	-	6	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	8
% Articulated Trucks	0.0	0.6	0.0	-	-	0.5	0.0	0.2	0.0	0.0	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.3
Bicycles on Road	0	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	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Sandalwood Parkway East & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020

Peak Hour Data

11/19/2020 1:00 PM
Ending At
11/19/2020 2:00 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

Out	In	Total
2	0	2
244	412	656
0	2	2
6	8	14
0	0	0
252	**422**	**674**

R	T	L	U	P
0	0	0	0	0
124	81	207	0	0
2	0	0	0	0
3	0	5	0	0
0	0	0	0	0
129	**81**	**212**	**0**	**0**

Sandalwood Parkway Eas [

Out	In	Total
0	0	0
1106	1131	2237
10	9	19
20	27	47
2	6	8
1138	**1173**	**2311**

U	L	T	R	P
0	0	0	0	0
0	66	1002	63	0
0	0	7	2	0
0	4	23	0	0
0	0	6	0	2
0	**70**	**1038**	**65**	**2**

Sandalwood Parkway East [

Out	In	Total
0	2	2
1283	1096	2379
7	6	13
30	15	45
6	2	8
1326	**1121**	**2447**

R	T	L	U	P
2	0	0	0	0
101	925	66	4	0
0	6	0	0	0
1	14	0	0	0
0	2	0	0	0
104	**947**	**66**	**4**	**0**

U	L	T	R	P
0	0	0	0	0
0	57	77	70	0
0	2	0	0	0
0	3	1	2	0
0	0	0	0	2
0	**62**	**78**	**72**	**2**

Out	In	Total
0	0	0
210	204	414
2	2	4
0	6	6
0	0	0
212	**212**	**424**

Heart Lake Road [S]

Turning Movement Peak Hour Data Plot (1:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Sandalwood Parkway East & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020
Page No: 8

Turning Movement Peak Hour Data (4:15 PM)

	Sandalwood Parkway Eas						Sandalwood Parkway East						Heart Lake Road						Heart Lake Road						
	Eastbound						Westbound						Northbound						Southbound						
Start Time	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
4:15 PM	40	330	26	0	3	396	20	361	35	1	0	417	21	19	21	0	0	61	52	20	54	0	0	126	1000
4:30 PM	35	282	16	0	3	333	31	363	21	2	1	417	11	36	25	2	3	74	60	30	67	0	1	157	981
4:45 PM	40	311	16	0	4	367	20	355	29	1	0	405	25	30	23	0	0	78	57	32	62	0	1	151	1001
5:00 PM	30	309	22	0	0	361	29	392	31	1	0	453	25	22	33	0	0	80	34	33	50	0	0	117	1011
Total	145	1232	80	0	10	1457	100	1471	116	5	1	1692	82	107	102	2	3	293	203	115	233	0	2	551	3993
Approach %	10.0	84.6	5.5	0.0	-	-	5.9	86.9	6.9	0.3	-	-	28.0	36.5	34.8	0.7	-	-	36.8	20.9	42.3	0.0	-	-	-
Total %	3.6	30.9	2.0	0.0	-	36.5	2.5	36.8	2.9	0.1	-	42.4	2.1	2.7	2.6	0.1	-	7.3	5.1	2.9	5.8	0.0	-	13.8	-
PHF	0.906	0.933	0.769	0.000	-	0.920	0.806	0.938	0.829	0.625	-	0.934	0.820	0.743	0.773	0.250	-	0.916	0.846	0.871	0.869	0.000	-	0.877	0.987
Motorcycles	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	1	0	0	0	-	1	3
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.1	0.0	0.0	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.5	0.0	0.0	-	-	0.2	0.1
Cars & Light Goods	143	1196	75	0	-	1414	98	1453	115	5	-	1671	78	105	101	2	-	286	199	114	232	0	-	545	3916
% Cars & Light Goods	98.6	97.1	93.8	-	-	97.0	98.0	98.8	99.1	100.0	-	98.8	95.1	98.1	99.0	100.0	-	97.6	98.0	99.1	99.6	-	-	98.9	98.1
Buses	1	6	5	0	-	12	1	7	0	0	-	8	3	0	1	0	-	4	1	1	1	0	-	3	27
% Buses	0.7	0.5	6.3	-	-	0.8	1.0	0.5	0.0	0.0	-	0.5	3.7	0.0	1.0	0.0	-	1.4	0.5	0.9	0.4	-	-	0.5	0.7
Single-Unit Trucks	1	24	0	0	-	25	1	8	1	0	-	10	1	2	0	0	-	3	2	0	0	0	-	2	40
% Single-Unit Trucks	0.7	1.9	0.0	-	-	1.7	1.0	0.5	0.9	0.0	-	0.6	1.2	1.9	0.0	0.0	-	1.0	1.0	0.0	0.0	-	-	0.4	1.0
Articulated Trucks	0	6	0	0	-	6	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	7
% Articulated Trucks	0.0	0.5	0.0	-	-	0.4	0.0	0.1	0.0	0.0	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	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	0
% Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	10.0	-	-	-	-	-	0.0	-	-	-	-	-	33.3	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	9	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	90.0	-	-	-	-	-	100.0	-	-	-	-	-	66.7	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Sandalwood Parkway East & Heart Lake Road
Site Code: 200333
Start Date: 11/19/2020

Peak Hour Data

11/19/2020 4:15 PM
Ending At
11/19/2020 5:15 PM

Motorcycles
Cars & Light Goods
Buses
Single-Unit Trucks
Other

Heart Lake Road [N]

	Out	In	Total
Motorcycles	0	1	1
Cars & Light Goods	363	545	908
Buses	1	3	4
Single-Unit Trucks	4	2	6
Other	0	0	0
Total	**368**	**551**	**919**

	R	T	L	U	P
Motorcycles	0	0	1	0	0
Cars & Light Goods	232	114	199	0	0
Buses	1	1	1	0	0
Single-Unit Trucks	0	0	2	0	0
Other	0	0	0	0	2
Total	**233**	**115**	**203**	**0**	**2**

Sandalwood Parkway Eas [

	Out	In	Total
Motorcycles	2	0	2
Cars & Light Goods	1763	1414	3177
Buses	11	12	23
Single-Unit Trucks	9	25	34
Other	1	6	7
Total	**1786**	**1457**	**3243**

	U	L	T	R	P
Motorcycles	0	0	0	0	0
Cars & Light Goods	0	143	1196	75	0
Buses	0	1	6	5	0
Single-Unit Trucks	0	1	24	0	0
Other	0	0	6	0	10
Total	**0**	**145**	**1232**	**80**	**10**

Sandalwood Parkway East [

	Out	In	Total
Motorcycles	1	2	3
Cars & Light Goods	1501	1671	3172
Buses	8	8	16
Single-Unit Trucks	26	10	36
Other	6	1	7
Total	**1542**	**1692**	**3234**

	R	T	L	U	P
Motorcycles	0	2	0	0	0
Cars & Light Goods	115	1453	98	5	0
Buses	0	7	1	0	0
Single-Unit Trucks	1	8	1	0	0
Other	0	1	0	0	1
Total	**116**	**1471**	**100**	**5**	**1**

Heart Lake Road [S]

	U	L	T	R	P
Motorcycles	0	0	0	0	0
Cars & Light Goods	2	78	105	101	0
Buses	0	3	0	1	0
Single-Unit Trucks	0	1	2	0	0
Other	0	0	0	0	3
Total	**2**	**82**	**107**	**102**	**3**

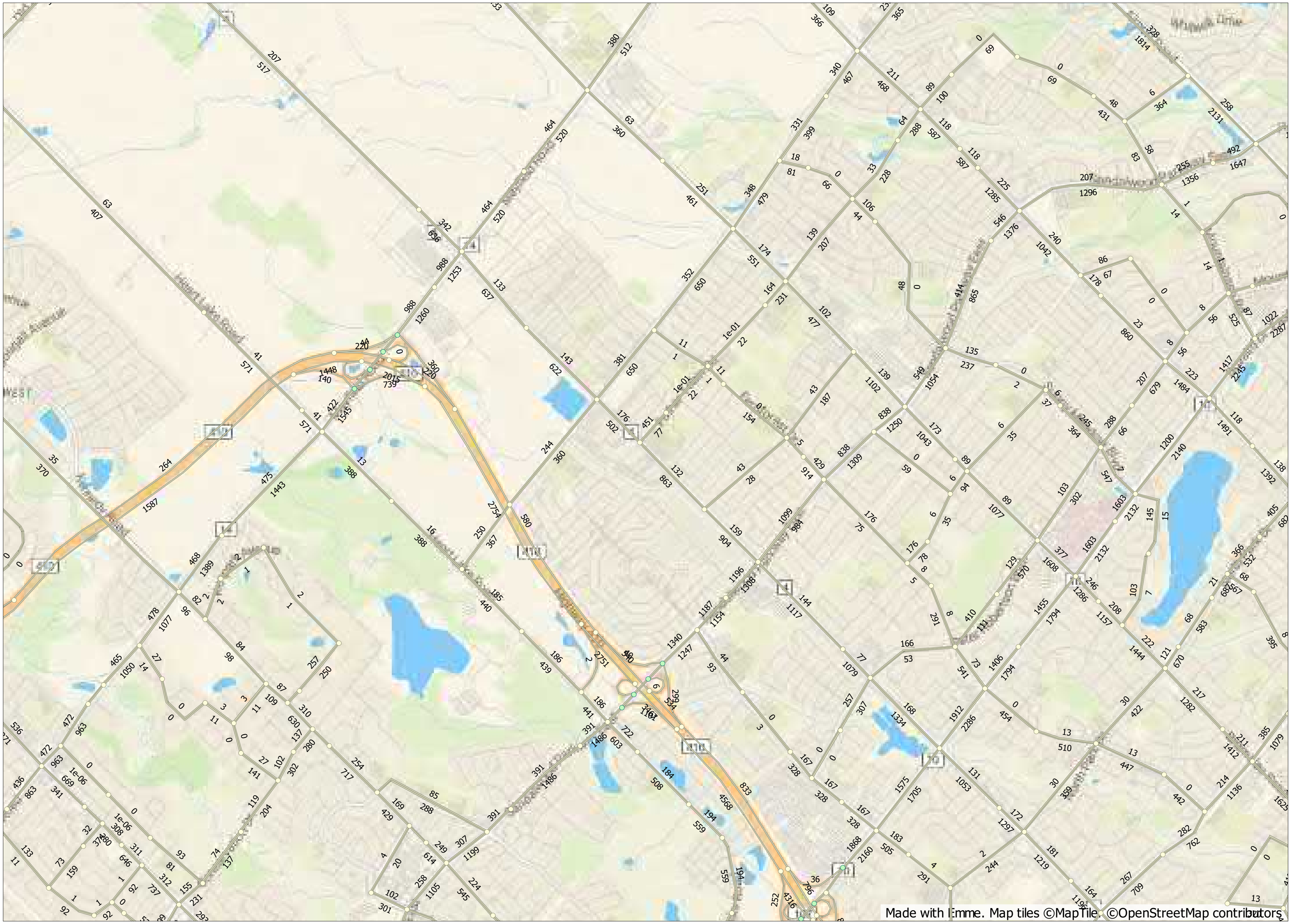
	Out	In	Total
Motorcycles	0	0	0
Cars & Light Goods	289	286	575
Buses	7	4	11
Single-Unit Trucks	1	3	4
Other	0	0	0
Total	**297**	**293**	**590**

Turning Movement Peak Hour Data Plot (4:15 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

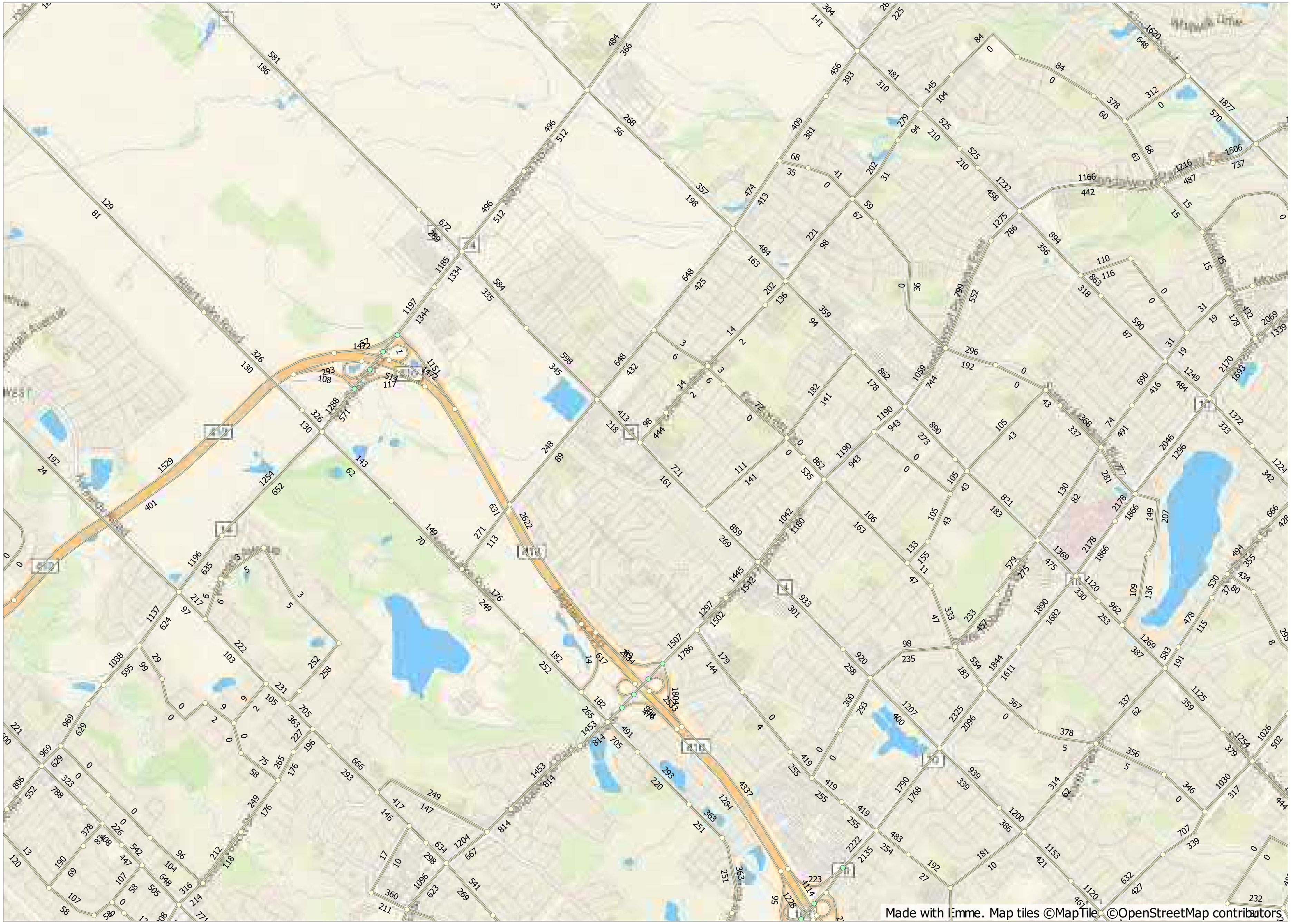
Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

2011_Peak Hour Auto Volume



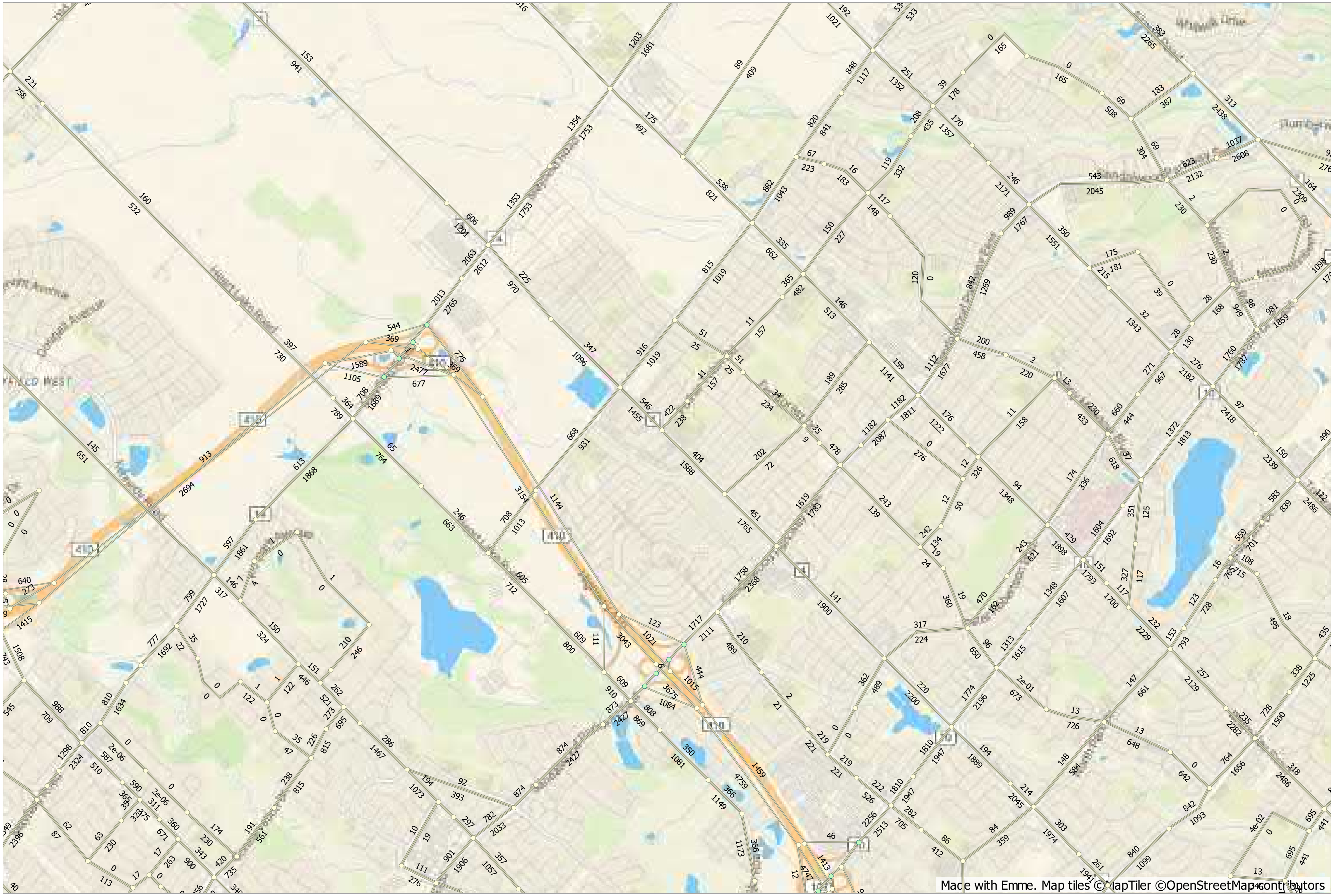
2011 (G:/TranModel/2011_Base/Database/emmebank)
Scenario 11: AM - Cleaned Network
2020-11-09 17:26 (lwu@COB10W-MJ03YM3B)

2011_Peak Hour Auto Volume



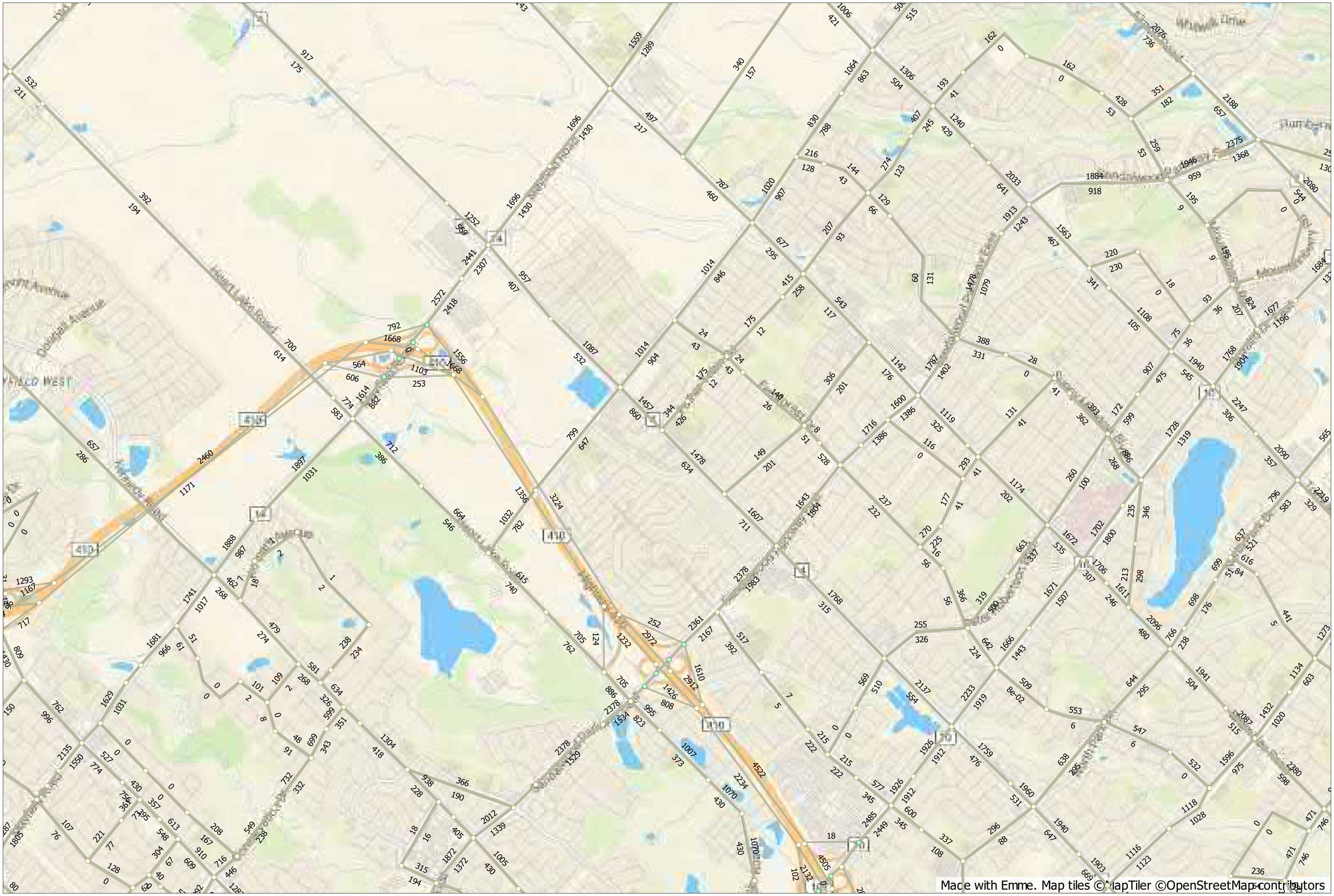
2011 (G:/TranModel/2011_Base/Database/emmebank)
Scenario 31: PM - Cleaned Network
2020-11-09 17:26 (lwu@COB10W-MJ03YM3B)

2031_Peak Hour Auto Volume



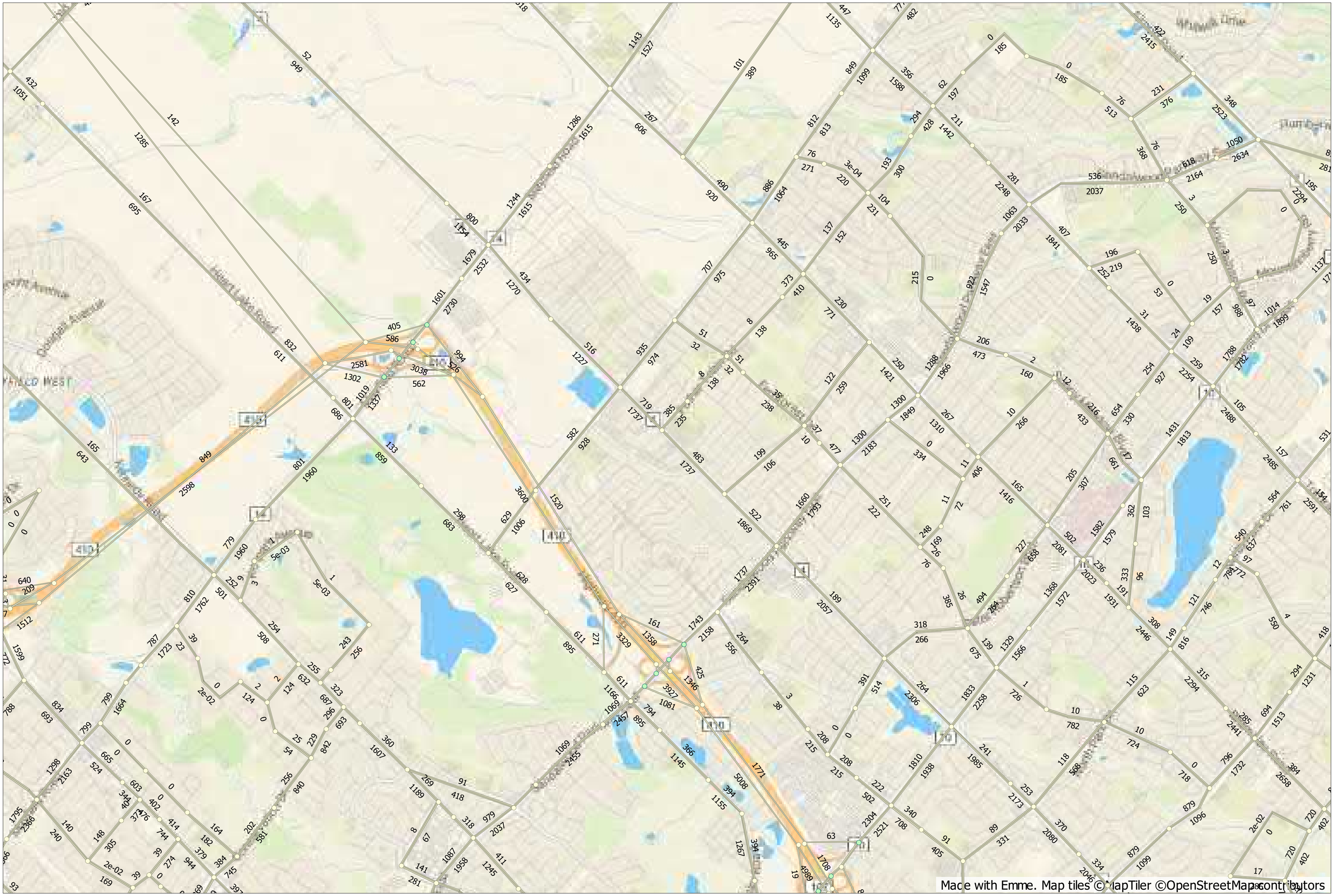
2031 with campus (G:/TranModel/2031_with_campus Base/Database/emmebank)
Scenario 11: AM - Cleaned Network
2020-11-09 18:01 (lwu@COB10W-MJ03YM3B)

2031_Peak Hour Auto Volume



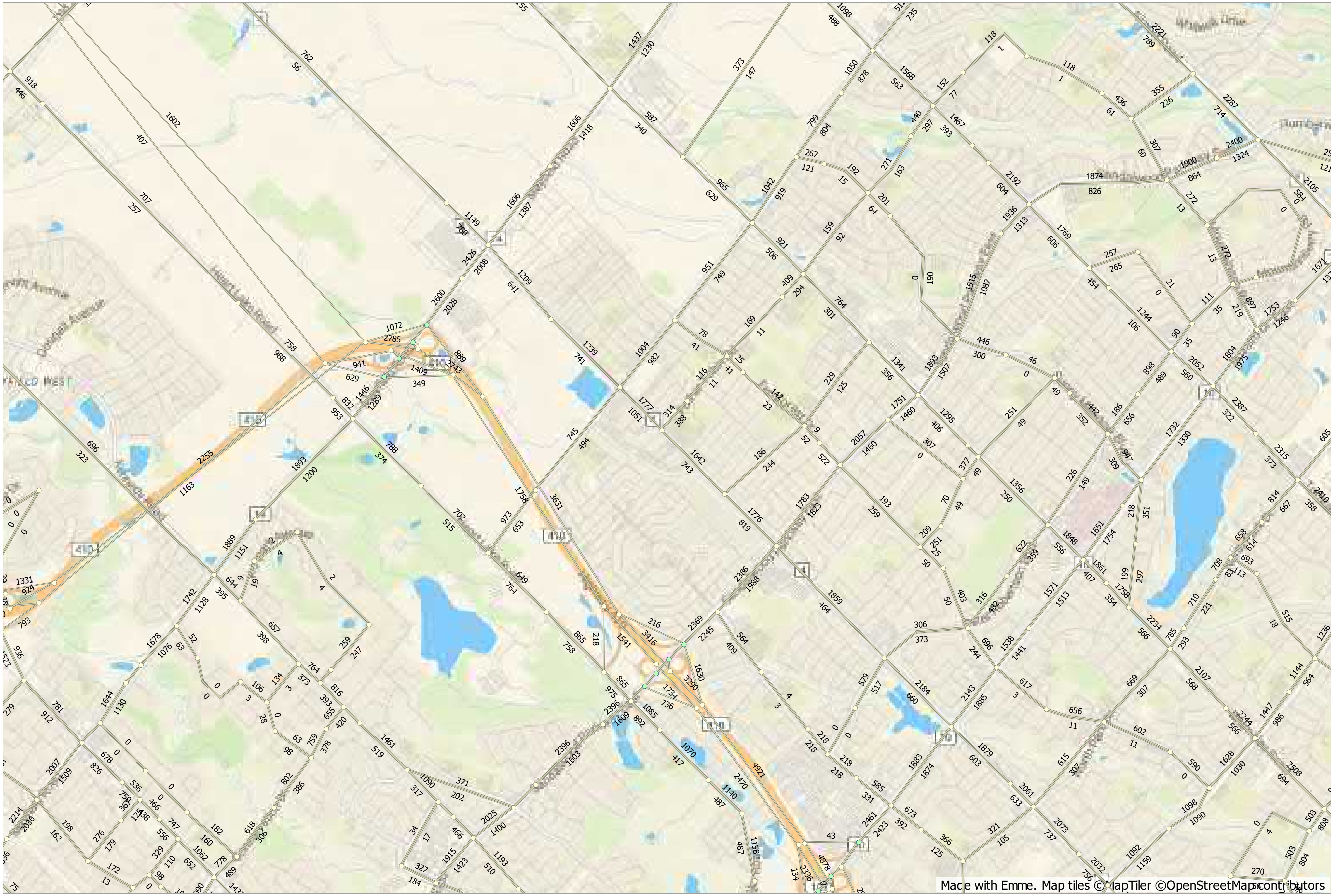
2031 with campus (G:/TranModel/2031_with_campus Base/Database/emmebank)
Scenario 31: PM - Cleaned Network
2020-11-09 18:01 (lwu@COB10W-MJ03YM3B)

2041_Peak Hour Auto Volume



2041_WITH CAMPUS (G:/TranModel/2041_with_campus Base with GTAW/Database/emmebank)
Scenario 11: AM - Cleaned Network
2020-11-09 18:39 (lwu@COB10W-MJ03YM3B)

2041_Peak Hour Auto Volume



2041_WITH CAMPUS (G:/TranModel/2041_with_campus Base with GTAW/Database/emmebank)
Scenario 31: PM - Cleaned Network
2020-11-09 18:40 (lwu@COB10W-MJ03YM3B)

Collision Details Report

From: January 1, 2015 **To:** December 31, 2019

Location .... COUNTRYSIDE DR @ HEART LAKE RD **Municipality........** Brampton

Traffic Control.... **Total Collisions....** 26

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
150055211	2015-Feb-08, Sun,11:55	Snow	Turning movement	P.D. only	South	Packed snow	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:	Road #1: Heart lake Road Road #2: Country Side Drive Statement #3: <Statement>V2 was traveling north on Heartlake Road, Brampton.V1 made a left onto Heart lake Road and hit V2.</Statement>				North	Packed snow	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
150282745	2015-Jul-18, Sat,18:12	Clear	Turning movement	P.D. only	South	Dry	Overtaking	Automobile, station wagon	Other motor vehicle	Improper passing	
Comments:	Statement #1: V2 traveling south on R1 is making east bound turn into private drive, V1 attempting to pass and over take V2 south bound collides with V2 making turn.				South	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly	
160045959	2016-Feb-03, Wed,04:45	Rain	SMV other	P.D. only	West		Going ahead	Automobile, station wagon	Ditch	Disobeyed traffic control	
Comments:	Statement #1: V1 W/B ON R1 DRIVES THRU STOP SIGN AND INTO DITCH BEFORE STRIKING TREE										
160126821	2016-Apr-03, Sun,20:10	Snow	SMV other	P.D. only	West	Ice	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Speed too fast for condition	
Comments:	Statement #1: V1 W/B R1 SLID THROUGH INTERSECTION AND ROLLED INTO DITCH. NO CHARGE LAID DUE TO WEATHER AND ROAD CONDITIONS.					Ice					
160193605	2016-May-21, Sat,20:10	Clear	Rear end	P.D. only	South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:	Statement #1: V2: WAS SLOWING DOWN ON R1 TO MAKE A LEFT ONTO R2V1: WAS BEHIND V2 ON R1 AND DID NOT SLOW DOWN AND STRUCK V2.				South	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly	
160261654	2016-Jul-11, Mon,16:59	Clear	Rear end	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:	Statement #1: V2 WAS SITTING IN FRONT OF V1 IN THE RIGHT HAND LANE ON COUNTRYSIDE DRIVE AT HEARTLAKE ROAD IN THE CITY OF BRAMPTON. COUNTRYSIDE DRIVE HAS A POSTED STOP SIGN WESTBOUND AT THE THRU LANE OF HEARTLAKE ROAD WHICH RUNS NORTH AND SOUTH. V2 WAS STOPPED AT THE SIGN WHEN THE FRONT BUMPER OF V1 COLLIDED WITH THE REAR BUMPER OF V2. BOTH VEHICLES WERE FACING WEST BOUND INTENDING TO GO NORTHBOUND ON HEARTLAKE ROAD.				West	Dry	Stopped	Pick-up truck	Other motor vehicle	Driving properly	
160333102	2016-Sep-04, Sun,07:29	Clear	SMV other	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Tree, shrub, stump		
Comments:	Statement #1: V1 IS A STOLEN AUTO THAT WENT OFF THE ROADWAY HEADING WESTBOUND ON COUNTRYSIDE DRIVE AND HIT A TREE					Dry					

160335865	2016-Sep-06, Tue,13:52	Clear	Turning movement	P.D. only	North	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:	Statement #1: V2 WAS TRAVELLING N/B ON HEART LAKE RD PROCEEDING STRAIGHT THROUGH THE INTERSECTION OF COUNTRYSIDE DRIVE WHILE V1 WAS INITALLY TRAVELLING S/B ON HEART LAKE RD AND TURNING LEFT AT COUNTRYSIDE DR TO PROCEED E/B. V1 MADE THE LEFT TURN DIRECTLY IN THE PATH OF V2 WHICH HAD THE RIGHT OF WAY LEADING TO CONTACT BETWEEN THE VEHICLES.				North	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
170027722	2017-Jan-21, Sat,22:10	Fog, mist, smoke, dust	SMV other	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Tree, shrub, stump	Disobeyed traffic control
Comments:	Statement #1: D1 WAS TRAVELLING WESTBOUND ON COUNTRYSIDE DRIVE WHEN HE FELL ASLEEP AT THE WHEEL FAILING TO STOP AT THE STOP SIGN.IN RESULT, D1 DROVE OFF THE ROAD INTO THE DITCH COLLIDING WITH A TREE. NO INJURIES WERE SUSTAINED AS A RESULT OF THIS COLLISION.									
170048944	2017-Feb-06, Mon,23:26	Clear	SMV other	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Tree, shrub, stump	Lost control
Comments:	Statement #1: V1 IS W/B ON R1 AT A HIGH RATE OF SPEEDV1 FAILS TURN S/B (LEFT) ONTO R2 V1 LEAVES ROADWAY AND COLLIDES WITH TREE									
170056208	2017-Feb-12, Sun,06:13	Snow	SMV other	P.D. only	West	Packed snow	Slowing or stopping	Automobile, station wagon	Tree, shrub, stump	Lost control
Comments:	Statement #1: D1 was travelling Westbound on Countryside Drive approaching a stop sign at Heart Lake Road, Brampton. As D1 attempted to stop at the stop sign the road conditions caused him slide through the stop sign and off the roadway on the West side of Heart Lake Road.					Packed snow				
170187379	2017-May-20, Sat,17:30	Clear	Angle	P.D. only	South	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: - V1 ADVISED HE WAS S/B ON R1 MAKING A E/B TURN ONTO R2 WHEN V2 RAN THE STOP SIGN AND COLLIDED WITH V1.- V2 ADVISED HE WAS W/B ON R2 AND STOPPED AT THE STOP SIGN AT R2 AND R1. V1 TURNED TO SHARPLY FROM R1 AND COLLIDED WITH V2.				West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
170230088	2017-Jun-21, Wed,18:35	Clear	Turning movement	P.D. only	West	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: R1 COUNTRYSIDE DRIVE.R2 HEARTLAKE ROAD.D2 TRAVELLING W/B ON R1.D1 TRAVELLING W/B ON R1.D2 STOPPED AT THE STOP SIGN ON R1.D1 STOPPED AT THE STOP SIGN ON R1.D2 PROCEEDDED AND THEN STOPPED, YEILDING TO N/B TRAFFIC ON R2.D1 REAR-ENED D2.				West	Dry	Merging	Automobile, station wagon	Other motor vehicle	Driving properly
170355103	2017-Sep-21, Thu,17:30	Clear	Rear end	P.D. only	West	Dry		Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V2 DRIVING ON COUNTRYSIDE MAKING A RIGHT TURN AT HEARTLAKE. V1 HIT V2 FROM BEHIND				West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly

170471857	2017-Dec-18, Mon,08:15	Clear	Angle	P.D. only	South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: On December 18th, 2017 at approximately 8:15am D1 was operating V1 southbound on R1 approaching R2. D2 was westbound on R2 at R1. D2 completed a left turn southbound in front of V1 who was unable to stop and collided with the rear of V2. V1 had the right of way and no stop sign.				West	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
180156726	2018-Apr-27, Fri,21:59	Rain	SMV other	P.D. only	North	Wet	Turning right	Automobile, station wagon	Pole (sign, parking meter)	Lost control
Comments:						Wet				
180223126	2018-Jun-14, Thu,14:27	Clear	Rear end	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: D1 AND D2 BOTH IN LEFT TURN LANE ON COUNTRYSIDE ROAD. D2 BEHIND D1 REAR ENDS D2.				West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
180231549	2018-Jun-19, Tue,18:30	Clear	Rear end	P.D. only	West	Dry	Going ahead	Truck - closed	Other motor vehicle	Following too close
Comments:	Statement #1: V2 TRAVELLING WESTBOUND ON R1, APPROACHED INTERSECTION AND STOPPED FOR THE STOP SIGN. V1 TRAVELLING BEHIND V2 AND REAR ENDED VEHICLE.NO CHARGES WERE LAID AS THERE WERE NO INJURIES SUSTAINED AND THE REPORT WAS TAKEN AT FRONT DESK.				West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
180366083	2018-Sep-27, Thu,15:15	Clear	Rear end	P.D. only	West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 STOPPED AT STOP SIGN ON COUNTRY SIDE DRIVE ATTEMPTING TO MAKE RIGHT TURN ONTO HEARTLAKE ROAD. V2 WESTBOUND ON COUNTRY SIDE DRIVE REAR ENDS V1.				West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Other
180369949	2018-Sep-30, Sun,19:50	Rain	SMV other	P.D. only	East	Wet	Going ahead	Pick-up truck	Tree, shrub, stump	Lost control
Comments:	Statement #1: V1 TURNED EB FROM HEARTLAKE RD TO PROCEED ONTO COUNTRYSIDE DR. V1 PROCEEDED OFF ROAD INTO A DITCH AND HIT A TREE IN THE S/E CORNER. D1 ADVISED AN ANIMAL JUMPED OUT IN FRONT OF HIS VEH AND WHEN HE ATTEMPTED TO BRAKE, HIS VEHICLE TIRES SLID AND WENT OFF ROAD. DUE TO LACK OF INDEPENDENT WITNESSES AND SLIPPERY ROAD CONDITIONS, THE DRIVER WAS NOT CHARGED.									
180452874	2018-Dec-02, Sun,08:13	Rain	Angle	P.D. only	West	Wet	Turning right	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:	Statement #1: V2 GOING NORTHBOUND ON HEARTLAKEV1 MAKING A RIGHT (NORTHBOUND) TURN ONTO HEARTLAKE FROM COUNTRYSIDE V1 COLLIDES WITH V2				North	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
190009709	2019-Jan-08, Tue,15:49	Clear	Angle	P.D. only	West	Wet	Turning right	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V2 travelling N/B on R1. V1 made right turn from R2 and stuck V2 on passenger side				North	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

190029494	2019-Jan-23, Wed,07:50	Snow	Angle	P.D. only	East	Loose snow	Turning left	School bus	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 TRAVELLING SOUTHBOUND ON HEARTLAKE RD. V2 TRAVELLING EASTBOUND ON COUNTRYSIDE DR, TURNING LEFT ONTO HEARTLAKE ROAD. V1 LOST CONTROL AND WAS UNABLE TO STOP FOR THE RED LIGHT. V1 COLLIDED WITH V2 WITHIN THE INTERSECTION.				South	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
190052524	2019-Feb-09, Sat,22:29	Clear	SMV other	P.D. only	North	Dry	Going ahead	Automobile, station wagon	Animal - domestic	Driving properly
Comments:	Statement #1: V1 TRAVELLING NORTHBOUND ON HEARTLAKE ROAD AT COUNTRYSIDE DRIVE. 4 DEER RAN ACROSS THE ROAD AND V1 STRUCK ONE DEER.					Dry				
190126502	2019-Apr-07, Sun,18:25	Clear	SMV other	P.D. only	South	Dry	Going ahead	Automobile, station wagon	Animal - wild	Driving properly
Comments:	Statement #1: V1 S/B ON R1 WHEN A DEER ENTERED THE ROADWAY FROM THE EAST SIDE OF THE ROAD STRIKING V1					Dry				
190137387	2019-Apr-15, Mon,18:00	Clear	Rear end	P.D. only	West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 AND V2 TRAVELLING WESTBOUND ON COUNTRYSIDE RD. V1 REAR ENDED V2. NO CHARGES LAID. REPORTED AT 22 DIVISION FRONT DESK.				West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

Collision Details Report

From: January 1, 2015 **To:** December 31, 2019

Location .... COUNTRYSIDE DR @ ROSS DR **Municipality........** Brampton

Traffic Control.... No control **Total Collisions....** 2

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
170485858	2017-Dec-29, Fri,20:35	Clear	Turning movement	P.D. only	West	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn	
Comments:	Statement #1: D2 E/B ON R1D1 TURNED LEFT ONTO R2 FROM W/B R1V2 STRUCK V1				East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
180019404	2018-Jan-15, Mon,16:20	Snow	Angle	Non-fatal injury	East	Loose snow	Turning right	Automobile, station wagon	Other motor vehicle	Lost control	
Comments:	Statement #1: D1 E/B ON R1 D2 STOPS FOR STOP SIGN ON R2 D1 MAKES RIGHT TURN S/B ONTO R2 D1 LOSE CONTROL AND COLLIDES WTH D2				North	Loose snow	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2015 **To:** December 31, 2019

Location .... COUNTRYSIDE DR btwn ACE DR / NAPERTON DR & DIXIE RD **Municipality........** Brampton

Traffic Control.... No control **Total Collisions....** 2

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
150317638	2015-Aug-12, Wed,20:53	Clear	SMV other	P.D. only	West	Dry	Other	Automobile, station wagon	Pole (sign, parking meter)	Driving properly	

Comments: Statement #1: V1 WAS TRAVELLING WEST BOUND ON COUNTRYSIDE ROAD. V1 FRONT DRIVER SIDE TIRE GOT A PUNCTURE. V1 THEN LOST CONTROL AND DROVE ON TO THE CENTRE MEDIAN PUNCTURING THE DRIVER SIDE REAR TIRE, WITH THE DRIVER THEN PULLING THE VEHICLE OVER TO THE RIGHT CURB LANE.

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
170207082	2017-Jun-05, Mon,05:30	Fog, mist, smoke, dust	Sideswipe	Non-reportable	East	Wet	Going ahead	Intercity bus	Other motor vehicle		
					East				Other motor vehicle	Driving properly	

Comments: Statement #1: V2 was travelling E/B on R1 in the right lane.V1 was travelling E/B on R1 in the left lane.V1 made an unsafe lane change and struck V2. V1 failed to remain at the scene.

Collision Details Report

From: January 1, 2015 **To:** December 31, 2019

Location .... HEART LAKE RD @ SANDALWOOD PKY E **Municipality........** Brampton

Traffic Control.... **Total Collisions....** 112

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
150003917	2015-Jan-04, Sun,11:20	Clear	SMV other	P.D. only	East	Wet	Changing lanes	Automobile, station wagon	Tree, shrub, stump	Driving properly	
Comments:	Road #1: Sandalwood Parkway East Road #2: Heart Lake Road E M 25Statement #3: <Statement>V1 on passing lane eastbound R1 changed to the curb lane. V1 lost control due to road condition and went over the curb and struck a tree and City of Brampton park sign. The driver sustained minor injuries and was taken to BCH by ambulance for precautionary.</Statement>					Wet					
150005285	2015-Jan-03, Sat,13:00	Snow	Rear end	P.D. only	East	Loose snow	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:	Road #1: SANDALWOOD PARKWAY E Road #2: HEART LAKE RD Statement #3: <Statement>V1 AND V2 TRAVELLING E/B ON SANDALWOOD PARKWAY EAST. V2 STOPS FOR TRAFFIC. V1 REAR ENDS V2.</Statement>				East	Loose snow	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly	
150006510	2015-Jan-06, Tue,06:30	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn	
Comments:	Road #1: SANDALWOOD PARKWAY Road #2: HEART LAKE ROAD Statement #3: <Statement>V1 WAS ATTEMPTING TO MAKE A LEFT TURN ONTO ROAD 2 FROM ROAD 1 ON A GREEN LIGHT.V2 WAS ATTEMPTING TO PROCEED THROUGH THE INTERSECTION ON ROAD 1 ON A GREEN LIGHT.V2 SUBSEQUENTLY STRUCK V1 WHILE ATTEMPTING TO PROCEED THROUGH THE INTERSECTION.</Statement>				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
150007608	2015-Jan-06, Tue,19:29	Clear	Rear end	Non-fatal injury	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Lost control	
Comments:	Road #1: Sandalwood Parkway East Road #2: Heart Lake Road E M 25Statement #3: <Statement>V1 and V2 were stopped at the red light facing w/b on R1, at the intersetion of R1 and R2. The light turned green, V1 then rear ended V2.</Statement>				West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
150021912	2015-Jan-16, Fri,09:10	Clear	Sideswipe	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Other	
Comments:	Road #1: SANDALWOOD PY E Road #2: HEART LAKE RD W M 20Statement #3: <Statement>V1, N/B, R2, LEFT TURN LANEV2, S/B, R2, RIGHT TURN LANEV1 ADVISED TURNED LEFT ON ADVANCE GREEN AND V2 MADE WIDE RIGHT TURN ONTO R1 AND SIDE SWIPED HIMV2 ADVISED HAD GREEN LIGHT AND RIGHT OF WAY; V1 MADE FAST, WIDE LEFT TURN INTO HIS LANE STRIKING HIS VEHICLE.CONFLICTING STORIES AND NO INDEPENDENT WITNESSES</Statement>				West	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Other	

150066729	2015-Feb-16, Mon,16:07	Clear	Rear end	P.D. only	East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Following too close
Comments:	Road #1: sandalwood parkway Road #2: heartlake road N M 5Statement #3: <Statement>V2 traveling east on R1 was slowing/stopping for traffic. V1 traveling east on R1 struck V1 from the rear.</Statement>				East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
150087565	2015-Mar-03, Tue,08:00	Clear	Turning movement	Non-fatal injury	West	Dry	Turning left	Delivery van	Other motor vehicle	Improper turn
Comments:	Road #1: SANDALWOOD PARKWAY Road #2: HEART LAKE ROAD Statement #3: <Statement>V1 WAS TRAVELLING E/B ON R1 ATTEMPTING TO MAKE A LEFT ONTO S/B HEART LAKE ROAD ON AN AMBER LIGHTV2 WAS PROCEEDING W/B ON R1 THROUGH THE INTERSECTION ON AN AMBER LIGHT.V2 SUBSEQUENTLY STRUCK V1</Statement>				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
150094231	2015-Mar-07, Sat,18:28	Other	Turning movement	P.D. only	North	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:	Road #1: HEART LAKE RD Road #2: SANDALWOOD PY E Statement #3: <Statement>V2, S/B, R1, L1, GREEN LIGHTV1, N/B, R1, LEFT TURN LANE, GREEN LIGHTV1 WAITING TO TURN LEFT, HESITATED THEN ATTEMPTED TO TURNV2 DID NOT HAVE ANY TIME TO AVOID COLLISION AND COLLIDED WITH V1 IN INTERSECTION.</Statement>				South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
150135353	2015-Apr-06, Mon,13:47	Clear	Rear end	Non-fatal injury	East	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: On Monday April 6th 2015 at 1:47PM V2(STRAKER), V3 (ESCOTO) were stopped in e/b lane 1 at the intersection of R1 (Sandalwood Pkwy E) and R2(Heartlake Rd) facing a red traffic signal. V1 (HARKNESS) was travelling e/b on R1 in lane 1 and rear ended V2. Minor injuries. V1 was not drivable. D1 was issued a PON for careless driving HTA 130.				East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
150180134	2015-May-07, Thu,14:39	Clear	Rear end	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V2 WAS COMING TO A STOP FROM EASTBOUND SANDALWOOD PKWY AT HEART LAKE RD.V1 REAR ENDED V2.D2 WAS TAKEN TO THE HOSPITAL COMPLAINING OF BACK AND LEG PAIN.				East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
150198330	2015-May-20, Wed,10:02	Clear	Rear end	P.D. only	East	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: BOTH V1 AND V2 WERE TRAVELLING ON EASTBOUND SANDALWOOD PARKWAY APPROACHING THE INTERSECTION OF HEARTLAKE ROAD. THE TRAFFIC SIGNAL FOR SANDALWOOD PARKWAY WAS GREEN ACCORDING TO BOTH DRIVERS.BOTH VEHICLES TURNED INTO THE RIGHT TURN CHANNEL AND ABOUT TO NAVIGATE A RIGHT HANDED TURN ONTO SOUTH BOUND HEARTLAKE ROAD.V1 REAR ENDED V2 WITHIN THE RIGHT TURN CHANNEL.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

150200303	2015-May-21, Thu,15:10	Clear	Rear end	Non-fatal injury	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Other
Comments:	Statement #1: V2 TRAVELLING E/B ON SANDALWOOD PY IN THE CENER LANE JUST E/O HEART LAKE RD. V1 FOLLOWING V2 IN CENTER LANE. V2 STOPPED DUE TO VEHICLE IN FRONT. V2 FAILED TO STOP AND REAR ENDED V1.				East	Dry	Slowing or stopping	Passenger van	Other motor vehicle	Driving properly
150232437	2015-Jun-12, Fri,19:43	Rain	SMV other	P.D. only	West	Wet	Turning left	Automobile, station wagon	Pole (utility, power)	Lost control
Comments:	Statement #1: D1 WAS TURNING FROM WESTBOUND SANDALWOOD PKWY TO SOUTHBOUND HEART LAKE RD.D1 LOST CONTROL OF HER VEHICLE AND STRUCK A POLE LOCATED ON HEART LAKE RD SOUTH OF SANDALWOOD PKWY.D1 WAS CHARGED WITH CARELESS DRIVING.					Wet				
150233693	2015-Jun-13, Sat,19:50	Clear	Rear end	Non-fatal injury	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: Both vehicles W/B R1. V1 rear ends V2 in left turn lane.				West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
150233722	2015-Jun-13, Sat,20:20	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:	Statement #1: V1 TRAVELLING W/B ON R1 IN L2 WEST OF INTERSECTION AT R2V2 TRAVELLING W/B ON R1 IN L1 WEST OF INTERSECTION AT R2DIRECTLY BESIDE V1V1 CHANGES LANES FROM L2 TO L1 AND SUBSEQUENTLY STRIKES V2 FROM THE SIDE				West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
150308475	2015-Aug-05, Wed,22:33	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 TRAVELLING WESTBOUND ON SANDALWOOD PARKWAY TO MAKE LEFT TURN TO GO SOUTHBOUND ON HEART LAKE ROAD. V2 TRAVELLING EASTBOUND ON SANDALWOOD PARKWAY TO GO STRAIGHT THROUGH INTERSECTION. V1 MADE LEFT TURN AND FRONT BUMPER OF V1 COLLIDED WITH DRIVERS SIDE OF V2 WITHIN INTERSECTION.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
150325131	2015-Aug-18, Tue,12:43	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: D1 DRIVING WESTBOUND ON SANDALWOOD PARKWAY.D2 DRIVING EASTBOUND ON SANDALWOOD PARKWAY.D1 MAKES A LEFT TURN AND COLLIDES INTO D2.**D1 IS AT FAULT**				East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
150329112	2015-Aug-21, Fri,08:26	Clear	Rear end	P.D. only	East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: ALL VEHICLES TRAVELLING EASTBOUND ON R1 IN RIGHT LANE. A MOTORIZED WHEEL CHAIRED PEDESTRIAN CROSSED R1 NORTHBOUND CAUSING ALL VEHICLES TO BREAK, V1 REAR-ENDED V2 WHO REAR-ENDED V3. NO INJURIES.				East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
150339255	2015-Aug-23, Sun,11:00	Clear	Other	P.D. only	South	Dry	Reversing	Truck-other	Other motor vehicle	Lost control
Comments:	Statement #1: V2 STOPPED ON R1.V1 REVERSES, STRIKES V2 AND FLEES ON R1.				South	Dry	Stopped	Pick-up truck	Other motor vehicle	Driving properly

