

Agenda Including Addeds

Ecological Community Advisory Committee

7th Meeting of the Ecological Community Advisory Committee

June 15, 2023, 4:30 PM

Advisory Committee Virtual Meeting - Please check the City website for current details

The City of London is situated on the traditional lands of the Anishinaabek (AUh-nish-in-ah-bek), Haudenosaunee (Ho-den-no-show-nee), Lūnaapéewak (Len-ah-pay-wuk) and Attawandaron (Add-a-won-da-run).

We honour and respect the history, languages and culture of the diverse Indigenous people who call this territory home. The City of London is currently home to many First Nations, Métis and Inuit today.

As representatives of the people of the City of London, we are grateful to have the opportunity to work and live in this territory.

The City of London is committed to making every effort to provide alternate formats and communication supports for meetings upon request. To make a request specific to this meeting, please contact advisorycommittee@london.ca.

	Pages
1. Call to Order	
1.1 Disclosures of Pecuniary Interest	
2. Scheduled Items	
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5. Items for Discussion	
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Note: The objective of the discussion will be to determine the interest in the Committee developing a similar document for rural land owners / farmers in London who own natural heritage features.	
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6.	Adjournment	

Ecological Community Advisory Committee

Report

6th Meeting of the Ecological Community Advisory Committee
May 18, 2023

Attendance

PRESENT: S. Levin (Chair), S. Evans, B. Krichker, K. Lee, K. Moser and S. Sivakumar and H. Lysynski (Committee Clerk)

ABSENT: P. Baker, E. Dusenge, T. Hain, S. Hall, M. Lima, R. McGarry, S. Miklosi, G. Sankar and V. Tai

ALSO PRESENT: S. Butnari, K. Edwards, K. Kys, M. Shepley and B. Westlake-Power

The meeting stood adjourned at 5:00 PM due to lack of quorum.



London
CANADA

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May 17, 2023

K. Edwards
Manager, Community Planning

I hereby certify that the Municipal Council, at its meeting held on May 16, 2023 resolved:

That the following actions be taken with respect to the 5th Report of the Ecological Community Advisory Committee, from its meeting held on April 20, 2023:

- a) K. Moser and S. Hall BE APPOINTED as Representative and Alternate to the Trails Advisory Group;
- b) the Working Group comments relating to the property located at 735 Southdale Road West BE FORWARDED to the Civic Administration for review and consideration; and,
- c) clauses 1.1, 3.1, 5.2 and 5.4 BE RECEIVED for information. (2023-C04) (2.2/8/PEC)

M. Schulthess
City Clerk
/pm

cc: E. Williamson, Ecologist
S. Butnari, Ecologist Planner
M. Shepley, Ecologist Planner
Chair and Members, Ecological Community Advisory Committee

Report to Planning and Environment Committee

To: Chair and Members
Planning and Environment Committee
From: Scott Mathers, MPA, P.Eng.
Deputy City Manager, Planning and Economic Development
Subject: Post-Development Environmental Impact Study Monitoring Update
Date: May 23, 2023

Recommendation

That, on the recommendation of the Deputy City Manager, Planning and Economic Development, the following report regarding the Post-Development Environmental Impact Study Monitoring Update **BE RECEIVED** for information.

Executive Summary

The Post-Development Environmental Impact Study (EIS) Monitoring program conducts assessments of natural features adjacent to subdivisions following assumption. Select subdivisions are evaluated to determine the success of the pre-development EIS report's recommended mitigation measures in achieving a net benefit to the natural heritage areas.

Dougan & Associates were retained to complete the review of 12 sites throughout 2021. This report completes the first year of a long-term ecological monitoring program that investigates the implementation of mitigation methods recommended in previously accepted EIS reports. Findings of the 2021 fieldworks confirm the need for buffers on all sites with natural heritage features.

Linkage to the Corporate Strategic Plan

A well planned and growing community - London's growth and development is well-planned and considers use, intensity, and form.

Analysis

1.0 Background Information

1.1 Previous Reports Related to this Matter

Planning and Environment Committee, December 13, 2021, Agenda Item 3.8, Environmental Management Guidelines

Planning and Environment Committee, March 29, 2021, Agenda Item 2.12, Post Development Environmental Impact Study Monitoring

Strategic Priorities and Policy Committee, May 06, 2019, Agenda Item 2.3, Approval of the 2019 Development Charges By-law and Background Study

Planning and Environment Committee, July 16, 2018, Agenda Item 2.6, Environmental Impact Study (EIS) Compliance

1.2 Environmental Impact Study Compliance Review

Environmental impact studies (EIS) are required to determine whether, or the extent to which, development may be permitted in areas within, or adjacent to, specific components of the Natural Heritage System. They confirm or refine the boundaries of natural heritage features and include conditions and mitigation measures to ensure that development does not negatively impact the natural features and ecological functions

for which the area is identified. The preparation of an environmental impact study is guided by the Council adopted Environmental Management Guidelines.

Historically, the monitoring of EIS mitigation measures in London was the responsibility of developers with consultants being retained by these individuals to assess outcomes for each subdivision. On July 16, 2018, a report was presented to Planning and Environment Committee that identified EIS compliance issues at the time and next steps as summarized below:

1. **Improve the EIS compliance process** by operationalizing recommended monitoring clauses through draft plan approval and subdivision agreements.
2. **Review active subdivisions.**
3. **Enhance compliance and enforcement** by undertaking continuous improvement initiatives.
4. **Explore options for a city-wide monitoring contract** to be led by city staff to conduct monitoring at regular intervals.
5. **Conduct post-development “audits”** to complete systematic long-term reviews of post-development impacts on natural heritage areas.

As Post-Development EIS Monitoring was included as a program in the 2019 Development Charges, the City is now able to undertake a city-wide monitoring contract approach to conducting audits. This report completes the first year of a long-term ecological monitoring program that investigates the implementation of mitigation methods recommended in previously accepted EIS reports. This approach allows for consistent monitoring (i.e., repeatable methodology), at regularized intervals over the long-term, and the ability to benchmark with other similar subdivisions. The results of the post-development monitoring program will inform if any remedial works are to be done or if any policy changes are to be made.

2.0 Discussion and Considerations

2.1 2021 Project Overview

The Post-Development EIS Monitoring program aims to evaluate the effectiveness of the implementation of recommended pre-development EIS mitigation measures in achieving a net benefit, or no negative impact, to the natural features and functions. The development of a repeatable monitoring program will allow staff to evaluate long-term (year-over-year) trends related to developments adjacent to natural areas.

In late 2020 staff undertook a competitive procurement process to retain an environmental consulting firm. Dougan & Associates were retained to conduct the first year of the Post-Development EIS Monitoring program.

The project involved conducting background reviews on EIS reports to determine the site’s pre-development condition, natural heritage features and any associated recommendations for monitoring and mitigation measures.

Twelve (12) study sites were selected for the initial study from the set of subdivisions assumed by the City between 2014 and 2019, and where the limits of the development contain or were adjacent to Open Space zones (OS4 and/or OS5). Dougan & Associates prepared site-specific monitoring plans for each that included:

- updates to existing Ecological Land Classification (ELC),
- establishing surveys of vegetation plots to monitor across multiple years,
- encroachment and disturbance monitoring for areas directly adjacent to development,
- baseline breeding bird and nocturnal amphibian calling surveys,
- turtle basking surveys (for select sites), and
- aquatic habitat and monitoring surveys (for select sites).

The methods used were aimed at answering several questions about the potential impacts of development on the vegetation communities, hydrology, aquatic habitat, and the disturbance of natural heritage features. General recommendations on matters such as restoring natural heritage feature integrity and future monitoring intervals were also included.

2.2 Study Sites

Table 1 below outlines the locations reviewed in 2021 as part of the Post-Development EIS Monitoring program. A map showing the locations of the study sites has been included in Appendix A for reference.

TABLE 1 – FEATURES STUDIED IN 2021 AND ASSOCIATED SUBDIVISION FILE NUMBER

File Number	Feature Name
39T-00514	Talbot Village Wetland
39T-03512	Cresthaven Woods
39T-03518	Kilally Woods
39T-04513	Pebblecreek
39T-05506	Pincombe Drain
39T-05510	Uplands North Wetland & Powell Woods
39T-06503	Ballymote Trail
39T-08502	Maple Grove Woods
39T-10501	Forest Hill Woods
39T-10502	Medway Valley Heritage Forest ESA
39T-98512	Gibbons/UWO Wetland
39T-99522	Northbrook Valley

2.3 Findings

Factsheets have been prepared for each of the 12 study sites summarizing the 2021 findings and are included in Appendix B.

2.3.1 Vegetation Resources

Vegetation plots were established to replicate (as best as possible) the study location from the pre-development EIS. Updated Ecological Land Classification (ELC) mapping was undertaken for each study site and the results compared to the pre-development ELC to detect changes in the feature (i.e., size, shape, and/or composition of the communities). Key findings include:

- Eleven (11) sites saw changes in vegetation compositions adjacent to the areas of development.
- Seven (7) of the sites experienced significant changes in their ELC composition from pre-development. A total of 4.65 hectares of area changed from natural to cultural communities from pre- to post-development.
- Eight (8) of the sites experienced a change in their wetland cover. A total of 7.89 hectares converted from wetland to non-wetland communities from pre- to post-development.

Changes to wetland communities potentially indicates a change in hydrology or other conditions on site. It should also be noted that some of the changes in ELC communities from pre- to post-development may be due to a refinement of the mapping and surveying differences for the vegetation communities. Therefore, some of these community changes may have occurred regardless of development proceeding on the adjacent lands.

The purpose of the pre-development EIS report is to ensure that no negative impacts occur to the natural area adjacent to developments. Based on the 2021 observations, if these changes were directly correlated to the adjacent developments, then that would suggest that the EIS mitigation measures were not successful in protecting the natural area. However, given the time between preparation of the pre-development EIS and the post-development audit, other unknown factors may have contributed to these impacts. More frequent monitoring and reporting throughout the buildout of the developments

would've been required to pinpoint the primary cause of the observed changes in vegetation communities.

2.3.2 Wildlife Resources

The 2021 field season included breeding bird surveys, nocturnal amphibian calling surveys, and the recording of incidental wildlife sightings for all sites, with only specific sites being targeted for turtle basking surveys. Monitoring stations were established to replicate (as best as possible) the pre-development EIS study locations and their proximity to significant features (e.g., wetlands or water features). The 2021 surveys identified a total of 66 bird species and 6 amphibian species, of which 14 species (13 birds and 1 reptile) were significant (species of special concern, endangered or threatened).

Where available, comparisons were made to documented pre-development conditions (both formally and incidentally recorded). However, these comparisons were inconsistent across the study sites. Occasionally data was incomplete due to the variable nature of pre-development data and the availability of background reports, which affects the ability to draw conclusions about impacts. Therefore, for some sites the data collected in 2021 will serve as a new baseline (i.e., of the post-development condition) for use in future studies to allow for comparison of long-term trends within the study areas. When comparing diversity of species across the sites (not the abundance), eleven (11) of the sites saw a reduction in the number of species present from pre- to post-development.

2.3.3 Aquatic Monitoring

Aquatic transects were established for eight (8) sites (Kilally Woods, Ballymote Trail, Maple Grove, Medway Valley, Northbrook, Pebblecreek, Pincombe, Uplands North) to replicate (as best as possible) the study location from the pre-development EIS to monitor aquatic and fish habitat. Sampling stations were determined during the 2021 fieldworks based on observed channel and flow conditions. Two (2) of the sites (Medway Valley and Ballymote Trail) are experiencing stable or improved watercourse conditions based on their compensation habitat. The remaining sites were observed to be experiencing varying levels of disturbance. On one site (Kilally Woods), an erosion scar was observed along the Thames River bank as a result of uncontrolled rear-yard overland flows from the adjacent development, while on another site (Maple Grove) the stormwater management facility was overrun with hundreds of invasive goldfish. The results of the 2021 fieldworks tend to suggest that the recommended pre-development mitigation measures did not prevent impacts to these sites.

It should also be noted that the pre-development EIS reports did not provide a sufficient level of detail regarding the baseline conditions of the aquatic systems within the natural heritage areas, which limits the extent of comparison between pre- and post-development conditions.

2.3.4 Disturbance Monitoring

Monitoring transects were established to determine the levels of site disturbance post-development. The 2021 field works categorized disturbance level as either low, medium, or high, assessed the types of encroachment, and for comparison across sites, recorded disturbances at pre-determined distance intervals from the edge of the feature. The types of encroachment include:

- site alteration (e.g., dumping of yard waste, filling, and grading, etc.),
- structures (e.g., play equipment, forts, sheds, lighting, bird feeders, etc.),
- recreational impacts (e.g., informal trail access points, bike jumps, draining of backyard pools into the natural area/buffer, etc.), and
- landscaping (e.g., removal of native vegetation, food crop gardening, planting of non-native trees/shrubs, introduction of invasive species, etc.).

Results of the 2021 field works are summarized below in Table 2 and Table 3.

TABLE 2 - SUMMARY OF DISTURBANCES AND OCCURRENCES

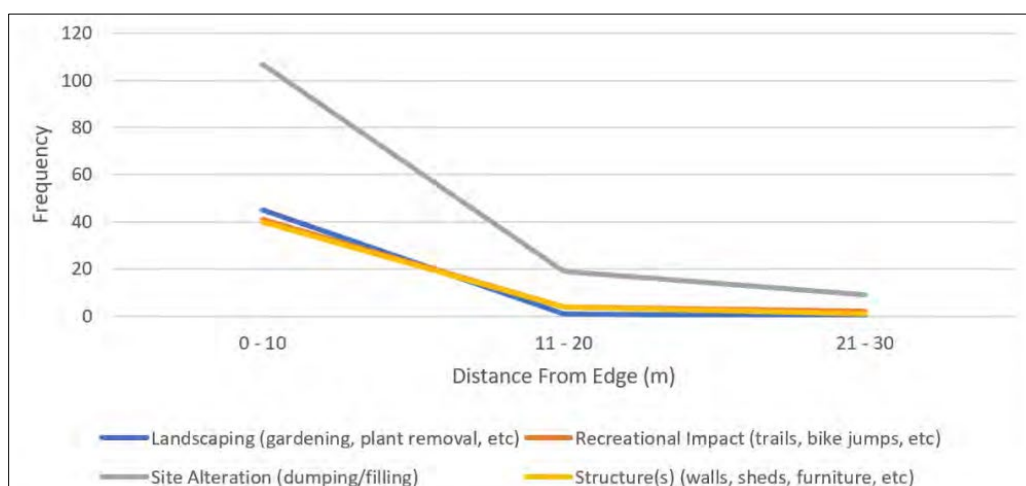
Disturbance Type	Occurrences
Site Alteration Impacts	133
Landscaping Impacts	50
Recreation Impacts	47
Structures	46
Total	276

TABLE 3 - SUMMARY OF DISTURBANCES RELATIVE TO THE FEATURE

Location of Disturbance	Occurrences
Within the natural feature	130
Within the buffer area (where one was proposed in the pre-development EIS)	88
Outside of the natural feature or the buffer area	58
Total	276

Most disturbances were detected within the natural feature; however, for many of the sites, disturbances were found to be occurring within a buffer area (where one was provided), suggesting that buffers are effective as a mitigation measure. When looking at the distribution of disturbances in Figure 1 below, the majority of encroachments were found to occur within 0-10 m of the edge of the natural feature; this would further suggest that buffers should be a minimum of 10 metres wide.

FIGURE 1 - FREQUENCY OF DISTURBANCE AT A DISTANCE FROM THE EDGE OF FEATURE¹



Furthermore, when upon comparing the average number of disturbances per metre of transect surveyed, it was found that disturbances occurred most frequently on sites with just fencing (with or without gates) implemented as a mitigation measure. Sites with a combination of buffers and fencing (with or without gates) had less disturbances than just fencing but, experienced more disturbances than sites with just buffers (which was likely due to dense vegetation in the natural area making the feature difficult to access).

2.3.5 Mitigation Measures

Through review of the pre-development EIS reports it was found that ten (10) of the sites recommended formal buffers around sensitive features (e.g., wetlands, watercourses and woodlots) with the range in buffer size being between 5 to 20 metres. The 2021 field works noted variation in buffer sizes (implemented versus recommended); however, it is difficult to determine if the variation is caused by the encroachments (e.g., mowing the buffer area), an expansion of the natural area boundary, or insufficient setbacks at the time of development.

¹ Figure 4 from City of London Post Development EIS Monitoring: Final Annual Report – 2021 (Dougan & Associates, 2022)

While only four (4) of the pre-development EIS reports recommended fencing for rear-yards of residential lots adjacent to the natural area, it was found that rear lot fencing was present on eight (8) of the sites. However, it was also determined that sites with both buffers and fencing had more instances of encroachments per metre of monitoring transect than sites with only buffers. Where rear-yard fencing had private gates allowing easy access into the natural area, the fencing was doing little to protect the natural feature from encroachment activities.

2.4 Recommendations

A summary of the recommended actions per site have been included in Table 4 below.

2.4.1 Remediation of Disturbed Areas

The most common impact observed across surveyed sites were disturbances to the buffer and natural features from the dumping of waste, the placing of fill, and grading. These actions can result in negative impacts to wildlife, local vegetation communities and quantity and quality of runoff reaching wetlands and watercourses. Suggested remediation actions to mitigate further encroachments include:

- Removal of yard waste, compost, dirt, and garbage found in the buffers and natural areas.
- Installation of fencing and signage where none are present to discourage additional dumping.
- Planting of the buffer areas to restore vegetative cover, reduce potential for erosion and mitigate sediment laden runoff entering wetlands and watercourses.

2.4.2 Invasive Species Management

Most sites experienced some form of landscaping disturbance in the buffer or natural feature (e.g., horticultural gardening, planting of non-native species, and disposal of yard waste) which may have contributed to the introduction of invasive species. It is recommended that invasive species are managed following The City of London's "Invasive Plant Management Strategy" (2017), with targeted species removal and specific management plans being developed, as required.

2.4.3 Targeted Educational Campaigns

Typically, landowner stewardship is promoted through distribution of educational pamphlets that discuss the adjacent natural area, its sensitivities and how to mitigate impacts caused by residential activities. This educational campaign is typically a one-time occurrence, with only the original landowners receiving the information. To mitigate future impacts, it was recommended that landowner education continues to occur to discourage further encroachments, such as:

- mowing/maintenance within the buffer,
- landscaping adjacent to natural area,
- dumping of yard waste into the feature,
- bird feeders and other structures (e.g., lighting) that can disrupt local wildlife,
- creation of informal trail access points (e.g., gates in rear-yard fencing), and
- dumping, or draining of swimming pools into the natural area.

Furthermore, it was suggested that any additional landowner engagement and stewardship strategies follow the recommendations outlined in the "EIS Performance Evaluation for the City of London" report (Beacon, 2014).

2.4.4 Proactive Actions

The majority of sites experienced some form of disturbance in the buffer or natural feature resulting from informal trail access point creation, which can result in trampling of vegetation, habitat disturbance, and introduction of invasive species. Updating the managed trail system was recommended including discouraging informal access points, decommissioning informal trails, erecting fencing and signage to discourage informal access in the future, and that the trail system continue to be monitored according to the City of London's "Guidelines for Management Zones and Trails in ESAs" (2016).

TABLE 4 – SUMMARY OF SITE-SPECIFIC RECOMMENDATIONS BASED ON 2021 MONITORING RESULTS

RECOMMENDATIONS	Kilally Woods	Ballymote Trail	Cresthaven Woods	Forest Hill Woods	Gibbons/UWO Wetland	Maple Grove Woods	Medway Valley Heritage Forest ESA	Northbrook Valley	Pebblecreek	Pincombe Drain	Talbot Village Wetland	Uplands North Wetland Powell Woods
Remediation of Disturbed Areas												
Remove structures, dumping and/or fill	●	●	●	●	●	●	●	●	●		●	●
Plant the buffer area		●	●	●								
Plant native species for re-naturalization	●											
Install fencing along trail to limit amount of wind-blown garbage and waste entering the feature						●						
Invasive Species Management												
Monitor invasive species	●		●		●	●	●	●	●		●	●
Develop site-specific invasive species management plan (if needed)	●		●		●	●	●	●	●		●	●
Remove invasive species from buffer				●								
Targeted Educational Campaigns												
Educational campaign to inform nearby residents of features and encourage stewardship	●	●	●	●	●	●	●	●	●		●	●
<i>Discourage mowing/maintenance in buffer</i>	●										●	
<i>Discourage landscaping adjacent to natural area</i>			●	●								
<i>Discourage dumping of yard waste into the feature</i>			●	●							●	
<i>Discourage bird feeders and other structures (e.g., lighting) that can disrupt local wildlife</i>			●	●								
<i>Discourage informal trail access point creation, dumping, or draining of swimming pools into the natural area</i>							●					
Proactive Actions												
Update the managed trail system to discourage informal trail access points	●				●		●	●	●		●	●
Additional Monitoring												
Attempt to re-detect SAR that were recorded in pre-development EIS, where suitable habitat is still present	●	●	●	●	●	●	●	●	●		●	●

2.4.5 Additional Monitoring

While some significant and at-risk species (SAR) were observed during the 2021 fieldworks, the surveys were not designed to specifically reconfirm the presence of SAR. Therefore, SAR should not be considered absent and may still be present within the area. It was recommended that additional monitoring be undertaken, where suitable habitat is still present, to re-detect SAR that were present during the pre-development EIS.

2.5 Long-term Monitoring Program

Continued monitoring of the study sites will allow for detection of additional changes in future years and will aid in determining the effectiveness of the above recommended mitigation measures in restoring the buffers and natural areas. A long-term suggested frequency of monitoring based on the study done by Dougan and Associates is shown below in Table 5.

TABLE 5 – ALTERNATIVE MONITORING PROGRAM BASED ON YEARS SINCE DEVELOPMENT

Time Since Development	Sites	Studies	Suggested Frequency	Next year of monitoring
18-23 years	Northbrook Valley Gibbons Wetland Kilally Woods	ELC	10 years	2031
18-23 years	Northbrook Valley Gibbons Wetland Kilally Woods	Vegetation plot, Wildlife surveys, Aquatic habitat, Encroachment	3-5 years	2024
15-16 years	Ballymote Trail Uplands N Powell Woods Pincombe Drain Cresthaven Woods Pebblecreek	ELC	10 years	2032
15-16 years	Ballymote Trail Uplands N Powell Woods Pincombe Drain Cresthaven Woods Pebblecreek	Vegetation plot, Wildlife surveys, Aquatic habitat, Encroachment	3-5 years	2025
12-13 years	Maple Grove Woods Medway Valley Forest Hill Woods Talbot Village Wetland	ELC	10 years	2033
12-13 years	Maple Grove Woods Medway Valley Forest Hill Woods Talbot Village Wetland	Vegetation plot, Wildlife surveys, Aquatic habitat, Encroachment	3-5 years	2026

2.6 Environmental Management Guidelines Update (2021)

Each of the 12 sites were developed prior to 2021 when the City of London’s Environmental Management Guidelines (EMGs) were updated. This recent update provides clearer expectations for the completion of environmental studies and requires applicants to apply consistent approaches when compiling pre-development data. Also required is post-construction data collection and monitoring to be undertaken by the developer until the end of the assumption development stage.

3.0 Financial Impact/Considerations

The Post-Development EIS Monitoring program is currently 100% growth funded by Development Charges (DC).

Natural Heritage areas are dedicated to the City at the time of subdivision registration, therefore the City assumes the long-term costs associated with any remedial efforts. Remedial actions identified through the monitoring program will inform future workplans which would be carried out by the applicable management program; Upper Thames River Conservation Authority for lands adjacent to the City’s ESA or Forestry for lands adjacent to Woodland Parks.

3.1 Bill 23 Impacts

The Government of Ontario's Bill 23, the *More Homes Built Faster Act* (2022), received Royal Assent on November 28, 2022, which had impacts to several Acts, including the *Development Charges Act*. The recent changes have excluded recovery for the cost of growth-related studies through DCs. While London's DCs have always ensured that 'growth pays for growth', this change to legislation would shift the burden for funding future Post-Development EIS Monitoring efforts to existing taxpayers.

3.2 Multi-Year Budget (MYB)

As part of 2024-2028 MYB preparation, Staff will be undertaking a detailed review of City led environmental initiatives to ensure funding and resources adequately addresses future monitoring and rehabilitation efforts.

3.3 Development Securities

Under the City's 'Subdivision and Development Agreement Security Policy' the City may increase the amount of security required for "Erosion and Sediment Control Measures" when there are site specific conditions that can contribute to an increased possibility of a sediment discharge and/or possibility of increased costs for necessary remedial works (e.g., adjacent to a watercourse, Environmentally Sensitive Area, etc.). Through a future update to the Policy, Staff should explore the option of taking additional securities or a holdback specific to the natural areas to ensure restoration can occur prior to assumption for observed changes in habitat and/or negative impacts to natural area as a result of development activity.

4.0 Next Steps

4.1 Updates to the Environmental Management Guidelines

Based on the findings of the 2021 post-development monitoring fieldworks it was found that most encroachments occur within 10 metres of the edge of the natural feature, which could be within a 10 metre wide buffer (if one was present). Staff should undertake a review of buffer requirements and their recommended minimum widths and adjust Table 5-2 of the City's Environmental Management Guidelines (2021) where buffers less than 10 metres are proposed.

4.2 Managing Encroachments

City Parks and Forestry divisions and the Upper Thames River Conservation Authority carryout specific land management programs based on the land use classification of the natural area. Given the variation of sites within this 2021 study, Staff will engage with each land management team by July 1, 2023, to highlight the study findings so that they can determine the remedial efforts required through their workplans.

Outside of planned annual works, Staff could explore opportunities to partner with external organizations to complete restoration plantings post-assumption to leverage additional tree planting opportunities.

City By-law staff should also be engaged to discuss enforcement mechanisms to deter future encroachments into the natural areas.

4.3 Update the Managed Trail System

Based on the recommendations provided, Staff should undertake an update to the managed trail system to discourage informal access points, decommission existing informal trails, and erect fencing and signage to discourage informal access in the future. These updates can be addressed through the Phase 2 Conservation Master Plan process within ESAs.

4.4 Education

Most of the encroachments observed are a direct result of the proximity of residential development to the natural area. It was recommended that additional targeted educational campaigns be undertaken to reach landowners who may not have received

initial stewardship packages that would have been distributed at the time of subdivision construction. Staff should explore opportunities for educational efforts, which could include placing notices within the annual garbage collection calendars, community engagement events, targeted mailings, etc., and work with Corporate Communications to develop an outreach strategy subject to the availability of existing budgets.

4.5 Next Post-Development Monitoring Review

Staff will advance the subsequent round of post-development EIS monitoring and look for opportunities to expand the scope of the monitoring program to include recently assumed subdivisions and other recently completed development applications where development has occurred adjacent to natural areas. It is anticipated that fieldworks will commence by Fall 2023 and carry through to summer of 2024, with reporting to occur by year end 2024.

Conclusion

Twelve (12) study sites were selected for the first year of the Post-Development EIS Monitoring program to determine the success of the pre-development EIS report's recommended mitigation measures. Fieldworks undertaken in 2021 demonstrated that no site was free from disturbances or encroachments in to the buffer or natural feature. It was found that most encroachments were occurring within 10 metres from the edge of the feature, suggesting that all sites with natural heritage features should have a minimum buffer of 10 meters. Furthermore, sites tended to experience more impacts where fencing (with or without gates) was included, indicating that fencing alone is not a sufficient mitigation measure.

Comparison of pre-development EIS data to post-development data collection highlighted a need for better data recording. For most sites, the 2021 monitoring data was the first sample collected since development of properties adjacent to the natural heritage areas. The data gathered through the 2021 fieldworks will support long-term monitoring of the natural sites, which are now in the care and control of the City.

Ultimately, the Post-Development EIS Monitoring program serves as an important feedback loop. The results of the monitoring program outline the need for remedial works, allowing for the assessment of long-term trends, and aid in identifying updates to policy to better protect features across the city as land development continues to progress.

Prepared by: Matt Davenport, P.Eng.
Manager, Subdivision Engineering

Reviewed by: Emily Williamson, MSc.
Ecologist, Long Range Planning, Research and Ecology

Reviewed by: Peter Kavcic, P.Eng.
Manager, Subdivisions and Development Inspections

Recommended by: Kevin Edwards, MCIP, RPP
Manager, Long Range Planning, Research and Ecology

Recommended by: Heather McNeely, MCIP, RPP
Director, Planning and Development

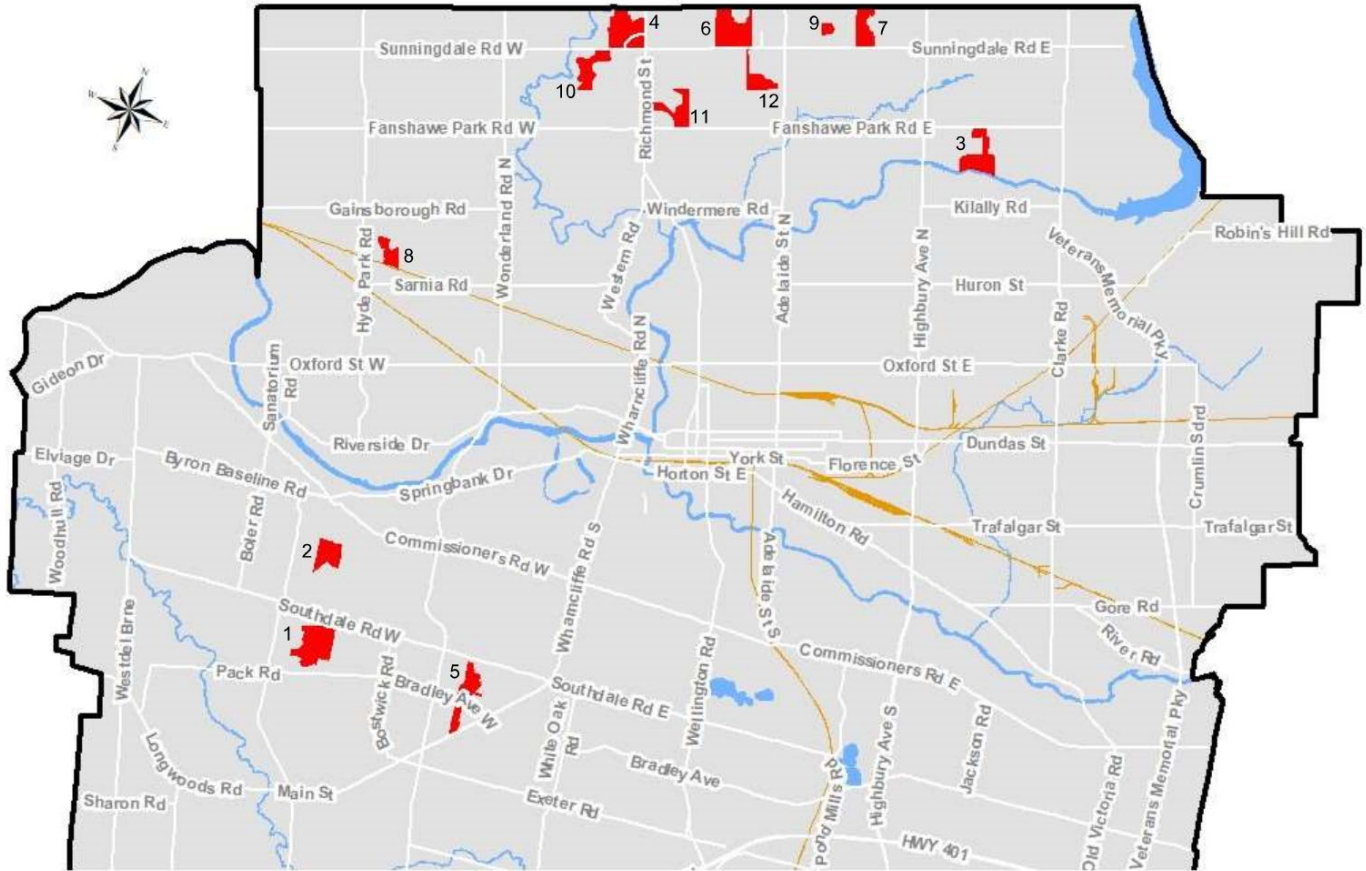
Submitted by: Scott Mathers, P.Eng.
Deputy City Manager, Planning and Economic Development

CC: Ecological Community Advisory Committee (ECAC)
Bruce Page, Manager, Subdivision Planning
Mustafa Almusawi, Manager, Development Inspections

Appendix A: Map
Appendix B: Fact Sheets

Appendix A – Map

Map of the City of London showing the location of the twelve (12) study sites.



ID	File Number	Feature Name
1	39T-00514	Talbot Village Wetland
2	39T-03512	Crethaven Woods
3	39T-03518	Kilally Woods
4	39T-04513	Pebblecreek
5	39T-05506	Pincombe Drain
6	39T-05510	Uplands North Wetland & Powell Woods
7	39T-06503	Ballymote Trail
8	39T-08502	Maple Grove Woods
9	39T-10501	Forest Hill Woods
10	39T-10502	Medway Valley Heritage Forest ESA
11	39T-98512	Gibbons/UWO Wetland
12	39T-99522	Northbrook Valley

Appendix B – Factsheets

Talbot Village Wetland

FACTSHEET

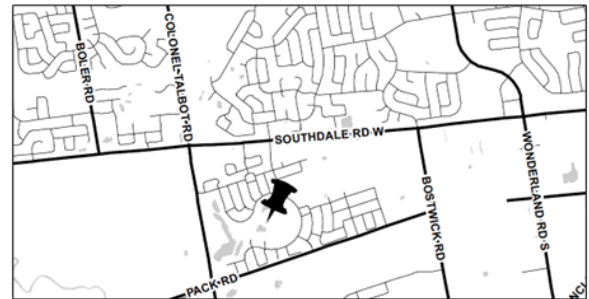
39T-00514

Mitigation Measures

- 10m buffer around the wetland
- no fencing was recommended as a mitigation

Recommendations

- Remediate disturbed areas
- Update the managed trail system to discourage informal trail access points
- Monitor invasive species and develop site specific invasive species management plan, as needed
- Educational campaign to inform residents of stewardship
- Attempt to re-detect SAR that were recorded in EIS, where suitable habitat is still present



At-Risk Species (SAR)
Bank Swallow, Barn Swallow, Prothonotary Warbler

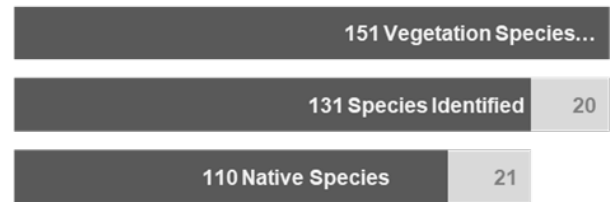
Breeding Bird Surveys
POST 37 species (3-SAR, 4-AS, 2-LR, 18-LU)
PRE 53 species (4-SAR)

Nocturnal Amphibian Call Surveys
POST 4 species
PRE 4 species

Incidental Wildlife
POST 1 bird, 1 turtle
PRE

Basking Turtle Surveys
POST 0
PRE N/A

Vegetation Surveys

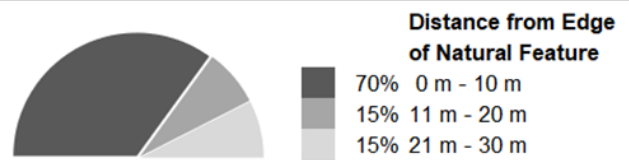
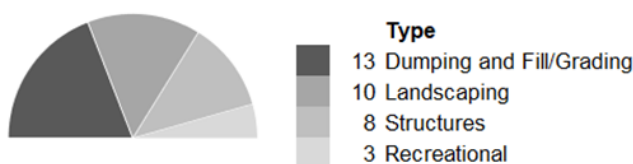
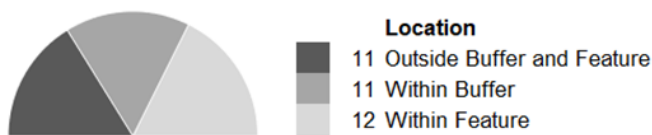


Average coefficient of conservatism across the site: **3.6**
 Average coefficient of wetness across the site: **0.0**

Ecological Land Classification Changes (from pre- to post-development)

1.30 ha Natural area to Cultural

Site Disturbances



Invasive Species Observed
 Garlic Mustard, Multiflora Rose, Honeysuckle (non-native species), Miscanthus Grass

Legend: Species at Risk (SAR), Area Sensitive (AS), Threatened (THR), Locally Rare (LR), Locally Uncommon (LU)

Summary of results from City of London's *Post-Development EIS Monitoring: Final Annual Report – 2021* (Dougan & Associates, 2022)

Cresthaven Woods

39T-03512

FACTSHEET

Mitigation Measures

- no formal buffer was recommended
- no fencing was recommended

Recommendations

- Remediate disturbed areas
- Monitor invasive species and develop site specific invasive species management plan, as needed
- Plant area between natural feature and homes
- Educational campaign to inform residents of stewardship
- Discourage landscaping adjacent to natural area
- Discourage dumping of yard waste into the feature
- Discourage bird feeders that disrupt local wildlife
- Attempt to re-detect SAR that were recorded in EIS, where suitable habitat is still present



Breeding Bird Surveys

POST 10 species (1-AS, 7-LU)
PRE N/A



Nocturnal Amphibian Call Surveys

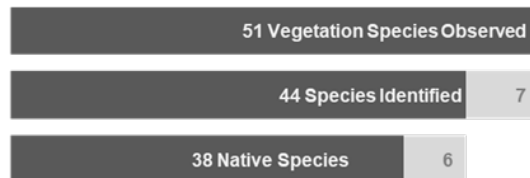
POST 2 species
PRE N/A



Incidental Wildlife

POST 5 birds, 1 mammal
PRE N/A

Vegetation Surveys



Average coefficient of conservatism across the site: **3.0**
Average coefficient of wetness across the site: **1.3**

Ecological Land Classification Changes

(from pre- to post-development)

- 0.06 ha** Cultural to Natural
- 0.01 ha** Reduction in Wetland

Site Disturbances



Location

- 14 Edge of Feature (No Buffer)
- 29 Within Feature



Distance from Edge of Natural Feature

- 86% 0 m - 10 m
- 9% 11 m - 20 m
- 5% 21 m - 30 m



Type

- 17 Dumping and Fill/Grading
- 14 Structures
- 12 Landscaping

Invasive Species Observed

Common Buckthorn, Miscanthus Grass, Japanese Barberry, Privet, Yellow Iris, Autumn Olive

Legend: Species at Risk (SAR), Area Sensitive (AS), Threatened (THR), Locally Rare (LR), Locally Uncommon (LU)

Summary of results from City of London's *Post-Development EIS Monitoring: Final Annual Report – 2021* (Dougan & Associates, 2022)

Kilally Woods

39T-03518

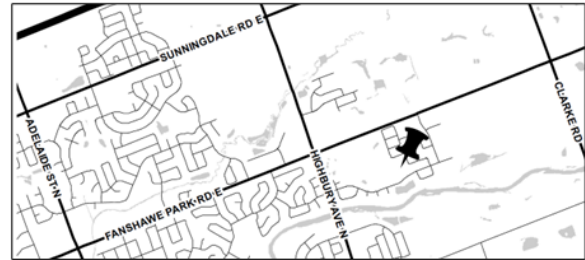
FACTSHEET

Pre-Development Mitigation Measures

- 5-6 metre wide buffer adjacent to ESA
- Orient human traffic to trails to mitigate potential disturbance
- Rear-yard runoff to ESA and direct all stormwater flows to stormwater management pond

Recommendations

- Update the managed trail system to discourage informal trail access points
- Cease mowing/maintenance in buffer
- Plant native species for re-naturalization
- Remediate disturbed areas
- Monitor invasive species and develop site specific management plan, as needed
- Educational campaign to inform residents of stewardship
- Attempt to re-detect SAR that were recorded in EIS, where suitable habitat is still present



At-Risk Species (SAR)
Eastern Wood-Pewee

Aquatic Monitoring

Channel Stability: surface runoff from development directed towards the Thames River has caused bank erosion
Change: increased bank erosion due to overland flows directed towards the river



Breeding Bird Surveys

POST 15 species (1-SAR, 6-LU)
PRE 53 species (4-SAR)



Nocturnal Amphibian Call Surveys

POST 4 species
PRE 4 species



Incidental Wildlife

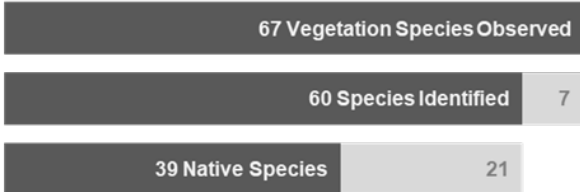
POST 4 birds, 3 mammals
PRE



Basking Turtles

POST 0
PRE 0

Vegetation Surveys

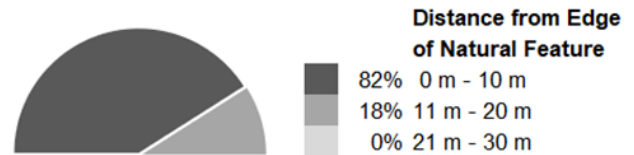
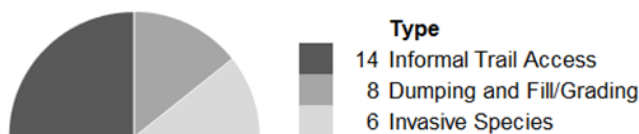
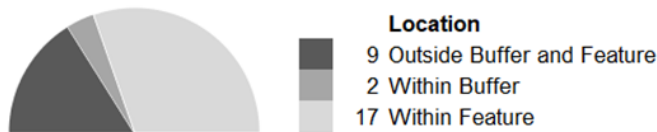


Average coefficient of conservatism across the site: **2.3**
Average coefficient of wetness across the site: **0.6**

Ecological Land Classification Changes (from pre- to post-development)

1.67 ha Wetland to Upland/Cultural
0.60 ha Natural area to Cultural

Site Disturbances



Invasive Species Observed
Common Buckthorn, White Poplar, English Ivy, Periwinkle, Dog-strangling Vine, Garlic Mustard

Legend: Species at Risk (SAR), Area Sensitive (AS), Threatened (THR), Locally Rare (LR), Locally Uncommon (LU)

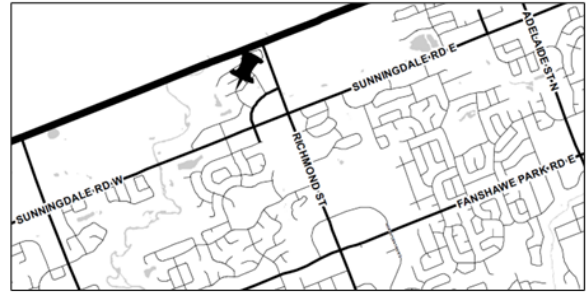
Summary of results from City of London's *Post-Development EIS Monitoring: Final Annual Report – 2021* (Dougan & Associates, 2022)

Mitigation Measures

- 10 m buffer was recommended
- 15 m setback from the tributary
- no fencing was recommended

Recommendations

- Remediate disturbed areas
- Update the managed trail system to discourage informal trail access points
- Monitor invasive species and develop site specific invasive species management plan, as needed
- Educational campaign to inform residents of stewardship
- Attempt to re-detect SAR that were recorded in EIS, where suitable habitat is still present



At-Risk Species (SAR)
Barn Swallow

Aquatic Monitoring

Substrate: silty with deep sediment
Channel Stability: stable channel with a few actively eroding banks
Fish Community: no fish observed
Change: deposits of fine sediment possibly from construction; lack of flow likely reduces the flushing of sediments resulting in poor fish habitat conditions



Breeding Bird Surveys
POST 13 species (1-SAR, 5-LU)
PRE 35 species (3-SAR)

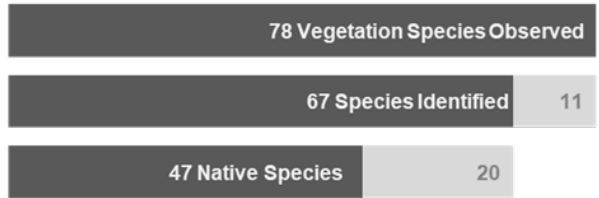


Nocturnal Amphibian Call Surveys
POST 5 species
PRE 1 species



Incidental Wildlife
POST 1 bird
PRE N/A

Vegetation Surveys

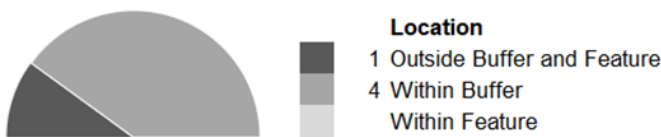


Average coefficient of conservatism across the site: **2.0**
 Average coefficient of wetness across the site: **0.6**

Ecological Land Classification Changes (from pre- to post-development)

0.27 ha Reduction in overall Natural Area
0.09 ha Reduction in Wetland

Site Disturbances



Invasive Species Observed
Garlic Mustard, Privet

Legend: Species at Risk (SAR), Area Sensitive (AS), Threatened (THR), Locally Rare (LR), Locally Uncommon (LU)

Summary of results from City of London's *Post-Development EIS Monitoring: Final Annual Report – 2021* (Dougan & Associates, 2022)

Pincombe Drain

FACTSHEET

39T-05506

Mitigation Measures

- Ecological buffers required for adjacent development proposals to protect surface water quality, enhance riparian cover and bird habitat
- Restore riparian cover by planting existing slopes
- Maintain existing vegetation where feasible to reduce surface water temperatures

Recommendations

- None



At-Risk Species (SAR)

Eastern Wood-Pewee

Aquatic Monitoring

Substrate: silty clay organic muck with cobbles and woody debris

Channel Stability: stormwater management facility outlet channel is eroding around the energy dissipation pad

Fish Community: brook stickleback, creek chub, fathead minnow, green sunfish, northern longear sunfish, white sucker

Change: overall poor channel condition



Breeding Bird Surveys

POST 15 species (2-LR, 4-LU)

PRE 26 Species



Nocturnal Amphibian Call Surveys

POST 3 species

PRE N/A



Incidental Wildlife

POST 6 birds, 1 mammal

PRE N/A

Vegetation Surveys

34 Vegetation Species Observed

32 Species Identified 2

20 Native Species 12

Average coefficient of conservatism across the site: 1.5
Average coefficient of wetness across the site: -0.5

Ecological Land Classification Changes

(from pre- to post-development)

1.34 ha Natural area to Cultural

0.23 ha Wetland to Cultural

Site Disturbances

No formal disturbance / encroachment surveys were proposed to be completed for this site. The natural feature (deciduous forest) is not directly adjacent to residential development but the stormwater management pond.

Invasive Species Observed

Common Buckthorn, White Poplar, English Ivy, Periwinkle, Dog-strangling Vine, Garlic Mustard

Uplands North Wetland & Powell Woods FACTSHEET

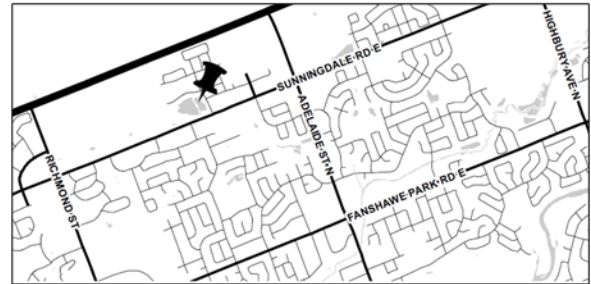
39T-05510

Mitigation Measures

- Vegetated buffers:
- 10m buffer at the northern edge of wetland
- 10m to 25m buffers at the southern edge of the wetland
- fencing was recommended along the edge of the ESA

Recommendations

- Remediate disturbed areas
- Update the managed trail system to discourage informal trail access points
- Monitor invasive species and develop site specific invasive species management plan, as needed
- Educational campaign to inform residents of stewardship
- Attempt to re-detect SAR that were recorded in EIS, where suitable habitat is still present



At-Risk Species (SAR)
Barn Swallow, Eastern Wood-pewee

Aquatic Monitoring

Channel Stability: if additional flow is released in a controlled manner, it will improve baseflow conditions of the receiving watercourse
Fish Community: several fish, ducks, and a great egret observed in the SWM facility
Change: stormwater management pond is likely providing a greater volume of water than the reed canary grass community. A berm was constructed downstream of the willow thicket swamp and appears to have increased the water elevation in the wetland, which is resulting in the death of the trees and shrubs in this community.



Breeding Bird Surveys

POST 25 species (2-SAR, 1-AS, 2-LR, 11-LU)
PRE 39 species (1-AS, 1-LR)



Nocturnal Amphibian Call Surveys

POST 6 species (1-AS)
PRE N/A



Incidental Wildlife

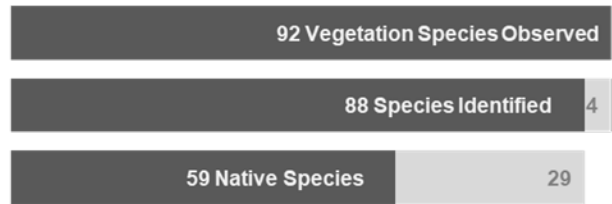
POST 2 butterflies, 1 dragonfly, 1 reptile
PRE N/A



Basking Turtles

POST 1 species
PRE N/A

Vegetation Surveys

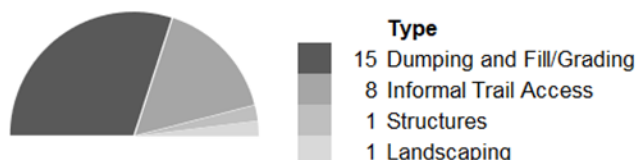
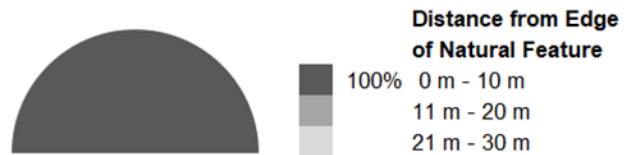


Average coefficient of conservatism across the site: **2.2**
 Average coefficient of wetness across the site: **0.5**

Ecological Land Classification Changes (from pre- to post-development)

1.45 ha Natural area to Cultural
3.35 ha Wetland to Upland/Cultural

Site Disturbances



Invasive Species Observed
 Glossy Buckthorn, European Common Reed, Reed Canary Grass, Common Buckthorn

Legend: Species at Risk (SAR), Area Sensitive (AS), Threatened (THR), Locally Rare (LR), Locally Uncommon (LU)

Summary of results from City of London's *Post-Development EIS Monitoring: Final Annual Report – 2021* (Dougan & Associates, 2022)

Ballymote Trail

39T-06503

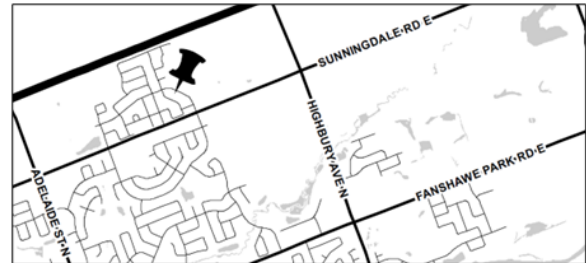
FACTSHEET

Mitigation Measures

- 10 m buffer was recommended along edges of all wetland communities
- Majority of the natural feature not directly adjacent to residential houses, separated by a public trail
- Stormwater runoff to ESA through rear-yard infiltration swales and pipes

Recommendations

- Remediate disturbed areas
- Plant buffer area
- Educational campaign to inform residents of stewardship
- Attempt to re-detect SAR that were recorded in EIS, where suitable habitat is still present



At-Risk Species (SAR)
Chimney Swift, Eastern-wood Pewee

Aquatic Monitoring

Substrate: fine sediment dominated
Channel Stability: stable, shallow, slightly confined
Fish Community: no fish observed
Change: no change determined, overall stable



Breeding Bird Surveys

POST 16 species (2-SAR, 2-LR, 6-LU)
PRE 36 species (2-SAR)



Nocturnal Amphibian Call Surveys

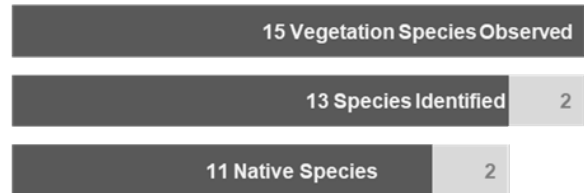
POST 2 species
PRE 5 species



Incidental Wildlife

POST N/A
PRE N/A

Vegetation Surveys

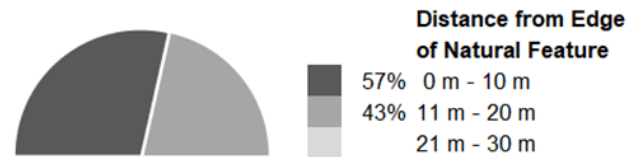
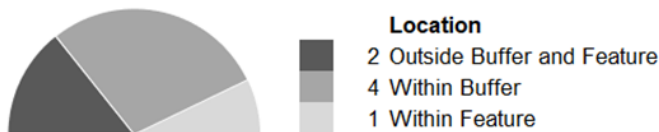


Average coefficient of conservatism across the site: **3.6**
 Average coefficient of wetness across the site: **-0.5**

Ecological Land Classification Changes (from pre- to post-development)

0.16 ha Increase to Wetland

Site Disturbances



Invasive Species Observed
Glossy Buckthorn

Legend: Species at Risk (SAR), Area Sensitive (AS), Threatened (THR), Locally Rare (LR), Locally Uncommon (LU)

Summary of results from City of London's *Post-Development EIS Monitoring: Final Annual Report – 2021* (Dougan & Associates, 2022)

Maple Grove Woods

39T-08502

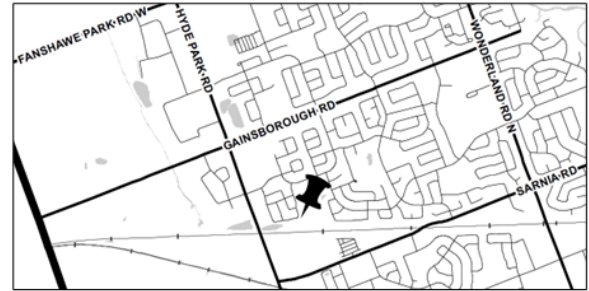
FACTSHEET

Mitigation Measures

- 15 m buffer was recommended
- Fencing recommended

Recommendations

- Remediate disturbed areas
- Consider fencing along trail to limit wind blown garbage and waste from entering the feature
- Invasive species monitoring and management plan to limit spread of English Ivy
- Educational campaign to inform residents and nearby school of stewardship
- Attempt to re-detect SAR that were recorded in EIS, where suitable habitat is still present



At-Risk Species (SAR)
Eastern Wood-Pewee, Goldfish

Aquatic Monitoring

Fish Community: several hundred goldfish (non-native)
Change: water quality appears low due to the constant churning of the sediment by the goldfish



Breeding Bird Surveys

POST 16 species (1-SAR, 1-LR, 5-LU)
PRE 29 species



Nocturnal Amphibian Call Surveys

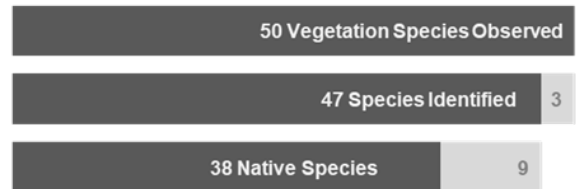
POST 3 species
PRE 1 species



Incidental Wildlife

POST N/A
PRE N/A

Vegetation Surveys

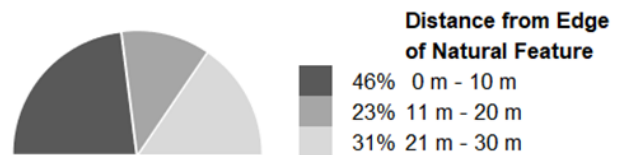
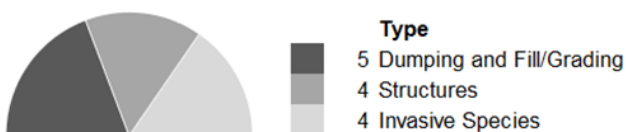


Average coefficient of conservatism across the site: **2.7**
Average coefficient of wetness across the site: **0.8**

Ecological Land Classification Changes (from pre- to post-development)

0.49 ha Natural area to Cultural
1.35 ha Wetland to Upland Forest

Site Disturbances



Invasive Species Observed
Common Buckthorn, English Ivy

Legend: Species at Risk (SAR), Area Sensitive (AS), Threatened (THR), Locally Rare (LR), Locally Uncommon (LU)

Summary of results from City of London's *Post-Development EIS Monitoring: Final Annual Report – 2021* (Dougan & Associates, 2022)

Forest Hill Woods

39T-10501

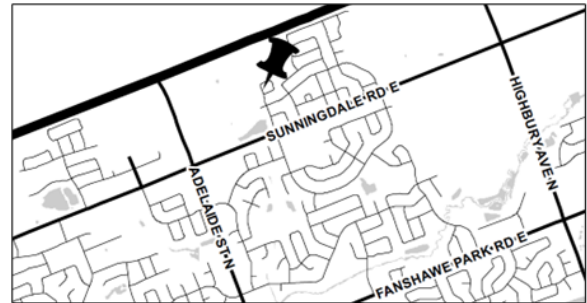
FACTSHEET

Mitigation Measures


- 10 m buffer was recommended
- Fencing was recommended at the rear of residential yards to protect the natural area

Recommendations


- Remediate disturbed areas
- Remove invasive species from the buffer
- Plant buffer area
- Educational campaign to inform residents of stewardship
- Discourage landscaping adjacent to natural area
- Discourage dumping of yard waste into the feature
- Discourage bird feeders that disrupt local wildlife
- Attempt to re-detect SAR that were recorded in EIS, where suitable habitat is still present



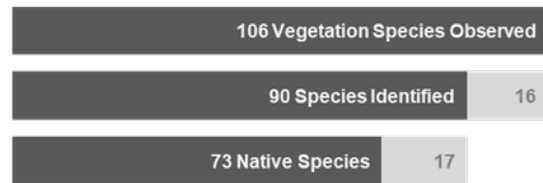
At-Risk Species (SAR)
Eastern Wood-Pewee

 **Breeding Bird Surveys**
POST 25 species (1-SAR, 2-AS, 1-LR, 14-LU)
PRE N/A

 **Nocturnal Amphibian Call Surveys**
POST 2 species
PRE N/A

 **Incidental Wildlife**
POST 1 mammal, 1 bat
PRE N/A

Vegetation Surveys

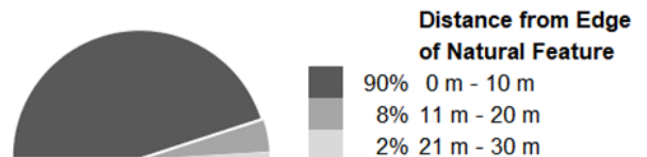
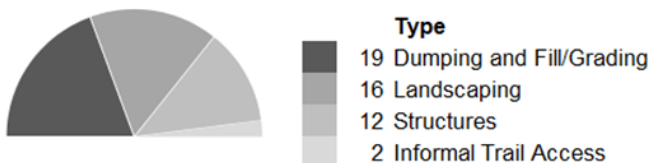
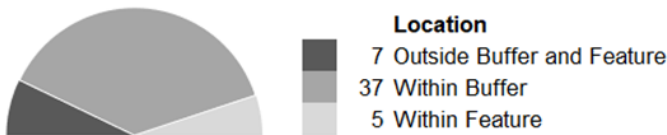


Average coefficient of conservatism across the site: **3.25**
Average coefficient of wetness across the site: **-0.6**

Ecological Land Classification Changes (from pre- to post-development)

0.10 ha Gain to overall Natural Area
2.52 ha Loss of Wetland Cover

Site Disturbances



Invasive Species Observed
Reed Canary Grass

Legend: Species at Risk (SAR), Area Sensitive (AS), Threatened (THR), Locally Rare (LR), Locally Uncommon (LU)

Summary of results from City of London's *Post-Development EIS Monitoring: Final Annual Report – 2021* (Dougan & Associates, 2022)

Medway Valley Heritage Forest ESA FACTSHEET

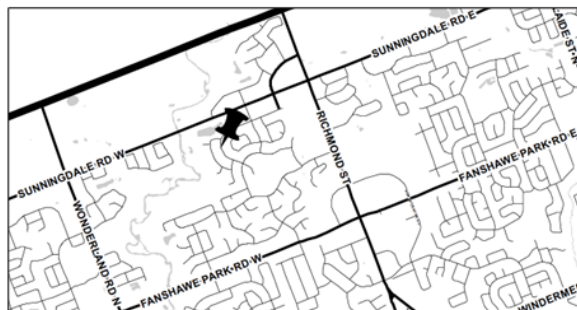
39T-10502

Mitigation Measures

- 30m setbacks around wetland
- No buffer was recommended
- Fencing was recommended at the rear of residential yards

Recommendations

- Remediate disturbed areas
- Update the managed trail system to discourage informal trail access points
- Monitor invasive species and develop site specific invasive species management plan, as needed
- Educational campaign to inform residents of stewardship
- Attempt to re-detect SAR that were recorded in EIS, where suitable habitat is still present



At-Risk Species (SAR)
Barn Swallow, Eastern Wood-pewee

Aquatic Monitoring

Substrate: Armoustone channel with stone bottom, clay and cobbles in southern reaches
Channel Stability: single channel with new pond (rehabilitation area)
Fish Community: no fish observed
Change: reduction in channel length, wetland pocket offsetting well established and functioning as intended

Breeding Bird Surveys



POST 17 species (2-SAR, 1-AS, 5-LU)
PRE 38 species (8-SAR, 4-AS)

Nocturnal Amphibian Call Surveys



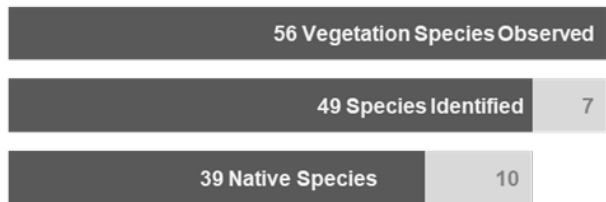
POST 5 species
PRE 4 species

Incidental Wildlife



POST 2 birds
PRE N/A

Vegetation Surveys

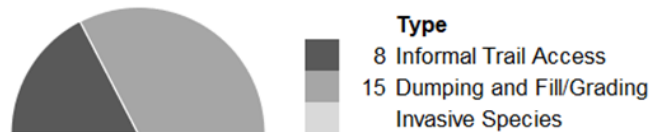
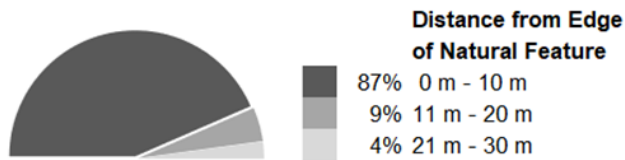


Average coefficient of conservatism across the site: **3.2**
 Average coefficient of wetness across the site: **0.4**

Ecological Land Classification Changes (from pre- to post-development)

2.57 ha Natural area to Cultural
0.94 ha Cultural to Wetland

Site Disturbances



Invasive Species Observed
 Common Buckthorn, White Poplar, English Ivy, Periwinkle, Dog-strangling Vine, Garlic Mustard

Legend: Species at Risk (SAR), Area Sensitive (AS), Threatened (THR), Locally Rare (LR), Locally Uncommon (LU)

Summary of results from City of London's *Post-Development EIS Monitoring: Final Annual Report – 2021* (Dougan & Associates, 2022)

Gibbons/UWO Wetland

FACTSHEET

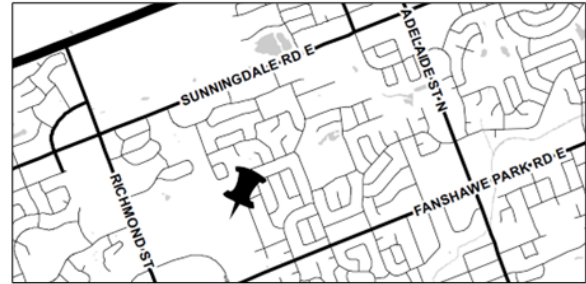
39T-98512

Mitigation Measures

- 10 m buffer was recommended
- No fencing was recommended at the rear of residential yards

Recommendations

- Update the managed trail system to discourage informal trail access points
- Monitor invasive species and develop site specific invasive species management plan, as needed
- Remediate disturbed areas
- Educational campaign to inform residents of stewardship
- Attempt to re-detect SAR that were recorded in EIS, where suitable habitat is still present



Breeding Bird Surveys

POST 10 species (2-LU)
PRE 14 species



Nocturnal Amphibian Call Surveys

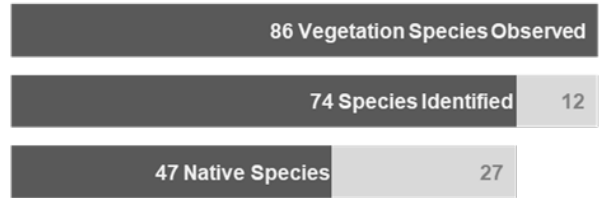
POST 2 species
PRE N/A



Incidental Wildlife

POST 1 mammal
PRE N/A

Vegetation Surveys



Average coefficient of conservatism across the site: **2.3**
Average coefficient of wetness across the site: **0.3**

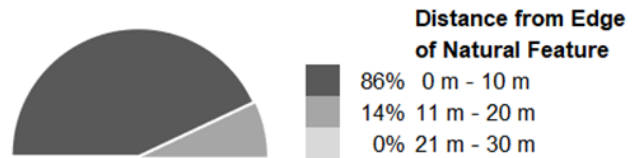
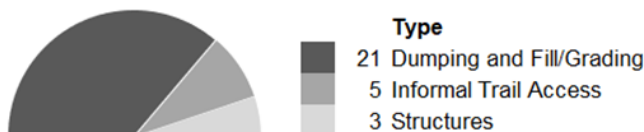
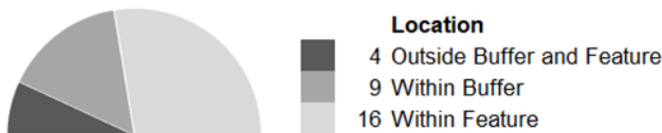
Ecological Land Classification Changes

(from pre- to post-development)

0.19 ha Cultural to Natural

0.13 ha Wetland to Upland/Cultural

Site Disturbances



Invasive Species Observed

Common Buckthorn, Periwinkle, Black Alder, Privet, Non-native Honeysuckle, Glossy Buckthorn

Legend: Species at Risk (SAR), Area Sensitive (AS), Threatened (THR), Locally Rare (LR), Locally Uncommon (LU)

Summary of results from City of London's *Post-Development EIS Monitoring: Final Annual Report – 2021* (Dougan & Associates, 2022)

Northbrook Valley

39T-99522

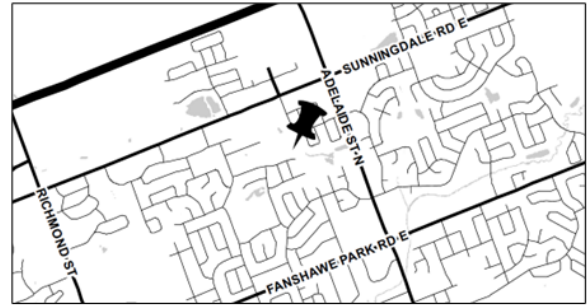
FACTSHEET

Mitigation Measures

- 5 m buffer was recommended
- No fencing was recommended
- Remove fish passage barrier at Adelaide Street
- Lower Powell Drain channel for improved fish migration

Recommendations

- Update the managed trail system to discourage informal trail access points
- Remediate disturbed areas
- Monitor invasive species and develop site specific invasive species management plan, as needed
- Educational campaign to inform residents of stewardship
- Attempt to re-detect SAR that were recorded in EIS, where suitable habitat is still present



Aquatic Monitoring

Substrate: fine silt and large woody debris

Channel Stability: good stability with localized areas of bank erosion and deep fine sediment deposits

Fish Community: brook stickleback, pumpkinseed, brown bullhead, creek chub, fathead minnows

Change: increased sediment, removal of barrier at Adelaide has improved the fish community diversity



Breeding Bird Surveys

POST 12 species (6-AS)

PRE 63 species (5-AS)



Nocturnal Amphibian Call Surveys

POST 4 species

PRE 7 species



Incidental Wildlife

POST 1 bird

PRE N/A

Vegetation Surveys

42 Vegetation Species Observed

37 Species Identified 5

28 Native Species 9

Average coefficient of conservatism across the site: 2.5

Average coefficient of wetness across the site: 0.5

Ecological Land Classification Changes (from pre- to post-development)

2.86 ha Increase to overall Natural Area

0.36 ha Increase in Wetland

Site Disturbances



Location

- 5 Outside Buffer and Feature
- 7 Within Buffer
- 9 Within Feature



Distance from Edge of Natural Feature

- 95% 0 m - 10 m
- 5% 11 m - 20 m
- 21 m - 30 m



Type

- 12 Dumping and Fill/Grading
- 5 Informal Trail Access
- 4 Landscaping

Invasive Species Observed

Common Buckthorn, Periwinkle, European Common Reed

Legend: Species at Risk (SAR), Area Sensitive (AS), Threatened (THR), Locally Rare (LR), Locally Uncommon (LU)

Summary of results from City of London's *Post-Development EIS Monitoring: Final Annual Report – 2021* (Dougan & Associates, 2022)

Report to Planning and Environment Committee

To: Chair and Members
Planning and Environment Committee

From: Scott Mathers, MBA, P.Eng.
Deputy City Manager, Planning & Economic Development

Subject: ESA Lands Asset Plan and Data Management Tool – Contract Award (RFP-2023-018)

Meeting on: June 12, 2023

Recommendation

That, on the recommendation of the Deputy City Manager, Planning and Development, the following actions **BE TAKEN** with respect to the appointment of consulting services for the completion of an ESA Lands Asset Plan and Data Management Tool:

- a) North South Environmental Inc. **BE APPOINTED** project consultants to prepare an ESA (Environmentally Significant Area) Asset Plan and Data Management Tool, in the total amount of \$179,394.00 (including contingency), excluding HST;
- b) the financing for the project **BE APPROVED** in accordance with the Source of Financing Report attached, hereto, as Appendix 'A';
- c) the Civic Administration **BE AUTHORIZED** to undertake all the administrative acts that are necessary in connection with this project;
- d) The approvals given, herein, **BE CONDITIONAL** upon the Corporation entering into a formal contract; and,
- e) The Mayor and City Clerk **BE AUTHORIZED** to execute any contract or other documents, if required, to give effect to these recommendations.

Executive Summary

This report recommends the appointment of North-South Environmental Inc. as project consultants to prepare an Asset Management Plan and a Data Management Tool for the City's Environmentally Significant Areas (ESAs) to serve as a foundational element for ESA Conservation Master Plans for these lands and provide direction for capital project budgeting.

In accordance with the City's *Procurement of Goods and Services Policy*, North-South Environmental Inc. had the highest scoring submission through the Request for Proposal (RFP).

Linkage to the Corporate Strategic Plan

The appointment of consulting services for the preparation of an ESA Asset Management Plan will contribute to the advancement of Municipal Council's 2023-2027 Strategic Plan in several ways:

Municipal Council's 2019-2023 Strategic Plan identifies 'Wellbeing and Safety' and 'Climate Action and Sustainable Growth' as strategic areas of focus. The recommendations in this report will protect and enhance waterways, wetlands and natural areas by supporting strategies to 'protect the natural environment when building new infrastructure', 'improving natural areas when replacing aging infrastructure' and 'protecting natural heritage areas for the needs of Londoners now and into the future'.

Analysis

1.0 Background Information

1.1 Environmentally Significant Areas (ESAs)

Environmentally Significant Areas (ESAs) are considered as the largest, highest quality areas within the City's Natural Heritage System, and are identified by The London Plan as 'areas that contain natural features and perform ecological functions that warrant their retention in a natural state'. Publicly owned ESAs have a purpose and function distinct from all other publicly owned green space. Permitted uses, access, and the provision of recreational activities within ESAs are governed by the Environmental Policies of The London Plan, and the ecological integrity and ecosystem health of the ESA shall have priority in any use of design-related decision.

The City maintains twelve (12) Environmentally Significant Areas (ESAs) that together total over 750 ha of high-quality natural features having over 58,000 linear metres of trails and at least 350 built structures. Given the focus on ecological integrity, these lands are administered by the Ecologist Planners in Planning and Development, while the management of these lands is contracted to a specialized, cross-function team with the Upper Thames Conversation Authority.

1.2 Project Background

A Conservation Master Plan (CMP) is a tool identified by The London Plan that Council can adopt for the purposes of providing direction on the management of these areas. In developing these master plans, key matters to be addressed include feature boundary refinement, the identification of management zones based on ecological sensitivity, and details of access permitted to and within the area including formalized pathways and trail systems. Furthermore, budgets are to be prepared to implement the recommendations of conservation master plans.

Over the next couple of years, the City will be initiating and completing CMPs for the City's ESAs. When preparing CMP's, it is essential to have an inventory of the locations, conditions and value of all the built assets in the ESA to develop the necessary environmental management strategies, identify restoration opportunities and determine appropriate funding requirements for the long-term management of the lands.

Furthermore, in January 2018 the Province enacted *O.Reg 588/17 Asset Management Planning for Municipal Infrastructure* that requires specific content for Asset Management Plans including an analysis of the municipality's risks, asset performance, lifecycle management, and financial strategy to achieve the municipality's proposed levels of service. This is to be completed by July 1, 2025. While UTRCA maintains most City assets within ESA lands, these have yet to be evaluated for replacement cost, nor have they been incorporated into a long-term asset management plan that conforms to O. Reg 588/17.

To enable the advancement of CMP's for ESAs, to guide their long-term management, and to support the City's Corporate Asset Management (CAM) division in meeting this regulation and to inform the next iteration of the City's Asset Management Plan, the City requires an inventory, condition assessment, and replacement cost valuation of all city assets within twelve (12) managed ESA lands in the City.

1.3 Location Map

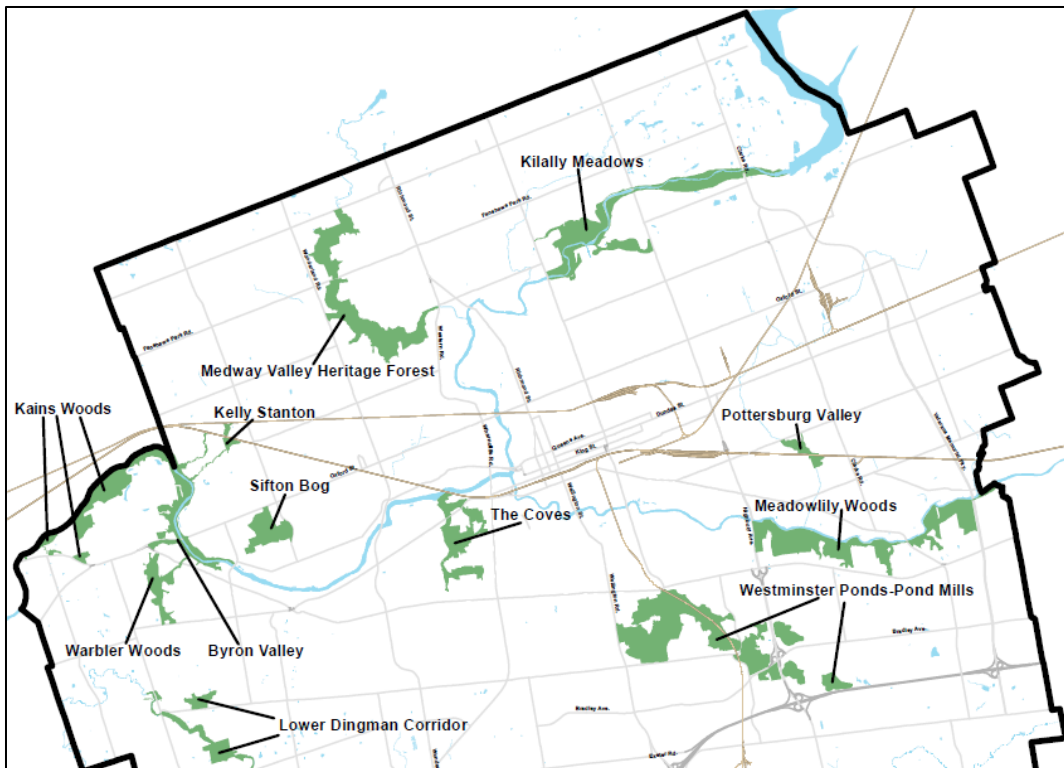


Figure 1: City of London, key map showing ESA locations included in the Asset Plan and Data Management Tool Project

2.0 Discussion and Considerations

2.1 Project Description

The primary objective of this assignment will be to complete a City-wide review to locate and evaluate all built structures within publicly owned ESA lands to enable the advancement of ESA Conservation Master Plans and allow for the development of an asset management plan that conforms to the City's existing Corporate Asset Management Plan.

All built assets collected during the inventory will need to be located (georeferenced), inventoried, inspected and assigned a condition rating, replacement cost, and evaluated for replacement/rehabilitation timing as part of a 20-year capital forecast. These results will be provided to the City in a GIS format to allow for integration into a georeferenced data management and collection tool that is also to be developed through this project so that new assets can be added at any time. Trails are considered built assets and as such are included in the asset inventory, they will be assessed for hazards and required maintenance over the long term.

Additional tasks include the development of two further data collection and referencing tools for ESA management activities: a Hazard Management tool and an Ecological Management tool. These will be linked with the data collection tool noted above, as a single web-based Dashboard Tool that can be accessed by both UTRCA and City staff. As much the City's natural heritage and management activity data is only in hard copy at present, the development of these tools will make these resources available in web maps and geodatabases for the first time. Having the data easily available and in real time will provide a great number of efficiencies for both City and UTRCA staff in tracking, monitoring and reporting activities.

Natural heritage and management activity data are essential inputs when preparing CMP's. In addition, having a tool to collect this data will allow for natural assets to be valued through future asset management plan work. The tools also can be expanded to incorporate city-wide ecological assets, restoration opportunities, compensation lands inventories, invasive species monitoring, development and infrastructure ecological asset inventories. These records will greatly assist city-wide planning and reporting.

3.0 Financial Impact/Considerations

3.1 Procurement Process

The selection of a consultant for the ESA Asset Management Plan project followed the Request for Proposal (RFP) procurement, in accordance with section 15 of the City's *Procurement of Goods and Services Policy*. An RFP process was chosen due to the technical considerations and experience needed, and to help ensure that staff could fairly evaluate the submissions in the key areas and provide any value-added factors that were to be considered as part of the final selection.

Following public posting of the ESA Asset Management Plan RFP, four proposal submissions were received and reviewed by staff from Planning and Development and Capital Assets and Projects. Evaluation criteria included previous experience, approach and methodology, project team qualifications, and cost. The proposal submitted by North-South Environmental Inc. with an upset limit of \$179,394.00 (excluding HST, including 20% contingency) was the highest scoring submission and is recommended for approval in accordance with Section 15.2 of the *Procurement of Goods and Services Policy*.

Funds are available in the Conservation Master Plan capital project account. The Source of Financing Report is appended to this report as Appendix 'A'.

All the bid proposals exceeded the original approved project budget of \$125,000.00, as such this result is considered irregular as per Section 8.10 of the Procurement Policy.

Conclusion

It is recommended to appoint North South Environmental to complete the asset management Plan and create the data management tools to enable the advancement of ESA Conservation Master Plans and provide direction for capital project budgeting.

Prepared by: Marnie Shepley,
Ecologist Planner, Community Planning

Reviewed by: Kevin Edwards, MCIP RPP
Manager, Community Planning

Submitted by: Heather McNeely, MCIP RPP
Director, Planning and Development

Recommended by: Scott Mathers, MPA, P.Eng.
Deputy City Manager, Planning and Economic
Development

cc: Nathan Asare-Bediako
Steve Mollon
Khaled Shahata

Appendix 'A' – Sources of Financing

Appendix "A"

#23121

June 12, 2023

(Award Contract)

Chair and Members

Planning and Environment Committee

RE: ESA Lands Asset Plan and Data Management Tool (RFP-2023-018)

(Subledger GG230006)

Capital Project PD2179 - New ESA Conservation Master Plans

North South Environmental Inc. - \$179,394.00 (excluding HST)

Finance Supports Report on the Sources of Financing:

Finance Supports confirms that the cost of this project can be accommodated within the financing available for it in the Capital Budget and that, subject to the approval of the recommendation of the Deputy City Manager, Planning and Economic Development, the detailed source of financing is:

Estimated Expenditures	Approved Budget	Committed To This Date	This Submission	Balance for Future Work
Engineering	716,800	111,791	182,551	422,458
Total Expenditures	\$716,800	\$111,791	\$182,551	\$422,458

Sources of Financing

Capital Levy	236,544	36,891	60,242	139,411
Drawdown from City Services - Parks and Recreation Reserve Fund (Development Charges) (Note 1)	480,256	74,900	122,309	283,047
Total Financing	\$716,800	\$111,791	\$182,551	\$422,458

Financial Note:

Contract Price	179,394
Add: HST @13%	23,321
Less: HST Rebate	<u>-20,164</u>
Net Contract Price	<u>\$182,551</u>

Note 1: Development charges have been utilized in accordance with the underlying legislation and the approved 2019 Development Charges Background Study and the 2021 Development Charges Background Study Update.

Jason Davies
Manager of Financial Planning & Policy

lp

1176 Crumlin Sideroad

Focused Environmental Impact Study (EIS) dated February 9, 2023

Received at ECAC on May 18, 2023 agenda

Reviewed by K. Lee and S. Levin

RECOMMENDATIONS

1. The 30 m buffer on the east side of the Loveless Drain must be designated and zoned OS4, noting that agricultural uses will be permitted to continue. The reason for this recommendation is to ensure that future development applications recognize the work done for this application.
2. As the lands support downstream habitat for SAR fish, the 2022 Recovery Strategy and Action Plan for the Black Redhorse found at https://www.registrelep-sararegistry.gc.ca/document/default_e.cfm?documentID=3658 be reviewed prior to final conditions so that any relevant recommendations can be added to the Environmental Management Plan.
3. The boundary monuments must be (not should be) installed and marked with “Buffer” instead of OS4 for easier understanding.
4. ESC fencing should be installed at the 30 m buffer on the west side of the watercourse. There is nothing in the EIS to suggest there will be construction or soil stockpiling that close to the buffer limits.
5. There must be regular monitoring (at least weekly and following storm events) of ESC measures. All monitoring reports must be sent immediately to the appropriate city and UTRCA staff. Any interruption of ESC measures must be immediately remediated.
6. Bat boxes should be installed to replace any removed potential bat maternity trees.
7. ECAC agrees that portions of the west OS4 buffer which are not currently vegetated will be naturalized with native woodland edge species wherever woodland vegetation is not already present. Monitoring must take place after two growing seasons post planting (which is clearer than the recommendations in the EIS and the EMP). Monitoring reports must go to the appropriate city staff. It would be helpful if they were also included on ECAC agendas when received by the City.
8. Monitoring must also include monitoring of encroachment. It is noted from the Servicing Report that the new house will be within 15 m of the woodland. The

recent EIS implementation work done for the City by Duggan noted that encroachment is an issue when a buffer is less than 10 m.

9. Recommendation 17 on page 17 must be revised to read – “Sedimentation controls during site grading work must control and avoid runoff to the Loveless Drain.” The current wording is insufficient to protect the watercourse.

Other

ECAC appreciates the consultants consulting eBird and INaturalist during its work.

ECAC appreciates that the EIS includes the qualifications of the consultants as required by the City’s Environmental Management Guidelines.



1176 Crumlin Sideroad

Focused Environmental Impact Study (EIS)

Project Location:

1176 Crumlin Sideroad, London, ON

Prepared for:

Peter Drankowsky
367 Edgeworth Avenue
London, ON N5W 5C3

Prepared by:

MTE Consultants Inc.
123 St. George Street
London, ON N6A 3A1

February 9, 2023

MTE File No.: 51594-100



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1.0 Introduction

Peter Drankowsky (the 'Proponent') has initiated the Draft Plan Approval and Zoning By-Law Amendment approval process for the severance of a lot into three parcels (the 'Project') on a property located at 1176 Crumlin Sideroad, south of Dundas Street, in the City of London (the 'Subject Lands'). The property is approximately 3.3 ha and is located on Lot 1, Concession 1 North Division Dorchester.

The Legal Parcel is referred to as the Subject Lands throughout this report [Figure 1]. The Subject Lands were the focus of field investigations for the Focused Environmental Impact Study (EIS), as well as a desktop review in the 120 m adjacent lands.

Through discussions with the City of London, it has been determined that a Focused EIS is appropriate for this Project. The objective of this type of EIS will be discussed in Section 1.1, below, while the pre-consultation history with the City is provided in Section 1.4.

1.1 Report Objective

This report is a Focused EIS as requested by the City of London and agreed-upon by UTRCA. A Focused EIS is appropriate where a commitment by the proponent is made to establish ecological buffers for natural heritage features that meet or exceed the City of London's minimum buffers as per the *Environmental Management Guidelines* (City of London, 2021). The typical detailed natural heritage field studies have therefore been waived and the focus of this EIS will be on the identification of natural heritage features and confirmation of buffers. Mitigation measures will also be provided to ensure the proposed buffers are effective and potential indirect impacts are limited.

The process and reporting are also designed to provide a support document for additional approvals that may be required, including permit applications that may be submitted to the Upper Thames River Conservation Authority (UTRCA).

1.2 Format

Natural heritage features and functions identified in this Focused EIS are evaluated through a review of the Natural Heritage Reference Manual (NHRM, 2010) for policy 2.1 of the Provincial Policy Statement (MMAH, 2020), and Section 6 (Environmental Policies) of The London Plan (2021).

This report will be circulated to the City of London and UTRCA for agency review and comment on the findings and recommendations.

This Focused EIS contains the following components in accordance with the standards noted above:

Section 2.0	Land Use Setting and Policy Overview
Section 3.0	Triggers for EIS
Section 4.0	Description of the Natural Environment
Section 5.0	Natural Heritage Policy Considerations
Section 6.0	Description of the Development
Section 7.0	Impacts and Mitigation
Section 8.0	Summary and Conclusions
Section 9.0	References

1.3 Background Documents

The following additional documents were reviewed to provide context for the Project and conditions within Study Area:

- Upper Thames River Source Protection Area Assessment Report (Thames-Sydenham and Region Source Protection Committee, 2015)
- Record of Pre-Application Consultation – 1176 Crumlin Sideroad (Nancy Pasato, 2022)

- Plan of Survey Showing Topographical Detail – Lots 15 and 16, Registered Plan No. 17(C) (AGM, 2022)

1.4 Pre-Consultation and Site History

A Proposal Summary was submitted by the Proponent to the City of London on December 23, 2021 and reviewed by City Staff at an Internal Review Meeting on January 13, 2022. A Record of Pre-Application Consultation was subsequently provided to Strik Baldinelli Moniz (SBM; Simona Rasanu, Planner), dated January 18, 2022. The Record of Pre-Application Consultation outlines the major concerns and comments from the City of London regarding the proposed Project. In addition, this document outlines the City’s option for a Focused EIS. City staff stated that for a complete application, a full SLSR could be waived (including field study requirements) if a suitable buffer to the drain was provided. The City comment states, “In this case, a buffer of 30 m on each side of the high-water mark would be required surrounding the water feature associated with the Significant Valleylands feature”. It was later confirmed with City of London Ecologist Planner Shane Butnari in late April 2022 that the buffer should be 30 m to either side of the high-water mark plus any contiguous woodland. The comments that are related to ecology and the Focused EIS will be addressed in this report. The Record of Pre-Application Consultation is provided in Appendix A.

A Scoping Meeting was held on August 19, 2022, with Shane Butnari (City Ecologist Planner), Mike Serra (UTRCA), Sandy Levin (ECAC), Steve Evans (ECAC), Kiana Lee (ECAC), Peter Drankowsky (Proponent), Simona Rasanu (SBM Planner), Melissa Cameron (MTE Ecologist) and Allie Leadbetter (MTE Ecologist). The Scoping Checklist was finalized and approved by Shane Butnari on October 21, 2022. The Scoping Checklist is provided in Appendix B.

A site visit was completed on August 31, 2022, with Will Huys (MTE Plant and Wildlife Technician), Allie Leadbetter, Shane Butnari, Mike Serra, Peter Drankowsky, and Simona Rasanu to review the staked woodland dripline, as well as discuss the buffers within the Subject Lands. The final revised woodland dripline was surveyed by AGM and will be used in this Focused EIS.