150402876	2015-Oct-14, Wed,13:34	Clear	Angle	P.D. only	East	Dry	Going ahead	Passenger van	Other motor vehicle	Other
Comments:	Statement #1: Vehicle 2 was westbound on Sandalwood Parkway and made a left to go south on Heartlake Road in Brampton. Vehicle 1 was traveling east on Sandalwood Parkway and struck vehicle 2 within the intersection.				South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
150425894	2015-Oct-31, Sat,00:30	Clear	Turning movement	P.D. only	South	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V2 WAS TRAVELLING SB ON ROAD ONE WHEN V1 TURNED INTO THE WRONG LANE AND HIT THE SIDE OF V2				South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
150430041	2015-Nov-03, Tue,21:10	Clear	Rear end	P.D. only	East	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Other
Comments:	Statement #1: V1, V2, and V3 E/B on R1. V1 struck V2, and V2 struck V3.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
150436563	2015-Nov-08, Sun,20:30	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 was travelling westbound on Sandalwood parkway and made a left turn to go southbound at the intersection of Heartlake road in the city of Brampton. V2 was travelling eastbound on Sandalwood parkway going straight through the intersection at Heartlake road. when v1 made the turn the front bumper of V1 collided with the drivers side front bumper of V2.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
150458994	2015-Nov-25, Wed,12:09	Clear	Turning movement	Non-fatal injury	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V2 EAST BOUND ON R2, V1 WEST BOUND R2. V1 ATTEMPTS TO TURN SOUTH BOUND ON R1 AND COLLIDES WITH V2.				East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
150475866	2015-Dec-07, Mon,17:45	Clear	Turning movement	P.D. only	East	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Other
Comments:	Statement #1: V1 travelling EB on HeartlakeV2 Travelling WB on Sandlewood V1 turning left onto Heartlake NBV2 turning right on Heartlake NBV1 and V2 collided on Heart Lake, just North of Sandalwood.				West	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Other
150488351	2015-Dec-16, Wed,19:22	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 WB R1V2 EB R1V1 TURNS SB R2V1 STRIKES V2				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
150488508	2015-Dec-16, Wed,20:15	Clear	Turning movement	P.D. only	West	Dry	Turning left	Delivery van	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 WB R1V2 EB R1V1 TURNS SB R2V1 STRIKES V2				East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
150491278	2015-Dec-18, Fri,17:30	Snow	Rear end	P.D. only	East	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: BOTH V1 AND V2 WERE TRAVELLING E/B ON R1 TO MERGE ONTO THE 410 S/B. V2 STOPPED FOR TRAFFIC, AND V1 WAS UNABLE TO STOP BECAUSE OF THE ROAD CONDITIONS AT THE TIME AND REAR ENDED V2. ROAD CONDITIONS AT THE TIME OF THE COLLISION WERE SLIPPERY DUE TO SNOW.				East		Stopped	Automobile, station wagon	Other motor vehicle	Driving properly

160011421	2016-Jan-08, Fri,21:54	Rain	Angle	P.D. only	West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 WAS PROCEEDING WESTBOUND ON SANDALWOOD PARKWAY THROUGH A GREEN LIGHT.V2 WAS PROCEEDING NORTHBOUND ON HEART LAKE ROAD THROUGH A RED LIGHT.V1 STRUCK V2.THE DRIVER OF V2 WAS CHARGED WITH RED LIGHT - FAIL TO STOP PON #4198824B.				North	Wet	Going ahead	Pick-up truck	Other motor vehicle	Disobeyed traffic control
160021897	2016-Jan-16, Sat,13:11	Clear	Rear end	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V1 WAS TRAVELLING WESTBOUND ON R1 BEHIND V2. BOTH VEHICLES WERE APPROACHING A RED LIGHT AT THE INTERSECTION OF R1 AND R2. V2 CAME TO A STOP AND V1 REAR ENDED V2.				West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160039970	2016-Jan-29, Fri,15:30	Clear	Rear end	P.D. only	South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Other
Comments:	Statement #1: V2 AND V3 SOUTHBOUND STOPPED AT RED LIGHT ON R1 IN L3.V1 CRASH INTO BACK OF V2, V3 THEN CRASH INTO BACK OF V3.V1 MAKE U-TURN AND TRAVEL NORTHBOUND ON R1, FAILING TO REMAIN AT SCENE.				South	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
160052131	2016-Feb-07, Sun,20:00	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 WAS MAKING L/T FROM R1 TO S/B R2.V2 WAS E/B ON R1 IN L2.V1 STRUCK V2.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160062671	2016-Feb-15, Mon,16:51	Snow	Angle	Non-fatal injury	East	Slush	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:	Statement #1: - V2 TRAVELLING S/B ON HEARTLAKE ROAD IN PASSING LANE AT 40 KM/HR. V1 TRAVELLING E/B ON SANDALWOOD PKWY E IN CURB LANE AT 50 KM/HR.- V2 HAD GREEN LIGHT AND RIGHT OF WAY.- V1 HAD RED LIGHT. D1 ATTEMPTED TO SLOW DOWN AND STOP. DUE TO WET ROAD CONDITIONS, V1 SLIPPED. D1 UNABLE TO STOP V1 IN TIME, PROCEEDED TO ENTER THE INTERSECTION ON A RED LIGHT.- V1 COLLIDED WITH V2. V2 STRUCK CITY OF BRAMPTON MEDIAN CAUTION SIGN.				South	Slush	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160069212	2016-Feb-20, Sat,09:45	Clear	Rear end	P.D. only	East	Wet	Turning right	Delivery van	Other motor vehicle	Failed to yield right-of-way
Comments:	Statement #1: V1 northbound Heart Lake Road in curb lane turns right facing a red light at Sandalwood Parkway East; struck by V2 travelling eastbound Sandalwood in curb lane facing solid green light.				East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

160092697	2016-Mar-09, Wed,06:16	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1ADVISED HE WAS IN THE LEFT TURN LANE AT SANDALWOOD PARKWAY AND HEARTLAKE ROAD. V1 WAS THE FIRST UP IN THE TURN LANE IN THE MIDDLE OF THE INTERSECTION, THE TRAFFIC LIGHTS CYCLED TO RED AND V1 PROCEEDED WITH HIS TURN HOWEVER V2 FAILED TO STOP FOR THE RED LIGHT TRAVELLING EASTBOUND ON SANDALWOOD PARKWAY CAUSING A MVC. V2 ADVISED HE WAS EASTBOUND ON SANDALWOOD PARKWAY FACING A SOLID GREEN LIGHT. V1 PROCEEDS THROUGH INTERSECTION AND V1 TURNS IN FRONT OF HIM CAUSING AN MVC. NO INDEPENDANT WITNESSES. CONFLICTING STORIES. NO CHARGES LAID. BOTH VEHICLE'S NOT DRIVEABLE. PARTIES INSIDE V1 TRASNPORTED TO BRAMPTON CIVIC HOSPITAL PRECAUTIONARY ONLY.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160111191	2016-Mar-22, Tue,19:00	Rain	Turning movement	P.D. only	West	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 WB R1V2 EB R1V1 TURNS SB R2V1 STRIKES V2 IN INTERSECTIONV1 FTRSELF REPORTED 22 DIVNO CHARGES FTR				East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160134522	2016-Apr-08, Fri,22:45	Clear	Other	P.D. only	East	Dry	Changing lanes	Automobile, station wagon		Improper lane change
Comments:	unknown				East	Dry	Going ahead	Automobile, station wagon	Ran off road	Driving properly
160231881	2016-Jun-17, Fri,20:15	Clear	Rear end	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V2 WAS TRAVELING EAST ON R1 WHEN V1 CAME IN CONTACT WITH V2'S REAR BUMPER. NO CHARGES LAID, SELF-REPORTED AT CASSIE CAMPBELL COMMUNITY STATION.				East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
160244744	2016-Jun-28, Tue,08:08	Clear	Turning movement	P.D. only	West	Dry	Turning left	Bicycle	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 W/B ON R1V2 E/B ON R1V1 TURNS TO GO S/B ON R2V2 HITS V1 WITHIN INTERSECTION				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160252880	2016-Jul-04, Mon,18:36	Clear	Rear end	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: VEHICLE 2 WAS TRAVELING W/B ON SANDALWOOD PWY, APPROACHING THE INTERSECTION AT HEARTLAKE RD. VEHICLE 2 SLOWED DOWN FOR THE TRAFFIC AHEAD, AT WHICH TIME IT WAS REAR-ENDED BY VEHICLE 1.				West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
160306257	2016-Aug-14, Sun,17:00	Clear	Rear end	P.D. only	East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 AND V2 TRAVELLING SOUTH ON SANDLEWOODV2 SLOWS V1 HITS V2				East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
160307800	2016-Aug-15, Mon,19:10	Clear	Angle	P.D. only	East	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:	Statement #1: V2 N/B ON R2V1 TURNING FROM E/B R1 TO N/B R2GREEN LIGHT FOR N/B AND S/B ON R2V1 TURNS OUT AND IS STRUCK BY V2V1 AT FAULT				North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

160308225	2016-Aug-16, Tue,07:57	Rain	Rear end	P.D. only	South	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V2 WAS HEADING S/B ON HEARTLAKE (R1) PROCEEDING TO MAKE A LEFT TURN ON SANDALWOOD (R2) TO HEAD E/B WHEN V1 WHICH WAS ALSO FACING S/B ON HEARTLAKE COLLIDED WITH V2 REAR BUMPER.				South	Wet	Turning left	Pick-up truck	Other motor vehicle	Driving properly
160332319	2016-Sep-03, Sat,16:25	Clear	Rear end	Non-fatal injury	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Other
Comments:	Statement #1: V2 WAS REAR ENDED BY V1. DRIVER OF V2 SUSTAINED NECK AND KNEE INJURY AND WAS TRANSPORTED TO BCH. PASSENGER OF V2 WAS ALSO TRANSPORTED FOR NECK PAIN.DRIVER OF V1 WAS CHARGED WITH CARELESS DRIVING.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160357642	2016-Sep-22, Thu,23:40	Clear	Turning movement	Non-fatal injury	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 WAS WB ON R1V2 WAS EB ON R1V1 ATTEMPTED A LEFT TURN FROM R1 TO SB R2V1 TURNED IN FRONT OF V2V1 CAUSED ACCIDENT				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160362106	2016-Sep-26, Mon,16:14	Rain	SMV other	P.D. only	East	Wet	Turning left	Automobile, station wagon	Ditch	Driving properly
Comments:	Statement #1: V1 INITIALLY TRAVELLING EAST BOUND ON R1 IN L1, STOPPED IN INTERSECTION WAITING TO MAKE LEFT TURN ONTO R2.V1 BACK TIRES LOSE TRACTION FROM ROAD CONDITIONS AND V1 SPIN AND END UP OVER CURB AND ON GRASS IN NORTHEAST CORNER OF INTERSECTION.					Wet				
160366958	2016-Sep-29, Thu,19:00	Clear	Rear end	P.D. only	North	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: D2 STATED SHE WAS NORTH BOUND ON HEARTLAKE ROAD, IN THE CITY OF BRAMPTON. AS SHE NEARED THE GAS STATION PARKING LOT AND PREPARED TO PULL IN, SHE WAS STRUCK BY D1 WHO WAS FOLLOWING BEHIND. D1 PROVIDED HER NAME AND SOME INFORMATION, BUT LEFT IN A HURRY. AFTERWARDS D2 CONTACTED HER INSURANCE COMPANY AND LEARNED SHE DID NOT HAVE ALL THE OTHER DRIVER'S INFORMATION, AT WHICH POINT POLICE WERE CALLED. D1'S VERSION OF EVENTS WAS THAT D2 WAS IN THE NUMBER ONE LANE AND CHANGED LANES INTO HER PATH. THE SCENE WAS NOT ATTENDED, BUT BASED UPON BOTH VERSIONS OF EVENTS AND THEIR DESCRIPTION OF VEHICLE DAMAGE, D1 WOULD APPEAR TO BE MOST AT FAULT.				North	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
160401025	2016-Oct-26, Wed,06:53	Rain	Turning movement	Non-fatal injury	West	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 travelling w/b on Sandalwood Pkwy in left turn lane facing green light. Effects left turn in front of v2 who was travelling e/b through intersection and vehicles collided. V3 also travelling w/b on Sandalwood Pkwy in left turn lane. Effected left turn following V1. vV3 advises he observed collision and subsequently had to come to a sudden stop within intersection. V4 travelling e/b on sandalwood parkway struck v3 in intersection due to the sudden stop.				East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

160467416	2016-Dec-16, Fri,14:02	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:	Statement #1: VEHICLE ONE WAS TRAVELING WESTBOUND ON SANDALWOOD PARKWAY EAST. VEHICLE TWO WAS TRAVELLING EASTBOUND ON SANDALWOOD PARKWAY EAST. TRAFFIC LIGHT WAS GREEN FOR BOTH PARTIES. VEHICLE ONE DID NOT AFFORD VEHICLE TWO REASONABLE OPPORTUNITY TO AVOID A COLLISION. VEHICLE ONE TURNED MADE A TURN SOUTHBOUND ONTO HEARTLAKE RD, AND SUBSEQUENTLY COLLIDED WITH VEHICLE TWO.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170019253	2017-Jan-15, Sun,16:05	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V2 E.B ON R1 IN L3 PROCEEDING WITH RIGHT OF WAY AS LIGHT CHANGES FROM RED TO GREEN. V1 W/B ON R1 MAKES LEFT TURN S/B TO R2 AFTER ADVANCED GREEN CHANGED TO RED STRIKING V2.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170032838	2017-Jan-25, Wed,19:01	Clear	Turning movement	Non-fatal injury	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 W/B ON SANDALWOOD PARKWAY, IN LEFT TURN LANE, V1 E/B ON SANDALWOOD IN LANE 3, BOTH ENTER INTERSECTION AT HEART LAKE ROAD, V1 MAKES LEFT TURN IN FRONT OF V2 CAUSING COLLISION.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170036564	2017-Jan-28, Sat,15:40	Clear	Rear end	P.D. only	West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
Comments:	Statement #1: V2 TRAVELLING W/B ON SANDALWOOD AT HEART LAKE ROAD IN LANE 2V1 TRAVELLING W/B ON SANDALWOOD AT HEART LAKE ROAD IN LANE 2V2 STOPPED FOR CONGESTIONV1 UNABLE TO STOP SWERVED TO AVOID COLLISION AND COLLIDED WITH LEFT REAR OF V2				West	Dry	Going ahead		Other motor vehicle	
170042656	2017-Feb-02, Thu,06:55	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:	Statement #1: V1 FACING W/B ON R1, TURNS LEFT ONTO R2.V2 TRAVELLING E/B ON R1.V1 COLLIDES WITH V2.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170091152	2017-Mar-10, Fri,17:07	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 TRAVELING W/B TOWARDS INTERSECTION OF R1 AND R2V2 TRAVELING E/B ON R1 TOWARDS INTERSECTION OF R1 AND R2 V2 AND V1 PROCEEDED INTO THE INTERSECTION OF R1 AND R2V1 INITIATED A TURN TO GO S/B AT INTERSECTION AND STRUCK V2 AS A RESULT				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170149943	2017-Apr-23, Sun,22:37	Clear	Rear end	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V3 WAS TRAVELING W/B ON R1 STOPPED AT THE INTERSECTION AT A REDLIGHT AT R2 WHEN V2 WHICH WAS STOPPED BEHIND V3 COLLIDIED WITH HIS NEAR BUMPER.V2 WAS TRAVELING W/B ON R1 STOP0PED AT THE INTERSECTION AT A RED LIGHT WHEN V2 WAS STRUCK FROM THE REAR BY V3. THE IMPACT OF THE COLLISION CAUSED V2 TO PULL FORWARD WHEN IT THEN STRUCK V3.V1 WAS TRAVELING W/B ON R1 APPROACHING R2 WHEN IT WAS UNABLE TO STOP AND COLLIDED WITH V2 WHICH THEN COLLIDED WITH V3.				West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

170211807	2017-Jun-08, Thu,16:00	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 W/B SANDALWOOD PKWY IN LEFT TURN LANE.V2 E/B SANDALWOOD PKWY IN RIGHT CURB LANE.V1 MAKES LEFT TURN S/B HEARTLAKE RD, COLLIDING WITH V2.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170213587	2017-Jun-09, Fri,22:50	Clear	Turning movement	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 eastbound on R1. V2 westbound on R1. V2 makes left turn, failing to yield right of way. V1 strikes V2.No injuries.D1 is a suspended driver. Served notice 006467. Issued PON for no current validation on plate.D2 issued PON for unsafe turn.				West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
170232552	2017-Jun-23, Fri,14:40	Clear	Rear end	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V1 TRAVELING W/B ON R1 REAR ENDED V2 THAT WAS STOPPED W/B ON R1. V2 THEN REAR ENDED V3 ALSO STOPPED W/B ON R1.				West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
170242341	2017-Jun-30, Fri,15:12	Clear	Rear end	Non-reportable	West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V1 WAS PROCEEDING WESTBOUND ON SANDALWOOD PKWY BEHIND V2, V1 DRIVER ADVISED HE REACHED DOWN TO GRAB SOMETHING WHEN TRAFFIC CAME TO A DEAD STOP CAUSING HIM TO REAR END V2. D1 IS AT FAULT.				West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
170254399	2017-Jul-09, Sun,15:39	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1- TRAVELING W/B ON R1 AND IN LEFT TURN LANE.V2- TRAVELING E/B ON R1, PROCEEDING THROUGH INTERSECTION AND IN THRU LANE 2.TRAFFIC HEAVY IN VOLUME.V1- INITIATES LEFT TURN AND COLLIDES WITH V2 IN INTERSECTION.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170298964	2017-Aug-11, Fri,12:20	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: ON AUGUST 11TH 2017 AT APPROXIMATELY 12:20 PM, THE DRIVER OF VEHICLE 1, ALLISTER RIVERS, WAS OPERATING A 2004 TOYOTA CAMRY BROWN BEARING ONTARIO MARKER BZEB354 ON SANDALWOOD PARKWAY AT HEART LAKE ROAD IN THE CITY OF BRAMPTON. RIVERS WAS ATTEMPTING TO CONDUCT A LEFT TURN FROM SANDALWOOD PARKWAY ONTO HEART LAKE ROAD TO CONTINUE SOUTHBOUND WHEN HE TURNED IN FRONT OF THE DRIVER OF VEHICLE 2, CYNTHIA HADLEY, WHO WAS OPERATING A 2008 TOYOTA UCS BEARING ONTARIO MARKER CBVB935 AS SHE WAS HEADED EASTBOUND ON SANDALWOOD PARKWAY. BOTH VEHICLES COLLIDED IN THE MIDDLE OF THE INTERSECTION, HOWEVER, THERE WERE NO INJURIES. VEHICLE 1 SUSTAINED DAMAGE TO THE PASSENGER SIDE OF THE VEHICLE WHILE VEHICLE 2 SUSTAINED DAMAGE TO THE FRONT END.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

170299540	2017-Aug-11, Fri,20:37	Rain	Turning movement	P.D. only	West	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: - D1 OPERATING V1 AND TRAVELLING W/B ON SANDALWOOD PKWY E IN THE LEFT TURN LANE TO TURN LEFT AND GO S/B ON HEARTLAKE RD. - D2 OPERATING V2 AND TRAVELLING E/B ON SANDALWOOD PKWY E IN THE CURB LANE AND WAS GOING STRAIGHT AHEAD. - D1 & V1 ENTERED THE INTERSECTION TO TURN LEFT. - D2 & V2 ENTERED THE INTERSECTION AROUND THE SAME TIME. - V1 AND V2 COLLIDED WITHIN THE INTERSECTION.				East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170325465	2017-Aug-31, Thu,09:43	Clear	Sideswipe	Non-fatal injury	East	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:	Statement #1: V1 WAS EASTBOUND ON SANDALWOOD PARKWAY, APPROACHING HEART LAKE ROAD, IN THE CURB LANE. V2 WAS EASTBOUND ON SANDALWOOD PARKWAY, APPROACHING HEART LAKE ROAD, IN THEN CENTRE LANE. V1 PROCEEDED TO ENTER THE CURBED LANE AND COLLIDED INTO V2.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170331312	2017-Sep-04, Mon,22:49	Clear	Approaching	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: R1 IS SANDALWOOD PRKY - 4 LANESR2 IS HEART LAKE ROAD - 3 LANESD1 OPERATING W/B R1 WAITING TO MAKE LEFT TURN ONTO R2. D2 OPERATING E/B THROUGH INTERSECTION ON R1. D1 TURNED LEFT BEFORE WAY WAS CLEAR, CAUSING D2 TO COLLIDE WITH D1.NO INJURIES TO EITHER DRIVER				East	Dry	Making "U" turn	Automobile, station wagon	Other motor vehicle	Driving properly
170353142	2017-Sep-20, Wed,11:55	Clear	Angle	P.D. only	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:	Statement #1: V1 WAS TRAVELING N/B FROM HEARTLAKE ROAD TO SANDALWOOD PKWY.V2 WAS TRAVELING W/B ON SANDALWOOD PKWY. THE INTERSECTION OF SANDALWOOD PKWY AND HEARTLAKE ROAD is CONTROLLED BY A TRAFFIC SIGNAL .V2 CROSSED THE PATH OF V1, CAUSING A COLLISION.D1 WAS CHARGED.NO PASSENGERS IN BOTH VEHICLES.D1 AND D2 TRANSPORTED TO BCH FOR MINOR INJURIES.				West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170370142	2017-Oct-03, Tue,07:50	Clear	Turning movement	P.D. only	South	Dry	Turning right	Truck - car carrier	Other motor vehicle	Failed to yield right-of-way
Comments:	Statement #1: V1 WAS EXITING A PRIVATE DRIVE ONTO HEART LAKE ROAD. V2 WAS SOUTHBOUND ON HEART LAKE ROAD.V1 COLLIDED INTO V2.				South	Dry	Going ahead	Passenger van	Other motor vehicle	Driving properly
170417290	2017-Nov-07, Tue,08:35	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:	Statement #1: V#2 WAS TRAVELLING WESTBOUND ON R#1 IN LANE 2V#1 WAS TRAVELLING WESTBOUND ON R#2 IN LANE 1V#1 ATTEMPTED TO CHANGE LANES FROM LANE 1 INTO LANE 2V#1 SIDE SWIPPED V#2 CAUSING MINOR DAMAGE TO BOTH VEHICLES.				West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170448328	2017-Nov-30, Thu,09:11	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V2, E/B, SANDALWOOD PY, CURB LANE, GOING STRAIGHT THROUGH INTERSECTION. V1, W/B, SANDALWOOD PY TURNING LEFT TO S/B HEART LAKE RD. V2 LEFT TURN INFRONT OF V1, SIDE SWIPE COLLISION.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

180040752	2018-Jan-31, Wed,10:02	Snow	Approaching	P.D. only	East	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: both vehicles in right turn lane, v1 slide into the back of v2, snow covered roads				West	Loose snow	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
180056763	2018-Feb-12, Mon,14:37	Clear	Rear end	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V2 E/B ON SANDALWOOD PKWY LN 2 APPROACHING HEART LAKE ROAD V1 FOLLOWING BEHING V2V2 STOPS FOR RED LIGHT; V1 COLLIDES WITH REAR OF V2; MINOR DAMAGE.V1(3) E/B ON SANDALWOOD PKWY INVOLVED IN A ROAD RAGE INCIDENT WITH AN UNKNOWN BLUE HONDA; V1(3) TRAVELING IN LN2BLUE HONDA IN LN 1 CUTS INFRONT OF V1(3); MOVING TO RIGHT TURN LANEV1(3) SLAMMS INTO REAR OF V1 FROM PRIOR COLLISION.DRVIER V2 FEELS TWO DISTICTIVE HITS.D1 AND D1(3) BOTH CHARGED.				East	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
180075304	2018-Feb-26, Mon,18:22	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V2 TRAVELLING E/B SANDALWOOD PKWY ON GREEN LIGHT. AS V2 IS PASSING THROUGH INTERSECTION LIGHT CYCLES TO YELLOW AND V1 ATTEMPTS S/B TURN FROM SANDALWOOD ONTO HEART LAKE RD. V2 COLLIDES WITH V1.D1 AND P1 TAKEN TO BCH AS PRECAUTION				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180135726	2018-Apr-12, Thu,08:00	Rain	Turning movement	P.D. only	West	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 TRAVELING WEST BOUND ON SANDALWOOD PARKWAYV2 TRAVELING EAST BOUND ON SANDLAWOOD PARKWAYV2 WAS CONTINUING THROUGH THE INTERSECTION AND WAS STUCK BY V1 WHO WAS MAKING A LEFT TURN AT THE LIGHTS PRIOR TO THE ROADWAY BEING CLEAR OF ON COMING TRAFFIC				East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180219046	2018-Jun-11, Mon,19:00	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V2 IS WESTBOUND SANDALWOOD PARKYWAY EAST, ENTERING THE INTERSECTION AT HEART LAKE ROAD. V1 MAKES LEFT TURN FROM WESTBOUND SANDALWOOD PKWY E, TO PROCEED SOUTHBOUND ON HEART LAKE ROAD. V1 CROSS THE PATH OF V2, STRIKING V2.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180221908	2018-Jun-13, Wed,16:00	Clear	Angle	P.D. only	South	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V2 TRAVELLING WESTBOUND ON R1 IN RIGHT LANE THROUGH INTERSECTION ON GREEN LIGHT.V1 TRAVELLING SOUTHBOUND ON R1 AND MADE A RIGHT HAND TURN ONTO R1 AND HIT V2.NO CHARGES WERE LAID AS THERE WERE NO INJURIES SUSTAINED AND THE REPORT WAS TAKEN AT FRONT DESK.				West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

180261642	2018-Jul-12, Thu,18:00	Clear	Turning movement	P.D. only	West	Dry	Turning right	Delivery van	Other motor vehicle	Improper turn
Comments:	Statement #1: ACCORDING TO V2 V2 WAS TRAVELLING W/B ON R1 RIGHT TURN LANE APPROACHING R2 TO MAKE A RIGHT TURN ONTO N/B R2.V1 WAS TRAVELLING W/B ON R1 LEFT LANE APPROACHING R2, PROCEEDED TO MAKE A RIGHT TURN ONTO N/B R2 FROM THE LEFT LANE CUTTING IN FRONT OF V2 AND WAS STRUCK BY V2. NO INJURIES REPORTED.				West	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Driving properly
180296946	2018-Aug-08, Wed,05:40	Rain	Turning movement	Non-fatal injury	West	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: 1. V2 DRIVING E/B ON SANDALWOOD PY AT HEART LAKE RD.2. V1 STOPPED IN LEFT TURN LANE W/B SANDALWOOD PY TO GO S/B HEART LAKE RD.3. V1 PROCEEDS TO TURN LEFT AND COLLIDES WITH V2.				East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180308535	2018-Aug-15, Wed,13:30	Clear	Approaching	Non-fatal injury	West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Other
Comments:	Statement #1: ***SELF-REPORTED AT CASSIE CAMPBELL COMMUNITY STATION. SCENE/COLLISION NOT INVESTIGATED BY POLICE***- D3 OPERATING V3. GOING W/B ON SANDALWOOD PKWY E IN PASSING LANE. FULLY STOPPED AT HEARTLAKE RD TRAFFIC LIGHTS.- D2 OPERATING V2. DIRECTLY BEHIND D3 & V3. FULLY STOPPED.- D1 OPERATING V1. DIRECTLY BEHIND D2 & V2. SLOWING DOWN.- V1 REAR ENDED V2 WHICH CAUSED V2 TO REAR END V3.				East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
180314719	2018-Aug-21, Tue,06:45	Rain	Turning movement	P.D. only	East	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 IS TURNING LEFT FROM SANDALWOOD PARKWAY TO HEART LAKE RDV2 IS PROCEEDING WESTBOUND ON SANDALWOODV2 HAS INDICATOR STATING VEHICLE IS TURNING RIGHT, HOWEVER PROCEEDS THROUGHV1 MAKES THE TURN STRIKING V2				West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	
180318844	2018-Aug-24, Fri,10:58	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: d1 travelling westbound on sandalwood parkway at heart lake road attempting to make a left turn to go southbound on heart lake road d2 travelling eastbound on sandalwood at a green light. d1 collides with d2				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180321782	2018-Aug-26, Sun,18:02	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: **SELF REPORTED**V1 was traveling W/B on R1. V2 was traveling E/B on R1. V1 made a left turn to go S/B on R2 into the path of V2 and the vehicles collided.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180327649	2018-Aug-31, Fri,05:30	Clear	Rear end	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: BOTH VEHICLES ARE EASTBOUND ON SANDALWOODV1 IS BEHIND V2HEAVY TRAFFICV2 STOPS FOR TRAFFIC AND IS REAR ENDED BY V1				East	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly

180359689	2018-Sep-22, Sat,20:40	Clear	Turning movement	Non-fatal injury	South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 WESTBOUND, MAKING LEFT TURN AT HEART LAKE ROAD. V2 TRAVELLING EASTBOUND IN LANE 1. V1 TURNS LEFT IN FRONT OF V2, COLLIDING. V2 VEERS OFF ROADWAY AND INTO PETRO CANADA LOT ON SOUTHEAST CORNER, COLLIDING INTO REAR OF V3.				West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
180362722	2018-Sep-25, Tue,08:00	Rain	Turning movement	P.D. only	West	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: ** Self Reported **V2 was E/B on R1 passing through intersection at R2. V1 was W/B on R1 turning left to go south on R2. V1 turned left and struck V2 within intersection.				East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180368261	2018-Sep-29, Sat,10:47	Clear	Turning movement	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 WESTBOUND ON SANDALWOOD PARKWAY AT INTERSECTION OF HEARTLAKE ROAD. V2 EASTBOUND ON SANDALWOOD PARKWAY MAKING LEFT TURN TO GO NORTH ON HEARTLAKE ROAD. V2 COLLIDES WITH V1 IN ITERSECTION.				East	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
180405795	2018-Oct-27, Sat,08:45	Rain	Turning movement	P.D. only	West	Wet	Making "U" turn	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: BOTH VEHICLES ARE WESTBOUND ON SANDALWOOD PARKWAY PASSING THROUGH THE INTERSECTION AT HEART LAKE RD.SANDALWOOD PARKWAY IS WEST AND EAST IS SEPERATED BY A CONTINUOUS ISLANDV1 SLOWS IN ATTEMPTS TO LOCATE A SPOT TO PERFORM A UNSAFE U TURN AND IS STRUCK BY V2				West	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
180411744	2018-Nov-01, Thu,04:30	Clear	Rear end	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V1 struck V2 from behind who was stopped in traffic travelling eastbound on Sandalwood Pwky				East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
180425763	2018-Nov-09, Fri,01:46	Clear	Sideswipe	P.D. only	South	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:	Statement #1: ** SELF REPORTED **V2 was S/B on R1 in left turn lane to turn left to go east on R2. D2 alleges V1 "squeezed in" beside them to also make a left turn and struck the left side of V2. D1 did not attend to make report.ON SUNDAY NOVEMBER 18TH, 2018 AT 6:14 PM D2 EMAILED THE OIC THE INSURANCE FOR V2.				South	Dry	Changing lanes	Delivery van	Other motor vehicle	Driving properly
180447478	2018-Nov-28, Wed,07:00	Snow	Angle	Non-fatal injury	South	Loose snow	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 W/B ON R1 IN L/T LANE AND V2 E/B IN THRU LANE ON R1. V1 MADE L/T TO PROCEED S/B ON R2 / STRUCK V2.				East	Mud	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180460332	2018-Dec-07, Fri,15:00	Clear	Turning movement	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 TRAVELLING WESTBOUND ON SANDALWOOD PKWY, TURNING SOUTHBOUND ON HEARTLAKE RD WHEN V1 COLLIDED WITH V2. V2 WAS TRAVELLING EASTBOUND ON SANDALWOOD PKWY				West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly

180465397	2018-Dec-11, Tue,17:30	Rain	Turning movement	P.D. only	West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: "TRAFFIC SIGNAL WAS GREEN EASTBOUND SANDALWOOD. I DROVE THROUGH INTERSECTION AND SAW VEHICLE TURNINNG LEEFT FROOM SANDALWOOD ONTO HEART LAKE ROAD SOUTH. I WAS STRUCK BEFORE CLEARINNG INTERSECTION BY OTHER DRIVER".				East	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
180468878	2018-Dec-14, Fri,07:52	Rain	Turning movement	P.D. only	West	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:	Statement #1: V1 WAS W/B ON SANDALWOOD, ATTEMPTING TO GO S/B ON HEART LAKE, V1 DID NOT ALLOW V2 TO CLEAR INTERSECTION, RESULTING INTO A COLLISION. V2 WAS E/B ON SANDALWOOD.				East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180478090	2018-Dec-21, Fri,06:50	Rain	Turning movement	P.D. only	West	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V2 WAS GOING AHEAD.V1 MADE A LEFT TURN IN FRONT OF V2.V1 AND V2 COLLIDED WITHIN THE INTERSECTION.				East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180481503	2018-Dec-23, Sun,21:35	Fog, mist, smoke, dust	SMV other	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Pole (utility, power)	Lost control
Comments:	Statement #1: v1 east on sandalwood, states vehicle was cut off. v1 applied breaks lost control and stuck utility pole on side of road					Wet				
180481533	2018-Dec-23, Sun,22:30	Rain	Rear end	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: V2 STOPPED IN LANE 1 OF E/B SANDALWOOD EAST OF HEARTLAKE RD- STOPPED FOR ASSISTANCE FOR EARLIER COLLISION. V1 COMPLETES RIGHT HAND TURN FROM N/B HEARTLAKE RD TO E/B SANDALWOOD. WHILE COMPLETING TURN V1 LOSSES CONTROL AND STRIKES V2.				East	Wet	Going ahead	Pick-up truck	Other motor vehicle	Speed too fast for condition
180489313	2018-Dec-31, Mon,13:28	Rain	Turning movement	P.D. only	North	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 TRAVELLING W/B ON R1. V1 WAS MAKING A LEFT TURN ONTO R2 WHEN V2 COLLIEDED WITH V1. V1 THEN SPUN OUT AND COLLIDED WITH A STOPPED V3.				West	Wet	Turning left	Pick-up truck	Other motor vehicle	Driving properly
190024746	2019-Jan-19, Sat,13:30	Clear	SMV other	P.D. only	East	Loose snow	Going ahead	Automobile, station wagon	Pole (utility, power)	Lost control
Comments:	Statement #1: V1 TRAVELLING E/B ON SANDALWOOD PKWY GOING AHEAD APPORACHING HEARTLAKE RD. V1 LOSES CONTROL COLLIDING WITH POLE.					Loose snow				
190025760	2019-Jan-20, Sun,15:00	Clear	Rear end	P.D. only	East	Loose snow	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V2 WAS EB R1 IN CRB LN STOPPING FOR AN EMERGENCY VEHICLE. V1 WAS ALSO EB R1 IN CRB LN AND REAR ENDED V2. ***SELF REPORTED AT CASSIE CAMPBELL - NO SCENE ATTENDANCE***				East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly

190025954	2019-Jan-20, Sun,17:20	Clear	Angle	P.D. only	East	Loose snow	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:	Statement #1: V2 WAS SB R2 THROUGH THE INTERSECTION OF R1 & R2 WITH A GREEN LIGHT. V1 WAS EB R1 IN CRB LN, FAILED TO STOP FOR RED LIGHT, AND STRUCK V2. - WITNESS WHO WAS TRAVELLING BEHIND V2 CONFIRMED V1 RAN THE RED LIGHT STATING 'IT LOOKED LIKE HE TRIED TO STOP'***SELF REPORTED AT CASSIE CAMPBELL - NO SCENE ATTENDANCE***				South	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
190032810	2019-Jan-25, Fri,17:35	Snow	Turning movement	P.D. only	East	Loose snow	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: V1 E/B ON SANDALWOOD PKWY AT HEART LAKE RD. APPLIES BREAKS FOR AMBER LIGHT, VEH UNABLE TO STOP BEGINS TO SLIDE. V2 W/B ON SANDALOOD PKWY ATTEMPTING LEFT TURN TO PROCEED S/B ON HEARTLAKE RD. V2 BEGINS TURN AND IS STRUCK BY V1 SLIDING THROUGH INTERSECTION.				West	Loose snow	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
190039871	2019-Jan-31, Thu,12:45	Clear	Rear end	P.D. only	East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Following too close
Comments:	Statement #1: D1 AND D2 WERE EB ON R1. D2 STOPPED FOR TRAFFIC AND WAS STRUCK FROM BEHIND BY D2.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
190040531	2019-Jan-31, Thu,18:40	Snow	SMV other	P.D. only	East	Ice	Going ahead	Automobile, station wagon	Curb	Lost control
Comments:	Statement #1: V1 E/B ON SANDALWOOD PKWY APPROACHING HEARTLAKE RD. V1 LOSSES CONTROL STRIKES CURB, HOPS MEDIAN AND ENDS UP IN W/B LANES/					Ice				
190040592	2019-Jan-31, Thu,19:30	Drifting Snow	Rear end	P.D. only	East	Ice	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V2 E/B ON SANDALWOOD PKWY APPROACHING REDLIGHT AT HEARTLAKE RD. V2 COMES TO A STOP BEHIND STOPPED TRAFFIC.V1 REAR ENDS V2.				East	Loose snow	Stopped	Pick-up truck	Other motor vehicle	Driving properly
190043078	2019-Feb-02, Sat,19:00	Clear	Rear end	P.D. only	North	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Other
Comments:	Statement #1: V1 AND V2 TRAVELLING NORTHBOUND ON HEARTLAKE RD. V2 STOPPED AT GREEN LIGHT AND V1 REAR ENDS V2.				North	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
190047472	2019-Feb-06, Wed,07:30	Drifting Snow	Turning movement	P.D. only	West	Loose snow	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 TRAVELLING WESTBOUND ON SANDALWOOD PKWY, TURNING LEFT, SOUTHBOUND, ONTO HEARTLAKE RD. V2 TRAVELLING NORTHBOUND ONTO SANDALWOOD PKWY. V1 MAKES LEFT TURN AND COLLIDES WITH V2.				East	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
190057274	2019-Feb-13, Wed,17:00	Clear	SMV other	P.D. only	North	Loose snow	Turning right	Automobile, station wagon	Pole (utility, power)	Improper turn
Comments:	Statement #1: V1 was travelling north bound on Heart Lake rd approaching sandalwood PY E. V1 attempted to make a right turn on to Sandalwood PY E from Heart lake Rd. V1 slid threw the intersection and struck the center light pole causing damage to the pole.					Loose snow				

190061960	2019-Feb-17, Sun,03:00	Clear	SMV other	P.D. only	West	Ice	Going ahead	Automobile, station wagon	Snowbank/drift	Driving properly
Comments:	Statement #1: V1 TRAVELLING WESTBOUND ON SANDALWOOD PKWY AND LOST CONTROL ON ICE AND COLLIDED WITH A SNOW BANK ON THE NORTH/WEST CORNER OF SANDALWOOD PKWY AND HEARTLAKE RD.					Ice				
190070518	2019-Feb-23, Sat,19:22	Clear	Turning movement	Non-fatal injury	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:	Statement #1: V1 TRAVELLING WESTBOUND ON SANDALWOOD PARKWAY APPROACHING HEART LAKE ROAD. V2 IS TRAVELLING EASTBOUND APPROACHING HEART LAKE ROAD THROUGH A GREEN LIGHT. V1 TURNS SOUTHBOUND ON HEARTLAKE AND STRIKES V2. V1 TURNED NOT IN SAFETY.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
190075741	2019-Feb-27, Wed,19:30	Snow	Turning movement	P.D. only	West	Loose snow	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:	Statement #1: V1 was westbound on Sandalwood Parkway East. V2 was travelling eastbound on Sandalwood Parkway East. V1 made a left turn on Heart Lake Road and struck V2 within the intersection.				East	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
190113219	2019-Mar-28, Thu,09:00	Rain	Sideswipe	P.D. only	South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: V1 was travelling southbound on Heart Lake Rd.V2 was southbound on Heart Lake Rd at Sandalwood Pkwy stopped for a red light. V1 side swiped V2.				South	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
190130253	2019-Apr-10, Wed,13:11	Clear	Rear end	P.D. only	East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					East	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
190155871	2019-Apr-29, Mon,21:20	Rain	Turning movement	Non-fatal injury	East	Wet	Turning left	Pick-up truck	Other motor vehicle	Improper turn
Comments:	Statement #1: D1 WAS DRIVING EB ON SANDALWOOD ABOUT TO MAKE A NB TURN ONTO HEARTLAKE ROADD2 WAS DRIVING WB ON SANDALWOOD PARKWAYD2 CONTINUED WB THROUGH THE YELLOW LIGHT AND WAS STRUCK BY D1 WHILE ATTEMPTING TO COMPLETE THE LEFT NB TURN				West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
190183443	2019-May-20, Mon,18:40	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:	Statement #1: V1 TRAVELLING NORTHBOUND ON HEARTLAKE RD, TURNING LEFT, WESTBOUND, ONTO SANDALWOOD PKWY. V2 TRAVELLING EASTBOUND ON SANDALWOOD PKWY. V1 AND V2 COLLIDE WITHIN THE INTERSECTION. GREEN SIGNAL FOR WESTBOUND AND EASTBOUND TRAFFIC. REPORTED TO 22 DIVISION FRONT DESK. NO CHARGES LAID.				East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

Collision Details Report

From: January 1, 2015 **To:** December 31, 2019

Location .... HIGHWAY 410 @ SANDALWOOD PKY E (2) **Municipality........** Brampton

Traffic Control.... Traffic signal **Total Collisions....** 1

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
170141468	2017-Apr-17, Mon,15:16	Clear	Rear end	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close	
Comments: Statement #1: D2 STOPS FOR RED LIGHT D1 REAR ENDS D2					West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2015 **To:** December 31, 2019

Location .... SANDALWOOD PKY E btwn GLOVER GATE / ROYAL PALM DRIVE & HEART LAKE RD **Municipality........** Brampton

Traffic Control.... No control **Total Collisions....** 44

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
150035175	2015-Jan-25, Sun,16:05	Clear	Rear end	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:	Road #1: SANDALWOOD PARKWAY Road #2: HEARTLAKE ROAD W M 200Statement #3: <Statement>V1 WESTBOUND ON SANDALWOOD. V2 WESTBOUND ON SANDALWOOD. V2 STOPS DUE TO TRAFFIC. V1 REAR ENDS V2.</Statement>				West		Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly	
150053792	2015-Feb-07, Sat,09:50	Snow	Rear end	P.D. only	East	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Lost control	
Comments:	Road #1: Sandalwood Parkway Statement #2: <Statement>V1 and V2 were traveling east on Sandalwood Parkway, Brampton.V2 stopped and was rear ended by V1.</Statement>				East		Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly	
150078506	2015-Feb-24, Tue,17:49	Snow	Rear end	P.D. only	East	Loose snow	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:	Road #1: SANDALWOOD Road #2: Unknown W M 100Statement #3: <Statement>V1, V2, AND V3 WERE ALL E/B ON R1, IN L2.V2 AND V3 SLOWED DUE TO TRAFFIC.V1 SLID INTO THE REAR OF V2, FORCING V2 TO COLLIDE WITH THE REAR OF V3.</Statement>				East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
150232091	2015-Jun-12, Fri,15:00	Rain	Rear end	P.D. only	West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:	Statement #1: DRIVER ONE AND DRIVER TWO WERE BOTH TRAVELLING E/B ON SANDALWOOD PARKWAY WHEN DRIVER TWO SLOWED TO ENTER A PRIVATE DRIVE ON THE NORTH SIDE OF THE STREET EAST OF HEARTLAKE ROAD. DRIVER ONE REAR ENDED DRIVER TWO				West		Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly	
150328020	2015-Aug-20, Thu,12:46	Clear	Angle	Non-fatal injury	South		Going ahead	Automobile, station wagon	Other motor vehicle	Other	
Comments:	Statement #1: V1 WAS EB ON SANDALWOOD PWY ON THE SIDEWALK WHEN HE WAS STRUCK BY V2				East		Going ahead		Other motor vehicle	Driving properly	
150454159	2015-Nov-21, Sat,20:53	Rain	SMV other	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Tree, shrub, stump	Lost control	
Comments:	Statement #1: V1 TRAVELLING EAST BOUND ON SANDALWOOD PARKWAY IN LANE ONEV1 LOST CONTROL DUE TO THE ROAD CONDITIONS, AND WENT OFF THE ROADWAY, COLLIDED INTO A TREENO INDEPENDENT WITNESSES, THEREFORE, NO CHARGES LAID										

150496032	2015-Dec-22, Tue,07:30	Rain	Sideswipe	Non-fatal injury	East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: V1 WAS TRAVELING EASTBOUND ON SANDALWOOD PARKWAY IN LANE 1. V2 WAS TRAVELING EASTBOUND ON SANDALWOOD PARKWAY IN LANE 2. V1 LOST CONTROL OF THE VEHCILE AND COLIDED WITH V2.				East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160040767	2016-Jan-30, Sat,07:58	Clear	Approaching	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: V1 TRAVELLING E/B ON SANDALWOOD PARKWAY MOUNTED AND DROVE OVER THE MEDICAN INTO THE W/B LANES WHEN IT WAS HIT IN THE REAR PASSENGER SIDE BY V2				West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160055131	2016-Feb-10, Wed,02:15	Snow	SMV other	Non-fatal injury	East	Ice	Going ahead	Automobile, station wagon	Pole (utility, power)	Lost control
Comments:	Statement #1: V1 east bound on R1. Loses control and strikes light post on center median.									
160068164	2016-Feb-19, Fri,13:57	Clear	Sideswipe	P.D. only	East	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:	Statement #1: ON FEBRUARY 19TH, 2016 AT APPROXIMATELY 2:00PM, DRIVER 1 WAS OPERATING A MOTOR VEHICLE BEARING ONTARIO MARKER *BNSM855* AND TRAVELLING EASTBOUND, IN LANE 2 OF 3, ON SANDALWOOD PARKWAY, JUST WEST OF HEART LAKE ROAD, IN THE CITY OF BRAMPTON.DRIVER 2 WAS OPERATING A MOTOR VEHICLE BEARING ONTARIO MARKER *9450MK* AND TRAVELLING EASTBOUND, IN LANE 3 OF 3, ON SANDWALWOOD PARKWAY, JUST SLIGHTLY BEHIND DRIVER 1.DRIVER 1 CHANGED LANES FROM LANE 2 TO LANE 3 WHERE DRIVER 2 WAS TRAVELLING AND SUBSEQUENTLY STRUCK DRIVER 2 TO THE FRONT DRIVER SIDE.				East		Going ahead	Pick-up truck	Other motor vehicle	Driving properly
160195225	2016-May-23, Mon,18:15	Clear	Rear end	P.D. only	East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V1 / V2 / V3 EB ON R1V2 SLOWS FOR TRAFFICV1 REAR END V2V3 TURNS OUT TO SHOULDER AND HITS REAR OF V1				East		Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
160198369	2016-May-25, Wed,19:11	Clear	Sideswipe	P.D. only	East	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:	Statement #1: v1 was attempting to change lanes into LT lane and turn into the esso gas station. v2 was in the lt e/b headed towards a n/b turn on r2. v1 changed lanes into v2.				East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160246084	2016-Jun-29, Wed,10:15	Clear	Rear end	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: Both vehicles were stationary in traffic, in the curb lane of the east bound lanes of Sandlewood, West of Heartlake Road. D1 moved forward with traffic and then braked as traffic slowed. D2 moved forward with traffic and failed to see D1 brake, consequently rolling into D1.				East		Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
160287620	2016-Jul-31, Sun,03:50	Clear	SMV other	Non-fatal injury	West	Dry	Going ahead	Automobile, station wagon	Curb	Lost control
Comments:	Statement #1: V1 WB on R1. V1 looses control and swerves, travelling off roadway and flips, landing in a ravine on the north side of R1.									

160300357	2016-Aug-10, Wed,07:36	Clear	Rear end	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V1 EB R1V2 EB R1V2 STOPPED FOR TRAFFICV1 REARENDS V2				East	Dry	Stopped	Pick-up truck	Other motor vehicle	Driving properly
160392671	2016-Oct-20, Thu,13:31	Rain	Rear end	Non-fatal injury	East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V1, V2 AND V3 ALL EASTBOUND IN LANE ONE OF R1. V2 AND V3 ADJUST SPEED FOR TRAFFIC. V1 COLLIDES WITH THE REAR END OF V2, PUSHING V2 INTO THE REAR END OF V3				East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
160457464	2016-Dec-08, Thu,23:27	Snow	SMV other	P.D. only	East	Packed snow	Going ahead	Automobile, station wagon	Pole (utility, power)	Lost control
Comments:	Statement #1: V1 E/B ON SANDALWOOD PARKWAY WEST OF HEART LAKE ROAD, V1 LOSES CONTROL COLLIDES WITH A LIGHT POLE IN BETWEEN EAST BOUND AND WEST BOUND LANES.									
160461855	2016-Dec-11, Sun,18:30	Snow	Sideswipe	P.D. only	West	Loose snow	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: V2 TRAV E/B SANDALWOOD IN R/T LANE TO PRIVATE DRIVE. V1 E/B SANDALWOOD, LOSES CONTROL, SLIDES ALONG RIGHT SIDE OF V2				West		Turning right	Automobile, station wagon	Other motor vehicle	Driving properly
170003508	2017-Jan-03, Tue,23:13	Clear	SMV other	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Pole (utility, power)	Speed too fast for condition
Comments:	Statement #1: V1 TRAVELLING E/B ON R1 IN L1. V1 LOST CONTROL ON CURVE MOUNTED CENTRAL MEDIAN AND COLLIDED WITH LIGHT POLE									
170165623	2017-May-05, Fri,06:50	Rain	Approaching	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: V1 E/B ON R1 IN E/B L1V2 W/B ON R1 IN W/B L1V1 CROSSES MEDIAN AND STRUCK V2				West		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170168164	2017-May-07, Sun,06:55	Clear	SMV other	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Pole (utility, power)	Speed too fast for condition
Comments:	Statement #1: - V1 TRAVELLING EAST BOUND ON SANDALWOOD PY E- V1 LOSES CONTROL OF MOTOR VEHICLE, CROSSES BARRIER BETWEEN EAST AND WEST BOUND LANES- V1 HITS LIGHT POLE LOCATED IN THE MIDDLE OF THE BARRIER- V1 STOPS IN THE WEST BOUND LANE AT SANDALWOOD PY E									
170258622	2017-Jul-12, Wed,16:00	Rain	SMV other	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Tree, shrub, stump	Lost control
Comments:	Statement #1: V1 TRAVELLING EAST BOUND ON R1 IN L1.V1 SLIP ON ROADWAY AND LOOSE CONTROL OF VEHICLE.V1 CROSS OVER MEDIAN, PASSING TWO LANES OF ON COMING TRAFFIC, AND DRIVES INTO A DITCH ON THE NORTH SIDE.NO CHARGES LAID AS NO INJURIES, NO DAMAGE TO ANY OTHER PROPERTY, AND ONLY ONE VEHICLE INVOLVED.HAPPENED DURING RAIN STORM AND ROADWAY VERY SLIPPERY.									
170278199	2017-Jul-27, Thu,08:14	Rain	SMV other	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Pole (utility, power)	Lost control
Comments:	Statement #1: V1 was travelling West bound on Sandalwood parkway east when D1 lost control of V1 causing it to go up onto the median and hit a pole.									