2.0 Land Use Setting and Policy Overview

The Subject Lands are comprised of an existing residential property, agricultural fields, and natural vegetation communities along an open drain. The surrounding area is primarily residential and agricultural, with a commercial region further to the southwest.

Federal, provincial, and municipal legislation and policies, summarized in an overview below, were reviewed to inform the evaluation of significant natural heritage features on the Subject Lands.

2.1 The London Plan

The London Plan (2021) includes environmental policies that provide direction for the long-term protection and conservation of natural heritage features and areas and the ecological functions, processes, and linkages that they provide in the City of London. The general environmental goals of the London Plan include, but are not limited to, the following:

- Achieve healthy terrestrial and aquatic ecosystems in the city’s subwatersheds.
- Provide for the identification, protection, rehabilitation, and management of natural heritage features and areas and their ecological functions.
- Protect, maintain, and improve surface and groundwater quality and quantity by protecting wetlands, groundwater recharge areas and headwater streams.
- Maintain, restore, monitor and improve the diversity and connectivity of natural heritage features and areas and the long-term ecological function and biodiversity of Natural Heritage Systems.

- Provide opportunities for appropriate recreational activities based on the ecological sensitivities of the area.

Natural Heritage features are identified and mapped on Map 5 of the London Plan (May 2021). Development and site alteration is not permitted within or adjacent to Unevaluated Wetlands, Provincially Significant Wetlands, Significant Valleylands and Woodlands, Habitat of Endangered or Threatened Species, Areas of Natural and Scientific Interest, and Environmentally Significant Areas unless evaluated by a professional and proven to have no negative impacts on the features or ecological functions.

2.1.1 Environmental Classifications

Map 5 (City of London, 2021) identifies a Significant Valleyland associated with a drain (Loveless Municipal Drain) passing north to south through the Subject Lands and extending to adjacent lands (OMAFRA, 2022). No other natural heritage features are shown within or adjacent to the Subject Lands on Map 5 [Figure 2].

2.1.2 Land Use Designations

The Subject Lands are shown on Map 1 (City of London, 2021) to be located outside the Urban Growth Boundary [Figure 3]. Place Types within the Subject Lands include Rural Neighbourhood in the west, Farmland in the east, and Green Space associated with the Significant Valleyland.

Place Types in the surrounding area primarily include Neighbourhoods to the north and west, and Farmland to the east. The Green Space designation follows the Significant Valleyland to the north and south.

2.2 City of London Zoning Bylaws

The west Subject Lands are zoned Agricultural 1 (AG1), and the east is zoned Agricultural 2 (AG2) [Figure 4]. The AG1 Zone permits a wide range of non-intensive agricultural uses, whereas the AG2 Zone variation permits intensive and non-intensive agricultural uses (Zoning By-law No. Z.-1). The west driveway is zoned Residential 1 (R1-11) which provides for and regulates single detached dwellings.

The drain through the property is zoned Open Space (OS4). The OS4 variation is intended to be applied to hazard lands, and development proposed there will be regulated by the Conservation Authorities Act. In this case, the floodway of the drain is the associated hazard.

2.3 Upper Thames River Conservation Authority (UTRCA) Regulation

The UTRCA regulates lands within its watershed under Ontario Regulation 157/06, pursuant to Section 28 of the *Conservation Authorities Act*. The UTRCA has jurisdiction over riverine flooding and erosion hazards, wetlands and the surrounding area, and requires that landowners obtain written approval from the Authority prior to undertaking any site alteration or development within the regulation limit.

The Upper Thames River Conservation Authority (UTRCA) regulations within the Subject Lands are primarily associated with the flood and erosion hazard of the drain flowing through the property [Figure 5]. An area in the southwest is also regulated due to a flood hazard. These regulation areas will be discussed further in this EIS.

2.4 Planning Act

The Provincial Policy Statement (PPS; MMAH, 2020) was issued under the *Planning Act, 1990* to provide direction to regional and local municipalities regarding planning policy, ensuring that decisions made by planning authorities were consistent with provincial policy.

With respect to natural heritage features and resources, the PPS defines seven natural heritage features:

- Significant Wetlands and Significant Coastal Wetlands
- Significant Woodlands
- Significant Valleylands
- Significant Wildlife Habitat (SWH)
- Significant Areas of Natural and Scientific Interest (ANSI's)
- Fish Habitat, and,
- Habitat of Endangered and Threatened Species

The Subject Lands are within Ecoregion 7E where no development or site alteration are permitted in Provincially Significant Wetlands or Coastal Wetlands. Development and site alteration are not permitted in Habitat of Endangered or Threatened Species or Fish Habitat or, except in accordance with provincial and federal legislation. For the remaining features, development and site alteration shall not be permitted unless it has been demonstrated through an EIS that there will be no negative impacts on the features or their ecological functions.

While not all features and functions of provincial interest noted above are provided on provincial maps, a review of the Make a Natural Heritage Map (NHIC, 2019) suggests there are no additional mapped features not already covered by the Official Plan Maps. However, the policies noted above are reviewed later in this report supported by site specific field work and consultation with the municipal review agencies.

2.5 Endangered Species Act

The *Endangered Species Act, 2007* protects species listed as Threatened, Endangered or Extirpated in Ontario (SARO, 2007) from killing, harm, harassment or possession, and also protects their habitats from damage or destruction. Activities that may impact a Protected Species or its habitat require prior authorization from the Ministry of Environment, Conservation and Parks (MECP), unless the activities are exempt under a Regulation. No contraventions of the *ESAct* are anticipated, and this will be discussed further later in this EIS.

2.6 Fisheries Act

The federal Fisheries Act, 1985 (amended 2019) manages fisheries resources, as well as conserves and protects fish and fish habitat, including by preventing pollution. The Act presents two main prohibitions: the prohibition of any work, undertaking, or activity that result in the harmful alteration, disruption or destruction of fish habitat [section 35(1)] and the prohibition of any work, undertaking, or activity that results in the death of fish by any other means other than fishing [section 34.4(1)]. Authorizations to proceed with a proposed work, undertaking, or activity that may harm fish or fish habitat may be provided by the Minister of Fisheries and Oceans, in accordance with sections 34.4(2)(b) and 35(2)(b).

This Focused EIS will take into account the potential fish habitat in the drain and, through avoidance or additional mitigation, ensure the federal Fisheries Act is not contravened.

2.7 Migratory Birds Convention Act

The federal *Migratory Birds Convention Act, 1994* aims to protect and conserve migratory birds as populations and individual birds in Canada and the United States. No work is permitted to proceed that would result in the destruction of active nests (nests with eggs or young birds), or the wounding or killing of bird species protected under the *Migratory Birds Convention Act, 1994* and/or Regulations under that Act. Many bird species not protected by the MBCA (e.g., raptors) are protected under the FWCA.

2.8 Fish and Wildlife Conservation Act

The *Fish and Wildlife Conservation Act, 1997* (FWCA) regulates hunting, trapping, fishing, and related activities in Ontario in order to address the conservation of fish and wildlife resources in the province, including mammals, birds, reptiles, amphibians and fish. Under the Act, a person that hunts or traps wildlife requires a license administered by the Ministry of Natural Resources and Forestry (MNRF). Deliberate capture of wildlife or fish for the purpose of salvage and relocation is regulated under the FWCA.

3.0 Triggers for EIS

When a development proposal requires a Planning Act application (i.e., Draft Plan submission, or amendments to the Official Plan and/or zoning by-law), the City of London requires an EIS to be completed where development or site alteration is proposed within or adjacent to the Natural Heritage System, as set out in Table 13 (Areas Requiring Environmental Study) of the London Plan (2021a).

The Proponent is proposing the severance of the Subject Lands into three parcels with the construction of two single family detached houses on two of the parcels. Based on the London Plan Maps 1, 5, and 6 (2021a), the triggers for the Environmental Impact Study (EIS) are as follows:

- Proposed development within 120 m of potential Fish Habitat
- Proposed development within 120 m of Significant Valleylands
- Proposed development within 30 m of a Significant Groundwater Recharge Area and Highly Vulnerable Aquifer

As well, application for a permit under the UTRCA Ontario Regulation 157/06 may require an EIS

- Subject Lands are within the UTRCA's regulation limits

In addition, the *Endangered Species Act* (2007) protects species and habitat not specifically identified on London Plan Maps. To be consistent with the Provincial Policy Statement (Ministry of Municipal Affairs and Housing (MMAH), 2020), the requirements for an additional study can be triggered without any adjacent features identified on the London Plan Maps.

The following section (Section 4.0) reviews the natural heritage setting of the Subject Lands.

4.0 Description of the Natural Environment

The following section reviews the abiotic and biotic features on and within 120 m of the Subject Lands that contribute to the overall natural heritage features and functions of the Subject Lands and adjacent lands. This review provides relevant background information for interpreting environmental features and functions for evaluation in Section 5.0. Areas outside the property limits were studied from the edge of the property or using satellite imagery.

4.1 Physical Setting

4.1.1 Physiography

The Subject Lands are underlain by Middle Devonian aged limestone, minor dolostone, and shale of the Dundee Formation based on mapping from the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF, 2017). Bedrock is not exposed in the area of the Subject Lands. Physiographic regional mapping indicates that the Subject Lands are situated within the Sand Plains (MNDMNRF, 2017).

4.1.2 Soils

The Subject Lands are located in an area of ice-contact stratified deposits based on OGSEarth surficial geology mapping (MNDMNR, 2017). These deposits include sand and gravel, minor silt, clay, and till. No site-specific soil investigations have been completed.

4.1.3 Topography

The topography in the general region is very gently sloping to nearly flat (Hagerty & Kingston, 1992). The Subject Lands are generally flat (AGM, 2022). The drain is approximately 1.5 m deep from top of slope to the bottom of the ditch (AGM, 2022).

4.1.4 Surface Water Features

A drain flows approximately north to south through the Subject Lands. This drain is identified as “Loveless Drainage Works -1998” on the Ministry of Agriculture, Food and Rural Affairs mapping (OMAFRA, 2022) and “Loveless Municipal Drain” on UTRCA mapping (2022) [Figure 5]. The drain flows south to Waubuno Creek approximately 2.9 km downstream. The drain is classified as a Class F drain by DFO (AgMaps, 2022), indicating it is an intermittent drain that is dry for at least three months of the year (Kavanagh, Wren, & Hoggarth, 2017). Field observations of the Loveless Municipal Drain were limited, but the drain was observed to be clearly channelized on August 31, 2022. This drain is piped north of the Subject Lands.

OMAFRA drain mapping (AgMaps, 2022) shows another constructed drain called Toloczko Drain passing through the Subject Lands and joining with the Loveless Municipal Drain to the south. Toloczko Drain is not apparent in air photos or UTRCA regulation mapping and was not encountered during site visits. Water does appear to pool near the south adjacent residential properties in the spring, but a flowpath was not observed.

4.1.5 Hydrogeology

According to the Upper Thames River Source Protection Area Assessment Report (Thames-Sydenham and Region Source Protection Committee, 2015), the Subject Lands are located within a Significant Groundwater Recharge Area (SGRA) and Highly Vulnerable Aquifer (HVA), although the site-specific recharge conditions are not known (TSRSPC, 2015).

4.2 Biological Setting

This section summarizes the background review of the Subject Lands and 120 m adjacent lands and the results of field investigations completed in 2022.

4.2.1 Records Review

Designated Natural Heritage Features

The Land Information Ontario (LIO) mapping (MNR, 2021) and Natural Heritage Information Centre (NHIC) online database (2021), and London Plan Map 5 were reviewed for natural heritage features in and adjacent to the Subject Lands.

A review of the LIO mapping did not identify any natural heritage features (woodlands, wetlands, ANSIs) within 120 m of the Subject Lands, except for a small patch of woodland approximately 117 m west across Crumlin Sideroad. The London Plan Map 5 identified a Significant Valleyland associated with the Loveless Municipal Drain flowing through the Subject Lands and extending to the north and south.

Species Records

Protected Species are those listed as Endangered or Threatened on the Species at Risk in Ontario (SARO) List of the *Endangered Species Act* (2007). Only Protected Species receive protection for individuals or habitat under the *ESAct*.

Species of Conservation Concern (SOCC) are those listed as Special Concern on the SARO list and species with a provincial ranking of S1-S3. Provincial status rankings for plants, vegetation communities, and wildlife are based on the number of occurrences in Ontario and have the following meanings:

- S1: critically imperiled; often fewer than 5 occurrences
- S2: imperiled; often fewer than 20 occurrences
- S3: vulnerable; often fewer than 80 occurrences
- S4: apparently secure
- S5: secure
- S?: unranked, or, if following a ranking, rank uncertain (e.g., S3?)

Provincial status rankings are established by the NHIC and do not provide an indication of regional abundance or rarity (i.e., species uncommon in the province may still be locally abundant in some regions).

A review of the Ontario Natural Heritage Information Centre (NHIC), Ontario Breeding Bird Atlas (OBBA), Ontario Reptile and Amphibian Atlas database, DFO Aquatic Species at Risk Map, and Citizen Science sources (iNaturalist and eBird) identified several Protected Species and SOCC as potentially present in the area of the Subject Lands. The areas included in the background review vary, including 10 km Atlas squares (OBBA and Ontario Reptile/Amphibian Atlas), a 1 km Atlas square (NHIC), and the 120 m adjacent lands (eBird, iNaturalist). It should be noted that OBBA occurrence data are from 2001-2005, and the dates of NHIC records are unknown. The remainder of the records are from within the past 10 years. The observation dates are provided for each species where possible. These sources display data for a broad area and therefore provide only a general potential for species presence on or near the Subject Lands.

Table 1: Species Occurrence Data Review (Potential Within 10 km of the Subject Lands)

Common Name	Scientific Name	SARO Status	SARA Status	Date Observed (If known)	Source
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	END	THR	2001-2005	Birds Canada, 2005
Queensnake	<i>Regina septemvittata</i>	END	END	2016	Ontario Nature, 2019
Bank Swallow	<i>Riparia riparia</i>	THR	THR	2001-2005	Birds Canada, 2005
Barn Swallow	<i>Hirundo rustica</i>	THR	THR	2001-2005	Birds Canada, 2005
Black Redhorse	<i>Moxostoma duquesnei</i>	THR	THR	-	DFO, 2019
Bobolink	<i>Dolichonyx oryzivorus</i>	THR	THR	2001-2005	Birds Canada, 2005
Chimney Swift	<i>Chaetura pelagica</i>	THR	THR	2001-2005	Birds Canada, 2005
Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>	THR	THR	2013	Ontario Nature, 2019
Eastern Meadowlark	<i>Sturnella magna</i>	THR	THR	2001-2005	NHIC, 2022; Birds Canada, 2005

In addition to the above list, there are a number of other species that are poorly represented in the background information sources and which may be present within the City of London. These additional species to consider include bat species (Little Brown Myotis [END], Northern Myotis [END], Tri-coloured Bat [END], Eastern Small-footed Myotis [END]), American Badger, Butternut, and American Chestnut [END].

Several Special Concern or rare (S1-S3) species were also identified through a background review within 10 km of the Subject Lands. These species are provided in Table 2, below. Observations of migrant bird species far outside nesting timing windows have been omitted where known.

Table 2: SOCC Occurrence Records Review (Potential Within 10 km of the Subject Lands)

Common Name	Scientific Name	SARO Status	Date Observed (If known)	Source
Bald Eagle	<i>Haliaeetus leucocephalus</i>	SC	2001-2005	Birds Canada, 2005
Common Nighthawk	<i>Chordeiles minor</i>	SC	2001-2005	Birds Canada, 2005
Eastern Wood-pewee	<i>Contopus virens</i>	SC	2001-2005	Birds Canada, 2005
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	SC	2001-2005	Birds Canada, 2005
Northern Brook Lamprey	<i>Ichthyomyzon fossor</i>	SC	-	NHIC, 2022
Northern Map Turtle	<i>Graptemys geographica</i>	SC	2018	Ontario Nature, 2019
Snapping Turtle	<i>Chelydra serpentina</i>	SC	2019	Ontario Nature, 2019
Wood Thrush	<i>Hylocichla mustelina</i>	SC	2001-2005	Birds Canada, 2005

A complete assessment of habitat for Protected Species and SOCC is provided in Appendix C based on the field surveys described below. Many of these species are determined to be unlikely to be present within the Subject Lands based on habitat requirements. The results of the SAR assessment will be presented in the context of policy protections and appropriate buffers later in this report.

Vegetation Communities

The Subject Lands are currently occupied by cultural meadow (previously agricultural lands), an existing landscaped residential property, and a small woodlot surrounding the Loveless Municipal Drain. Trees are also present around the existing residential home and in hedgerows along property boundaries, particularly to the north and east.

Provincial significance of vegetation communities is based on the rankings assigned by the NHIC (2020). All communities listed in Table 3 are secure in Ontario. ELC communities within the Subject Lands are shown on Figure 6.

Table 3: Ecological Land Classifications for the Subject Lands

Polygon	ELC Code	Description	S-rank
1	CUM	Cultural Meadow	N/A
2	FOD7	Fresh-Moist Lowland Deciduous Forest Ecosite	N/A
3	CUM	Cultural Meadow	N/A

Community 1 is a Cultural Meadow in the south of the Subject Lands in an area previously used for agriculture. Grass species dominate this community, although Goldenrod was also noted to be prominent during a site visit on August 31, 2022. This community has been mowed annually.

Community 2 is a Fresh-Moist Lowland Deciduous Forest Ecosite (FOD7) along the Loveless Municipal Drain flowing through the Subject Lands. Plant species were not investigated in detail for this Focused EIS, but maple trees were noted as well as a large Eastern Cottonwood and a patch of Tree of Heaven in the north near the existing residence.

Community 3 is a Cultural Meadow in the east Subject Lands that includes common forb and grass species. Community 3 was used for agriculture in the past.

The north Subject Lands are residential with an existing single-family home and lawn. This home is accessed via a gravel driveway connected to Crumlin Sideroad. Several sheds are located in the backyard of the house.

4.2.2 Significant Wildlife Habitat

MNRF Significant Wildlife Habitat (SWH) Criteria Schedules for Ecoregion 7E (January 2015) uses ELC ecosite codes and habitat criteria (e.g., size of ELC polygon, proximity to other natural features) to define candidate SWH. Additional candidate SWH types for the City of London were obtained from the London Plan (Policy 1354, 2021a). An assessment of candidate SWH was completed for the Subject Lands using a combination of desktop analysis and field observations, and is provided in Appendix D.

Candidate Seasonal Concentrations of Animals

Bat Maternity Colonies – Community 2 (FOD7)

Candidate Habitats for Species of Conservation Concern Considered SWH

Special Concern and Rare Wildlife Species – Subject Lands

Candidate SWH features were further evaluated using the results of a general habitat field investigation and background review. Targeted field surveys were not completed as this is a Focused EIS. Results of the assessment of significance for SWH are presented in Section 5.0.

4.2.3 Field Investigations

Field surveys were limited based on the scope of this Project and the agreement with the City of London to complete a Focused EIS. One site visit was completed on August 4, 2022, by MTE Plant and Wildlife Technician Will Huys to search for tree species protected under the *Endangered Species Act 2007*, inventory trees within 3 m of the property boundaries, delineate the woodland dripline, and complete a general habitat assessment. All incidental wildlife species observations were recorded, and potential habitat features were noted. Field sheets are provided in Appendix E and MTE staff CVs are in Appendix F.

A second site visit was completed on August 31, 2022, by Will Huys (MTE), Allie Leadbetter (MTE), Mike Serra (UTRCA), Shane Butnari (City of London Ecologist), Simona Rasanu (SBM), and Peter Drankowsky (Proponent) to review the woodland dripline and discuss feature buffers. All incidental wildlife species encountered were recorded.

Protected Species

No floral or faunal species protected under the *Endangered Species Act, 2007* were identified within the Subject Lands during the targeted Species at Risk search on August 4, 2022.

Several snags were observed in Community 2 (FOD7) that may be capable of providing maternity roost habitat for Little Brown Myotis [END], Northern Myotis [END], or Tri-coloured Bat [END]. Bat maternity roost habitat was not confirmed through a targeted survey, so candidate habitat will be assumed to be present in Community 2.

DFO identified the Loveless Municipal Drain flowing south through the Subject Lands as potentially containing Black Redhorse [THR] (DFO, 2019). This is likely because the Loveless Municipal Drain drains directly into Waubuno Creek approximately 2.9 km downstream. Waubuno Creek is identified as critical habitat for Black Redhorse by DFO (2019). The Loveless Municipal Drain is a small drain classified as a Class F drain (intermittent), and therefore is very unlikely to provide the moderate to fast-flowing warmwater river conditions with diverse substrates that Black Redhorse require (COSEWIC, 2005). However, protections for downstream habitat in Waubuno Creek will need to be considered in this Focused EIS.

Incidental Observations

Two Monarch butterflies [SC] were observed flying through Community 1 (CUM) on August 31, 2022. This is the early migratory period for this species.

5.0 Natural Heritage Policy Considerations

Provincial and municipal natural heritage policies provide guidelines that determine appropriate land uses on and adjacent to natural heritage features and functions. This section reviews the provincial, municipal and Conservation Authority regulatory policies which apply to Natural Heritage features and functions of the Subject Lands and adjacent lands.

Policies and regulations that may pertain to the Subject Lands include:

- the 2020 Provincial Policy Statement, Section 2.1, issued under the Planning Act, 1990
- these have been reviewed in conjunction with the Natural Heritage Reference Manual (NHRM) (OMNR, 2010),
- the London Plan, Section 6 – Environmental Policies (May 28, 2021),
- the City of London Environmental Management Guidelines (2021),
- the UTRCA Regulations (Conservation Authorities Act, Section 28 – Ontario Regulation 157/06).
- the Endangered Species Act, 2007
- the Migratory Birds Convention Act, 1994

The policies above are applied to natural features and functions identified in Section 4.0 of this Focused EIS in order to determine which components of the natural heritage system will require additional consideration. Policy (provincial, municipal, and UTRCA) is reviewed below.

5.1 Provincial and Municipal Policy

5.1.1 Significant Wetlands, Wetlands, and Unevaluated Wetlands

No wetlands (significant or unevaluated) are present within 120 m of the Subject Lands (MNRF, 2021). The absence of wetlands within the Subject Lands was confirmed through field investigations.

5.1.2 Significant Woodlands and Woodlands

No Woodlands or Significant Woodlands are identified on Map 5 (City of London, 2021) within 120 of the Subject Lands. A wooded vegetation patch (Community 2) within the Subject Lands will be treated as a Woodland in this Focused EIS. The Woodland boundary was delineated in the field with Shane Butnari (City Ecologist), Simona Rasanu (SBM Planner), Mike Serra (UTRCA), Peter Drankowsky (Proponent), Will Huys (MTE), and Allie Leadbetter (MTE) on August 31, 2022.

5.1.3 Significant Valleylands and Valleylands

A Significant Valleyland is present within the Subject Lands based on Map 5 of the City of London Map 5 (2021). The Significant Valleyland is associated with the Loveless Municipal Drain flowing approximately north to south through the Subject Lands.

5.1.4 Significant Wildlife Habitat

Candidate significant wildlife habitat (SWH) is based on ELC communities that were identified in Section 4.2.2. Confirmed significant wildlife habitat is determined through appropriate field investigations and evaluation of species use in accordance with specific criterion outlined in the Ecoregion Criteria Schedules 7E (MNRF, 2015). Candidate SWH identified on or adjacent to the Subject Lands is fully assessed in Appendix D and the results are presented here.

Bat Maternity Colonies

Community 2 (FOD7) contains several snags and may support bat maternity roost habitat. No targeted bat maternity roost surveys were conducted to confirm SWH.

Candidate SWH – Unconfirmed (Community 2 – FOD7)

Species Concern and Rare Wildlife Species

The potential for Special Concern and rare wildlife species within the Subject Lands was evaluated based on a general habitat investigation and a background review [Appendix C].

Two Monarch butterflies [SC] were observed flying through Community 1 on August 31, 2022, during the early migratory season for this species. No Milkweed was noted in Community 1 during site visits, so breeding habitat is not present. This community is grass-dominated and is unlikely to provide especially abundant nectaring opportunities. Community 1 is a culturally impacted grass-dominated community and Community 3 (CUM) is similarly disturbed by mowing and agricultural activities. No Monarch SWH is present within the Subject Lands.

Eastern Wood-pewee [SC] was not observed, however Community 2 (FOD7) may provide appropriate suitable breeding habitat for this species based on the Species at Risk assessment in Appendix C. Eastern Wood-pewee nests in a variety of wooded habitats, including small woodlots and forest edges. No breeding bird surveys were completed, so breeding habitat for Eastern Wood-pewee is unconfirmed in Community 2.

As per Policy 1354 of the London Plan (2021), under-represented habitat types in the City of London should be considered as candidate SWH and assessed following the processes outlined in the Natural Heritage Reference Manual (MNR, 2010). Under-represented habitat types listed by the City of London (marshes, tall grass prairie and savannahs, bogs, fens, bluffs, shallow aquatic, and open aquatic types) were not identified within the Subject Lands.

Candidate SWH – Unconfirmed (Eastern Wood-pewee in Community 2 – FOD7)

5.1.5 Areas of Natural and Scientific Interest

No Areas of Natural and Scientific Interest (ANSIs) of provincial or regional significance are present within 120 m of the Subject Lands (MNR, 2021).

5.1.6 Fish Habitat

The Loveless Municipal Drain within the Subject Lands may contain fish habitat although it is classified as an intermittent (Class F) drain and therefore aquatic habitat may not be available year-round (DFO, 2019). The Subject Lands support downstream fish habitat in Waubuno Creek approximately 2.9 km downstream.

5.1.7 Habitat of Endangered or Threatened Species

A complete habitat screening assessment for Protected Species was completed and is provided in Appendix C. Based on the vegetation communities and habitat features within and directly adjacent to the Subject Lands, the Protected Species that are most likely to be present include protected bat species [END] and Black Redhorse [THR].

Little Brown Myotis [END], Northern Myotis [END], and Tri-coloured Bat [END] maternity roost habitat may be present in Community 2 (FOD7). One potential habitat tree (Sugar Maple) was also identified along the north property boundary [Figure 6]. Several snags were observed in Community 2, but a targeted bat maternity roost survey was not completed to identify all trees with peeling/loose bark, knotholes, or cavities. Habitat will be assumed present in Community 2 for this Focused EIS.

DFO identified the Loveless Municipal Drain as potentially containing Black Redhorse [THR] (DFO, 2019). This is likely because the Loveless Municipal Drain drains directly into Waubuno Creek approximately 2.9 km downstream, which is identified as critical habitat for Black Redhorse. The Loveless Municipal Drain is a small Class F drain (intermittent), and therefore does not provide the moderate/fast flowing warmwater conditions and diverse substrates that Black Redhorse require (COSEWIC, 2005). However, protections for downstream habitat in Waubuno Creek will need to be considered in this Focused EIS.

5.1.8 Environmentally Significant Areas (1367-1371)

No Environmentally Significant Area (ESA) is present within or adjacent to the Subject Lands (City of London, 2021).

5.1.9 Upland Corridors (1372-1377)

No Upland Corridor is mapped within or adjacent to the Subject Lands (City of London, 2021).

5.1.10 Potential Naturalization Areas (1378-1381)

No Potential Naturalization Areas are mapped within or adjacent to the Subject Lands (City of London, 2021).

5.2 Conservation Authority Regulations

The Upper Thames River Conservation Authority (UTRCA) regulations fall across portions of the Subject Lands. The primary regulated area is associated with the flood and erosion hazards of the Loveless Municipal Drain through the Subject Lands. A small area in the southwest is also regulated by UTRCA due to a flood hazard. Any development proposed within the regulated areas will require a Section 28 Permit Application from the UTRCA.

5.3 Summary of Identified Features and Functions

Table 4 presents a summary of features and functions of the Subject Lands and adjacent lands that have been identified through the policy review, above, as requiring consideration in determination of appropriate buffers and mitigations in this Focused EIS. Features considered under the PPS are not re-stated under the London Plan.

Table 4: Environmental Considerations for the Study Area

Policy Category	Environmental Consideration	Natural Heritage Feature
Provincial Policy Statement (2020)	Significant Valleyland	Associated with the Loveless Municipal Drain flowing through the Subject Lands
	Significant Wildlife Habitat	<ul style="list-style-type: none"> • Candidate bat maternity colonies SWH – Community 2 (FOD7) • Candidate Eastern Wood-pewee [SC] SWH – Community 2 (FOD7)
	Fish Habitat	The Loveless Municipal Drain within the Subject Lands may support common fish habitat (DFO, 2019), as well as supports downstream fisheries in Waubuno Creek
	Habitat of Endangered and Threatened Species	<ul style="list-style-type: none"> • Potential habitat for Little Brown Myotis [END], Northern Myotis [END], and Tri-coloured Bat [END] within Community 2 on the Subject Lands • The Loveless Municipal Drain does not contain suitable habitat itself, but it does support downstream critical habitat for Black Redhorse [THR] in Waubuno Creek (DFO, 2019)
London Plan (2021)	Woodland	<ul style="list-style-type: none"> • Community 2 (FOD7)
UTRCA Regulations	Regulated Area	UTRCA regulates the Significant Valleyland within the Subject Lands due to the flood/erosion hazard and a small area in the southwest regulated due to a flood hazard

6.0 Description of the Development

The proponent is proposing the severance of the existing Legal Parcel into three Parcels [Figure 7]. Parcels 1 and 2 are west of the Loveless Municipal Drain, and Parcel 3 is to the east and includes the drain [Figure 7]. Parcels 1 and 2 will both have developable areas outside UTRCA regulated areas and the finalized OS4 zone that will allow for one single-family home to exist on each parcel. Access to the homes on Parcels 1 and 2 is proposed via Crumlin Sideroad along separate driveways (approximately 10 m wide) with a shared 6.0 m wide access easement that leads to the existing agricultural access path.

The existing agricultural access pathway (maintained grass path several metres wide) provides access over a culvert for farm equipment travelling to the east (Parcel 3). This pathway is shown on Figure 8 and is proposed to be retained for agricultural vehicle access from Parcel 1 to the east field (Parcel 3). Agricultural use of the east property will continue and will not be impacted by the OS4 zoning.

6.1 Ecological Buffers and Pre-Development Considerations

Natural heritage features and functions of the Subject Lands and adjacent lands have been identified and will need to be considered as part of the development proposal.

6.1.1 Public Ownership/Acquisition

In policy section 1404-1407 of the London Plan (2021), the City recognizes not all natural heritage areas will be brought into public ownership or shall be open and accessible for public use. The OS4 zone will remain under the ownership of the Proponent.

6.1.2 Ecological Buffers

Through consideration of the natural heritage features within the Subject Lands, discussions with the City of London through Pre-Application Consultation [Appendix A], and a site meeting with City staff and the proponent, a buffer area 30 m from either side of the high-water mark of the drain is to be designated Open Space 4 (OS4), along with the inclusion of all contiguous woodland vegetation as delineated by the staked dripline [Figure 8]. This buffer fulfills the requirements for a Focused EIS as written in the EMGs (2021) as it provides the minimum ecological buffers for the Significant Valleyland and, in conjunction with other mitigation measures to be discussed, protects all significant features within the Subject Lands.

It should be noted that the OS4 zoning east of the Loveless Municipal Drain will not restrict agricultural uses as Policy 2.1.9 of the Natural Heritage section of the Provincial Policy Statement states “Nothing in Policy 2.1 is intended to limit the ability of agricultural uses to continue” (2020).

This OS4 zone is proposed to protect all significant ecological features that are or may be present within the Subject Lands, and the protection of each of these features will be discussed in greater detail in Section 7.0.

6.1.3 Stewardship

Under the stewardship policies 1408-1411 of the London Plan, protection is encouraged for natural heritage systems that remain in private lands. These protection efforts can include stewardship agreements, conservation easements, education, land trusts, tax incentives, signage and other suitable techniques. Such efforts will be discussed in the context of mitigation measures and their contribution to the effectiveness of buffers.

7.0 Impacts and Mitigation

This section reviews the development proposal [Figures 7 and 8] and identifies potential impacts to the significant natural heritage features within and adjacent to the Subject Lands. No direct impacts

are anticipated because the OS4 buffer, as discussed in Section 6.1, will protect all significant natural heritage features present. This OS4 zone is shown on Figure 8 and is defined by a 30 m buffer from the high-water mark of the Loveless Municipal Drain and including the staked woodland dripline. The buffer is proposed to be vegetated with native species on the west side of the drain and is discussed further in Section 7.1.

Additional mitigation measures are presented in this section to ensure buffer effectiveness and mitigation of indirect impacts. Mitigation and avoidance measures are shown on Figure 9. At the conclusion of the section, a net effects table [Table 5] is provided for the proposed development application, summarizing potential impacts as well as proposed mitigation measures.

The potential direct impacts of the proposed development on natural heritage features identified in Table 4 will be discussed in the following Section 7.1. The potential for indirect impacts is discussed in Section 7.2.

7.1 Direct Impacts and Mitigation

7.1.1 Vegetation Removal and Tree Protection

No tree removal is required for the proposed severance. The dripline of Community 2 (FOD7) is fully included in the OS4 zone and therefore all trees in this Woodland will be retained and protected from future development.

Portions of the west OS4 buffer which are not currently vegetated will be naturalized with native woodland edge species wherever woodland vegetation is not already present [Figure 9]. This will not include the existing agricultural lane as access to the east field cannot be inhibited.

A Tree Preservation Report was completed by MTE (2022) for trees over 10 cm DBH within 3 m of the proposed severance boundaries. The report was requested by the City of London as a part of the Planning submissions to address boundary trees protected under the *Forestry Act* (2009). The Tree Preservation Report confirmed that no tree removals are required for the proposed severance, however six individual trees along the edge of the residential area are recommended for removal as a preventative/maintenance measure. All trees proposed for removal, except for one Sugar Maple with internal rot, are non-native species and do not provide potential bat habitat or contribute to a woodland feature. Overall tree cover will be maintained and no impact to woodlands or tree cover within the Subject Lands is anticipated.

Recommendation 1:

Naturalize the west OS4 buffer with native species wherever woodland vegetation is not present and provided agricultural access is not inhibited [Figure 9]. An Upland Woodland Edge seed mix suitable for site conditions should be used, as outlined in the Standard Contract Documents for Municipal Construction Projects 2020 Edition (City of London, 2020). 80% coverage is recommended. The contractor should follow the supplier's recommendations for overseeding.

Recommendation 2:

No mowing or encroachment should occur within the Naturalization Area. Small concrete monuments engraved with "OS4 Zone" should be installed along the west boundary of the Naturalization Area to clearly mark the permissible limits of mowing and maintenance. An example of City-designed monuments is provided in Appendix G of this EIS. The conceptual location of the monuments is shown on Figure 8.

Recommendation 3:

A point of access to the existing agricultural access over the Loveless Municipal Drain should be established to retain agricultural access to Parcel 3 from both Parcels 1 and 2, while avoiding the OS4 zone. The proposed shared access alignment is shown on the Severance Plan on Figures 7 and 8.

Recommendation 4:

If the removal of a tree is required for the shared access path, and the DBH is greater than 50 cm, a Private Tree Permit Application should be completed, and the appropriate number of replacement trees (as per Schedule A of the Tree Protection By-Law) should be planted on site. Replacement trees should be native to Ecoregion 7E.

Recommendation 5:

Refer to the Tree Preservation Plan (MTE, 2022) for recommendations regarding tree protection and recommended removals within the Subject Lands.

7.1.2 Significant Valleylands

The Significant Valleyland associated with the Loveless Municipal Drain on the Subject Lands is included within the proposed OS4 zone [Figure 9] and therefore no direct impacts from the proposed lot severance and home construction are anticipated. Indirect impacts are addressed in Section 7.2.

7.1.3 Significant Wildlife Habitat

Candidate SWH (Bat Maternity Colonies, Eastern Wood-pewee [SC] habitat) within Community 2 of the Subject Lands is proposed to be fully retained in the OS4 zone [Figure 9]. No direct impacts to confirmed or candidate SWH are anticipated.

7.1.4 Fish Habitat

The Loveless Municipal Drain within the Subject Lands may support common fish habitat as it is wet at least part of the year and connects to Waubuno Creek downstream which is known to include fish habitat. The City of London EMGs (2021) recommend fish habitat be provided a 15 m buffer for warm-water habitats and 30 m buffer for cold or cool-water habitats. The fish community of the Loveless Municipal Drain was not investigated but a conservative 30 m buffer from the high-water mark is included in the OS4 zone [Figure 9]. No aquatic Protected Species are present in the drain.

Downstream fish habitat also needs to be considered. The Loveless Municipal Drain flows south to Waubuno Creek approximately 2.9 km downstream. Waubuno Creek is identified by DFO as containing critical habitat for Black Redhorse [THR]. The proposed house construction will be outside the OS4 buffer so there should be no impact on the hydrological or nutrient inputs to Loveless Municipal Drain which would travel downstream to Waubuno Creek. Tree cover providing shade to the watercourse will remain as well.

Mitigation of indirect impacts (sediment and erosion, equipment spills, fertilizer/salt use) is addressed in Section 7.2 below.

Recommendation 6:

Install erosion and sediment control fencing surrounding the ground disturbance limits of the development to ensure the Loveless Municipal Drain and downstream systems are not impacted during home construction activities. Details for ESC measures are provided in Section 7.2.

7.1.5 Habitat of Endangered and Threatened Species

Little Brown Myotis [END], Northern Myotis [END], and Tri-coloured Bat [END] may be present within Community 2 in the Subject Lands, although these species were not confirmed present through targeted field investigations. Habitat for these bat species will be retained within Community 2 in the OS4 zone and one potential habitat tree (Sugar Maple) along the north property boundary will be retained, therefore no impacts to habitat are expected.

7.1.6 Migratory Birds and Wildlife

Nesting migratory birds are protected under the *Migratory Birds Convention Act (MBCA)*, 1994. No work is permitted to proceed that would result in the destruction of active nests (nests with eggs or young birds), or the wounding or killing of birds, of species protected under the *Migratory Birds Convention Act, 1994* and/or Regulations under that Act. Some MBCA-protected species, such as

Killdeer, may make use of un-maintained areas as they frequently make nests on the ground in construction sites and other disturbed areas.

Wildlife may also experience disturbance during construction when moving through active construction areas. Timing restrictions on vegetation removal are recommended to avoid disturbance to wildlife that may be using natural areas on the site, including breeding birds and reptiles.

Recommendation 7:

Avoid vegetation clearing during the migratory bird breeding season (April 1 to August 31) to ensure that no active nests are removed or disturbed. If works are proposed within the breeding season, the area should be checked for nesting birds by a qualified person prior to any vegetation removal or ground disturbance. If nesting birds are present, works in the area should not proceed until after August 31 or until the nest has been confirmed inactive (e.g., young have fledged).

Recommendation 8:

Make workers aware of potential incidental encounters with wildlife. If an animal enters the work site, work at that location will stop and the animal should be permitted to leave without being harassed. If there are repeat observations of wildlife in the work area, barrier fencing may be used to direct wildlife away from active construction and toward natural areas.

Recommendation 9:

Bank Swallow [THR] have not been identified within the Subject Lands, but the creation of suitable habitat (e.g., soil stockpiles) during construction should be avoided. Best management practices for deterring nesting during construction activities should be implemented (OMNRF, 2017). These measures should include stockpile slope management (i.e., grading stockpiles, eliminating vertical extraction faces, reducing slopes to 70 degrees or less) until at least July 15.

7.2 Indirect Impacts and Mitigation

Natural heritage features may also experience indirect effects. Indirect impacts on natural features will be limited as site activities are limited to the proposed severance and a single-family home to be built in the future on Parcel 2.

7.2.1 Sediment and Erosion Control

For all works adjacent to the OS4 zone, sediment and erosion control measures will be required to ensure that indirect impacts to natural heritage features are avoided or mitigated.

Recommendation 10:

Prior to construction works on site, sediment and erosion control fencing should be installed around the ground disturbance limits of the construction area. The fence will act as a barrier to keep construction equipment and spoil away from the vegetation to remain and prevent erosion and sedimentation of the adjacent natural heritage features. Sediment and erosion control fencing is to be installed according to the City of London Design Specifications and Requirements Manual specifications (2019b) and The Erosion and Sediment Control Guide for Urban Construction (TRCA, 2019). During construction, the lands between the sediment and erosion control fencing should be maintained.

Recommendation 11:

Soil stockpiles should be established in locations where natural drainage is away from the OS4 zone. If this is not possible and there is a possibility of any stockpile slumping and moving toward the edge of natural heritage features, the stockpiles should be protected with robust sediment and erosion controls. Access to the stockpile should be confined to the up-gradient side.

Recommendation 12:

Sediment and erosion control fencing should be inspected prior to construction to ensure it was installed correctly.

Recommendation 13:

Sediment and erosion control fencing should be inspected prior to rain events during construction to ensure that the fencing is being maintained and functioning properly. Any issues that are identified are resolved as quickly as possible, ideally the same day.

Recommendation 14:

Sediment and erosion control fencing should not be removed until adequate re-vegetation and site stabilization has occurred. All disturbed areas should be re-seeded as soon as possible to maximize erosion protection and to minimize volunteer populations of invasive species which may spread to the adjacent feature. Additional re-vegetation plantings and/or more time for vegetation to establish may be required; however, two growing seasons are typically sufficient to stabilize most sites.

7.2.2 Construction Site Management

Recommendation 15:

Regular cleanup of the Subject Lands must be completed during construction and post-construction to ensure the adjacent natural heritage features are not degraded.

Recommendation 16:

Equipment should be cleaned prior to arrival on site including tires, undercarriage, and any part of the equipment that may transport invasive seeds to the site. Clean equipment protocols are provided by London's Invasive Plant Management Strategy (2017) and should be followed where appropriate.

7.2.3 Protection of Water Resources

Recommendation 17:

Sedimentation controls during site grading work must help control and reduce the turbidity of runoff that could flow to the Loveless Municipal Drain.

Recommendation 18:

Use Best Management Practices (BMPs) for fuel handling, storage, and onsite equipment maintenance activities to minimize the risk of contaminant release as a result of the proposed construction activities.

Recommendation 19:

Contractors working at the site should ensure that construction equipment is in good working order. Equipment operators should have spill-prevention kits, where appropriate.

Recommendation 20:

Limit the use of commercial fertilizers, salts/ice melting additives, and other chemical applications within the Subject Lands, especially in areas that border the OS4 zone. Consideration may be given to using grass varieties which are hardier and require less extensive watering or fertilizers.

7.2.4 Lighting and Noise

The lands adjacent to the Subject Lands to the north, south, and west are in existing residential use, and a single home already exists on the Subject Lands. Residential noise is managed through existing By-laws which restrict excessive noise, and wildlife using the Subject Lands are already subject to some noise disturbance by neighbouring residents, traffic, or agricultural practices. Consequently, no impacts resulting from light or noise are anticipated as a result of development.

Recommendation 21:

Noise disturbance during construction should be limited to allowable hours per City of London By-law.

7.2.5 Landowner(s) Education

Recommendation 22:

Homeowners should be provided the "Living with Natural Areas" brochure published by UTRCA (2005) based on the *Living with Natural Areas - A Guide for Citizens of London* document. This

brochure [Appendix H] outlines the impacts of various encroachment activities (ex: use of fertilizers, creation of trails, disposal of yard waste, introduction of invasive species, etc.) and ways homeowners can reduce their impacts on adjacent natural areas.

7.3 Monitoring Plan

Mitigation and compensation measures recommended in this EIS aim to minimize and compensate for the direct and indirect impacts to significant natural heritage features and functions. The monitoring plan is recommended to document the implementation of the mitigation and compensation measures during construction and post-construction.

The monitoring plan will be 2-phase and will consist of a construction monitoring plan and a long-term post-construction plan. The construction monitoring plan will monitor for construction-related impacts, document successes or deficiencies of the implemented mitigation measures and provide guidance on remedial actions for circumstances when mitigation is not successful [e.g., Erosion and Sedimentation Control (ESC) measures]. This plan should continue from clearing and grubbing through to home construction until grounds adjacent to natural features are vegetated and stabilized. Reports should be made available to the UTRCA and City design services staff.

Long-term post-construction monitoring shall evaluate the success of the proposed mitigation measures. Monitoring should be undertaken at Year 1 of buffer planting (e.g., plant warranty) to document success of seed germination and cover, and at Year 3 to document plant establishment and growth. This plan should include remedial actions that are triggered if effects exceed pre-determined thresholds. Recommendations for monitoring are:

- Vegetation monitoring in the naturalized OS4 buffer should be completed for two years after planting to document compliance with the plans (e.g., the correct seed mix was used), and establishment of planted material. Implementation of adaptive management to correct deficiencies.
- Adaptive management strategies such as supplemental plantings, and/or control of non-native invasive species. Adaptive management may be triggered by poor survival/germination of seed mix (80% natural groundcover is target) and the presence of unacceptable non-native and invasive species.
- Monitor for tree damage post-construction of the single-family home. Consult a certified arborist if damage has occurred.

Monitoring requirements are restated in the Environmental Management Plan [Appendix I].

7.4 UTRCA Regulation

UTRCA regulates a portion of the Subject Lands under Ontario Regulation 157/06 based on UTRCA regulation mapping (UTRCA, 2022). The regulation area is associated with the flooding and erosion hazard for the Loveless Municipal Drain. No development or site alteration is proposed within the regulated areas, so no Section 28 Permit Application will be required.

7.5 Net Effects

Table 5, below, summarizes potential impacts to natural heritage features and functions as well as proposed mitigation or avoidance measures.

Table 5: Net Effects of the Proposed Development

Source of Impact	Affected Feature	Predictions of Impact	Mitigation Strategy	Net Effects	Recommendations for Management and Monitoring
Artificial Lighting	OS4 Zone (Community 2, Drain)	Low impacts expected - residential lights	Adding residential lighting from one house where one home already previously exists is unlikely to significantly impact wildlife species.	No net effect	None
Litter and Garbage	OS4 Zone (Community 2, Drain)	Low impacts expected - garbage/litter from two residential homes	Homeowner brochure (UTRCA, 2005) to discourage encroachment.	No net effect	Continuing education.
Creation of new trails	OS4 Zone (Community 2, Drain)	Low impacts expected - ad-hoc trails may trample ground cover or transport invasive species	Homeowner brochure (UTRCA, 2005) to discourage encroachment; maintenance of agricultural access may reduce the potential for informal trail development.	No net effect	Continuing education.
Tree damage (limb damage, soil compaction, changes in grade)	OS4 Zone (Community 2, Drain)	Low impacts expected - limb removal	Community 2 dripline is protected in the proposed OS4 zone; refer to TPP (MTE, 2022).	No net effect	Monitor for tree damage during and post-construction of the single-family home. Consult a certified arborist if damage has occurred.
Increased noise	OS4 Zone (Community 2, Drain)	Low impacts expected - only common faunal species present - residential home currently exists on the Subject Lands	Low level noise from adjacent two houses will not impact wildlife; noise disturbance during construction should be limited to allowable hours per City of London By-law.	No net effect	Residential by-laws restrict excessive noise.
Disturbance to wildlife during construction	OS4 Zone (Community 2, Drain)	Low impacts expected - disruption to activities of nearby wildlife will be temporary	Restrict timing of vegetation removal to outside breeding and sensitive periods for birds and other wildlife; make workers aware of potential incidental encounters and necessary protections.	No net effect	Disturbance is temporary and minimal for species within the retained OS4 zone. Monitoring and reporting protocols for incidental wildlife encounters should be followed.

Source of Impact	Affected Feature	Predictions of Impact	Mitigation Strategy	Net Effects	Recommendations for Management and Monitoring
Decreased infiltration and increased run-off	OS4 Zone (Community 2, Drain)	Low impacts expected - impervious surfaces decrease infiltration	Vegetated OS4 zone including minimum 30 m buffer from the high-water mark of the Loveless Municipal Drain; two single family home replacing one home is not expected to have a significant impact on infiltration rates.	No net effect	None.
Increased erosion	OS4 Zone (Community 2, Drain)	Low impacts expected	Vegetated OS4 zone including minimum 30 m buffer from the high-water mark of the Loveless Municipal Drain; no development proposed within the UTRCA regulated area; sediment and erosion control fencing installed at development limit during construction.	No net effect	Monitor sediment and erosion control fencing.
Increased nutrient, pesticide, chemicals, and sediment	OS4 Zone (Community 2, Drain)	Low impacts expected - The ESA may receive regular seasonal nutrient and sediment loads	Vegetated OS4 zone including minimum 30 m buffer from the high-water mark of the Loveless Municipal Drain; sediment and erosion control plan during construction; limit the use of commercial fertilizers and other chemical applications; consider the use of grass varieties which are hardier; limit the use of salts or other additives for ice and snow control; change in land use from agricultural (regular application of fertilizers and other chemicals) to single family residential may be a positive impact.	No net effect	Monitor sediment and erosion control fencing.
Domestic animals	OS4 Zone (Community 2, Drain)	Medium impacts expected - off-leash dogs can trample plants - outdoor cats can kill wildlife	Homeowner brochure (UTRCA, 2005) to discourage encroachment of pets.	No net effect	Continuing education.
Introduced invasive plants	OS4 Zone (Community 2, Drain)	Low impacts expected - inappropriate disposal of lawn/gardening waste	Homeowner brochure (UTRCA, 2005) to discourage encroachment and inappropriate disposal practices.	No net effect	Continuing education.
Air pollution	OS4 Zone (Community 2, Drain)	No impacts expected	Single family home will not generate substantial air pollution in the region.	No net effect	None.

Source of Impact	Affected Feature	Predictions of Impact	Mitigation Strategy	Net Effects	Recommendations for Management and Monitoring
Fire Hazards	OS4 Zone (Community 2, Drain)	Low impacts expected - potential for recreational gatherings	Homeowner brochure (UTRCA, 2005) to discourage encroachment.	No net effect	Continuing education.
Use of heavy machinery – oil, gasoline, grease spill	OS4 Zone (Community 2, Drain), SGRA, HVA	Low impacts expected - machinery can leak or refueling can generate spills	Establish storage/refueling area away from OS4 Zone; BMPs should be followed for fuel handling, storage, and onsite equipment maintenance activities to minimize the risk of contaminant releases as a result of the proposed construction activities; contractors working at the site should ensure that construction equipment is in good working order; equipment operators should have spill-prevention kits, where appropriate.	No net effect	None.

8.0 Summary and Conclusions

The Proponent (Peter Drankowsky) is proposing the severance of the Legal Parcel located at 1176 Crumlin Sideroad, London, ON into three Parcels [Figure 8]. The existing home will remain, and one new single-family home will be constructed on Parcel 2. Parcel 3 will continue to be actively farmed.

Based on the application of the 2021 EMGs and discussion with the City of London, this Focused EIS has proposed an OS4 Zone defined by a 30 m buffer from the high-water mark of the Loveless Municipal Drain and the contiguous staked dripline of woodland Community 2 (FOD7). This vegetated OS4 zone [Figure 9] will protect the natural heritage features associated with the Loveless Municipal Drain and surrounding woodland, including a Significant Valleyland, candidate SWH, indirect fish habitat, and potential habitat for endangered bats. This Focused EIS has also set out recommendations to improve the effectiveness of the buffer through measures such as naturalized planting within the buffer and erosion and sediment control measures.

Provided the recommendations in this Focused EIS are followed; it is our opinion that the proposed development can proceed.

MTE seeks comments from the City of London and the UTRCA with respect to the contents of the Focused EIS. Formal comments can be submitted in writing to MTE on behalf of the client. Should you wish to clarify any questions or require additional information as part of the review of this Focused EIS, do not hesitate to contact us.

All of which is respectfully submitted,

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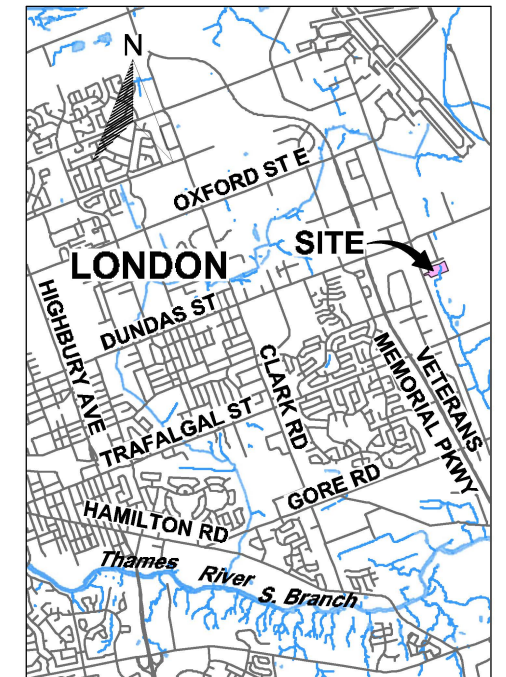
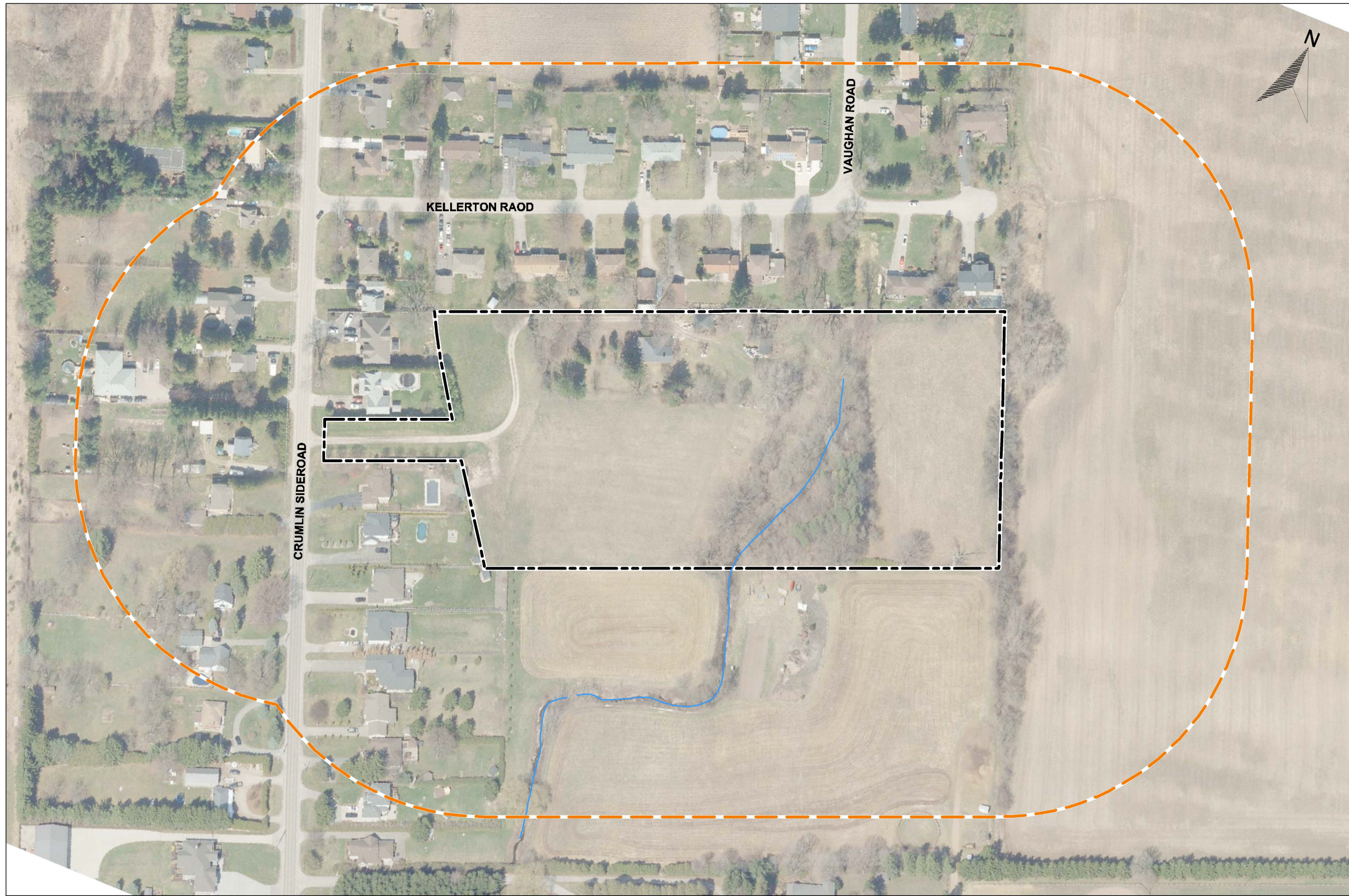
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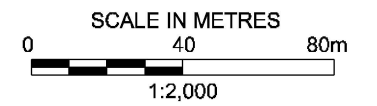
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Figures



KEY PLAN



LEGEND

- SUBJECT LANDS
- STUDY AREA
(120m Buffer from Subject Site)

REFERENCES

CITY OF LONDON OPEN DATA SET, 2021.

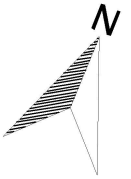
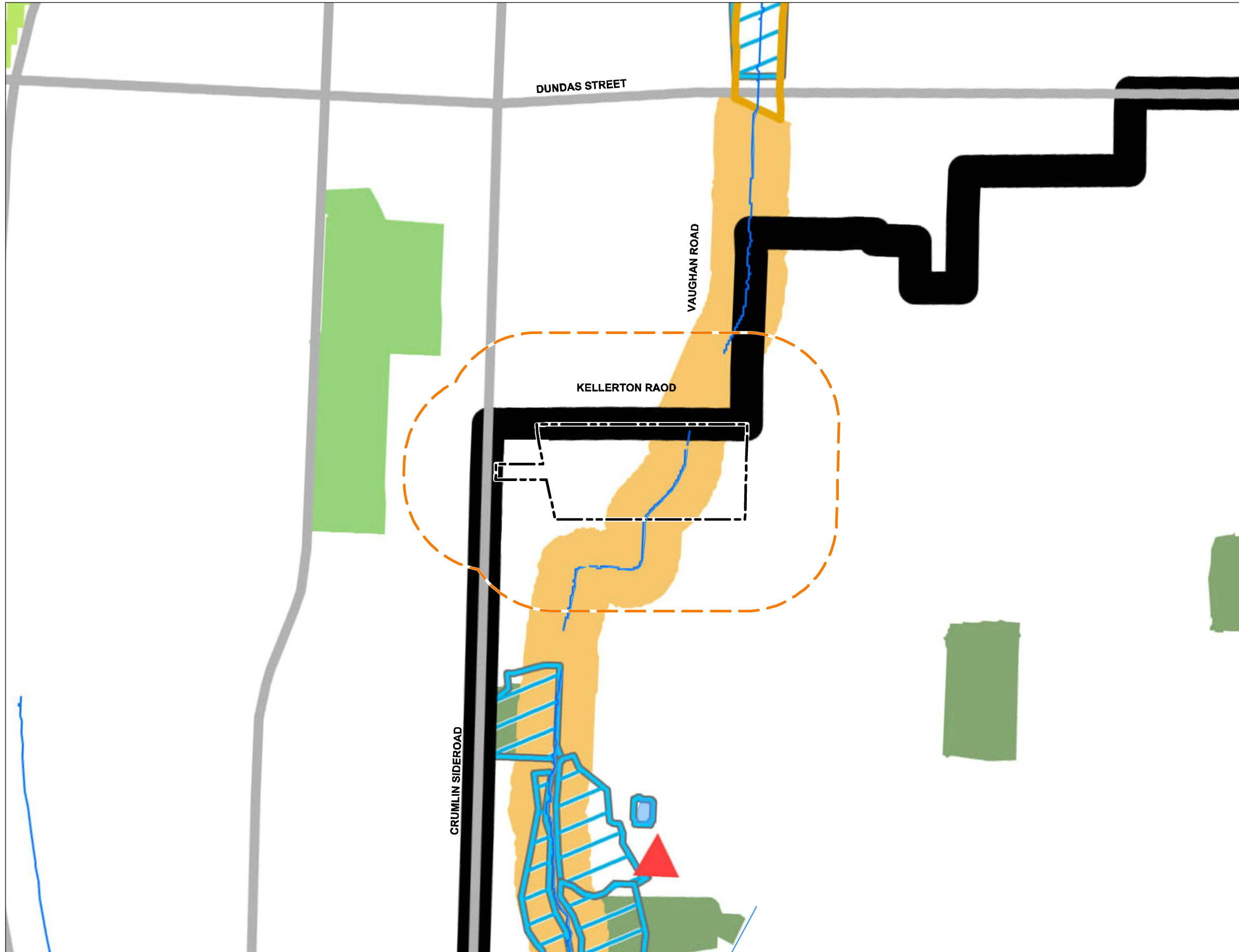
NOTES

THIS FIGURE IS SCHEMATIC ONLY AND TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.
 ALL LOCATIONS ARE APPROXIMATE.

MTE
Engineers, Scientists, Surveyors

PROJECT		ENVIRONMENTAL IMPACT STUDY 1176 CRUMLIN SIDEROAD LONDON, ONTARIO	
TITLE			
PROJECT LOCATION			
Drawn	DCH	Scale	AS SHOWN
Checked		Project No.	51594-100
Date	Jan 12/23	Rev No.	0

FIGURE 1



LEGEND

- SITE BOUNDARY
- STUDY AREA (120m Buffer from Subject Site)
- POTENTIAL NATURALIZATION AREA
- UNEVALUATED WETLAND
- SIGNIFICANT VALLEYLAND
- SIGNIFICANT WOODLAND
- STREET
- URBAN GROWTH BOUNDARY
- WATER BODY
- WATERCOURSE/POND
- WOODLAND

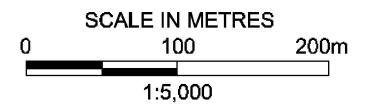
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CITY OF LONDON OPEN DATA SET, 2021; AND CITY OF LONDON, MAP 5 - NATURAL HERITAGE, MAY 28 - 2021.

NOTES

THIS FIGURE IS SCHEMATIC ONLY AND TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

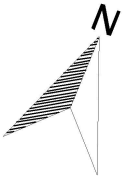
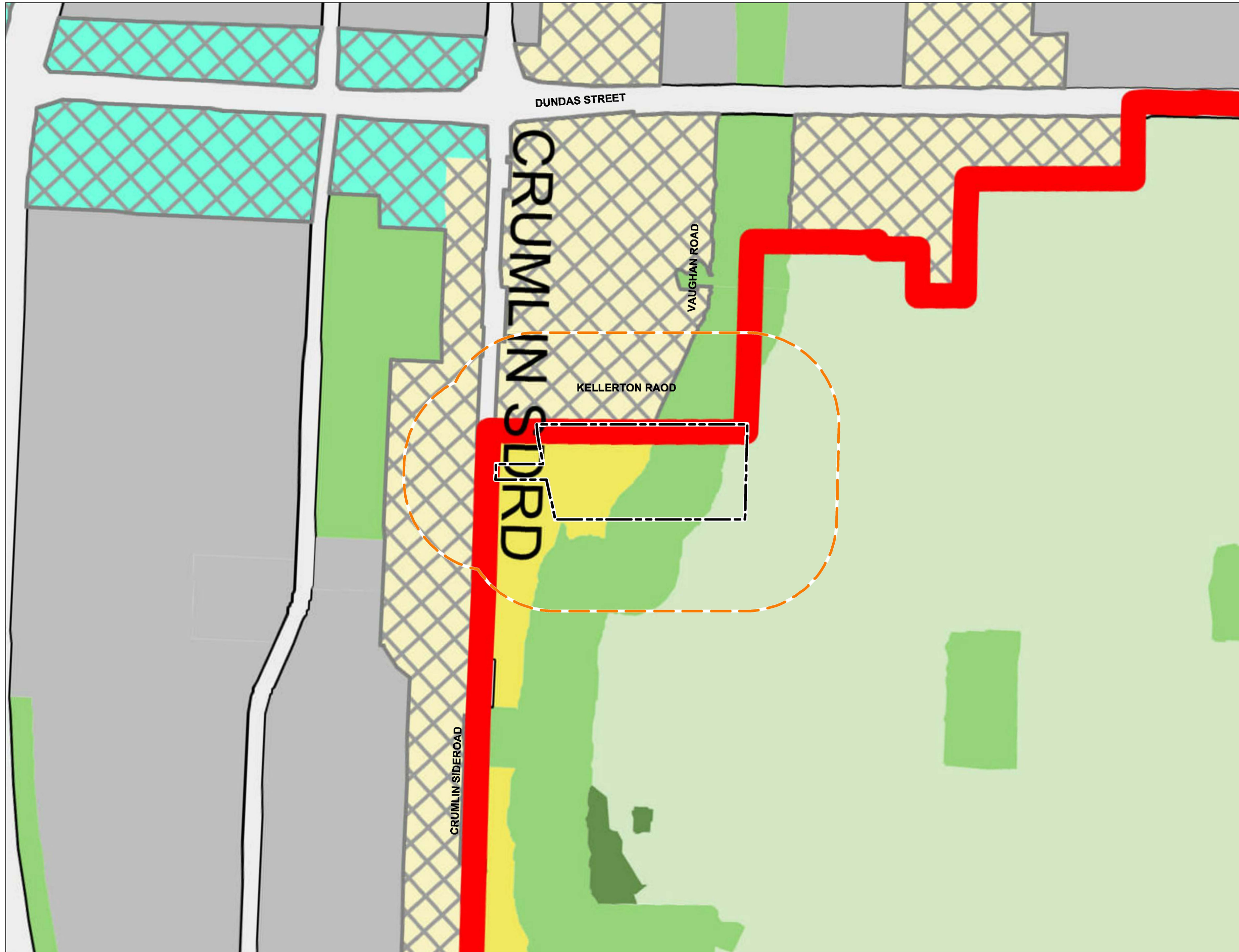


PROJECT
ENVIRONMENTAL IMPACT STUDY
 1176 CRUMLIN SIDEROAD
 LONDON, ONTARIO

TITLE
NATURAL HERITAGE

Drawn	DCH	Scale	AS SHOWN
Checked		Project No.	51594-100
Date	Jan 12/23	Rev No.	0

FIGURE 2



LEGEND

- SITE BOUNDARY
- - - STUDY AREA (120m Buffer from Subject Site)
- XXXXX AREA WITHHELD FROM LPAT APPROVAL
- ENVIRONMENTAL REVIEW
- FARMLAND
- GREEN SPACE
- LIGHT INDUSTRIAL
- NEIGHBOURHOOD
- RURAL NEIGHBOURHOOD
- STREET
- URBAN CORRIDOR
- URBAN GROWTH BOUNDARY

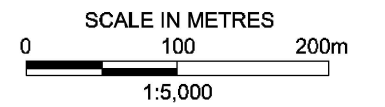
REFERENCES

CITY OF LONDON OPEN DATA SET, 2021; AND CITY OF LONDON, MAP 5 - NATURAL HERITAGE, MAY 28 - 2021.

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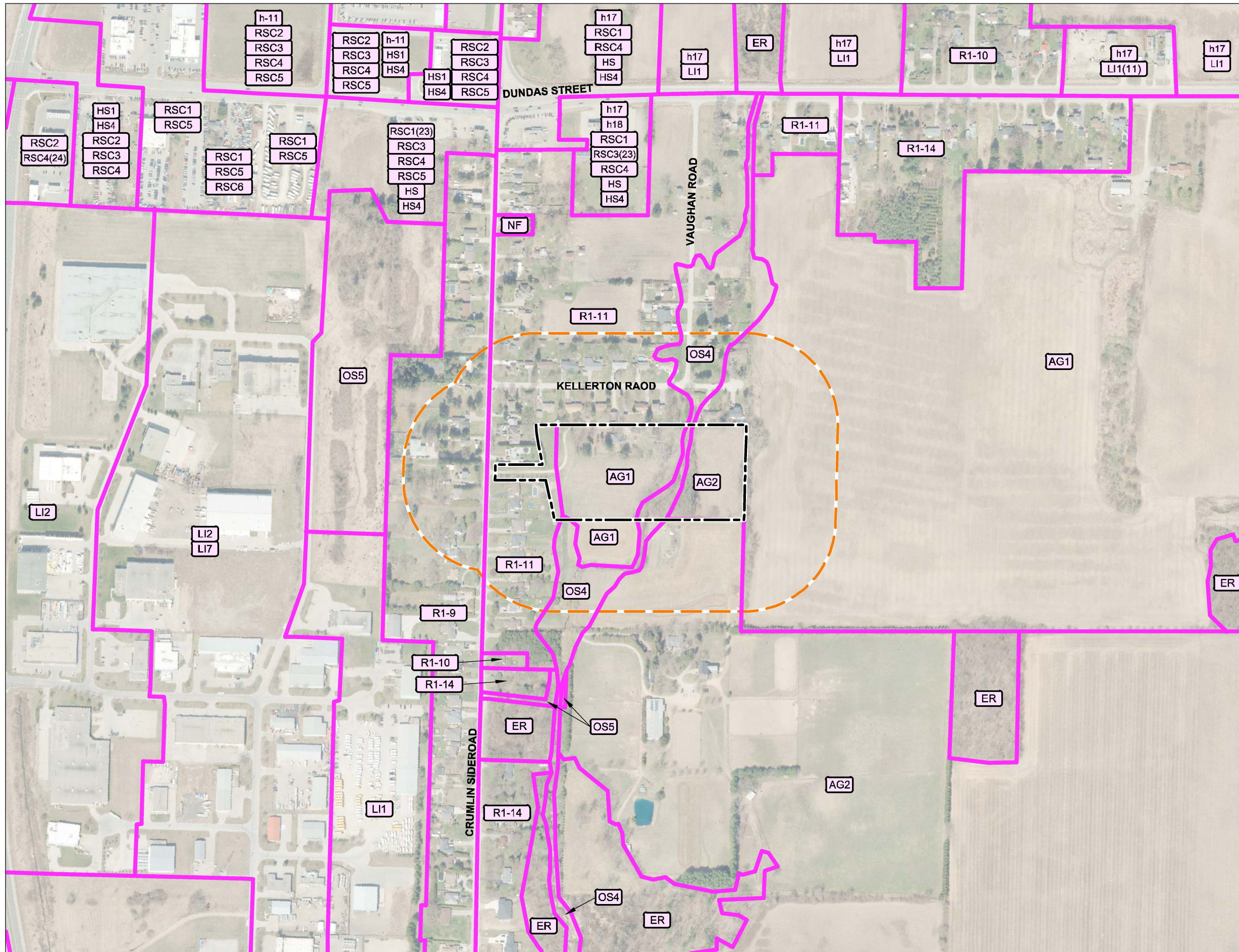


PROJECT
ENVIRONMENTAL IMPACT STUDY
1176 CRUMLIN SIDEROAD
LONDON, ONTARIO

TITLE
PLACE TYPES

Drawn	DCH	Scale	AS SHOWN
Checked		Project No.	51594-100
Date	Jan 12/23	Rev No.	0

FIGURE 3



LEGEND

- SITE BOUNDARY
- - - STUDY AREA (120m Buffer from Subject Site)
- AG** AGRICULTURAL ZONE
- ER** ENVIRONMENTAL REVIEW ZONE
- h** HOLDING ZONE PROVISION
- HS** HIGHWAY SERVICE COMMERCIAL ZONE
- LI** LIGHT INDUSTRIAL ZONE
- OS** OPEN SPACE ZONE
- R** RESIDENTIAL ZONE
- RO** RESTRICTED OFFICE ZONE
- RSC** RESTRICTED SERVICE COMMERCIAL ZONE

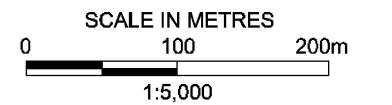
REFERENCES

CITY OF LONDON OPEN DATA SET, 2021; AND CITY OF LONDON, MAP 5 - NATURAL HERITAGE, MAY 28 - 2021.

NOTES

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PROJECT			
ENVIRONMENTAL IMPACT STUDY 1176 CRUMLIN SIDEROAD LONDON, ONTARIO			
TITLE			
ZONING			
Drawn	DCH	Scale	AS SHOWN
Checked		Project No.	51594-100
Date	Jan 12/23	Rev No.	0

FIGURE 4

Figure 5: UTRCA Regulated Areas (UTRCA, 2022)



Regulated Areas

Regulation under s.28 of the *Conservation Authorities Act*
 Development, interference with wetlands, and alterations
 to shorelines and watercourses. O.Reg 157/06, 97/04.

Legend

- UTRCA Jurisdiction Watershed
- UTRCA Watershed (2017 LiDAR)
- Assessment Parcel (MPAC)
- Watercourse (UTRCA)**
 - Open
 - Tiled
- Middlesex NHSS Woodland (2014)**
 - Candidate for Ecologically Important
 - Ecologically Important
 - Significant Ecologically Important
- Wetlands (MNR)**
 - Evaluated-Provincial
 - Evaluated-Other
 - Not Evaluated
- Regulated Wetland
- Flooding Hazard Limit
- Erosion Hazard Limit
- Regulation Limit 2021

The mapping is for information screening purposes only, and shows the approximate regulation limits. The text of Ontario Regulation 157/06 supersedes the mapping as represented by this data layer. This mapping is subject to change. A site specific determination may be made by the UTRCA.

This layer is the approximate limit for areas regulated under Ontario Regulation 157/06 - Upper Thames River Conservation Authority: Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, which came into effect May 4, 2006.

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This map is not a substitute for professional advice. Please contact UTRCA staff for any changes, updates and amendments to the information provided.

This document is not a Plan of Survey.

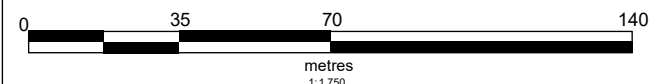
Sources: Base data, Aerial Photography used under licence with the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry Copyright © Queen's Printer for Ontario; City of London.

Notes:
1176 Crumlin Sideroad, London (2022)

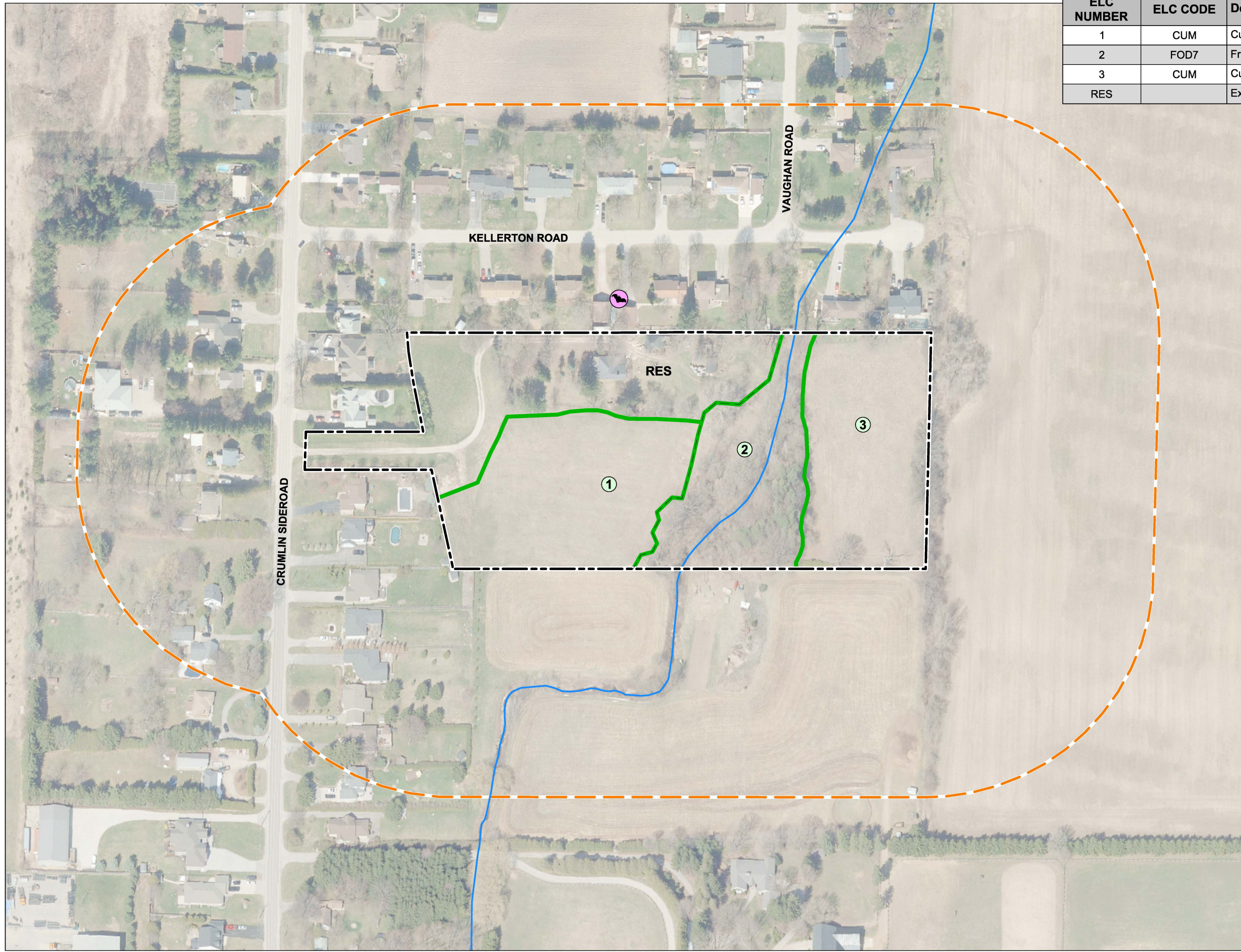
Created By: MS August 22, 2022

* Please note: Any reference to scale on this map is only appropriate when it is printed landscape on legal-sized (8.5" x 14") paper.

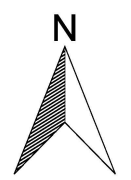
71



UPPER THAMES RIVER
CONSERVATION AUTHORITY
 Copyright ©2022 UTRCA.



ELC NUMBER	ELC CODE	Description
1	CUM	Cultural Meadow (0.88ha)
2	FOD7	Fresh-Moist Lowland Deciduous Forest Ecosite (0.65ha)
3	CUM	Cultural Meadow (0.78ha)
RES		Existing Residential



LEGEND

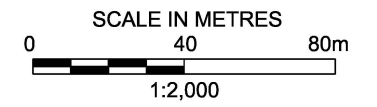
- SITE BOUNDARY
- STUDY AREA (120m Buffer from Subject Site)
- WATERCOURSE (UTRCA)
- WOODLAND DRIPLINE (AGM Survey)
- ① VEGETATION COMMUNITY
- CANDIDATE MATERNITY ROOST TREE

REFERENCES

CITY OF LONDON OPEN DATA SET, 2021; UPPER THAMES RIVER CONSERVATION AUTHORITY (UTRCA), WATERCOURSE NETWORK; AND AGM PLAN OF SURVEY, FILE No. DORN-218-2h, PLAN No. L-5857, NOVEMBER 4 - 2022.

NOTES

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 ALL LOCATIONS ARE APPROXIMATE.



PROJECT		ENVIRONMENTAL IMPACT STUDY 1176 CRUMLIN SIDEROAD LONDON, ONTARIO	
TITLE			
VEGETATION COMMUNITIES			
Drawn	DCH	Scale	AS SHOWN
Checked		Project No.	51594-100
Date	Jan 12/23	Rev No.	0

FIGURE 6

Figure 7: Site Severance Plan (February 8, 2023)

ZONING DATA CHART

RETAINED LAND (PARCEL 1)		
ITEM	REQUIRED	PROPOSED
1	2,000.0	10,314.9
2	30.0	10.0*
3	8.0	153.58
4	57.9	45.95
5	8.0	12.0
6	50	89.9
7	50	3.3
8	12	<12.0
9	25	6.8
10	1	1

*SPECIAL PROVISION REQUIRED

ZONING DATA CHART

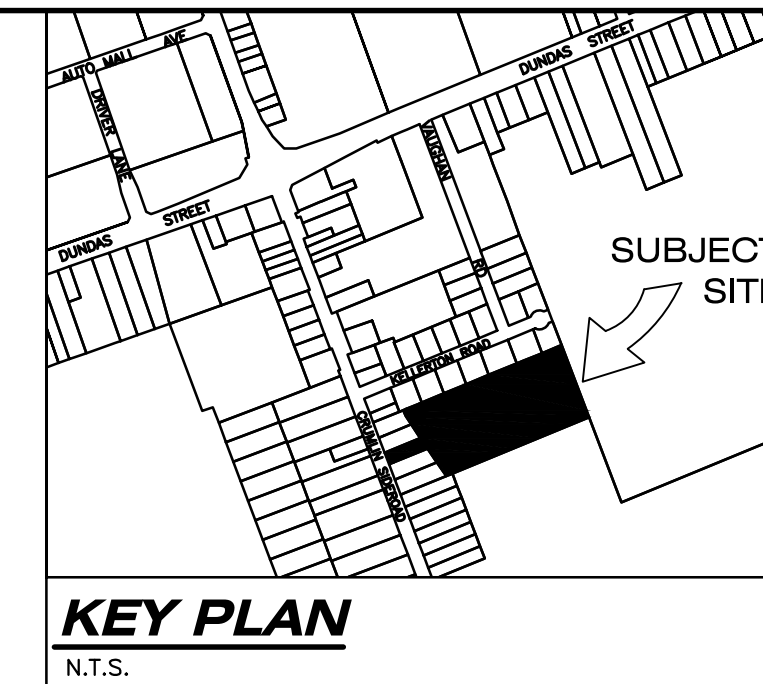
SEVERED LAND (PARCEL 2)		
ITEM	REQUIRED	PROPOSED
1	2,000.0	7,387.1
2	30.0	10.0*
3	8.0	N/A
4	47.1	N/A
5	8.0	N/A
6	50	98.0
7	50	N/A
8	12	N/A
9	25	2.0
10	1	1

*SPECIAL PROVISION REQUIRED

ZONING DATA CHART

SEVERED LAND (PARCEL 3)				
ITEM	REQUIRED	PROPOSED	REQUIRED	PROPOSED
1	4,000	10,072.8	40 (ha)	6,221.1m ² *
2	15.0	0.0*	200.0	0.0*
3	8.0	N/A	15.0	N/A
4	7.0	N/A	15.0	N/A
5	6.0	N/A	15.0	N/A
6	20.0	100	N/A	N/A
7	10.0	N/A	20.0	N/A
8	12.0	N/A	12.0 (RES)	N/A
			15.0 (OTHERS)	N/A

*SPECIAL PROVISION REQUIRED



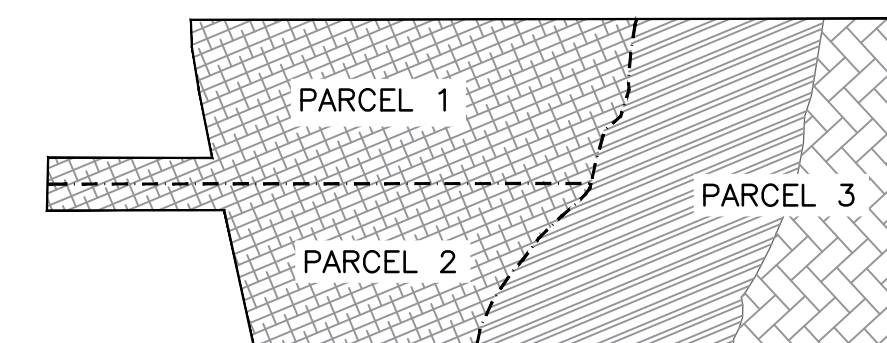
LEGAL INFORMATION

PART OF
PLAN 17 PT LOTS 15 & 16
RP 33R13539 PARTS 3,4,7-12, 15, 16, 19-21
IN THE
CITY OF LONDON
COUNTY OF MIDDLESEX

LEGEND

- SITE BOUNDARY
- WATERCOURSE (UTRCA)
- HIGH WATER MARK (AGM Survey)
- WOODLAND DRIPLINE (AGM Survey)
- LIMIT OF NATURAL HERITAGE BUFFER (OS4 ZONE)
- NATURALIZATION AREA
- UTRCA REGULATED AREA
- PARCEL SEVERANCE LINE
- EXISTING AGRICULTURAL ACCESS
- PROPOSED EASEMENTS

PROPOSED ZONING MAP



- PROPOSED R1-14(X) ZONE
- PROPOSED OS4(X) ZONE
- PROPOSED AG1(X) ZONE
- PROPOSED SEVERANCE LINE

REFERENCE DOCUMENTS:

- Plan of Survey LOTS 15 AND 16, REGISTERED PLAN NO 17(C), AGM, L-587, DORN-218-2 FEB2, 2023.
- MTE Environmental Impact Study - Additional Mitigation Measures Figure 8, 51594-100-R02008 - EIS report CAD drawing.dwg
- City of London Open Source Data

METRIC - DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.



AS CONSTRUCTED SERVICES	COMPLETION	No.	REVISIONS	D/M/Y	BY	CONSULTANT
	DESIGN	1	INITIAL DESIGN	23/03/22	JR	
	DRAWN	2	REVISED BASED ON SURVEY AAND EIS INFO	04/01/23	SC	
	CHECKED	3	REVISED BASED ON LEGAL SURVEY FROM AGM	08/02/23	SC	
	APPROVED					
	DATE					
	CAD					

STRIK BALDINELLI MONIZ
 PLANNING - CIVIL - STRUCTURAL - MECHANICAL - ELECTRICAL
 1599 Adelaide St. N, Unit 301, London, Ontario, N5X 4E8
 Tel: (519) 471-6667 Fax: (519) 471-0034
 Email: sbm@sbmild.ca

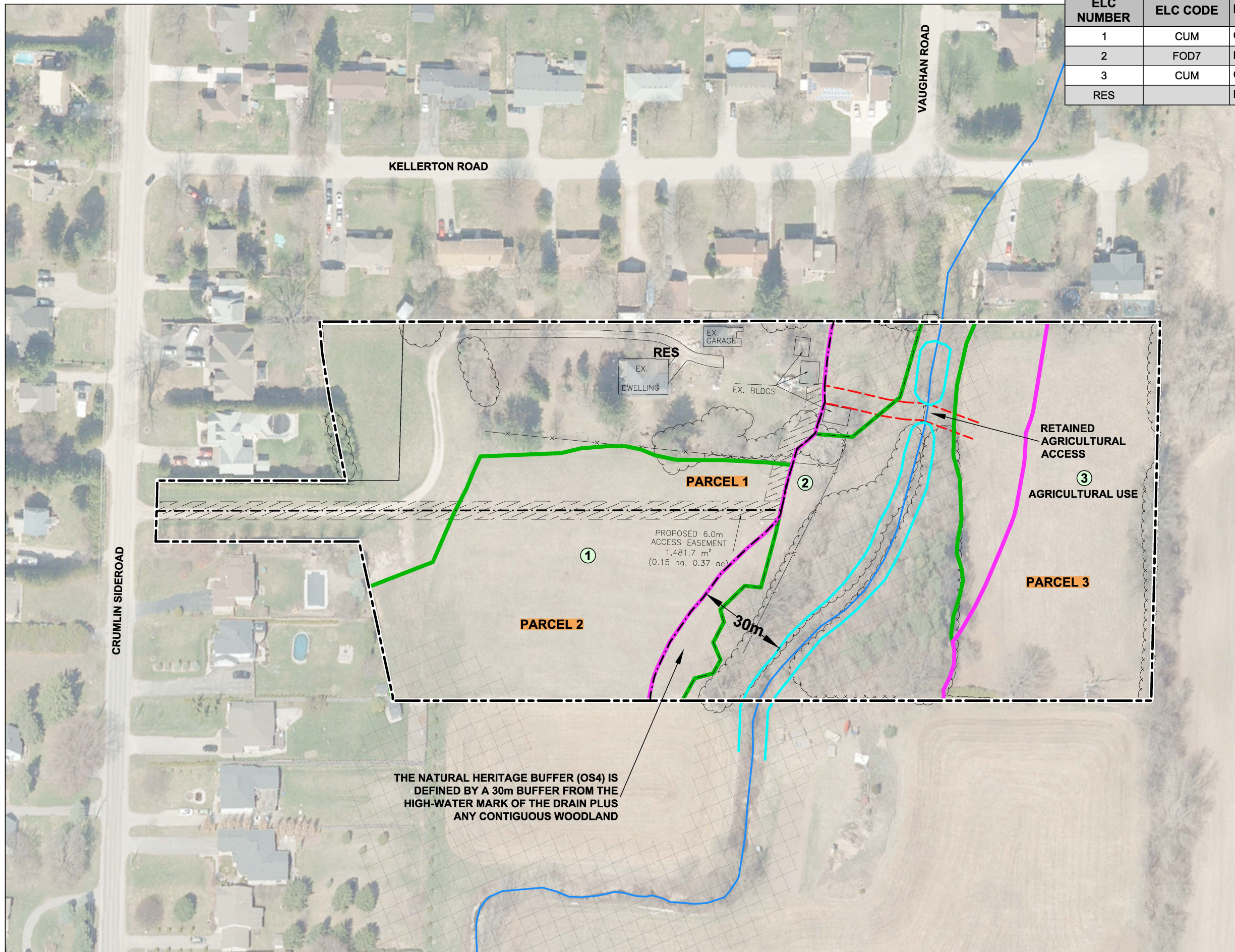
ENGINEER'S STAMP
PRELIMINARY NOT FOR CONSTRUCTION

CLIENT
FINE HOME DESIGN
 1885 WHITNEY STREET
 LONDON, ON
 N5W 2W6

SCALE
 1:500
 5.0 0 10.0m

TITLE
CONCEPT SEVERANCE SKETCH
SEVERANCE
 1176 CRUMLIN ROAD
 LONDON, ON.