170278355	2017-Jul-27, Thu,10:47	Clear	SMV other	Non-fatal injury	West	Wet	Going ahead	Automobile, station wagon	Pole (utility, power)	Lost control
Comments:	Statement #1: DVR travelling westbound on RDWY, DVR loses control of VEH and strikes Light Pole, located on center median, with right front corner of VEH; momentum causes VEH to spin counter-clockwise around pole upon impact. Single MVC only.									
170325858	2017-Aug-31, Thu,14:13	Clear	Sideswipe	P.D. only	West	Dry	Merging	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:	Statement #1: on August 31 2017 at 3:00 pm police were called to a collision near the intersection of sandalwood parkway and heartlake road. Police attended and observed 2 vehicles involved. vehicle 1 pulled out of the plaza turning westbound onto sandalwood parkway colliding with vehicle 2. vehicle 2 had right of way; vehicle 1 was charged. no injuries occurredno further police action required				West		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170398180	2017-Oct-23, Mon,20:08	Rain	Approaching	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: V1 WAS GOING E/B ON SANDALWOOD PKWY IN L1 WHEN V1 LOST CONTROL AND CROSSED OVER TO THE OTHER SIDE OF THE ROAD TO TRAFFIC GOING W/B AND COLLIDED WITH V2 GOING W/B ON SANDALWOOD PKWY IN L1				West		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170398325	2017-Oct-23, Mon,23:37	Rain	SMV other	P.D. only	East		Going ahead	Automobile, station wagon	Tree, shrub, stump	Lost control
Comments:	Statement #1: V1 INVOLVED. TRAVELLING E/B ON R1. THIS SECTION OF ROAD ARE 'S' BENDS IN RDWY. D1'S FOOT SLIPPED, HITTING THE ACCELERATOR CAUSING HER TO LOSE CONTROL AND GO OFF THE RDWY AND STRIKE A TREE.									
170420482	2017-Nov-07, Tue,17:25	Clear	SMV other	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Animal - wild	Driving properly
Comments:	Statement #1: V1 W/B SANDALWOOD W/O HEART LAKE ROAD V1 HEARS A BANG AND STOPS. DAMAGE DOWN TO DRIVER SIDE. POLICE VIEW PICTURES OF VEHICLE AND BELIEVES V1 HIT A DEER									
170446189	2017-Nov-28, Tue,20:15	Clear	Sideswipe	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: V1 IN LANE 3 OF EAST BOUND SANDALWOOD PARKWAY. V2 IN LANE 2 OF SANDALWOOD PARKWAY. V1 PASSED V2 AND STRUCK THE PASSENGER SIDE MIRROR OF V2 WITH V1'S DRIVER SIDE MIRROR.				East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
170483761	2017-Dec-28, Thu,06:56	Clear	Rear end	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V2 WAS TRAVELLING EASTBOUND ON SANDLEWOOD PARKWAY COMING TO A STOP AS THERE WAS HEAVY VEHICLULAR TRAFFIC AHEAD WHEN V2 WAS STRUCK IN THE REAR BY V1. THE IMPACT THEN CAUSED A CHAIN REACTION OF V3, V4 AND V5 TO REAR END EACH OTHER.				East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180038086	2018-Jan-29, Mon,14:07	Snow	Approaching	P.D. only	East	Loose snow	Going ahead		Other motor vehicle	Lost control
Comments:	Statement #1: V1 eastbound V2 westbound V1 crosses median struck V2				West		Going ahead		Other motor vehicle	Driving properly

180043684	2018-Feb-02, Fri,08:55	Clear	SMV other	P.D. only	West	Dry	Pulling away from shoulder or curb	Pick-up truck	Pole (sign, parking meter)	Lost control
Comments:	Statement #1: D1 W/B ON R1.D1 LOSES CONTROL OF HIS VEHICLE AND COLLIDES WITH A FIXED LIGHT POLE.									
180055217	2018-Feb-11, Sun,09:55	Clear	Approaching	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Lost control
Comments:	Statement #1: ON SUNDAY FEBRUARY 11, 2018 AT APPROXIMATELY 9:55AM V1 WAS TRAVELLING EASTBOUND ON SANDALWOOD PARKWAY IN THE CITY OF BRAMPTON. AT THIS TIME V1 LOST CONTROL OF HER MOTOR VEHICLE SUBSEQUENTLY CROSSING THE MEDIAN INTO ONCOMING WESTBOUND TRAFFIC. V2 WAS TRAVELLING WESTBOUND ON SANDALWOOD PARKWAY IN THE CURB LANE. ULTIMATELY V1 COLLIDED HEAD-ON WITH V2. BOTH DRIVERS WERE CLEARED BY AMBULANCE AT THE SCENE. BOTH VEHICLES SUFFERED MAJOR FONT END DAMAGE. V1 WAS ISSUED PON# 5135120B FOR CARELESS DRIVING UNDER THE HIGHWAY TRAFFIC ACT SECTION 130.				West		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180095175	2018-Mar-13, Tue,02:30	Clear	Sideswipe	P.D. only	East	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:	Statement #1: V2 EASTBOUND ON SANDALWOOD PARKWAY EAST IN CURB LANE, SIDESWIPED BY V1 ALSO EASTBOUND ON SANDALWOOD. V2 LOSES CONTROL, MOUNTS CURB AND STRIKES SMALL TREE. V1 STOPS BRIEFLY DOWN THE ROAD THEN FAILS TO REMAIN AT SCENE OF ACCIDENT.				East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180123775	2018-Apr-03, Tue,06:04	Rain	Sideswipe	Non-fatal injury	East	Wet	Going ahead	Pick-up truck	Other motor vehicle	Speed too fast for condition
Comments:	Statement #1: V1 E/B ON R1 IN FAST LANE. V2 E/B ON R1 IN CURB LANE. V1 COLLIDES INTO V2, OVER CORRECTS MANOUVERING LEFT, MOUNTS THE MEDIAN, COLLIDES INTO LIGHT POLE, COMES TO A STOP FACING W/B IN ONCOMING TRAFFIC. DEBRIS FROM LIGHT POLE FALLS ON V3 AND V4 WHO WERE BOTH W/B ON R1.				East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180275238	2018-Jul-22, Sun,23:00	Clear	Rear end	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	
Comments:	Statement #1: 22 DIVISION FRONT DESK:V1 TRAVELING E/B ON R1V2 TRAVELING E/B ON R1V3 TRAVELING E/B ON R1V4 TRAVELING E/B ON R1V1 CUT OF V2 ON R1, AS A RESULT V2 COLLIDED WITH V1,V3 COLLIDED WITH V2,V4 COLLIDED WITH V3.V1 PROCEEDED TO FLEE THE SCENE. V1 FAIL TO REMAIN.				East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180329175	2018-Sep-01, Sat,05:25	Clear	Rear end	P.D. only	West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: ** SELF REPORTED **V2 was W/B on R1 west of R2 in curb lane. V1 was W/B on R1 west of R2 behind V2. V1 rear-ended V2.				West		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180384553	2018-Nov-11, Sun,19:58	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:	Statement #1: V1 WAS W/B ON R1 IN R/LV2 WAS W/B ON R1 IN L/LV1 CROSSED OVER TO THE L/L AND STRUCK V2				West		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
180413917	2018-Nov-02, Fri,12:50	Rain	Rear end	P.D. only	West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V1 AND V2 W/B SANDALWOOD PKWY, BRAMPTON.V2 STOPPED DUE TO TRAFFIC.V1 REAR ENDED V2.				West		Stopped	Automobile, station wagon	Other motor vehicle	Driving properly

180423764	2018-Nov-09, Fri,19:00	Rain	Rear end	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V1 WAS E/B ON R1 IN R/LV2 WAS E/B ON R1 IN R/LV2 SLOWED FOR TRAFFIC AND V1 REARENDED V2				East		Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
180472834	2018-Dec-15, Sat,21:20	Snow	SMV other	P.D. only	East	Slush	Going ahead	Automobile, station wagon	Curb	Lost control
Comments:	Statement #1: V1 WAS E/B ON R1 IN L/L. D1 STATES THEY WERE AVOIDING ANOTHER VEHICLE, SWEARVED TO THE LEFT AND STRUCK THE CURB CAUSING DAMAGE TO V1									
190041196	2019-Feb-01, Fri,08:24	Clear	Rear end	P.D. only	East	Ice	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Statement #1: SELF REPORTED 2 VEHICLE COLLISION AT 22 DIVISION. V1 AND V2 TRAVELLIN EASTBOUND ON SANDALWOOD PARKWAY APPROACHING HEARTLAKE ROAD IN THE CITY OF BRAMPTON. V2 WAS DIRECTLY IN FRONT OF V1 IN LANE 1. V1 HIT A PATCH OF ICE ON THE ROADWAY AND WAS UNABLE TO BREAK ON TIME AND STRUCK V2 TO REAR.				East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
190116856	2019-Mar-31, Sun,14:00	Snow	Rear end	P.D. only	East	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V1 AND V2 TRAVELLING EAST ON R1V2 SLOWS DOWN FOR ACCIDENT AHEAD AND V1 REAR ENDS VEHICLE				East		Stopped	Tow truck	Other motor vehicle	Driving properly
190172722	2019-May-11, Sat,20:00	Rain	Rear end	P.D. only	East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:	Statement #1: V1 AND V2 E/B ON R1V2 SLOWING/STOPPINGV1 REAR ENDS V2				East		Stopped	Automobile, station wagon	Other motor vehicle	Driving properly

Appendix B

Base Year Synchro Analysis Outputs

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	22	1175	366	84	765	15	120	12	21	38	64	41
v/c Ratio	0.05	0.36	0.32	0.24	0.21	0.01	0.40	0.03	0.06	0.37	0.46	0.22
Control Delay	13.5	13.5	2.2	8.2	7.8	0.0	47.7	40.8	0.4	70.6	72.1	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.5	13.5	2.2	8.2	7.8	0.0	47.7	40.8	0.4	70.6	72.1	4.6
Queue Length 50th (m)	2.3	57.0	0.0	6.3	26.1	0.0	29.2	2.8	0.0	10.8	18.2	0.0
Queue Length 95th (m)	7.8	84.2	14.9	14.7	40.5	0.0	43.5	8.0	0.2	22.6	33.6	2.4
Internal Link Dist (m)		638.5			401.6			1215.6			450.1	
Turn Bay Length (m)	115.0		180.0	80.0		70.0	110.0		45.0	30.0		25.0
Base Capacity (vph)	422	3294	1157	351	3679	1160	297	567	518	336	448	438
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.36	0.32	0.24	0.21	0.01	0.40	0.02	0.04	0.11	0.14	0.09

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	1175	366	84	765	15	120	12	21	38	64	41
Future Volume (vph)	22	1175	366	84	765	15	120	12	21	38	64	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	5142	1601	1789	5142	1601	1750	1842	1566	1750	1842	1566
Flt Permitted	0.35	1.00	1.00	0.20	1.00	1.00	0.54	1.00	1.00	0.75	1.00	1.00
Satd. Flow (perm)	659	5142	1601	371	5142	1601	988	1842	1566	1381	1842	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	22	1175	366	84	765	15	120	12	21	38	64	41
RTOR Reduction (vph)	0	0	135	0	0	4	0	0	17	0	0	38
Lane Group Flow (vph)	22	1175	231	84	765	11	120	12	4	38	64	3
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	88.3	88.3	88.3	98.8	98.8	98.8	27.6	27.6	27.6	9.0	9.0	9.0
Effective Green, g (s)	88.3	88.3	88.3	98.8	98.8	98.8	27.6	27.6	27.6	9.0	9.0	9.0
Actuated g/C Ratio	0.63	0.63	0.63	0.71	0.71	0.71	0.20	0.20	0.20	0.06	0.06	0.06
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	415	3243	1009	337	3628	1129	279	363	308	88	118	100
v/s Ratio Prot		c0.23		c0.01	0.15		c0.05	0.01			0.03	
v/s Ratio Perm	0.03		0.14	0.16		0.01	c0.04		0.00	0.03		0.00
v/c Ratio	0.05	0.36	0.23	0.25	0.21	0.01	0.43	0.03	0.01	0.43	0.54	0.03
Uniform Delay, d1	9.9	12.4	11.2	7.1	7.1	6.1	48.5	45.4	45.2	63.0	63.5	61.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3	0.5	0.4	0.1	0.0	1.1	0.0	0.0	3.4	5.0	0.1
Delay (s)	10.1	12.7	11.7	7.4	7.3	6.1	49.5	45.5	45.3	66.4	68.5	61.5
Level of Service	B	B	B	A	A	A	D	D	D	E	E	E
Approach Delay (s)		12.4			7.3			48.6			65.9	
Approach LOS		B			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.6
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	283	110	43	150	334	179
Future Volume (Veh/h)	283	110	43	150	334	179
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	283	110	43	150	334	179
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	890	43			193	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	890	43			193	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	89			76	
cM capacity (veh/h)	240	1030			1392	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	283	110	43	150	513
Volume Left	283	0	0	0	334
Volume Right	0	110	0	150	0
cSH	240	1030	1700	1700	1392
Volume to Capacity	1.18	0.11	0.03	0.09	0.24
Queue Length 95th (m)	106.6	2.9	0.0	0.0	7.5
Control Delay (s)	158.0	8.9	0.0	0.0	6.3
Lane LOS	F	A			A
Approach Delay (s)	116.3		0.0		6.3
Approach LOS	F				

Intersection Summary			
Average Delay	44.5		
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	13	325	146	58	302	41	75	235	136	162	490
v/c Ratio	0.05	0.37	0.29	0.22	0.34	0.10	0.19	0.24	0.15	0.27	0.51
Control Delay	17.5	19.6	6.1	20.3	19.4	7.2	9.3	8.9	2.2	9.7	11.8
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	17.5	19.6	6.1	20.3	19.4	7.2	9.3	8.9	2.2	9.7	11.8
Queue Length 50th (m)	1.1	16.0	0.6	5.2	14.7	0.0	4.2	13.7	0.0	9.6	33.5
Queue Length 95th (m)	4.7	26.0	12.3	13.8	24.4	6.2	10.7	24.9	6.6	20.0	56.2
Internal Link Dist (m)		1354.0			266.3			317.4			333.2
Turn Bay Length (m)	85.0		80.0	25.0		80.0	110.0			50.0	
Base Capacity (vph)	985	3298	1484	963	3298	1478	404	966	888	592	963
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.10	0.10	0.06	0.09	0.03	0.19	0.24	0.15	0.27	0.51

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	325	146	58	302	41	75	235	136	162	474	16
Future Volume (vph)	13	325	146	58	302	41	75	235	136	162	474	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3500	1566	1750	3500	1566	1789	1883	1601	1789	1874	
Flt Permitted	0.57	1.00	1.00	0.56	1.00	1.00	0.42	1.00	1.00	0.61	1.00	
Satd. Flow (perm)	1046	3500	1566	1023	3500	1566	787	1883	1601	1153	1874	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	13	325	146	58	302	41	75	235	136	162	474	16
RTOR Reduction (vph)	0	0	104	0	0	31	0	0	66	0	1	0
Lane Group Flow (vph)	13	325	42	58	302	10	75	235	70	162	489	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	15.0	15.0	15.0	15.0	15.0	15.0	30.4	30.4	30.4	30.4	30.4	
Effective Green, g (s)	15.0	15.0	15.0	15.0	15.0	15.0	30.4	30.4	30.4	30.4	30.4	
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.51	0.51	0.51	0.51	0.51	
Clearance Time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	265	886	396	259	886	396	404	966	822	592	962	
v/s Ratio Prot		c0.09			0.09			0.12			c0.26	
v/s Ratio Perm	0.01		0.03	0.06		0.01	0.10		0.04	0.14		
v/c Ratio	0.05	0.37	0.11	0.22	0.34	0.03	0.19	0.24	0.08	0.27	0.51	
Uniform Delay, d1	16.7	18.2	17.0	17.5	18.1	16.6	7.7	8.0	7.3	8.2	9.5	
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	0.3	0.1	0.4	0.2	0.0	1.0	0.6	0.2	1.1	1.9	
Delay (s)	16.8	18.4	17.1	17.9	18.3	16.6	8.8	8.6	7.5	9.3	11.4	
Level of Service	B	B	B	B	B	B	A	A	A	A	B	
Approach Delay (s)		18.0			18.1			8.3			10.9	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	59.2	Sum of lost time (s)	13.8
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	372	10	305	0	0	509
Future Volume (Veh/h)	372	10	305	0	0	509
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	372	10	305	0	0	509
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None			None
Median storage veh)						
Upstream signal (m)			243			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	814	305			305	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	772	232			232	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	99			100	
cM capacity (veh/h)	347	761			1259	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	382	305	509
Volume Left	372	0	0
Volume Right	10	0	0
cSH	353	1700	1700
Volume to Capacity	1.08	0.18	0.30
Queue Length 95th (m)	111.3	0.0	0.0
Control Delay (s)	106.5	0.0	0.0
Lane LOS	F		
Approach Delay (s)	106.5	0.0	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	34.0		
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	131	1875	161	1026	70	61	104	111	414	420	95
v/c Ratio	0.45	0.77	0.86	0.58	0.10	0.32	0.26	0.26	1.00	0.90	0.22
Control Delay	19.7	35.8	73.6	30.2	6.1	34.6	46.7	8.5	89.9	75.3	18.7
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	19.7	35.8	73.6	30.2	6.1	34.6	46.7	8.5	89.9	75.3	18.7
Queue Length 50th (m)	17.4	178.7	34.0	121.5	0.3	12.4	26.2	0.0	109.1	126.5	8.1
Queue Length 95th (m)	32.7	225.7	#87.2	167.1	10.5	23.0	43.5	15.6	#175.6	173.1	23.7
Internal Link Dist (m)		97.9		281.6			369.2			219.0	
Turn Bay Length (m)	35.0		60.0					30.0	90.0		35.0
Base Capacity (vph)	321	2423	191	1757	703	225	592	566	412	598	544
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.77	0.84	0.58	0.10	0.27	0.18	0.20	1.00	0.70	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	131	1820	55	161	1026	70	61	104	111	414	420	95
Future Volume (vph)	131	1820	55	161	1026	70	61	104	111	414	420	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	6.0		3.0	6.0	6.0	3.0	7.0	7.0	3.0	7.0	7.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99	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	1.00	1.00	1.00
Frt	1.00	1.00		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)	1767	5004		1700	3535	1346	1767	1824	1514	1606	1842	1551
Flt Permitted	0.19	1.00		0.06	1.00	1.00	0.17	1.00	1.00	0.63	1.00	1.00
Satd. Flow (perm)	345	5004		98	3535	1346	317	1824	1514	1069	1842	1551
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	131	1820	55	161	1026	70	61	104	111	414	420	95
RTOR Reduction (vph)	0	2	0	0	0	34	0	0	86	0	0	46
Lane Group Flow (vph)	131	1873	0	161	1026	36	61	104	25	414	420	49
Confl. Peds. (#/hr)	1					1			2	2		
Heavy Vehicles (%)	1%	2%	4%	5%	1%	16%	1%	3%	4%	11%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Actuated Green, G (s)	80.6	70.7		84.6	72.7	72.7	40.9	33.0	33.0	48.1	37.2	37.2
Effective Green, g (s)	80.6	70.7		84.6	72.7	72.7	40.9	33.0	33.0	48.1	37.2	37.2
Actuated g/C Ratio	0.55	0.48		0.58	0.50	0.50	0.28	0.22	0.22	0.33	0.25	0.25
Clearance Time (s)	3.0	6.0		3.0	6.0	6.0	3.0	7.0	7.0	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	285	2411		186	1751	667	166	410	340	394	467	393
v/s Ratio Prot	0.03	0.37		c0.07	0.29		0.02	0.06		c0.09	0.23	
v/s Ratio Perm	0.22			c0.43		0.03	0.08		0.02	c0.26		0.03
v/c Ratio	0.46	0.78		0.87	0.59	0.05	0.37	0.25	0.07	1.05	0.90	0.13
Uniform Delay, d1	18.6	31.5		41.5	26.3	19.2	41.3	46.7	44.8	48.2	52.9	42.2
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	1.2	2.5		31.7	1.4	0.2	1.4	0.3	0.1	59.3	19.8	0.1
Delay (s)	19.8	34.0		73.2	27.7	19.3	42.7	47.1	44.9	107.5	72.7	42.4
Level of Service	B	C		E	C	B	D	D	D	F	E	D
Approach Delay (s)		33.1			33.1			45.2			85.1	
Approach LOS		C			C			D			F	

Intersection Summary			
HCM 2000 Control Delay	44.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	146.7	Sum of lost time (s)	19.0
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	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	25	857	219	27	1054	30	346	21	17	40	19	25
v/c Ratio	0.10	0.32	0.23	0.07	0.36	0.03	0.61	0.03	0.03	0.40	0.14	0.13
Control Delay	26.8	22.6	4.1	16.9	18.8	1.5	36.9	23.9	0.1	71.1	59.6	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.8	22.6	4.1	16.9	18.8	1.5	36.9	23.9	0.1	71.1	59.6	1.4
Queue Length 50th (m)	3.8	53.8	0.0	3.1	59.3	0.0	74.2	3.9	0.0	11.0	5.1	0.0
Queue Length 95th (m)	12.6	82.5	17.8	9.9	90.1	2.1	83.5	8.1	0.0	23.3	13.2	0.0
Internal Link Dist (m)		638.5			401.6			1215.6			450.1	
Turn Bay Length (m)	115.0		180.0	80.0		70.0	110.0		45.0	30.0		25.0
Base Capacity (vph)	267	2941	1035	373	3176	1000	569	697	626	336	451	461
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.29	0.21	0.07	0.33	0.03	0.61	0.03	0.03	0.12	0.04	0.05

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	857	219	27	1054	30	346	21	17	40	19	25
Future Volume (vph)	25	857	219	27	1054	30	346	21	17	40	19	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1755	5092	1633	1825	5142	1585	1785	1879	1597	1700	1789	1597
Flt Permitted	0.25	1.00	1.00	0.27	1.00	1.00	0.55	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)	461	5092	1633	520	5142	1585	1035	1879	1597	1331	1789	1597
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	857	219	27	1054	30	346	21	17	40	19	25
RTOR Reduction (vph)	0	0	109	0	0	13	0	0	11	0	0	23
Lane Group Flow (vph)	25	857	110	27	1054	17	346	21	6	40	19	2
Heavy Vehicles (%)	4%	3%	0%	0%	2%	3%	0%	0%	0%	5%	5%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	67.7	67.7	67.7	74.9	74.9	74.9	46.5	46.5	46.5	8.5	8.5	8.5
Effective Green, g (s)	67.7	67.7	67.7	74.9	74.9	74.9	46.5	46.5	46.5	8.5	8.5	8.5
Actuated g/C Ratio	0.50	0.50	0.50	0.55	0.55	0.55	0.34	0.34	0.34	0.06	0.06	0.06
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	231	2553	818	329	2852	879	550	647	550	83	112	100
v/s Ratio Prot		0.17		0.00	c0.20		c0.16	0.01			0.01	
v/s Ratio Perm	0.05		0.07	0.04		0.01	c0.05		0.00	0.03		0.00
v/c Ratio	0.11	0.34	0.13	0.08	0.37	0.02	0.63	0.03	0.01	0.48	0.17	0.02
Uniform Delay, d1	17.7	20.2	18.0	14.0	16.8	13.5	36.0	29.3	29.1	61.1	59.9	59.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.4	0.3	0.1	0.4	0.0	2.3	0.0	0.0	4.4	0.7	0.1
Delay (s)	18.7	20.5	18.3	14.1	17.2	13.6	38.3	29.4	29.1	65.5	60.6	59.4
Level of Service	B	C	B	B	B	B	D	C	C	E	E	E
Approach Delay (s)		20.0			17.0			37.4			62.6	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	19.6
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

2: Heart Lake Road & Countryside Drive

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	396	298	91	287	212	137
Future Volume (Veh/h)	396	298	91	287	212	137
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	396	298	91	287	212	137
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	652	91			378	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	652	91			378	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	69			82	
cM capacity (veh/h)	356	969			1180	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	396	298	91	287	349
Volume Left	396	0	0	0	212
Volume Right	0	298	0	287	0
cSH	356	969	1700	1700	1180
Volume to Capacity	1.11	0.31	0.05	0.17	0.18
Queue Length 95th (m)	119.4	10.5	0.0	0.0	5.2
Control Delay (s)	115.7	10.4	0.0	0.0	6.0
Lane LOS	F	B			A
Approach Delay (s)	70.5		0.0		6.0
Approach LOS	F				

Intersection Summary			
Average Delay	35.9		
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

3: Dixie Road & Countryside Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	38	327	26	211	657	130	28	301	200	119	255
v/c Ratio	0.19	0.29	0.05	0.67	0.58	0.22	0.05	0.35	0.23	0.23	0.30
Control Delay	17.8	16.9	3.7	30.3	20.4	4.1	12.2	13.9	3.1	13.9	13.0
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	17.8	16.9	3.7	30.3	20.4	4.1	12.2	13.9	3.1	13.9	13.0
Queue Length 50th (m)	3.4	16.1	0.0	22.8	36.0	0.0	1.8	22.3	0.0	8.3	17.8
Queue Length 95th (m)	9.7	24.8	3.2	43.6	50.1	9.5	7.3	51.1	11.7	23.7	42.4
Internal Link Dist (m)		1354.0			266.3			317.4			333.2
Turn Bay Length (m)	85.0		80.0	25.0		80.0	110.0			50.0	
Base Capacity (vph)	543	3011	1358	850	3071	1342	539	865	853	507	860
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.11	0.02	0.25	0.21	0.10	0.05	0.35	0.23	0.23	0.30

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Dixie Road & Countryside Drive

Base Year PM Peak Hour
200333

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	327	26	211	657	130	28	301	200	119	225	30
Future Volume (vph)	38	327	26	211	657	130	28	301	200	119	225	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	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	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1782	3500	1575	1698	3570	1542	1821	1847	1595	1805	1829	
Flt Permitted	0.34	1.00	1.00	0.55	1.00	1.00	0.60	1.00	1.00	0.57	1.00	
Satd. Flow (perm)	632	3500	1575	990	3570	1542	1152	1847	1595	1083	1829	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	38	327	26	211	657	130	28	301	200	119	225	30
RTOR Reduction (vph)	0	0	18	0	0	89	0	0	106	0	4	0
Lane Group Flow (vph)	38	327	8	211	657	41	28	301	94	119	251	0
Confl. Peds. (#/hr)	4		3	3		4	5		2	2		5
Heavy Vehicles (%)	0%	2%	0%	5%	0%	1%	0%	4%	1%	1%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	20.8	20.8	20.8	20.8	20.8	20.8	30.6	30.6	30.6	30.6	30.6	
Effective Green, g (s)	20.8	20.8	20.8	20.8	20.8	20.8	30.6	30.6	30.6	30.6	30.6	
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32	0.32	0.47	0.47	0.47	0.47	0.47	
Clearance Time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	201	1116	502	315	1138	491	540	866	748	508	858	
v/s Ratio Prot		0.09			0.18			c0.16			0.14	
v/s Ratio Perm	0.06		0.01	c0.21		0.03	0.02		0.06	0.11		
v/c Ratio	0.19	0.29	0.02	0.67	0.58	0.08	0.05	0.35	0.13	0.23	0.29	
Uniform Delay, d1	16.1	16.7	15.2	19.2	18.5	15.5	9.4	11.0	9.8	10.3	10.6	
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	0.5	0.1	0.0	5.3	0.7	0.1	0.2	1.1	0.3	1.1	0.9	
Delay (s)	16.5	16.8	15.2	24.6	19.2	15.6	9.6	12.1	10.1	11.4	11.5	
Level of Service	B	B	B	C	B	B	A	B	B	B	B	
Approach Delay (s)		16.7			19.9			11.2			11.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	65.2	Sum of lost time (s)	13.8
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
4: Highway 410 Off-Ramp & Heart Lake Road

Base Year PM Peak Hour
200333

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	66	3	377	0	0	533
Future Volume (Veh/h)	66	3	377	0	0	533
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	66	3	377	0	0	533
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None			None
Median storage veh)						
Upstream signal (m)			243			
pX, platoon unblocked	0.95	0.95			0.95	
vC, conflicting volume	910	377			377	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	882	324			324	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	78	100			100	
cM capacity (veh/h)	299	689			1191	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	69	377	533
Volume Left	66	0	0
Volume Right	3	0	0
cSH	312	1700	1700
Volume to Capacity	0.22	0.22	0.31
Queue Length 95th (m)	6.6	0.0	0.0
Control Delay (s)	20.0	0.0	0.0
Lane LOS	C		
Approach Delay (s)	20.0	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	131	1251	127	1644	181	90	121	105	237	127	224
v/c Ratio	0.80	0.50	0.49	0.93	0.22	0.21	0.24	0.21	0.53	0.25	0.40
Control Delay	67.4	27.3	20.4	48.1	10.4	36.0	46.5	8.3	45.0	46.6	12.5
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	67.4	27.3	20.4	48.1	10.4	36.0	46.5	8.3	45.0	46.6	12.5
Queue Length 50th (m)	26.5	100.1	17.6	267.3	13.9	20.3	31.7	0.0	58.4	33.3	10.6
Queue Length 95th (m)	#62.0	114.7	28.1	#306.5	29.4	34.6	50.6	15.8	83.7	52.9	35.0
Internal Link Dist (m)		97.9		281.6			369.2			219.0	
Turn Bay Length (m)	35.0		60.0					30.0	90.0		35.0
Base Capacity (vph)	170	2506	273	1768	819	427	508	501	445	518	566
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.50	0.47	0.93	0.22	0.21	0.24	0.21	0.53	0.25	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	131	1170	81	127	1644	181	90	121	105	237	127	224
Future Volume (vph)	131	1170	81	127	1644	181	90	121	105	237	127	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	6.0		3.0	6.0	6.0	3.0	7.0	7.0	3.0	7.0	7.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	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	0.99		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)	1767	5011		1785	3570	1550	1715	1842	1542	1764	1879	1576
Flt Permitted	0.05	1.00		0.16	1.00	1.00	0.65	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)	93	5011		293	3570	1550	1171	1842	1542	1223	1879	1576
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	131	1170	81	127	1644	181	90	121	105	237	127	224
RTOR Reduction (vph)	0	5	0	0	0	51	0	0	76	0	0	132
Lane Group Flow (vph)	131	1246	0	127	1644	130	90	121	29	237	127	92
Confl. Peds. (#/hr)	4		3	3		4	1		3	3		1
Heavy Vehicles (%)	1%	1%	5%	0%	0%	0%	4%	2%	2%	1%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Actuated Green, G (s)	90.2	79.7		88.8	79.0	79.0	51.0	44.0	44.0	51.0	44.0	44.0
Effective Green, g (s)	90.2	79.7		88.8	79.0	79.0	51.0	44.0	44.0	51.0	44.0	44.0
Actuated g/C Ratio	0.57	0.50		0.56	0.50	0.50	0.32	0.28	0.28	0.32	0.28	0.28
Clearance Time (s)	3.0	6.0		3.0	6.0	6.0	3.0	7.0	7.0	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	162	2503		254	1768	767	398	508	425	414	518	434
v/s Ratio Prot	c0.05	0.25		0.03	c0.46		0.01	0.07		c0.03	0.07	
v/s Ratio Perm	0.40			0.25		0.08	0.06		0.02	c0.16		0.06
v/c Ratio	0.81	0.50		0.50	0.93	0.17	0.23	0.24	0.07	0.57	0.25	0.21
Uniform Delay, d1	45.2	26.6		18.8	37.7	22.2	39.0	44.8	42.6	44.2	44.9	44.4
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	24.8	0.7		1.5	10.2	0.5	0.3	1.1	0.3	1.9	1.1	1.1
Delay (s)	70.0	27.3		20.4	47.9	22.6	39.2	45.9	42.9	46.2	46.0	45.5
Level of Service	E	C		C	D	C	D	D	D	D	D	D
Approach Delay (s)		31.3			43.7			43.0			45.9	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	39.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	159.5	Sum of lost time (s)	19.0
Intersection Capacity Utilization	119.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Appendix C

Detailed Collision Summary

Avg # Collisions	Location												Road Surface Condition			
	Road 1	Location	Road 2	Year	Date	Time	V1	V2	Description	Classification of Accident	Environment	First Event	Rd Surface Road 1	Rd Surface Road 2	Traffic Control Condition	Notes
	Countryside Drive at Heart Lake Road															
5.2	Countryside Drive	at	Heart Lake Road	2015	2015-02-08	11:55	Car	Car	Turning Movement	Property Damage Only	Snow	Other motor vehicle	Packed Snow	Packed Snow	Stop Sign	Driver 1 failed to yield ROW
	Countryside Drive	at	Heart Lake Road	2015	2015-07-18	18:12	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Stop Sign	Driver 1 improper passing
	Countryside Drive	at	Heart Lake Road	2016	2016-02-03	4:45	Car		SMV Other	Property Damage Only	Rain	Ditch			Stop Sign	Driver 1 disobeyed traffic control
	Countryside Drive	at	Heart Lake Road	2016	2016-04-03	20:10	Car		SMV Other	Property Damage Only	Snow	Skidding/Sliding	Ice	Ice	Stop Sign	Driver 1 speeding
	Countryside Drive	at	Heart Lake Road	2016	2016-05-21	20:10	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Stop Sign	Driver 1 following too closely
	Countryside Drive	at	Heart Lake Road	2016	2016-07-11	16:59	Car	Pick-up truck	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Stop Sign	Driver 1 struck a stopped Driver 2
	Countryside Drive	at	Heart Lake Road	2016	2016-09-04	7:29	Car		SMV Other	Property Damage Only	Clear	Tree, shrub, stump	Dry	Dry	Stop Sign	Stolen vehicle
	Countryside Drive	at	Heart Lake Road	2016	2016-09-06	13:52	Car	Pick-up truck	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Stop Sign	Driver 1 failed to yield ROW
	Countryside Drive	at	Heart Lake Road	2017	2017-01-21	22:10	Car		SMV Other	Property Damage Only	Fog, mist, smoke, dust	Tree, shrub, stump	Dry		Stop Sign	Driver 1 disobeyed traffic control
	Countryside Drive	at	Heart Lake Road	2017	2017-02-06	23:26	Car		SMV Other	Property Damage Only	Clear	Tree, shrub, stump	Dry		Stop Sign	Driver 1 lost control
	Countryside Drive	at	Heart Lake Road	2017	2017-02-12	6:13	Car		SMV Other	Property Damage Only	Snow	Tree, shrub, stump	Packed Snow	Packed Snow	Stop Sign	Driver 1 lost control
	Countryside Drive	at	Heart Lake Road	2017	2017-05-20	17:30	Car	Car	Angle	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Stop Sign	
	Countryside Drive	at	Heart Lake Road	2017	2017-06-21	18:35	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Stop Sign	Driver 1 following too closely
	Countryside Drive	at	Heart Lake Road	2017	2017-09-21	17:30	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Stop Sign	Driver 1 following too closely
	Countryside Drive	at	Heart Lake Road	2017	2017-12-18	8:15	Car	Car	Angle	Property Damage Only	Clear	Other motor vehicle	Wet	Wet	Stop Sign	Driver 2 failed to yield ROW
	Countryside Drive	at	Heart Lake Road	2018	2018-04-27	21:59	Car		SMV Other	Property Damage Only	Rain	Pole	Wet	Wet	Stop Sign	Driver 1 lost control
	Countryside Drive	at	Heart Lake Road	2018	2018-06-14	14:27	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Stop Sign	Driver 1 following too closely
	Countryside Drive	at	Heart Lake Road	2018	2018-06-19	18:30	Truck - closed	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Stop Sign	Driver 1 following too closely
	Countryside Drive	at	Heart Lake Road	2018	2018-09-27	15:15	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Stop Sign	Driver 1 struck a stopped Driver 2
	Countryside Drive	at	Heart Lake Road	2018	2018-09-30	19:50	Pick-up truck		SMV Other	Property Damage Only	Rain	Tree, shrub, stump	Wet		Stop Sign	Driver 1 lost control
	Countryside Drive	at	Heart Lake Road	2018	2018-12-02	8:13	Car	Car	Angle	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Stop Sign	Driver 1 improper lane change
	Countryside Drive	at	Heart Lake Road	2019	2019-01-08	15:49	Car	Car	Angle	Property Damage Only	Clear	Other motor vehicle	Wet	Wet	Stop Sign	Driver 1 improper turn
	Countryside Drive	at	Heart Lake Road	2019	2019-01-23	7:50	School bus	Car	Angle	Property Damage Only	Snow	Other motor vehicle	Loose Snow	Loose Snow	Stop Sign	Driver 1 lost control
	Countryside Drive	at	Heart Lake Road	2019	2019-02-09	22:29	Car		SMV Other	Property Damage Only	Clear	Animal	Dry	Dry	Stop Sign	
	Countryside Drive	at	Heart Lake Road	2019	2019-04-07	18:25	Car		SMV Other	Property Damage Only	Clear	Animal	Dry	Dry	Stop Sign	
	Countryside Drive	at	Heart Lake Road	2019	2019-04-15	18:00	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Stop Sign	Driver 1 struck a slowing Driver 2

10 SMV other collisions and **7** rear end (**5** angle & **4** turning movement - expected more of both for this intersection) 10

5 collisions lost control and **5** were following to close 7

2 collisions with animals - both were with deer and both occurred in 2019 5

1 collision notes a vehicle being unable to stop at a red light in Jan. 2019 4

Avg # Collisions	Location			Year	Date	Time	V1	V2	Description	Classification of Accident	Environment	First Event	Road Surface Condition		Traffic Control Condition	Notes
	Road 1	Location	Road 2										Rd Surface Road 1	Rd Surface Road 2		
	Heart Lake Road at Sandalwood Parkway															
22.4	Heart Lake Road	at	Sandalwood Parkway	2015	2015-01-04	11:20	Car		SMV Other	Property Damage Only	Clear	Tree, shrub, stump	Wet	Wet	Traffic Signal	Driver 1 lost control due to road conditions
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-01-03	13:00	Car	Car	Rear end	Property Damage Only	Snow	Other motor vehicle	Loose Snow	Loose Snow	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-01-06	6:30	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-01-06	19:29	Car	Car	Rear end	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 lost control
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-01-16	9:10	Car	Car	Sideswipe	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-02-16	16:07	Pick-up truck	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-03-03	8:00	Delivery van	Car	Turning Movement	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-03-07	18:28	Car	Car	Turning Movement	Property Damage Only	Other	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 failed to yield ROW
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-04-06	13:47	Car	Car	Rear end	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 lost control
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-05-07	14:39	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-05-20	10:02	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-05-21	15:10	Car	Passenger van	Rear end	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-06-12	19:43	Car		SMV Other	Property Damage Only	Rain	Pole (utility, power)	Wet	Wet	Traffic Signal	Driver 1 lost control
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-06-13	19:50	Car	Car	Rear end	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-06-13	20:20	Car	Car	Sideswipe	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-08-05	22:33	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-08-18	12:43	Car	Pick-up truck	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-08-21	8:26	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-08-23	11:00	Truck-other	Pick-up truck	Other	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 lost control
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-10-14	13:34	Passenger van	Car	Angle	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-10-31	0:30	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-11-03	21:10	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-11-08	20:30	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-11-25	12:09	Car	Pick-up truck	Turning Movement	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-12-07	17:45	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 disobeyed traffic control
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-12-16	19:22	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-12-16	20:15	Delivery van	Pick-up truck	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2015	2015-12-18	17:30	Car	Car	Rear end	Property Damage Only	Snow	Other motor vehicle	Wet		Traffic Signal	Driver 1 lost control
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-01-08	21:54	Car	Pick-up truck	Angle	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 2 disobeyed traffic control
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-01-16	13:11	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-01-29	15:30	Car	Pick-up truck	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-02-07	20:00	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-02-15	16:51	Car	Car	Angle	Non-fatal Injury	Snow	Other motor vehicle	Slush	Slush	Traffic Signal	Driver 1 disobeyed traffic control
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-02-20	9:45	Delivery van	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 failed to yield ROW
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-03-09	6:16	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-03-22	19:00	Car	Car	Turning Movement	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-04-08	22:45	Car	Car	Other	Property Damage Only	Clear	Ran off road	Dry	Dry	Traffic Signal	Driver 1 improper lane change
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-06-17	20:15	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-06-28	8:08	Bicycle	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-07-04	18:36	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-08-14	17:00	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-08-15	19:10	Car	Car	Angle	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 failed to yield ROW
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-08-15	7:57	Car	Pick-up truck	Rear end	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-09-03	16:25	Car	Car	Rear end	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-09-22	23:40	Car	Car	Turning Movement	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-09-26	16:14	Car		SMV Other	Property Damage Only	Rain	Ditch	Wet	Wet	Traffic Signal	Driver 1 lost control
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-09-29	19:00	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-10-26	6:53	Car	Car	Turning Movement	Non-fatal Injury	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2016	2016-12-16	14:02	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 failed to yield ROW
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-01-15	16:05	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-01-25	19:01	Car	Car	Turning Movement	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-01-28	15:40	Car		Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-02-02	6:55	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 failed to yield ROW
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-03-10	17:07	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-04-23	22:37	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-06-08	16:00	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-06-09	22:50	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 2 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-06-23	14:40	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-06-30	15:12	Car	Car	Rear end	Non-reportable	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-07-09	15:39	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-08-11	12:20	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-08-11	20:37	Car	Car	Turning Movement	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-08-31	9:43	Car	Car	Sideswipe	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper lane change
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-09-04	22:49	Car	Car	Approaching	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-09-20	11:55	Car	Car	Angle	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 disobeyed traffic control
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-10-03	7:50	Truck - car carrie	Passenger van	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 failed to yield ROW
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-11-07	8:35	Car	Car	Sideswipe	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper lane change
	Heart Lake Road	at	Sandalwood Parkway	2017	2017-11-30	9:11	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-01-31	10:02	Car	Car	Approaching	Property Damage Only	Snow	Other motor vehicle	Loose Snow	Loose Snow	Traffic Signal	Driver 1 lost control
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-02-12	14:37	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-02-26	18:22	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-04-12	8:00	Car	Car	Turning Movement	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-06-11	19:00	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-06-13	16:00	Car	Car	Angle	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-07-12	18:00	Delivery van	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-08-08	5:40	Car	Car	Turning Movement	Non-fatal Injury	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-08-15	13:30	Car	Car	Approaching	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-08-21	6:45	Car	Car	Turning Movement	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-08-24	10:58	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-08-26	18:02	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-08-31	5:30	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-09-22	20:40	Car	Car	Turning Movement	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-09-25	8:00	Car	Car	Turning Movement	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-09-29	10:47	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-10-27	8:45	Car	Car	Turning Movement	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-11-01	4:30	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-11-09	1:46	Car	Delivery van	Sideswipe	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper lane change
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-11-28	7:00	Car	Car	Angle	Non-fatal Injury	Snow	Other motor vehicle	Loose Snow	Mud	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-12-07	15:00	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-12-11	17:30	Car	Car	Turning Movement	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 2 failed to yield ROW
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-12-14	7:52	Car	Car	Turning Movement	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 failed to yield ROW
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-12-21	6:50	Car	Car	Turning Movement	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-12-23	21:35	Car		SMV Other	Property Damage Only	Fog, mist, smoke, dust	Pole (utility, power)	Wet	Wet	Traffic Signal	Driver 1 lost control
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-12-23	22:30	Car	Pick-up truck	Rear end	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 speeding
	Heart Lake Road	at	Sandalwood Parkway	2018	2018-12-31	13:28	Car	Pick-up truck	Turning Movement	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-01-19	13:30	Car		SMV Other	Property Damage Only	Clear	Pole (utility, power)	Loose Snow	Loose Snow	Traffic Signal	Driver 1 lost control
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-01-20	15:00	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Loose Snow	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-01-20	17:20	Car	Car	Angle	Property Damage Only	Clear	Other motor vehicle	Loose Snow	Loose Snow	Traffic Signal	Driver 1 disobeyed traffic control
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-01-25	17:35	Car	Car	Turning Movement	Property Damage Only	Snow	Other motor vehicle	Loose Snow	Loose Snow	Traffic Signal	Driver 1 lost control
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-01-31	12:45	Pick-up truck	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-01-31	18:40	Car		SMV Other	Property Damage Only	Snow	Curb	Ice	Ice	Traffic Signal	Driver 1 lost control
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-01-31	19:30	Car	Pick-up truck	Rear end	Property Damage Only	Drifting Snow	Other motor vehicle	Ice	Loose Snow	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-02-02	19:00	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-02-06	7:30	Car	Car	Turning Movement	Property Damage Only	Drifting Snow	Other motor vehicle	Loose Snow	Loose Snow	Traffic Signal	Driver 1 disobeyed traffic control
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-02-13	17:00	Car		SMV Other	Property Damage Only	Clear	Pole (utility, power)	Loose Snow	Loose Snow	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-02-17	3:00	Car		SMV Other	Property Damage Only	Clear	Snowbank/drift	Ice	Ice	Traffic Signal	Driver 1 lost control due to road conditions
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-02-23	19:22	Car	Car	Turning Movement	Non-fatal Injury	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-02-27	19:30	Car	Car	Turning Movement	Property Damage Only	Snow	Other motor vehicle	Loose Snow	Loose Snow	Traffic Signal	Driver 1 failed to yield ROW
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-03-28	9:00	Car	Car	Sideswipe	Property Damage Only	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-04-10	13:11	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 following too close
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-04-29	21:20	Pick-up truck	Car	Turning Movement	Non-fatal Injury	Rain	Other motor vehicle	Wet	Wet	Traffic Signal	Driver 1 improper turn
	Heart Lake Road	at	Sandalwood Parkway	2019	2019-05-20	18:40	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Dry	Dry	Traffic Signal	Driver 1 failed to yield ROW

52 turning movement collisions and **33** rear end collisons
45 collisions due to improper turns and **24** collisions due to following too close
39 collisions occur in non-dry conditions (wet, ice, snow, slush)
1 collision with cyclist (#39)

turning movemer	52	46.429%
rear end	33	29.464%
SMV other	7	6.250%
angle	8	7.143%
sideswipe	6	5.357%
approaching	3	2.679%
other	2	1.786%

Avg # Collisions	Location												Road Surface Condition			
	Road 1	Location	Road 2	Year	Date	Time	V1	V2	Description	Classification of Accident	Environment	First Event	Rd Surface Road 1	Rd Surface Road 2	Traffic Control Condition	Notes
	Countryside Drive at Ross Drive															
0.4	Countryside Drive	at	Ross Drive	2017	2017-12-29	20:35	Car	Car	Turning Movement	Property Damage Only	Clear	Other motor vehicle	Wet	Wet	NB Stop control	Driver 1 improper turn
	Countryside Drive	at	Ross Drive	2018	2018-01-15	16:20	Car	Car	Angle	Non-fatal injury	Snow	Other motor vehicle	Loose Snow	Loose Snow	NB Stop control	Driver 1 lost control due to road conditions

The 2 events are unrelated: 1 was a driver making an aggressive turn and the other was a driver losing control in the snow.

Avg # Collisions	Location												Road Surface Condition			
	Road 1	Location	Road 2	Year	Date	Time	V1	V2	Description	Classification of Accident	Environment	First Event	Rd Surface Road 1	Rd Surface Road 2	Traffic Control Condition	Notes
	Countryside Drive between Ace Drive/Naperton Drive and Dixie Road															
0.4	Countryside Drive	west of	Countryside Drive	2015	2015-08-12	20:53	Car		SMV Other	Property Damage Only	Clear	Pole (sign, parking me	Dry		n/a	
	Countryside Drive	east of	Ace Drive/Naperton Drive	2017	2017-06-05	5:30	Intercity bus		Sideswipe	Non-reportable	Fog, mist, smoke, dust	Other motor vehicle	Wet		n/a	Driver 1 improper turn

The 2 events are unrelated: 1 was a driver making an aggressive lane change and the other was a driver blowing two tires.

Avg # Collisions	Location												Road Surface Condition			
	Road 1	Location	Road 2	Year	Date	Time	V1	V2	Description	Classification of Accident	Environment	First Event	Rd Surface Road 1	Rd Surface Road 2	Traffic Control Condition	Notes
	Sandalwood Parkway between Glover Gate/Royal Palm Drive and Heart Lake Road															
8.8	Sandalwood Parkway	west of	Heart Lake Road	2015	2015-01-25	16:05	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 following too close
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2015	2015-02-07	9:50	Car	Car	Rear end	Property Damage Only	Snow	Other motor vehicle	Loose snow		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2015	2015-02-24	17:49	Car	Car	Rear end	Property Damage Only	Snow	Other motor vehicle	Loose snow		n/a	Driver 1 following too close
	Sandalwood Parkway	west of	Heart Lake Road	2015	2015-06-12	15:00	Car	Car	Rear end	Property Damage Only	Rain	Other motor vehicle	Wet		n/a	Driver 1 following too close
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2015	2015-08-20	12:46	Car	Car	Angle	Non-fatal injury	Clear	Other motor vehicle			n/a	
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2015	2015-11-21	20:53	Car	Car	SMV Other	Property Damage Only	Rain	Tree, shrub, stump	Wet		n/a	Driver 1 lost control due to road conditions
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2015	2015-12-22	7:30	Car	Car	Sideswipe	Non-fatal injury	Rain	Other motor vehicle	Wet		n/a	Driver 1 lost control
	Sandalwood Parkway	west of	Heart Lake Road	2016	2016-01-30	7:58	Car	Car	Approaching	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2016	2016-02-10	2:15	Car		SMV Other	Non-fatal injury	Snow	Pole (utility, power)	Ice		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2016	2016-02-19	13:57	Car	Pick-up truck	Sideswipe	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 improper lane change
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2016	2016-05-23	18:15	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 following too close
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2016	2016-05-25	19:11	Car	Car	Sideswipe	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 improper lane change
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2016	2016-06-29	10:15	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 2 following to close
	Sandalwood Parkway	west of	Heart Lake Road	2016	2016-07-31	3:50	Car		SMV Other	Non-fatal injury	Clear	Curb	Dry		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2016	2016-08-10	7:36	Car	Pick-up truck	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 following too close
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2016	2016-10-20	13:31	Car	Car	Rear end	Non-fatal injury	Rain	Other motor vehicle	Wet		n/a	Driver 1 following too close
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2016	2016-12-08	23:27	Car		SMV Other	Property Damage Only	Snow	Pole (utility, power)	Packed snow		n/a	Driver 1 lost control
	Sandalwood Parkway	west of	Heart Lake Road	2016	2016-12-11	18:30	Car	Car	Sideswipe	Property Damage Only	Snow	Other motor vehicle	Loose snow		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2017	2017-01-03	23:13	Car		SMV Other	Property Damage Only	Clear	Pole (utility, power)	Wet		n/a	Driver 1 speeding
	Sandalwood Parkway	west of	Heart Lake Road	2017	2017-05-05	6:50	Car	Car	Approaching	Property Damage Only	Rain	Other motor vehicle	Wet		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2017	2017-05-07	6:55	Car		SMV Other	Property Damage Only	Clear	Pole (utility, power)	Wet		n/a	Driver 1 speeding
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2017	2017-07-12	16:00	Car		SMV Other	Property Damage Only	Rain	Tree, shrub, stump	Wet		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2017	2017-07-27	8:14	Car		SMV Other	Property Damage Only	Rain	Pole (utility, power)	Wet		n/a	Driver 1 lost control
	Sandalwood Parkway	west of	Heart Lake Road	2017	2017-07-27	10:47	Car		SMV Other	Non-fatal injury	Clear	Pole (utility, power)	Wet		n/a	Driver 1 lost control
	Sandalwood Parkway	west of	Heart Lake Road	2017	2017-08-31	14:13	Car	Car	Sideswipe	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 failed to yield ROW
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2017	2017-10-23	20:08	Car	Car	Approaching	Property Damage Only	Rain	Other motor vehicle	Wet		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2017	2017-10-23	23:37	Car		SMV Other	Property Damage Only	Rain	Tree, shrub, stump			n/a	Driver 1 lost control
	Sandalwood Parkway	west of	Heart Lake Road	2017	2018-11-07	17:25	Car		SMV Other	Property Damage Only	Clear	Animal - wild	Dry		n/a	Driver 1 struck a deer
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2017	2017-11-28	20:15	Car	Car	Sideswipe	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2017	2017-12-28	6:56	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 following too close
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2018	2018-01-29	14:07			Approaching	Property Damage Only	Snow	Other motor vehicle	Loose snow		n/a	Driver 1 lost control
	Sandalwood Parkway	west of	Heart Lake Road	2018	2018-02-02	8:55	Pick-up truck		SMV Other	Property Damage Only	Clear	Pole (sign, parking me	Dry		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2018	2018-02-11	9:55	Car	Car	Approaching	Property Damage Only	Clear	Other motor vehicle	Wet		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2018	2018-03-13	2:30	Car	Car	Sideswipe	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 improper lane change
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2018	2019-04-03	6:04	Pick-up truck	Car	Sideswipe	Non-fatal injury	Rain	Other motor vehicle	Wet		n/a	Driver 1 speeding
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2018	2018-07-22	23:00	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 improper lane change
	Sandalwood Parkway	west of	Heart Lake Road	2018	2018-09-01	5:00	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 following too close
	Sandalwood Parkway	west of	Heart Lake Road	2018	2018-11-11	19:58	Car	Car	Sideswipe	Property Damage Only	Clear	Other motor vehicle	Dry		n/a	Driver 1 improper lane change
	Sandalwood Parkway	west of	Heart Lake Road	2018	2018-11-02	12:50	Car	Car	Rear end	Property Damage Only	Rain	Other motor vehicle	Wet		n/a	Driver 1 following too close
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2018	2018-11-09	19:00	Car	Car	Rear end	Property Damage Only	Rain	Other motor vehicle	Wet		n/a	Driver 1 following too close
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2018	2018-12-15	21:20	Car		SMV Other	Property Damage Only	Snow	Curb	Slush		n/a	Driver 1 lost control
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2019	2019-02-01	8:24	Car	Car	Rear end	Property Damage Only	Clear	Other motor vehicle	Ice		n/a	Driver 1 lost control due to road conditions
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2019	2019-03-31	14:00	Car	Tow truck	Rear end	Property Damage Only	Snow	Other motor vehicle	Loose snow		n/a	Driver 1 following too close
	Sandalwood Parkway	east of	Glover Gate/Royal Palm Drive	2019	2019-05-11	20:00	Car	Car	Rear end	Property Damage Only	Rain	Other motor vehicle	Wet		n/a	Driver 1 following too close

25 collisions in non-dry conditions (i.e., wet, ice, slush, snow, etc.)
20 drivers lost control in the collision
16 rear end collisions
13 cases of following too close

rear end	15	34.091%
SMV other	13	29.545%
sideswipe	9	20.455%
approaching	5	11.364%
angle	1	2.273%
turning movemer	0	0.000%
other	0	0.000%

Appendix D

Growth Calculations

5A-150 Pinebush Road
Cambridge ON N1R 8J8
p: 519.896.3163
905.381.2229
416.479.9684

www.ptsl.com

19 January 2021
Project: 200333

Ghaz Mohammad, M.Eng., P.Eng., PMP
Project Engineer, Infrastructure Planning
Public Works & Engineering
City of Brampton

Dear Mr. Mohammad:

**RE: TRAFFIC GROWTH PROJECTIONS MEMORANDUM
ENVIRONMENTAL ASSESSMENT STUDY FOR HEART LAKE ROAD AND COUNTRYSIDE DRIVE INTERSECTION, CITY OF BRAMPTON**

Introduction and Purpose

The purpose of this memorandum is to provide the approach to forecast intersection turning movement volumes for horizon years 2031 and 2041 for the study area intersections assessed as part of the Environmental Assessment for the Heart Lake Road and Countryside Drive intersection. The methodology is based on provided EMME modelling outputs and traffic count data provided by City staff.

The City provided EMME model plots for the 2011 (base year), and 2031 and 2041 (future year) horizons which captured all roadway sections including the subject study area segments and adjacent roadways. Specifically, model output plots of link volumes, roadway capacity, number of lanes, and speed were provided for the AM and PM peak hours.

The provided EMME model output plots have been utilized to determine applicable growth rates to generate future traffic volume forecasts. This document summarizes the growth rates derived.

Methodology

Traffic growth rates for each planning horizon for the study area intersections have been developed from the EMME model output link volumes. For this analysis, the land use and population and employment assumptions of the current traffic model are deemed to be representative of the planned growth in the study area and the city at large. The growth rates will be applied to the base year traffic volumes derived to develop the future traffic forecasts.

Analysis and Findings

Applicable roadway link volumes for the AM and PM peak hours were assessed. The 2011, 2031, and 2041 volumes were used to calculate the per annum growth rates. The data was analyzed on an individual road-by-road basis, as well examining the overall growth for all study area roadway links.

Table 1 summarizes the calculated annual compounded growth rates, sorted by overall study area as well as on a roadway-by-roadway basis. It should be noted that although the ADT volumes are broken down by direction in the EMME model plots, the two-way volumes (i.e., total volume on each segment) are the values summarized in the table.

Analysis worksheets are attached for reference.

TABLE 1: CALCULATED GROWTH RATES

Road	Percentage Growth Per Annum			
	2011 – 2031		2031 – 2041	
	AM	PM	AM	PM
Countryside Drive	4.3%	5.4%	-0.4%	-0.7%
Heart Lake Road	3.3%	5.5%	1.0%	1.1%
Highway 410 Off-Ramp	22.2%	11.5%	9.3%	5.8%
Mayfield Road	1.1%	1.8%	0.5%	0.7%
Sandalwood Parkway	2.9%	2.8%	0.7%	0.2%
Dixie Road	4.4%	4.7%	2.0%	2.0%
Overall Study Area	***2.9%***	***4.0%***	***0.6%***	***0.6%***

The calculated annual growth rates indicate significant growth is expected to occur along the study area roadways up to the 2031 horizon. In reviewing link volumes between 2031 and 2041 it is noted that growth reaches a plateau, as is typical. High growth cannot be sustained for such long periods, and it was determined growth occurring between 2031 and 2041 follows a lower rate. For the overall study area roadways, a 0.6% per annum growth rate was calculated between 2031 and 2041. City staff have confirmed that the corridor growth rates calculated between 2011 – 2031 are reflective of the proposed developments situated on the east side of Heart Lake Road, north and south of Countryside Drive.

To develop the 2031 traffic forecasts, the calculated corridor growth rates will be applied to the derived base year traffic volumes.

To develop the 2041 traffic forecasts, the calculated corridor growth rates will be applied to the derived 2031 traffic volumes. For any calculated negative growth rates, a conservative approach will be taken (i.e., errs on the high side) where zero growth will be considered.

The average of AM and PM corridor growth rates will be applied for uniformity.

Yours very truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED

Adrian Soo

Adrian Soo
P.Eng.
Senior Project Manager

Project:	**Heart Lake Road EA Study Traffic Analysis**
Project #:	**200333**
Task:	**Growth Rate Calculations**

Roadway Section			AM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
Roadway	To	From	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way
Heart Lake Road	Mayfield Road	Highway 410	41	571	612	364	789	1153	801	686	1487
Heart Lake Road	Mid-Block	Countryside Drive	13	388	401	65	764	829	133	859	992
Heart Lake Road	Countryside Drive	Mid-Block	16	388	404	246	663	909	298	683	981
Heart Lake Road	Mid-Block	Countryside Drive	185	440	625	605	712	1317	628	627	1255
Heart Lake Road	Highway 410	Mid-Block	186	439	625	609	800	1409	611	895	1506
Heart Lake Road	Sandalwood Parkway	Highway 410	186	441	627	609	910	1519	611	1166	1777
Heart Lake Road	Mid-Block	Sandalwood Parkway	722	603	1325	808	869	1677	794	895	1689
Mayfield Road	Mid-Block	Heart Lake Road	1443	475	1918	1868	613	2481	1960	801	2761
Mayfield Road	Highway 410	Heart Lake Road	1545	422	1967	1689	708	2397	1337	1019	2356
Countryside Drive	Highway 410	Heart Lake Road	367	250	617	1013	708	1721	1006	629	1635
Countryside Drive	Dixie Road	Highway 410	360	244	604	931	668	1599	928	582	1510
Countryside Drive	Fernforest Drive	Dixie Road	650	381	1031	1019	916	1935	974	935	1909
Highway 410	Heart Lake Road	Off-Ramp		2	2		111	111		271	271
Sandalwood Parkway	Heart Lake Road	Mid-Block	1486	391	1877	2427	873	3300	2457	1069	3526
			7200	5435	12635	12253	10104	22357	12538	11117	23655

GR (2031 - 2011)	2.9%
GR (2041 - 2011)	2.1%
GR (2041 - 2031)	0.6%

Roadway Section			PM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
Roadway	To	From	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way	NB/EB	SB/WB	Two-Way
Heart Lake Road	Mayfield Road	Highway 410	326	130	456	774	583	1357	832	953	1785
Heart Lake Road	Mid-Block	Countryside Drive	143	62	205	712	386	1098	788	374	1162
Heart Lake Road	Countryside Drive	Mid-Block	149	70	219	664	546	1210	702	515	1217
Heart Lake Road	Mid-Block	Countryside Drive	176	249	425	615	740	1355	649	764	1413
Heart Lake Road	Highway 410	Mid-Block	182	252	434	705	762	1467	865	758	1623
Heart Lake Road	Sandalwood Parkway	Highway 410	182	265	447	705	886	1591	865	975	1840
Heart Lake Road	Mid-Block	Sandalwood Parkway	491	705	1196	995	823	1818	1085	892	1977
Mayfield Road	Mid-Block	Heart Lake Road	652	1254	1906	1031	1897	2928	1200	1893	3093
Mayfield Road	Highway 410	Heart Lake Road	571	1288	1859	882	1614	2496	1289	1446	2735
Countryside Drive	Highway 410	Heart Lake Road	113	271	384	782	1032	1814	653	973	1626
Countryside Drive	Dixie Road	Highway 410	89	248	337	647	799	1446	494	745	1239
Countryside Drive	Fernforest Drive	Dixie Road	432	648	1080	904	1014	1918	982	1004	1986
Highway 410	Heart Lake Road	Off-Ramp		14	14		124	124		218	218
Sandalwood Parkway	Heart Lake Road	Mid-Block	814	1453	2267	1534	2378	3912	1609	2396	4005
			4320	6909	11229	10950	13584	24534	12013	13906	25919

GR (2031 - 2011)	4.0%
GR (2041 - 2011)	2.8%
GR (2041 - 2031)	0.6%

Project: **Heart Lake Road EA Study Traffic Analysis**
Project #: **200333**
Task: **Growth Rate Calculations**

Roadway Section			AM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	NB	SB	Two-Way	NB	SB	Two-Way	NB	SB	Two-Way
Heart Lake Road	Mayfield Road	Highway 410	41	571	612	364	789	1153	801	686	1487
Heart Lake Road	Mid-Block	Countryside Drive	13	388	401	65	764	829	133	859	992
Heart Lake Road	Countryside Drive	Mid-Block	16	388	404	246	663	909	298	683	981
Heart Lake Road	Mid-Block	Countryside Drive	185	440	625	605	712	1317	628	627	1255
Heart Lake Road	Highway 410	Mid-Block	186	439	625	609	800	1409	611	895	1506
Heart Lake Road	Sandalwood Parkway	Highway 410	186	441	627	609	910	1519	611	1166	1777
Heart Lake Road	Mid-Block	Sandalwood Parkway	722	603	1325	808	869	1677	794	895	1689
			1349	3270	4619	3306	5507	8813	3876	5811	9687

GR (2031 - 2011) 3.3%

GR (2041 - 2011) 2.5%

GR (2041 - 2031) 1.0%

Roadway Section			PM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	NB	SB	Two-Way	NB	SB	Two-Way	NB	SB	Two-Way
Heart Lake Road	Mayfield Road	Highway 410	326	130	456	774	583	1357	832	953	1785
Heart Lake Road	Mid-Block	Countryside Drive	143	62	205	712	386	1098	788	374	1162
Heart Lake Road	Countryside Drive	Mid-Block	149	70	219	664	546	1210	702	515	1217
Heart Lake Road	Mid-Block	Countryside Drive	176	249	425	615	740	1355	649	764	1413
Heart Lake Road	Highway 410	Mid-Block	182	252	434	705	762	1467	865	758	1623
Heart Lake Road	Sandalwood Parkway	Highway 410	182	265	447	705	886	1591	865	975	1840
Heart Lake Road	Mid-Block	Sandalwood Parkway	491	705	1196	995	823	1818	1085	892	1977
			1649	1733	3382	5170	4726	9896	5786	5231	11017

GR (2031 - 2011) 5.5%

GR (2041 - 2011) 4.0%

GR (2041 - 2031) 1.1%

Project:	**Heart Lake Road EA Study Traffic Analysis**
Project #:	**200333**
Task:	**Growth Rate Calculations**

Roadway Section			AM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	NB	SB	Two-Way	NB	SB	Two-Way	NB	SB	Two-Way
Mayfield Road	Mid-Block	Heart Lake Road	1443	475	1918	1868	613	2481	1960	801	2761
Mayfield Road	Highway 410	Heart Lake Road	1545	422	1967	1689	708	2397	1337	1019	2356
			2988	897	3885	3557	1321	4878	3297	1820	5117

GR (2031 - 2011)	1.1%
GR (2041 - 2011)	0.9%
GR (2041 - 2031)	0.5%

Roadway Section			PM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	NB	SB	Two-Way	NB	SB	Two-Way	NB	SB	Two-Way
Mayfield Road	Mid-Block	Heart Lake Road	652	1254	1906	1031	1897	2928	1200	1893	3093
Mayfield Road	Highway 410	Heart Lake Road	571	1288	1859	882	1614	2496	1289	1446	2735
			1223	2542	3765	1913	3511	5424	2489	3339	5828

GR (2031 - 2011)	1.8%
GR (2041 - 2011)	1.5%
GR (2041 - 2031)	0.7%

Project:	**Heart Lake Road EA Study Traffic Analysis**										
Project #:	**200333**										
Task:	**Growth Rate Calculations**										

Roadway Section			AM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	NB	SB	Two-Way	NB	SB	Two-Way	NB	SB	Two-Way
Countryside Drive	Highway 410	Heart Lake Road	367	250	617	1013	708	1721	1006	629	1635
Countryside Drive	Dixie Road	Highway 410	360	244	604	931	668	1599	928	582	1510
Countryside Drive	Fernforest Drive	Dixie Road	650	381	1031	1019	916	1935	974	935	1909
			1377	875	2252	2963	2292	5255	2908	2146	5054

GR (2031 - 2011)	4.3%
GR (2041 - 2011)	2.7%
GR (2041 - 2031)	-0.4%

Roadway Section			PM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	NB	SB	Two-Way	NB	SB	Two-Way	NB	SB	Two-Way
Countryside Drive	Highway 410	Heart Lake Road	113	271	384	782	1032	1814	653	973	1626
Countryside Drive	Dixie Road	Highway 410	89	248	337	647	799	1446	494	745	1239
Countryside Drive	Fernforest Drive	Dixie Road	432	648	1080	904	1014	1918	982	1004	1986
			634	1167	1801	2333	2845	5178	2129	2722	4851

GR (2031 - 2011)	5.4%
GR (2041 - 2011)	3.4%
GR (2041 - 2031)	-0.7%

Project: **Heart Lake Road EA Study Traffic Analysis**
Project #: **200333**
Task: **Growth Rate Calculations**

Roadway Section			AM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	EB	WB	Two-Way	EB	WB	Two-Way	EB	WB	Two-Way
Highway 410	Heart Lake Road	Off-Ramp	0	2	2	0	111	111	0	271	271
			0	2	2	0	111	111	0	271	271

GR (2031 - 2011) 22.2%

GR (2041 - 2011) 17.8%

GR (2041 - 2031) 9.3%

Roadway Section			PM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	EB	WB	Two-Way	EB	WB	Two-Way	EB	WB	Two-Way
Highway 410	Heart Lake Road	Off-Ramp	0	14	14	0	124	124	0	218	218
			0	14	14	0	124	124	0	218	218

GR (2031 - 2011) 11.5%

GR (2041 - 2011) 9.6%

GR (2041 - 2031) 5.8%

Project: **Heart Lake Road EA Study Traffic Analysis**
Project #: **200333**
Task: **Growth Rate Calculations**

Roadway Section			AM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	NB	SB	Two-Way	NB	SB	Two-Way	NB	SB	Two-Way
Sandalwood Parkway	Heart Lake Road	Mid-Block	1486	391	1877	2427	873	3300	2457	1069	3526
			1486	391	1877	2427	873	3300	2457	1069	3526

GR (2031 - 2011) 2.9%

GR (2041 - 2011) 2.1%

GR (2041 - 2031) 0.7%

Roadway Section			PM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	NB	SB	Two-Way	NB	SB	Two-Way	NB	SB	Two-Way
Sandalwood Parkway	Heart Lake Road	Mid-Block	814	1453	2267	1534	2378	3912	1609	2396	4005
			814	1453	2267	1534	2378	3912	1609	2396	4005

GR (2031 - 2011) 2.8%

GR (2041 - 2011) 1.9%

GR (2041 - 2031) 0.2%

Project: **Heart Lake Road EA Study Traffic Analysis**
Project #: **200333**
Task: **Growth Rate Calculations**

Roadway Section			AM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	NB	SB	Two-Way	NB	SB	Two-Way	NB	SB	Two-Way
Dixie Road	South of Countryside Dr		176	502	678	546	1455	2001	719	1737	2456
Dixie Road	North of Countryside Dr		143	622	765	347	1096	1443	516	1227	1743
			319	1124	1443	893	2551	3444	1235	2964	4199

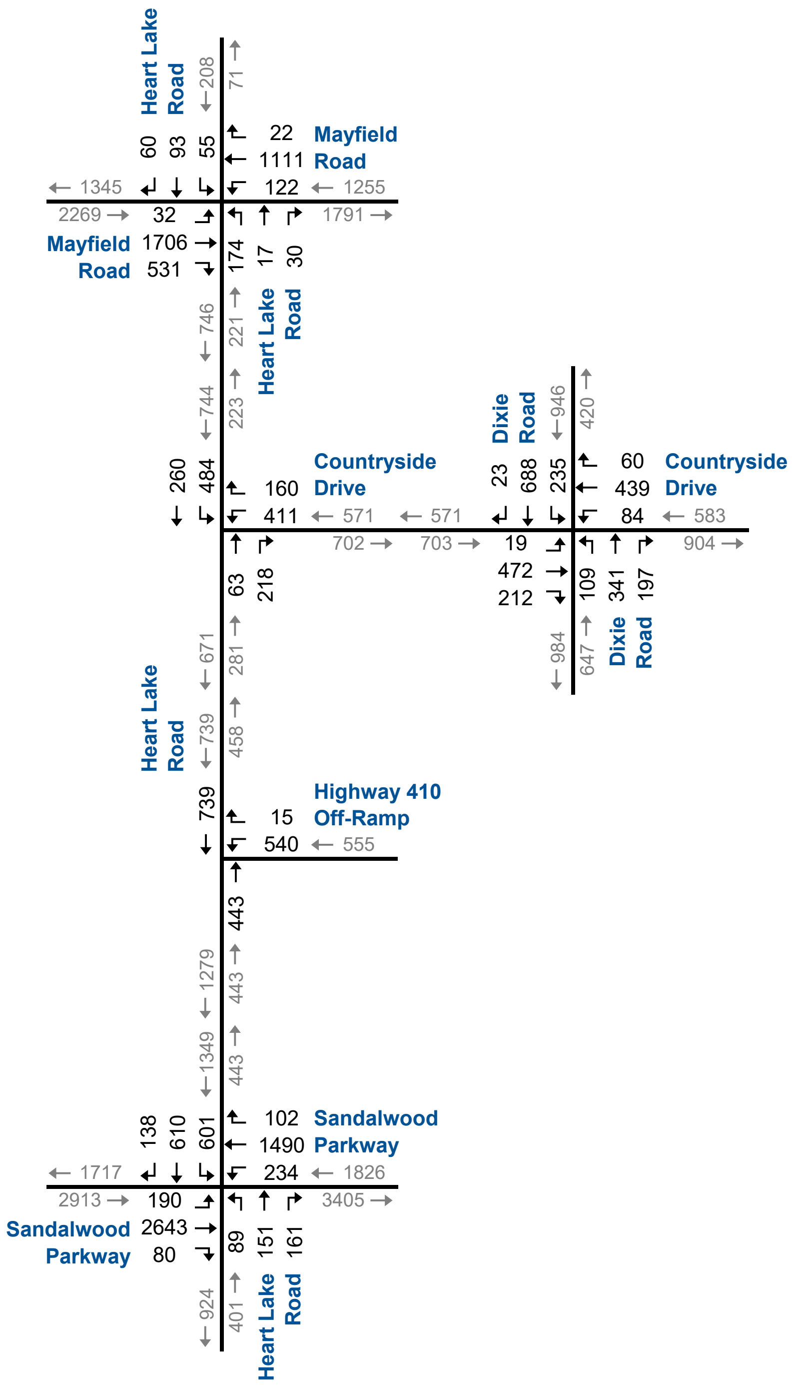
GR (2031 - 2011)	4.4%
GR (2041 - 2011)	3.6%
GR (2041 - 2031)	2.0%

Roadway Section			PM Peak Hour								
			2011 Model Output			2031 Model Output			2041 Model Output		
	To	From	NB	SB	Two-Way	NB	SB	Two-Way	NB	SB	Two-Way
Dixie Road	South of Countryside Dr		413	218	631	1457	860	2317	1777	1051	2828
Dixie Road	North of Countryside Dr		598	345	943	1087	532	1619	1239	741	1980
			1011	563	1574	2544	1392	3936	3016	1792	4808

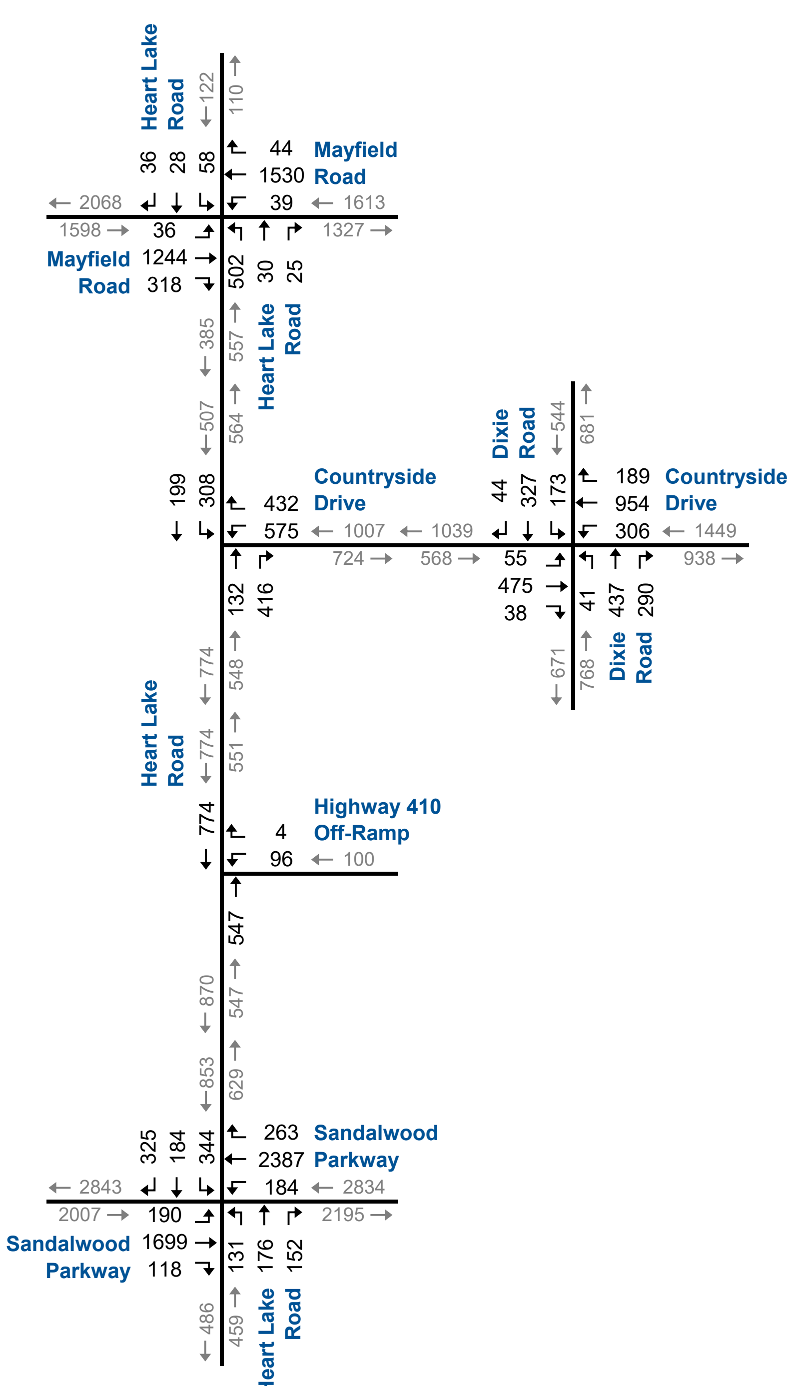
GR (2031 - 2011)	4.7%
GR (2041 - 2011)	3.8%
GR (2041 - 2031)	2.0%

Future Growth (2031) Traffic Volumes

AM Peak Hour

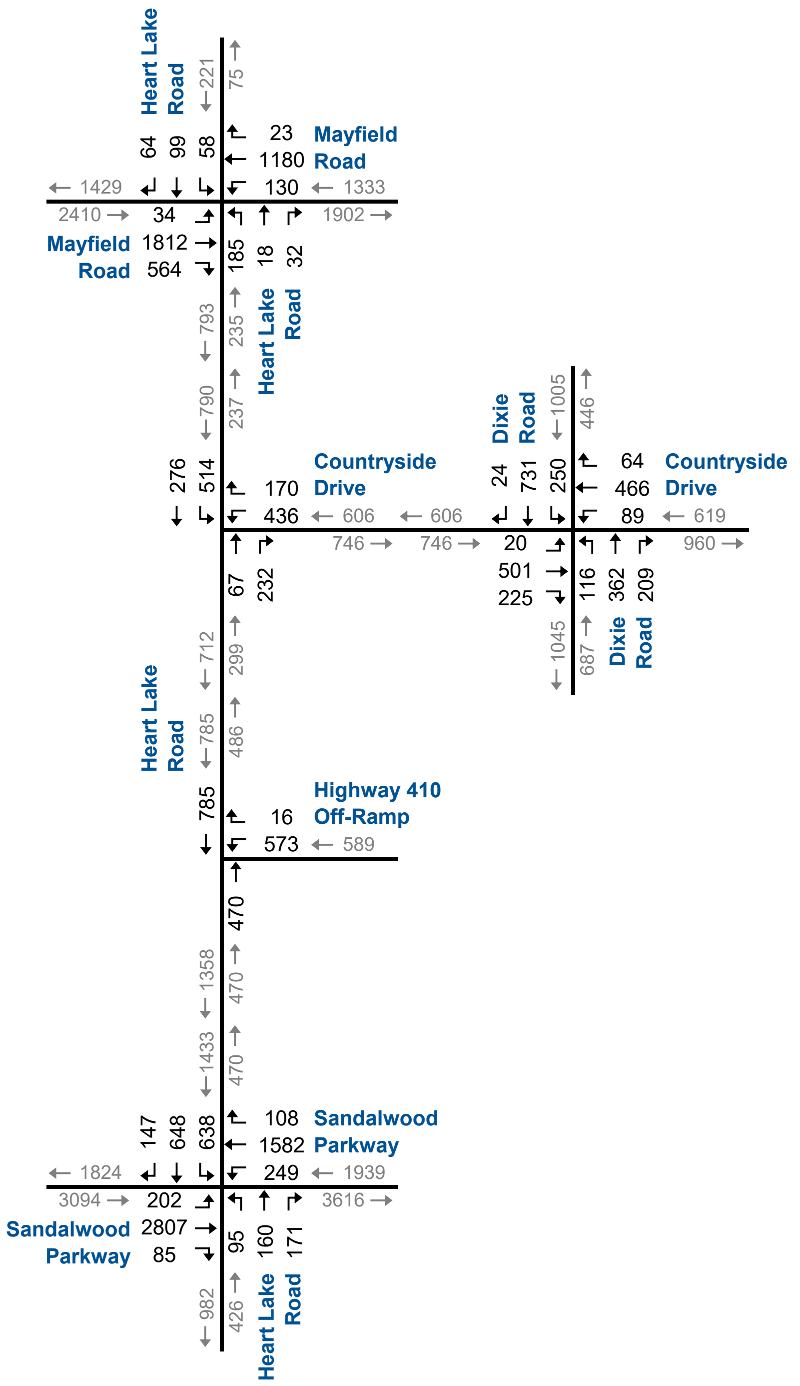


PM Peak Hour

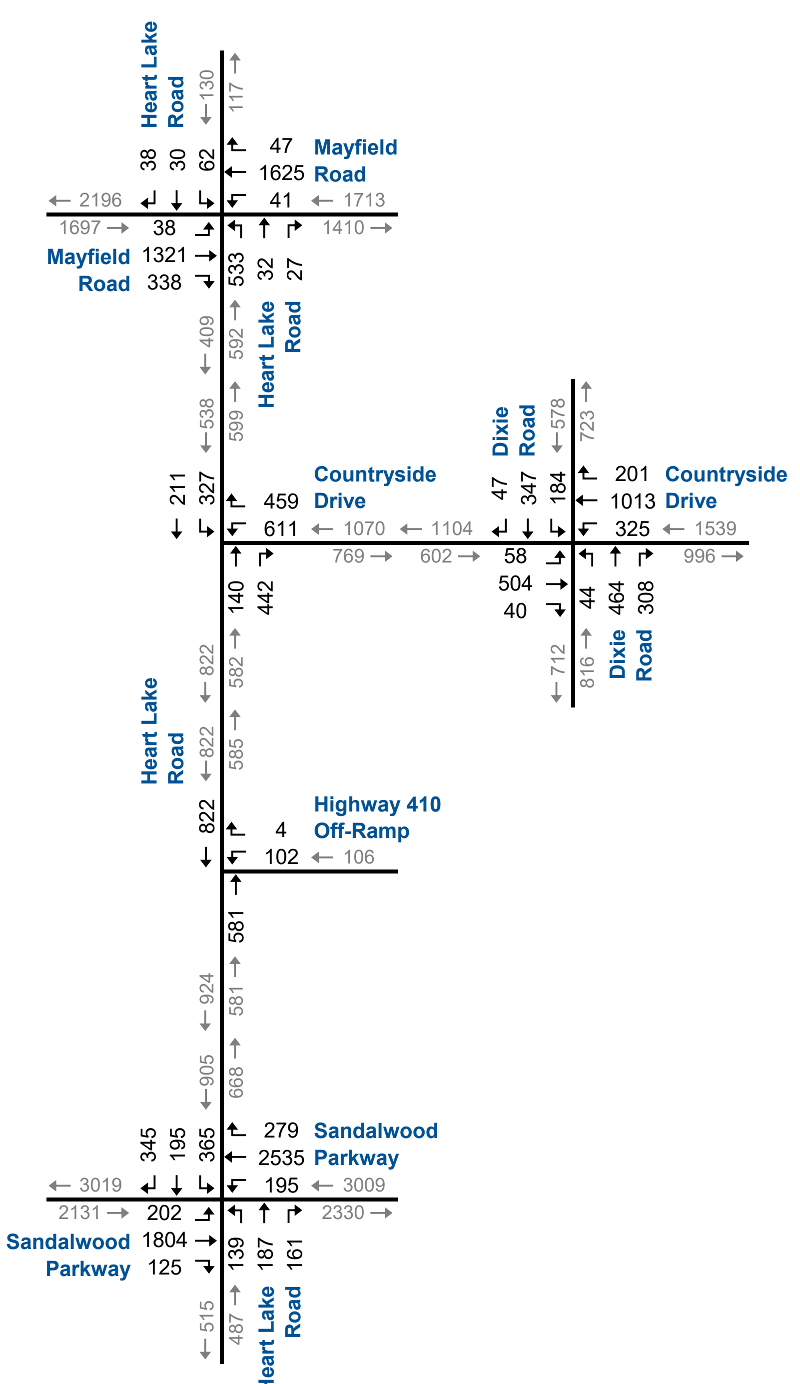


Future Growth (2041) Traffic Volumes

AM Peak Hour

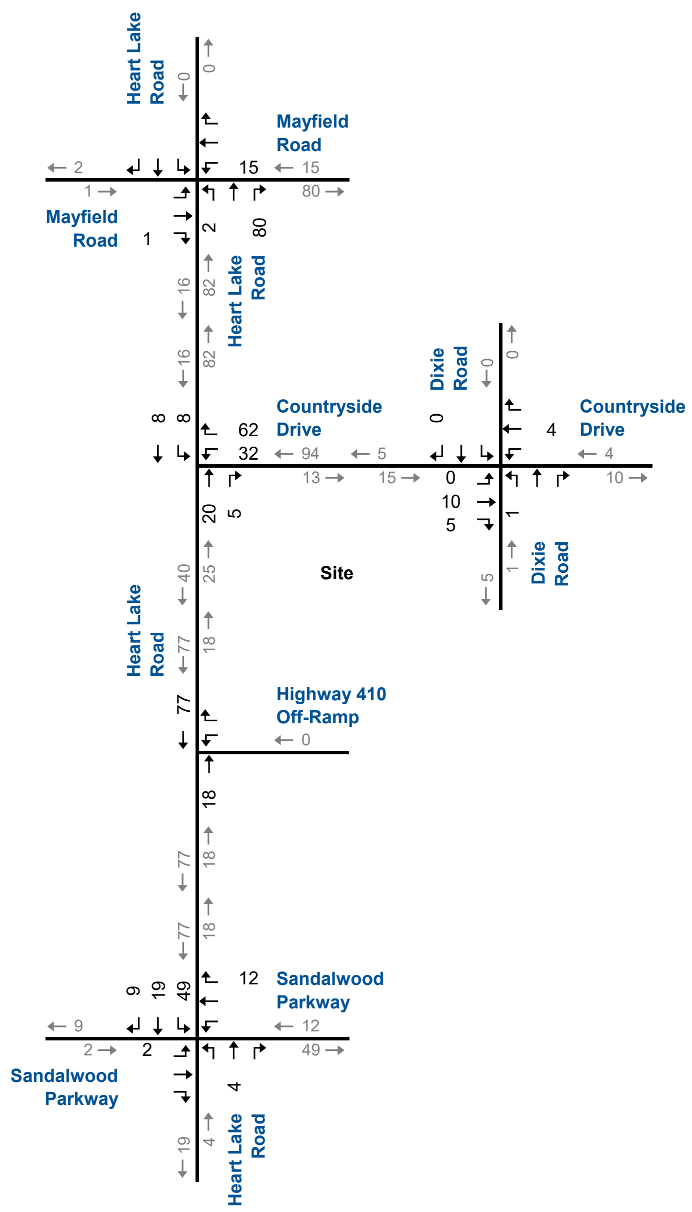


PM Peak Hour

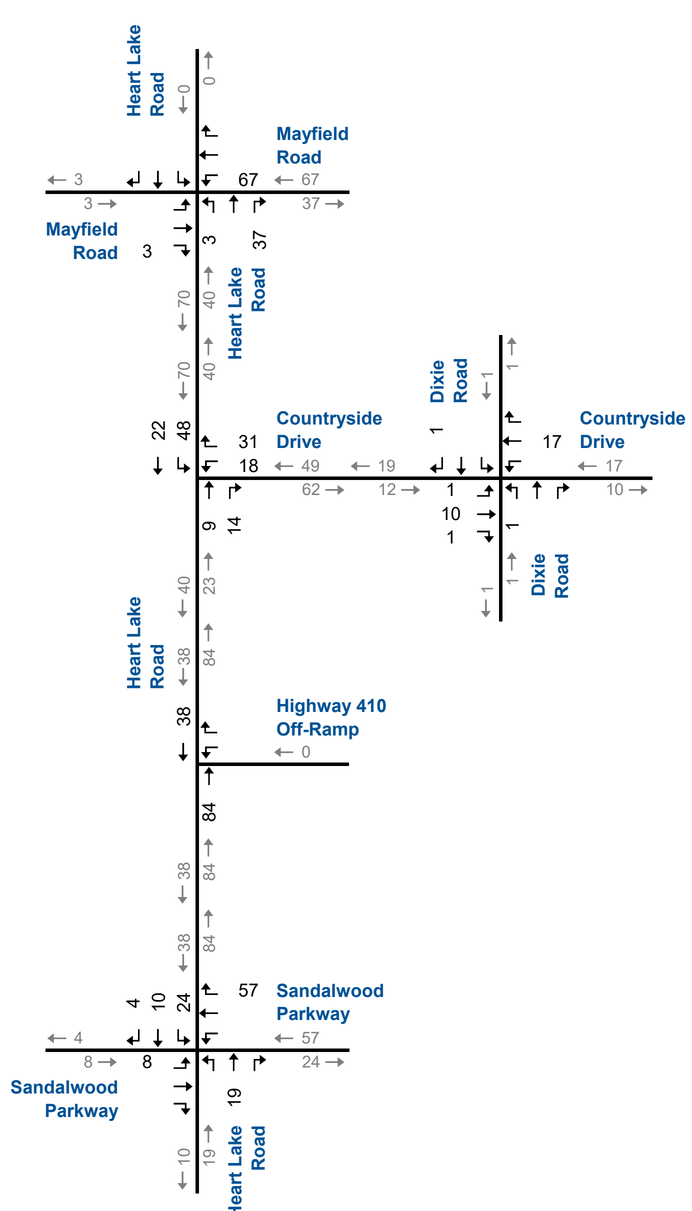


BG Development (Countryside Villages) Traffic Volumes

AM Peak Hour



PM Peak Hour

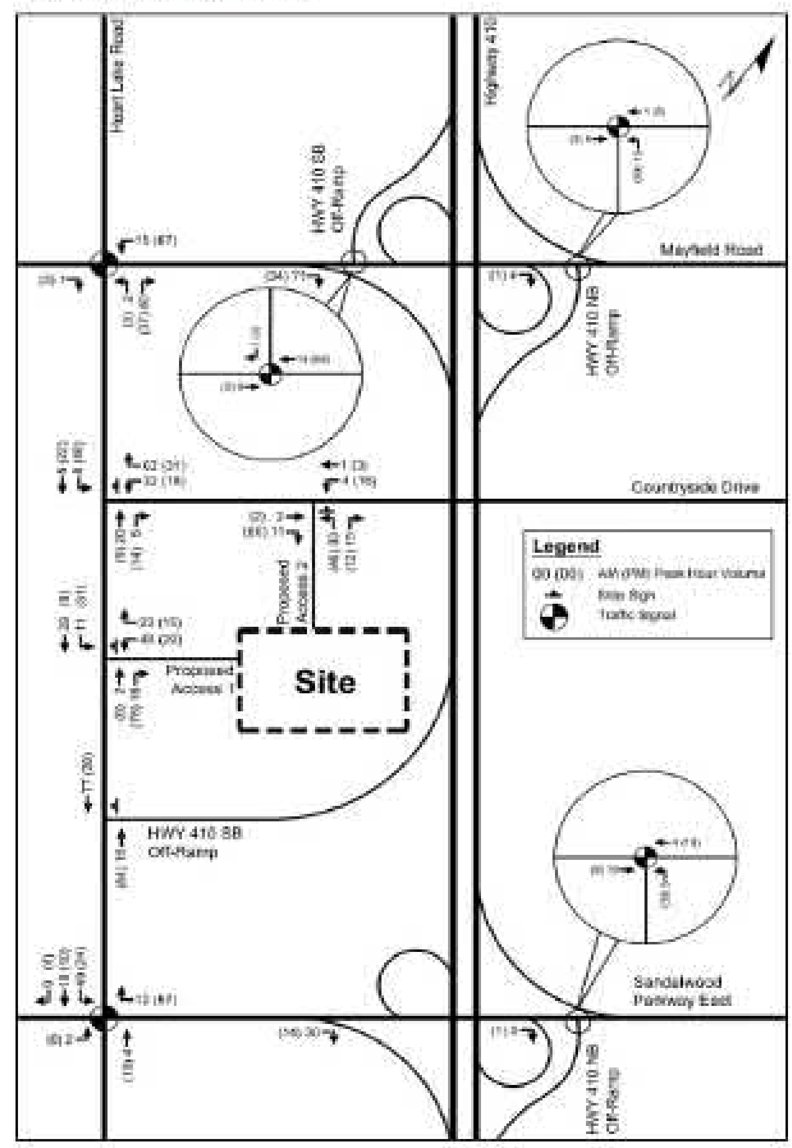


	TIME	INTID	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Mayfield/Heart Lake	900	1	2	0	80	0	0	0	0	0	1	15	0	0
Countryside/Heart Lake	900	2		20	5	8	8					32		62
Dixie	900	3	1	0	0	0	0	0	0	10	5	0	4	0
Hwy 410	900	4		18			77					0		0
Sandalwood	900	5	0	4	0	49	19	9	2	0	0	0	0	12
Mayfield/Heart Lake	1700	1	3	0	37	0	0	0	0	0	3	67	0	0
Countryside/Heart Lake	1700	2		9	14	48	22					18		31
Dixie	1700	3	1	0	0	0	0	1	1	10	1	0	17	0
Hwy 410	1700	4		84			38					0		0
Sandalwood	1700	5	0	19	0	24	10	4	8	0	0	0	0	57

NOTES:

February 2011

Figure 10: Site Total Trips



Appendix E

2031 Synchro Analysis Outputs

Queues
1: Heart Lake Road & Mayfield Road

2031 AM Peak Hour
200333

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	32	1706	532	137	1111	22	176	17	110	55	93	60
v/c Ratio	0.12	0.59	0.47	0.54	0.32	0.02	0.50	0.04	0.25	0.45	0.57	0.29
Control Delay	18.4	22.0	2.8	20.9	10.4	0.0	47.1	39.9	12.1	71.1	73.8	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	22.0	2.8	20.9	10.4	0.0	47.1	39.9	12.1	71.1	73.8	10.6
Queue Length 50th (m)	4.5	121.5	0.0	12.9	49.4	0.0	41.2	3.8	3.5	15.5	26.5	0.0
Queue Length 95th (m)	11.0	138.4	17.0	31.0	54.9	0.1	65.1	10.6	19.6	29.5	44.3	9.9
Internal Link Dist (m)		638.5			401.6			1215.6			450.1	
Turn Bay Length (m)	115.0		180.0	80.0		70.0	110.0		45.0	30.0		25.0
Base Capacity (vph)	262	2928	1140	252	3450	1092	355	567	547	334	448	438
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.58	0.47	0.54	0.32	0.02	0.50	0.03	0.20	0.16	0.21	0.14

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Heart Lake Road & Mayfield Road

2031 AM Peak Hour
200333

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1706	532	137	1111	22	176	17	110	55	93	60
Future Volume (vph)	32	1706	532	137	1111	22	176	17	110	55	93	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	5142	1601	1789	5142	1601	1750	1842	1566	1750	1842	1566
Flt Permitted	0.24	1.00	1.00	0.08	1.00	1.00	0.56	1.00	1.00	0.75	1.00	1.00
Satd. Flow (perm)	460	5142	1601	158	5142	1601	1031	1842	1566	1375	1842	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	32	1706	532	137	1111	22	176	17	110	55	93	60
RTOR Reduction (vph)	0	0	233	0	0	7	0	0	72	0	0	55
Lane Group Flow (vph)	32	1706	299	137	1111	15	176	17	38	55	93	5
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	78.7	78.7	78.7	93.9	93.9	93.9	32.5	32.5	32.5	12.5	12.5	12.5
Effective Green, g (s)	78.7	78.7	78.7	93.9	93.9	93.9	32.5	32.5	32.5	12.5	12.5	12.5
Actuated g/C Ratio	0.56	0.56	0.56	0.67	0.67	0.67	0.23	0.23	0.23	0.09	0.09	0.09
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	258	2890	899	248	3448	1073	326	427	363	122	164	139
v/s Ratio Prot		c0.33		c0.05	0.22		c0.07	0.01			0.05	
v/s Ratio Perm	0.07		0.19	0.32		0.01	c0.06		0.02	0.04		0.00
v/c Ratio	0.12	0.59	0.33	0.55	0.32	0.01	0.54	0.04	0.10	0.45	0.57	0.04
Uniform Delay, d1	14.4	20.1	16.5	15.0	9.7	7.7	45.9	41.7	42.3	60.5	61.2	58.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.9	1.0	2.7	0.2	0.0	1.7	0.0	0.1	2.6	4.4	0.1
Delay (s)	15.4	21.0	17.5	17.6	9.9	7.7	47.6	41.7	42.4	63.1	65.6	58.4
Level of Service	B	C	B	B	A	A	D	D	D	E	E	E
Approach Delay (s)		20.1			10.7			45.4			62.9	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.6
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	443	222	83	223	492	268
Future Volume (Veh/h)	443	222	83	223	492	268
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	443	222	83	223	492	268
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	1335	83			306	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1335	83			306	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	77			61	
cM capacity (veh/h)	105	979			1266	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	443	222	83	223	760
Volume Left	443	0	0	0	492
Volume Right	0	222	0	223	0
cSH	105	979	1700	1700	1266
Volume to Capacity	4.23	0.23	0.05	0.13	0.39
Queue Length 95th (m)	Err	7.0	0.0	0.0	15.0
Control Delay (s)	Err	9.8	0.0	0.0	7.8
Lane LOS	F	A			A
Approach Delay (s)	6664.2		0.0		7.8
Approach LOS	F				

Intersection Summary			
Average Delay	2563.6		
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	19	482	217	84	443	60	110	341	197	235	711
v/c Ratio	0.08	0.53	0.49	0.37	0.48	0.13	0.50	0.36	0.22	0.45	0.75
Control Delay	17.6	21.3	18.2	23.4	20.7	6.2	20.0	10.4	2.2	13.1	18.4
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	17.6	21.3	18.2	23.4	20.7	6.2	20.0	10.4	2.2	13.1	18.4
Queue Length 50th (m)	1.7	25.0	15.7	7.9	22.6	0.0	7.5	21.1	0.0	15.4	58.0
Queue Length 95th (m)	6.1	37.7	33.2	19.1	34.6	7.3	#26.1	40.9	8.8	35.1	#115.3
Internal Link Dist (m)		1354.0			266.3			317.4			333.2
Turn Bay Length (m)	85.0		80.0	25.0		80.0	110.0			50.0	
Base Capacity (vph)	850	3263	1464	815	3263	1464	221	956	910	527	953
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.15	0.15	0.10	0.14	0.04	0.50	0.36	0.22	0.45	0.75

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
3: Dixie Road & Countryside Drive

2031 AM Peak Hour
200333

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	482	217	84	443	60	110	341	197	235	688	23
Future Volume (vph)	19	482	217	84	443	60	110	341	197	235	688	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3500	1566	1750	3500	1566	1789	1883	1601	1789	1874	
Flt Permitted	0.50	1.00	1.00	0.48	1.00	1.00	0.23	1.00	1.00	0.55	1.00	
Satd. Flow (perm)	912	3500	1566	876	3500	1566	436	1883	1601	1037	1874	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	19	482	217	84	443	60	110	341	197	235	688	23
RTOR Reduction (vph)	0	0	38	0	0	44	0	0	97	0	1	0
Lane Group Flow (vph)	19	482	179	84	443	16	110	341	100	235	710	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	15.6	15.6	15.6	15.6	15.6	15.6	30.4	30.4	30.4	30.4	30.4	
Effective Green, g (s)	15.6	15.6	15.6	15.6	15.6	15.6	30.4	30.4	30.4	30.4	30.4	
Actuated g/C Ratio	0.26	0.26	0.26	0.26	0.26	0.26	0.51	0.51	0.51	0.51	0.51	
Clearance Time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	237	913	408	228	913	408	221	957	813	527	952	
v/s Ratio Prot		c0.14			0.13			0.18			c0.38	
v/s Ratio Perm	0.02		0.11	0.10		0.01	0.25		0.06	0.23		
v/c Ratio	0.08	0.53	0.44	0.37	0.49	0.04	0.50	0.36	0.12	0.45	0.75	
Uniform Delay, d1	16.7	18.9	18.4	18.1	18.7	16.5	9.7	8.8	7.7	9.3	11.6	
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	0.1	0.6	0.8	1.0	0.4	0.0	7.8	1.0	0.3	2.7	5.3	
Delay (s)	16.8	19.5	19.2	19.1	19.1	16.5	17.5	9.9	8.0	12.1	16.9	
Level of Service	B	B	B	B	B	B	B	A	A	B	B	
Approach Delay (s)		19.3			18.8			10.6			15.7	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	59.8	Sum of lost time (s)	13.8
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
4: Highway 410 Off-Ramp & Heart Lake Road

2031 AM Peak Hour
200333

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	540	15	461	0	0	816
Future Volume (Veh/h)	540	15	461	0	0	816
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	540	15	461	0	0	816
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None			None
Median storage veh)						
Upstream signal (m)			243			
pX, platoon unblocked	0.88	0.88			0.88	
vC, conflicting volume	1277	461			461	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1245	314			314	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	98			100	
cM capacity (veh/h)	168	636			1092	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	555	461	816
Volume Left	540	0	0
Volume Right	15	0	0
cSH	172	1700	1700
Volume to Capacity	3.23	0.27	0.48
Queue Length 95th (m)	Err	0.0	0.0
Control Delay (s)	Err	0.0	0.0
Lane LOS	F		
Approach Delay (s)	Err	0.0	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	3029.2		
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		

Queues
5: Heart Lake Road & Sandalwood Parkway

2031 AM Peak Hour
200333

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	192	2723	234	1604	89	155	161	650	629	147
v/c Ratio	0.89	1.29	1.42	0.81	0.75	0.32	0.32	1.33	0.98	0.25
Control Delay	78.6	170.6	251.7	46.9	67.4	49.3	11.0	194.9	80.1	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.6	170.6	251.7	46.9	67.4	49.3	11.0	194.9	80.1	17.2
Queue Length 50th (m)	46.9	~427.0	~89.6	176.5	17.5	41.8	4.8	~279.5	206.0	14.6
Queue Length 95th (m)	#92.7	#451.2	#148.6	196.9	#41.8	64.0	24.6	#358.5	#287.8	32.9
Internal Link Dist (m)		97.9		281.6		369.2			219.0	
Turn Bay Length (m)	35.0		60.0				30.0	90.0		35.0
Base Capacity (vph)	226	2117	165	1973	118	494	513	490	662	610
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	1.29	1.42	0.81	0.75	0.31	0.31	1.33	0.95	0.24

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: Heart Lake Road & Sandalwood Parkway

2031 AM Peak Hour
200333

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	192	2643	80	234	1490	114	89	155	161	650	629	147
Future Volume (vph)	192	2643	80	234	1490	114	89	155	161	650	629	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.99	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	1.00	1.00
Frt	1.00	1.00		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)	1767	5004		1700	4964		1767	1824	1514	1607	1842	1551
Flt Permitted	0.06	1.00		0.06	1.00		0.10	1.00	1.00	0.55	1.00	1.00
Satd. Flow (perm)	113	5004		114	4964		179	1824	1514	938	1842	1551
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	192	2643	80	234	1490	114	89	155	161	650	629	147
RTOR Reduction (vph)	0	2	0	0	5	0	0	0	105	0	0	53
Lane Group Flow (vph)	192	2721	0	234	1599	0	89	155	56	650	629	94
Confl. Peds. (#/hr)	1					1			2	2		
Heavy Vehicles (%)	1%	2%	4%	5%	1%	16%	1%	3%	4%	11%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	81.0	67.0		73.9	62.9		47.6	41.6	41.6	64.6	55.6	55.6
Effective Green, g (s)	81.0	67.0		73.9	62.9		47.6	41.6	41.6	64.6	55.6	55.6
Actuated g/C Ratio	0.51	0.42		0.47	0.40		0.30	0.26	0.26	0.41	0.35	0.35
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	215	2113		163	1968		113	478	397	466	645	543
v/s Ratio Prot	c0.08	0.54		c0.10	0.32		0.03	0.08		c0.18	0.34	
v/s Ratio Perm	0.37			c0.57			0.21		0.04	c0.39		0.06
v/c Ratio	0.89	1.29		1.44	0.81		0.79	0.32	0.14	1.39	0.98	0.17
Uniform Delay, d1	47.4	45.8		48.3	42.6		45.0	47.2	44.8	44.9	50.8	35.6
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	33.8	133.2		227.4	3.8		29.4	0.4	0.2	190.4	29.0	0.2
Delay (s)	81.2	179.0		275.7	46.4		74.4	47.6	45.0	235.3	79.8	35.8
Level of Service	F	F		F	D		E	D	D	F	E	D
Approach Delay (s)		172.6			75.6			52.4			146.2	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	132.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	158.6	Sum of lost time (s)	19.0
Intersection Capacity Utilization	129.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	36	1244	321	106	1530	44	505	30	62	58	28	36
v/c Ratio	0.36	0.57	0.36	0.43	0.57	0.05	0.78	0.04	0.10	0.51	0.18	0.17
Control Delay	39.2	30.5	3.6	20.2	23.2	2.5	43.5	27.3	7.1	73.6	58.3	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	30.5	3.6	20.2	23.2	2.5	43.5	27.3	7.1	73.6	58.3	1.8
Queue Length 50th (m)	7.1	100.4	0.0	14.7	110.9	0.0	109.9	5.0	0.0	15.9	7.5	0.0
Queue Length 95th (m)	17.9	106.8	17.1	21.6	109.7	4.2	#206.0	13.1	10.3	30.3	17.2	0.0
Internal Link Dist (m)		638.5			401.6			1215.6			450.1	
Turn Bay Length (m)	115.0		180.0	80.0		70.0	110.0		45.0	30.0		25.0
Base Capacity (vph)	119	2613	994	245	2982	942	645	711	643	333	451	461
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.48	0.32	0.43	0.51	0.05	0.78	0.04	0.10	0.17	0.06	0.08