PROJECT No.
SBM-20-3512
 SHEET No.
CP1
 PLAN FILE No.
 —



THE NATURAL HERITAGE BUFFER (OS4) IS DEFINED BY A 30m BUFFER FROM THE HIGH-WATER MARK OF THE DRAIN PLUS ANY CONTIGUOUS WOODLAND

PROPOSED 6.0m ACCESS EASEMENT
1,481.7 m²
(0.15 ha, 0.37 ac)

ELC NUMBER	ELC CODE	Description
1	CUM	Cultural Meadow (0.88ha)
2	FOD7	Fresh-Moist Lowland Deciduous Forest Ecosite (0.65ha)
3	CUM	Cultural Meadow (0.78ha)
RES		Existing Residential



LEGEND

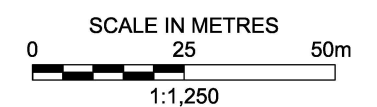
- SITE BOUNDARY
- WATERCOURSE (UTRCA)
- WOODLAND DRIPLINE (AGM Survey)
- HIGH WATER MARK (AGM Survey)
- UTRCA REGULATED AREA
- VEGETATION COMMUNITY
- NATURAL HERITAGE BUFFER (OS4 ZONE)
- PARCEL SEVERANCE LINE

REFERENCES

CITY OF LONDON OPEN DATA SET, 2021; UPPER THAMES RIVER CONSERVATION AUTHORITY (UTRCA), WATERCOURSE NETWORK; AGM PLAN OF SURVEY, FILE No. DORN-218-2h, PLAN No. L-5857, NOVEMBER 4 - 2022; AND STRIK BALDINELLI MONIZ, SEVERANCE PLAN, PROJECT No. SBM-20-3512, SHEET No. CP1, FEBRUARY 8 - 2023.

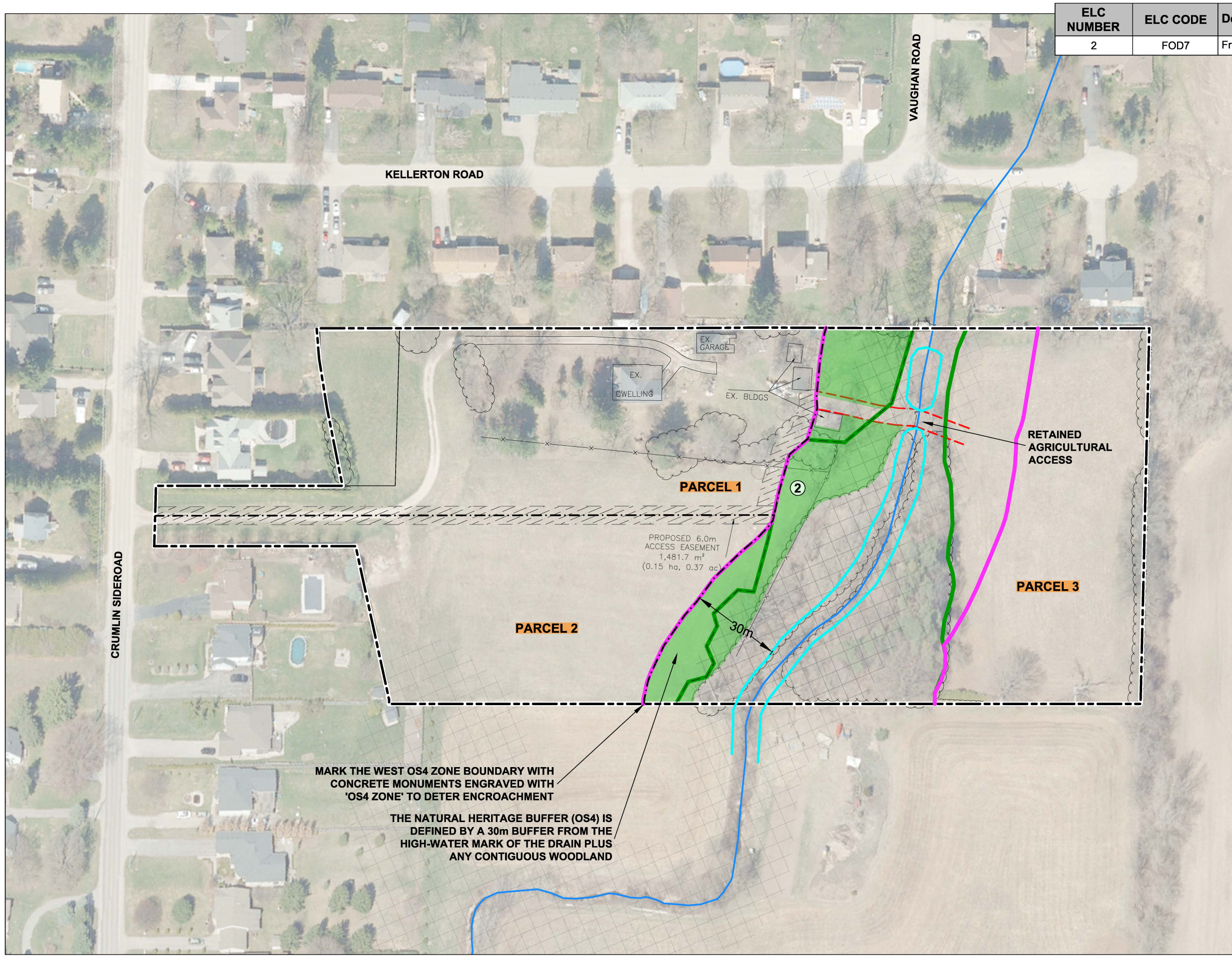
NOTES

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PROJECT		ENVIRONMENTAL IMPACT STUDY 1176 CRUMLIN SIDEROAD LONDON, ONTARIO	
TITLE		SITE SEVERANCE PLAN OVERLAY	
Drawn	DCH	Scale	AS SHOWN
Checked		Project No.	51594-100
Date	Feb 8/23	Rev No.	0

FIGURE 8



ELC NUMBER	ELC CODE	Description
2	FOD7	Fresh-Moist Lowland Deciduous Forest Ecosite (0.65ha)



LEGEND

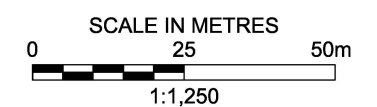
- SITE BOUNDARY
- WATERCOURSE (UTRCA)
- WOODLAND DRIPLINE (AGM Survey)
- HIGH WATER MARK (AGM Survey)
- UTRCA REGULATED AREA
- VEGETATION COMMUNITY
- NATURAL HERITAGE BUFFER (OS4 ZONE)
- NATURALIZATION AREA
- PARCEL SEVERANCE LINE

REFERENCES

CITY OF LONDON OPEN DATA SET, 2021;
 UPPER THAMES RIVER CONSERVATION AUTHORITY (UTRCA), WATERCOURSE NETWORK;
 AGM PLAN OF SURVEY, FILE No. DORN-218-2h, PLAN No. L-5857, NOVEMBER 4 - 2022; AND STRIK BALDINELLI MONIZ, SEVERANCE PLAN, PROJECT No. SBM-20-3512, SHEET No. CP1, FEBRUARY 8 - 2023.

NOTES


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 ALL LOCATIONS ARE APPROXIMATE.



MARK THE WEST OS4 ZONE BOUNDARY WITH CONCRETE MONUMENTS ENGRAVED WITH 'OS4 ZONE' TO DETER ENCROACHMENT

THE NATURAL HERITAGE BUFFER (OS4) IS DEFINED BY A 30m BUFFER FROM THE HIGH-WATER MARK OF THE DRAIN PLUS ANY CONTIGUOUS WOODLAND

PROPOSED 6.0m ACCESS EASEMENT
 1,481.7 m²
 (0.15 ha, 0.37 ac)



PROJECT
ENVIRONMENTAL IMPACT STUDY
 1176 CRUMLIN SIDEROAD
 LONDON, ONTARIO

TITLE
ADDITIONAL MITIGATION MEASURES

Drawn	DCH	Scale	AS SHOWN
Checked		Project No.	51594-100
Date	Jan 13/23	Rev No.	0

FIGURE 9

Appendix A

Record of Pre-Application Consultation



RECORD OF PRE-APPLICATION CONSULTATION

The following form is to be completed and signed off at/following the Pre-application Consultation Meeting (PACM).

Date: January 18, 2022

TO: Simona Rasanu, SBM

FROM: Nancy Pasato

RE: 1176 Crumlin Sideroad

ATTENDEES: Nancy Pasato, Senior Planner – Planning Implementation, Planning and Development, City of London
Simona Rasanu, SBM, Agent
Laverne Kirkness, SBM, Agent
Shane Butari, Long Range Planning, Research & Ecology
Emily Williamson, Long Range Planning, Research & Ecology

PLANNING APPLICATION TEAM: Nancy Pasato, Senior Planner (npasato@london.ca); Amanda Lockwood, Urban Designer (alockwood@london.ca); Brent Lambert, Senior Engineering Technologist (blambert@london.ca); Laura Dent, Heritage Planner (ldent@london.ca), Shane Butari, Ecologist (sbutnari@london.ca), Craig Smith, Senior Planner, Parks Planning and Design (crsmith@london.ca), Lisa McNiven, Landscape Architect (lmcniven@london.ca), Stefanie Pratt, UTRCA (pratts@thamesriver.on.ca)

City staff reviewed your Proposal Summary submitted December 23, 2021 at an Internal Review Meeting on January 13, 2022. The following form summarizes a preliminary list of issues to be considered during the processing of your application. We have also identified the initial material submissions (Studies, Reports, Background or Information) that must be submitted along with the completed application form, required fees and this Record of Pre-Application Consultation Form before your application will be accepted as complete for opening and processing.

Proposed Development

- Proposal: The Subject Site is proposed to be divided into three parcels and, with the construction of two single family detached dwellings on two of the three parcels.
- Parcel 1 would have a net area of 1.39 ha and a potential developable area (i.e., excluding the UTRCA regulated lands) of 1.13 ha; parcel 2 would have a net area of 1.18 ha and a potential developable area (i.e., excluding UTRCA regulated lands) of 0.77 ha; and parcel 3 would have a net area of 0.83 ha. The total potential developable area of parcel 1 and 2 lands (i.e., excluding UTRCA lands) would be 1.9 ha.
- Access to the two proposed houses from Crumlin Sideroad is proposed via separate driveways, approx. 10m wide, and a shared 3m wide easement. The shared easement would also provide access to the proposed parcel 3 lands at the rear of the Subject Site.
- The existing buildings/structures on the Subject Site would be demolished.
- London Plan Place Type: Rural Neighbourhood, Greenspace, Farmland Place Type on a Rural Connector
- London Plan Map 5 Natural Heritage: Significant Valleyland
- 1989 Official Plan Designation: Agriculture, Rural Settlement, and Open Space
- Current Zoning: R1-11, AG1, OS4 Zone

Major Issues Identified

- Official Plan amendment required to 1989 Official Plan for area designated as Agriculture that is within the Rural Neighbourhood Place – City initiated
- Rezoning required for Parcels 1 and 2. Zone should reflect size of lot(s) and size of private servicing entirely on parcel. Zone will need to include special provisions for lot frontage – EIS will also determine extent of R1 Zone vs. OS4 Zone
- Rezoning will also be required for agricultural parcel 3 (lands outside of urban growth area and open space) – special provision to remove ability to build house/structures on this parcel
- Fragmenting Open Space area not supported; any severance would need to maintain feature as a whole with one of the parcels – see UTRCA comments
- Existing access to rear agricultural lands is provided towards north end of the watercourse and is proposed to be relocated. UTRCA is encouraging applicant to keep access in same location – further discussion necessary
- MDS consideration – equestrian facility located (Eastern Equestrian) to the south in the Agriculture designation/Farmland Place Type – required as part of complete application, impact on development
- Scoped EIS will be required to determine appropriate buffer/setbacks for development – this will be reflected in zoning applied for development.
- Engineering suitability study to determine appropriateness/size/location of proposed private servicing/hydrogeological conditions
- Archaeological assessment required
- Tree preservation plan required – see landscape architect comments
- Vacant Land Condominium would permit more lots

Internal and External Comments

Urban Design:

- Consider retaining the parcel for future use that encompasses a more comprehensive and fulsome development for the site.

Engineering:

The following are required as part of a complete application:

- The Owner's Engineer will be required to submit a suitability study of the hydrogeological conditions that includes an assessment of sewage disposal system impacts. The assessment shall demonstrate that the site can adequately meet the requirements of MECP Procedure D-5-4.

The following items are to be considered during a future development application stage:

Transportation:

- A right-of-way dedication of 10.75 m from the centre line will be required along Crumlin Sideroad.
- Detailed comments regarding access design and location will be made through the Site Plan Application process.

Water:

- There is a 300 mm diameter municipal watermain located along Crumlin Sideroad.
- Each of the severed developable parcels will require an individual water service. A meter pit and check valve at property line will probably be required due to the distance from the road back to the proposed dwellings.

Wastewater:

- The subject lands are located outside of the Urban Growth Boundary for the City of London. There is no municipal sanitary sewer fronting or near the subject lands to service the subject lands.
- The applicant is to clarify whether the proposed lot sizes and proposed servicing are in keeping with the London Plan.

- The size and location of the septic systems and all required separation distances shall be to the satisfaction of the Building Control Division and in accordance with the Ontario Building Code (OBC).

Stormwater:

- The site is located within the UTRCA regulated area and therefore UTRCA approval/permits may be required, including confirmation as to required setbacks.
- There are no storm sewers currently established for the proposed site on Crumlin Sideroad. As per the Drainage By-Law, section 5.2, where no storm sewer is accessible the applicant shall provide a dry well or storm water retention system to meet water quality and quantity control which is certified by a Professional Engineer to the satisfaction of the City Engineer.
- Please note that any future development applications within subject lands that are not serviced by municipal water or wastewater systems may be subject to a suitability study of the hydrogeological conditions that includes an assessment of water supply and sewage disposal system impacts from the proposed development(s) associated with the site. If required, the hydrogeological assessment shall be prepared by a qualified professional and demonstrate, to the satisfaction of the City, that private water well(s) and private sewage disposal system(s) can be established that meet the appropriate standards and will not impact adjacent properties and/or natural heritage features.
- The open channel should be verified and the report/drawings are to demonstrate capacity, velocity, ponding limits and erosion thresholds of the channel, ensuring the safe conveyance of flows.
- The Developer shall be required to provide a Storm/Drainage Servicing Report demonstrating that the proper SWM practices will be applied to ensure on-site controls are designed to reduce/match existing peak flows from the 2 through 100 year return period storms and demonstrate safe conveyance of the 250-year event.
- Any proposed LID solutions should be supported by a Geotechnical Report and/or a Hydrogeological Assessment report prepared with a focus on the type(s) of soil present at the Site, measured infiltration rate, hydraulic conductivity (under field saturated conditions), and seasonal high ground water elevation. Please note that the installation of monitoring wells may be required to properly evaluate seasonal groundwater fluctuations. The report(s) should include geotechnical and hydrogeological recommendations of any preferred/suitable LID solution. All LID proposals are to be in accordance with Section 6 Stormwater Management of the Design Specifications & Requirements manual.
- The proposed land use of a medium/high density residential will trigger(s) the application of design requirements of Permanent Private Storm System (PPS) as approved by Council resolution on January 18, 2010.
- Comments provided as part of the parallel IPR submission that may impact the rezoning will also be required to be addressed.
- The subject lands are located in the Waubuno Subwatershed and is tributary to the Crumlin Drain. The Owner shall provide a Storm/Drainage Servicing Report demonstrating compliance with the SWM criteria and environmental targets identified in the Pottersburg Subwatershed Study that may include but not be limited to, quantity/quality control (80% TSS), erosion, stream morphology, etc.
- The Owner agrees to promote the implementation of SWM Best Management Practices (BMP's) within the plan, including Low Impact Development (LID) where possible, to the satisfaction of the City Engineer.
- The owner is required to provide a lot grading plan for stormwater flows and major overland flows on site and ensure that stormwater flows are self-contained on site, up to the 100 year event and safely conveys up to the 250 year storm event, all to be designed by a Professional Engineer for review.
- The Owner shall allow for conveyance of overland flows from external drainage areas that naturally drain by topography through the subject lands.
- Stormwater run-off from the subject lands shall not cause any adverse effects to adjacent or downstream lands.
- An erosion/sediment control plan that will identify all erosion and sediment control measures for the subject site and that will be in accordance with City of London

and MECP standards and requirements, all to the specification and satisfaction of the City Engineer. This plan is to include measures to be used during all phases of construction. These measures shall be identified in the Storm/Drainage Servicing Report.

- Additional SWM related comments will be provided upon future review of this site.

Heritage:

Note: This e-mail is to re-confirm that there is archaeological potential on the property at 1176 Crumlin Side Road. Previous comments remain from the Initial Proposal Review Meeting (January 20, 2021) regarding heritage requirement conditions of an application. See Proposal Review Meeting Summary and Record of Consultation (pp2-3).

Major issues identified

- Archaeological potential at 1176 Crumlin Side Road is identified on the City's 2018
- Archaeological Mapping, and soil disturbance is reasonably anticipated due to
- proposed development.
- Heritage planning – complete application requirements
- Archaeological Assessment Stage 1-2 – entire property considered, w/possible scoping

If an archaeological assessment has already been completed and received a compliance letter from the Ministry, the compliance letter along with the assessment report may be submitted for review to ensure they meet municipal requirements.

Archaeological Assessment

- The proponent shall retain a consultant archaeologist, licensed by the Ministry of Heritage, Sport, Tourism and Culture Industries under the provisions of the Ontario Heritage Act (R.S.O. 1990 as amended) to carry out a Stage 1-2 archaeological assessment on the property at 1176 Crumlin Side Road, and follow through with recommendations to mitigate, through preservation or resource removal and documentation, adverse impacts to any significant archaeological resources found (Stages 3-4).
- The consultant archaeologist is to consider the entire property, but may propose possible scoping which will be determined through consult with the heritage planner and approval from the Ontario Ministry of Heritage, Sport, Tourism, Culture Industries.
- The archaeological assessment must be completed in accordance with the most current Standards and Guidelines for Consulting Archaeologists, Ministry of Tourism, Culture and Sport.
- All archaeological assessment reports will to be submitted to the City of London once the Ministry of Heritage, Sport, Tourism and Culture Industries has accepted them into the Public Registry; both a hard copy and PDF format of archaeological reports should be submitted to Development Services.
- No soil disturbance arising from demolition, construction, or any other activity shall take place on the property prior to Development Services receiving the Ministry of Heritage, Sport, Tourism and Culture Industries compliance letter indicating that all archaeological licensing and technical review requirements have been satisfied. It is an offence under Section 48 and 69 of the Ontario Heritage Act for any party other than a consultant archaeologist to make alterations to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from an archaeological site.
- Should previously undocumented (i.e. unknown or deeply buried) archaeological resources be discovered, they may be a new archaeological site and therefore be 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 consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the Ontario Heritage Act. Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48(1) of the Ontario Heritage Act and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license.

- If human remains/or a grave site is discovered, the proponent or person discovering the human remains and/or grave site must cease alteration of the site immediately.
- The Funerals, Burials and Cremation Services Act requires that any person discovering human remains must immediately notify the police or coroner and the Registrar of Burial Sites, War Graves, Abandoned Cemeteries and Cemetery Closures, Ontario Ministry of Government and Consumer Services.

Parks Planning and Design:

- Parkland dedication is required in the form of cash in lieu, pursuant to By-law CP-9 and will be finalized at the time of consent.
- Required Parkland Dedication of Natural Heritage Feature maybe if deemed desirable and would be taken at a reduced rate pursuant to By-law CP-9

Long Range Planning – Ecology:

Major issues identified

- Natural Heritage Features on, and/or adjacent to the site have been identified on Map 5 of the London Plan or based on current aerial photo interpretation, including, but not limited to, Significant Valleylands, Fish Habitat and Other Vegetation Patches Larger Than 0.5 Hectares.
- The site falls within the Upper Thames Conservation Authority Regulation Limit and is subject to the *Conservation Authorities Act*. The proponent is encouraged to reach out to UTRCA to determine if permits are required.

Complete application requirements

- Focused EIS – entire property
 - Requirements for a full SLSR may be waived (i.e., waiving field study requirements) if the proponent is committed to providing a buffer that meets or exceeds the minimum ecological buffer distance required for the associated Natural Heritage Feature(s) in conjunction with other mitigation measures to protect all significant features associated with the subject lands. In this case, a buffer of 30m on each side of the high-water mark would be required surrounding the water feature associated with the Significant Valleylands feature contained within the subject land. Further information on the Focused EIS process can be found in Section 2.6.3 of the Environmental Management Guidelines (2021).
 - The severance lines currently proposed intersect and sever the natural heritage feature. In order for the natural heritage feature to remain consolidated, the severance line shall be revised to follow the Natural Heritage Feature buffer delineation on the west edge of the feature.
 - The proponent shall retain a consultant ecologist to carry out the Focused EIS assessment on the entire property at 1176 Crumlin Sdrd.
 - The Focused EIS must be completed in accordance with provincial guidelines and standards, including the Provincial Policy Statement, Natural Heritage Reference Manual, the London Plan and the Environmental Management Guidelines (2021).
- or**
- SLSR – entire property, demonstrating that the 30 m buffer is unnecessary due to feature absence or lack of feature sensitivity. Note that feature delineation and assessment could result in additional features or functions not currently included on Map 5 to be identified. In that case, the proponent shall follow through on recommendations to mitigate adverse impacts to any significant environmental features and functions that are found, demonstrating that no negative impacts to the natural heritage system will result from the proposed severance.

Notes

If a Focused EIS is pursued:

- The proponent must flag the desire to submit a Focused EIS as early in the process as possible, typically at the pre-consultation stage and obtain initial in principle agreement from the City.

- A Focused EIS scoping meeting shall be held between the proponent and a City Ecologist to review and confirm the Focused EIS plan and associated mapping prior to waiving the requirements of the full-EIS and associated studies. Other agencies may be included as appropriate. A site visit to stake feature line delineation and ensure that appropriate minimum buffer requirements have been satisfied is a requirement.
- No disturbance arising from demolition, construction, or any other activity shall take place on the property prior to Planning & Development Services receiving and approving the Focused EIS to ensure that all technical requirements have been satisfied.
- It is an offence under Section 10(1) of the *Endangered Species Act* to damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario list as an Endangered or Threatened species.

or

If an SLSR is pursued:

- A scoping meeting shall be held between the proponent and a City Ecologist to review and confirm the study scope. A site visit may be requested in support of application review.
- The proponent and/or their consultant is required to complete the Environmental Impact Study Issues Scoping Checklist as a draft for submission to the City in advance of the scoping meeting. Once all comments regarding the draft Checklist have been received and finalized the City of London will send a written approval e-mail.
- No disturbance arising from demolition, construction, or any other activity shall take place on the property prior to Planning and Development Services receiving and approving the EIS to ensure that all technical requirements have been satisfied.
- It is an offence under Section 10(1) of the *Endangered Species Act* to damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario list as an Endangered or Threatened species.
- Avoid tree removal within the active bat roosting period (April 30 – September 1) to reduce potential interactions with Endangered bat species, to avoid contravention of the *Endangered Species Act*.
- Avoid vegetation removal within the active breeding bird period (April 1 – August 1) to avoid disturbing nesting birds and contravening the *Migratory Bird Convention Act*.

Landscape Architecture:

- A tree preservation plan is required as part of a complete application to:
 - establish the ownership of trees growing along property lines, including the identification of boundary trees that are protected by the province's Forestry Act 1998, c. 18, Sched. I, s. 21.
 - Identify rare or endangered species that are protected by the province's Endangered Species Act, 2007, S.O., C.6
 - Identify canopy spread of existing trees within or offsite, tree symbols to reflect canopy widths
 - Identify Tree Protection Areas
 - Identify City Owned trees and shrubs that require consent to injure or remove.
 - Detail tree removals, tree retention, tree fence alignment

The tree preservation plan and tree protection measures must include:

- inventory of existing vegetation-species, size, location, health, age, rare or threatened species. Include trees $\geq 10\text{cm}$ dbh and shrubs 1.5m high;
- opinion of the significance of the vegetation.

UTRCA:

- Regulated due to the presence of riverine flooding and erosion hazards through rear-central portion of lands, and a small area at the southwest corner
- Comments previously provided through Proposal Review process (Feb 18, 2021)
- Proposal has since changed to a consent application resulting in three lots, and associated ZBA

- Provided email comments to agent (Laverne Kirkness) in 2021 on revised proposal
- UTRCA not supportive of fragmenting hazard lands
- Rear lot line should be located on western side of watercourse, and established by slope stability and scoped EIS
- Existing access to rear agricultural lands is provided towards north end of the watercourse and is proposed to be relocated. We are encouraging applicant to keep this in same location, however will engage in discussions to relocate should it be deemed necessary and can be supported by technical studies

Studies, Reports, Background or Information to be completed and submitted with the application form

- Zoning By-law Amendment Application and Fee
- Zoning Data Sheet (based on proposed zoning)
- Planning & Design Report
- MDS Calculation
- Archaeological Assessment Stage 1-2
- Focused EIS, scoped with appropriate City and UTRCA staff *see details in Ecology section
- Subject Land Status Report if development proposed within 30m of feature
- Servicing Suitability Study with hydrogeological conditions that includes an assessment of sewage disposal system impacts. The assessment shall demonstrate that the site can adequately meet the requirements of MECP Procedure D-5-4.
- Tree Preservation Plan with tree protection measures – scope with staff
- Image for use on sign/webpage
- Electronic copy of all submitted materials (USB) – AODA
- Additional studies may be required through the consent process

PRE-APPLICATION CONSULTATION HAS OCCURRED

YES NO

PLANNER: Nancy Pasato

PROPONENT: Simona Rasanu

DATE: January 18, 2022

Disclaimer

The pre-application consultation process is intended to identify issues early in the process and to identify the reports, studies and information required to be submitted as part of a complete application. A complete application enables Council to make informed decisions within a reasonable period of time and ensures that the public and other stakeholders have access to the relevant information early in the process. While every effort has been made to identify information needs at this stage, additional issues and/or information needs may be identified through the application review process and may be requested at that time. Should a formal submission of an application not materialize within 9 months, a subsequent Pre-Application Consultation Meeting (PACM) will be required.

Council adopted *The London Plan*, the City’s new Official Plan for the City, on June 23, 2016. It is not yet in force and effect, but should it come into force and effect before you submit your complete application, City staff may identify additional complete application requirements at the time of application submission in order to comply with *The London Plan* policies.

ZONING DATA SHEET – ZONING BY-LAW AMENDMENT

To be completed by Applicant as part of Complete Application

File No.

Description of Land		
Municipal street address:		
Legal Description:		
Street Frontage / Street Flankage (name):		
Existing Zone(s) in Z.-1 Zoning By-law:		Proposed Zone(s) in Zoning By-law:
BY-LAW RESTRICTIONS	REQUIRED (PROPOSED ZONE)	AS SHOWN ON PLAN
(a) Use		
(b) Lot Area (m ²) Min		
(c) Lot Frontage (m) Min		
(d) Front Yard Depth (m) Main Building/ Garage (m) Min		
(e) Rear Yard Depth (m) Min		
(f) Interior Yard Depth (m) Min		
(g) Interior Yard Depth (m) Min		
(h) Exterior Yard Depth (m) Min		
(i) Lot Coverage (%) Max		
(j) Landscaped Open Space (% Min)		
(k) Height (m) Max		
(l) Off-street Parking Min (rate/number)		
(m) Bicycle Parking Min (rate/number)		
(n) Parking Area Coverage (%) Max		
(o) Parking Set Back Min		
(p) Gross Floor Area (m ²) Max		
(q) Gross Floor Area For Specific Uses (m ²) Max		
(r) Yard Encroachments (if applicable)		
(s) Density Max (rate/number) (see Section 3.4 1) for mixed-use)		
(t) Special Provisions		
(u) Other By-law Regulations		
COMMENTS		
<p>NOTE:</p> <ul style="list-style-type: none"> • Please be sure to carefully review and include data / details related to: <ul style="list-style-type: none"> - General Provisions (Section 4) of the Zoning By-law - Zones and Zone Symbols (Section 3) of the Zoning By-law - Regulations Section and Table for Proposed Zone - Zoning By-law Definitions • The Applicant is responsible for submitting complete & accurate information on the Zoning Data Sheet and associated plans. • Failure to provide complete & accurate information on the Zoning Data Sheet and associated plans will result in processing delays, and may require the submission of a revised Zoning By-law amendment application. 		

Appendix B

EIS Scoping Checklist

APPENDIX B - Environmental Study Scoping Checklist

Application/Project Name: 1176 Crumlin Sideroad Focused EIS (51594-100)
Proponent: Fine Home Design (Peter Drankowsky) **Date:** August 19, 2022
Proposed Project Works: Severing the lot to create 3 parcels, construct 1 home
Study Type: Focused EIS
Lead Consultant: SBM Ltd.
Key Contact: Simona Rasanu
Subconsultants: MTE Consultants (Main Contact: Allie Leadbetter)

Technical Review Team:

- Ecologist Planner: Shane Butnari Province – Species at Risk: _____
 Planner for the File: _____ Province - Other: _____
 Conservation Authority: UTRCA Contact: Mike Serra
 EEPAC: Sandy Levin, Kiana Lee Other: _____
 Project Manager, Environmental Assessment: _____
 First Nation(s): _____

Subject Lands and Study Area:

Location/Address and Size (ha) of Subject Lands:
1176 Crumlin Sideroad (3.28 ha)

Study Area Size (approximate ha): ~18ha Map (attached): _____

Position of Site in Subwatershed: Waubuno Creek (Map 5)/Crumlin Drain (Map 6)

Tributary Fact Sheet: *Get for Waubuno Creek (2017 Watershed Report Card)

Is the proposed location within the vicinity of the Thames River (<120 m)? Yes No

If Yes, initiate engagement with local First Nation communities. Consultation activity to be provided at Application Review stage.

Policy:

- Study must demonstrate how it conforms to the Provincial Policy Statement
 Study must demonstrate how it conforms to *The London Plan*

Map 1 Place Types:

- Green Space Environmental Review

Other Place Types: Farmland, Rural Neighbourhood, Neighbourhoods (adj.)

Map 4 Active Mobility Network:

Pathway placement and future trail accesses shall be considered as part of this study.

Map 5 Natural Heritage System:

(Subject Lands and Study Area delineated on current aerial photographs)

- Provincially Significant Wetland Name: _____
- Wetlands Unevaluated Wetlands*
- Area of Natural & Scientific Interest Name: _____
- Environmentally Significant Area Name: _____
- Potential ESAs Upland Corridors
- Significant Woodlands Woodlands
- Significant Valleylands Valleylands
- Unevaluated Vegetation Patches Potential Naturalization Areas

Patch No. _____

** ELC (air photo interpretation and / or previous studies) may identify potential wetlands or other potential features not captured on Map 5.*

Map 6 Hazards and Natural Resources:

Maximum Hazard Line Conservation Authority Regulation Limit (and text based regulatory limit) – Project falls under *Conservation Authority Act* Section 28

Required Field Investigations:

Aquatic:

- Aquatic Habitat Assessment: _____
- Fish Community (Collection): _____
- Spawning Surveys: _____
- Benthic Invertebrate Survey: _____
- Mussels: _____
- Other: _____

Wetlands:

- Wetland Delineation: _____
- Wetland Evaluation (OWES): _____
- Other: _____

Terrestrial (Wetland, Upland and Lowland):

- Vegetation Communities (ELC): _____
- Botanical Inventories Winter Spring Summer Fall
- Breeding Bird Surveys (type & frequency): _____
- Raptor Surveys: _____ Shoreline Birds: _____
- Crepuscular Surveys: _____ Grassland Surveys: _____
- Amphibian Surveys (type & frequency): _____
- Reptile Surveys:
 - Turtle (type & frequency): _____
 - Snake (type & frequency): _____
 - Other (type & frequency): _____
- Bat Habitat, Cavity & Acoustic Surveys: _____
- Mammal Surveys: _____
 - Winter Wildlife Surveys: _____
- Butterflies (Lepidoptera): _____
- Dragonflies / Damselflies (Odonata): _____
- Species at Risk Specific Surveys: Included in tree surveys
- Species of Conservation Concern Surveys: _____
- Significant Wildlife Habitat Surveys: General habitat assessment
- Other field investigations: _____

Supporting Concurrent Studies/Investigations:

- Hydrogeological/Groundwater: _____
- Surface Water/Hydrology: _____
- Water Balance: _____
- Fluvial Geomorphological: _____
- Geotechnical: _____
- Tree Inventory: Trees (>10cm) tagged along the property line + within 3 m on Adj. Lands
- Other: Tagged trees and woodland boundary to be surveyed by OLS

Evaluation of Significance:

Federal:

- Fish Habitat Other Federal: _____
- Species at Risk (SARA)

Provincial:

- Provincially Significant Wetlands
- Significant Valleylands
- Areas of Natural & Scientific Interest
- Water Resource Systems
- Species at Risk (ESA): Included in tree survey
- Significant Woodlands
- Significant Wildlife Habitat Ecoregion 7E
- Fish Habitat

Municipal/London:

- Environmentally Significant Areas (ESAs), Potential ESAs
- Significant Woodlands, Woodlands
- Significant Valleylands, Valleylands
- Wetlands, Unevaluated Wetlands
- Significant Wildlife Habitat
- Unevaluated Vegetation Patches
- Other Vegetation Patches >0.5 ha
- Potential Naturalization Area
- Other: _____

Impact Assessment:

- Impact Assessment Required
- Net Effects Table Required

Environmental Management Recommendations:

- Environmental Management Plan: Focus on buffer and construction - can be included
- Specifications & Conditions of Approval: _____
- Other: _____

Environmental Monitoring:

- Baseline Monitoring: Tree inventory, SAR survey
- Construction Monitoring: _____
- Post-Construction Monitoring: Consider success rate (%) and adaptive management

Additional Requirements and Notes:

- In the Record of Pre-Application Consultation (January 18, 2022), the City states "In this case, a buffer of 30m on each side of the high-water mark would be required surrounding the water feature associated with the Significant Valleylands feature contained within the subject land." This would be rezoned as an Open Space buffer, and then a full EIS is not required ("Focused EIS" instead)
- Woodland edge to be staked and then checked during a field visit with the City of London (extend invitation to Stefanie Pratt, Mike Serra, Peter)
- UTRCA will send a regulation map for the site
- Mike will speak to Stefanie about getting high water mark/floodline mapping
- Recommendations for Landscape Plan can be put in Focused EIS, can also submit it at this stage
- Agricultural access to east field is intended to be maintained and will be discussed in the Focused EIS
- City would like to see monuments along buffer delineation (physical marker) to address encroachment concerns

Appendix C

Species at Risk Screening Table

Table A: Species Occurrence Data Review (Potential Within 10 km of the Subject Lands)

Species	SARO Status	Source(s)	Habitat Description	Habitat Suitability in the Subject Lands and 120 m Adjacent Lands	Probability of Occurrence on the Subject Lands
American Badger (<i>Taxidea taxus jacksoni</i>)	END	Added due to under-representation in species records	Typical habitat includes natural/undisturbed grasslands, old fields or pastures, agricultural field edges, scrubland, wooded ravines, and woodlots (Ontario American Badger Recovery Team, 2010).	The Subject Lands do contain Cultural Meadows bordered by a woodlot, however the fields are cultural and the surrounding area is largely residential and agricultural. In addition, no potential American Badger burrows were located during site visits.	Absent
Butternut (<i>Juglans cinerea</i>)	END	Added due to under-representation in species records	Butternut trees are found in deciduous or mixed forests with a preference for stream banks or well-drained soils. This species also prefers open habitat such as in canopy openings or near the forest edge (Environment Canada, 2010).	The wooded community along the watercourse may be suitable for Butternut [END]. A targeted search for Protected floral species on August 4, 2022, did not find any Butternut within the Subject Lands.	Absent
Little Brown Myotis (<i>Myotis lucifugus</i>), Northern Myotis (<i>Myotis septentrionalis</i>), Tri-coloured Bat (<i>Perimyotis subflavus</i>)	END	Added due to under-representation in species records	These three bat species require habitat for overwintering (hibernacula in caves, mines, wells), roost habitat in the summer (trees with loose bark, cracks, holes, dead foliage), and foraging habitat. Little Brown Myotis is frequently found roosting in anthropogenic structures such as houses, barns, bat boxes, and bridges (Environment Canada, 2015).	A few snags were noted in Community 2, but no targeted bat habitat surveys have been completed. Adjacent lands to the west contain wooded areas that may provide suitable maternity roost trees. No potential hibernaculum feature is present within the Subject Lands.	Moderate
Queensnake (<i>Regina septemvittata</i>)	END	Ontario Nature, 2019	Queensnakes are a primarily aquatic species that inhabits rocky or gravel bottomed streams and rivers (MECP, 2022) and are usually within 3 m of the shoreline (COSEWIC, 2010). Queensnakes rely on crayfish as their main prey (COSEWIC, 2010).	The watercourse passing through the Subject Lands is unlikely to contain Queensnake as it is a very narrow drain with no suitable rocky riverine habitat.	Absent
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	END	Birds Canada, 2005	Red-headed Woodpecker breeding habitat ranges from open deciduous forests or woodlots to woodland edges to urban treed areas (orchards, cemeteries, golf courses, roadsides, pastures with scattered trees, etc.) (COSEWIC, 2018a). This species requires an open understorey and a high density of dead trees.	Community 2 (FOD7) is wooded, however it is quite small and the understorey is relatively dense. A high density of dead trees was not observed. No Red-headed Woodpeckers have been observed, but no targeted surveys were completed.	Low

Species	SARO Status	Source(s)	Habitat Description	Habitat Suitability in the Subject Lands and 120 m Adjacent Lands	Probability of Occurrence on the Subject Lands
Bank Swallow (<i>Riparia riparia</i>)	THR	Birds Canada, 2005	Bank Swallow foraging habitat includes open terrestrial and aquatic areas with abundant insect prey, such as wetlands, open water, grasslands, and agricultural lands (Falconer et al., 2016). Nests are burrowed into vertical or near-vertical banks of silt or sand. Roosting habitat where large numbers of Bank Swallows congregate at night are usually located in large wetlands, reed/cane beds, or in other dense vegetation over water (Falconer et al., 2016).	The Subject Lands may contain suitable foraging habitat over the agricultural fields, but no nesting or roosting habitat is present. No Bank Swallows were observed on site.	Low
Barn Swallow (<i>Hirundo rustica</i>)	THR	Birds Canada, 2005	Foraging habitat include areas with abundant insects such as grasslands, farmland, open wetlands, open water, savannah, cleared right-of-ways, and even highways and residential areas (Brown & Brown, 1999). Nesting habitat includes buildings, barns, bridges, wharves, and culverts. Nocturnal roost sites are often associated with marshes or shrub thickets near water (Heagy et al., 2014).	There is no suitable nesting habitat within the Subject Lands. The agricultural fields may be suitable foraging habitat. No Barn Swallows were incidentally observed on site during field investigations.	Low
Black Redhorse (<i>Moxostoma duquesnei</i>)	THR	DFO, 2022	Black Redhorse is found in moderate to fast-flowing regions of medium-sized warmwater streams and rivers with substrates of rubble, gravel, sand, boulders, and silt (COSEWIC, 2005).	DFO identifies the Loveless Municipal Drain within the Subject Lands as potential habitat for this species, likely due to critical habitat identified in Waubuno Creek approximately 2.9 km downstream. The habitat zone for this species includes the area from the mid-channel to bankfull width on both sides of the watercourse where Black Redhorse is present (DFO, 2021). The Loveless Municipal Drain is a Class F drain, indicating it is intermittent. It is very unlikely to be suitable habitat for Black Redhorse.	Low (critical habitat located ~2.9 km downstream in Waubuno Creek)
Bobolink (<i>Dolichonyx oryzivorus</i>)	THR	Birds Canada, 2005	This species use grassland habitat including hayfields, pastures, old/abandoned fields, remnant prairies,	The Subject Lands only include relatively small (<1.0 ha) Cultural	Low

Species	SARO Status	Source(s)	Habitat Description	Habitat Suitability in the Subject Lands and 120 m Adjacent Lands	Probability of Occurrence on the Subject Lands
			savannahs, and alvar grasslands (McCraken et al., 2013).	Meadows. No targeted surveys were completed.	
Chimney Swift (<i>Chaetura pelagica</i>)	THR	Birds Canada, 2005	Chimney Swifts typically nest and roost in chimneys or other human structures. This species often forages at high altitudes away from nesting sites (COSEWIC, 2007).	No suitable hollow trees or anthropogenic structures were observed within or adjacent to the Subject Lands to provide nesting habitat for this species. No individuals were incidentally identified within the Subject Lands during site investigations.	Low
Eastern Hog-nosed Snake (<i>Heterodon platirhinos</i>)	THR	Ontario Nature, 2019	Eastern Hog-nosed Snakes are found in areas with well-drained loose or sandy soils, open vegetative cover, close proximity to water, and climatic conditions typical of the eastern deciduous forest biome (Seburn, 2009; COSEWIC, 2021). Areas such as beaches and dune habitat are often used for nesting, and this species hibernates in sandy excavated burrows (Kraus, 2011).	Eastern Hog-nosed Snakes are not typically found in the London area, and no recent records are available. The Subject Lands and adjacent lands are largely cultural, agricultural, or residential and are unlikely to be used for critical life processes for this species.	Low
Eastern Meadowlark (<i>Sturnella Magna</i>)	THR	NHIC, 2022; Birds Canada, 2005	Suitable habitat includes pastures, hayfields, old/abandoned fields, and native prairies or savannahs (McCraken et al., 2013).	There is no suitable nesting habitat (tall grass meadows and fallowed hay fields) for this species within the Subject Lands. Communities 1 and 3 are relatively small (<1.0 ha) Cultural Meadows. No targeted surveys were completed.	Low

Table B: SOCC Identified During the Species Records Review

Species	S-Rank & SARO	Source(s)	Key Habitats Used by Species	Habitat Suitability in the Subject Lands and 120 m Adjacent Lands	Probability of Occurrence on the Subject Lands
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	SC S4	Birds Canada, 2005	Bald Eagles typically nest in mature forests with super-canopy trees next to large waterbodies where they forage (Armstrong, 2014).	The Subject Lands only include a narrow watercourse with a small woodlot and are not capable of supporting Bald Eagle habitat.	Low
Common Nighthawk (<i>Chordeiles minor</i>)	SC S4B	Birds Canada, 2005	Common Nighthawk nesting habitat is located in open habitat such as forest openings, prairies, bogs, rocky/sandy habitat, and disturbed areas (COSEWIC, 2018b). In urban areas, they may use flat graveled roofs.	The Subject Lands are unlikely to contain suitable open natural habitat for this species, and no flat graveled roofs are present.	Low
Eastern Wood-pewee (<i>Contopus virens</i>)	SC S4B	Birds Canada, 2005	Eastern Wood-pewee nest in mature and intermediate-age deciduous or mixed forests with open understoreys (COSEWIC, 2012a). Eastern Wood-pewee can be found along forest edges and do not require interior habitat. Various forested community types are used during migration, and this species overwinters in northern South America.	The Subject Lands do include deciduous forested habitat in Community 2, and therefore may support breeding habitat for Eastern Wood-pewee. This species can be found in woodlots in rural areas. No Eastern Wood-pewee were observed or heard on site on August 4, 2022. This visit was during the breeding season for this species (June 3 – August 16 in this Ecodistrict), although a targeted breeding bird survey was not conducted.	Moderate
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	SC S4B	Birds Canada, 2005	Grasshopper Sparrow nesting habitat is located in large human-created grasslands (>5 ha) and natural prairies (COSEWIC, 2013).	No suitable large grassland habitat is present within the Subject Lands to support breeding of Grasshopper Sparrow.	Low
Northern Brook Lamprey (<i>Ichthyomyzon fossor</i>)	SC S3	NHIC, 2022	Northern Brook Lamprey is generally found in clear water streams (COSEWIC, 2017). They burrow in silt/sand substrate as larvae and require coarse gravel substrates and fast currents for spawning.	The watercourse within the Subject Lands was not investigated in detail, but it is a relatively narrow drain without clear waters or gravel substrates. It is unlikely to contain Northern Brook Lamprey habitat.	Low