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1244	321	106	1530	44	505	30	62	58	28	36
Future Volume (vph)	36	1244	321	106	1530	44	505	30	62	58	28	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1755	5092	1633	1825	5142	1585	1785	1879	1597	1700	1789	1597
Flt Permitted	0.13	1.00	1.00	0.13	1.00	1.00	0.57	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)	234	5092	1633	252	5142	1585	1070	1879	1597	1320	1789	1597
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	1244	321	106	1530	44	505	30	62	58	28	36
RTOR Reduction (vph)	0	0	186	0	0	22	0	0	38	0	0	33
Lane Group Flow (vph)	36	1244	135	106	1530	22	505	30	24	58	28	3
Heavy Vehicles (%)	4%	3%	0%	0%	2%	3%	0%	0%	0%	5%	5%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	56.6	56.6	56.6	68.8	68.8	68.8	52.6	52.6	52.6	10.1	10.1	10.1
Effective Green, g (s)	56.6	56.6	56.6	68.8	68.8	68.8	52.6	52.6	52.6	10.1	10.1	10.1
Actuated g/C Ratio	0.42	0.42	0.42	0.51	0.51	0.51	0.39	0.39	0.39	0.07	0.07	0.07
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	98	2134	684	235	2620	807	626	732	622	98	133	119
v/s Ratio Prot		0.24		0.03	c0.30		c0.24	0.02			0.02	
v/s Ratio Perm	0.15		0.08	0.20		0.01	c0.08		0.02	0.04		0.00
v/c Ratio	0.37	0.58	0.20	0.45	0.58	0.03	0.81	0.04	0.04	0.59	0.21	0.02
Uniform Delay, d1	26.9	30.1	24.8	19.8	23.1	16.5	35.1	25.6	25.5	60.5	58.7	57.9
Progression Factor	1.00	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	10.3	1.2	0.6	1.4	1.0	0.1	7.5	0.0	0.0	9.2	0.8	0.1
Delay (s)	37.2	31.3	25.5	21.2	24.1	16.5	42.6	25.6	25.6	69.7	59.5	58.0
Level of Service	D	C	C	C	C	B	D	C	C	E	E	E
Approach Delay (s)		30.3			23.7			40.0			63.9	
Approach LOS		C			C			D			E	

Intersection Summary

HCM 2000 Control Delay	30.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	19.6
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	593	463	141	430	356	221
Future Volume (Veh/h)	593	463	141	430	356	221
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	593	463	141	430	356	221
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	1074	141			571	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1074	141			571	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	49			64	
cM capacity (veh/h)	158	910			1002	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	593	463	141	430	577
Volume Left	593	0	0	0	356
Volume Right	0	463	0	430	0
cSH	158	910	1700	1700	1002
Volume to Capacity	3.76	0.51	0.08	0.25	0.36
Queue Length 95th (m)	Err	23.6	0.0	0.0	13.0
Control Delay (s)	Err	13.0	0.0	0.0	8.2
Lane LOS	F	B			A
Approach Delay (s)	5620.7		0.0		8.2
Approach LOS	F				

Intersection Summary			
Average Delay	2695.2		
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	56	485	39	306	971	189	42	437	290	173	372
v/c Ratio	0.33	0.31	0.05	0.82	0.62	0.25	0.13	0.62	0.37	0.66	0.53
Control Delay	19.1	14.3	3.7	37.8	18.3	3.6	22.9	28.2	4.6	40.4	25.5
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	19.1	14.3	3.7	37.8	18.3	3.6	22.9	28.2	4.6	40.4	25.5
Queue Length 50th (m)	5.6	25.1	0.0	40.8	59.6	2.3	4.3	55.5	0.0	22.5	44.3
Queue Length 95th (m)	14.2	34.4	4.6	75.0	76.0	12.2	15.2	#127.3	18.7	#72.4	97.4
Internal Link Dist (m)		1354.0			266.3			317.4			333.2
Turn Bay Length (m)	85.0		80.0	25.0		80.0	110.0			50.0	
Base Capacity (vph)	273	2470	1121	594	2519	1133	317	710	791	261	707
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.20	0.03	0.52	0.39	0.17	0.13	0.62	0.37	0.66	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	485	39	306	971	189	42	437	290	173	327	45
Future Volume (vph)	56	485	39	306	971	189	42	437	290	173	327	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	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	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1783	3500	1574	1698	3570	1541	1821	1847	1595	1806	1828	
Flt Permitted	0.21	1.00	1.00	0.47	1.00	1.00	0.43	1.00	1.00	0.36	1.00	
Satd. Flow (perm)	389	3500	1574	844	3570	1541	826	1847	1595	680	1828	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	56	485	39	306	971	189	42	437	290	173	327	45
RTOR Reduction (vph)	0	0	22	0	0	90	0	0	178	0	4	0
Lane Group Flow (vph)	56	485	17	306	971	99	42	437	112	173	368	0
Confl. Peds. (#/hr)	4		3	3		4	5		2	2		5
Heavy Vehicles (%)	0%	2%	0%	5%	0%	1%	0%	4%	1%	1%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	35.7	35.7	35.7	35.7	35.7	35.7	31.2	31.2	31.2	31.2	31.2	
Effective Green, g (s)	35.7	35.7	35.7	35.7	35.7	35.7	31.2	31.2	31.2	31.2	31.2	
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.44	0.44	0.39	0.39	0.39	0.39	0.39	
Clearance Time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	172	1548	696	373	1579	681	319	714	616	262	706	
v/s Ratio Prot		0.14			0.27			0.24			0.20	
v/s Ratio Perm	0.14		0.01	c0.36		0.06	0.05		0.07	c0.25		
v/c Ratio	0.33	0.31	0.02	0.82	0.61	0.14	0.13	0.61	0.18	0.66	0.52	
Uniform Delay, d1	14.7	14.6	12.7	19.7	17.2	13.4	16.0	19.9	16.3	20.4	19.0	
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	1.1	0.1	0.0	13.5	0.7	0.1	0.9	3.9	0.6	12.4	2.7	
Delay (s)	15.8	14.7	12.7	33.1	18.0	13.5	16.8	23.8	17.0	32.7	21.7	
Level of Service	B	B	B	C	B	B	B	C	B	C	C	
Approach Delay (s)		14.7			20.6			20.8			25.2	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.7	Sum of lost time (s)	13.8
Intersection Capacity Utilization	97.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	96	4	631	0	0	812
Future Volume (Veh/h)	96	4	631	0	0	812
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	96	4	631	0	0	812
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None			None
Median storage veh)						
Upstream signal (m)			243			
pX, platoon unblocked	0.88	0.88			0.88	
vC, conflicting volume	1443	631			631	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1435	513			513	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	25	99			100	
cM capacity (veh/h)	128	498			936	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	100	631	812
Volume Left	96	0	0
Volume Right	4	0	0
cSH	133	1700	1700
Volume to Capacity	0.75	0.37	0.48
Queue Length 95th (m)	35.2	0.0	0.0
Control Delay (s)	86.8	0.0	0.0
Lane LOS	F		
Approach Delay (s)	86.8	0.0	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	198	1817	184	2707	131	195	152	368	194	329
v/c Ratio	1.18	0.73	1.05	1.08	0.36	0.40	0.31	0.99	0.39	0.61
Control Delay	163.6	33.9	118.4	82.7	39.6	51.3	15.6	92.1	51.0	30.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	163.6	33.9	118.4	82.7	39.6	51.3	15.6	92.1	51.0	30.7
Queue Length 50th (m)	~62.4	173.0	~47.7	~371.1	30.6	54.3	10.0	100.2	53.8	49.8
Queue Length 95th (m)	#117.6	191.3	#102.1	#395.4	48.3	80.2	30.3	#178.0	79.2	85.9
Internal Link Dist (m)		97.9		281.6		369.2			219.0	
Turn Bay Length (m)	35.0		60.0				30.0	90.0		35.0
Base Capacity (vph)	168	2494	176	2504	363	491	494	373	501	539
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.18	0.73	1.05	1.08	0.36	0.40	0.31	0.99	0.39	0.61

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	198	1699	118	184	2387	320	131	195	152	368	194	329
Future Volume (vph)	198	1699	118	184	2387	320	131	195	152	368	194	329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		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)	1767	5011		1785	5021		1716	1842	1542	1765	1879	1576
Flt Permitted	0.05	1.00		0.06	1.00		0.53	1.00	1.00	0.53	1.00	1.00
Satd. Flow (perm)	93	5011		104	5021		954	1842	1542	979	1879	1576
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	198	1699	118	184	2387	320	131	195	152	368	194	329
RTOR Reduction (vph)	0	5	0	0	11	0	0	0	83	0	0	119
Lane Group Flow (vph)	198	1812	0	184	2696	0	131	195	69	368	194	210
Confl. Peds. (#/hr)	4		3	3		4	1		3	3		1
Heavy Vehicles (%)	1%	1%	5%	0%	0%	0%	4%	2%	2%	1%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	91.0	80.0		91.0	80.0		51.0	43.0	43.0	51.0	43.0	43.0
Effective Green, g (s)	91.0	80.0		91.0	80.0		51.0	43.0	43.0	51.0	43.0	43.0
Actuated g/C Ratio	0.57	0.50		0.57	0.50		0.32	0.27	0.27	0.32	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	166	2489		173	2494		340	491	411	349	501	420
v/s Ratio Prot	c0.08	0.36		0.07	0.54		0.02	0.11		c0.05	0.10	
v/s Ratio Perm	c0.59			0.52			0.10		0.04	c0.28		0.13
v/c Ratio	1.19	0.73		1.06	1.08		0.39	0.40	0.17	1.05	0.39	0.50
Uniform Delay, d1	53.4	31.9		46.6	40.5		41.6	48.4	45.3	55.3	48.2	49.9
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	131.1	1.9		86.3	44.4		0.7	2.4	0.9	63.2	2.3	4.2
Delay (s)	184.5	33.8		132.9	84.9		42.3	50.8	46.2	118.5	50.5	54.1
Level of Service	F	C		F	F		D	D	D	F	D	D
Approach Delay (s)		48.6			88.0			47.0			79.9	
Approach LOS		D			F			D			E	

Intersection Summary			
HCM 2000 Control Delay	71.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	161.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	138.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Appendix F

2041 Synchro Analysis Outputs

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	34	1812	565	145	1180	23	187	18	112	58	99	64
v/c Ratio	0.14	0.63	0.50	0.54	0.34	0.02	0.58	0.04	0.27	0.46	0.59	0.30
Control Delay	17.8	22.9	2.7	25.8	9.6	0.0	52.9	43.3	14.5	70.9	74.1	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	22.9	2.7	25.8	9.6	0.0	52.9	43.3	14.5	70.9	74.1	12.0
Queue Length 50th (m)	5.1	141.8	0.0	17.1	55.2	0.0	43.5	3.9	4.6	16.3	28.2	0.0
Queue Length 95th (m)	10.9	138.0	15.9	37.3	50.0	0.3	#79.6	11.7	22.5	30.9	46.5	11.2
Internal Link Dist (m)		638.5			401.6			1215.6			450.1	
Turn Bay Length (m)	115.0		180.0	80.0		70.0	110.0		45.0	30.0		25.0
Base Capacity (vph)	239	2882	1145	268	3515	1111	325	567	545	334	448	438
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.63	0.49	0.54	0.34	0.02	0.58	0.03	0.21	0.17	0.22	0.15

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	1812	565	145	1180	23	187	18	112	58	99	64
Future Volume (vph)	34	1812	565	145	1180	23	187	18	112	58	99	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	5142	1601	1789	5142	1601	1750	1842	1566	1750	1842	1566
Flt Permitted	0.23	1.00	1.00	0.07	1.00	1.00	0.54	1.00	1.00	0.75	1.00	1.00
Satd. Flow (perm)	428	5142	1601	131	5142	1601	996	1842	1566	1374	1842	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	34	1812	565	145	1180	23	187	18	112	58	99	64
RTOR Reduction (vph)	0	0	251	0	0	7	0	0	71	0	0	58
Lane Group Flow (vph)	34	1812	314	145	1180	16	187	18	41	58	99	6
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	77.9	77.9	77.9	95.7	95.7	95.7	30.7	30.7	30.7	12.9	12.9	12.9
Effective Green, g (s)	77.9	77.9	77.9	95.7	95.7	95.7	30.7	30.7	30.7	12.9	12.9	12.9
Actuated g/C Ratio	0.56	0.56	0.56	0.68	0.68	0.68	0.22	0.22	0.22	0.09	0.09	0.09
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	238	2861	890	264	3514	1094	298	403	343	126	169	144
v/s Ratio Prot		c0.35		c0.06	0.23		c0.07	0.01			0.05	
v/s Ratio Perm	0.08		0.20	0.32		0.01	c0.07		0.03	0.04		0.00
v/c Ratio	0.14	0.63	0.35	0.55	0.34	0.01	0.63	0.04	0.12	0.46	0.59	0.04
Uniform Delay, d1	15.0	21.3	17.1	21.2	9.1	7.1	47.8	43.1	43.8	60.2	61.0	57.9
Progression Factor	1.00	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	1.3	1.1	1.1	2.3	0.3	0.0	4.1	0.0	0.2	2.7	5.1	0.1
Delay (s)	16.2	22.3	18.2	23.5	9.4	7.1	51.9	43.1	44.0	62.9	66.1	58.0
Level of Service	B	C	B	C	A	A	D	D	D	E	E	E
Approach Delay (s)		21.3			10.8			48.6			62.9	
Approach LOS		C			B			D			E	

Intersection Summary

HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.6
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	468	232	87	237	522	284
Future Volume (Veh/h)	468	232	87	237	522	284
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	468	232	87	237	522	284
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	1415	87			324	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1415	87			324	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	76			58	
cM capacity (veh/h)	89	974			1247	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	468	232	87	237	806
Volume Left	468	0	0	0	522
Volume Right	0	232	0	237	0
cSH	89	974	1700	1700	1247
Volume to Capacity	5.26	0.24	0.05	0.14	0.42
Queue Length 95th (m)	Err	7.4	0.0	0.0	16.9
Control Delay (s)	Err	9.8	0.0	0.0	8.2
Lane LOS	F	A			A
Approach Delay (s)	6688.3		0.0		8.2
Approach LOS	F				

Intersection Summary			
Average Delay	2562.0		
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	511	230	89	470	64	117	362	209	250	755
v/c Ratio	0.09	0.55	0.52	0.41	0.51	0.14	0.64	0.38	0.23	0.50	0.80
Control Delay	17.4	21.5	19.8	24.7	20.9	6.0	32.6	10.9	2.3	14.5	21.2
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	17.4	21.5	19.8	24.7	20.9	6.0	32.6	10.9	2.3	14.5	21.2
Queue Length 50th (m)	1.7	26.7	18.0	8.5	24.2	0.0	8.8	22.7	0.0	16.9	63.9
Queue Length 95th (m)	6.3	39.9	36.4	20.3	36.6	7.5	#36.6	45.0	9.2	40.2	#141.9
Internal Link Dist (m)		1354.0			266.3			317.4			333.2
Turn Bay Length (m)	85.0		80.0	25.0		80.0	110.0			50.0	
Base Capacity (vph)	825	3247	1456	763	3247	1457	183	951	912	503	948
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.16	0.16	0.12	0.14	0.04	0.64	0.38	0.23	0.50	0.80

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	511	230	89	470	64	117	362	209	250	731	24
Future Volume (vph)	20	511	230	89	470	64	117	362	209	250	731	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3500	1566	1750	3500	1566	1789	1883	1601	1789	1874	
Flt Permitted	0.48	1.00	1.00	0.45	1.00	1.00	0.19	1.00	1.00	0.53	1.00	
Satd. Flow (perm)	889	3500	1566	824	3500	1566	363	1883	1601	996	1874	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	511	230	89	470	64	117	362	209	250	731	24
RTOR Reduction (vph)	0	0	32	0	0	47	0	0	103	0	1	0
Lane Group Flow (vph)	20	511	198	89	470	17	117	362	106	250	754	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	16.0	16.0	16.0	16.0	16.0	16.0	30.4	30.4	30.4	30.4	30.4	
Effective Green, g (s)	16.0	16.0	16.0	16.0	16.0	16.0	30.4	30.4	30.4	30.4	30.4	
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.27	0.27	0.50	0.50	0.50	0.50	0.50	
Clearance Time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	236	930	416	219	930	416	183	950	808	502	946	
v/s Ratio Prot		c0.15			0.13			0.19			c0.40	
v/s Ratio Perm	0.02		0.13	0.11		0.01	0.32		0.07	0.25		
v/c Ratio	0.08	0.55	0.48	0.41	0.51	0.04	0.64	0.38	0.13	0.50	0.80	
Uniform Delay, d1	16.6	19.0	18.6	18.2	18.7	16.4	10.9	9.1	7.9	9.9	12.3	
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	0.2	0.7	0.9	1.2	0.4	0.0	15.9	1.2	0.3	3.5	6.9	
Delay (s)	16.8	19.7	19.4	19.4	19.2	16.4	26.8	10.3	8.2	13.4	19.3	
Level of Service	B	B	B	B	B	B	C	B	A	B	B	
Approach Delay (s)		19.5			18.9			12.5			17.8	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	60.2	Sum of lost time (s)	13.8
Intersection Capacity Utilization	99.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	573	16	488	0	0	862
Future Volume (Veh/h)	573	16	488	0	0	862
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	573	16	488	0	0	862
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None			None
Median storage veh)						
Upstream signal (m)			243			
pX, platoon unblocked	0.87	0.87			0.87	
vC, conflicting volume	1350	488			488	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1327	330			330	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	97			100	
cM capacity (veh/h)	148	615			1063	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	589	488	862
Volume Left	573	0	0
Volume Right	16	0	0
cSH	151	1700	1700
Volume to Capacity	3.89	0.29	0.51
Queue Length 95th (m)	Err	0.0	0.0
Control Delay (s)	Err	0.0	0.0
Lane LOS	F		
Approach Delay (s)	Err	0.0	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	3037.3		
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	204	2892	249	1702	95	164	171	687	667	156
v/c Ratio	0.90	1.38	1.42	0.87	0.81	0.33	0.33	1.44	1.04	0.26
Control Delay	80.9	209.7	255.1	50.8	76.8	49.4	10.9	242.3	94.8	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.9	209.7	255.1	50.8	76.8	49.4	10.9	242.3	94.8	18.5
Queue Length 50th (m)	50.9	~470.5	~96.3	192.8	19.0	44.5	5.0	~310.8	~239.0	16.9
Queue Length 95th (m)	#98.6	#493.4	#156.7	214.3	#47.8	67.5	25.6	#391.2	#318.8	36.0
Internal Link Dist (m)		97.9		281.6		369.2			219.0	
Turn Bay Length (m)	35.0		60.0				30.0	90.0		35.0
Base Capacity (vph)	235	2098	175	1952	117	490	517	477	644	596
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	1.38	1.42	0.87	0.81	0.33	0.33	1.44	1.04	0.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	2807	85	249	1582	120	95	164	171	687	667	156
Future Volume (vph)	204	2807	85	249	1582	120	95	164	171	687	667	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.99	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	1.00	1.00
Frt	1.00	1.00		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)	1767	5004		1700	4965		1767	1824	1514	1607	1842	1551
Flt Permitted	0.06	1.00		0.06	1.00		0.09	1.00	1.00	0.54	1.00	1.00
Satd. Flow (perm)	113	5004		114	4965		173	1824	1514	919	1842	1551
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	204	2807	85	249	1582	120	95	164	171	687	667	156
RTOR Reduction (vph)	0	2	0	0	5	0	0	0	110	0	0	53
Lane Group Flow (vph)	204	2890	0	249	1697	0	95	164	61	687	667	103
Confl. Peds. (#/hr)	1					1			2	2		
Heavy Vehicles (%)	1%	2%	4%	5%	1%	16%	1%	3%	4%	11%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	82.0	67.0		74.8	62.8		49.0	43.0	43.0	65.0	56.0	56.0
Effective Green, g (s)	82.0	67.0		74.8	62.8		49.0	43.0	43.0	65.0	56.0	56.0
Actuated g/C Ratio	0.51	0.42		0.47	0.39		0.31	0.27	0.27	0.41	0.35	0.35
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	225	2095		172	1948		112	490	406	455	644	542
v/s Ratio Prot	c0.09	0.58		c0.11	0.34		0.03	0.09		c0.18	0.36	
v/s Ratio Perm	0.37			c0.57			0.23		0.04	c0.43		0.07
v/c Ratio	0.91	1.38		1.45	0.87		0.85	0.33	0.15	1.51	1.04	0.19
Uniform Delay, d1	49.6	46.5		49.8	44.9		47.1	47.0	44.6	45.6	52.0	36.2
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	35.4	173.9		231.0	5.7		41.5	0.4	0.2	240.6	45.0	0.2
Delay (s)	85.0	220.4		280.7	50.5		88.6	47.4	44.7	286.2	97.0	36.4
Level of Service	F	F		F	D		F	D	D	F	F	D
Approach Delay (s)		211.5			79.9			55.5			176.8	
Approach LOS		F			E			E			F	

Intersection Summary			
HCM 2000 Control Delay	157.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.48		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	135.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	38	1321	341	108	1625	47	536	32	64	62	30	38
v/c Ratio	0.39	0.56	0.36	0.44	0.58	0.05	0.91	0.05	0.11	0.53	0.19	0.18
Control Delay	38.8	27.8	3.1	18.6	21.0	2.4	58.5	30.3	7.9	74.1	58.0	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	27.8	3.1	18.6	21.0	2.4	58.5	30.3	7.9	74.1	58.0	2.1
Queue Length 50th (m)	7.3	102.0	0.0	13.9	112.3	0.0	127.1	5.7	0.0	17.0	8.0	0.0
Queue Length 95th (m)	18.2	104.5	15.9	19.4	106.4	4.3	#248.9	14.7	11.2	31.7	17.9	0.8
Internal Link Dist (m)		638.5			401.6			1215.6			450.1	
Turn Bay Length (m)	115.0		180.0	80.0		70.0	110.0		45.0	30.0		25.0
Base Capacity (vph)	108	2613	1004	243	2999	947	592	663	605	332	451	461
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.51	0.34	0.44	0.54	0.05	0.91	0.05	0.11	0.19	0.07	0.08

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	1321	341	108	1625	47	536	32	64	62	30	38
Future Volume (vph)	38	1321	341	108	1625	47	536	32	64	62	30	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.7	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1755	5092	1633	1825	5142	1585	1785	1879	1597	1700	1789	1597
Flt Permitted	0.11	1.00	1.00	0.12	1.00	1.00	0.57	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)	210	5092	1633	237	5142	1585	1076	1879	1597	1318	1789	1597
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	38	1321	341	108	1625	47	536	32	64	62	30	38
RTOR Reduction (vph)	0	0	187	0	0	22	0	0	41	0	0	35
Lane Group Flow (vph)	38	1321	154	108	1625	25	536	32	23	62	30	3
Heavy Vehicles (%)	4%	3%	0%	0%	2%	3%	0%	0%	0%	5%	5%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	60.8	60.8	60.8	72.8	72.8	72.8	48.6	48.6	48.6	10.4	10.4	10.4
Effective Green, g (s)	60.8	60.8	60.8	72.8	72.8	72.8	48.6	48.6	48.6	10.4	10.4	10.4
Actuated g/C Ratio	0.45	0.45	0.45	0.54	0.54	0.54	0.36	0.36	0.36	0.08	0.08	0.08
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	94	2293	735	233	2772	854	572	676	574	101	137	123
v/s Ratio Prot		0.26		0.03	c0.32		c0.24	0.02			0.02	
v/s Ratio Perm	0.18		0.09	0.22		0.02	c0.09		0.01	0.05		0.00
v/c Ratio	0.40	0.58	0.21	0.46	0.59	0.03	0.94	0.05	0.04	0.61	0.22	0.02
Uniform Delay, d1	24.9	27.5	22.5	18.1	21.0	14.6	39.7	28.1	28.1	60.4	58.5	57.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.4	1.1	0.6	1.5	0.9	0.1	23.0	0.0	0.0	10.6	0.8	0.1
Delay (s)	37.3	28.6	23.2	19.6	21.9	14.6	62.7	28.2	28.1	70.9	59.3	57.7
Level of Service	D	C	C	B	C	B	E	C	C	E	E	E
Approach Delay (s)		27.7			21.5			57.5			64.4	
Approach LOS		C			C			E			E	

Intersection Summary

HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	19.6
Intersection Capacity Utilization	94.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

2: Heart Lake Road & Countryside Drive

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	629	490	149	456	375	233
Future Volume (Veh/h)	629	490	149	456	375	233
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	629	490	149	456	375	233
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	1132	149			605	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1132	149			605	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	46			61	
cM capacity (veh/h)	139	900			973	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	629	490	149	456	608
Volume Left	629	0	0	0	375
Volume Right	0	490	0	456	0
cSH	139	900	1700	1700	973
Volume to Capacity	4.53	0.54	0.09	0.27	0.39
Queue Length 95th (m)	Err	26.9	0.0	0.0	14.7
Control Delay (s)	Err	13.7	0.0	0.0	8.7
Lane LOS	F	B			A
Approach Delay (s)	5626.5		0.0		8.7
Approach LOS	F				

Intersection Summary			
Average Delay	2702.1		
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

3: Dixie Road & Countryside Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	59	514	41	325	1030	201	45	464	308	184	395
v/c Ratio	0.35	0.32	0.05	0.86	0.62	0.25	0.17	0.68	0.39	0.86	0.59
Control Delay	19.6	13.8	3.5	42.0	17.9	4.6	25.3	32.5	4.8	67.2	28.7
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	19.6	13.8	3.5	42.0	17.9	4.6	25.3	32.5	4.8	67.2	28.7
Queue Length 50th (m)	6.0	26.9	0.0	46.0	64.7	5.1	5.2	67.0	0.0	29.1	53.4
Queue Length 95th (m)	15.6	36.6	4.7	#87.4	82.1	15.6	16.4	#140.1	19.2	#84.3	104.6
Internal Link Dist (m)		1354.0			266.3			317.4			333.2
Turn Bay Length (m)	85.0		80.0	25.0		80.0	110.0			50.0	
Base Capacity (vph)	243	2360	1073	546	2407	1084	271	678	780	213	675
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.22	0.04	0.60	0.43	0.19	0.17	0.68	0.39	0.86	0.59

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	514	41	325	1030	201	45	464	308	184	347	48
Future Volume (vph)	59	514	41	325	1030	201	45	464	308	184	347	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	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	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1783	3500	1574	1698	3570	1540	1821	1847	1595	1806	1828	
Flt Permitted	0.19	1.00	1.00	0.45	1.00	1.00	0.39	1.00	1.00	0.31	1.00	
Satd. Flow (perm)	361	3500	1574	811	3570	1540	740	1847	1595	582	1828	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	59	514	41	325	1030	201	45	464	308	184	347	48
RTOR Reduction (vph)	0	0	22	0	0	76	0	0	195	0	4	0
Lane Group Flow (vph)	59	514	19	325	1030	125	45	464	113	184	391	0
Confl. Peds. (#/hr)	4		3	3		4	5		2	2		5
Heavy Vehicles (%)	0%	2%	0%	5%	0%	1%	0%	4%	1%	1%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	39.5	39.5	39.5	39.5	39.5	39.5	31.1	31.1	31.1	31.1	31.1	
Effective Green, g (s)	39.5	39.5	39.5	39.5	39.5	39.5	31.1	31.1	31.1	31.1	31.1	
Actuated g/C Ratio	0.47	0.47	0.47	0.47	0.47	0.47	0.37	0.37	0.37	0.37	0.37	
Clearance Time (s)	7.2	7.2	7.2	7.2	7.2	7.2	6.6	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	168	1638	736	379	1670	720	272	680	587	214	673	
v/s Ratio Prot		0.15			0.29			0.25			0.21	
v/s Ratio Perm	0.16		0.01	c0.40		0.08	0.06		0.07	c0.32		
v/c Ratio	0.35	0.31	0.03	0.86	0.62	0.17	0.17	0.68	0.19	0.86	0.58	
Uniform Delay, d1	14.3	14.0	12.1	19.9	16.8	13.0	17.9	22.5	18.1	24.6	21.4	
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	1.3	0.1	0.0	17.1	0.7	0.1	1.3	5.5	0.7	33.6	3.6	
Delay (s)	15.6	14.1	12.1	37.1	17.5	13.1	19.2	28.0	18.9	58.3	25.0	
Level of Service	B	B	B	D	B	B	B	C	B	E	C	
Approach Delay (s)		14.1			21.0			24.0			35.6	
Approach LOS		B			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	84.4	Sum of lost time (s)	13.8
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	102	4	665	0	0	860
Future Volume (Veh/h)	102	4	665	0	0	860
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	102	4	665	0	0	860
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None			None
Median storage veh)						
Upstream signal (m)			243			
pX, platoon unblocked	0.86	0.86			0.86	
vC, conflicting volume	1525	665			665	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1529	533			533	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	7	99			100	
cM capacity (veh/h)	110	476			902	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	106	665	860
Volume Left	102	0	0
Volume Right	4	0	0
cSH	114	1700	1700
Volume to Capacity	0.93	0.39	0.51
Queue Length 95th (m)	46.7	0.0	0.0
Control Delay (s)	137.6	0.0	0.0
Lane LOS	F		
Approach Delay (s)	137.6	0.0	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	8.9		
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	210	1929	195	2871	139	206	161	389	205	349
v/c Ratio	1.24	0.84	0.88	1.18	0.37	0.42	0.33	1.01	0.40	0.63
Control Delay	187.2	43.3	78.6	121.1	38.5	51.9	17.2	95.7	50.6	30.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	187.2	43.3	78.6	121.1	38.5	51.9	17.2	95.7	50.6	30.8
Queue Length 50th (m)	~71.3	210.9	48.1	~421.7	32.0	57.8	12.3	~107.3	56.8	53.1
Queue Length 95th (m)	#128.5	232.1	#92.3	#444.5	50.0	84.3	33.8	#190.4	82.5	90.7
Internal Link Dist (m)		97.9		281.6		369.2			219.0	
Turn Bay Length (m)	35.0		60.0				30.0	90.0		35.0
Base Capacity (vph)	169	2284	235	2442	373	491	494	384	513	555
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.24	0.84	0.83	1.18	0.37	0.42	0.33	1.01	0.40	0.63

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

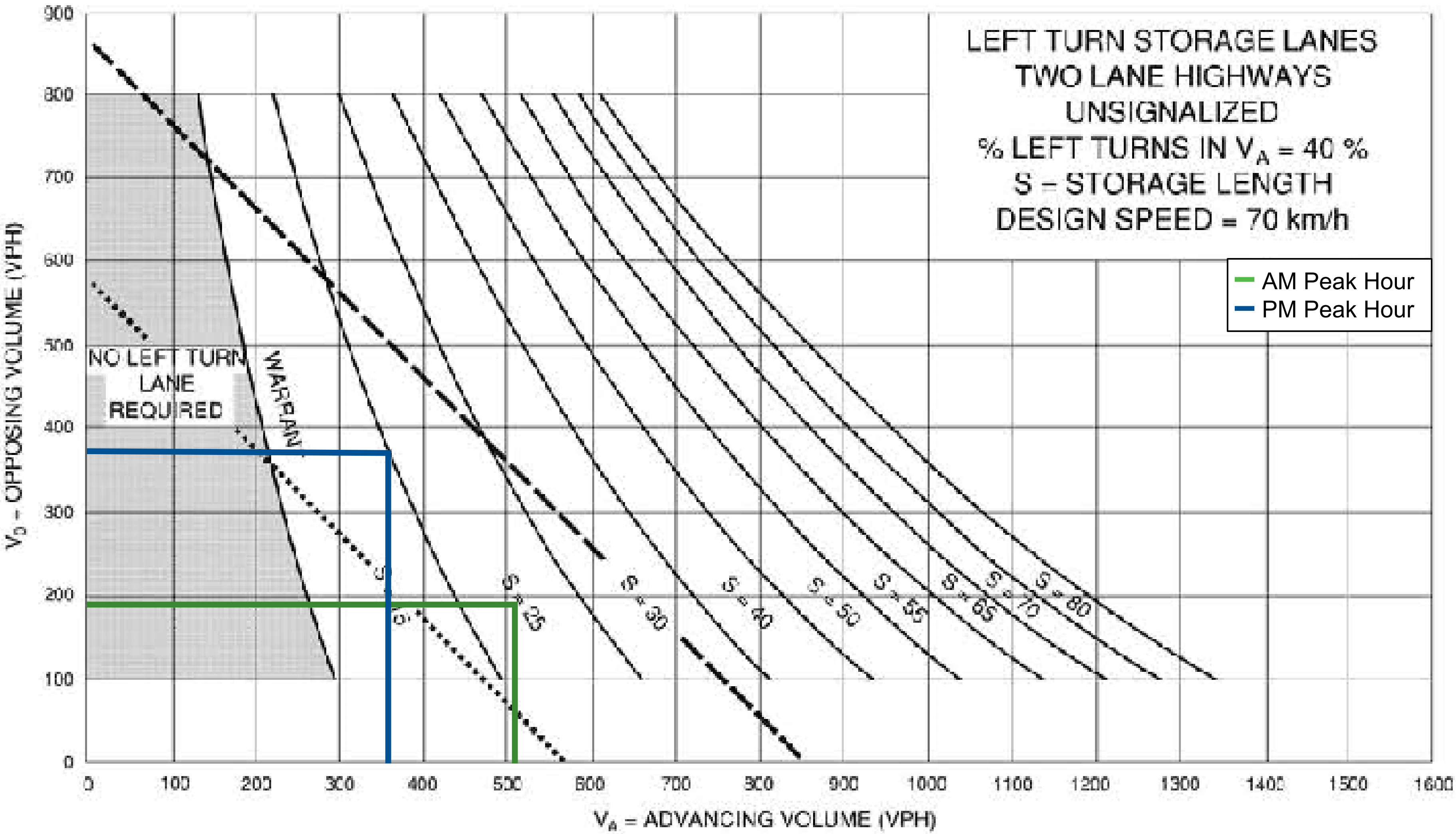
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	1804	125	195	2535	336	139	206	161	389	205	349
Future Volume (vph)	210	1804	125	195	2535	336	139	206	161	389	205	349
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		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)	1767	5011		1785	5022		1716	1842	1542	1765	1879	1576
Flt Permitted	0.05	1.00		0.05	1.00		0.53	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)	102	5011		99	5022		950	1842	1542	923	1879	1576
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	210	1804	125	195	2535	336	139	206	161	389	205	349
RTOR Reduction (vph)	0	5	0	0	11	0	0	0	83	0	0	125
Lane Group Flow (vph)	210	1924	0	195	2860	0	139	206	78	389	205	224
Confl. Peds. (#/hr)	4		3	3		4	1		3	3		1
Heavy Vehicles (%)	1%	1%	5%	0%	0%	0%	4%	2%	2%	1%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4		4	8		8
Actuated Green, G (s)	84.2	73.2		92.0	78.0		52.0	43.0	43.0	54.0	44.0	44.0
Effective Green, g (s)	84.2	73.2		92.0	78.0		52.0	43.0	43.0	54.0	44.0	44.0
Actuated g/C Ratio	0.52	0.45		0.57	0.48		0.32	0.27	0.27	0.34	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	167	2278		222	2433		349	491	411	361	513	430
v/s Ratio Prot	c0.09	0.38		c0.09	0.57		0.02	0.11		c0.07	0.11	
v/s Ratio Perm	c0.57			0.42			0.11		0.05	c0.29		0.14
v/c Ratio	1.26	0.84		0.88	1.18		0.40	0.42	0.19	1.08	0.40	0.52
Uniform Delay, d1	51.7	38.9		50.6	41.5		40.7	48.7	45.6	53.5	47.7	49.6
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	155.2	4.1		30.0	83.7		0.7	2.6	1.0	69.6	2.3	4.5
Delay (s)	206.8	42.9		80.6	125.2		41.4	51.3	46.6	123.1	50.0	54.0
Level of Service	F	D		F	F		D	D	D	F	D	D
Approach Delay (s)		59.0			122.3			47.1			81.7	
Approach LOS		E			F			D			F	

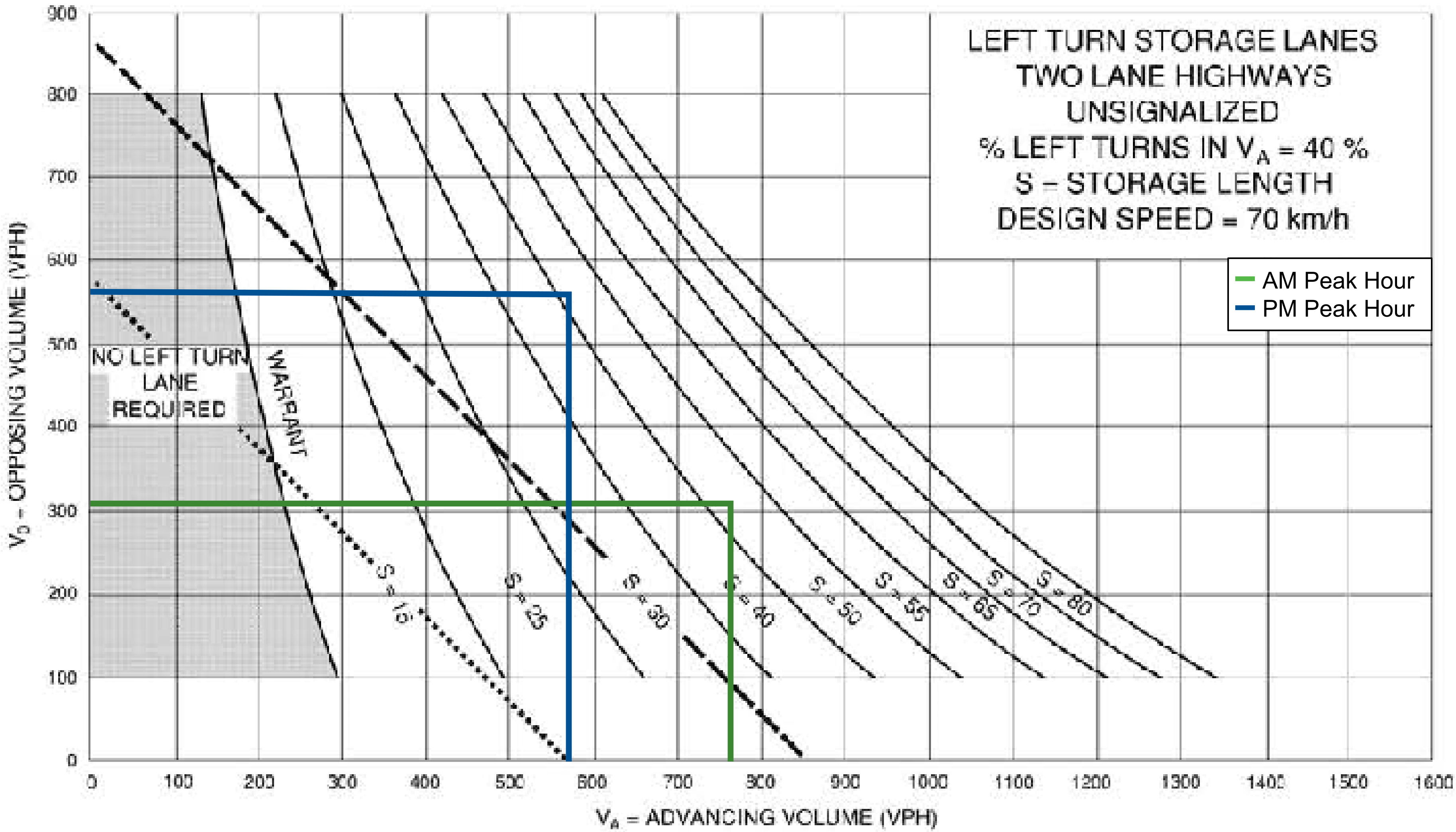
Intersection Summary			
HCM 2000 Control Delay	90.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	161.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	143.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Appendix G

Left-Turn Lane Nomographs

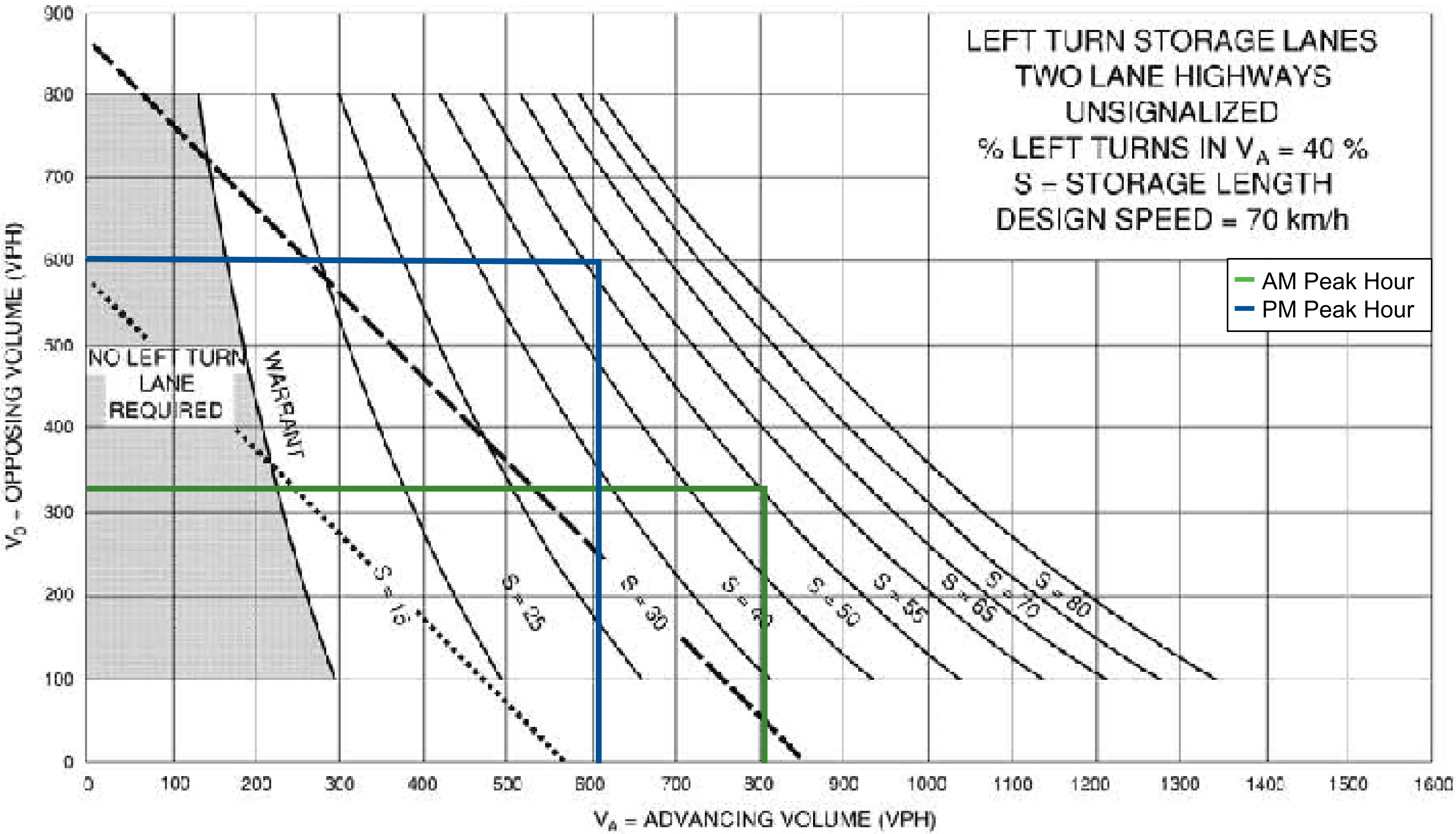


Location: Heart Lake Road & Countryside Drive
Direction: Southbound Left-Turn Lane
Horizon Year: Existing Traffic Volumes



Location: Heart Lake Road & Countryside Drive
Direction: Southbound Left-Turn Lane
Horizon Year: 2031 Horizon Traffic Volumes

Appendix G



paradigm

Location: Heart Lake Road & Countryside Drive
Direction: Southbound Left-Turn Lane
Horizon Year: 2041 Horizon Traffic Volumes

Appendix G

Appendix H

Signal Warrant Analysis Sheets

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Heart Lake Road/Country Side Drive

Count Date: Base Year

Summary Results

Justification			Compliance		Signal Justified?	
					YES	NO
1. Minimum Vehicular Volume	A	Total Volume	91	%	☐	☑
	B	Crossing Volume	100	%		
2. Delay to Cross Traffic	A	Main Road	62	%	☐	☑
	B	Crossing Road	100	%		
3. Combination	A	Justificaton 1	91	%	☐	☑
	B	Justification 2	62	%		
4. 4-Hr Volume			75	%	☐	☑

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Heart Lake Road/Country Side Drive

Count Date: 2031

Summary Results

Justification			Compliance		Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	100	%	☑	☐
	B	Crossing Volume	100	%		
2. Delay to Cross Traffic	A	Main Road	83	%	☐	☑
	B	Crossing Road	100	%		
3. Combination	A	Justificaton 1	100	%	☑	☐
	B	Justification 2	83	%		
4. 4-Hr Volume			100	%	☑	☐

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Heart Lake Road/Country Side Drive   Count Date: 2041

Summary Results

Justification			Compliance		Signal Justified?	
					YES	NO
1. Minimum Vehicular Volume	A	Total Volume	100	%	☑	☐
	B	Crossing Volume	100	%		
2. Delay to Cross Traffic	A	Main Road	86	%	☐	☑
	B	Crossing Road	100	%		
3. Combination	A	Justificaton 1	100	%	☑	☐
	B	Justification 2	86	%		
4. 4-Hr Volume			100	%	☑	☐

Appendix I

Traffic Signal Control Synchro Analysis Outputs

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	443	222	83	223	492	268
v/c Ratio	0.67	0.31	0.21	0.44	0.62	0.28
Control Delay	32.5	4.2	34.4	7.6	18.7	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	4.2	34.4	7.6	18.7	15.0
Queue Length 50th (m)	74.6	0.0	14.1	0.0	60.4	29.9
Queue Length 95th (m)	110.5	15.0	27.6	19.2	88.8	46.7
Internal Link Dist (m)	1354.0		1063.6			1215.6
Turn Bay Length (m)				10.0	50.0	
Base Capacity (vph)	660	724	394	511	794	958
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.31	0.21	0.44	0.62	0.28

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	443	222	83	223	492	268
Future Volume (vph)	443	222	83	223	492	268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.0	6.0	6.0	6.0	3.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1785	1581	1879	1597	1785	1879
Flt Permitted	0.95	1.00	1.00	1.00	0.62	1.00
Satd. Flow (perm)	1785	1581	1879	1597	1156	1879
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	443	222	83	223	492	268
RTOR Reduction (vph)	0	140	0	176	0	0
Lane Group Flow (vph)	443	82	83	47	492	268
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	37.0	37.0	21.0	21.0	51.0	51.0
Effective Green, g (s)	37.0	37.0	21.0	21.0	51.0	51.0
Actuated g/C Ratio	0.37	0.37	0.21	0.21	0.51	0.51
Clearance Time (s)	6.0	6.0	6.0	6.0	3.0	6.0
Lane Grp Cap (vph)	660	584	394	335	759	958
v/s Ratio Prot	c0.25		0.04		c0.17	0.14
v/s Ratio Perm		0.05		0.03	c0.16	
v/c Ratio	0.67	0.14	0.21	0.14	0.65	0.28
Uniform Delay, d1	26.4	20.9	32.6	32.1	16.6	14.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.4	0.5	1.2	0.9	4.3	0.7
Delay (s)	31.8	21.4	33.9	33.0	20.9	14.7
Level of Service	C	C	C	C	C	B
Approach Delay (s)	28.3		33.2			18.7
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	593	463	141	430	356	221
v/c Ratio	0.68	0.46	0.43	0.36	0.62	0.30
Control Delay	28.4	3.1	48.8	3.0	29.5	25.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	3.1	48.8	3.0	29.5	25.3
Queue Length 50th (m)	109.2	0.0	31.5	11.3	61.6	36.3
Queue Length 95th (m)	152.5	17.0	52.3	22.1	89.4	56.1
Internal Link Dist (m)	1354.0		1063.6			1215.6
Turn Bay Length (m)				10.0	50.0	
Base Capacity (vph)	868	1012	328	1208	578	744
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.46	0.43	0.36	0.62	0.30

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	593	463	141	430	356	221
Future Volume (vph)	593	463	141	430	356	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.0	6.0	6.0	6.0	3.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1767	1581	1879	1581	1750	1824
Flt Permitted	0.95	1.00	1.00	1.00	0.52	1.00
Satd. Flow (perm)	1767	1581	1879	1581	952	1824
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	593	463	141	430	356	221
RTOR Reduction (vph)	0	235	0	89	0	0
Lane Group Flow (vph)	593	228	141	341	356	221
Heavy Vehicles (%)	1%	1%	0%	1%	2%	3%
Turn Type	Prot	Perm	NA	pm+ov	pm+pt	NA
Protected Phases	8		2	8	1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	59.0	59.0	21.0	80.0	49.0	49.0
Effective Green, g (s)	59.0	59.0	21.0	80.0	49.0	49.0
Actuated g/C Ratio	0.49	0.49	0.18	0.67	0.41	0.41
Clearance Time (s)	6.0	6.0	6.0	6.0	3.0	6.0
Lane Grp Cap (vph)	868	777	328	1133	554	744
v/s Ratio Prot	c0.34		0.08	0.15	c0.13	0.12
v/s Ratio Perm		0.14		0.07	c0.13	
v/c Ratio	0.68	0.29	0.43	0.30	0.64	0.30
Uniform Delay, d1	23.3	18.1	44.2	8.3	26.5	23.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.3	1.0	4.1	0.7	5.6	1.0
Delay (s)	27.7	19.1	48.2	9.0	32.2	24.9
Level of Service	C	B	D	A	C	C
Approach Delay (s)	23.9		18.7			29.4
Approach LOS	C		B			C

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	468	232	87	237	522	284
v/c Ratio	0.71	0.32	0.24	0.48	0.65	0.30
Control Delay	34.0	4.2	36.6	8.2	19.5	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.0	4.2	36.6	8.2	19.5	15.2
Queue Length 50th (m)	80.4	0.0	15.2	0.0	65.6	32.0
Queue Length 95th (m)	118.7	15.3	29.3	20.3	96.1	49.4
Internal Link Dist (m)	1354.0		1063.6			1215.6
Turn Bay Length (m)				10.0	50.0	
Base Capacity (vph)	660	731	357	495	801	958
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.32	0.24	0.48	0.65	0.30

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	468	232	87	237	522	284
Future Volume (vph)	468	232	87	237	522	284
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.0	6.0	6.0	6.0	3.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1785	1581	1879	1597	1785	1879
Flt Permitted	0.95	1.00	1.00	1.00	0.61	1.00
Satd. Flow (perm)	1785	1581	1879	1597	1137	1879
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	468	232	87	237	522	284
RTOR Reduction (vph)	0	146	0	192	0	0
Lane Group Flow (vph)	468	86	87	45	522	284
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	37.0	37.0	19.0	19.0	51.0	51.0
Effective Green, g (s)	37.0	37.0	19.0	19.0	51.0	51.0
Actuated g/C Ratio	0.37	0.37	0.19	0.19	0.51	0.51
Clearance Time (s)	6.0	6.0	6.0	6.0	3.0	6.0
Lane Grp Cap (vph)	660	584	357	303	767	958
v/s Ratio Prot	c0.26		0.05		c0.20	0.15
v/s Ratio Perm		0.05		0.03	c0.15	
v/c Ratio	0.71	0.15	0.24	0.15	0.68	0.30
Uniform Delay, d1	26.9	21.0	34.4	33.8	17.0	14.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.3	0.5	1.6	1.0	4.8	0.8
Delay (s)	33.2	21.5	36.0	34.8	21.9	14.9
Level of Service	C	C	D	C	C	B
Approach Delay (s)	29.4		35.1			19.4
Approach LOS	C		D			B

Intersection Summary			
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	629	490	149	456	375	233
v/c Ratio	0.74	0.48	0.48	0.39	0.64	0.31
Control Delay	31.3	3.3	51.0	3.9	29.5	24.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.3	3.3	51.0	3.9	29.5	24.8
Queue Length 50th (m)	121.6	0.0	33.8	15.4	64.7	38.0
Queue Length 95th (m)	169.8	17.7	55.6	29.3	93.4	58.2
Internal Link Dist (m)	1354.0		1063.6			1215.6
Turn Bay Length (m)				10.0	50.0	
Base Capacity (vph)	854	1017	313	1183	588	760
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.48	0.48	0.39	0.64	0.31

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	629	490	149	456	375	233
Future Volume (vph)	629	490	149	456	375	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.0	6.0	6.0	6.0	3.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1767	1581	1879	1581	1750	1824
Flt Permitted	0.95	1.00	1.00	1.00	0.49	1.00
Satd. Flow (perm)	1767	1581	1879	1581	900	1824
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	629	490	149	456	375	233
RTOR Reduction (vph)	0	253	0	89	0	0
Lane Group Flow (vph)	629	237	149	367	375	233
Heavy Vehicles (%)	1%	1%	0%	1%	2%	3%
Turn Type	Prot	Perm	NA	pm+ov	pm+pt	NA
Protected Phases	8		2	8	1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	58.0	58.0	20.0	78.0	50.0	50.0
Effective Green, g (s)	58.0	58.0	20.0	78.0	50.0	50.0
Actuated g/C Ratio	0.48	0.48	0.17	0.65	0.42	0.42
Clearance Time (s)	6.0	6.0	6.0	6.0	3.0	6.0
Lane Grp Cap (vph)	854	764	313	1106	566	760
v/s Ratio Prot	c0.36		0.08	0.16	c0.15	0.13
v/s Ratio Perm		0.15		0.07	c0.13	
v/c Ratio	0.74	0.31	0.48	0.33	0.66	0.31
Uniform Delay, d1	24.9	18.8	45.3	9.4	26.2	23.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.6	1.1	5.1	0.8	6.0	1.0
Delay (s)	30.5	19.9	50.4	10.2	32.2	24.5
Level of Service	C	B	D	B	C	C
Approach Delay (s)	25.9		20.1			29.2
Approach LOS	C		C			C

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Appendix J

Roundabout Screening

2041 Future Traffic Volumes														
Intersection	**AM**							**PM**						
	Movement	**Volume**	**Approach**	**E**	**C**	**E + C**	**Result**	**Movement**	**Volume**	**Approach**	**E**	**C**	**E + C**	**Result**
Heart Lake Road at Countryside Drive	EBL		EB	0	1274	1274		EBL		EB	0	1237	1237	
	EBT				1274			EBT				1237		
	EBR				1274			EBR				1237		
	WBL	468	WB	700	87	787	Single-lane entry likely sufficient	WBL	629	WB	1119	149	1268	Single-lane entry likely sufficient
	WBT				87			WBT				149		
	WBR	232			87			WBR	490			149		
	NBL		NB	324	522	846	Single-lane entry likely sufficient	NBL		NB	605	375	980	Single-lane entry likely sufficient
	NBT	87			522			NBT	149			375		
	NBR	237			522			NBR	456			375		
	SBL	522	SB	806	468	1274	Single-lane entry likely sufficient	SBL	375	SB	608	629	1237	Single-lane entry likely sufficient
	SBT	284			468			SBT	233			629		
	SBR				468			SBR				629		
	Total	1830	**Total**	1830	-			**Total**	2332	**Total**	2332	-		

E - Entry Flow
C - Circulating Flow

From the MTO Roundabout Feasibility Initial Screening Tool Version 1.0
It identifies the capacity guidelines for multi-lane entries as follows:
Entry flow + circulating flow < 1400 vph, use single lane entry
1400 vph < entry flow + circulating flow < 2200 vph, use two-lane entry
Entry flow + circulating flow > 2200 vph, use three-lane entry

This is generally consistent with NCHRP Report 675 Roundabouts: An Informational Guide, Second Edition

Volume Range (sum of entering and conflicting volumes)	Number of Lanes Required
0 to 1,000 vph	Single-lane entry likely to be sufficient
1,000 to 1,300 vph	Two-lane entry may be needed
1,300 to 1,800 vph	Two-lane entry likely to be sufficient
1,800 vph	More than two entering lanes may be required

Appendix K

Roundabout ARCADY Analysis Outputs

Junctions 8

ARCADY 8 - Roundabout Module

Filename: Heart Lake and Country Side.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Projects\200333
Report generation date: 2021-04-14 11:21:40 AM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031						
Intersection 1 - Leg North	3.45	10.20	15.29	0.78	C	10.10	B
Intersection 1 - Leg South	0.48	1.02	5.19	0.32	A		
Intersection 1 - Leg East	1.29	1.02	6.41	0.56	A		
Intersection 2 - Leg North	3.45	10.20	15.30	0.78	C	9.36	A
Intersection 2 - Leg South	0.48	1.02	5.19	0.32	A		
Intersection 2 - Leg East	0.61	1.02	4.49	0.37	A		
Intersection 3 - Leg North	3.45	10.20	15.30	0.78	C	8.79	A
Intersection 3 - Leg South	0.48	1.02	5.19	0.32	A		
Intersection 3 - Leg East	0.61	1.02	3.01	0.37	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2031, AM " model duration: 8:00 AM - 9:30 AM
"D2 - 2031, PM" model duration: 4:00 PM - 5:30 PM
"D3 - 2041, AM" model duration: 8:00 AM - 9:30 AM
"D4 - 2041, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2021-04-14 11:21:39 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	2021-04-14
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031, AM	2031	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	1	Single-Lanes	Roundabout	North,South,East				10.10	B
2	2	Single-Lane + WB Bypass	Roundabout	North,South,East				9.36	A
3	3	Patial Dual Lane	Roundabout	North,South,East				8.79	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1	North	North	Heart Lake Road	
1	South	South	Heart Lake Road	
1	East	East	Countryside Drive	
2	North	North	Heart Lake Road	
2	South	South	Heart Lake Road	
2	East	East	Countryside Drive	
3	North	North	Heart Lake Road	
3	South	South	Heart Lake Road	
3	East	East	Countryside Drive	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	North	0.00	99999.00		0.00
1	South	0.00	99999.00		0.00
1	East	0.00	99999.00		0.00
2	North	0.00	99999.00		0.00
2	South	0.00	99999.00		0.00
2	East	0.00	99999.00		0.00
3	North	0.00	99999.00		0.00
3	South	0.00	99999.00		0.00
3	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	North	3.50	4.50	30.00	20.00	40.00	25.00	
1	South	3.50	4.50	30.00	20.00	40.00	25.00	
1	East	3.50	4.50	30.00	20.00	40.00	25.00	
2	North	3.50	4.50	30.00	20.00	40.00	25.00	
2	South	3.50	4.50	30.00	20.00	40.00	25.00	
2	East	3.50	4.50	30.00	20.00	40.00	25.00	
3	North	3.50	4.50	30.00	20.00	40.00	25.00	
3	South	3.50	4.50	30.00	20.00	40.00	25.00	
3	East	3.50	8.00	30.00	20.00	45.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1	North		
1	South		
1	East		
2	North		
2	South		
2	East	✓	100
3	North		
3	South		
3	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1	North		(calculated)	(calculated)	0.579	1357.445
1	South		(calculated)	(calculated)	0.579	1357.445
1	East		(calculated)	(calculated)	0.579	1357.445
2	North		(calculated)	(calculated)	0.579	1357.445
2	South		(calculated)	(calculated)	0.579	1357.445
2	East		(calculated)	(calculated)	0.579	1357.445
3	North		(calculated)	(calculated)	0.579	1357.445
3	South		(calculated)	(calculated)	0.579	1357.445
3	East		(calculated)	(calculated)	0.695	2016.168

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	North	ONE HOUR	✓	760.00	100.000
1	South	ONE HOUR	✓	306.00	100.000
1	East	ONE HOUR	✓	665.00	100.000
2	North	ONE HOUR	✓	760.00	100.000
2	South	ONE HOUR	✓	306.00	100.000
2	East	ONE HOUR	✓	665.00	100.000
3	North	ONE HOUR	✓	760.00	100.000
3	South	ONE HOUR	✓	306.00	100.000
3	East	ONE HOUR	✓	665.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	0.000	268.000	492.000
	South	83.000	0.000	223.000
	East	222.000	443.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	0.00	0.35	0.65
	South	0.27	0.00	0.73

	East	0.33	0.67	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	0.000	268.000	492.000
	South	83.000	0.000	223.000
	East	222.000	443.000	0.000

Turning Proportions (PCE) - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	0.00	0.35	0.65
	South	0.27	0.00	0.73
	East	0.33	0.67	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	0.000	268.000	492.000
	South	83.000	0.000	223.000
	East	222.000	443.000	0.000

Turning Proportions (PCE) - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	0.00	0.35	0.65
	South	0.27	0.00	0.73
	East	0.33	0.67	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Average PCE Per Vehicle - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Average PCE Per Vehicle - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1	North	0.78	15.29	3.45	10.20	C	697.39	1046.08	173.44	9.95	1.93	173.46	9.95
1	South	0.32	5.19	0.48	1.02	A	280.79	421.19	32.19	4.59	0.36	32.20	4.59
1	East	0.56	6.41	1.29	1.02	A	610.22	915.32	82.16	5.39	0.91	82.17	5.39
2	North	0.78	15.30	3.45	10.20	C	697.39	1046.08	173.50	9.95	1.93	173.52	9.95
2	South	0.32	5.19	0.48	1.02	A	280.79	421.19	32.19	4.59	0.36	32.20	4.59
2	East	0.37	4.49	0.61	1.02	A	610.22	609.76	41.59	4.09	0.46	41.59	4.09
3	North	0.78	15.30	3.45	10.20	C	697.39	1046.08	173.53	9.95	1.93	173.56	9.95
3	South	0.32	5.19	0.48	1.02	A	280.79	421.19	32.19	4.59	0.36	32.20	4.59
3	East	0.37	3.01	0.61	1.02	A	610.22	915.32	41.91	2.75	0.47	41.92	2.75

Main Results for each time segment

Main results: (08:00-08:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	572.17		143.04			568.28	228.52	331.87	0.00	1165.37	895.93	0.491	0.00	0.97	6.112	A
1	South	230.37		57.59			229.35	532.26	367.89	0.00	1144.53	1021.77	0.201	0.00	0.26	4.008	A
1	East	500.65		125.16			498.18	535.03	62.21	0.00	1321.44	1197.04	0.379	0.00	0.62	4.447	A
2	North	572.17	572.17	143.04	0.00	167.13	568.28	62.21	332.14	0.00	1165.21	672.26	0.491	0.00	0.97	6.113	A
2	South	230.37	230.37	57.59	0.00	0.00	229.35	532.54	367.89	0.00	1144.53	1105.57	0.201	0.00	0.26	4.008	A
2	East	500.65	333.51	83.38	167.13	0.00	332.14	535.03	62.21	0.00	1321.44	1183.89	0.252	0.00	0.34	3.707	A
3	North	572.17		143.04			568.28	228.88	332.59	0.00	1164.95	660.74	0.491	0.00	0.97	6.116	A
3	South	230.37		57.59			229.35	532.99	367.89	0.00	1144.53	1109.89	0.201	0.00	0.26	4.008	A
3	East	500.65		125.16			499.26	535.03	62.21	0.00	1972.95	1807.03	0.254	0.00	0.35	2.489	A

Main results: (08:15-08:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	683.22		170.81			680.97	273.80	397.65	0.00	1127.30	895.93	0.606	0.97	1.53	8.184	A
1	South	275.09		68.77			274.76	637.78	440.84	0.00	1102.31	1021.77	0.250	0.26	0.34	4.434	A
1	East	597.82		149.46			596.92	641.07	74.53	0.00	1314.31	1197.04	0.455	0.62	0.84	5.112	A
2	North	683.22	683.22	170.81	0.00	199.57	680.97	74.53	397.86	0.00	1127.18	672.26	0.606	0.97	1.54	8.186	A
2	South	275.09	275.09	68.77	0.00	0.00	274.76	637.99	440.84	0.00	1102.31	1105.57	0.250	0.26	0.34	4.434	A
2	East	597.82	398.25	99.56	199.57	0.00	397.86	641.07	74.53	0.00	1314.31	1183.89	0.303	0.34	0.44	4.005	A
3	North	683.22		170.81			680.97	273.97	397.98	0.00	1127.11	660.74	0.606	0.97	1.54	8.188	A
3	South	275.09		68.77			274.76	638.12	440.84	0.00	1102.31	1109.89	0.250	0.26	0.34	4.434	A
3	East	597.82		149.46			597.43	641.07	74.53	0.00	1964.39	1807.03	0.304	0.35	0.44	2.686	A

Main results: (08:30-08:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	836.78		209.19			829.58	335.07	486.57	0.00	1075.84	895.93	0.778	1.53	3.33	14.498	B
1	South	336.91		84.23			336.34	779.11	537.04	0.00	1046.63	1021.77	0.322	0.34	0.48	5.165	A
1	East	732.18		183.04			730.41	782.15	91.23	0.00	1304.65	1197.04	0.561	0.84	1.28	6.376	A
2	North	836.78	836.78	209.19	0.00	244.43	829.56	91.23	487.10	0.00	1075.53	672.26	0.778	1.54	3.34	14.514	B
2	South	336.91	336.91	84.23	0.00	0.00	336.34	779.63	537.03	0.00	1046.63	1105.57	0.322	0.34	0.48	5.165	A
2	East	732.18	487.75	121.94	244.43	0.00	487.10	782.14	91.23	0.00	1304.65	1183.89	0.374	0.44	0.60	4.487	A
3	North	836.78		209.19			829.56	335.44	487.31	0.00	1075.41	660.74	0.778	1.54	3.34	14.520	B
3	South	336.91		84.23			336.34	779.84	537.03	0.00	1046.63	1109.89	0.322	0.34	0.48	5.165	A

3	East	732.18		183.04			731.52	782.14	91.23	0.00	1952.79	1807.03	0.375	0.44	0.61	3.005	A

Main results: (08:45-09:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	836.78		209.19			836.31	335.79	487.73	0.00	1075.17	895.93	0.778	3.33	3.45	15.294	C
1	South	336.91		84.23			336.90	782.64	541.40	0.00	1044.10	1021.77	0.323	0.48	0.48	5.191	A
1	East	732.18		183.04			732.14	786.92	91.38	0.00	1304.56	1197.04	0.561	1.28	1.29	6.414	A
2	North	836.78	836.78	209.19	0.00	244.43	836.32	91.38	487.74	0.00	1075.16	672.26	0.778	3.34	3.45	15.296	C
2	South	336.91	336.91	84.23	0.00	0.00	336.90	782.66	541.41	0.00	1044.10	1105.57	0.323	0.48	0.48	5.191	A
2	East	732.18	487.75	121.94	244.43	0.00	487.74	786.93	91.38	0.00	1304.56	1183.89	0.374	0.60	0.61	4.495	A
3	North	836.78		209.19			836.33	335.81	487.75	0.00	1075.16	660.74	0.778	3.34	3.45	15.296	C
3	South	336.91		84.23			336.90	782.66	541.41	0.00	1044.10	1109.89	0.323	0.48	0.48	5.191	A
3	East	732.18		183.04			732.17	786.93	91.38	0.00	1952.69	1807.03	0.375	0.61	0.61	3.007	A

Main results: (09:00-09:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	683.22		170.81			690.59	274.92	399.41	0.00	1126.29	895.93	0.607	3.45	1.61	8.566	A
1	South	275.09		68.77			275.65	642.93	447.07	0.00	1098.70	1021.77	0.250	0.48	0.34	4.464	A
1	East	597.82		149.46			599.56	647.95	74.77	0.00	1314.17	1197.04	0.455	1.29	0.86	5.152	A
2	North	683.22	683.22	170.81	0.00	199.57	690.60	74.77	398.89	0.00	1126.58	672.26	0.606	3.45	1.61	8.558	A
2	South	275.09	275.09	68.77	0.00	0.00	275.65	642.42	447.07	0.00	1098.70	1105.57	0.250	0.48	0.34	4.465	A
2	East	597.82	398.25	99.56	199.57	0.00	398.89	647.96	74.77	0.00	1314.17	1183.89	0.303	0.61	0.45	4.016	A
3	North	683.22		170.81			690.60	274.56	398.68	0.00	1126.71	660.74	0.606	3.45	1.61	8.556	A
3	South	275.09		68.77			275.65	642.21	447.08	0.00	1098.70	1109.89	0.250	0.48	0.34	4.465	A
3	East	597.82		149.46			598.47	647.96	74.77	0.00	1964.23	1807.03	0.304	0.61	0.45	2.691	A

Main results: (09:15-09:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	572.17		143.04			574.61	230.02	334.13	0.00	1164.06	895.93	0.492	1.61	1.00	6.256	A
1	South	230.37		57.59			230.71	536.76	371.98	0.00	1142.16	1021.77	0.202	0.34	0.26	4.029	A
1	East	500.65		125.16			501.58	540.11	62.58	0.00	1321.23	1197.04	0.379	0.86	0.63	4.484	A
2	North	572.17	572.17	143.04	0.00	167.13	574.60	62.58	333.91	0.00	1164.19	672.26	0.491	1.61	1.00	6.255	A
2	South	230.37	230.37	57.59	0.00	0.00	230.71	536.54	371.98	0.00	1142.16	1105.57	0.202	0.34	0.26	4.031	A
2	East	500.65	333.51	83.38	167.13	0.00	333.91	540.11	62.58	0.00	1321.23	1183.89	0.252	0.45	0.35	3.719	A
3	North	572.17		143.04			574.60	229.84	333.78	0.00	1164.27	660.74	0.491	1.61	1.00	6.254	A
3	South	230.37		57.59			230.71	536.40	371.98	0.00	1142.16	1109.89	0.202	0.34	0.26	4.029	A
3	East	500.65		125.16			501.05	540.11	62.58	0.00	1972.70	1807.03	0.254	0.45	0.35	2.497	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	13.94	0.93	6.112	A	A
1	South	3.75	0.25	4.008	A	A
1	East	8.99	0.60	4.447	A	A
2	North	13.95	0.93	6.113	A	A
2	South	3.75	0.25	4.008	A	A
2	East	5.02	0.33	3.707	A	A
3	North	13.95	0.93	6.116	A	A
3	South	3.75	0.25	4.008	A	A
3	East	5.10	0.34	2.489	A	A

Queueing Delay results: (08:15-08:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	21.99	1.47	8.184	A	A
1	South	4.97	0.33	4.434	A	A
1	East	12.33	0.82	5.112	A	A
2	North	22.00	1.47	8.186	A	A
2	South	4.97	0.33	4.434	A	A
2	East	6.50	0.43	4.005	A	A
3	North	22.00	1.47	8.188	A	A
3	South	4.97	0.33	4.434	A	A
3	East	6.58	0.44	2.686	A	A

Queueing Delay results: (08:30-08:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	45.19	3.01	14.498	B	B
1	South	7.04	0.47	5.165	A	A
1	East	18.58	1.24	6.376	A	A
2	North	45.24	3.02	14.514	B	B
2	South	7.04	0.47	5.165	A	A
2	East	8.88	0.59	4.487	A	A
3	North	45.26	3.02	14.520	B	B
3	South	7.04	0.47	5.165	A	A
3	East	8.98	0.60	3.005	A	A

Queueing Delay results: (08:45-09:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	51.07	3.40	15.294	C	B
1	South	7.24	0.48	5.191	A	A
1	East	19.36	1.29	6.414	A	A
2	North	51.10	3.41	15.296	C	B
2	South	7.24	0.48	5.191	A	A
2	East	9.09	0.61	4.495	A	A
3	North	51.11	3.41	15.296	C	B
3	South	7.24	0.48	5.191	A	A
3	East	9.14	0.61	3.007	A	A

Queueing Delay results: (09:00-09:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	25.69	1.71	8.566	A	A
1	South	5.25	0.35	4.464	A	A
1	East	13.28	0.89	5.152	A	A
2	North	25.67	1.71	8.558	A	A
2	South	5.25	0.35	4.465	A	A
2	East	6.82	0.45	4.016	A	A
3	North	25.66	1.71	8.556	A	A
3	South	5.25	0.35	4.465	A	A
3	East	6.82	0.45	2.691	A	A

Queueing Delay results: (09:15-09:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	15.55	1.04	6.256	A	A
1	South	3.95	0.26	4.029	A	A
1	East	9.62	0.64	4.484	A	A
2	North	15.54	1.04	6.255	A	A
2	South	3.95	0.26	4.031	A	A
2	East	5.28	0.35	3.719	A	A
3	North	15.54	1.04	6.254	A	A
3	South	3.95	0.26	4.029	A	A
3	East	5.29	0.35	2.497	A	A

Queue Variation Results for each time segment

Queue Variation results: (08:00-08:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.97	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.62	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	0.97	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.97	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.53	0.00	0.00	3.06	4.08			N/A	N/A
1	South	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.84	0.00	0.00	0.00	1.02			N/A	N/A
2	North	1.54	0.00	0.00	3.06	4.08			N/A	N/A
2	South	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.44	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	1.54	0.00	0.00	3.06	4.08			N/A	N/A
3	South	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.44	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	3.33	0.00	0.00	2.04	10.20			N/A	N/A
1	South	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	1.28	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	3.34	0.00	0.00	2.04	10.20			N/A	N/A
2	South	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.60	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	3.34	0.00	0.00	2.04	10.20			N/A	N/A
3	South	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.61	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	3.45	0.00	0.00	0.00	6.12			N/A	N/A
1	South	0.48	0.00	0.00	0.00	1.02			N/A	N/A
1	East	1.29	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	3.45	0.00	0.00	0.00	6.12			N/A	N/A
2	South	0.48	0.00	0.00	0.00	1.02			N/A	N/A
2	East	0.61	0.00	0.00	0.00	1.02			N/A	N/A
3	North	3.45	0.00	0.00	0.00	6.12			N/A	N/A
3	South	0.48	0.00	0.00	0.00	1.02			N/A	N/A
3	East	0.61	0.00	0.00	0.00	1.02			N/A	N/A

Queue Variation results: (09:00-09:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.61	0.00	0.00	3.06	5.10			N/A	N/A
1	South	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.86	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	1.61	0.00	0.00	3.06	5.10			N/A	N/A
2	South	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	1.61	0.00	0.00	3.06	5.10			N/A	N/A
3	South	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:15-09:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.00	0.00	0.00	1.02	3.06			N/A	N/A
1	South	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.63	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	1.00	0.00	0.00	1.02	3.06			N/A	N/A
							Percentiles could not be calculated. This may be			

2	**South**	0.26	~1	~1	~1	~1	because the mean queue is very small or very big.		N/A	N/A
2	**East**	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**North**	1.00	0.00	0.00	1.02	3.06			N/A	N/A
3	**South**	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**East**	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Filename: Heart Lake and Country Side.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Projects\200333
Report generation date: 2021-04-14 11:19:59 AM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031						
Intersection 1 - Leg North	1.84	2.04	10.60	0.65	B	19.63	C
Intersection 1 - Leg South	1.27	?	7.31	0.56	A		
Intersection 1 - Leg East	9.45	36.72	31.23	0.92	D		
Intersection 2 - Leg North	1.85	2.04	10.65	0.65	B	7.55	A
Intersection 2 - Leg South	1.27	?	7.31	0.56	A		
Intersection 2 - Leg East	1.08	?	5.97	0.52	A		
Intersection 3 - Leg North	1.85	2.04	10.65	0.65	B	7.04	A
Intersection 3 - Leg South	1.27	?	7.31	0.56	A		
Intersection 3 - Leg East	1.58	2.04	4.92	0.61	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2031, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2031, PM " model duration: 4:00 PM - 5:30 PM
"D3 - 2041, AM" model duration: 8:00 AM - 9:30 AM
"D4 - 2041, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2021-04-14 11:19:58 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	2021-04-14
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031, PM	2031	PM		ONE HOUR	16:00	17:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	1	Single-Lanes	Roundabout	North,South,East				19.63	C
2	2	Single-Lane + WB Bypass	Roundabout	North,South,East				7.55	A
3	3	Patial Dual Lane	Roundabout	North,South,East				7.04	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1	North	North	Heart Lake Road	
1	South	South	Heart Lake Road	
1	East	East	Countryside Drive	
2	North	North	Heart Lake Road	
2	South	South	Heart Lake Road	
2	East	East	Countryside Drive	
3	North	North	Heart Lake Road	
3	South	South	Heart Lake Road	
3	East	East	Countryside Drive	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	North	0.00	99999.00		0.00
1	South	0.00	99999.00		0.00
1	East	0.00	99999.00		0.00
2	North	0.00	99999.00		0.00
2	South	0.00	99999.00		0.00
2	East	0.00	99999.00		0.00
3	North	0.00	99999.00		0.00
3	South	0.00	99999.00		0.00
3	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	North	3.50	4.50	30.00	20.00	40.00	25.00	
1	South	3.50	4.50	30.00	20.00	40.00	25.00	
1	East	3.50	4.50	30.00	20.00	40.00	25.00	
2	North	3.50	4.50	30.00	20.00	40.00	25.00	
2	South	3.50	4.50	30.00	20.00	40.00	25.00	
2	East	3.50	4.50	30.00	20.00	40.00	25.00	
3	North	3.50	4.50	30.00	20.00	40.00	25.00	
3	South	3.50	4.50	30.00	20.00	40.00	25.00	
3	East	3.50	8.00	30.00	20.00	45.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1	North		
1	South		
1	East		
2	North		
2	South		
2	East	✓	100
3	North		
3	South		
3	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1	North		(calculated)	(calculated)	0.579	1357.445
1	South		(calculated)	(calculated)	0.579	1357.445
1	East		(calculated)	(calculated)	0.579	1357.445
2	North		(calculated)	(calculated)	0.579	1357.445
2	South		(calculated)	(calculated)	0.579	1357.445
2	East		(calculated)	(calculated)	0.579	1357.445
3	North		(calculated)	(calculated)	0.579	1357.445
3	South		(calculated)	(calculated)	0.579	1357.445
3	East		(calculated)	(calculated)	0.695	2016.168

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	North	ONE HOUR	✓	577.00	100.000
1	South	ONE HOUR	✓	571.00	100.000
1	East	ONE HOUR	✓	1056.00	100.000
2	North	ONE HOUR	✓	577.00	100.000
2	South	ONE HOUR	✓	571.00	100.000
2	East	ONE HOUR	✓	1056.00	100.000
3	North	ONE HOUR	✓	577.00	100.000
3	South	ONE HOUR	✓	571.00	100.000
3	East	ONE HOUR	✓	1056.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	0.000	221.000	356.000
	South	141.000	0.000	430.000
	East	463.000	593.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	0.00	0.38	0.62
	South	0.25	0.00	0.75

	East	0.44	0.56	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	0.000	221.000	356.000
	South	141.000	0.000	430.000
	East	463.000	593.000	0.000

Turning Proportions (PCE) - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	0.00	0.38	0.62
	South	0.25	0.00	0.75
	East	0.44	0.56	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	0.000	221.000	356.000
	South	141.000	0.000	430.000
	East	463.000	593.000	0.000

Turning Proportions (PCE) - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	0.00	0.38	0.62
	South	0.25	0.00	0.75
	East	0.44	0.56	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Average PCE Per Vehicle - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Average PCE Per Vehicle - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1	North	0.65	10.60	1.84	2.04	B	529.47	794.20	102.82	7.77	1.14	102.84	7.77
1	South	0.56	7.31	1.27	?	A	523.96	785.94	77.87	5.95	0.87	77.88	5.95
1	East	0.92	31.23	9.45	36.72	D	969.00	1453.51	377.83	15.60	4.20	377.89	15.60
2	North	0.65	10.65	1.85	2.04	B	529.47	794.20	103.29	7.80	1.15	103.30	7.80
2	South	0.56	7.31	1.27	?	A	523.96	785.94	77.87	5.94	0.87	77.88	5.95
2	East	0.52	5.97	1.08	?	A	969.00	816.22	69.44	5.10	0.77	69.44	5.10
3	North	0.65	10.65	1.85	2.04	B	529.47	794.20	103.30	7.80	1.15	103.31	7.80
3	South	0.56	7.31	1.27	?	A	523.96	785.94	77.87	5.94	0.87	77.88	5.95
3	East	0.61	4.92	1.58	2.04	A	969.00	1453.51	97.29	4.02	1.08	97.29	4.02

Main Results for each time segment

Main results: (16:00-16:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	434.40		108.60			431.76	451.39	442.88	0.00	1101.12	963.34	0.395	0.00	0.66	5.466	A
1	South	429.88		107.47			427.63	608.25	266.39	0.00	1203.27	1013.45	0.357	0.00	0.56	4.721	A
1	East	795.01		198.75			788.67	588.42	105.60	0.00	1296.33	1212.61	0.613	0.00	1.58	7.149	A
2	North	434.40	434.40	108.60	0.00	348.57	431.76	105.60	444.31	0.00	1100.29	664.47	0.395	0.00	0.66	5.472	A
2	South	429.88	429.88	107.47	0.00	0.00	427.63	609.68	266.39	0.00	1203.27	1120.17	0.357	0.00	0.56	4.721	A
2	East	795.01	446.44	111.61	348.57	0.00	444.31	588.42	105.60	0.00	1296.33	1197.35	0.344	0.00	0.53	4.299	A
3	North	434.40		108.60			431.76	452.94	444.86	0.00	1099.98	762.68	0.395	0.00	0.66	5.475	A
3	South	429.88		107.47			427.63	610.23	266.39	0.00	1203.27	1085.10	0.357	0.00	0.56	4.721	A
3	East	795.01		198.75			792.20	588.42	105.60	0.00	1942.81	1830.03	0.409	0.00	0.70	3.183	A

Main results: (16:15-16:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	518.71		129.68			517.42	540.68	530.43	0.00	1050.45	963.34	0.494	0.66	0.98	6.872	A
1	South	513.32		128.33			512.42	728.61	319.24	0.00	1172.68	1013.45	0.438	0.56	0.79	5.553	A
1	East	949.32		237.33			944.58	705.13	126.54	0.00	1284.21	1212.61	0.739	1.58	2.77	10.660	B
2	North	518.71	518.71	129.68	0.00	416.23	517.42	126.54	532.35	0.00	1049.34	664.46	0.494	0.66	0.98	6.886	A
2	South	513.32	513.32	128.33	0.00	0.00	512.42	730.53	319.24	0.00	1172.68	1120.18	0.438	0.56	0.79	5.553	A
2	East	949.32	533.09	133.27	416.23	0.00	532.35	705.13	126.54	0.00	1284.21	1197.35	0.415	0.53	0.72	4.878	A
3	North	518.71		129.68			517.42	542.27	532.47	0.00	1049.27	762.67	0.494	0.66	0.98	6.887	A
3	South	513.32		128.33			512.42	730.65	319.24	0.00	1172.68	1085.11	0.438	0.56	0.79	5.553	A
3	East	949.32		237.33			948.21	705.13	126.54	0.00	1928.26	1830.03	0.492	0.70	0.98	3.744	A

Main results: (16:30-16:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	635.29		158.82			632.06	654.68	640.26	0.00	986.89	963.34	0.644	0.98	1.79	10.255	B
1	South	628.68		157.17			626.82	882.35	389.97	0.00	1131.74	1013.45	0.556	0.79	1.25	7.244	A
1	East	1162.68		290.67			1140.16	862.00	154.78	0.00	1267.86	1212.61	0.917	2.77	8.40	25.183	D
2	North	635.29	635.29	158.82	0.00	509.77	631.94	154.78	651.50	0.00	980.38	664.46	0.648	0.98	1.82	10.438	B
2	South	628.68	628.68	157.17	0.00	0.00	626.82	893.54	389.90	0.00	1131.79	1120.18	0.555	0.79	1.25	7.243	A
2	East	1162.68	652.91	163.23	509.77	0.00	651.50	861.93	154.78	0.00	1267.86	1197.35	0.515	0.72	1.07	5.944	A
3	North	635.29		158.82			631.94	663.53	651.59	0.00	980.33	762.67	0.648	0.98	1.82	10.439	B
3	South	628.68		157.17			626.82	893.63	389.90	0.00	1131.79	1085.11	0.555	0.79	1.25	7.243	A

3	East	1162.68		290.67			1160.33	861.93	154.78	0.00	1908.64	1830.03	0.609	0.98	1.57	4.891	A

Main results: (16:45-17:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	635.29		158.82			635.09	663.16	650.54	0.00	980.94	963.34	0.648	1.79	1.84	10.604	B
1	South	628.68		157.17			628.63	893.79	391.84	0.00	1130.67	1013.45	0.556	1.25	1.27	7.314	A
1	East	1162.68		290.67			1158.47	865.24	155.23	0.00	1267.60	1212.61	0.917	8.40	9.45	31.230	D
2	North	635.29	635.29	158.82	0.00	509.77	635.16	155.23	652.88	0.00	979.59	664.46	0.649	1.82	1.85	10.652	B
2	South	628.68	628.68	157.17	0.00	0.00	628.63	896.15	391.89	0.00	1130.64	1120.18	0.556	1.25	1.27	7.314	A
2	East	1162.68	652.91	163.23	509.77	0.00	652.88	865.29	155.23	0.00	1267.60	1197.35	0.515	1.07	1.08	5.972	A
3	North	635.29		158.82			635.16	664.98	652.88	0.00	979.58	762.67	0.649	1.82	1.85	10.652	B
3	South	628.68		157.17			628.63	896.16	391.89	0.00	1130.64	1085.11	0.556	1.25	1.27	7.314	A
3	East	1162.68		290.67			1162.63	865.29	155.23	0.00	1908.33	1830.03	0.609	1.57	1.58	4.924	A

Main results: (17:00-17:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	518.71		129.68			521.95	554.70	547.52	0.00	1040.56	963.34	0.498	1.84	1.03	7.125	A
1	South	513.32		128.33			515.16	747.44	322.03	0.00	1171.07	1013.45	0.438	1.27	0.80	5.613	A
1	East	949.32		237.33			975.02	709.98	127.21	0.00	1283.82	1212.61	0.739	9.45	3.03	12.784	B
2	North	518.71	518.71	129.68	0.00	416.23	522.06	127.21	534.48	0.00	1048.11	664.46	0.495	1.85	1.01	7.022	A
2	South	513.32	513.32	128.33	0.00	0.00	515.16	734.43	322.10	0.00	1171.03	1120.18	0.438	1.27	0.80	5.613	A
2	East	949.32	533.09	133.27	416.23	0.00	534.48	710.05	127.21	0.00	1283.82	1197.35	0.415	1.08	0.73	4.910	A
3	North	518.71		129.68			522.06	544.46	534.40	0.00	1048.15	762.67	0.495	1.85	1.01	7.025	A
3	South	513.32		128.33			515.16	734.36	322.10	0.00	1171.03	1085.11	0.438	1.27	0.80	5.613	A
3	East	949.32		237.33			951.65	710.05	127.21	0.00	1927.80	1830.03	0.492	1.58	1.00	3.769	A

Main results: (17:15-17:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	434.40		108.60			435.81	457.37	449.53	0.00	1097.27	963.34	0.396	1.03	0.68	5.564	A
1	South	429.88		107.47			430.81	616.46	268.89	0.00	1201.82	1013.45	0.358	0.80	0.57	4.769	A
1	East	795.01		198.75			800.52	593.32	106.38	0.00	1295.88	1212.61	0.613	3.03	1.65	7.492	A
2	North	434.40	434.40	108.60	0.00	348.57	435.76	106.38	447.21	0.00	1098.62	664.47	0.395	1.01	0.67	5.550	A
2	South	429.88	429.88	107.47	0.00	0.00	430.81	614.11	268.86	0.00	1201.84	1120.17	0.358	0.80	0.57	4.769	A
2	East	795.01	446.44	111.61	348.57	0.00	447.21	593.28	106.38	0.00	1295.88	1197.35	0.345	0.73	0.54	4.332	A
3	North	434.40		108.60			435.76	455.45	447.09	0.00	1098.69	762.68	0.395	1.01	0.67	5.552	A
3	South	429.88		107.47			430.81	613.99	268.86	0.00	1201.84	1085.10	0.358	0.80	0.57	4.767	A
3	East	795.01		198.75			796.16	593.28	106.38	0.00	1942.27	1830.03	0.409	1.00	0.71	3.206	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	9.52	0.63	5.466	A	A
1	South	8.18	0.55	4.721	A	A
1	East	22.43	1.50	7.149	A	A
2	North	9.54	0.64	5.472	A	A
2	South	8.18	0.55	4.721	A	A
2	East	7.76	0.52	4.299	A	A
3	North	9.54	0.64	5.475	A	A
3	South	8.18	0.55	4.721	A	A
3	East	10.28	0.69	3.183	A	A

Queueing Delay results: (16:15-16:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	14.22	0.95	6.872	A	A
1	South	11.48	0.77	5.553	A	A
1	East	38.70	2.58	10.660	B	B
2	North	14.25	0.95	6.886	A	A
2	South	11.48	0.77	5.553	A	A
2	East	10.52	0.70	4.878	A	A
3	North	14.25	0.95	6.887	A	A
3	South	11.48	0.77	5.553	A	A
3	East	14.40	0.96	3.744	A	A

Queueing Delay results: (16:30-16:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	25.24	1.68	10.255	B	B
1	South	18.05	1.20	7.244	A	A
1	East	101.62	6.77	25.183	D	C
2	North	25.65	1.71	10.438	B	B
2	South	18.05	1.20	7.243	A	A
2	East	15.53	1.04	5.944	A	A
3	North	25.66	1.71	10.439	B	B
3	South	18.05	1.20	7.243	A	A
3	East	22.74	1.52	4.891	A	A

Queueing Delay results: (16:45-17:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	27.30	1.82	10.604	B	B
1	South	18.91	1.26	7.314	A	A
1	East	135.12	9.01	31.230	D	C
2	North	27.58	1.84	10.652	B	B
2	South	18.91	1.26	7.314	A	A
2	East	16.10	1.07	5.972	A	A
3	North	27.58	1.84	10.652	B	B
3	South	18.91	1.26	7.314	A	A
3	East	23.63	1.58	4.924	A	A

Queueing Delay results: (17:00-17:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	16.11	1.07	7.125	A	A
1	South	12.46	0.83	5.613	A	A
1	East	53.87	3.59	12.784	B	B
2	North	15.88	1.06	7.022	A	A
2	South	12.46	0.83	5.613	A	A
2	East	11.26	0.75	4.910	A	A
3	North	15.87	1.06	7.025	A	A
3	South	12.46	0.83	5.613	A	A
3	East	15.36	1.02	3.769	A	A

Queueing Delay results: (17:15-17:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	10.43	0.70	5.564	A	A
1	South	8.79	0.59	4.769	A	A
1	East	26.09	1.74	7.492	A	A
2	North	10.40	0.69	5.550	A	A
2	South	8.79	0.59	4.769	A	A
2	East	8.27	0.55	4.332	A	A
3	North	10.40	0.69	5.552	A	A
3	South	8.79	0.59	4.767	A	A
3	East	10.87	0.72	3.206	A	A

Queue Variation Results for each time segment

Queue Variation results: (16:00-16:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.66	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	1.58	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	0.66	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.53	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.66	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.70	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:15-16:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.98	0.00	0.00	1.02	1.02			N/A	N/A
1	South	0.79	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	2.77	0.00	0.00	6.12	9.18			N/A	N/A
2	North	0.98	0.00	0.00	1.02	1.02			N/A	N/A
2	South	0.79	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.72	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.98	0.00	0.00	1.02	1.02			N/A	N/A
3	South	0.79	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.98	0.00	0.00	1.02	2.04			N/A	N/A

Queue Variation results: (16:30-16:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.79	0.00	0.00	0.00	2.04			N/A	N/A
1	South	1.25	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	8.40	0.00	0.00	20.40	32.64			N/A	N/A
2	North	1.82	0.00	0.00	0.00	2.04			N/A	N/A
2	South	1.25	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	1.07	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	1.82	0.00	0.00	0.00	2.04			N/A	N/A
3	South	1.25	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	1.57	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:45-17:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.84	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	1.27	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	9.45	0.00	0.00	17.34	36.72			N/A	N/A
2	North	1.85	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	1.27	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	1.08	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	1.85	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	1.27	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	1.58	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:00-17:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.03	0.00	0.00	1.02	2.04			N/A	N/A
1	South	0.80	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	3.03	0.00	0.00	6.12	11.22			N/A	N/A
2	North	1.01	0.00	0.00	1.02	2.04			N/A	N/A
2	South	0.80	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.73	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	1.01	0.00	0.00	1.02	2.04			N/A	N/A
3	South	0.80	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	1.00	0.00	0.00	1.02	1.02			N/A	N/A

Queue Variation results: (17:15-17:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.68	0.00	0.00	1.02	1.02			N/A	N/A
1	South	0.57	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	1.65	0.00	0.00	1.02	5.10			N/A	N/A

2	**North**	0.67	0.00	0.00	1.02	1.02			N/A	N/A
2	**South**	0.57	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	**East**	0.54	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**North**	0.67	0.00	0.00	1.02	1.02			N/A	N/A
3	**South**	0.57	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**East**	0.71	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2021
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Filename: Heart Lake and Country Side.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Projects\200333
Report generation date: 2021-04-14 11:18:48 AM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2041						
Intersection 1 - Leg North	4.93	17.34	20.91	0.84	C	12.82	B
Intersection 1 - Leg South	0.54	1.02	5.49	0.35	A		
Intersection 1 - Leg East	1.47	1.02	6.91	0.59	A		
Intersection 2 - Leg North	4.93	17.34	20.91	0.84	C	11.97	B
Intersection 2 - Leg South	0.54	1.02	5.49	0.35	A		
Intersection 2 - Leg East	0.67	1.02	4.67	0.40	A		
Intersection 3 - Leg North	4.93	17.34	20.92	0.84	C	11.38	B
Intersection 3 - Leg South	0.54	1.02	5.49	0.35	A		
Intersection 3 - Leg East	0.66	1.02	3.11	0.40	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2031, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2031, PM" model duration: 4:00 PM - 5:30 PM
"D3 - 2041, AM " model duration: 8:00 AM - 9:30 AM
"D4 - 2041, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2021-04-14 11:18:47 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	2021-04-14
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2041, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2041, AM	2041	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	1	Single-Lanes	Roundabout	North,South,East				12.82	B
2	2	Single-Lane + WB Bypass	Roundabout	North,South,East				11.97	B
3	3	Patial Dual Lane	Roundabout	North,South,East				11.38	B

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1	North	North	Heart Lake Road	
1	South	South	Heart Lake Road	
1	East	East	Countryside Drive	
2	North	North	Heart Lake Road	
2	South	South	Heart Lake Road	
2	East	East	Countryside Drive	
3	North	North	Heart Lake Road	
3	South	South	Heart Lake Road	
3	East	East	Countryside Drive	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	North	0.00	99999.00		0.00
1	South	0.00	99999.00		0.00
1	East	0.00	99999.00		0.00
2	North	0.00	99999.00		0.00
2	South	0.00	99999.00		0.00
2	East	0.00	99999.00		0.00
3	North	0.00	99999.00		0.00
3	South	0.00	99999.00		0.00
3	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	North	3.50	4.50	30.00	20.00	40.00	25.00	
1	South	3.50	4.50	30.00	20.00	40.00	25.00	
1	East	3.50	4.50	30.00	20.00	40.00	25.00	
2	North	3.50	4.50	30.00	20.00	40.00	25.00	
2	South	3.50	4.50	30.00	20.00	40.00	25.00	
2	East	3.50	4.50	30.00	20.00	40.00	25.00	
3	North	3.50	4.50	30.00	20.00	40.00	25.00	
3	South	3.50	4.50	30.00	20.00	40.00	25.00	
3	East	3.50	8.00	30.00	20.00	45.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1	North		
1	South		
1	East		
2	North		
2	South		
2	East	✓	100
3	North		
3	South		
3	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1	North		(calculated)	(calculated)	0.579	1357.445
1	South		(calculated)	(calculated)	0.579	1357.445
1	East		(calculated)	(calculated)	0.579	1357.445
2	North		(calculated)	(calculated)	0.579	1357.445
2	South		(calculated)	(calculated)	0.579	1357.445
2	East		(calculated)	(calculated)	0.579	1357.445
3	North		(calculated)	(calculated)	0.579	1357.445
3	South		(calculated)	(calculated)	0.579	1357.445
3	East		(calculated)	(calculated)	0.695	2016.168

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	North	ONE HOUR	✓	806.00	100.000
1	South	ONE HOUR	✓	324.00	100.000
1	East	ONE HOUR	✓	700.00	100.000
2	North	ONE HOUR	✓	806.00	100.000
2	South	ONE HOUR	✓	324.00	100.000
2	East	ONE HOUR	✓	700.00	100.000
3	North	ONE HOUR	✓	806.00	100.000
3	South	ONE HOUR	✓	324.00	100.000
3	East	ONE HOUR	✓	700.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	0.000	284.000	522.000
	South	87.000	0.000	237.000
	East	232.000	468.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	0.00	0.35	0.65
	South	0.27	0.00	0.73

	East	0.33	0.67	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 (for whole period)

	To			
		North	South	East
From	North	0.000	284.000	522.000
	South	87.000	0.000	237.000
	East	232.000	468.000	0.000

Turning Proportions (PCE) - Intersection 2 (for whole period)

	To			
		North	South	East
From	North	0.00	0.35	0.65
	South	0.27	0.00	0.73
	East	0.33	0.67	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 3 (for whole period)

	To			
		North	South	East
From	North	0.000	284.000	522.000
	South	87.000	0.000	237.000
	East	232.000	468.000	0.000

Turning Proportions (PCE) - Intersection 3 (for whole period)

	To			
		North	South	East
From	North	0.00	0.35	0.65
	South	0.27	0.00	0.73
	East	0.33	0.67	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Average PCE Per Vehicle - Intersection 2 (for whole period)

	To			
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 2 (for whole period)

	To			
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Average PCE Per Vehicle - Intersection 3 (for whole period)

	To			
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1	North	0.84	20.91	4.93	17.34	C	739.60	1109.40	225.08	12.17	2.50	225.12	12.18
1	South	0.35	5.49	0.54	1.02	A	297.31	445.96	35.61	4.79	0.40	35.61	4.79
1	East	0.59	6.91	1.47	1.02	A	642.33	963.50	91.43	5.69	1.02	91.44	5.69
2	North	0.84	20.91	4.93	17.34	C	739.60	1109.40	225.22	12.18	2.50	225.26	12.18
2	South	0.35	5.49	0.54	1.02	A	297.31	445.96	35.61	4.79	0.40	35.61	4.79
2	East	0.40	4.67	0.67	1.02	A	642.33	644.17	45.26	4.22	0.50	45.26	4.22
3	North	0.84	20.92	4.93	17.34	C	739.60	1109.40	225.28	12.18	2.50	225.32	12.19
3	South	0.35	5.49	0.54	1.02	A	297.31	445.96	35.61	4.79	0.40	35.61	4.79
3	East	0.40	3.11	0.66	1.02	A	642.33	963.50	45.35	2.82	0.50	45.36	2.82

Main Results for each time segment

Main results: (08:00-08:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	606.80		151.70			602.35	238.97	350.54	0.00	1154.57	893.68	0.526	0.00	1.11	6.598	A
1	South	243.92		60.98			242.81	562.78	390.11	0.00	1131.67	1022.47	0.216	0.00	0.28	4.126	A
1	East	527.00		131.75			524.31	567.72	65.20	0.00	1319.71	1198.55	0.399	0.00	0.67	4.601	A
2	North	606.80	606.80	151.70	0.00	174.66	602.35	65.20	350.86	0.00	1154.38	671.27	0.526	0.00	1.11	6.600	A
2	South	243.92	243.92	60.98	0.00	0.00	242.81	563.10	390.11	0.00	1131.67	1105.83	0.216	0.00	0.28	4.126	A
2	East	527.00	352.33	88.08	174.66	0.00	350.86	567.72	65.20	0.00	1319.71	1185.59	0.267	0.00	0.37	3.785	A
3	North	606.80		151.70			602.34	239.37	351.34	0.00	1154.10	657.49	0.526	0.00	1.11	6.603	A
3	South	243.92		60.98			242.81	563.58	390.10	0.00	1131.67	1111.00	0.216	0.00	0.28	4.126	A
3	East	527.00		131.75			525.51	567.72	65.20	0.00	1970.87	1808.93	0.267	0.00	0.37	2.538	A

Main results: (08:15-08:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	724.58		181.14			721.65	286.33	420.03	0.00	1114.35	893.68	0.650	1.11	1.84	9.280	A
1	South	291.27		72.82			290.90	674.31	467.37	0.00	1086.95	1022.47	0.268	0.28	0.37	4.610	A
1	East	629.29		157.32			628.26	680.16	78.11	0.00	1312.24	1198.55	0.480	0.67	0.93	5.361	A
2	North	724.58	724.58	181.14	0.00	208.56	721.65	78.11	420.29	0.00	1114.20	671.27	0.650	1.11	1.84	9.284	A
2	South	291.27	291.27	72.82	0.00	0.00	290.90	674.57	467.37	0.00	1086.95	1105.83	0.268	0.28	0.37	4.610	A
2	East	629.29	420.72	105.18	208.56	0.00	420.29	680.16	78.11	0.00	1312.24	1185.59	0.321	0.37	0.48	4.115	A
3	North	724.58		181.14			721.65	286.53	420.43	0.00	1114.12	657.49	0.650	1.11	1.84	9.286	A
3	South	291.27		72.82			290.90	674.71	467.37	0.00	1086.95	1111.00	0.268	0.28	0.37	4.610	A
3	East	629.29		157.32			628.85	680.16	78.11	0.00	1961.90	1808.93	0.321	0.37	0.48	2.754	A

Main results: (08:30-08:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	887.42		221.86			876.18	350.35	513.88	0.00	1060.03	893.68	0.837	1.84	4.65	18.901	C
1	South	356.73		89.18			356.07	822.61	567.45	0.00	1029.03	1022.47	0.347	0.37	0.54	5.450	A
1	East	770.71		192.68			768.62	827.91	95.61	0.00	1302.11	1198.55	0.592	0.93	1.45	6.855	A
2	North	887.42	887.42	221.86	0.00	255.44	876.15	95.61	514.54	0.00	1059.65	671.27	0.837	1.84	4.66	18.938	C
2	South	356.73	356.73	89.18	0.00	0.00	356.07	823.26	567.43	0.00	1029.04	1105.83	0.347	0.37	0.54	5.450	A
2	East	770.71	515.28	128.82	255.44	0.00	514.54	827.89	95.61	0.00	1302.11	1185.59	0.396	0.48	0.66	4.659	A
3	North	887.42		221.86			876.14	350.80	514.79	0.00	1059.51	657.49	0.838	1.84	4.66	18.949	C
3	South	356.73		89.18			356.07	823.50	567.43	0.00	1029.04	1111.00	0.347	0.37	0.54	5.450	A

3	East	770.71		192.68			769.98	827.88	95.61	0.00	1949.75	1808.93	0.395	0.48	0.66	3.111	A

Main results: (08:45-09:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	887.42		221.86			886.33	351.20	515.24	0.00	1059.24	893.68	0.838	4.65	4.93	20.907	C
1	South	356.73		89.18			356.71	827.55	574.02	0.00	1025.22	1022.47	0.348	0.54	0.54	5.492	A
1	East	770.71		192.68			770.66	834.95	95.78	0.00	1302.01	1198.55	0.592	1.45	1.47	6.910	A
2	North	887.42	887.42	221.86	0.00	255.44	886.35	95.78	515.27	0.00	1059.23	671.27	0.838	4.66	4.93	20.909	C
2	South	356.73	356.73	89.18	0.00	0.00	356.71	827.58	574.04	0.00	1025.21	1105.83	0.348	0.54	0.54	5.492	A
2	East	770.71	515.28	128.82	255.44	0.00	515.27	834.97	95.78	0.00	1302.01	1185.59	0.396	0.66	0.67	4.667	A
3	North	887.42		221.86			886.36	351.22	515.27	0.00	1059.23	657.49	0.838	4.66	4.93	20.917	C
3	South	356.73		89.18			356.71	827.59	574.04	0.00	1025.21	1111.00	0.348	0.54	0.54	5.492	A
3	East	770.71		192.68			770.71	834.97	95.78	0.00	1949.63	1808.93	0.395	0.66	0.66	3.114	A