Species	S-Rank & SARO	Source(s)	Key Habitats Used by Species	Habitat Suitability in the Subject Lands and 120 m Adjacent Lands	Probability of Occurrence on the Subject Lands
Northern Map Turtle (<i>Graptemys geographica</i>)	SC S3	Ontario Nature, 2019	Northern Map Turtles live in rivers and lakeshores with basking sites (ex: rocks, deadheads), slow currents, plentiful aquatic vegetation, and abundant mollusk prey species (Roche, 2002). Northern Map Turtles rarely leave the water except to bask or lay eggs. They hibernate on the bottom of deep slow-flowing rivers with patches of sand/gravel (Roche, 2002).	No suitable aquatic habitat exists within or adjacent to the Subject Lands. The watercourse is not large or deep enough to support this species. No suitable habitat is located upstream based on aerial photo interpretation, so movement habitat is unlikely to be present as well.	Low
Snapping Turtle (<i>Chelydra serpentina</i>)	SC S4	Ontario Nature, 2019	Snapping Turtles are typically found in slow-moving water with soft mud substrate and dense aquatic vegetation (COSEWIC, 2008). This species uses areas of gravel or sand adjacent to water for nesting sites.	No suitable aquatic critical habitat exists within or adjacent to the Subject Lands for Snapping Turtle. No suitable habitat is located upstream based on aerial photo interpretation, so movement habitat is unlikely to be present as well.	Low
Wood Thrush (<i>Hylocichla mustelina</i>)	SC S4B	Birds Canada, 2005	Wood Thrush typically nests in second growth and mature deciduous or mixed forests with well-developed understories. This species prefers large forest mosaics (COSEWIC, 2012b).	The Subject Lands only contain a small area of woodland surrounding a drain. Wood Thrush is unlikely to be breeding within the Subject Lands.	Low

Appendix D

Significant Wildlife Habitat Assessment Table

ELCs: CUM, FOD7

Seasonal Concentration of Animals

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Waterfowl Stopover and Staging Areas (Terrestrial)	CUM	- Large fields with abundant sheet water in spring not available.	No	<p>Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”.</p> <ul style="list-style-type: none"> • Any mixed species aggregations of 100 or more individuals required. • The flooded field ecosite habitat plus a 100-300m radius, dependent on local site conditions and adjacent land use is the significant wildlife habitat. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). 	No
Waterfowl Stopover and Staging Areas (Aquatic)	-	- No aquatic ELCs present.	No	<p>Studies carried out and verified presence of:</p> <ul style="list-style-type: none"> • 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 • The combined area of the ELC ecosites and a 100m radius area is SWH • Wetland area and shorelines associated with sites identified within the SWHTG are significant wildlife habitat. • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). 	No
Shorebird Migratory Stopover Area	-	- No beach areas, bars, seasonally flooded, muddy and un-vegetated shoreline habitat available within the Subject Lands.	No	<p>Studies confirming:</p> <ul style="list-style-type: none"> • 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). • 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 100m radius area. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. 	No

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Raptor Wintering Area	CUM, FOD7	- No combination of forest and fields >20 ha present. Woodland is very small (<1.0 ha) and surrounding area is largely agricultural and residential.	No	Studies confirm the use of these habitats by: <ul style="list-style-type: none"> • One or more Short-eared Owls or; One of more Bald Eagles or; At least 10 individuals and two of the 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. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". 	No
Bat Hibernacula	-	- No suitable features present.	No	<ul style="list-style-type: none"> • All sites with confirmed hibernating bats are SWH. • The area includes 200m radius around the entrance of the hibernaculum for most development types and 1000m for wind farms • Studies are to be conducted during the peak swarming period (Aug–Sept). Surveys should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects" 	No
Bat Maternity Colonies	FOD7	- No targeted surveys completed. Potential for bat maternity habitat in woodland (Community 2).	Yes (Community 2 – FOD7)	Maternity Colonies with confirmed use by; <ul style="list-style-type: none"> • >10 Big Brown Bats • >5 Adult Female Silver-haired Bats • The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies. • Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects" 	Unconfirmed (Community 2 – FOD7)
Turtle Wintering Areas	-	- Over-wintering sites are permanent water bodies, large wetlands, and bogs and fens with adequate dissolved oxygen. No suitable features present.	No	Presence of 5 over-wintering Midland Painted Turtles is significant. <ul style="list-style-type: none"> • 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 deepwater pool where the turtles are over wintering is the SWH. • Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept-Oct) or spring (Mar-May). • Congregation of turtles is more common where wintering areas are limited and therefore significant. 	No

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Reptile Hibernaculum	All other than really wet	- No features indicative of hibernation sites (bedrock fissures, rock piles, burrows) present within the Subject Lands.	No	<p>Studies confirming:</p> <ul style="list-style-type: none"> • 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 (eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct). • Note: If there are Special Concern Species present, then site is SWH. • The feature in which the hibernacula is located plus a 30 m radius area is SWH. 	No
Colonially-Nesting Bird Breeding Habitat (Bank/Cliff)	CUM	- No exposed soil banks, cliff faces, sandy hills, borrow pits, steep slopes, or other suitable habitat present.	No	<p>Studies confirming:</p> <ul style="list-style-type: none"> • Presence of 1 or more nesting sites with 8cxlix or more cliff swallow pairs 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. • Field surveys to observe and count swallow nests are to be completed during the breeding season. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". 	No
Colonially-Nesting Bird Breeding Habitat (Trees/Shrubs)	-	- No suitable wetland habitat is present. - No heron nesting sites/colonies present based on LIO mapping (wildlife values area map).	No	<p>Studies confirming:</p> <ul style="list-style-type: none"> • 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 <15.0ha with a colony is the SWH. • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April-August) or by evidence such as the presence of fresh guano, dead young and/or eggshells. 	No
Colonially-Nesting Bird Breeding Habitat (Ground)	CUM	- No islands, peninsulas, or low bushes and open fields directly next to streams/ditches are present. - No nesting sites for Ring-billed Gull or Herring Gull identified in the area by LIO wildlife values area mapping.	No	<p>Studies confirming:</p> <ul style="list-style-type: none"> • 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. • Presence of 5 or more pairs for Brewer's Blackbird. • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant. • The edge of the colony and a minimum 150m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a colony is the SWH. • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". 	No

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Migratory Butterfly Stopover Areas	CUM	- A butterfly stopover area will be >10 ha in size with a combination of forest (FOD) and field (CUM/CUT), and be located within 5 km of Lake Erie or Lake Ontario. Criteria not met due to the lack of suitable habitat and the large distance from both Lake Erie and Lake Ontario.	No	<p>Studies confirm:</p> <ul style="list-style-type: none"> • 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. • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD. • MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. 	No
Land Bird Migratory Stopover Areas	FOD7	- No woodlots >5 ha in size that are within 5 km of Lake Ontario and Lake Erie. Criteria not met.	No	<p>Studies confirm:</p> <ul style="list-style-type: none"> • Use of the habitat by >200 birds/day and with >35 spp. 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. • Studies should be completed during spring (Mar to May) and fall (Aug-Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" 	No
Deer Winter Congregation Areas	FOD7	- No woodlots >100 ha in size. - No White-tailed Deer wintering areas identified in the area by LIO wildlife values area mapping.	No	<p>Studies confirm:</p> <ul style="list-style-type: none"> • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF. • Use of the woodlot by whitetailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF. • Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques, ground or road surveys. or a pellet count deer density survey. 	No

Rare Vegetation Communities

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Cliffs and Talus Slopes	-	Not present.	No	<ul style="list-style-type: none"> Confirm any ELC Vegetation Type for Cliffs or Talus Slopes. 	No
Sand Barren	-	Not present.	No	<ul style="list-style-type: none"> Confirm any ELC Vegetation Type for Sand Barrens. Site must not be dominated by exotic/introduced species (<50% vegetative cover exotic sp.). 	No
Alvar	-	Not present.	No	<ul style="list-style-type: none"> Field studies that identify 4 of the 5 Alvar Indicator Species at a Candidate Alvar site is significant. Site must not be dominated by exotic/introduced species (<50% vegetative cover exotic sp.). The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses. 	No
Old Growth Forest	FOD7	Not present. No woodlands >0.5 ha.	No	<p>Field Studies will determine:</p> <ul style="list-style-type: none"> If dominant trees species are >140 years old, then the area containing these trees 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. Determine ELC vegetation types for the forest area containing the old growth characteristics. 	No
Savannah	-	Not present.	No	<ul style="list-style-type: none"> Field studies confirm one or more of the Savannah indicator species listed in Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 7E should be used. Area of the ELC Ecosite is the SWH. Site must not be dominated by exotic/introduced species (<50% vegetative cover exotic sp.). 	No
Tallgrass Prairie	-	Not present.	No	<ul style="list-style-type: none"> Field studies confirm one or more of the Prairie indicator species listed in Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 7E should be used. Area of the ELC Ecosite is the SWH. Site must not be dominated by exotic/introduced species (<50% vegetative cover exotic sp.). 	No
Other Rare Vegetation	-	Not present.	No	<ul style="list-style-type: none"> Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG. Area of the ELC Vegetation Type polygon is the SWH. 	No

Specialized Habitats of Wildlife considered SWH

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Waterfowl Nesting Area	-	- Wetland habitat is not present.	No	<p>Studies confirmed:</p> <ul style="list-style-type: none"> • 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. • Nesting studies should be completed during the spring breeding season (April-June). Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to successfully nest. 	No
Bald Eagle and Osprey Nesting, Foraging, Perching	FOD7	<ul style="list-style-type: none"> - No stick nests observed on site. - Small watercourse on site is not suitable for typical Osprey or Bald Eagle nesting or foraging habitat. - No Osprey feeding or resting areas identified in the area of the Subject Lands on LIO wildlife values mapping. 	No	<p>Studies confirm the use of these nests by:</p> <ul style="list-style-type: none"> • 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, 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. • Observational studies to determine nest site use, perching sites and foraging areas need to be done from early March to mid-August. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. 	No
Woodland Raptor Nesting Habitat	FOD7	- No natural or conifer plantation woodlands/forest stands >30ha with >4ha of interior habitat. Criteria not met.	No	<p>Studies confirm:</p> <ul style="list-style-type: none"> • 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 area of 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 SWH. • Sharp-Shinned Hawk – A 50m radius around the nest is the SWH. • Conduct field investigations from early March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. 	No

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Turtle Nesting Areas	-	- No areas with exposed mineral soils adjacent to suitable aquatic habitat.	No	Studies confirm: <ul style="list-style-type: none"> • Presence of 5 or more nesting Midland Painted Turtles. • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH. • 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 dependent 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 as part of the 30-100m area of habitat. • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. 	No
Springs and Seeps	FOD7	- No seeps or springs observed within the Subject Lands. - Not located in a headwater area.	No	Field Studies confirm: <ul style="list-style-type: none"> • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of a ELC forest ecosite or an ecoelement within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation of the habitat. 	No
Amphibian Breeding Habitat (Woodland)	FOD7	- No breeding pools available within or adjacent to the woodland.	No	Studies confirm; <ul style="list-style-type: none"> • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog species with Call Level Code 3. • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the wetland area plus a 230m radius of woodland area. If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat 	No
Amphibian Breeding Habitat (Wetlands)	-	- No wetlands located >120m from woodland ecosites are present within or directly adjacent to the Subject Lands.	No	Studies confirm: <ul style="list-style-type: none"> • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog/toad species with Call Level Codes of 3. or; Wetland with confirmed breeding Bullfrogs are significant. • The ELC ecosite wetland area and the shoreline are the SWH. • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. 	No
Woodland Area-Sensitive Bird Breeding	FOD7	- No large mature (>60yrs old) forest stands or woodlots >30 ha are present within or adjacent to	No	Studies confirm: <ul style="list-style-type: none"> • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH. 	No

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Habitat		the Subject Lands.		<ul style="list-style-type: none"> • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. 	

Habitats of Species of Conservation Concern considered SWH

Wildlife Habitat	ELC Codes Triggers	Candidate Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Marsh Breeding Bird Habitat	CUM	- No wetland communities present to support marsh breeding birds.	No	<p>Studies confirm:</p> <ul style="list-style-type: none"> • 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 Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH. • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. 	No
Open Country Bird Breeding Habitat	CUM	- Natural and cultural fields >30 ha are not present.	No	<p>Field studies confirm:</p> <ul style="list-style-type: none"> • 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. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. 	No
Shrub/Early Successional Bird Breeding Habitat	-	- No large fields succeeding to shrub and thicket habitats >10 ha in size are present.	No	<p>Field Studies confirm:</p> <ul style="list-style-type: none"> • 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 SWH. • The area of the SWH is the contiguous ELC Ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their 	No

Wildlife Habitat	ELC Codes Triggers	Candidate Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
				territories • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”.	
Terrestrial Crayfish	-	- No suitable habitat present. - No chimneys or individuals observed within the Subject Lands.	No	Studies Confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites. • Area of ELC ecosite or an eco-element area of meadow marsh or swamp within the larger ecosite area is the SWH. • Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult.	No
Special Concern and Rare Wildlife Species (NHIC and MNRF pre-consultation)	-	- NHIC and The 2001-2005 OBBA database identified several Special Concern or rare species as potentially present within the area of the Subject Lands. These include Bald Eagle [SC], Common Nighthawk [SC], Eastern Wood-pewee [SC], Grasshopper Sparrow [SC], Northern Brook Lamprey [SC], Northern Map Turtle [SC], Snapping Turtle [SC], and Wood Thrush [SC]. - The adjacent lands outside the property boundary were not investigated for potential Special Concern or rare wildlife. - Based on the habitat assessment [Appendix B], the only SOCC that may be likely to be present is Eastern Wood-pewee [SC].	Yes	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. • 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.	Unconfirmed (Potential for Eastern Wood-pewee in Community 2)

Animal Movement Corridors

Wildlife Habitat	ELC Codes Triggers*	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Amphibian Movement Corridors	-	- Movement corridors are determined when there is confirmed amphibian breeding habitat in wetlands. Only woodland amphibian breeding SWH has been identified.	No	<ul style="list-style-type: none"> • 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 have at least 15m of vegetation on both sides of waterway or be up to 200m wide of woodland habitat and with gaps <20m. • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat. 	No

SWH exceptions

Wildlife Habitat	Ecosites	Habitat Criteria and Information	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Bat Migratory Stopover Area	No triggers	- The site is not near Long Point.	No	• The confirmation criteria and habitat areas for this SWH are still being determined.	No

Appendix E

MTE Field Sheets





MTE NATURAL ENVIRONMENT FIELD SHEET

Project #: 51594-100 Description: 1176 CRUMLIN SDRD.
 Date: 4-Aug-22 Staff: WH, SW
 Start Time: 8:00 End Time: 10:00 Total Time: 4hrs
 Temp: 22C Cloud %: 100 Precipitation: 0
 Wind: 2 Direction: W Yesterday: RAIN

BEAUFORT WIND SCALE:

0 Calm, 1 Smoke Drifts, 2 Wind Felt on Face, 3 Leaves in Constant Motion,
 4 Wind Raises Paper, 5 Small Trees Sway, 6 Large Limbs Sway

DATA FOCUS

Amphibians:	1	2	3	Aqua Hab.:		Dripline:	X	Invertebrates:		Wetland:	
Birds:	M	1	2	Bats:		ELC's:		Reptiles:		Other:	TREES
Floral:	v	s	a	BHA:		Habitat:		SAR Target:			

NATURAL FEATURES

YES	NO	Description	Mapped (see GPS)	Follow-up Req'd		
				Yes	No	Who
		Man-made Structures: None observed <input type="checkbox"/>				
		Barns/Footings/Wells/other(list)				
		Rock Piles				
		Garbage				

		Natural Vegetation: None observed <input type="checkbox"/>				
		Fallen Logs outside woods (#'s)				
		Brush Piles				
		Snags (raptor perch)				
		Tree Cavities (nesting)				
		Sentinel Trees				
		Butternut Identified				

		Wildlife Features: None observed <input type="checkbox"/>				
		Waterfowl nesting (large #'s, # of species)				
		Exposed Banks (nesting swallows)				
		Stick Nests				
		Animal Burrows (>10cm)				
		Heronry				
		Crayfish mounds				
		Sand/gravel on site				
		Marsh/open country/shrub				
		Winter Deer yards				
		Corridor from pond to woods (amphibian movement)				
		Bat corridor (shorelines, escarpments)				
		Bat hibernacula (caves, mines, crevices, etc.)				

		Aquatic Features: None observed <input type="checkbox"/>				
		Pond (woods) emergents	sumergents	logs	temp.	
		Pond (open) emergents	sumergents	logs	temp.	
		Water in woodland flowing	dry	pools		
		Nat. Stream flowing	dry	pools		
		Swale flowing	dry	pools		
		Open Drain flowing	dry	pools		
		Seeps flowing	dry	pools		
		River				

Incidental Observations/Notes:

NO SAR OBSERVED.
 BOUNDARY TREES TAGGED AND FEATURE DRIPLINE FLAGGED WITH GREEN



GENERAL SITE INFORMATION FIELD SHEET

Project: 51594-100 (1176 Crumlin Sideroad)

Date: 31-Aug-22

Project Manager: AL/MC

Collector(s): AL

Visit #: 2

Time started: 1:00 PM Time finished: ~2:30 Combined collectors' hours: _____

NHIC List MNR EO's one not provided to collector

WEATHER CONDITIONS					WIND SCALE			
Temp:	Wind:		Cloud Cover (%)	Precipitation	0	Calm		
	Direction:		Sunny	Today: No	1	Smoke Drifts		
				Yesterday:	2	Wind Felt on Face		
DATA FOCUS					3	Leaves in constant motion		
<input type="checkbox"/>	Birds 1__2__ Mig__	<input type="checkbox"/>	ELC's	<input type="checkbox"/>	4	Wind raises dust and paper		
<input type="checkbox"/>	Mammals	<input type="checkbox"/>	Floral V__S__A	<input type="checkbox"/>	5	Small trees sway		
<input type="checkbox"/>	Amphibians 1_2_3_	<input type="checkbox"/>	Wetland	<input type="checkbox"/>	6	Large branches sway		
<input type="checkbox"/>	Reptiles	<input type="checkbox"/>	Butternut (BHA)	<input type="checkbox"/>	7	Lots of resistance when walking		
<input type="checkbox"/>	Invertebrates	<input type="checkbox"/>	other SAR	<input checked="" type="checkbox"/>	8	Limbs breaking off trees		
FEATURES (with GPS co-ordinates where applicable)					Mapped	Follow-up Req'd		
Man-made Structures:					UTM	Yes	No	Who
<input type="checkbox"/> None observed								
Yes	No							
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Barns/Footings/Wells/other(list)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Rock Piles						
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Garbage						
Natural Vegetation:					<input type="checkbox"/>	None observed		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Fallen Logs outside woods (#'s)						
<input type="checkbox"/>	<input type="checkbox"/>	Brush Piles						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Snags (raptor perch)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Tree Cavities (nesting)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Sentinel Trees						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Butternut Identified						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Mast Trees (6E)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Berry Shrubs (6E)						
Wildlife Features:					<input type="checkbox"/>	None observed		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Waterfowl nesting (large #'s, # of species)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Exposed Banks (nesting swallows)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Stick Nests						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Animal Burrows (>10cm)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Heronry						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Crayfish mounds						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Sand/gravel on site						
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Marsh/open country/shrub						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Winter Deer yards						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Corridor from pond to woods (ampibian movement)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Bat corridor (shorelines, escarpments)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Bat hibernacula (caves, mines, crevices, etc.)						
Aquatic Features:								
<input type="checkbox"/>	<input type="checkbox"/>	Perm. pond in woodland	<input type="checkbox"/>	emergents/submergents/logs	<input type="checkbox"/>	mp.		
<input type="checkbox"/>	<input type="checkbox"/>	Perm. pond in open	<input type="checkbox"/>	emergents/submergents/logs	<input type="checkbox"/>	mp.		
<input type="checkbox"/>	<input type="checkbox"/>	Water in woodland	<input type="checkbox"/>	pools	<input type="checkbox"/>	flowing		
<input type="checkbox"/>	<input type="checkbox"/>	Waterways	<input type="checkbox"/>	flowing	<input type="checkbox"/>	dry		
<input type="checkbox"/>	<input type="checkbox"/>	natural stream	<input type="checkbox"/>		<input type="checkbox"/>	pools		
<input type="checkbox"/>	<input type="checkbox"/>	swale	<input type="checkbox"/>		<input type="checkbox"/>	None observed		
<input type="checkbox"/>	<input type="checkbox"/>	open drain	<input type="checkbox"/>		<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	Seeps/Springs	<input type="checkbox"/>		<input type="checkbox"/>			
Incidental Observations/Notes:								
City meeting to go over the site, buffers, and the woodland dripline								
Two Monarchs seen flying through Community 1 field								
Tree of Heaven and residential disturbance at north area (sheds, drain clean-out)								
Shane Butnari says top of bank looks like the high water mark of the watercourse and should be good to use for buffer measurements								

Graphic Attached or Name

Checked by Project Manager Date: _____

Appendix F

MTE Staff CVs





Allie Leadbetter, B.Sc.

Title: Biologist

Professional Experience

Education

Bachelor of Science, Environmental Science (Ecology Specialization)
| University of Waterloo | 2020

Tenure with MTE

Since 2020

Professional Development

WHMIS

Work History

Biologist | MTE Consultants | 2020-Present

Aquatic Field Biologist | Natural Resource Solutions | 2020

Season Assistant Ecologist | Savanta | 2019

Wetlands Soils Research Assistant | Wetland Soils & Greenhouse
Gas Exchange Lab (University of Waterloo) | 2018

Toxicology Research Technician | Canada Centre for Inland Waters
(Environment Canada) | 2017

Greenhouse Crops Research Assistant | Agriculture and Agri-Food
Canada | 2017

Awards

President's Research Award | University of Waterloo | 2019

NSERC Undergraduate Student Research Award | 2019

McEwen Clean Water Prize | Grand River Conservation Authority |
2017

Allie has over two years of experience completing terrestrial and aquatic field surveys, as well as with analyzing and summarizing field data for technical reports. In her current role at MTE, she assists with data collection and reporting to support environmental planning, monitoring and approvals in compliance with provincial natural heritage policies including Ontario Planning Act, Endangered Species Act, Aggregate Resources Act and Environmental Assessment Act.





Melissa Cameron, M.Sc., M.L.A., OALA

Title: Manager, Ecology

Professional Experience

Education

Master of Landscape Architecture | University of Guelph | 2007

Master of Zoology | University of Guelph | 2005

Bachelor of Science, Ecology | University of Guelph | 2001

Tenure with MTE

Since 2021

Memberships

Member, Canadian Society of Landscape Architects

Member, Ontario Association of Landscape Architects

Work History

Manager, Ecology; Senior Biologist | MTE Consultants | 2021-Present

Ecologist | Stantec Consulting Ltd. | 2012-2021

Conservation Biologist | ExxonMobil Biomedical Sciences Inc. | 2009-2010; 2010-2012 (contractor)

Landscape Architect | MMM Group Ltd. | 2009

Landscape Architect, Associate | Stantec Consulting Ltd. | 2006-2009

Melissa has over 16 years of professional experience and has been involved in a wide range of projects including natural heritage assessments, environmental impact studies, constraint analyses, restoration plans and natural heritage components of Environmental Assessments. This work involves the implementation of natural heritage policies under the Planning Act / Provincial Policy Statement, the Renewable Energy Act, the Aggregate Resources Act, the Places to Grow Act / Growth Plan for the Greater Golden Horseshoe, and municipal policy documents. She is very knowledgeable with many Species at Risk and their potential interaction with proposed projects as it relates to the Endangered Species Act and the Species at Risk Act.



**Township of Woolwich
Breslau Wet Well Upgrades Class
Environmental Assessment (EA),
Breslau
Role: Lead Ecologist**

**City of London
Meadowlily Road Area Class
Environmental Assessment (EA),
London
Role: Lead Ecologist**

Civil & Municipal Infrastructure

**City of London
Huron Street Watermain Removal
Role: Lead Ecologist
2020**

**City of London
Mornington Stormwater
Management Facility Expansion
and McCormick Reservoir
Removal
Role: Lead Ecologist
2020-2021**

**City of London
Dingman Creek Tributary 12 - EIS
for Creek Realignment
Role: Project Manager / Lead
Ecologist
2020-2021**

MTE is managing the completion of a Schedule 'B' Class EA for upgrades to the Breslau Wet Well on behalf of the Township. Following the identification of significant cost and technical challenges associated with the planned expansion of the existing Breslau Wet Well, the Township decided to explore a new location for the pumping station and thus a Class EA was required. The sanitary servicing encompasses three main components: collection system, pumping station, and forcemain. MTE will evaluate all three of these components in the Class EA to ensure a thorough and practical servicing alternative is identified. The presence of existing infrastructure (trunk gravity sewer) under the Grand River presents challenges to the potential design. Given the proximity to the Grand River, MTE will also coordinate engagement and consultation with the First Nations. Melissa is leading the completion of the Natural Heritage Screening Study, species at risk screening (SAR), and Significant Wildlife Habitat (SWH) screening in support of the Class EA and conceptual design.

The City has retained MTE to undertake a Schedule 'B' Class EA Study for a new municipal pumping station and servicing study to address servicing future developments within the Meadowlily Road area. This study will identify and evaluate alternative solutions, and select the preferred servicing strategy for the study area. Melissa is leading the completion of an Environmental Impact Study (EIS) in support of the Class EA. A species at risk (SAR) screening and Significant Wildlife Habitat (SWH) screening are being completed as part of the environmental scope of work.

Melissa was part of a team tasked to develop a preferred solution for the removal of the Huron Street watermain below the Thames River. She was responsible for the coordination of field studies, determination of impacts, agency consultation and assistance with permit applications for species at risk.

As lead ecologist on the project, Melissa was responsible for designing an ecological study and assessing the impacts of the expansion of the Mornington Stormwater Management Facility and demolition/removal of the McCormick Reservoir. The EIS incorporated measures to enhance vegetation and habitat for wildlife, and control invasive plant species.

Melissa oversaw the Environmental Impact Study of the proposed realignment of Tributary 12 of Dingman Creek south of Colonel Talbot Rd. This project was part of a larger, multidisciplinary study to design a complete riparian corridor for the tributary, incorporating enhancements to fish and wildlife habitat.



**Town of Amherstburg
Edgewater Sewage Lagoon
Decommissioning and Wetland
Conversion**
Role: Project Manager /
Consulting Ecologist / Landscape
Architect
2020-2021

**City of Kitchener
Huron Village Central Stormwater
Management Facility Clean-out
Wildlife Mitigation Plan**
Role: Ecologist
2014

**Greater Toronto Area
Various Watermain Projects
2015**

Transportation

**County of Middlesex
Thorndale Bridge Replacement**
Role: Lead Ecologist
2019-2020

**City of Barrie
Essa Road Inspection
Improvements**
Role: Terrestrial Ecologist
2019-2020

**Municipality of Northern Bruce
Peninsula, Tobermory
Large Value Retainer, Agreement
3017-E-0004 | Highway 6
Reconstruction and Highway 89
Primrose to Rosemount**
Role: Terrestrial Ecologist
2019-2020

Melissa served as project manager, consulting ecologist and landscape architect for the decommissioning of Edgewater Sewage Lagoons in Amherstburg, Ontario, and their conversion to naturalized wetlands and recreational open space

Melissa developed a mitigation plan for Blanding's Turtle and other wildlife for the scheduled sediment clean-out of a residential storm-water management (SWM) facility. She conducted pre-construction surveys, corresponded with MNRF in order to identify measures to avoid harm to Blanding's Turtle and its habitat from construction, prepared mitigation plan and coordinated turtle "rescue" and relocation during the de-watering phase. As a follow-up activity, she was invited to speak with a grade 6 class from the adjacent public school on the topic of protecting biodiversity within the SWM pond.

Melissa was responsible for coordinating terrestrial ecology, aquatic ecology and environmental permitting components of multiple watermain upgrade or new installation projects within the Greater Toronto Area. Specific tasks for terrestrial ecology components included a background review of potential rare species or Species at Risk, development of a field program, summary of results and correspondence with MNRF.

As lead ecologist on the project, Melissa coordinated ecological field studies and prepared an EIS for a proposed bridge replacement over the Thames River.

Melissa coordinated ecological field investigations and prepared a Terrestrial Existing Conditions and Impact Assessment Report.

For these projects, Melissa coordinated ecological field investigations and input to design of four wildlife underpasses along Highway 6 (including two dry culverts for Eastern Massasauga) and prepared a migratory bird nest habitat impact assessment along Highway 89, Primrose to Rosemount.



**Region of Waterloo
Scheifele Bridge Replacement
Municipal Class EA
Role: Lead Ecologist
2020-2021**

**City of London
Windermere Road EA
Role: Lead Ecologist
2020-2021**

**Milton and Halton Hills
Highway 401 North Halton
Commercial Vehicle Inspection
Facility Relocation
Role: Ecologist
2018**

**Highway 401 Expansion Project,
London to Tilbury
Role: Terrestrial Ecologist
2020-2021**

**City of Pickering
Seaton Lands - Whitevale Bypass
Role: Lead Ecologist
2017**

**City of Pickering
Seaton Spine Servicing
Assignment #6
Role: Lead Ecologist
2018-2019**

**City of Mississauga
Meadowvale and Milton GO
Station Improvements
Role: Terrestrial Ecologist
2018**

**Highway 401 Planning Study,
Cobourg to Colborne
Role: Terrestrial Ecologist
2020**

Melissa was responsible for developing the ecological study design and assessing the impacts of the proposed Scheifele Bridge replacement over the Conestogo River.

Melissa was responsible for coordinating ecological studies, assessing natural heritage significance, and determining potential impacts for proposed improvements to Windermere Road from Western Road to Doon Drive.

As part of the proposal to relocate two commercial vehicle inspection stations along Highway 401, Melissa prepared Terrestrial Ecosystems Existing Condition and Impact Assessment Reports for the Preliminary Design and Class Environmental Assessment.

As part of the MTO Highway 401 Expansion Project within the City of London, Melissa authored the Terrestrial Existing Conditions and Impact Assessment reports for the Dingman Drive interchange improvements.

Melissa prepared the Environmental Impact Report for Terrestrial Ecosystems and provided input to post-construction landscape restoration plans.

In addition to preparing the Environmental Impact Report, Melissa conducted and coordinated field surveys, coordinated with other project team members (internal and external), attended project team meetings, and developed restoration plans for the project footprint.

Related to a preliminary natural heritage study of two existing GO Stations and one maintenance/office complex where upgrades were proposed, Melissa coordinated the field program and provided senior review of the summary report.

Melissa coordinated ecological field investigations and prepared a Terrestrial Existing Conditions and Impact Assessment Report.

Cement & Aggregates

Hardrock Project, Geraldton
Role: Project Lead
2016-2020

Melissa coordinated the Aggregate Resources Act (ARA) permit applications for three aggregate sources proposed to support the Hardrock Mine development. She prepared the Level I/II Natural Environment Reports and developed the Site Plan drawings for each pit (two below water, one above water), including design of the pit rehabilitation, with support from project team members and in collaboration with another consulting firm.

Ottawa Airport Pit, Ottawa
Role: Project Lead, Ecologist
2019-2020

For this project, Melissa coordinated ecological field investigations, prepared a Natural Environment Technical Report and Environmental Impact Assessment, and permit for Species at Risk under SARA.

Walker Edgar Pit Expansion, Orillia
Role: Project Lead, Ecologist
2019

The Walker Edgar Pit Expansion project required ecological field studies and summary reports as part of a preliminary constraints analysis. Melissa coordinated the studies and prepared the report.

Upper's Lane Quarry, Niagara Falls
Role: Lead Ecologist
2019-2020

Melissa coordinated ecological field investigations, prepared a Natural Environment Technical Report and Environmental Impact Study, and authorized Species at Risk under the ESA in support of an application for an ARA license.

OSSGA Rehabilitated Wetlands Study, Toronto
Role: Project Lead
2018

In addition to coordinating a study of wetlands and ponds on rehabilitated aggregate extraction sites for the Ontario Stone Sand and Gravel Association (OSSGA), Melissa managed the field program, assisted with data analysis, developed the final report, and presented findings to the OSSGA rehabilitation committee.

Duntroon Quarry Proposed Expansion Ecological Reforestation and Monitoring Plan, Duntroon
Role: Restoration Ecologist, Project Lead
2007-2020

The purpose of this project was to develop an ecologically-based reforestation plan for 50+ hectares of land adjacent to a proposed limestone quarry, as part of a compensation and mitigation program for a quarry license application. A series of experimental plots were installed on a 1.5 hectare parcel in 2007, involving pit and mound site preparation, wildlife habitat features and varied woody plant species composition. A monitoring protocol was developed for the site in order to guide the reforestation on the remaining land parcels. Melissa is currently responsible for implementing ecological monitoring and mitigation measures as documented in the Adaptive Management Plan.

Simpson Lake Quarry, Denbigh
Role: Landscape Architect
2013

Melissa prepared a full set of Site Plan drawings for submission as part of the ARA Application package to MNR.

CBM Bromberg Pit, Ayr
Role: Landscape Architect
2007-2013

Under the direction of a senior terrestrial ecologist, Melissa developed a reforestation plan as part of the ARA Application and provided technical support during an OMB hearing.

**Biesenthal Pit Site Plan Updates,
Ottawa**
Role: Landscape Architect
2015

**Olszowka Pit Blanding's Turtle
Permitting, Brantford**
Role: Ecologist
2013-2017

**McLaren Gravel Pit Ecological
Restoration, Highgate**
**Role: Ecologist and Landscape
Designer**
2006-2007

**Acton Quarry Rehabilitation and
Enhancement Plan, Acton**
**Role: Ecologist and Landscape
Designer**
2007-2008

As part of the ARA application package to MNRF, Melissa prepared a complete updated set of Site Plan drawings for submission. Updates included incorporation of habitat enhancements for Whip-poor-will, a provincial Species at Risk, as required by authorization under the Endangered Species Act.

Part of a team developing an Overall Benefit plan to protect Blanding's Turtle and its habitat within the project area, Melissa participated in surveys for Blanding's Turtle, developed mitigation measures during and after construction, prepared habitat restoration plans, as well as ongoing consultation with MNRF.

The goal of this project was to use an abandoned gravel pit upstream of the provincially significant Clear Creek Forest to store and slowly release peak storm flows from two tributaries of Clear Creek, in order to prevent further channel down-cutting and floodplain disassociation which were occurring downstream. A secondary goal was to restore the quarry to a swamp condition, as well as to provide an interpretive trail loop for visitors. Melissa served as ecologist and landscape designer, as part of a team including a landscape architect and water resources engineer.

As part of a limestone quarry license application within the significant Niagara Escarpment region, Melissa assisted in the preparation of a rehabilitation plan, for lands within the extraction area, and an enhancement plan for lands adjacent to the extraction area. The goal of these plans was to restore and improve ecological connectivity across the broader landscape by careful and sensitive restoration of woodland and wetland ecosystems. Another component of this project was the detailed design of amphibian breeding ponds for a federal and provincial Species at Risk. Melissa served as an ecologist and landscape designer, as part of a team of terrestrial and aquatic ecologists.

Land Development

City of London
Hyde Park Road
Role: Lead Ecologist
2020

City of London
Commissioners Road
Role: Lead Ecologist
2020

Town of Lakeshore
Lighthouse Cove Secondary Plan -
Natural Heritage Study
Role: Lead Ecologist
2018

City of Markham
Elgin Mills Road - Church of God
Development
Role: Lead Ecologist
2015

City of Burlington
King Road EIA
Role: Lead Ecologist
2016-2017

Related to a Site Plan application for a future residential development. Melissa developed the study design and prepared a Subject Lands Status Report and mitigation plan to protect a significant natural heritage feature.

On a parcel of land situated adjacent to the Meadowlily Woods, Melissa developed the study design and prepared a natural heritage constraints analysis for an ESA.

As Project Lead for the Secondary Plan for Lighthouse Cove, Melissa coordinated natural heritage field investigations and prepared a Natural Heritage Study.

Melissa updated the Greenbelt Conformity Plan in support of a site development permit for the Church of God in the Rouge River valley. She provided input to the project Landscape Architect on restoration of buffer zones around the development to protect key natural heritage features on adjacent lands.

Melissa prepared a Woodland Assessment Report (scoped EIA) in support of a site plan application for a commercial development in Burlington.

Renewable Energy

Nigig Power / Henvey Inlet Wind Project | Henvey Inlet

Role: Co-lead / Reptile Species at Risk expert
2013-2014

White Pines Wind Project, Prince Edward County,

Role: Reptile Species at Risk Expert
2014

Ostrander Point Wind Project, Prince Edward County

Role: Reptile Species at Risk Expert
2013

Bow Lake Wind Project, Montreal River Harbour, Ontario

Role: Ecologist
2012-2013

In the role of Co-lead and Reptile Species at Risk expert, Melissa supported the terrestrial ecology component of the Environmental Assessment for the proposed Henvey Inlet Wind Project.

Under the direction of a senior terrestrial ecologist, Melissa prepared a Reptile Mitigation Plan which included mitigation for potential effects during construction and operations, monitoring and potential habitat restoration.

Melissa was part of the team that developed an Alvar Management Plan and Species at Risk Mitigation Plan for the Ostrander Point Wind Project, specifically providing expertise on terrestrial ecosystem restoration and mitigation/monitoring for turtle Species at Risk.

A Natural Heritage Assessment was required for the Bow Lake Wind Project. Melissa assisted with preparing the assessment, including coordinating the 2013 field program and providing technical expertise on wildlife data analysis.

Oil & Gas

**Union Gas Windsor
Pipeline Replacement**
Role: Lead Ecologist
2018-2019

**Union Gas Parkway West
Wildlife Habitat Enhancement**
Role: Ecologist / Landscape
Architect
2013

**Brantford-Kirkwall Pipeline Fill
Area Restoration**
Role: Ecologist / Landscape
Architect
2015

Enbridge GTA Pipeline
Role: Ecologist / Landscape
Architect
2015-2016

**GTA Parkway Loop
Wildlife Monitoring**
Role: Ecologist
2013-2015

Melissa was tasked with preparing support materials for an OEB application to replace and existing residential distribution gas pipeline. She coordinated ecological field investigations, prepared the terrestrial component of an Environmental Report, and prepared a Natural Heritage Report.

The purpose of this project was to provide habitat for Species at Risk on the site, increase habitat diversity, and restore connectivity between natural areas within the local landscape. Melissa was part of the team that developed a conceptual wildlife habitat enhancement plan for additional lands surrounding a proposed compressor station.

As part of the Brantford-Kirkwall pipeline construction project, ecological restoration plans were needed for the infill of a pond and low-lying areas on the grounds of the African Lion Safari. In addition to addressing the areas of concern, Melissa's plan provided increased area for public and wildlife use and featured a combination of native herbaceous and woody species in 5m buffers along existing wetland/area edges to protect these sensitive features. Plant selection was based on existing vegetation and typical wetland communities in the project area.

Melissa developed post-construction pipeline corridor restoration plans to replace natural vegetation cover and enhance wildlife habitat function within the corridor (ie. pollinators), and assisted with vegetative stabilization methods for work within stream channels. The restoration plan used Ecological Land Classification (ELC) vegetation units to characterize all areas proposed for removal. Vegetation replacement was then calculated by estimating the average cover or density of vegetation expected for a typical ELC unit. Multiple stakeholders (Infrastructure Ontario, Hydro One Networks Inc., and local conservation authorities) were involved during development of the plan in order to ensure all corridor uses and safety concerns were considered and incorporated as necessary.

Melissa coordinated field surveys of restored grassland bird habitat and an existing Great Blue Heron rookery, and reviewed summary deliverables, as part of the client's environmental commitments under the Ontario Energy Board Approval.

**US Wildlife Habitat Council
Wildlife at Work Certifications**
Role: Ecologist / Landscape
Architect
2010-2012

**Louisiana Wetlands Mitigation
Bank**
Role: Ecologist / Landscape
Architect
2011-2012

**Surplus Property Restoration and
Disposition**
Blacksburg, South Carolina
Role: Ecologist / Landscape
Architect
2009-2012

**Tools for Evaluating Conservation
End-use Potential of
Former Industrial Properties**
Role: Ecologist / Landscape
Architect
2009-present

Wildlife Habitat Council is a non-profit organization dedicated to enhancing and restoring wildlife habitat on corporate lands, and which provides certifications to companies managing land for wildlife. Melissa assisted with site-specific wildlife habitat enhancement projects and the certification of individual sites, including preparation of the Wildlife Habitat Management Plan. She was also involved in the development of a corporate-wide WHC certification strategy for ExxonMobil.

This pilot project with Natural Land Management Inc. was designed to evaluate and develop a conservation-based end-use strategy for a 4,500 acre property in southern Louisiana owned by Shell Oil Company. Melissa provided a GIS-based evaluation of the property's ecological attributes and developed several general end-use scenarios. She coordinated with wetland mitigation experts to develop a wetland mitigation banking strategy for the property.

Melissa assisted a remediation consultant with the design of a conceptual restoration plan and provided peer-review of detailed design and construction documentation prior to construction. As part of the disposition process, the team assisted the client with preparing a detailed disposition strategy, selecting a suitable land trust to hold a conservation easement on the property, facilitating meetings between the selected land trust and project team, drafting terms of the conservation easement, and developing documents for client internal management reviews.

Melissa was responsible for developing tools to screen the client's portfolio of surplus properties as well as to evaluate individual sites for conservation end-use potential. In 2011 the screening tool was applied to all surplus properties in the U.S., identifying approximately 10% of properties as candidates for further evaluation. The framework developed for evaluating properties utilizes GIS data to quantitatively and qualitatively evaluate a property's potential for a conservation end-use using metrics grouped in the following categories: ecosystem services, biodiversity, and community services. This framework has been used to evaluate more than a dozen surplus properties in North America and Europe. Many of these sites are being progressed toward a conservation-based disposition as a result of these evaluations.

Mining

Hardrock Project Biodiversity Mitigation and Management Plan, Geraldton
Role: Lead Ecologist
2018-2021

Tomclid Open Pit Mine, Ompah
Role: Ecologist
2013

Agrium Kapuskasing Reclamation Monitoring Plan, Kapuskasing
Role: Ecologist / Landscape Architect
2014

Bicycle & Pedestrian Studies

Melissa developed and implemented a Biodiversity Mitigation and Management Plan for use during operation of a gold mine.

Melissa prepared an evaluation of natural heritage constraints for expansion of the Tomclid Open Pit Mine, with support from a Senior Ecologist. She assisted in preparation of the Information Gathering Form for submission to MNR with respect to Species at Risk concerns on the subject property.

Melissa co-wrote a terrestrial ecosystems monitoring plan for implementation during closure of a phosphate mine in northern Ontario. The monitoring plan will provide the client with specific criteria for monitoring, evaluating and reporting on the status of revegetation at the mine site. Implementation of the plan will provide the information required to demonstrate revegetation success through the establishment of self-sustaining ecosystems or identify problems for mitigation through adaptive management.

Under the direction of a Senior Landscape Architect and a Transportation Engineer, Melissa coordinated the network evaluation and planning component of these projects. Her tasks involved updating and revising the on-road bicycle route GIS database, preparing display panels for public consultation, participating in client and steering committee meetings, and participating in public open houses.