Main results: (09:00-09:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	724.58		181.14			736.45	287.63	422.10	0.00	1113.15	893.68	0.651	4.93	1.96	10.037	B
1	South	291.27		72.82			291.92	681.60	476.96	0.00	1081.40	1022.47	0.269	0.54	0.38	4.656	A
1	East	629.29		157.32			631.35	690.49	78.39	0.00	1312.08	1198.55	0.480	1.47	0.95	5.409	A
2	North	724.58	724.58	181.14	0.00	208.56	736.47	78.39	421.44	0.00	1113.53	671.27	0.651	4.93	1.96	10.029	B
2	South	291.27	291.27	72.82	0.00	0.00	291.92	680.95	476.97	0.00	1081.39	1105.83	0.269	0.54	0.38	4.656	A
2	East	629.29	420.72	105.18	208.56	0.00	421.44	690.51	78.39	0.00	1312.08	1185.59	0.321	0.67	0.48	4.127	A
3	North	724.58		181.14			736.48	287.19	421.21	0.00	1113.67	657.49	0.651	4.93	1.96	10.026	B
3	South	291.27		72.82			291.92	680.71	476.98	0.00	1081.39	1111.00	0.269	0.54	0.38	4.656	A
3	East	629.29		157.32			630.01	690.51	78.39	0.00	1961.71	1808.93	0.321	0.66	0.48	2.758	A

Main results: (09:15-09:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	606.80		151.70			610.03	240.62	353.05	0.00	1153.12	893.68	0.526	1.96	1.15	6.800	A
1	South	243.92		60.98			244.31	568.00	395.08	0.00	1128.79	1022.47	0.216	0.38	0.28	4.154	A
1	East	527.00		131.75			528.06	573.79	65.60	0.00	1319.48	1198.55	0.399	0.95	0.68	4.645	A
2	North	606.80	606.80	151.70	0.00	174.66	610.02	65.60	352.78	0.00	1153.27	671.27	0.526	1.96	1.15	6.800	A
2	South	243.92	243.92	60.98	0.00	0.00	244.31	567.72	395.08	0.00	1128.79	1105.83	0.216	0.38	0.28	4.154	A
2	East	527.00	352.33	88.08	174.66	0.00	352.78	573.78	65.60	0.00	1319.48	1185.59	0.267	0.48	0.37	3.802	A
3	North	606.80		151.70			610.02	240.41	352.63	0.00	1153.36	657.49	0.526	1.96	1.15	6.796	A
3	South	243.92		60.98			244.31	567.57	395.08	0.00	1128.79	1111.00	0.216	0.38	0.28	4.153	A
3	East	527.00		131.75			527.44	573.78	65.60	0.00	1970.60	1808.93	0.267	0.48	0.37	2.546	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	15.91	1.06	6.598	A	A
1	South	4.08	0.27	4.126	A	A
1	East	9.77	0.65	4.601	A	A
2	North	15.91	1.06	6.600	A	A
2	South	4.08	0.27	4.126	A	A
2	East	5.41	0.36	3.785	A	A
3	North	15.92	1.06	6.603	A	A
3	South	4.08	0.27	4.126	A	A
3	East	5.47	0.36	2.538	A	A

Queueing Delay results: (08:15-08:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	26.19	1.75	9.280	A	A
1	South	5.46	0.36	4.610	A	A
1	East	13.57	0.90	5.361	A	A
2	North	26.20	1.75	9.284	A	A
2	South	5.46	0.36	4.610	A	A
2	East	7.05	0.47	4.115	A	A
3	North	26.20	1.75	9.286	A	A
3	South	5.46	0.36	4.610	A	A
3	East	7.10	0.47	2.754	A	A

Queueing Delay results: (08:30-08:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	60.62	4.04	18.901	C	B
1	South	7.85	0.52	5.450	A	A
1	East	20.94	1.40	6.855	A	A
2	North	60.71	4.05	18.938	C	B
2	South	7.85	0.52	5.450	A	A
2	East	9.72	0.65	4.659	A	A
3	North	60.75	4.05	18.949	C	B
3	South	7.85	0.52	5.450	A	A
3	East	9.78	0.65	3.111	A	A

Queueing Delay results: (08:45-09:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	72.25	4.82	20.907	C	C
1	South	8.09	0.54	5.492	A	A
1	East	21.91	1.46	6.910	A	A
2	North	72.33	4.82	20.909	C	C
2	South	8.09	0.54	5.492	A	A
2	East	9.96	0.66	4.667	A	A
3	North	72.35	4.82	20.917	C	C
3	South	8.09	0.54	5.492	A	A
3	East	9.96	0.66	3.114	A	A

Queueing Delay results: (09:00-09:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	32.12	2.14	10.037	B	B
1	South	5.80	0.39	4.656	A	A
1	East	14.72	0.98	5.409	A	A
2	North	32.09	2.14	10.029	B	B
2	South	5.80	0.39	4.656	A	A
2	East	7.42	0.49	4.127	A	A
3	North	32.08	2.14	10.026	B	B
3	South	5.80	0.39	4.656	A	A
3	East	7.37	0.49	2.758	A	A

Queueing Delay results: (09:15-09:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	17.99	1.20	6.800	A	A
1	South	4.32	0.29	4.154	A	A
1	East	10.51	0.70	4.645	A	A
2	North	17.98	1.20	6.800	A	A
2	South	4.32	0.29	4.154	A	A
2	East	5.70	0.38	3.802	A	A
3	North	17.98	1.20	6.796	A	A
3	South	4.32	0.29	4.153	A	A
3	East	5.68	0.38	2.546	A	A

Queue Variation Results for each time segment

Queue Variation results: (08:00-08:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.11	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	0.28	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.67	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	1.11	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.28	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.37	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	1.11	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.28	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.37	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.84	0.00	0.00	4.08	5.10			N/A	N/A
1	South	0.37	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.93	0.00	0.00	1.02	1.02			N/A	N/A
2	North	1.84	0.00	0.00	4.08	5.10			N/A	N/A
2	South	0.37	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	1.84	0.00	0.00	4.08	5.10			N/A	N/A
3	South	0.37	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	4.65	0.00	0.00	7.14	17.34			N/A	N/A
1	South	0.54	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	1.45	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	4.66	0.00	0.00	7.14	17.34			N/A	N/A
2	South	0.54	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.66	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	4.66	0.00	0.00	7.14	17.34			N/A	N/A
3	South	0.54	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.66	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	4.93	0.00	0.00	3.06	14.28			N/A	N/A
1	South	0.54	0.00	0.00	0.00	1.02			N/A	N/A
1	East	1.47	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	4.93	0.00	0.00	3.06	14.28			N/A	N/A
2	South	0.54	0.00	0.00	0.00	1.02			N/A	N/A
2	East	0.67	0.00	0.00	0.00	1.02			N/A	N/A
3	North	4.93	0.00	0.00	3.06	14.28			N/A	N/A
3	South	0.54	0.00	0.00	0.00	1.02			N/A	N/A
3	East	0.66	0.00	0.00	0.00	1.02			N/A	N/A

Queue Variation results: (09:00-09:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.96	0.00	0.00	4.08	6.12			N/A	N/A
1	South	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.95	0.00	0.00	1.02	1.02			N/A	N/A
2	North	1.96	0.00	0.00	4.08	6.12			N/A	N/A
2	South	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	1.96	0.00	0.00	4.08	6.12			N/A	N/A
3	South	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:15-09:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.15	0.00	0.00	1.02	3.06			N/A	N/A
1	South	0.28	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.68	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	1.15	0.00	0.00	1.02	3.06			N/A	N/A
2	South	0.28	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

2	**East**	0.37	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**North**	1.15	0.00	0.00	1.02	3.06			N/A	N/A
3	**South**	0.28	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**East**	0.37	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8
ARCADY 8 - Roundabout Module
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Filename: Heart Lake and Country Side.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Projects\200333
Report generation date: 2021-04-14 11:13:32 AM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2041						
Intersection 1 - Leg North	2.27	4.08	12.50	0.70	B	32.20	D
Intersection 1 - Leg South	1.48	1.02	8.11	0.60	A		
Intersection 1 - Leg East	18.39	72.42	55.92	0.98	F		
Intersection 2 - Leg North	2.32	5.10	12.75	0.70	B	8.52	A
Intersection 2 - Leg South	1.48	1.02	8.11	0.60	A		
Intersection 2 - Leg East	1.23	1.02	6.44	0.55	A		
Intersection 3 - Leg North	2.32	5.10	12.75	0.70	B	8.06	A
Intersection 3 - Leg South	1.48	1.02	8.11	0.60	A		
Intersection 3 - Leg East	1.86	2.04	5.48	0.65	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2031, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2031, PM" model duration: 4:00 PM - 5:30 PM
"D3 - 2041, AM" model duration: 8:00 AM - 9:30 AM
"D4 - 2041, PM " model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2021-04-14 11:13:31 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	2021-04-14
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2041, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2041, PM	2041	PM		ONE HOUR	16:00	17:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	1	Single-Lanes	Roundabout	North,South,East				32.20	D
2	2	Single-Lane + WB Bypass	Roundabout	North,South,East				8.52	A
3	3	Patial Dual Lane	Roundabout	North,South,East				8.06	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1	North	North	Heart Lake Road	
1	South	South	Heart Lake Road	
1	East	East	Countryside Drive	
2	North	North	Heart Lake Road	
2	South	South	Heart Lake Road	
2	East	East	Countryside Drive	
3	North	North	Heart Lake Road	
3	South	South	Heart Lake Road	
3	East	East	Countryside Drive	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	North	0.00	99999.00		0.00
1	South	0.00	99999.00		0.00
1	East	0.00	99999.00		0.00
2	North	0.00	99999.00		0.00
2	South	0.00	99999.00		0.00
2	East	0.00	99999.00		0.00
3	North	0.00	99999.00		0.00
3	South	0.00	99999.00		0.00
3	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	North	3.50	4.50	30.00	20.00	40.00	25.00	
1	South	3.50	4.50	30.00	20.00	40.00	25.00	
1	East	3.50	4.50	30.00	20.00	40.00	25.00	
2	North	3.50	4.50	30.00	20.00	40.00	25.00	
2	South	3.50	4.50	30.00	20.00	40.00	25.00	
2	East	3.50	4.50	30.00	20.00	40.00	25.00	
3	North	3.50	4.50	30.00	20.00	40.00	25.00	
3	South	3.50	4.50	30.00	20.00	40.00	25.00	
3	East	3.50	8.00	30.00	20.00	45.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1	North		
1	South		
1	East		
2	North		
2	South		
2	East	✓	100
3	North		
3	South		
3	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1	North		(calculated)	(calculated)	0.579	1357.445
1	South		(calculated)	(calculated)	0.579	1357.445
1	East		(calculated)	(calculated)	0.579	1357.445
2	North		(calculated)	(calculated)	0.579	1357.445
2	South		(calculated)	(calculated)	0.579	1357.445
2	East		(calculated)	(calculated)	0.579	1357.445
3	North		(calculated)	(calculated)	0.579	1357.445
3	South		(calculated)	(calculated)	0.579	1357.445
3	East		(calculated)	(calculated)	0.695	2016.168

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	North	ONE HOUR	✓	608.00	100.000
1	South	ONE HOUR	✓	605.00	100.000
1	East	ONE HOUR	✓	1119.00	100.000
2	North	ONE HOUR	✓	608.00	100.000
2	South	ONE HOUR	✓	605.00	100.000
2	East	ONE HOUR	✓	1119.00	100.000
3	North	ONE HOUR	✓	608.00	100.000
3	South	ONE HOUR	✓	605.00	100.000
3	East	ONE HOUR	✓	1119.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	0.000	233.000	375.000
	South	149.000	0.000	456.000
	East	490.000	629.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	0.00	0.38	0.62
	South	0.25	0.00	0.75

	East	0.44	0.56	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	0.000	233.000	375.000
	South	149.000	0.000	456.000
	East	490.000	629.000	0.000

Turning Proportions (PCE) - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	0.00	0.38	0.62
	South	0.25	0.00	0.75
	East	0.44	0.56	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	0.000	233.000	375.000
	South	149.000	0.000	456.000
	East	490.000	629.000	0.000

Turning Proportions (PCE) - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	0.00	0.38	0.62
	South	0.25	0.00	0.75
	East	0.44	0.56	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 1 (for whole period)

		To		
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Average PCE Per Vehicle - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 2 (for whole period)

		To		
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Average PCE Per Vehicle - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	1.020	1.020	1.020
	South	1.020	1.020	1.020
	East	1.020	1.020	1.020

Truck Percentages - Intersection 3 (for whole period)

		To		
		North	South	East
From	North	2.0	2.0	2.0
	South	2.0	2.0	2.0
	East	2.0	2.0	2.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1	North	0.70	12.50	2.27	4.08	B	557.91	836.87	121.82	8.73	1.35	121.84	8.74
1	South	0.60	8.11	1.48	1.02	A	555.16	832.74	89.02	6.41	0.99	89.03	6.41
1	East	0.98	55.92	18.39	72.42	F	1026.81	1540.22	601.06	23.41	6.68	601.15	23.42
2	North	0.70	12.75	2.32	5.10	B	557.91	836.87	123.20	8.83	1.37	123.21	8.83
2	South	0.60	8.11	1.48	1.02	A	555.16	832.74	89.01	6.41	0.99	89.02	6.41
2	East	0.55	6.44	1.23	1.02	A	1026.81	865.77	77.98	5.40	0.87	77.99	5.40
3	North	0.70	12.75	2.32	5.10	B	557.91	836.87	123.21	8.83	1.37	123.22	8.83
3	South	0.60	8.11	1.48	1.02	A	555.16	832.74	89.01	6.41	0.99	89.02	6.41
3	East	0.65	5.48	1.86	2.04	A	1026.81	1540.22	111.52	4.34	1.24	111.53	4.34

Main Results for each time segment

Main results: (16:00-16:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	457.73		114.43			454.79	477.20	469.36	0.00	1085.80	962.84	0.422	0.00	0.74	5.793	A
1	South	455.48		113.87			452.99	643.65	280.51	0.00	1195.10	1013.74	0.381	0.00	0.62	4.933	A
1	East	842.44		210.61			835.00	621.93	111.56	0.00	1292.88	1212.95	0.652	0.00	1.86	7.923	A
2	North	457.73	457.73	114.43	0.00	368.90	454.79	111.56	471.20	0.00	1084.73	664.23	0.422	0.00	0.74	5.803	A
2	South	455.48	455.48	113.87	0.00	0.00	452.99	645.49	280.50	0.00	1195.10	1120.34	0.381	0.00	0.62	4.933	A
2	East	842.44	473.54	118.39	368.90	0.00	471.20	621.93	111.56	0.00	1292.88	1197.76	0.366	0.00	0.58	4.456	A
3	North	457.73		114.43			454.79	479.10	471.79	0.00	1084.39	761.95	0.422	0.00	0.74	5.806	A
3	South	455.48		113.87			452.99	646.08	280.50	0.00	1195.10	1085.46	0.381	0.00	0.62	4.933	A
3	East	842.44		210.61			839.33	621.93	111.56	0.00	1938.67	1830.46	0.435	0.00	0.78	3.330	A

Main results: (16:15-16:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	546.58		136.64			545.01	571.28	561.73	0.00	1032.34	962.84	0.529	0.74	1.13	7.511	A
1	South	543.88		135.97			542.83	770.59	336.15	0.00	1162.90	1013.74	0.468	0.62	0.89	5.912	A
1	East	1005.96		251.49			999.32	745.29	133.69	0.00	1280.07	1212.95	0.786	1.86	3.52	12.777	B
2	North	546.58	546.58	136.64	0.00	440.50	545.00	133.69	564.60	0.00	1030.68	664.23	0.530	0.74	1.13	7.536	A
2	South	543.88	543.88	135.97	0.00	0.00	542.83	773.46	336.14	0.00	1162.90	1120.34	0.468	0.62	0.89	5.912	A
2	East	1005.96	565.46	141.36	440.50	0.00	564.60	745.28	133.69	0.00	1280.07	1197.75	0.442	0.58	0.80	5.125	A
3	North	546.58		136.64			545.00	573.61	564.72	0.00	1030.61	761.94	0.530	0.74	1.13	7.537	A
3	South	543.88		135.97			542.83	773.57	336.14	0.00	1162.90	1085.46	0.468	0.62	0.89	5.912	A
3	East	1005.96		251.49			1004.64	745.28	133.69	0.00	1923.30	1830.46	0.523	0.78	1.11	3.991	A

Main results: (16:30-16:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	669.42		167.36			665.22	684.27	668.52	0.00	970.53	962.84	0.690	1.13	2.18	11.865	B
1	South	666.12		166.53			663.80	923.45	410.29	0.00	1119.98	1013.74	0.595	0.89	1.47	8.008	A
1	East	1232.04		308.01			1189.30	910.61	163.48	0.00	1262.83	1212.95	0.976	3.52	14.20	37.173	E
2	North	669.42	669.42	167.36	0.00	539.50	664.87	163.48	690.86	0.00	957.60	664.23	0.699	1.13	2.27	12.352	B
2	South	666.12	666.12	166.53	0.00	0.00	663.80	945.65	410.08	0.00	1120.11	1120.34	0.595	0.89	1.47	8.005	A
2	East	1232.04	692.54	173.14	539.50	0.00	690.86	910.40	163.48	0.00	1262.83	1197.75	0.548	0.80	1.22	6.400	A
3	North	669.42		167.36			664.87	701.69	690.89	0.00	957.59	761.95	0.699	1.13	2.27	12.353	B
3	South	666.12		166.53			663.80	945.69	410.08	0.00	1120.11	1085.46	0.595	0.89	1.47	8.005	A

3	East	1232.04		308.01			1229.10	910.40	163.48	0.00	1902.60	1830.46	0.648	1.11	1.84	5.428	A

Main results: (16:45-17:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	669.42		167.36			669.05	696.20	683.13	0.00	962.07	962.84	0.696	2.18	2.27	12.499	B
1	South	666.12		166.53			666.04	939.53	412.66	0.00	1118.62	1013.74	0.595	1.47	1.48	8.109	A
1	East	1232.04		308.01			1215.30	914.66	164.03	0.00	1262.51	1212.95	0.976	14.20	18.39	55.923	F
2	North	669.42	669.42	167.36	0.00	539.50	669.21	164.03	692.50	0.00	956.65	664.23	0.700	2.27	2.32	12.748	B
2	South	666.12	666.12	166.53	0.00	0.00	666.04	948.96	412.75	0.00	1118.56	1120.34	0.596	1.47	1.48	8.110	A
2	East	1232.04	692.54	173.14	539.50	0.00	692.50	914.76	164.03	0.00	1262.51	1197.75	0.549	1.22	1.23	6.441	A
3	North	669.42		167.36			669.21	703.51	692.51	0.00	956.65	761.95	0.700	2.27	2.32	12.748	B
3	South	666.12		166.53			666.04	948.96	412.75	0.00	1118.56	1085.46	0.596	1.47	1.48	8.110	A
3	East	1232.04		308.01			1231.98	914.76	164.03	0.00	1902.22	1830.46	0.648	1.84	1.86	5.478	A

Main results: (17:00-17:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	546.58		136.64			550.77	600.15	597.73	0.00	1011.51	962.84	0.540	2.27	1.22	8.041	A
1	South	543.88		135.97			546.18	808.80	339.70	0.00	1160.84	1013.74	0.469	1.48	0.91	5.995	A
1	East	1005.96		251.49			1063.36	751.37	134.51	0.00	1279.59	1212.95	0.786	18.39	4.04	20.713	C
2	North	546.58	546.58	136.64	0.00	440.50	551.17	134.51	567.11	0.00	1029.22	664.23	0.531	2.32	1.18	7.752	A
2	South	543.88	543.88	135.97	0.00	0.00	546.18	778.33	339.95	0.00	1160.70	1120.34	0.469	1.48	0.91	5.996	A
2	East	1005.96	565.46	141.36	440.50	0.00	567.11	751.61	134.51	0.00	1279.59	1197.75	0.442	1.23	0.82	5.167	A
3	North	546.58		136.64			551.17	576.29	567.10	0.00	1029.23	761.94	0.531	2.32	1.18	7.753	A
3	South	543.88		135.97			546.18	778.32	339.95	0.00	1160.70	1085.46	0.469	1.48	0.91	5.996	A
3	East	1005.96		251.49			1008.88	751.61	134.51	0.00	1922.72	1830.46	0.523	1.86	1.13	4.030	A

Main results: (17:15-17:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	457.73		114.43			459.59	484.99	478.22	0.00	1080.67	962.84	0.424	1.22	0.76	5.929	A
1	South	455.48		113.87			456.58	654.35	283.46	0.00	1193.39	1013.74	0.382	0.91	0.64	4.990	A
1	East	842.44		210.61			850.76	627.59	112.45	0.00	1292.37	1212.95	0.652	4.04	1.96	8.466	A
2	North	457.73	457.73	114.43	0.00	368.90	459.42	112.45	474.43	0.00	1082.86	664.23	0.423	1.18	0.76	5.907	A
2	South	455.48	455.48	113.87	0.00	0.00	456.58	650.49	283.36	0.00	1193.45	1120.34	0.382	0.91	0.64	4.992	A
2	East	842.44	473.54	118.39	368.90	0.00	474.43	627.49	112.45	0.00	1292.37	1197.76	0.366	0.82	0.59	4.495	A
3	North	457.73		114.43			459.42	481.94	474.31	0.00	1082.93	761.95	0.423	1.18	0.76	5.904	A
3	South	455.48		113.87			456.58	650.37	283.36	0.00	1193.45	1085.46	0.382	0.91	0.64	4.992	A
3	East	842.44		210.61			843.80	627.49	112.45	0.00	1938.05	1830.46	0.435	1.13	0.79	3.361	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	10.61	0.71	5.793	A	A
1	South	9.04	0.60	4.933	A	A
1	East	26.11	1.74	7.923	A	A
2	North	10.63	0.71	5.803	A	A
2	South	9.04	0.60	4.933	A	A
2	East	8.52	0.57	4.456	A	A
3	North	10.64	0.71	5.806	A	A
3	South	9.04	0.60	4.933	A	A
3	East	11.39	0.76	3.330	A	A

Queueing Delay results: (16:15-16:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	16.29	1.09	7.511	A	A
1	South	12.91	0.86	5.912	A	A
1	East	48.22	3.21	12.777	B	B
2	North	16.34	1.09	7.536	A	A
2	South	12.91	0.86	5.912	A	A
2	East	11.70	0.78	5.125	A	A
3	North	16.34	1.09	7.537	A	A
3	South	12.91	0.86	5.912	A	A
3	East	16.23	1.08	3.991	A	A

Queueing Delay results: (16:30-16:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	30.37	2.02	11.865	B	B
1	South	21.00	1.40	8.008	A	A
1	East	154.38	10.29	37.173	E	D
2	North	31.51	2.10	12.352	B	B
2	South	20.99	1.40	8.005	A	A
2	East	17.66	1.18	6.400	A	A
3	North	31.51	2.10	12.353	B	B
3	South	20.99	1.40	8.005	A	A
3	East	26.58	1.77	5.428	A	A

Queueing Delay results: (16:45-17:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	33.56	2.24	12.499	B	B
1	South	22.16	1.48	8.109	A	A
1	East	247.17	16.48	55.923	F	E
2	North	34.52	2.30	12.748	B	B
2	South	22.16	1.48	8.110	A	A
2	East	18.39	1.23	6.441	A	A
3	North	34.52	2.30	12.748	B	B
3	South	22.16	1.48	8.110	A	A
3	East	27.79	1.85	5.478	A	A

Queueing Delay results: (17:00-17:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	19.24	1.28	8.041	A	A
1	South	14.14	0.94	5.995	A	A
1	East	93.89	6.26	20.713	C	C
2	North	18.51	1.23	7.752	A	A
2	South	14.14	0.94	5.996	A	A
2	East	12.60	0.84	5.167	A	A
3	North	18.51	1.23	7.753	A	A
3	South	14.14	0.94	5.996	A	A
3	East	17.44	1.16	4.030	A	A

Queueing Delay results: (17:15-17:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	11.75	0.78	5.929	A	A
1	South	9.77	0.65	4.990	A	A
1	East	31.29	2.09	8.466	A	A
2	North	11.69	0.78	5.907	A	A
2	South	9.77	0.65	4.992	A	A
2	East	9.12	0.61	4.495	A	A
3	North	11.69	0.78	5.904	A	A
3	South	9.77	0.65	4.992	A	A
3	East	12.09	0.81	3.361	A	A

Queue Variation Results for each time segment

Queue Variation results: (16:00-16:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.74	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	0.62	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	1.86	0.00	1.02	2.04	2.04			N/A	N/A
2	North	0.74	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.62	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.58	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.74	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.62	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.78	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:15-16:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.13	0.00	0.00	1.02	2.04			N/A	N/A
1	South	0.89	0.00	0.00	1.02	1.02			N/A	N/A
1	East	3.52	0.00	0.00	8.16	12.24			N/A	N/A
2	North	1.13	0.00	0.00	2.04	2.04			N/A	N/A
2	South	0.89	0.00	0.00	1.02	1.02			N/A	N/A
2	East	0.80	0.00	0.00	0.00	1.02			N/A	N/A
3	North	1.13	0.00	0.00	2.04	2.04			N/A	N/A
3	South	0.89	0.00	0.00	1.02	1.02			N/A	N/A
3	East	1.11	0.00	0.00	2.04	2.04			N/A	N/A

Queue Variation results: (16:30-16:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	2.18	0.00	0.00	0.00	4.08			N/A	N/A
1	South	1.47	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	14.20	0.00	5.10	36.72	51.00			N/A	N/A
2	North	2.27	0.00	0.00	0.00	5.10			N/A	N/A
2	South	1.47	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	1.22	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	2.27	0.00	0.00	0.00	5.10			N/A	N/A
3	South	1.47	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	1.84	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:45-17:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	2.27	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	1.48	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	18.39	0.00	4.08	48.96	72.42			N/A	N/A
2	North	2.32	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	1.48	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	1.23	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	2.32	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	1.48	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	1.86	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:00-17:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.22	0.00	0.00	2.04	3.06			N/A	N/A
1	South	0.91	0.00	0.00	1.02	1.02			N/A	N/A
1	East	4.04	0.00	0.00	8.16	15.30			N/A	N/A
2	North	1.18	0.00	0.00	2.04	3.06			N/A	N/A
2	South	0.91	0.00	0.00	1.02	1.02			N/A	N/A
2	East	0.82	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	1.18	0.00	0.00	2.04	3.06			N/A	N/A
3	South	0.91	0.00	0.00	1.02	1.02			N/A	N/A
3	East	1.13	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:15-17:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.76	0.00	0.00	1.02	1.02			N/A	N/A
1	South	0.64	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	1.96	0.00	0.00	1.02	6.12			N/A	N/A
2	North	0.76	0.00	0.00	1.02	2.04			N/A	N/A
2	South	0.64	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.59	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

3	**North**	0.76	0.00	0.00	1.02	2.04			N/A	N/A
3	**South**	0.64	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**East**	0.79	0.00	0.00	1.02	1.02			N/A	N/A

Appendix J

Public and Agency Consultation

NOTICE OF STUDY COMMENCEMENT

Intersection Improvements
Heart Lake Road and Countryside Drive
Class Environmental Assessment Study

The Study

The City of Brampton has initiated a Class Environmental Assessment for improvements to the intersection of Heart Lake Road and Countryside Drive. The City identified the need for intersection improvements as part of an overall operational and safety improvement for the Heart Lake Road Corridor.

The Process

The study is being undertaken in accordance with the planning and design process for Schedule "B" projects as outlined in the Municipal Class Environmental Assessment document (October 2000, as amended in 2007, 2011 and 2015), which is approved under the *Ontario Environmental Assessment Act.* This study will define the problem(s) with the intersection, identify and evaluate alternative solutions to the problem, evaluate alternative design concepts for the solution, recommend a preferred design concept and assess potential impacts and identify mitigation measures associated with the preferred design.

A key component of the study will be consultation with interested stakeholders, including public agencies and Aboriginal Communities. A Public Information Centre (PIC) will be held to present the project, review the study findings and discuss issues related to the project including alternative solutions, evaluation criteria, alternative design concepts, and environmental impacts and mitigation measures. Details regarding the forthcoming PIC will be advertised as the study progresses. At the conclusion of the study, the EA process will be documented in an Environmental Project Report which will be made available for 30 calendar days for public review and comment.

Comments Invited

If you have any questions or comments regarding the Study or wish to be added to the Study mailing list, please contact either of the project team members:

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Brampton ON L6S 6E5
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KEY PLAN

Dave Hallman, P.Eng.
Consultant Project Manager
MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener ON N2B 3X9
T: 905-639-2552 x 1336
F: 905-639-7727
Email: dhallman@mte85.com

For more information please visit: www.brampton.ca

Information will be collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

This notice first issued on September xx, 2020.

Public Notice

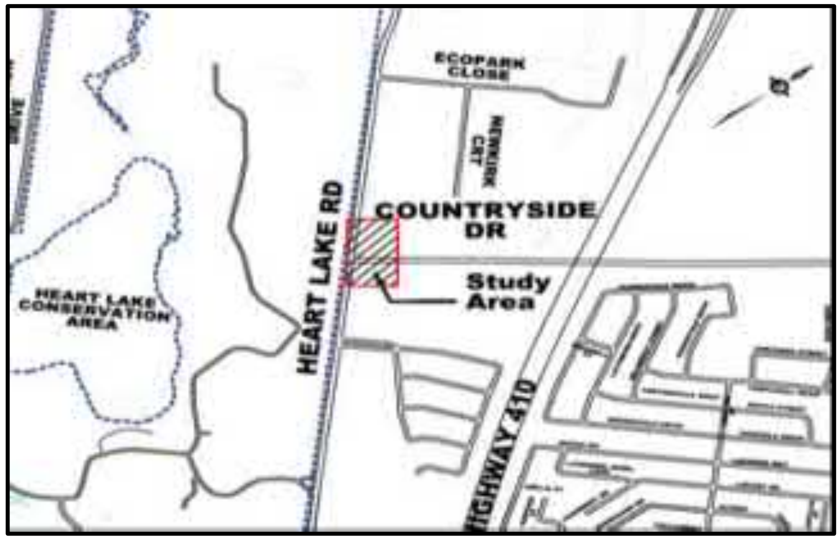
NOTICE OF ONLINE PUBLIC INFORMATION CENTRE #1

Municipal Class Environmental Assessment Study for Intersection Improvements at Heart Lake Road and Countryside Drive

The City of Brampton has initiated a Schedule 'B' Class Environmental Assessment (Class EA) for the following road intersection in accordance with the Environmental Assessment Act:

- Intersection Improvements at Heart Lake Road and Countryside Drive

The EA study is assessing the need for intersection improvements as part of an overall operational and safety improvements for the Heart Lake Road corridor to accommodate current and future transportation and safety needs of pedestrians, cyclists, and motorists. You are invited to participate in the Online Public Information Centre to learn about the project findings to date and share your input.



The Process

The study is being carried out in accordance with the planning and design process for Schedule 'B' projects as outlined in the *Municipal Class Environmental Assessment* (October 2000, as amended in 2007, 2011, 2015), which is approved under the Ontario Environmental Assessment Act.

Online Public Information Centre

The City of Brampton is working hard to protect the health and wellbeing of our community. To help protect the health and safety of residents and staff during the COVID-19 pandemic, this Public Information Centre (PIC) is being held using a virtual format.

The City is committed to informing and engaging the public on the Intersection Improvements at Heart Lake Rd. and Countryside Dr. Class EA and will be posting Public Information Centre content on the City's website starting **April 14, 2022 to May 13, 2022.**

How to Participate:

Step 1: Visit: www.brampton.ca/Heartlake-Countryside-EA by using your computer or scan the QR code using mobile phone.
Step 2: View the material and complete the comment form provided on the website.

If you are unable to participate online, please leave a voicemail with your name and phone number and a member of the project team will contact you for your input.

Comments Invited

If you have any questions or comments regarding the study, or wish to be added to the study mailing list, please contact either of the following project members:

Ghaz Mohammad, M.Eng., P.Eng, PMP
Sr. Project Engineer, Infrastructure Planning
Public Works & Engineering, City of Brampton
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Brampton, ON L6S 6E5
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Information will be collected in accordance with *the Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

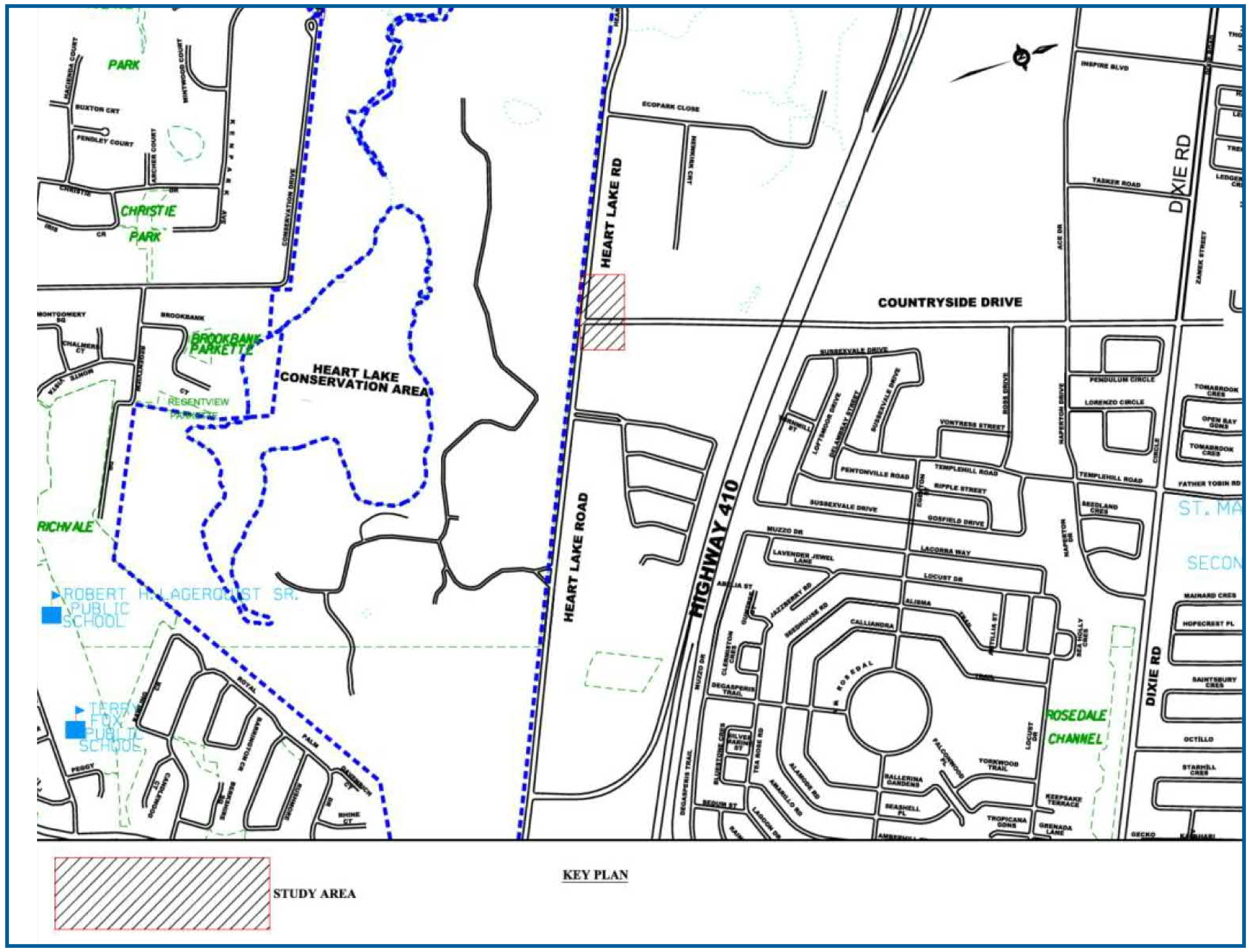
This notice was first issued on **April 14, 2022**.

BRAMPTON

Welcome to the

Heart Lake Road & Countryside Drive Class EA Public Information Centre

April 14 - May 13, 2022



BRAMPTON

MTE

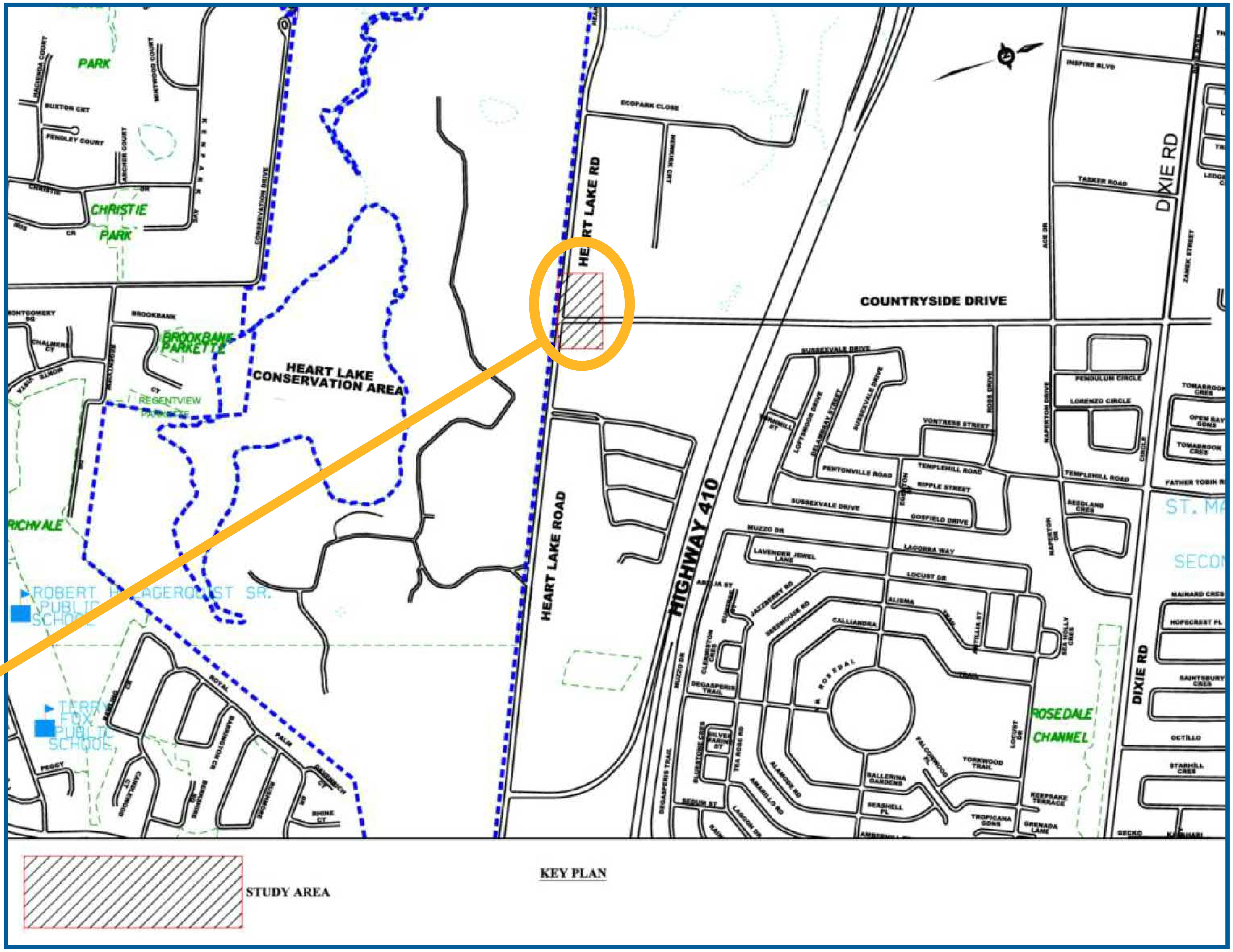
Introduction

The City of Brampton has initiated a Schedule B Class Environmental Assessment (EA) for improvements to the intersection of Heart Lake Road and Countryside Drive

Desired Outcomes of this Class EA Study:

- Safety and operations - including traffic calming
- Minimize natural environment impacts and wildlife mortality
- Conservation of cultural heritage landscape
- Consider proposed land uses and meet travel demands
- Vision Zero initiative, active transportation, safety

Study Limits



Study Area

2019 Function and Design Review Study

Short-Term Recommendations

- Narrower lanes, hybrid multi-use trails through Heart Lake Conservation Area
- Reclassify as Collector Road, 50 km/h speed limit, speed cushions
- *Wildlife mortality:* Maintain flashers, maintain optical speed bars, additional eco-passages, wildlife directional fencing, turtle nesting mounds
- Maintain an enhance wildlife

2019 Function and Design Review Study

Long-Term Recommendations

- Separated bike lanes on Heart Lake Rd. & Roundabout at Countryside

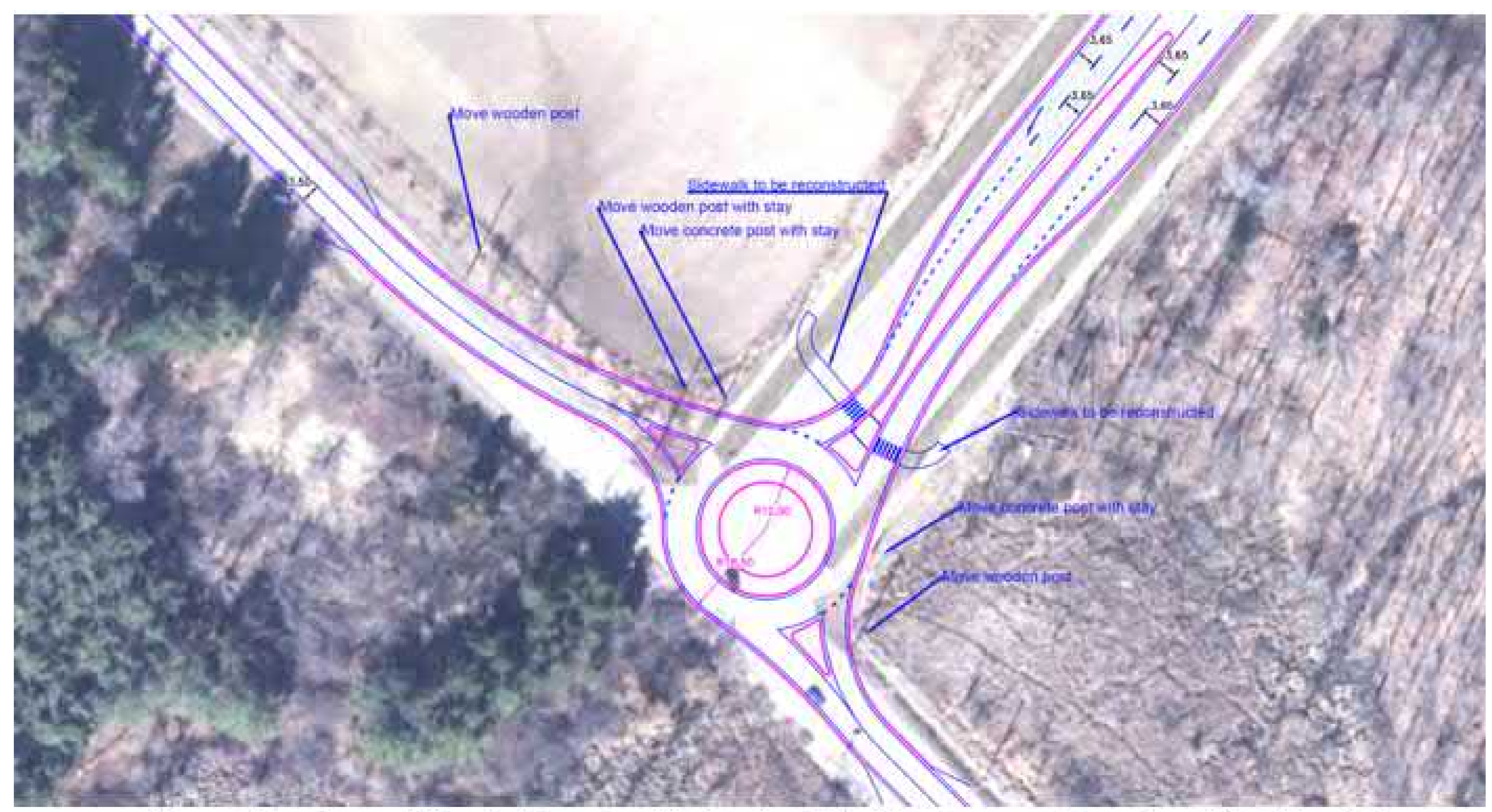
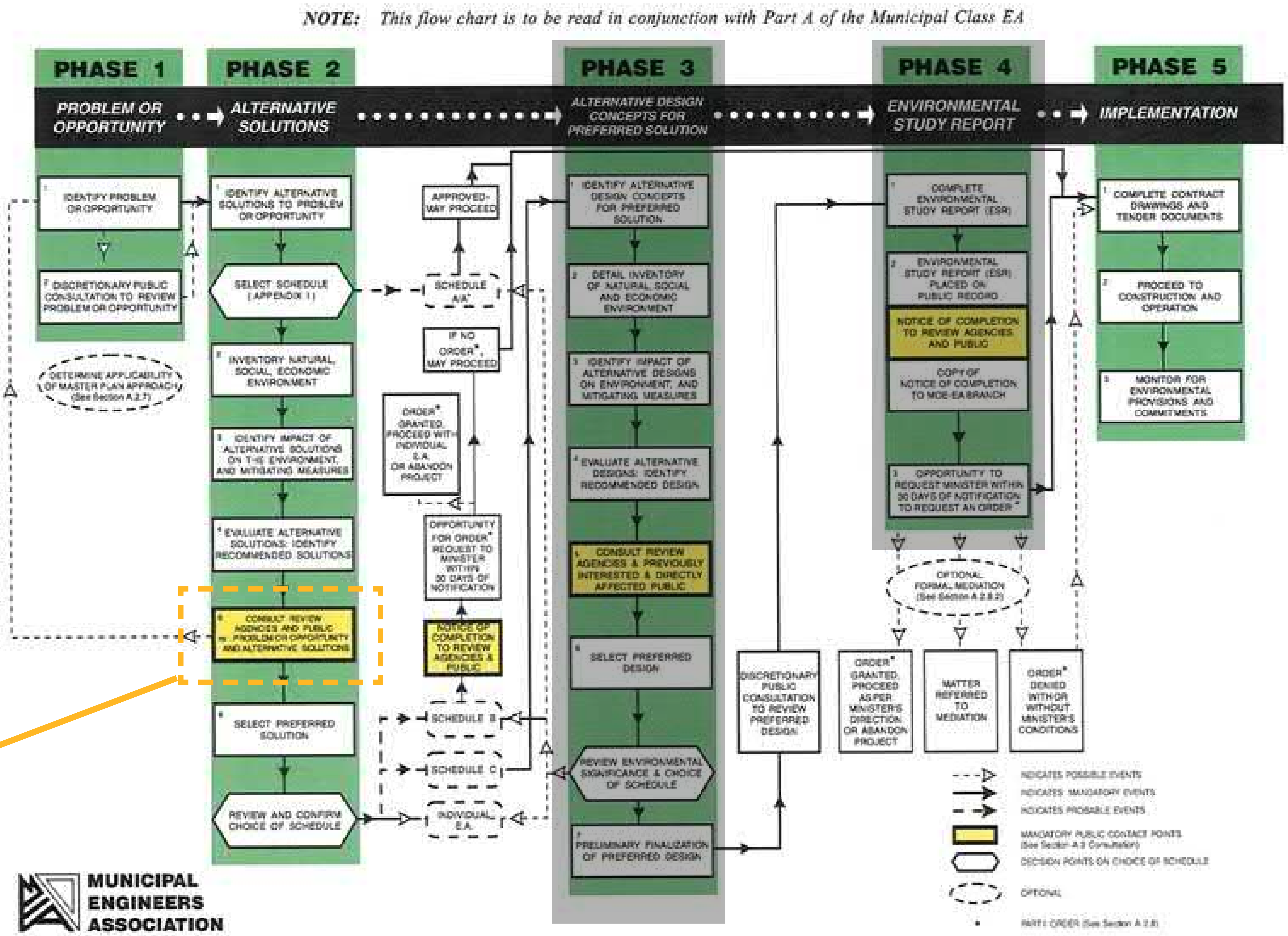


Figure 50: Roundabout at Countryside Option 2 (without encroachment on TRCA lands)

The Class EA Process

- The study is being undertaken in accordance with the Municipal Class EA planning and design process for Schedule “B” project
- *Study is for Heart Lake Road and Countryside Drive intersection only*
- The Function & Design Review of Heart Lake Road Corridor (2019) Study provides background information, provide support for problem/opportunity identification for this intersection improvement
- Additional studies have been undertaken building upon existing background information and studies

The Class EA Process



We are here

Phases 3 and 4 Not Required for Schedule 'B' Class EA

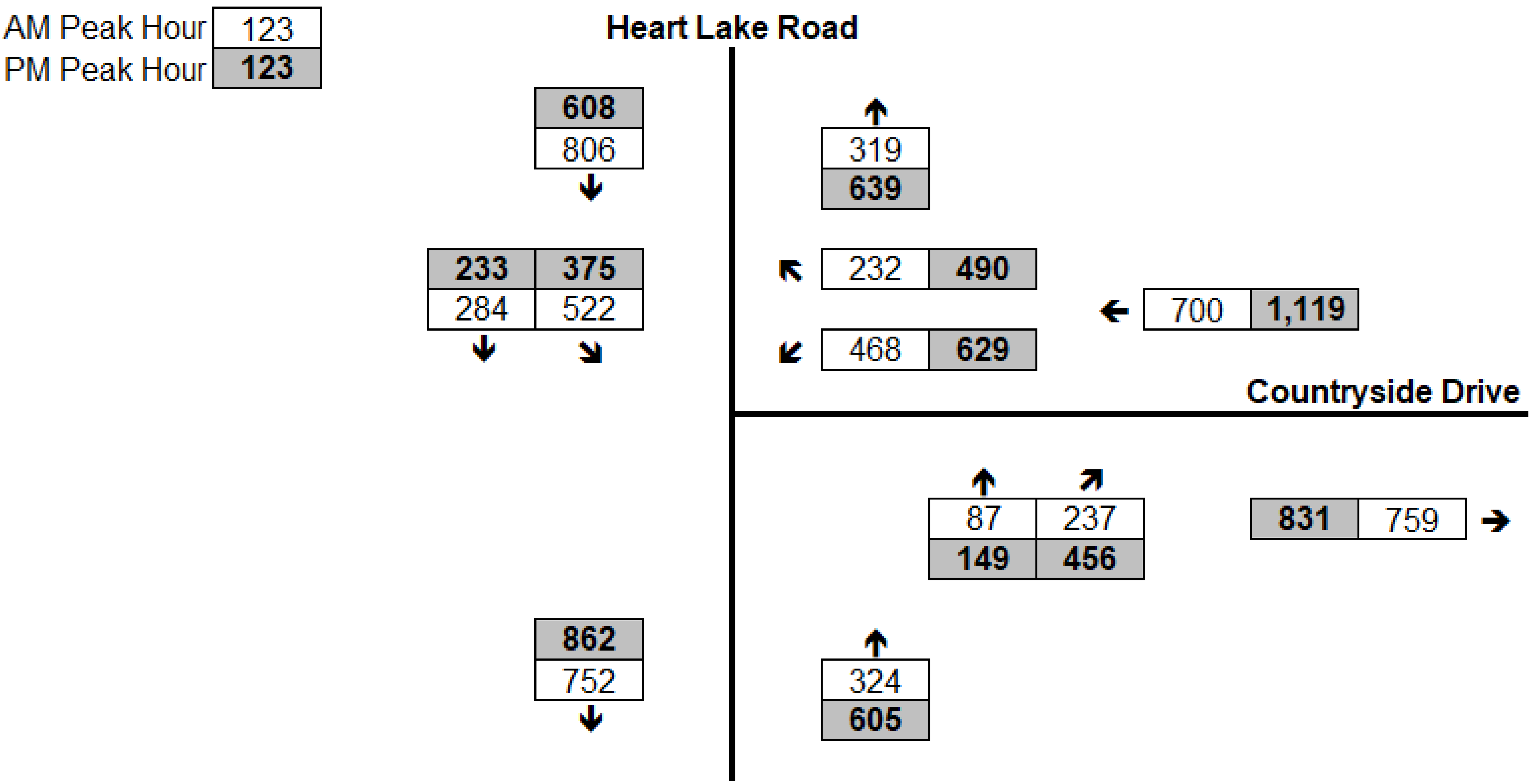
BRAMPTON MTE

Needs and Justification

Improve the safety and operations of the Heart Lake Road and Countryside Drive intersection including *meeting the traffic demand* of increasing population and growth while incorporating *traffic calming and wildlife mortality reduction* recommendations for the Heart Lake Road Corridor.