Role: GIS Lead and Landscape Architect (Intern)

- City of Burlington | Cycling Master Plan | 2008-2009
- City of Ottawa | Cycling Plan | 2007-2009
- City of Waterloo | Transportation Master Plan | 2009
- City of Ottawa | Pedestrian Plan | 2008-2009
- City of Milton | Jaycee Park Trail Study and Open Space Master Plan | 2007
- City of London | Cycling Master Plan Feasibility Study | 2007
- Municipality of Cape Breton | Regional Active Transportation Plan | 2007-2008
- City of Cambridge | Bikeway Network Plan | 2008-2009
- Municipality of Chatham-Kent | Trail Master Plan | 2008-2009
- Haldimand County | Trail Master Plan | 2008-2009

Landscape & Trail Design

Role: Landscape Architect

- Maitland Park and Loafer's Lake, Brampton | Trail Realignment | 2009
- City of St. John's, Newfoundland | Grand Concourse Walkway | 2009
- City of Woodstock | Thames Trail Plan | 2007
- City of London | Medway Valley Trail Plan | 2007
- City of St. John's, Newfoundland | Grand Concourse Walkway | 2009
- City of Brampton | Goreway Meter Station and Woodlot Compensation | 2007
- City of Guelph | Pine Meadows Community Stormwater Management and Natural Areas Buffer Planting Design | 2007
- City of Guelph | Gordon-Norfolk Streetscape Design | 2007
- City of Guelph | Oren Reid Park Open Space and Wildlife Corridor | 2005
- City of Kitchener | Victoria Place Retirement Residence Landscape Design | 2005

Publications

- Congdon, J., **M. Cameron**, W. Hollet, N. Dickson, J. Austin and R. Brooks. Manuscript under review (2020). Eggs to hatchlings, the components of reproduction of Sonoran Mud Turtles (*Kinosternon sonoriense*) in southeastern Arizona.
- Cameron, M.** and R. St. Clair. COSEWIC status report on the Pacific pond turtle, *Clemmys marmorata*, in COSEWIC assessment and status report on the Pacific pond turtle, *Clemmys marmorata*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario, 2002.
- Cameron, M.** and R. St. Clair. COSEWIC status report on the rubber boa, *Charina bottae*, in COSEWIC assessment and status report on the rubber boa, *Charina bottae*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario, 2003.
- Cameron, M.** COSEWIC status report on the snapping turtle, *Chelydra serpentina*, in COSEWIC assessment and status report on the snapping turtle, *Chelydra serpentina*, in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario, 2007.
- Cameron, M.**, R. Brooks, N. Goodenough, K. McNichols and P. Wesley. Demography, Home Range and Habitat Utilization of Wood Turtles (*Clemmys insculpta*) in the Algoma District. Unpublished project report to the Ontario Ministry of Natural Resources (MNR), 2002.
- Cameron, M.** and R. Brown. A Metapopulation Approach to Endangered Species Recovery Using Rehabilitated Aggregate Extraction Sites. Annual meeting of the US Chapter of the International Association of Landscape Ecology, Tucson, Arizona, 2007.
- Cameron, M.** and R. Brooks. Maitland River Wood Turtle Population Analysis. Annual meeting of the Canadian Amphibian and Reptile Conservation Network, Pelee Island, Ontario, 2003.
- Cameron, M.** and R.J. Brooks. Maitland river valley wood turtle population analysis. Unpublished report to the Ontario Ministry of Natural Resources (MNR), 2002.
- Cameron, M.** Short chapters on Pacific Gopher Snake and Bullsnake. Ecology, Conservation and Status of Reptiles in Canada. Editors: Carolyn Seburn and Christine Bishop, 2007.

Presentations

- Oral Presentation: **Cameron, M.**, R. Brooks and J. Congdon. Adaptive significance of diapause in the turtle family Kinosternidae. Ontario Ecology and Ethology Colloquium, University of Toronto, Ontario, Canada, 2004.
- Poster Presentation: **Cameron, M.** and R. Brooks. Application of life history theory and population modeling to the conservation of a southern Ontario population of wood turtles. Canadian Society of Zoologists, Wilfred Laurier University, Ontario, Canada, 2003.



Will's main responsibilities include life science data collection to support Environmental Impact Studies and Environmental Assessments. This involves completion of three-season plant inventories, vegetation classification according to Ecological Land Classification for southern Ontario and wetland evaluations according to Ontario Wetland Evaluation System. He is also qualified to prepare tree risk assessment surveys, tree preservation reports, and tree identification / health assessments. Will also is responsible for design, tendering, site supervision and post-construction inspection habitat enhancement and / or creation. He has participated in various fish sampling and salvage projects and has developed an expertise in bird identification by sight and song to conduct breeding bird inventory surveys. Other duties include the design and production of report graphics, maps and digital drawings.

Will Huys

Title: Plant and Wildlife Technician

Professional Experience

Education

Basic Surveying | Fanshawe College | 2012

Landscape Design | Fanshawe College | 2000

Professional Designations

ISA Certified Arborist #ON-1183A | International Society of Arboriculture

Tenure with MTE

Since 2005

Professional Development

ISA TRAQ

Ontario Wetland Evaluation

Butternut Health Assessor

Electro-fishing Class 2

Ecological Land Classification

Standard First Aid & CPR

WHIMIS

Memberships

Field Botanists of Ontario

Ontario Field Ornithologists

Work History

Plant and Wildlife Technician | MTE Consultants | 2005-Present



**Adelaide Street North
Apartments, London
Tree Assessment
Role: Arborist**

**Summerside Residential
Subdivision, London
Tree Assessment
Role: Arborist**

**Comfort Lands Residential
Subdivision, London
Tree Assessment
Role: Arborist**

**Winston Churchill Boulevard
Industrial Development, Oakville
Woodland Assessment
Role: Arborist**

**Aggregate Act Level 1 & 2 Natural
Environment Field Work
Role: Plant and Wildlife Technician**

**Natural Heritage Studies Field
Work
Role: Plant and Wildlife Technician**

**Tree Preservation / Appraisal
Role: Arborist**

MTE was retained to prepare a Tree Preservation Report and plan for existing trees prior to construction of a nine-unit residential building on the property. Will was the Arborist responsible for the onsite assessment and preparation of the report. His report outlined the number, type and location of the trees, as well as tree protection measures.

Will was responsible for carrying out an assessment of trees prior to construction of an outlet structure. The outlet was designed to provide water to a swamp within a development project. He also outlined tree protection measures for the contractor.

This project involves the development and construction of a residential subdivision with internal roads and infrastructure. The client required a Tree Preservation Report to satisfy a Draft Plan Condition. Will carried out the assessment and summarized his findings in a report. A total of 610 trees were studied as part of the report, of which 305 will be preserved and new trees will be planted as part of the development.

Will was a member of the project team responsible for assessing an existing woodland to determine if the site contained a Significant Woodland. This was required by the client as part of the approval process for development. The team visited the site on several occasions as part of the assessment. Their findings were captured in a report for the client that included observations and recommendations.

Johnston Bros. Ltd. | Erwin Pit #2, Putnam
McCann Redi-Mix Inc. | Millian Pit, Auburn
AAROC Aggregates Ltd., | Hamilton Road Pit, Putnam
Thames Valley Aggregates Inc. | Clendinning Pit, Banner
Johnston Brothers | Erwin Pit, Putnam
Johnston Brothers | Tote Road Pit, London
Jennison Construction Ltd. | JCL Staff 2 Pit, Staffa

Southside Group | Topping Lands, London
London Properties | Caledon Mt. Road, Caledon
Drewlo Holdings | South Ross Lands, London
Azar | Tilbury Development
Storey Samways | Lot Development, Lighthouse Cove
Quagiatto Developments | Martin Lane, Amherstburg
York Developments | W3 Farms, London

Drewlo Holdings | Pond Mills Subdivision, London
Glenn Powell | Storey Drive Single Lot Development, St. Marys
Terracorp | Apartment Complex Re-landscaping, London
Co-operators | Post Impact Tree Appraisal, Mt. Brydges



Renewable Energy
Role: Plant and Wildlife Technician

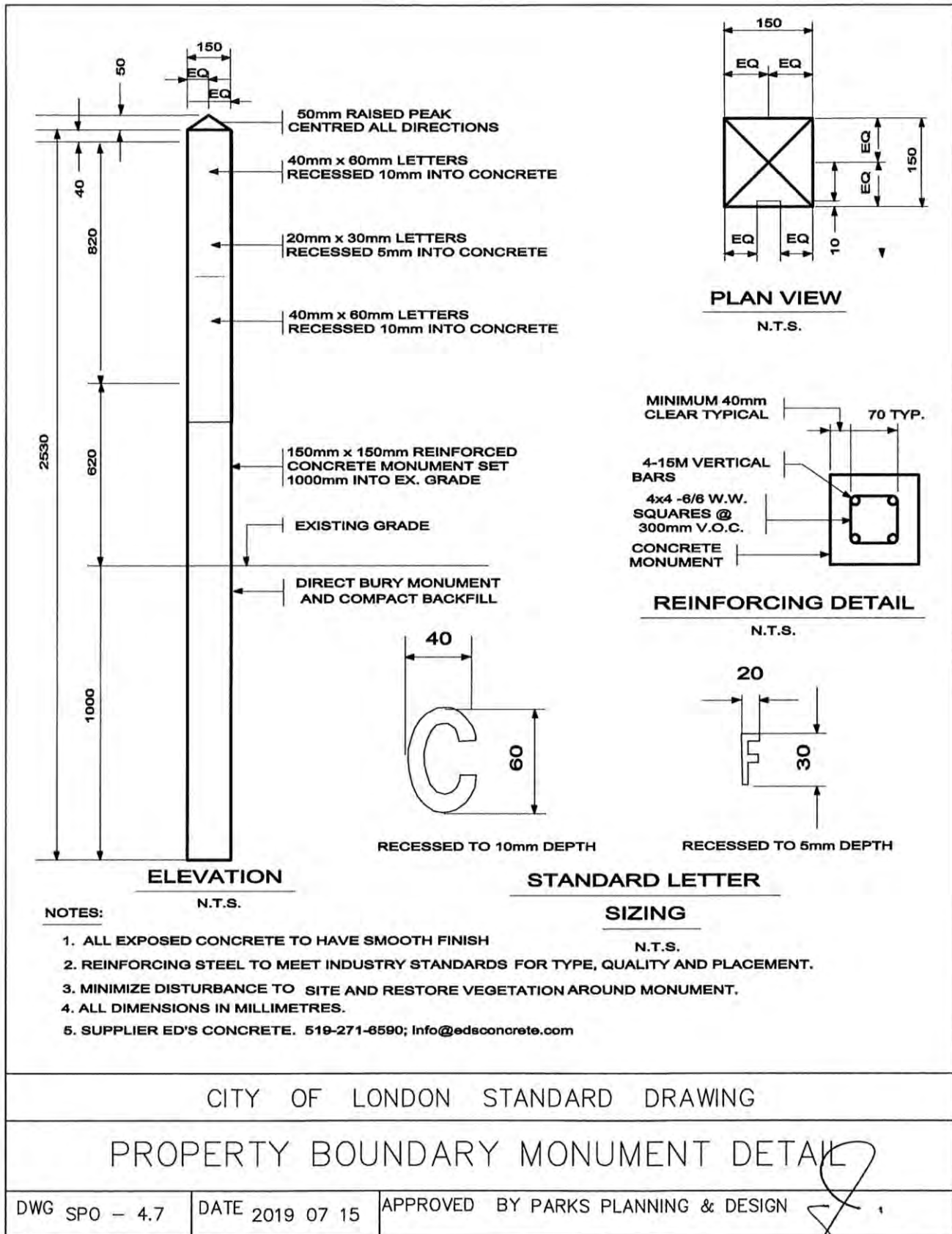
Electro-fishing
Role: Plant and Wildlife Technician

Kent Breeze Suncor | Post Construction Monitoring
Petewawa Renewable Energy

Fekete Drain, London
Detroit River International Crossing, Windsor
Grand Marais Drain, Windsor

Appendix G

City Monument Design Example



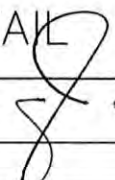
CITY OF LONDON STANDARD DRAWING

PROPERTY BOUNDARY MONUMENT DETAIL

DWG SPO - 4.7

DATE 2019 07 15

APPROVED BY PARKS PLANNING & DESIGN



Appendix H

“Living with Natural Areas” Homeowner Brochure (UTRCA, 2005)



Living With Natural Areas

a guide for homeowners

Is this information for me?

Natural areas are valuable features of our communities' parks and open spaces. Many citizens, however, may not be aware of these local treasures and the need to protect them. What can you do - whether as a property owner or as someone out to enjoy the scenery and get some exercise - to minimize your impact on natural areas? This brochure answers that question. First, it provides guidelines for those of us who live near natural areas, outlining ways to make the spillover impact from our properties more positive. Next, a "code of behaviour" describes what activities are appropriate in a natural area. The last section lists sources where more information can be obtained.



What is a natural area?

Natural areas include wetlands, meadows, woodlots, valley lands and other relatively undisturbed lands that are home to many different plants and wildlife. Natural areas also include the green spaces and stormwater management ponds found in many new developments.

Some natural areas contain rare plants, wildlife or landforms, or have features characteristic of the region before European settlement, or are especially large or diverse in habitat. Many natural areas are considered environmentally significant on a local, regional, provincial or even national scale.

Many municipalities are working to preserve local natural areas. Settlement and development have destroyed much natural vegetation and caused some types of habitat to disappear completely. Often, natural areas contain the only remaining large sections of forest or wetland. They help us to learn about nature, provide clues to the current health of our environment, and add to our quality of life.

Around your home - having a positive impact

The properties that surround natural areas were once part of a wild landscape. Some yards still have remnants of particular habitat types, such as wet areas along the edge of a wetland. As development moves closer to natural areas, trees and other plants that were once in the middle of woodlands or wetlands, shielded by forests, are now exposed.

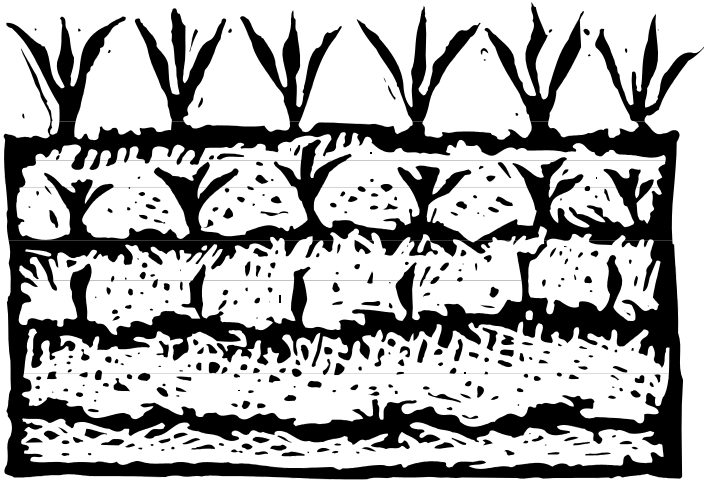
Because urban development sits on the doorstep of many natural areas, what is done in neighbouring yards is critical to their health. Here are some ideas to help home owners to ensure that their activities can help neighbouring natural areas and enhance their yards at the same time.



What about encroachment into natural areas?

Thanks to people who recognize their property limits! If a lawn is mowed past property boundaries into a natural area, the rich habitat is replaced by a manicured lawn and the original diversity is reduced. The cumulative impact of dozens, even hundreds of landowners cutting into the edges of natural areas threatens their integrity.

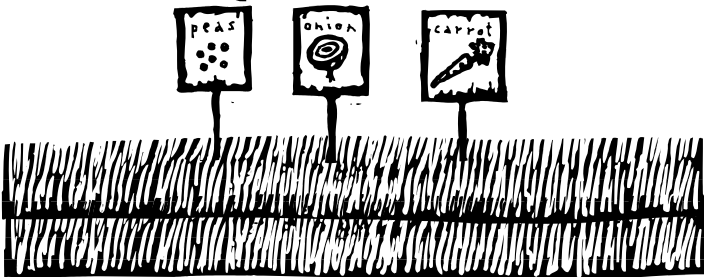
Encroaching past private lot lines into municipal parkland or open space is not permitted and may result in legal proceedings. Call your municipality for more information.



Can I dump my yard & garden waste in a natural area?

Dumped yard waste is bad news for any natural area. Dumped material smothers natural vegetation, may contain harmful chemicals, and often has plant seeds not found normally in the wild. If these materials are dumped in a natural area, the introduced seeds may grow where they fall. Native plants and the wildlife that depends on are constantly under threat from invading non-native plants.

Your local municipality has by-laws concerning dumping waste. For more serious offences, charges can be laid under the Provincial Offences Act, with fines of up to \$5000. Call your municipality if you have concerns about waste being dumped illegally.

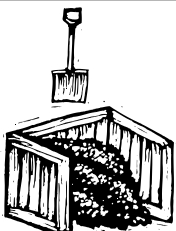


What should I do with yard & garden waste?

The best solution is to reduce and recycle as much as possible, by composting leaves, grass clippings, weeds and other materials on your own property. You reduce the amount of garbage going to landfills and create rich soil for your lawn and garden. If you can't use all your grass clippings, leaves and brush, ask your neighbours if they need more material for their home composters. Alternatively, put your yard waste out for curbside collection, or drop it off at London's Yard Waste Depots.

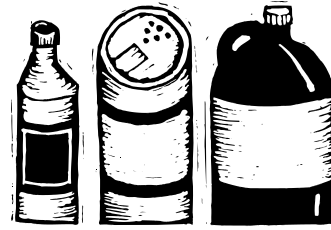
If you employ a professional gardener, check that proper disposal practices are followed. Reputable commercial gardeners are well aware of the City's yard waste regulations.

If you are having home composting problems, such as visits from unwanted wildlife, call the Rot Line (operated by the Thames Region Ecological Association, or TREA) at 519-672-5991 for free advice.



Is it okay to use lawn and garden chemicals?

Remember that, just as water landing on your property doesn't always stay there, neither may all the chemicals that you put on your lawn, garden or driveway. If your property drains into a natural area, any chemical that you use can be carried by water into that area. By adopting an environmentally friendly approach to yard maintenance, you will enhance both your yard and the natural area beyond.



Here are some tips to follow:

- Add compost to your lawn to fertilize it.
- Use a mulching lawnmower to return nutrients to your lawn.
- Cut your lawn at a high setting to reduce weed growth and retain moisture.
- Water grass early in the morning and allow it to dry out between waterings.
- Use alternative native ground covers in shaded areas.
- If you live next to a natural area, consider creating a buffer strip (up to 5 metres wide) on your property. Plant native shrubs and trees in the buffer to reduce the spillover effect.
- Investigate non-toxic alternatives to chemicals for control of pests, weeds and plant diseases.
- If you have to use pesticides, read the product labels carefully and use only as directed. Dispose of household and pool chemicals safely.



Did you know that, in general, approximately 10 times more pesticides are applied by city home owners than are used by farmers on an equal area of farm land?

Does it matter what I grow in my garden?

Alien alert! Be careful when growing plants that are not native to Southern Ontario. Plants don't recognize property boundaries and can spread easily from gardens to natural areas. Many alien species do not have natural predators here and are extremely invasive. For example, the beautiful European import called Purple Loosestrife is flourishing across North America, invading wetlands and out-competing native plants. As a result, plant diversity is reduced and fewer places remain where native wildlife can survive.

Other common species that out-compete native plants are Norway Maple, Periwinkle, and Goutweed (Goat's Foot). Check with your local nursery to find out which plants are native to your region before purchasing. Native plants are better adapted to the climate, soil conditions, insects and diseases of this area.



Many municipalities or counties have information on plants that are suitable for use near natural areas and which plants to avoid.

Can I attract wildlife to my yard?

Habitat loss is the number one threat to wildlife today. With time and careful planning, you can create habitat in your back yard and provide a safe haven for many species to visit. Wildlife will be attracted by food, water and shelter, but these elements must be arranged so that birds and animals are not exposed to danger. Cats can have a major impact on bird and animal populations. Keeping your cat indoors from May to July will reduce its impact on nesting birds and small animals. Squirrels drawn to birdfeeders will also eat eggs and nestlings.



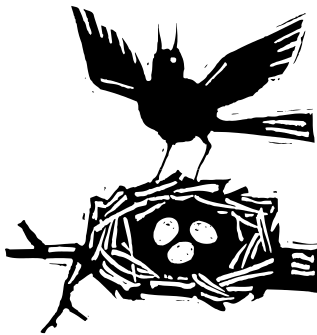
A natural area can be a great source of scenic beauty and pleasure. These areas may also be home to insects, such as mosquitoes, that are an important link in the food chain. Suitable clothing and insect repellents will help you avoid becoming part of the chain.



Stepping out in a natural area - "Take only memories, leave only footprints"

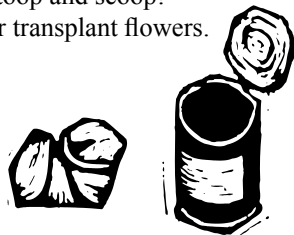


Many natural areas are accessible to the public. Local significant areas may contain rare and endangered plants and animals, unique landforms, and habitats that are prized for their high quality and diversity. However, the very features that make them precious are also those that could be easily damaged by thoughtless actions. Most damage occurs when people leave the marked trails and trample vegetation. By following the guidelines below, you can enjoy these natural areas without harming them, and leave them in a healthy state for their "residents" and future visitors.



Rules to remember in a natural area

- Please use the official access points and managed trails. Don't create or use trails that originate in people's backyards, as these additional trails cause more widespread trampling and disturbance of wildlife and plants.
- Avoid walking in natural areas when the trails are muddy, such as in the early spring or after a heavy rainfall. More vegetation gets trampled when people have to walk around mudholes.
- Please respect signs indicating that bicycles are not permitted in a natural area.
- Keep natural areas litter free.
- Keep dogs leashed. Cats and dogs are hunters by nature. If allowed to run loose, they put great stress on or kill birds and small animals. Don't forget to stoop and scoop!
- Do not disturb wildlife or pick or transplant flowers.



Can I take anything from a natural area?

Natural areas are often the only wild place remaining for rare native wildflowers to grow. These plants may have complicated life cycles or need seeds from existing flowers to regenerate the next year. Removing even a few plants can jeopardize the remaining population. Some garden centres stock a wide variety of native plants, trees and shrubs. These have a much better chance of surviving in your yard as they have been raised under similar soil and light conditions.

It is tempting to pick plants for food or herbal remedies, but this practice, just like transplanting, is not appropriate or sustainable. Even a few people picking plants can put the local population of that species in danger. Besides, those plants have a more important role in the natural environment than as food or medicine for humans!

A natural area is no place to find firewood or lawn decorations. Taking dead wood from a natural area will hurt that area's health in the long-term. As wood decays, it contributes nutrients to the soil and provides food and shelter for thousands of tiny organisms. In addition, new growth often depends on old stumps and logs. Cutting trees and brush destroys habitat, tramples vegetation and disturbs wildlife.

Enjoy wildlife when you discover it, but leave it in its natural setting. Don't make survival harder by taking animals out of their homes, leaving fewer behind to carry on. It is impossible to give a wild animal the proper care and nutrition to keep it healthy and happy. Also, it is illegal to keep wild animals, even injured ones, in captivity without a permit.

You can help out the local naturalist and trail groups that regularly remove litter from the natural areas. Pick up any litter that you find and dispose of it properly, and, of course, don't leave any more behind!





Beware!

If you encounter a plant with three shiny green leaflets, leave it alone! You may have found poison ivy, which is abundant in many natural areas. Many people get nasty rashes from the sap of this plant, whether from direct contact with the leaves, roots and stems or from touching pets or equipment that have the sap on them. Remember, though, that poison ivy is part of the food chain, growing berries that are edible for birds and animals. Learn to recognize and avoid it, rather than trying to get rid of it. Poison ivy is usually found in partial shade as a knee-high ground cover, but can also grow as a vine up tree trunks. "Leaflets three, let it be!"

Deer, Deer!

If you are bothered by deer foraging in your backyard, here are some suggestions to protect your garden.

Make your garden unpalatable - Garden centres and the Internet are good sources of information on "deer proof plants." Beebalm, bleeding heart, butterfly bush, cone flower, foxglove and rhododendron are among the plants that deer don't like eating.

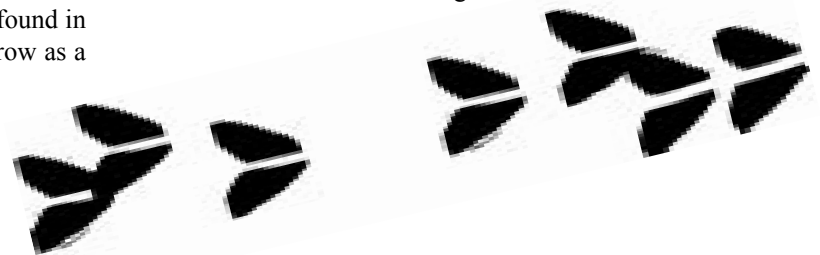
Make the fringes unpalatable - Surround your property with unpalatable and repellent native plants, and the deer may decide to forage elsewhere. Cedar and yew are delicacies for deer and should be avoided. White spruce, tamarack and juniper are good substitutes as deer will avoid them.

Block the view - Deer want an unobstructed view to see approaching predators and do not like to venture past anything that they cannot see through or over. A trellis covered in vines may discourage them.

Block the landing sites - Deer will not jump into your yard if they cannot see where they will land. Wooden fences or lattices that obstruct their view are a good deterrent.

Tidy up - Pick fruit such as apples and pears as they ripen, and remove or till under plants in the vegetable garden after harvest.

Fence them out - Specific trees or beds can be protected with mesh or screen. The barriers should be at least two metres high and at least half a metre from the foliage.



Where can I find out more?

More information on being a good natural neighbour:

- For composting tips call the "Rot Line" at 519-672-5991. This free service is offered to the public by the Thames Region Ecological Association (TREA).
- *Backyard Habitats* (pamphlet) and *Natural Invaders* (booklet). Available from the Federation of Ontario Naturalists at 1-800-440-2366, www.ontarionature.org
- Johnson, Lorraine, 1995. *The Ontario Naturalized Garden*. Whitecap Books, Toronto, Ontario.
- Ministry of Natural Resources, 1990. *Landscaping for Wildlife*. Queen's Printer for Ontario, Ontario.
- Rubin, Carole, 1989. *How to Get your Lawn & Garden off Drugs*. Friends of the Earth, Ottawa, Ontario.

This brochure was published in 2005 by the Upper Thames River Conservation Authority, and based on *Living with Natural Areas - A Guide for Citizens of London*, originally produced by the Upper Thames River Conservation Authority, the City of London's Ecological and Environmental Planning Advisory Committee, and Celebrate the Thames.

UPPER THAMES RIVER

CONSERVATION AUTHORITY

Inspiring a healthy environment

1424 Clarke Road, London, Ontario N5V 5B9
519-451-2800 www.thamesriver.on.ca

Appendix I

Environmental Management Plan (EMP)



February 9, 2023
MTE File No.: 51594-100

Fine Home Design
367 Edgeworth Avenue
London, ON N5W 5C3
finehomedesign@rogers.com

To whom it may concern,

RE: Environmental Management Plan (EMP) for 1176 Crumlin Sideroad, London, ON

Fine Home Design (the 'Proponent') has initiated the Draft Plan Approval and Zoning By-Law Amendment approval process for the severance of a lot into three parcels (the 'Project') on a property located at 1176 Crumlin Sideroad, south of Dundas Street, in the City of London (the 'Subject Lands'). MTE Consultants has been retained to prepare a Focused Environmental Impact Study (EIS), including an Environmental Management Plan (EMP), for the proposed development. The EIS (MTE, 2022) provides recommendations for avoidance and mitigation measures to protect adjacent significant natural heritage features. This EMP has been prepared to complement the Focused EIS and provide the mitigation and monitoring recommendations from the Focused EIS (MTE, 2022) in the order to be completed.

Based on the analysis of the Subject Lands in the Focused EIS (MTE, 2022), the significant features identified on or adjacent to the Subject Lands are:

- Significant Woodland (Community 2)
- Significant Valleyland
- Candidate Significant Wildlife Habitat
- Fish Habitat
- Potential Habitat of Threatened and Endangered Species
- Water Resource Systems

1.0 Pre-Construction

Pre-construction planning includes defining the project, identifying potential risks, and mitigating risks before development begins. The recommendations are to be completed prior to the initiation of construction activities.

Buffer Establishment

The proposed Severance Plan will provide an OS4 zone that builds upon the existing Open Space area to incorporate buffers to the natural heritage features surrounding the Loveless Municipal Drain within the Subject Lands [Figure 8; MTE, 2022] in accordance with the London Environmental Management Guidelines (2021). This OS4 zone, as agreed upon with the City of London, is defined as 30 m from the high-water mark of the drain plus contiguous woodland vegetation. This buffer is shown on Figure 8 of the EIS and protects the Significant Woodland, Candidate SWH for bat roosting and Eastern Wood-pewee, possible fish habitat, and potential habitat for endangered bat species inside the OS4 zone. The west side of the buffer will be naturalized where woodland vegetation does not already exist, and the east side will continue to be used for agricultural activities. Naturalization activities are described in more detail in the Focused EIS and under Section 3.0 Post-Construction of this EMP.

Other Design and Pre-Construction Considerations

Recommendation 1:

A point of access to the existing agricultural access over the Loveless Municipal Drain should be established to retain agricultural access to Parcel 3 from both Parcels 1 and 2, while avoiding the OS4 zone. The proposed shared access alignment is shown on the Severance Plan on Figures 7 and 8 of the EIS.

Recommendation 2:

Prior to construction works on site, sediment and erosion control fencing should be installed around the ground disturbance limits of the construction area. The fence will act as a barrier to keep construction equipment and spoil away from the vegetation to remain and prevent erosion and sedimentation of the adjacent natural heritage features. Sediment and erosion control fencing is to be installed according to the City of London Design Specifications and Requirements Manual specifications (2019b) and The Erosion and Sediment Control Guide for Urban Construction (TRCA, 2019).

Recommendation 3:

Sediment and erosion control fencing should be inspected prior to construction to ensure it was installed correctly.

Recommendation 4:

Refer to the Tree Preservation Plan (MTE, 2022) for recommendations regarding tree protection and recommended removals within the Subject Lands.

Recommendation 5:

Soil stockpiles should be established in locations where natural drainage is away from the OS4 zone. If this is not possible and there is a possibility of any stockpile slumping and moving toward the edge of natural heritage features, the stockpiles should be protected with robust sediment and erosion controls.

Recommendation 6:

Contractors working at the site should ensure that construction equipment is in good working order. Equipment operators should have spill-prevention kits, where appropriate.

Recommendation 7:

Make workers aware of potential incidental encounters with wildlife. Refer to Recommendation 16 of this EMP.

2.0 During Construction

These recommendations are to be conducted from initiation of construction activities until a specified build-out stage as determined in consultation with the City of London.

Recommendation 8:

Avoid vegetation clearing during the migratory bird breeding season (April 1 to August 31) to ensure that no active nests are removed or disturbed. If works are proposed within the breeding season, the area should be checked for nesting birds by a qualified person prior to any vegetation removal or ground disturbance. If nesting birds are present, works in the area should not proceed until after August 31 or until the nest has been confirmed inactive (e.g., young have fledged).

Recommendation 9:

Access to stockpiles should be confined to the up-gradient side.

Recommendation 10:

Use Best Management Practices (BMPs) for fuel handling, storage, and onsite equipment maintenance activities to minimize the risk of contaminant release as a result of the proposed construction activities.

Recommendation 11:

During construction, the lands between the sediment and erosion control fencing should be maintained.

Recommendation 12:

Regular cleanup of the Subject Lands must be completed during construction and post-construction to ensure the adjacent natural heritage features are not degraded.

Recommendation 13:

Equipment should be cleaned prior to arrival on site including tires, undercarriage, and any part of the equipment that may transport invasive seeds to the site. Clean equipment protocols are provided by London's Invasive Plant Management Strategy (2017) and should be followed where appropriate.

Recommendation 14:

Sedimentation controls during site grading work must help control and reduce the turbidity of runoff that could flow to the Loveless Municipal Drain.

Recommendation 15:

Noise disturbance during construction should be limited to allowable hours per City of London By-law.

Recommendation 16:

If an animal enters the work site, work at that location will stop and the animal should be permitted to leave without being harassed. If there are repeat observations of wildlife in the work area, barrier fencing may be used to direct wildlife away from active construction and toward natural areas.

Recommendation 17:

Bank Swallow [THR] have not been identified within the Subject Lands, but the creation of suitable habitat (e.g. soil stockpiles) during construction should be avoided. Best management practices for deterring nesting during construction activities should be implemented (OMNRF, 2017). These measures should include stockpile slope management (i.e., grading stockpiles, eliminating vertical extraction faces, reducing slopes to 70 degrees or less) until at least July 15.

Monitoring Phase 1 - During Construction

The construction monitoring plan will monitor for construction-related impacts, document successes or deficiencies of the implemented mitigation measures and provide guidance on remedial actions for circumstances when mitigation is not successful [e.g. Erosion and Sedimentation Control (ESC) measures]. This plan should continue from clearing and grubbing through to home construction until construction is complete and grounds adjacent to natural features are vegetated and stabilized. Reports should be made available to the UTRCA and City of London Planning and Economic Development Staff.

Recommendation 18:

Sediment and erosion control fencing should be inspected prior to rain events during construction to ensure that the fencing is being maintained and functioning properly. Any issues that are identified are resolved as quickly as possible, ideally the same day.

Recommendation 19:

Monitor for tree damage during construction of the single-family home. Consult a certified arborist if damage has occurred.

3.0 Post-Construction

These recommendations are to be carried out following construction until the end of the Assumption of Development Stage.

Recommendation 20:

Sediment and erosion control fencing should not be removed until adequate re-vegetation and site stabilization has occurred. All disturbed areas should be re-seeded as soon as possible to maximize erosion protection and to minimize volunteer populations of invasive species which may spread to the adjacent feature. Additional re-vegetation plantings and/or more time for vegetation to establish may be required; however, two growing seasons are typically sufficient to stabilize most sites.

Recommendation 21:

Homeowners should be provided the “Living with Natural Areas” brochure published by UTRCA (2005) based on the *Living with Natural Areas - A Guide for Citizens of London* document. This brochure [Appendix H] outlines the impacts of various encroachment activities (ex: use of fertilizers, creation of trails, disposal of yard waste, introduction of invasive species, etc.) and ways homeowners can reduce their impacts on adjacent natural areas.

Recommendation 22:

Limit the use of commercial fertilizers, salts/ice melting additives, and other chemical applications within the Subject Lands, especially in areas that border the OS4 zone. Consideration may be given to using grass varieties which are hardier and require less extensive watering or fertilizers.

Naturalization

This section provides recommendations for the proposed naturalized buffer as delineated by the 30 m buffer from the high-water mark of the Loveless Municipal Drain and the woodland dripline.

Recommendation 23:

Naturalize the west OS4 buffer with native species wherever woodland vegetation is not present and provided agricultural access is not inhibited [Figure 9]. An Upland Woodland Edge seed mix suitable for site conditions should be used, as outlined in the Standard Contract Documents for Municipal Construction Projects 2020 Edition (City of London, 2020). 80% coverage is recommended. The contractor should follow the supplier’s recommendations for overseeding.

Recommendation 24:

If the removal of a tree is required for the shared access path, and the DBH is greater than 50 cm, a Private Tree Permit Application should be completed, and the appropriate number of replacement trees (as per Schedule A of the Tree Protection By-Law) should be planted on site. Replacement trees should be native to Ecoregion 7E.

Recommendation 25:

No mowing or encroachment should occur within the Naturalization Area. Small concrete monuments engraved with “OS4 Zone” should be installed along the west boundary of the Naturalization Area to clearly mark the permissible limits of mowing and maintenance. An example of City-designed monuments is provided in Appendix G of this EIS. The conceptual location of the monuments is shown on Figure 8.

Monitoring Phase 2 – Post-Construction

Long-term post-construction monitoring shall evaluate the success of the proposed active naturalization efforts. This plan should include remedial actions that are triggered if effects exceed pre-determined thresholds (e.g. supplemental plantings if survival rates are low). Recommendations for monitoring include, but are not limited to:

- Vegetation monitoring in the naturalized OS4 buffer should be completed for two years after planting to document compliance with the plans (e.g., the correct seed mix was used), and establishment of planted material. Implementation of adaptive management to correct deficiencies.
- Adaptive management strategies such as supplemental plantings, and/or control of non-native invasive species. Adaptive management may be triggered by poor survival/germination of seed mix (80% natural groundcover is target) and the presence of unacceptable non-native and invasive species.
- Check for tree damage post-construction of the single-family home. Consult a certified arborist if damage has occurred.

4.0 Conclusion

This Environmental Management Plan has provided recommendations to protect the adjacent significant natural heritage features from both direct and indirect impacts, through avoidance, mitigation, management, and monitoring. Timelines (pre-, during, and post-construction) have been outlined. Provided these recommendations are followed, it is our opinion that the proposed development will have no significant impacts on the adjacent natural heritage features.

Yours Truly,

MTE Consultants Inc.



Allie Leadbetter, B.Sc.
Biologist
519-204-6510 ext. 2243
aleadbetter@mte85.com

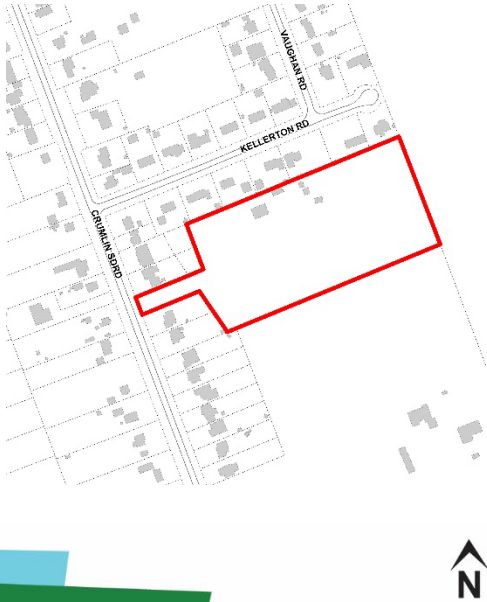


Melissa Cameron, M.Sc., M.LA, OALA
Manager, Ecology
519-204-6510 Ext. 2263
mcameron@mte85.com

NOTICE OF PLANNING APPLICATION

Zoning By-Law Amendment

1176 Crumlin Side Road



File: Z-9601

Applicant: Strik Baldinelli Moniz Ltd.

What is Proposed?

Zoning amendment to allow:

- The severance of two additional parcels and the retention of a third.
- Parcel 1: retain the existing single-detached dwelling.
- Parcel 2: to permit a single-detached dwelling.
- Parcel 3: retain the existing woodlot and agricultural lands.

LEARN MORE & PROVIDE INPUT

Please provide any comments by **April 12, 2023**

Brent House

bhouse@london.ca

519-661-CITY (2489) ext. 4078

Planning & Development, City of London

300 Dufferin Avenue, 6th Floor,

London ON PO Box 5035 N6A 4L9

File: Z-9601

london.ca/planapps

You may also discuss any concerns you have with your Ward Councillor:

Shawn Lewis

slewis@london.ca

519-661-CITY (2489) ext. 4002

**If you are a landlord, please post a copy of this notice where your tenants can see it.
We want to make sure they have a chance to take part.**

Application Details

Requested Zoning By-law Amendment

Possible change to Zoning By-law Z.-1 **FROM** a Residential R1 (R1-11) Zone, an Agricultural (AG1) Zone, and an Open Space (OS4) Zone **TO** a Residential R1 (R1-14) Zone, an Agricultural Special Provision (AG1(_)) Zone, and an Open Space Special Provision (OS4(_)) Zone. Changes to the currently permitted land uses and development regulations are summarized below.

The Zoning By-law is available at london.ca.

Current Zoning

Zone: Residential R1 (R1-11) & Agricultural (AG1) & Open Space (OS4) Zone

Permitted Uses: Residential R1-11 Zone – single-detached dwellings. Agricultural (AG1) Zone – agricultural uses; livestock facilities provided that such facilities are located at least 300 metres from the City’s Urban Growth boundary; or in accordance with the MDS regulations, whichever is greater; Farm Dwelling; Forestry uses; Kennels; Conservation lands; Wayside pits; Nursery; Passive recreation use; Farm market; Small Wind Energy Conversion System; Greenhouse farm. Open Space (OS4) Zone – Conservation lands; Conservation works; Passive recreation uses which include hiking trails and multi-use pathways; Managed woodlots.

Requested Zoning

Zone: Residential R1 (R1-14) & Agricultural Special Provision (AG1(_)) & Open Space Special Provision (OS4(_)) Zones

Permitted Uses: Residential R1-11 Zone – single-detached dwellings. Agricultural (AG1) Zone – agricultural uses; livestock facilities provided that such facilities are located at least 300 metres from the City’s Urban Growth boundary; or in accordance with the MDS regulations, whichever is greater; Farm Dwelling; Forestry uses; Kennels; Conservation lands; Wayside pits; Nursery; Passive recreation use; Farm market; Small Wind Energy Conversion System; Greenhouse farm. Open Space (OS4) Zone – Conservation lands; Conservation works; Passive recreation uses which include hiking trails and multi-use pathways; Managed woodlots.

The City may also consider the use of holding provisions, and additional special provisions to facilitate the proposed development.

Planning Policies

Any change to the Zoning By-law must conform to the policies of the Official Plan, London’s long-range planning document. These lands are currently designated as Rural Neighbourhoods Place Type, as well as Green Space Place Type and Farmland Place Type.

The subject lands are in the Rural Neighbourhoods & Green Space & Agricultural Place Types in The London Plan, permitting single detached dwellings, including infill development for the Rural Neighbourhoods Place Type. The lands also permit agricultural uses, within the Farmland Place Type. The lands also permit varying permitted uses within the Green Space Place Type, depending on the natural heritage features and areas contained on the subject lands, the hazards that are present, and the presence of natural resources which are to be protected.

How Can You Participate in the Planning Process?

You have received this Notice because someone has applied to change the zoning of land located within 120 metres of a property you own, or your landlord has posted the notice of application in your building. The City reviews and makes decisions on such planning applications in accordance with the requirements of the Planning Act. The ways you can participate in the City’s planning review and decision-making process are summarized below.

See More Information

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Reply to this Notice of Application

We are inviting your comments on the requested changes at this time so that we can consider them as we review the application and prepare a report that will include Planning &

Development staff's recommendation to the City's Planning and Environment Committee. Planning considerations usually include such matters as land use, development intensity, and form of development.

Attend a Future Public Participation Meeting

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Personal information collected and recorded at the Public Participation Meeting, or through written submissions on this subject, is collected under the authority of the Municipal Act, 2001, as amended, and the Planning Act, 1990 R.S.O. 1990, c.P.13 and will be used by Members of Council and City of London staff in their consideration of this matter. The written submissions, including names and contact information and the associated reports arising from the public participation process, will be made available to the public, including publishing on the City's website. Video recordings of the Public Participation Meeting may also be posted to the City of London's website. Questions about this collection should be referred to Evelina Skalski, Manager, Records and Information Services 519-661-CITY(2489) ext. 5590.

Accessibility

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Living With Natural Areas

a guide for homeowners

Is this information for me?

Natural areas are valuable features of our communities' parks and open spaces. Many citizens, however, may not be aware of these local treasures and the need to protect them. What can you do - whether as a property owner or as someone out to enjoy the scenery and get some exercise - to minimize your impact on natural areas? This brochure answers that question. First, it provides guidelines for those of us who live near natural areas, outlining ways to make the spillover impact from our properties more positive. Next, a "code of behaviour" describes what activities are appropriate in a natural area. The last section lists sources where more information can be obtained.



What is a natural area?

Natural areas include wetlands, meadows, woodlots, valley lands and other relatively undisturbed lands that are home to many different plants and wildlife. Natural areas also include the green spaces and stormwater management ponds found in many new developments.

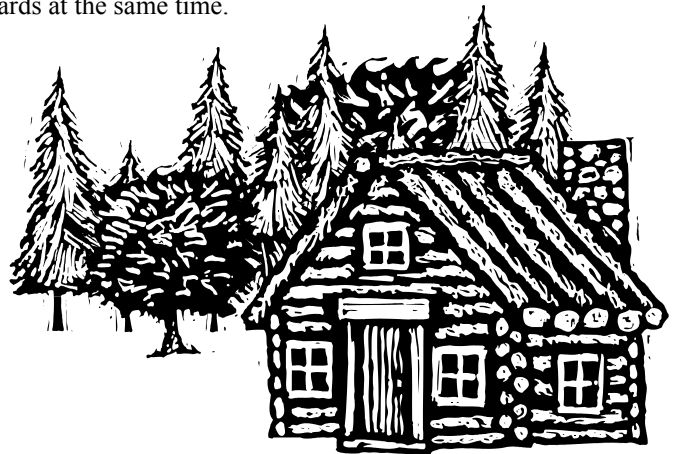
Some natural areas contain rare plants, wildlife or landforms, or have features characteristic of the region before European settlement, or are especially large or diverse in habitat. Many natural areas are considered environmentally significant on a local, regional, provincial or even national scale.