BRAMPTON MTE

2041 Traffic Volumes



Traffic forecasts were developed via the application of calculated growth rates

The 2041 traffic forecasts represent approximately a 65% increase in comparison to base year traffic volumes

2041 Traffic Operations

1. Do Nothing Scenario (Remain as Unsignalized)

- The westbound left-turn movement is forecast to operate over-capacity

2. Traffic Signal Control

- The forecast traffic volumes would warrant the consideration of traffic signal control
- Operating under signal control, the overall intersection and all movements are forecast to operate within capacity and with acceptable delays

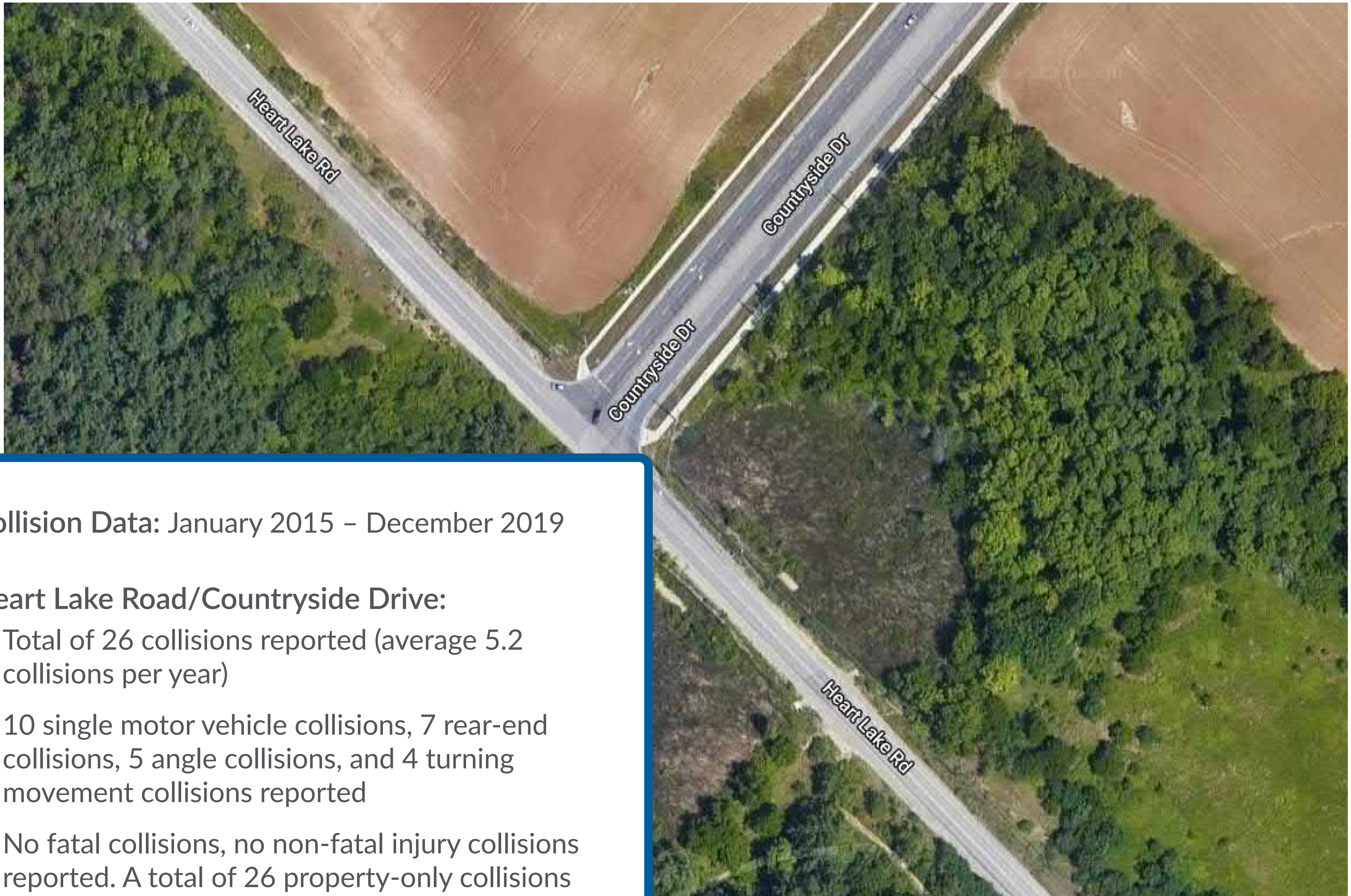
3. Roundabout Control

- Initial screening of the intersection identified and confirmed the location would be applicable for roundabout consideration
- Operating under roundabout control, the overall intersection and all movements are forecast to operate well within capacity and with acceptable delays

Safety Review Study

- Investigation confirmed there is more than adequate approach and departure sight distance available
- However, even with the adequate sight distances, a high frequency of collisions were reported and were determined to be attributed to aggressive driver behaviour (i.e. speed)
- Correlates with the poor traffic operations stemming from a lack of gaps within the traffic stream along Heart Lake Road
- Concluded that the current intersection warrants improvement

Collision Data



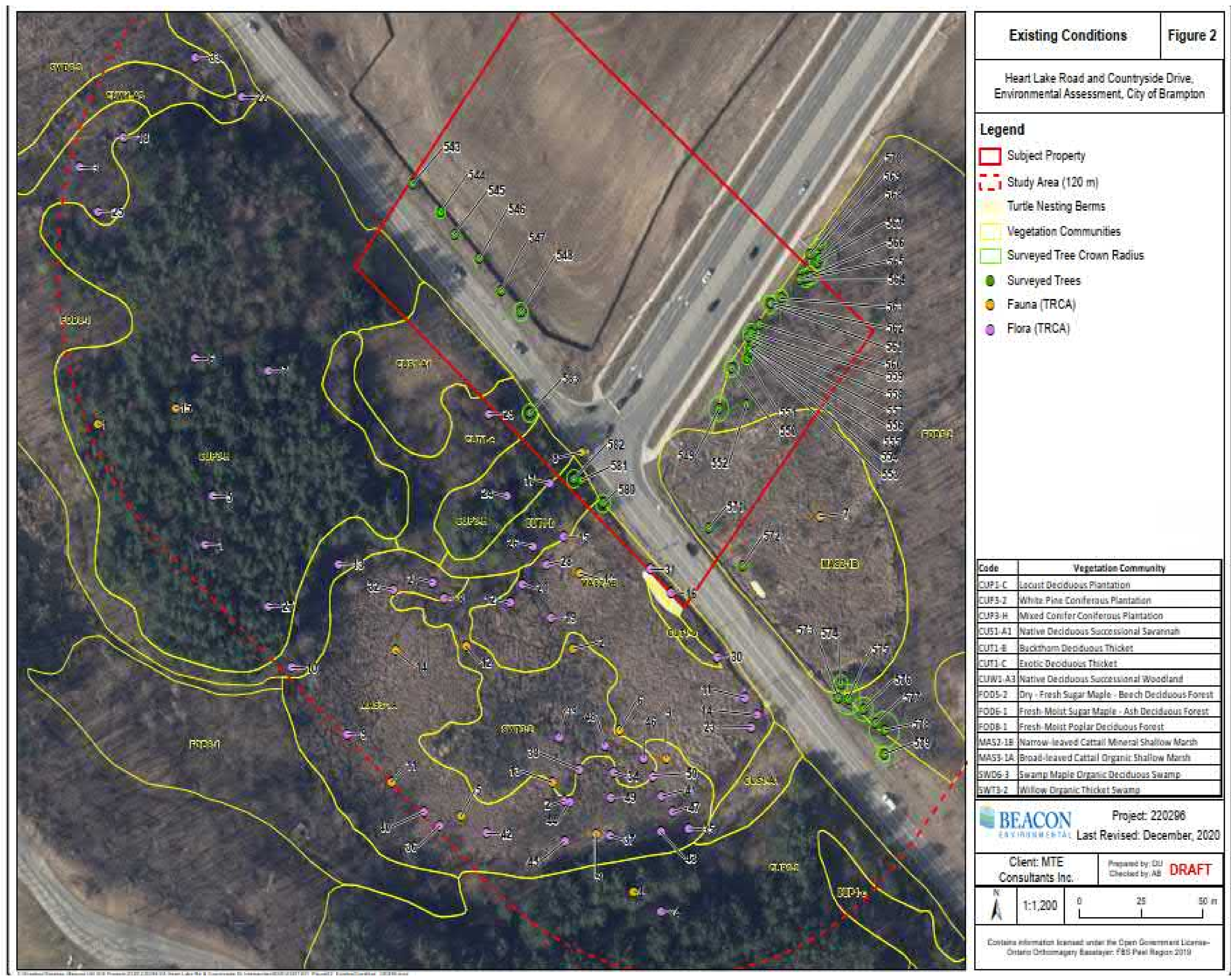
Collision Data: January 2015 – December 2019

Heart Lake Road/Countryside Drive:

- Total of 26 collisions reported (average 5.2 collisions per year)
- 10 single motor vehicle collisions, 7 rear-end collisions, 5 angle collisions, and 4 turning movement collisions reported
- No fatal collisions, no non-fatal injury collisions reported. A total of 26 property-only collisions reported

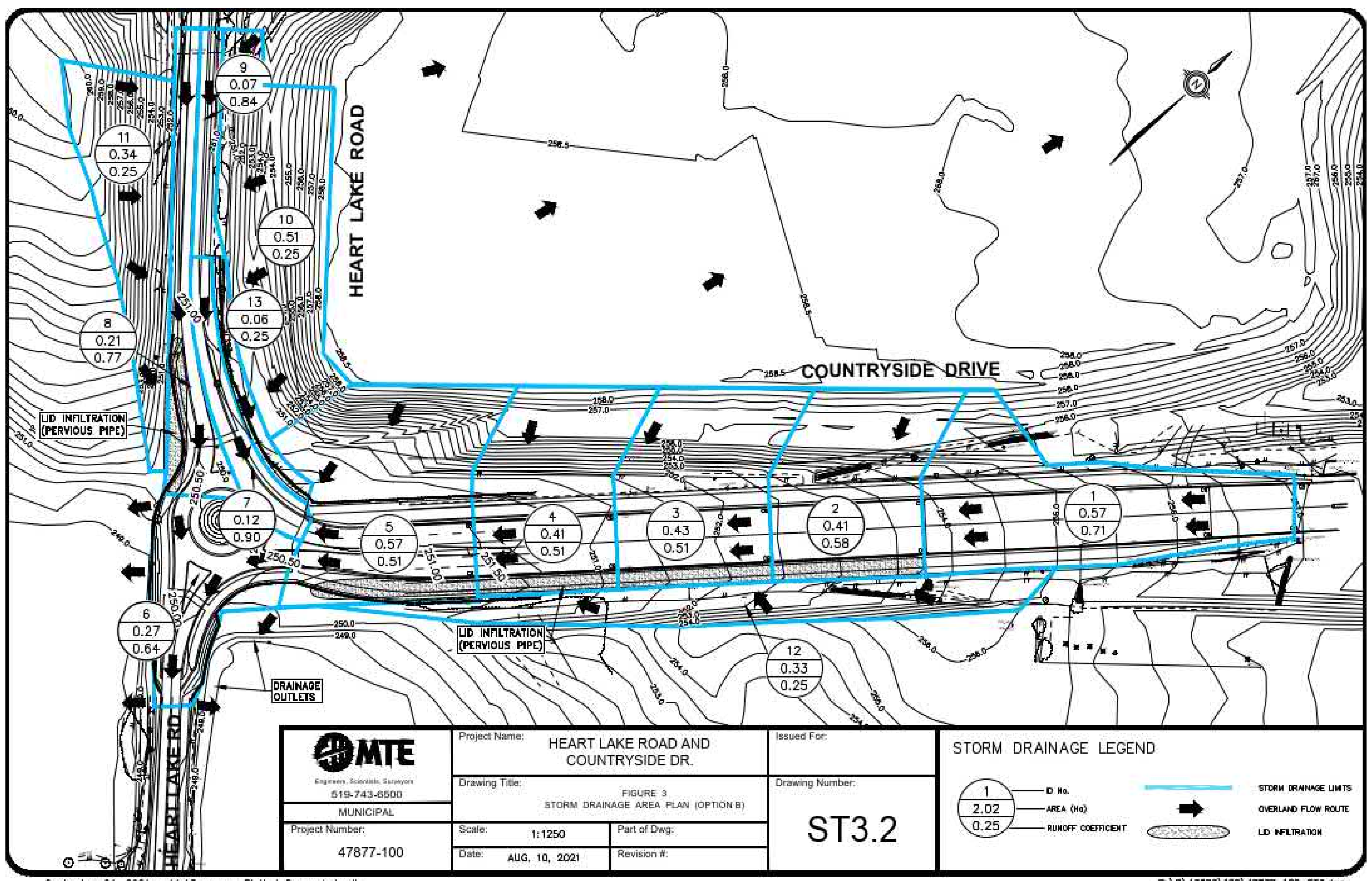
Natural Environment

- Significant wetlands and woodlands near intersection (Part of Heart Lake PSW)
- Significant wildlife habitat in wetland and woodland communities, endangered and threatened species:
  - *Bats, turtles (incl. Snapping), waterfowl, raptor nesting, reptiles*
- Turtle nesting berms
- No fish habitat
- Adjacent to Heart Lake ANSI's



Drainage Study

- Roundabout results in an extra 14 L/s during 100-year-storm compared to signalized intersection
- Low-impact development (LID) recommended for stormwater quantity/quality control



Existing

300-mm storm sewer with sub-drains

Ditch drainage with culvert crossing Countryside Drive; at intersection

Overland flow draining to ditch / wetlands (generally uncontrolled drainage)

Proposed

Replace existing storm sewers and enhance LID to promote infiltration

Re-grade/enhance ditches and replace/relocate culvert at intersection

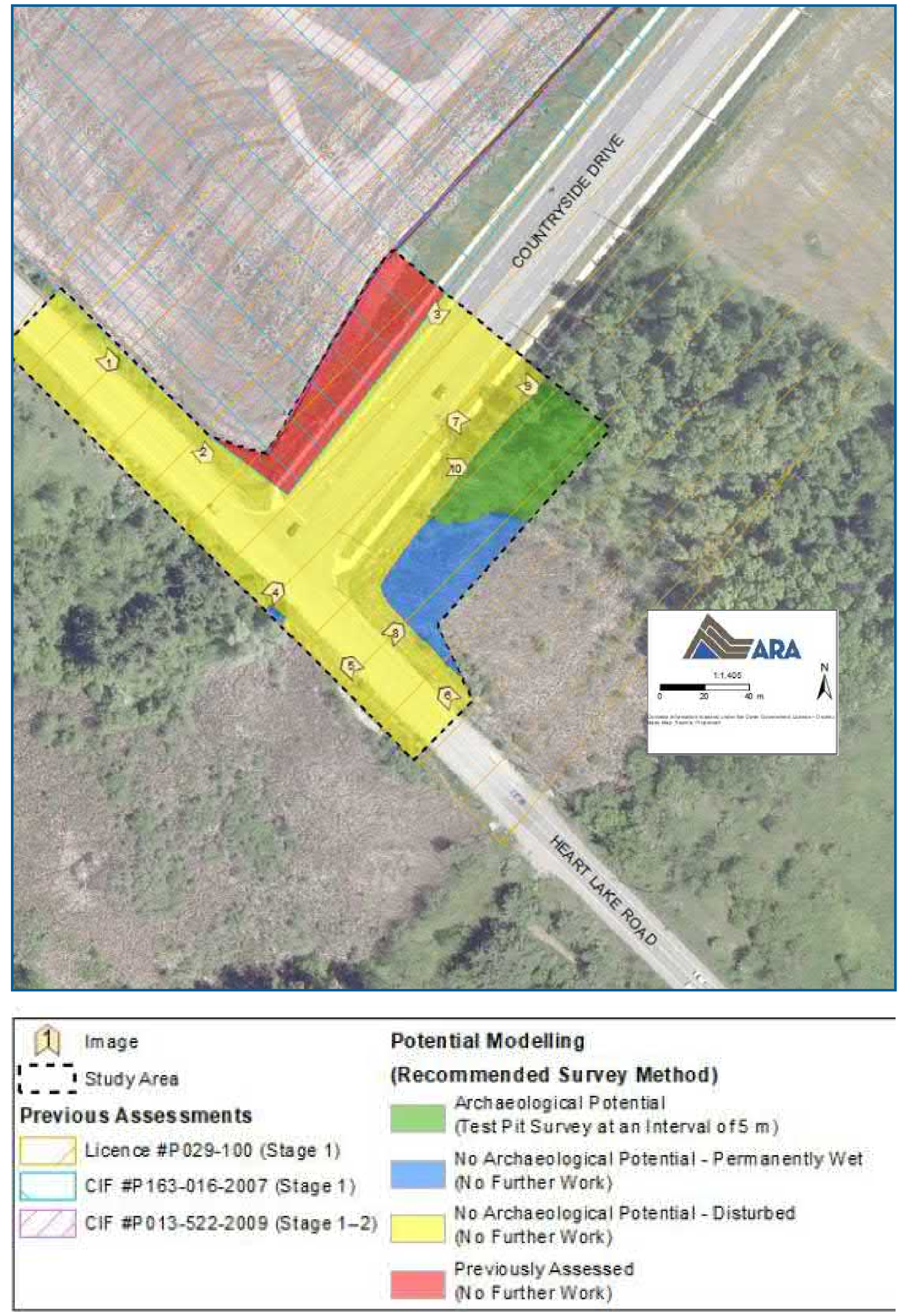
Flows contained and conveyed into ditches or infiltrated within project limits

Phase 1 Environmental Site Assessment

- No records of spills
- Fill has been added over the years
- Additional testing should be undertaken prior to construction

Stage 1 Archeological Investigation

- Most areas have no archaeological potential; previously disturbed, permanently wet, previously assessed
- Intersection options to be designed to avoid potential areas

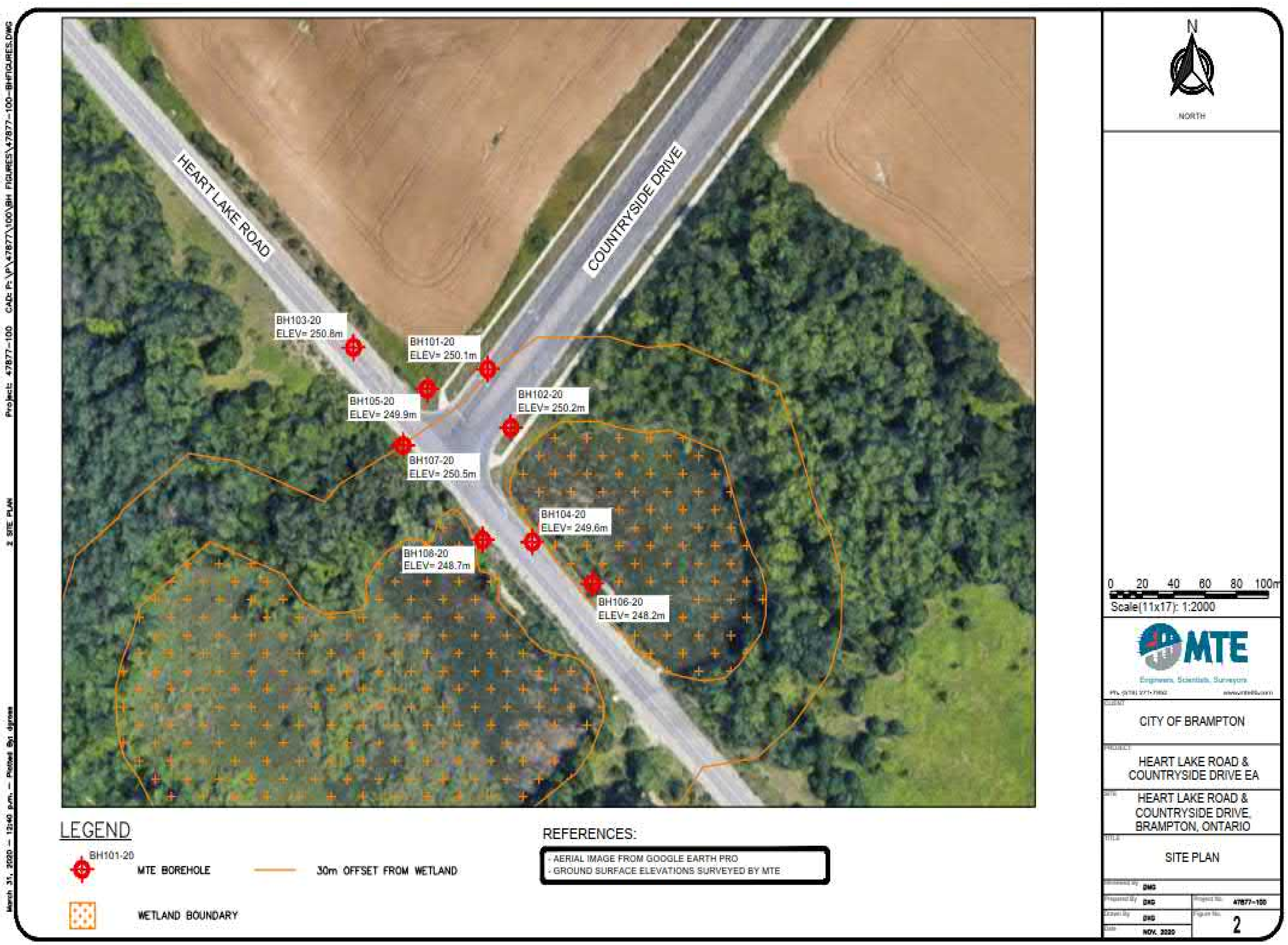


Built/ Cultural Heritage Assessment

- Wetland is considered a Built Heritage Resource
- Heart Lake Road is considered a Cultural Heritage Landmark

Geotechnical Investigation

- Underlying soil is glacial till - gravelly silt
- Peat deposit between 2-4 m, found on west side of Heart Lake Road
- Dewatering expected in excavations greater than 2-m deep



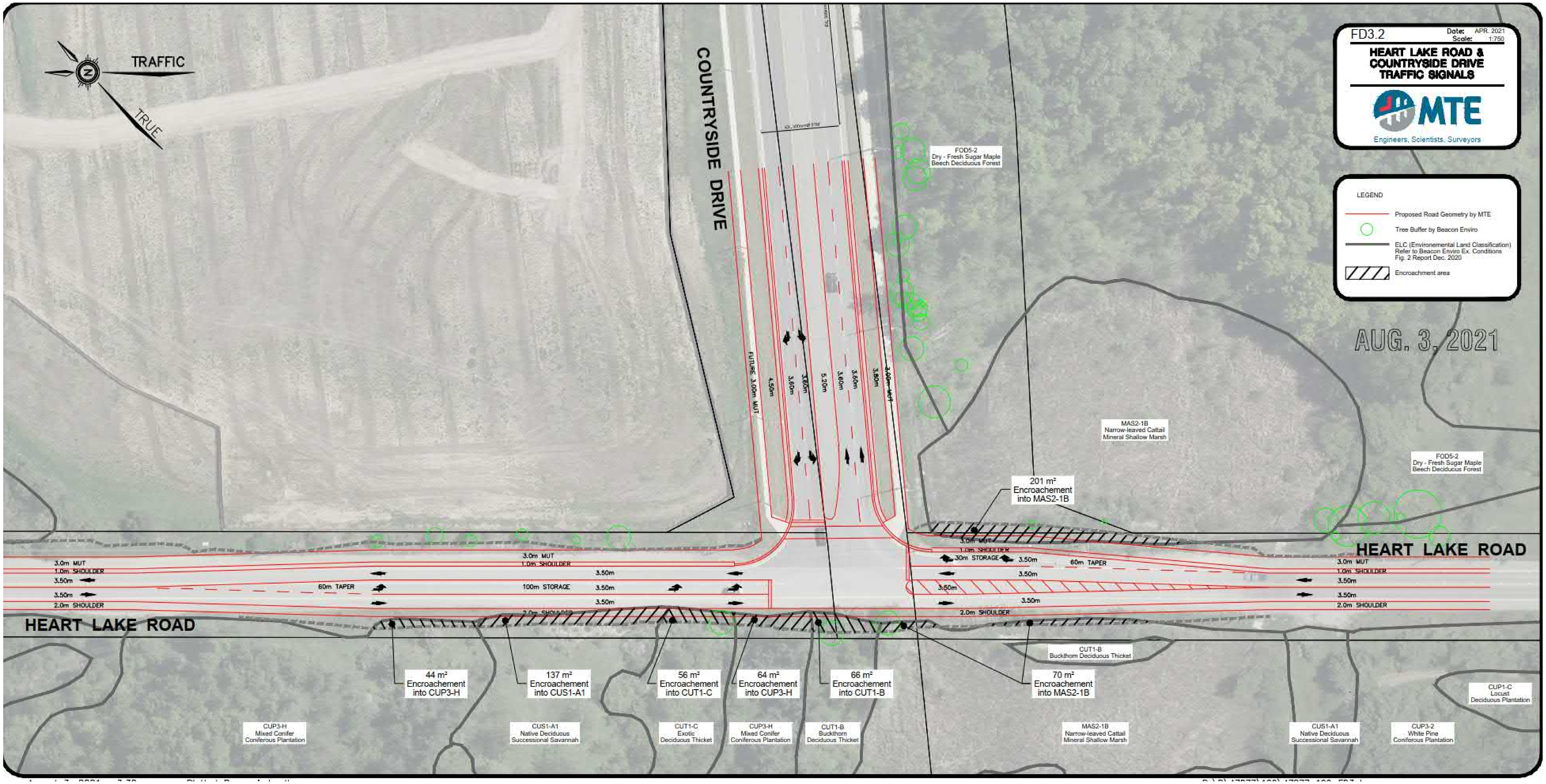
Alternatives

Do Nothing

Signalized Intersection with Turn Landes

Roundabout

Signalized with Turn Lanes



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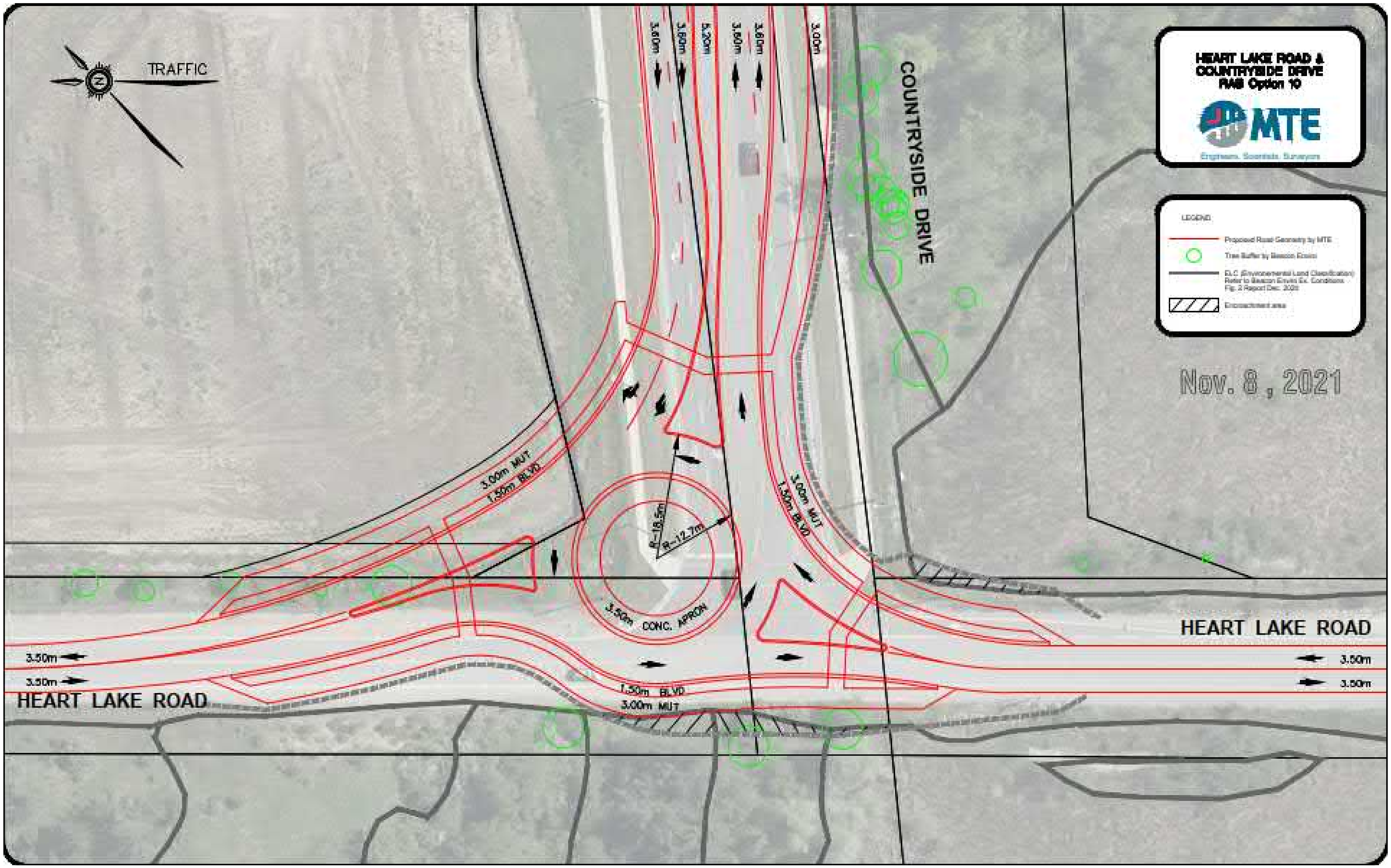
Roundabout


TRAFFIC
3.60m
3.60m
5.20m
3.60m
3.60m
3.00m
COUNTRYSIDE DRIVE
HEART LAKE ROAD &
COUNTRYSIDE DRIVE
RAB Option 10
MTE
LEGEND
Proposed Road Geometry by MTE
Encroachment area
Nov. 8 , 2021
3.00m MUT
1.50m BLVD
3.00m MUT
1.50m BLVD
R=18.5m
R=12.7m
3.50m CONC. APRON
HEART LAKE ROAD
3.50m
3.50m
3.50m
3.50m
HEART LAKE ROAD
1.50m BLVD
3.00m MUT

Heart Lake Road at Countryside Drive Environmental Assessment

Legend

Least Desirable → Most Desirable

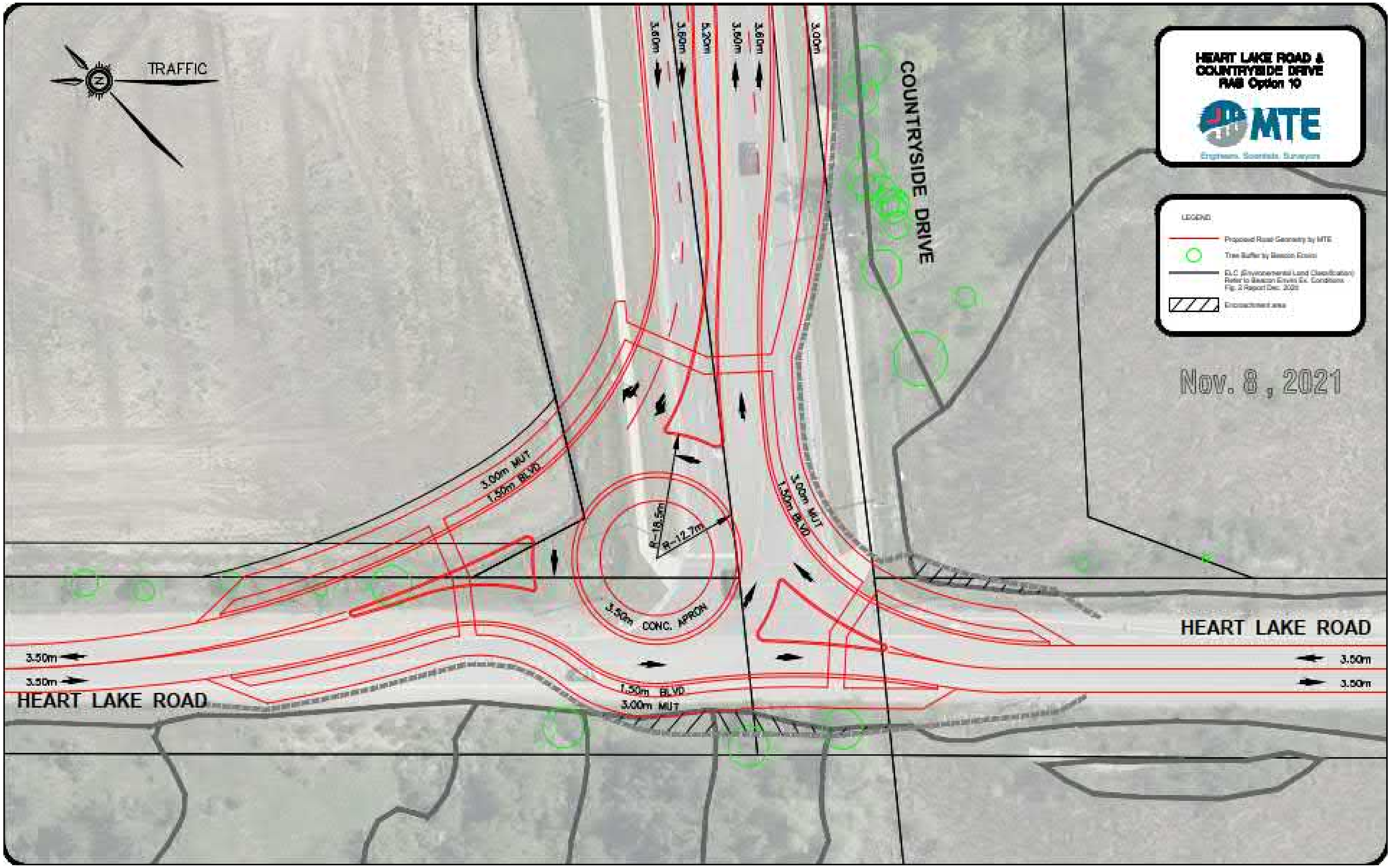
Does not address minimum criteria

Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
Natural Environment			
1. Minimize impacts to Designated Natural Areas, vegetation, wildlife, aquatic features	1. No impacts to existing Natural Areas, vegetation, wildlife or aquatic features, but Heart Lake Road traffic will continue at speed limit, increasing chance of wildlife strikes	1. a) Traffic with green light will continue at speed limit increasing chance of wildlife strikes b) Wildlife fencing and erosion controls to be installed	1. a) All traffic will slow down to navigate roundabout, which should reduce wildlife strikes b) Wildlife fencing and erosion controls to be installed
2. Minimize impacts to wetlands	2. No impacts to designated wetlands	2. Some intrusions into designated wetlands ($271m^2$)	2. Minimal intrusion into designated wetlands ($45m^2$)
3. Minimize impacts to surface water and groundwater	3. No change in runoff/ surface drainage	3. Least pavement drainage/surface water runoff	3. More pavement resulting in more drainage/ surface water runoff
4. Minimize air quality impacts and effects on climate change	4. Traffic volumes will continue to increase, resulting in increase delays / congestion	4. Traffic delays/congestion resulting in vehicles idling at red lights	4. Less traffic delays due to vehicles not having to stop at red lights, less vehicle starting/stopping
	4	1	3
Planning Objectives			
1. Adhere to Transportation Master Plan	1. Does not implement required improvements per Transportation Master Plan	1. Adheres to Transportation Master Plan	1. Adheres to Transportation Master Plan
2. Adhere to Official Plan	2. Other transportation improvements will be required to adhere to the Official Plan	2. Adheres to Official Plan	2. Adheres to Official Plan
3. Adhere to Active Transportation Master Plan	3. Does not adhere to Active Transportation Master Plan	3. Adheres to Active Transportation Master Plan	3. Adheres to Active Transportation Master Plan
4. Adhere to Region Official Plan Policies	4. Other transportation improvements will be required to adhere to Official Plan Plolicies	4. Adheres to Region Official Plan Policies	4. Adheres to Region Official Plan Policies
	0	4	4

Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
Social and Cultural Environment			
1. Improve visual aesthetics	1. Visual aesthetics will remain the same, no opportunities to enhance landscape	1. Landscaping opportunities behind curb/ sidewalk/MUT	1. Opportunities for landscaping in center island and behind sidewalk/MUT
2. Preserve archaeological and cultural heritage features	2. No impacts to archaeological/ heritage features	2. a) No direct impacts to archaeological/ heritage features b) Some impact on existing rural road cross section	2. a) No direct impacts to known archaeological features b) Disrupt existing linear views c) Changes the existing cross section d) Additional Stage 1/2 Archaeological investigation required in property purchase area
3. Preserve the agricultural setting, community character and public realm	3. No impacts to existing setting, character or public realm	3. Signals contribute to urban look and setting	3. Opportunity to enhance the public realm, and all traffic must slow to navigate roundabout
4. Minimize traffic noise	4. Traffic noise will continue to increase as traffic volumes increase	4. Traffic noise will not decrease	4. Traffic noise will decrease due to less stop/starts of traffic
5. Minimize disruption due to construction	5. No disruption due to construction, however, increasing congestions may cause disruption	5. Least time for construction and traffic can be maintained during construction	5. Most time for construction and traffic can be maintained during construction
6. Minimize impacts to existing accesses in the area	6. No impacts to existing access, however, increasing congestion may impact access	6. No accesses impacted in the area	6. No accesses impacted in the area
	2	2	3
Economic Development			
1. Beneficial to business/ community with respect to travel time	1. Travel time will not be reduced, and will increase as traffic volumes increase	1. More delays than with a roundabout due to stopped traffic stopped for red lights	1. Roundabout provides more free flowing traffic, and results in less traffic delays/congestion
2. Minimize capital and construction costs	2. No construction or capital costs	2. Road improvements and signal installation have lowest capital/construction costs - est. $1.15 million	2. Highest Capital Costs due to additional pavement, curb, signage and line markings - est. $1.57 million
3. Minimize property impacts/ requirements	3. No additional property required	3. No additional property required	3. Approximately 550 sm of property is required on NE corner, which can be obtained through subdivision approvals
4. Minimize operating and maintenance costs	4. Operating and maintenance costs do not change	4. Operating and maintenance costs include powering and maintaining signals	4. No signal power and maintenance costs
	3	2	2

Evaluation Criteria	Do Nothing	Signalized Intersection with Turn Lanes	Roundabout
Engineering and Technical			
1. Congestion and collisions will continue	1. Is safe for all travel modes	1. Safe for all travel modes	1. Safe for all travel modes. Roundabout reduces severity of collisions (i.e. less conflict points and sideswipes vs head-on or "T bone" collisions)
2. Create an Active Transportation Friendly Environment (Cyclists, pedestrians etc.)	2. No additional sidewalks or cycling facilities	2. Sidewalks, cycle facilities provided. Motorist must stop at red light and be aware of pedestrians.	2. Sidewalks, cycle facilities provided. Requires pedestrians to be sure motorists are aware of their presence. Cyclists can use Roundabout or multi-use path at Roundabout
3. Accommodate future travel demands	3. Future travel demands not accommodated	3. Future travel demands accommodated (20 years)	3. Future travel demands accommodated (20 years). Roundabout results in less delays/congestion
4. Improve transportation mode choice including transit	4. Transportation mode choice not improved	4. All transportation modes accommodated including transit	4. All transportation modes accommodated including transit
5. Accommodate emergency services	5. Fire trucks can be accommodated, but may experience congestion in future	5. Fire Truck can use priority signal to enhance access through intersection	5. Fire trucks can navigate roundabout within acceptable response times - less congestion
6. Minimize impacts to utilities in the corridor	6. No utility relocations required	6. Utility relocations will be required, but somewhat less than Roundabout	6. Utility relocations required will be slightly more than signalized due mainly to additional street lighting
	1	4	3
Overall Evaluation Score			
	Does not meet planning objectives nor active transportation requirements, and will result in increased congestion.	Meets Planning and Engineering/ Technical objectives; some intersections encroach into natural areas; idling traffic will continue/ increase; and noise and urban look will increase.	Meets Planning and Engineering/ Technical objectives; visual/ landscaping can be enhanced; less idling/ congestion; lower lifecycle cost due to very low maintenance with no intrusions into wetlands; Pedestrians/ cyclists may be initially unfamiliar with Roundabouts.
	10	13	15

Roundabout is Preferred



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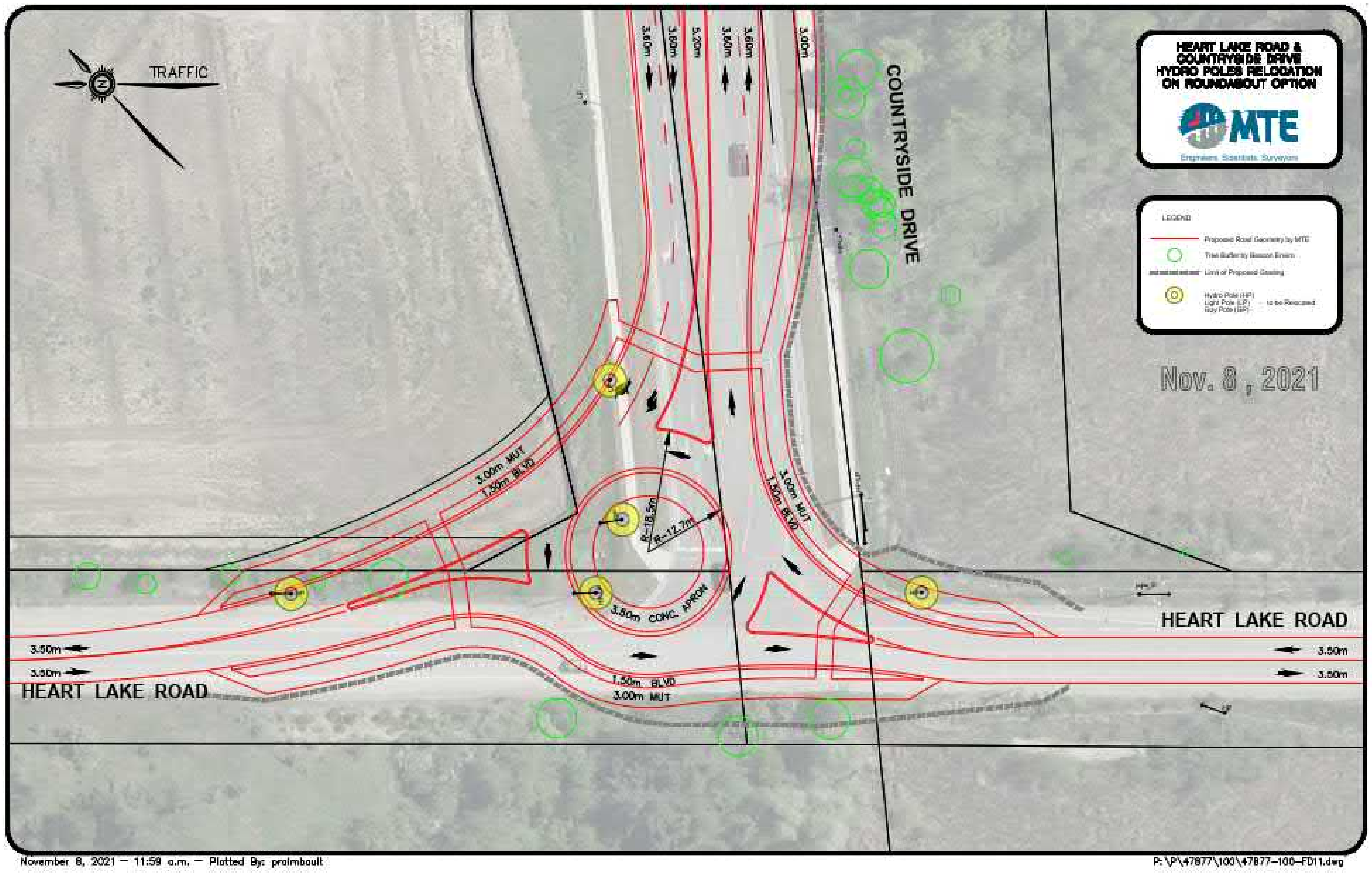
Utility Issues



- Alectra, some communications cables
- Not many conflicts, but hydro relocations and new streetlighting is critical

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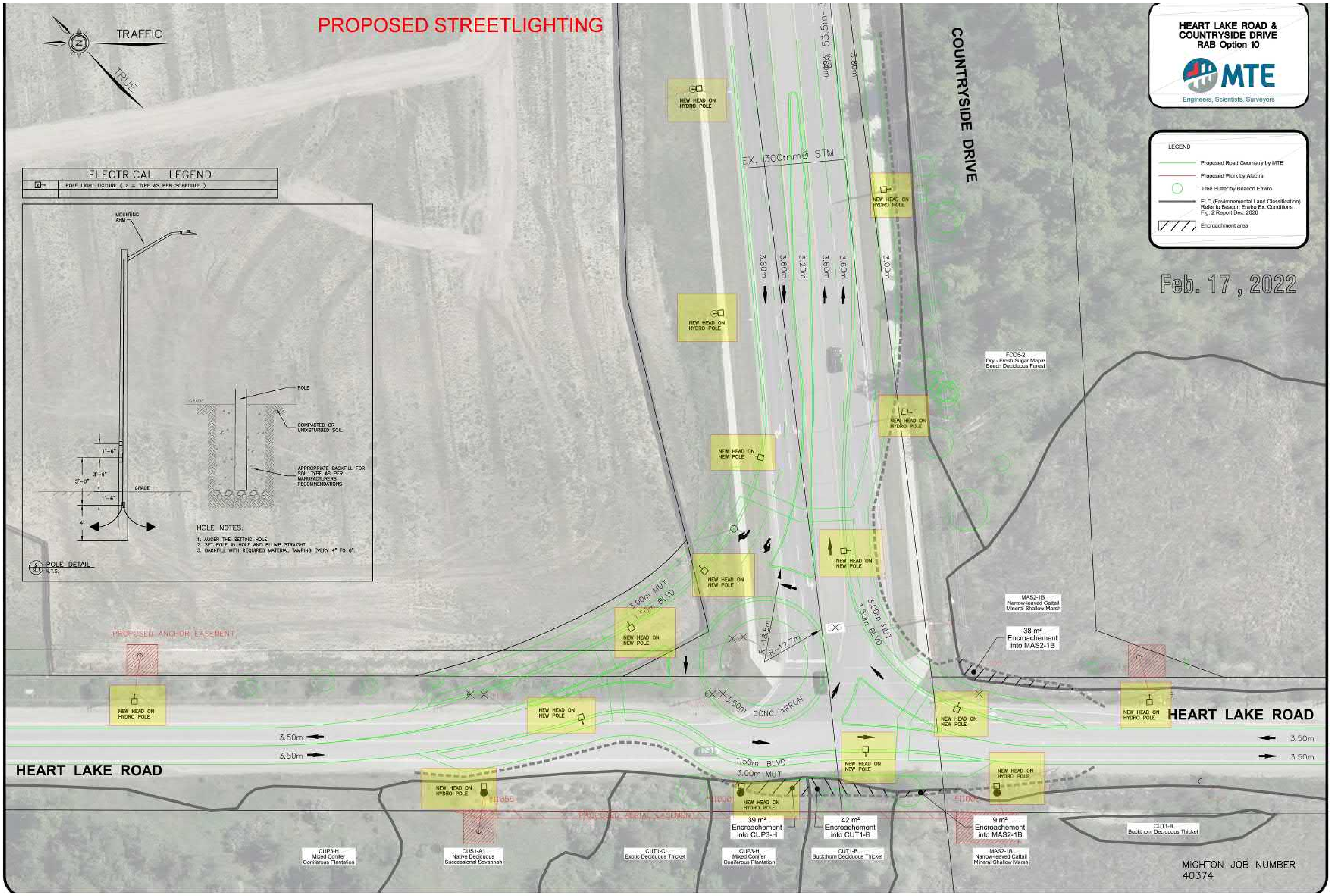
Proposed Streetlighting



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We Want to Hear From You!

Please provide comments by filling out the comment form or by contacting the City's representative or the consultant below by May 13, 2022:

Ghaz Mohammad
Project Manager, Infrastructure Planning
City of Brampton
Ghazanfar.mohammad@Brampton.ca
905-874-2949

Dave Hallman, P.Eng.
Senior Project Manager
MTE Consultants
Dhallman@mte85.com
519-743-6500 ext. 1336

The personal information on the comment form is collected under the authority of the Municipal Act SO 2001, c.25. Questions about the collection of personal information should be directed to our Call Centre by dialing 3-1-1 (within Brampton city limits) or 905-874-2000 (outside city limits). Please review the City's Privacy Statement for more information http://www.Brampton.ca/policy

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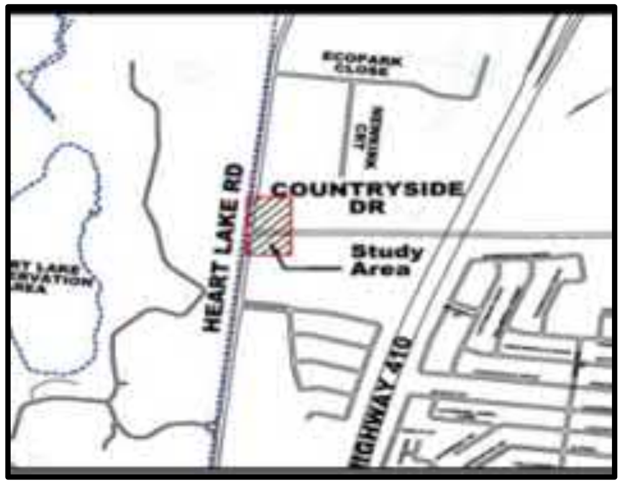
Public Notice

NOTICE OF Study Completion

Intersection Improvements
Heart Lake Road and Countryside Drive
Municipal Class Environmental Assessment Study

The Study

The City of Brampton (the "City") has completed a Class Environmental Assessment for improvements to the intersection of Heart Lake Road and Countryside Drive. The City identified the need for intersection improvements as part of an overall operational and safety improvement for the Heart Lake Road Corridor.



The study is being undertaken in accordance with the planning and design process for Schedule "B" projects as outlined in the Municipal Class Environmental Assessment document (October 2000, as amended in 2007, 2011, 2015 and 2020), which is approved under the Ontario Environmental Assessment Act. This study has defined the problem(s) with the intersection, identified and evaluated alternative solutions to the problem, evaluated alternative design concepts for the solution, recommended a preferred design concept and assessed potential impacts and identified and included mitigation measures associated with the preferred design.

A key component of the study has been consultation with interested stakeholders, including public agencies and Aboriginal Communities. A Public Information Centre (PIC) was held online from April 14, 2022 to May 13, 2022 to present the project, review the study findings and discuss issues related to the project including alternative solutions, evaluation criteria, alternative design concepts, and environmental impacts and mitigation measures.

SCAN ME

A Project File Report (PFR) has been prepared to document the Class EA planning process used in developing the recommended solution, including the alternatives considered, the preferred design, impacts and mitigation measures, and consultation activities. The PFR will be made available for 45 days public review from December 15, 2022 to January 28, 2023 on the project website, which can be accessed through the following link or scanning the QR code: www.brampton.ca/Heartlake-Countryside-EA

Comments Invited

Interested persons may provide written comments to our project team by January 28, 2023. All comments and concerns should be sent directly to **Ghaz Mohamed at the City of Brampton**.

In addition, a request may be made to the Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study (i.e. requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), only on the grounds that the requested

Notice first issued on December 15, 2022

order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name.

Requests should specify what kind of order is being requested (request for conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy potential adverse impacts on Aboriginal and treaty rights, and any information in support of the statements in the request. This will ensure that the ministry is able to efficiently begin reviewing the request.

The request should be sent in writing or by email to:

Minister
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto, ON M7A 2J3
Email: Minister.mecp@ontario.ca

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, ON M4V 1P5
EABDirector@ontario.ca

Requests should also be copied to the **City of Brampton by mail or by e-mail**. Please visit the ministry's website for more information on requests for orders under section 16 of the Environmental Assessment Act at: https://www.ontario.ca/page/class-environmental-assessments-part-ii-order

All personal information included in your request – such as name, address, telephone number and property location – is collected, under the authority of section 30 of the Environmental Assessment Act and is collected and maintained for the purpose of creating a record that is available to the general public. As this information is collected for the purpose of a public record, the protection of personal information provided in the Freedom of Information and Protection of Privacy Act (FIPPA) does not apply (s.37). Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remains confidential.

General comments on the study should also be submitted by January 28, 2023 to the following key project contacts:

Ghazanfar Mohammad, P.Eng., PMP

City Project Manager

Public Works & Engineering, City of Brampton
1975 Williams Parkway, Brampton, ON L6S 6E5
Call: 311
TTY: 905 874 2130
Fax: 905 874 2505
Email: ghazanfar.mohammad@brampton.ca

Dave Hallman, P. Eng

Consultant Project Manager

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, ON N2B 3X9
T: 905-639-2552 x1336
F: 905-639-7727
Email: dhallman@mte85.com

Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

This Notice was first issued on December 15, 2022.