Many municipalities are working to preserve local natural areas. Settlement and development have destroyed much natural vegetation and caused some types of habitat to disappear completely. Often, natural areas contain the only remaining large sections of forest or wetland. They help us to learn about nature, provide clues to the current health of our environment, and add to our quality of life.

Around your home - having a positive impact

The properties that surround natural areas were once part of a wild landscape. Some yards still have remnants of particular habitat types, such as wet areas along the edge of a wetland. As development moves closer to natural areas, trees and other plants that were once in the middle of woodlands or wetlands, shielded by forests, are now exposed.

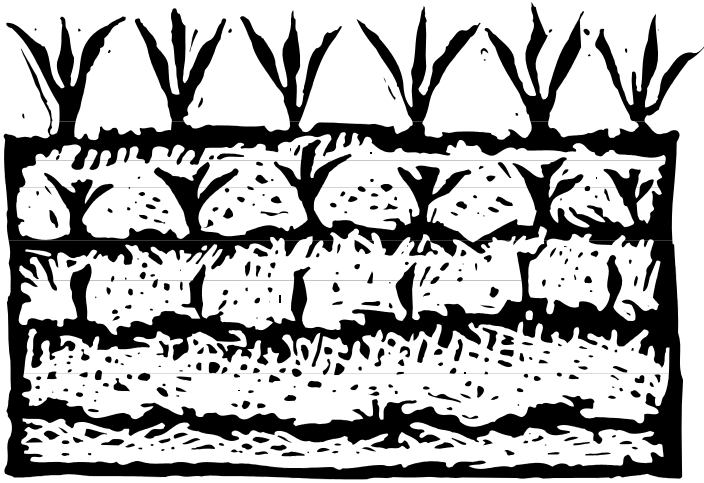
Because urban development sits on the doorstep of many natural areas, what is done in neighbouring yards is critical to their health. Here are some ideas to help home owners to ensure that their activities can help neighbouring natural areas and enhance their yards at the same time.



What about encroachment into natural areas?

Thanks to people who recognize their property limits! If a lawn is mowed past property boundaries into a natural area, the rich habitat is replaced by a manicured lawn and the original diversity is reduced. The cumulative impact of dozens, even hundreds of landowners cutting into the edges of natural areas threatens their integrity.

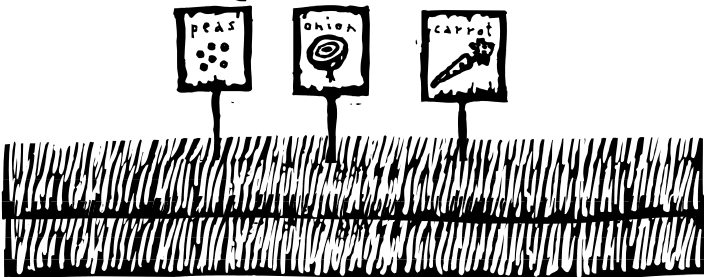
Encroaching past private lot lines into municipal parkland or open space is not permitted and may result in legal proceedings. Call your municipality for more information.



Can I dump my yard & garden waste in a natural area?

Dumped yard waste is bad news for any natural area. Dumped material smothers natural vegetation, may contain harmful chemicals, and often has plant seeds not found normally in the wild. If these materials are dumped in a natural area, the introduced seeds may grow where they fall. Native plants and the wildlife that depends on are constantly under threat from invading non-native plants.

Your local municipality has by-laws concerning dumping waste. For more serious offences, charges can be laid under the Provincial Offences Act, with fines of up to \$5000. Call your municipality if you have concerns about waste being dumped illegally.

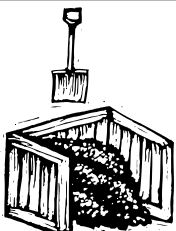


What should I do with yard & garden waste?

The best solution is to reduce and recycle as much as possible, by composting leaves, grass clippings, weeds and other materials on your own property. You reduce the amount of garbage going to landfills and create rich soil for your lawn and garden. If you can't use all your grass clippings, leaves and brush, ask your neighbours if they need more material for their home composters. Alternatively, put your yard waste out for curbside collection, or drop it off at London's Yard Waste Depots.

If you employ a professional gardener, check that proper disposal practices are followed. Reputable commercial gardeners are well aware of the City's yard waste regulations.

If you are having home composting problems, such as visits from unwanted wildlife, call the Rot Line (operated by the Thames Region Ecological Association, or TREA) at 519-672-5991 for free advice.



Is it okay to use lawn and garden chemicals?

Remember that, just as water landing on your property doesn't always stay there, neither may all the chemicals that you put on your lawn, garden or driveway. If your property drains into a natural area, any chemical that you use can be carried by water into that area. By adopting an environmentally friendly approach to yard maintenance, you will enhance both your yard and the natural area beyond.



Here are some tips to follow:

- Add compost to your lawn to fertilize it.
- Use a mulching lawnmower to return nutrients to your lawn.
- Cut your lawn at a high setting to reduce weed growth and retain moisture.
- Water grass early in the morning and allow it to dry out between waterings.
- Use alternative native ground covers in shaded areas.
- If you live next to a natural area, consider creating a buffer strip (up to 5 metres wide) on your property. Plant native shrubs and trees in the buffer to reduce the spillover effect.
- Investigate non-toxic alternatives to chemicals for control of pests, weeds and plant diseases.
- If you have to use pesticides, read the product labels carefully and use only as directed. Dispose of household and pool chemicals safely.



Did you know that, in general, approximately 10 times more pesticides are applied by city home owners than are used by farmers on an equal area of farm land?

Does it matter what I grow in my garden?

Alien alert! Be careful when growing plants that are not native to Southern Ontario. Plants don't recognize property boundaries and can spread easily from gardens to natural areas. Many alien species do not have natural predators here and are extremely invasive. For example, the beautiful European import called Purple Loosestrife is flourishing across North America, invading wetlands and out-competing native plants. As a result, plant diversity is reduced and fewer places remain where native wildlife can survive.

Other common species that out-compete native plants are Norway Maple, Periwinkle, and Goutweed (Goat's Foot). Check with your local nursery to find out which plants are native to your region before purchasing. Native plants are better adapted to the climate, soil conditions, insects and diseases of this area.



Many municipalities or counties have information on plants that are suitable for use near natural areas and which plants to avoid.

Can I attract wildlife to my yard?

Habitat loss is the number one threat to wildlife today. With time and careful planning, you can create habitat in your back yard and provide a safe haven for many species to visit. Wildlife will be attracted by food, water and shelter, but these elements must be arranged so that birds and animals are not exposed to danger. Cats can have a major impact on bird and animal populations. Keeping your cat indoors from May to July will reduce its impact on nesting birds and small animals. Squirrels drawn to birdfeeders will also eat eggs and nestlings.



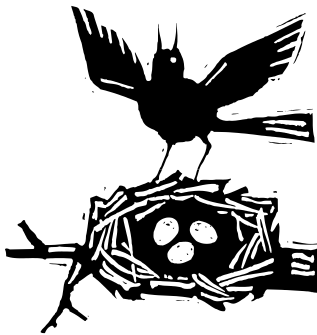
A natural area can be a great source of scenic beauty and pleasure. These areas may also be home to insects, such as mosquitoes, that are an important link in the food chain. Suitable clothing and insect repellents will help you avoid becoming part of the chain.



Stepping out in a natural area - "Take only memories, leave only footprints"

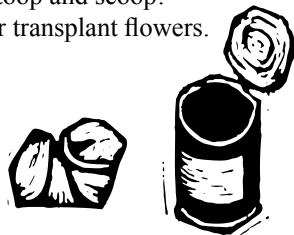


Many natural areas are accessible to the public. Local significant areas may contain rare and endangered plants and animals, unique landforms, and habitats that are prized for their high quality and diversity. However, the very features that make them precious are also those that could be easily damaged by thoughtless actions. Most damage occurs when people leave the marked trails and trample vegetation. By following the guidelines below, you can enjoy these natural areas without harming them, and leave them in a healthy state for their "residents" and future visitors.



Rules to remember in a natural area

- Please use the official access points and managed trails. Don't create or use trails that originate in people's backyards, as these additional trails cause more widespread trampling and disturbance of wildlife and plants.
- Avoid walking in natural areas when the trails are muddy, such as in the early spring or after a heavy rainfall. More vegetation gets trampled when people have to walk around mudholes.
- Please respect signs indicating that bicycles are not permitted in a natural area.
- Keep natural areas litter free.
- Keep dogs leashed. Cats and dogs are hunters by nature. If allowed to run loose, they put great stress on or kill birds and small animals. Don't forget to stoop and scoop!
- Do not disturb wildlife or pick or transplant flowers.



Can I take anything from a natural area?

Natural areas are often the only wild place remaining for rare native wildflowers to grow. These plants may have complicated life cycles or need seeds from existing flowers to regenerate the next year. Removing even a few plants can jeopardize the remaining population. Some garden centres stock a wide variety of native plants, trees and shrubs. These have a much better chance of surviving in your yard as they have been raised under similar soil and light conditions.

It is tempting to pick plants for food or herbal remedies, but this practice, just like transplanting, is not appropriate or sustainable. Even a few people picking plants can put the local population of that species in danger. Besides, those plants have a more important role in the natural environment than as food or medicine for humans!

A natural area is no place to find firewood or lawn decorations. Taking dead wood from a natural area will hurt that area's health in the long-term. As wood decays, it contributes nutrients to the soil and provides food and shelter for thousands of tiny organisms. In addition, new growth often depends on old stumps and logs. Cutting trees and brush destroys habitat, tramples vegetation and disturbs wildlife.

Enjoy wildlife when you discover it, but leave it in its natural setting. Don't make survival harder by taking animals out of their homes, leaving fewer behind to carry on. It is impossible to give a wild animal the proper care and nutrition to keep it healthy and happy. Also, it is illegal to keep wild animals, even injured ones, in captivity without a permit.

You can help out the local naturalist and trail groups that regularly remove litter from the natural areas. Pick up any litter that you find and dispose of it properly, and, of course, don't leave any more behind!





Beware!

If you encounter a plant with three shiny green leaflets, leave it alone! You may have found poison ivy, which is abundant in many natural areas. Many people get nasty rashes from the sap of this plant, whether from direct contact with the leaves, roots and stems or from touching pets or equipment that have the sap on them. Remember, though, that poison ivy is part of the food chain, growing berries that are edible for birds and animals. Learn to recognize and avoid it, rather than trying to get rid of it. Poison ivy is usually found in partial shade as a knee-high ground cover, but can also grow as a vine up tree trunks. “Leaflets three, let it be!”

Deer, Deer!

If you are bothered by deer foraging in your backyard, here are some suggestions to protect your garden.

Make your garden unpalatable - Garden centres and the Internet are good sources of information on “deer proof plants.” Beebalm, bleeding heart, butterfly bush, cone flower, foxglove and rhododendron are among the plants that deer don’t like eating.

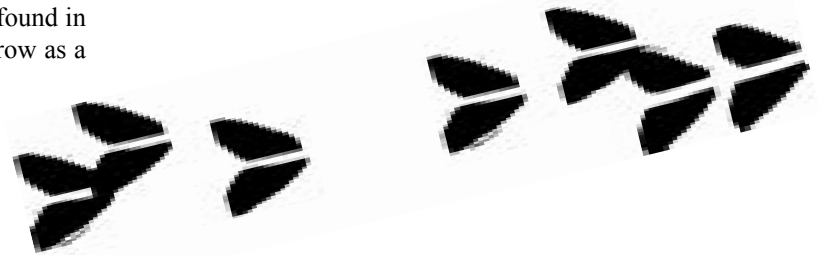
Make the fringes unpalatable - Surround your property with unpalatable and repellent native plants, and the deer may decide to forage elsewhere. Cedar and yew are delicacies for deer and should be avoided. White spruce, tamarack and juniper are good substitutes as deer will avoid them.

Block the view - Deer want an unobstructed view to see approaching predators and do not like to venture past anything that they cannot see through or over. A trellis covered in vines may discourage them.

Block the landing sites - Deer will not jump into your yard if they cannot see where they will land. Wooden fences or lattices that obstruct their view are a good deterrent.

Tidy up - Pick fruit such as apples and pears as they ripen, and remove or till under plants in the vegetable garden after harvest.

Fence them out - Specific trees or beds can be protected with mesh or screen. The barriers should be at least two metres high and at least half a metre from the foliage.



Where can I find out more?

More information on being a good natural neighbour:

- For composting tips call the “Rot Line” at 519-672-5991. This free service is offered to the public by the Thames Region Ecological Association (TREA).
- *Backyard Habitats* (pamphlet) and *Natural Invaders* (booklet). Available from the Federation of Ontario Naturalists at 1-800-440-2366, www.ontarionature.org
- Johnson, Lorraine, 1995. *The Ontario Naturalized Garden*. Whitecap Books, Toronto, Ontario.
- Ministry of Natural Resources, 1990. *Landscaping for Wildlife*. Queen’s Printer for Ontario, Ontario.
- Rubin, Carole, 1989. *How to Get your Lawn & Garden off Drugs*. Friends of the Earth, Ottawa, Ontario.

This brochure was published in 2005 by the Upper Thames River Conservation Authority, and based on *Living with Natural Areas - A Guide for Citizens of London*, originally produced by the Upper Thames River Conservation Authority, the City of London’s Ecological and Environmental Planning Advisory Committee, and Celebrate the Thames.

UPPER THAMES RIVER

CONSERVATION AUTHORITY

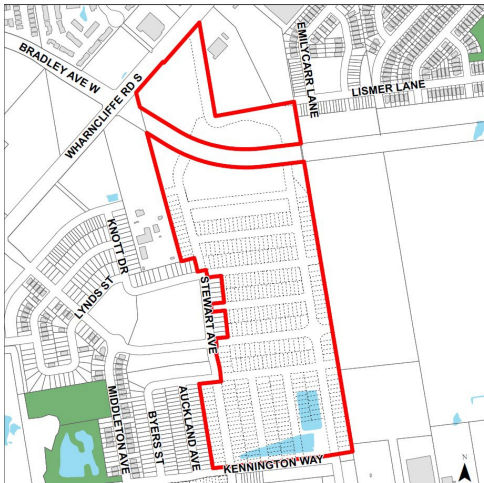
Inspiring a healthy environment

1424 Clarke Road, London, Ontario N5V 5B9
519-451-2800 www.thamesriver.on.ca

NOTICE OF PLANNING APPLICATION

REVISED Draft Plan of Subdivision and Zoning By-law Amendment

Richardson North Subdivision 146 Exeter Road



File: 39T-22502 / Z-9528

Applicant: 1103125 Ontario Inc.

What is Proposed?

Draft Plan of Subdivision and Zoning amendment to allow:

- 307 single detached residential lots
- 16 low density street townhouse blocks
- 4 medium density residential blocks
- 1 commercial block
- 2 open space/drainage blocks
- 6 new streets



LEARN MORE & PROVIDE INPUT

Please provide any comments by **June 14, 2023**

Sean Meksula

smeksula@london.ca

519-661-CITY (2489) ext. 5349

Planning & Development, City of London, 300 Dufferin Avenue, 6th Floor,
London ON PO BOX 5035 N6A 4L9

File: 39T-22502 / Z-9528

london.ca/planapps

You may also discuss any concerns you have with your Ward Councillor:

Elizabeth Pelosa

epelosa@london.ca 519-661-CITY (2489) ext. 4012

**If you are a landlord, please post a copy of this notice where your tenants can see it.
We want to make sure they have a chance to take part.**

Application Details

Requested Draft Plan of Subdivision

Consideration of a Draft Plan of Subdivision consisting of 307 single detached lots; one (16) low density townhouse blocks, four (4) medium density residential blocks; one (1) commercial block; (2) open space/drainage blocks; twelve (12) road widening and reserve blocks, serviced by six (6) new local streets (Street Q, R, S, T, U and V).

Requested Zoning By-law Amendment

To change the zoning from a Urban Reserve UR6 Zone and Holding Light Industrial h-17*LI3 Zone to a Residential Special Provision R1 (R1-13(7)), Residential Special Provision R4 (R4-4(2)), Holding Residential Special Provision R5/R6 (R5-4()/R6-5()), Restricted Service Commercial Special Provision/ Arterial Commercial Special Provision RSC1/RSC2()/RSC3(16)/RSC4(14)/RSC5(16)/(AC4()), Open Space (OS1), Open Space (OS5), Open Space Special Provision (OS5()) and Urban Reserve Special Provision UR4(9) Zone. Changes to the currently permitted land uses and development regulations are summarized below.

The Zoning By-law is available at london.ca.

Requested Zoning (Please refer to attached map)

Zone(s): Residential Special Provision R1 (R1-13(7)) Zone to permit single detached dwellings on lots with a minimum 6.0 metre rear yard setback and garages shall not project beyond the façade of the dwelling or façade (front face) of any porch, and shall not occupy more than 50% of lot frontage; a Residential Special Provision R4 (R4-4(2)) Zone, to permit street townhouse dwellings with a minimum lot frontage of 6.7 metres, a minimum lot area of 160m², a minimum exterior side yard setback of 1.2 metres, a minimum interior side yard setback of 1.2 metres, maximum lot coverage of 45% and maximum height of 10.5 metres; a Holding Residential Special Provision h-198/R5/R6 (R5-4()/R6-5()) Zone, to permit cluster townhouses dwellings and cluster stacked townhouse dwellings, at a minimum density of 30 units per hectare and a maximum height of 14.0 m; R6-5 - cluster single detached dwellings, cluster semi-detached dwellings, cluster duplex dwellings, cluster triplex dwellings, cluster townhouse dwellings, cluster apartment buildings and cluster fourplex dwellings, at a minimum density of 30 units per hectare, and a maximum height of 14m; a Restricted Service Commercial Special Provision/ Arterial Commercial Special Provision RSC1/RSC2()/RSC3(16)/RSC4(14)/RSC5(16)/(AC4()) Zone to permit a range of moderate intensity commercial uses, and trade service uses, which may require significant amounts of land for outdoor storage or interior building space and a location on major streets; a Arterial Commercial (AC) Zone provides for and regulates a mix of small scale retail, office, personal service and automotive uses located along arterial roads which serve both vehicular and pedestrian trade; an Open Space (OS1) Zone, to permit conservation lands, conservation works, cultivation of land for agricultural/horticultural purposes, golf courses, private and public parks, recreational golf courses, recreational buildings associated with conservation lands and public parks, campground, and managed forest; an Open Space (OS5) Zone, to permit conservation lands, conservation works, passive recreation uses which include hiking trails and multi-use pathways, and managed woodlots; and Urban Reserve Special Provision UR4(9) zone provides for and regulates existing uses on lands which are primarily undeveloped for urban uses, with a minimum lot area of 160 square metres and no minimum lot frontage requirement.

The City may also consider applying holding provisions in the zoning to ensure adequate provision of municipal services, that a subdivision agreement or development agreement is entered into, and to ensure completion of noise assessment reports and implementation of mitigation measures for development in proximity to arterial roads

An Environmental Impact Study has been prepared to assist in the evaluation of this application.

Planning Policies

Any change to the Zoning By-law must conform to the policies of the London Plan, London's long-range planning document. The subject lands are in the 'Neighbourhoods' and 'Commercial Industrial' Place Types in *The London Plan*.

How Can You Participate in the Planning Process?

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The Planning and Environment Committee will consider the requested Draft Plan of Subdivision and zoning changes on a date that has not yet been scheduled. The City will send you another notice inviting you to attend this meeting, which is required by the Planning Act. You will also be invited to provide your comments at this public participation meeting. A neighbourhood or community association may exist in your area. If it reflects your views on this application, you may wish to select a representative of the association to speak on your behalf at the public participation meeting. Neighbourhood Associations are listed on the Neighbourgood website. The Planning and Environment Committee will make a recommendation to Council, which will make its decision at a future Council meeting. The Council Decision will inform the decision of the Director, Planning & Development, who is the Approval Authority for Draft Plans of Subdivision.

What Are Your Legal Rights?

Notification of Council and Approval Authority's Decision

If you wish to be notified of the Approval Authority's decision in respect of the proposed draft plan of subdivision, you must make a written request to the Director, Planning & Development, City of London, 300 Dufferin Ave., P.O. Box 5035, London ON N6A 4L9, or at plandev@london.ca. You will also be notified if you provide written comments, or make a written request to the City of London for conditions of draft approval to be included in the Decision.

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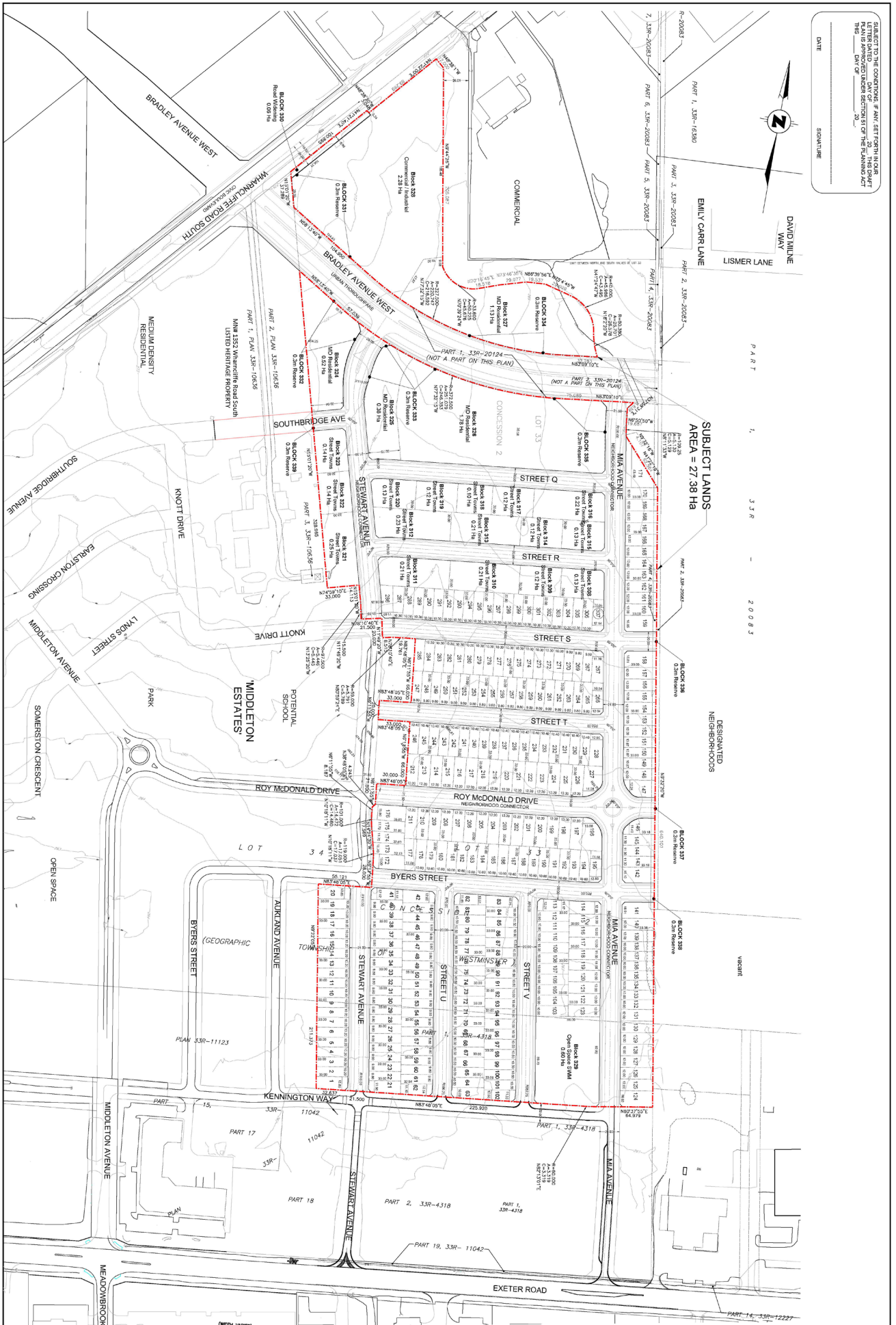
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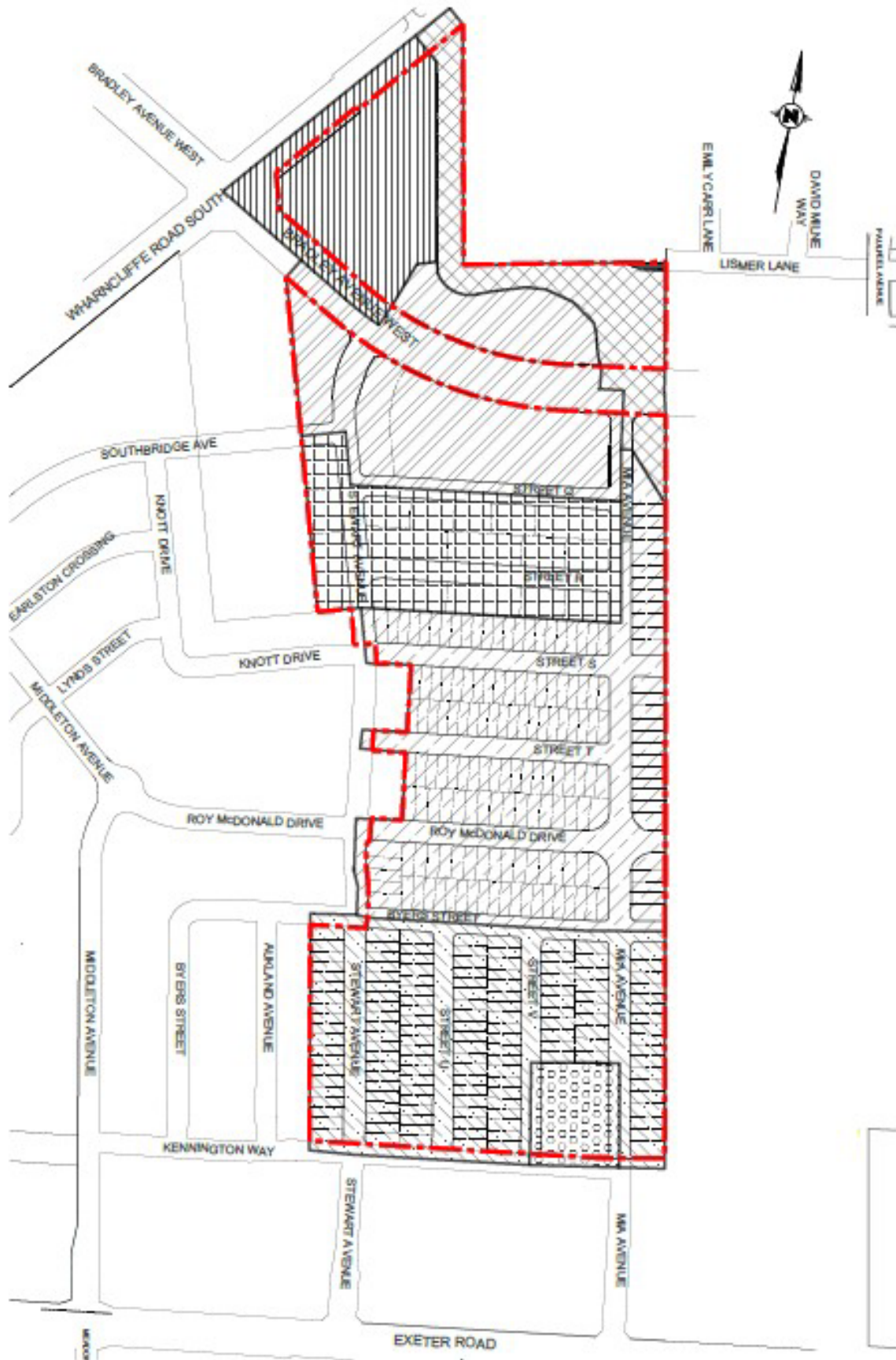
Revised Requested Draft Plan of Subdivision



<p>Monteith • Brown planning consultants</p> <p>DRAFT PLAN OF SUBDIVISION</p> <p>Part of Lot 33.35 of Concession 2 (Geographic) City of London County of Middlesex</p>		<p>OWNERS CERTIFICATE I, the undersigned, being the owner of the land shown on this plan, do hereby certify that the information given in this plan is true and correct to the best of my knowledge and belief.</p> <p>SUBDIVISION CERTIFICATE I, the undersigned, being the owner of the land shown on this plan, do hereby certify that the information given in this plan is true and correct to the best of my knowledge and belief.</p>		<p>RECORD OF SUBMISSION</p> <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>REMARKS</th> </tr> <tr> <td>1</td> <td>MAY 2020</td> <td>CITY REVIEW</td> </tr> <tr> <td>2</td> <td>MAY 2022</td> <td>CITY REVIEW</td> </tr> </table>		NO.	DATE	REMARKS	1	MAY 2020	CITY REVIEW	2	MAY 2022	CITY REVIEW															
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<p>LAND USE SCHEDULE</p> <table border="1"> <thead> <tr> <th>LAND USE</th> <th>AREA (M²)</th> <th>PERCENT</th> </tr> </thead> <tbody> <tr> <td>RESIDENTIAL</td> <td>1120</td> <td>4.0</td> </tr> <tr> <td>COMMERCIAL</td> <td>267</td> <td>9.8</td> </tr> <tr> <td>CONCESSION 2</td> <td>3.81</td> <td>13.9</td> </tr> <tr> <td>CONCESSION 3</td> <td>228</td> <td>8.3</td> </tr> <tr> <td>CONCESSION 4</td> <td>0.00</td> <td>2.2</td> </tr> <tr> <td>CONCESSION 5</td> <td>6.62</td> <td>24.0</td> </tr> <tr> <td>TOTAL SITE AREA</td> <td>27.38</td> <td>100.0</td> </tr> </tbody> </table>		LAND USE	AREA (M ²)	PERCENT	RESIDENTIAL	1120	4.0	COMMERCIAL	267	9.8	CONCESSION 2	3.81	13.9	CONCESSION 3	228	8.3	CONCESSION 4	0.00	2.2	CONCESSION 5	6.62	24.0	TOTAL SITE AREA	27.38	100.0	<p>PREPARED BY: ZEDCOR INC.</p> <p>DATE: May 12, 2022</p>		<p>SCALE: 1:1,500</p> <p>DATE: May 12, 2022</p>	
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The above image represents the applicant's proposal as submitted and may change.

Revised Requested Zoning



LEGEND	
	SUBJECT LANDS
	EX. ZONE LIMITS
	STREETLINE
	REZONE FROM UR6 TO R1-13(7)
	REZONE FROM LI3 TO R1-13(7)
	REZONE FROM LI3 TO OS1
	REZONE FROM UR6 TO R4-4(2)
	REZONE FROM UR6 TO RSC1, RSC1, RSC2(#), RSC3(16), RSC4(14) RSC5(16), AC4(#)
	REZONE FROM UR6 TO R5-4(#), R6-5(#), R-198
	REZONE FROM UR6 TO OS5(#)
	REZONE FROM UR6 TO UR6(9)



ZONING BY-LAW AMENDMENT SKETCH RICHARDSON NORTH SUBDIVISION

148 Exeter Road

Apr 28, 2023
20-2801
1: 5,000 (11x17)

The above image represents the applicant's proposal as submitted and may change.



HYDROGEOLOGICAL ASSESSMENT

**PROPOSED MIXED USE DEVELOPMENT
952 SOUTHDALE ROAD WEST, LONDON**

LDS PROJECT NO. GE-00085

REPORT DATE: AUGUST 18, 2021

Submitted to:

1739626 ONTARIO LTD.

Distribution (via email):

Mr. David Traher, Vice President, Planning/Development

Mr. Lyman Meddoui, President

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Appendix C – Groundwater Hydrographs

Appendix D – Site Photographs

Appendix E – Analytical Lab Results

Appendix F – MECP Well Record Summary

Appendix G – Water Balance

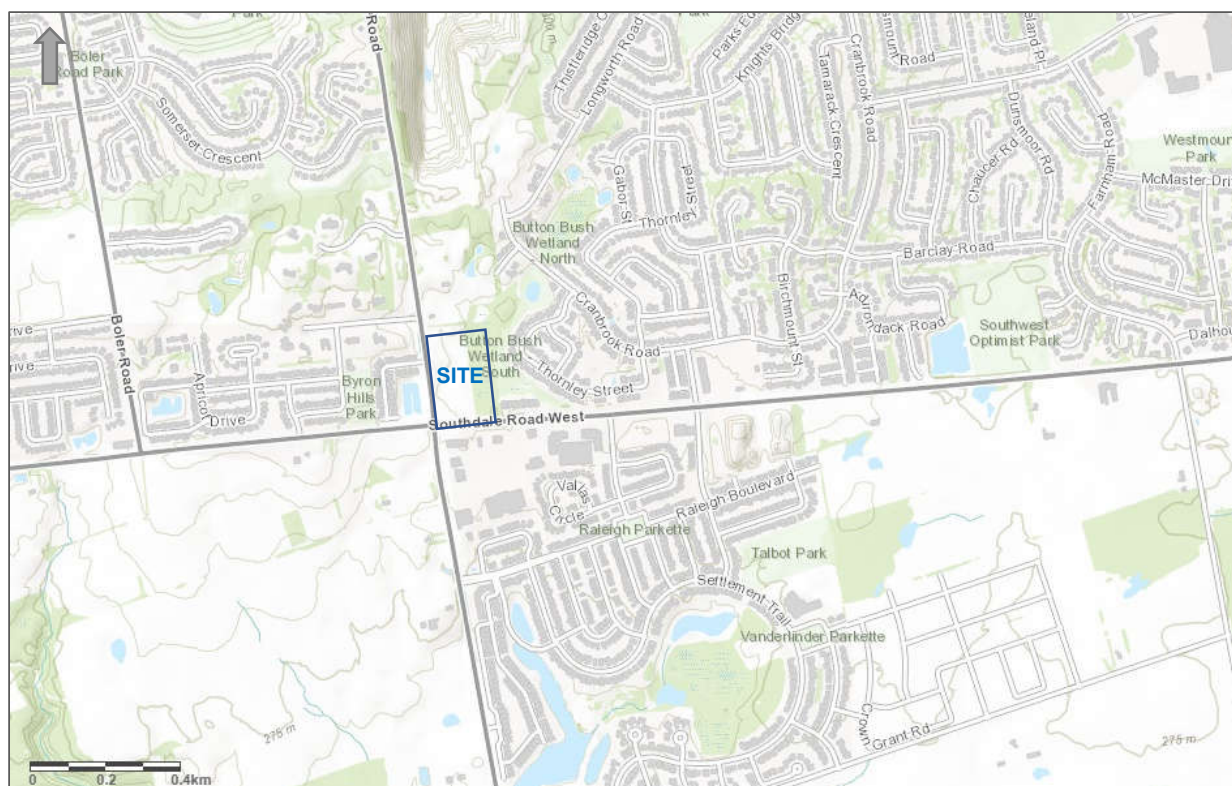
1.0 INTRODUCTION

LDS Consultants Inc. (LDS) has been retained by 1739626 Ontario Ltd. c/o Westdell Development Corp. to carry out a Preliminary Hydrogeological Assessment for a proposed commercial development in London, Ontario. The subject property is located at 952 Southdale Road, which is on the north-east junction of Colonel Talbot Road and Southdale Road in West London. The Legal description for the site is as follows:

- Concession 1, Part Lot 42 RP 33R8507, Part 1, City of London.

A key plan showing the site location is provided below as Figure 1, for reference.

Figure 1: Key Plan



The City of London zoning designation for this parcel of land is Urban Reserve, UR2. UR2 designation is applied to undeveloped areas within the former City boundaries and to areas which have been reviewed through the Community Plan Process. Under Schedule B1 of the City of London Official Plan, the site does not contain a natural heritage feature overlay over the property. However, Schedule B1 does identify the Buttonbush Wetland (to the east) as a Provincially Significant Wetland, along with unevaluated wetland patches north and northeast of the site.

The site is also located within the North Talbot Community Plan (prepared in December 1999) area. Of particular significance within the Community Plan, are the stormwater management objectives which have been established, for the purposes of maintaining and protecting the natural wetlands and natural heritage features in the area, to encourage the use of at-source and conveyance stormwater controls, encourage infiltration and groundwater recharge where possible, and provide at-source sedimentation and erosion control measures during construction. The Community Plan also identified that post-development runoff from the area north of Southdale Road (which includes the subject lands) will be intercepted at Southdale Road by a storm sewer, which directs stormwater flows to the Talbot Village stormwater management facility located to the south.

The site is located within the Dingman Creek watershed. The broader watershed area drains an area of approximately 170 km², and includes approximately 30 tributaries, most of which have been altered from their natural state as a result of urbanization.

Surface water run-off at the site collects into a pair of existing swales which cross the property in an east-west configuration, and drain towards the wetland area on the east side of the property. The wetland feature next to the site is the southerly limit of the Buttonbush Wetland.

The proposed development plans at the site include a mix of commercial and residential uses. The west end of the site is expected to have a series of 3-storey townhouse blocks, with surface parking. The central part of the site is expected to have a large grocery store, oriented towards Southdale Road West, with a central parking lot area. At the east end of the site, two smaller commercial buildings are planned, potentially housing restaurants, coffee shops, and/or office space.

This report contains the findings of the Hydrogeological Assessment for the proposed development on the subject lands.

1.1 Terms of Reference

This Report has been prepared for the purposes of examining hydrogeologic (groundwater) and hydrologic (surface water) characteristics of the site, and determining if the proposed commercial site development could result in adverse / negative impacts to natural features in the area. Of critical importance, is the Buttonbush Swamp/North Talbot Wetland, located along the eastern side of the property and beyond the eastern and north-eastern site boundaries, and providing recommendations to minimize potential negative impacts to the nearby natural features.

This hydrogeological report includes the following scoped elements:

- Site location and description;
- Summarised conditions, including topography, physiography, geology and borehole findings;
- Review of aerial photographs;
- Ministry of Environment, Conservation and Parks (MECP) well record review;
- Description of surface water features, drainage and functions;
- Discussion regarding shallow groundwater conditions;
- Water Quality testing on shallow groundwater and wetland samples;
- Preliminary Feature Based Water Balance Assessment (including a monthly breakdown) for baseflows to existing wetland;
- Impact assessment for potential impacts to the adjacent wetland and shallow groundwater, including considerations for groundwater recharge and discharge; and,
- A discussion for mitigation measures to be incorporated into the design and construction of the commercial development to prevent and / or limit negative impacts to the adjacent wetland, and shallow groundwater conditions at the site.

Prior to the issuance of this report, LDS undertook a pre-consultation discussion with City of London Hydrogeologist, Jeff Hachey on February 7, 2019. From that discussion, the following items were identified for inclusion in the Hydrogeological Report:

- Water quality data for the groundwater and surface water in the wetland.
- Details of the planned stormwater discharge, since a municipal storm sewer outlet is not available.
- Discussion outlining LID measures and soil / groundwater suitable to accommodate whatever LID measures are being considered.
- Discussion of mitigation measures to ensure that stormwater from the development will not cause further degradation to the water quality in the wetland.
- Construction dewatering discussion – identify estimated volumes and associated zone of influence, discuss how will impacts of dewatering be minimized/mitigated on the wetland, and outline requirements for treatment which will be part of the discharge plan for any pumped water.
- Outline recommendations for an environmental monitoring program to characterize water quality in the wetland during and post construction.

On September 17, 2020, a formal pre-consultation (Zoom) meeting was held to review the scoping of the Hydrogeological Report and Environmental Impact Study (EIS) being prepared in support of the proposed development. The following items were identified during meeting discussion to supplement the preliminary consultation noted above with City of London in February 2020:

- UTRCA advised that additional monitoring wells located away from the swales are recommended, along with multi-level piezometers should be considered for the wetland area. At least 3 wells required for each aquifer being assessed. Additional dataloggers and monitoring should be conducted.
- UTRCA advised that if water quality discussion relies on inferred presence of contaminants associated with SWM facilities up gradient, that additional water quality sampling would be required to support any such assumptions.
- City suggested use of the Hydrogeological Checklist table outlined in Section 6 of the current City Design Standards.
- City advised that a monitoring well should be located in LID areas (if known) to confirm stabilized and high groundwater conditions which may limit effectiveness.
- Construction dewatering recommendations required to address the need for EASR or PTTW, confirm zone of influence, and include recommendations to minimize amount of groundwater pumping required.

This report is provided on the basis of the terms noted above. The site investigation and recommendations provided in this report follow generally accepted practice for professional consultants carrying out geoscience and geotechnical work in Ontario. The format and content of this report has been guided to address specific client needs.

It is important to note that this report has been prepared to support the planning applications at the site, and that recommendations are provided to assist in the design of the proposed development. Ongoing fieldwork, data collection and monitoring is planned at the site, to provide additional data to support the preparation of a final Hydrogeological Report for the proposed development.

1.2 Coordination with Supporting Studies

LDS has been involved with site characterization work at this property since 2017, primarily for the purposes of preparing a Hydrogeological background study to support the proposed Official Plan amendment and Zoning change for the site development to proceed. In conjunction with the preparation of this Hydrogeological Report, LDS has also prepared the Geotechnical Report (October 2020) outlining geotechnical comments and recommendations related to the proposed site development.

LDS has coordinated with Stantec Consulting, with regards to site grading and stormwater management design aspects for the proposed development, to ensure that the Hydrogeological Report provides the information required to support their design efforts.

In addition, LDS has coordinated with MTE Consultants (formerly Biologic) with regards to the EIS work being completed by their staff, to ensure that this report provides the required information to complement and inform the EIS from a hydrogeologic and hydrologic standpoint.

LDS has also had regard for previous EIS work which was completed (by others) in the vicinity of the site, for the lands immediately east of the site. Previous reports which have been reviewed are outlined below:

- Environmental Impact Statement, Norquay Developments Limited, Dillon Consulting Limited, Project Reference 03-1844, report date February 2004.
- Phase II Crestwood Subdivision, Environmental Impact Study, Dillon Consulting Limited, Project Reference 05-5223, report date August 8, 2006.
- Phase II Highland Ridge Corp Property, Addendum Environmental Impact Study Letter Report, report date November 7, 2007.

As work continues through the planning and approvals process, it is anticipated that ongoing coordination will be required with the design team to ensure that the design of the proposed development is updated in a manner which addresses hydrogeological and ecological issues and concerns, to ensure that the approved development does not cause ‘adverse effects’ to the form and function of the Buttonbush Wetland feature, as defined in the Environmental Protection Act..

2.0 EXISTING CONDITIONS

2.1 Site Location and Description

2.1.1 Site Description

The subject site is located in the south-west portion of the City of London, on the northeast corner of Colonel Talbot Road and Southdale Road. The site occupies 6.37 acres (25.8 ha), and is roughly rectangular shaped. The property was historically occupied by agricultural cropland and is currently vacant. For an overview of the project area and general site features, refer to Drawing 1, in Appendix A

A portion of the Buttonbush Wetland (South) is located along the easterly extent of the property, and extends northeast and east of the property. It is understood that the Buttonbush Wetland was designated as a Provincially Significant Wetland in 2006. This natural feature is discussed further in Section 2.2.

Beyond the wetland area, the site is bordered by single family residential homes to the east, by a small-holding farm and house to the north, Southdale Road and commercial plaza to the south, and a stormwater pond and residential subdivision to the west, across Colonel Talbot Road.

Select site photographs are provided in Appendix D.

2.1.2 Site Topography

The site slopes to the east and south-east with significant drop in grade (approximately 4m) from Colonel Talbot Road at the western boundary of the property. The most significant change in grade at the site occurs along a 3 to 4 m high slope along the western site boundary, and then the site follows a general slope to the east towards the wetland area.

2.1.3 Surface Water Features

Surface drainage is generally from west to east and from north-west to south-east following the general area topography. Under existing conditions, stormwater which accumulates at the site generally follows overland swales which discharge to the east into the wetland, due to the low permeability shallow silty subgrade soils at the site.

Under existing conditions, stormwater which accumulates at the site generally follows overland swales which discharge to the east into the wetland. A series of auger probes which were advanced along the drainage swales contacted very little topsoil at surface. It is anticipated that over the years, the surficial topsoil has been conveyed towards the wetland with overland flows.

An aerial photograph (2018) is provided on Drawing 1 in Appendix A, shows the nearby site features and current surface drainage patterns.

A review of historical aerial photographs has been carried out - refer to select photographs provided on Drawings 2A and 2B, in Appendix A. Drawing 2A shows the development of the overland drains at the site, with the southerly of the two drains appearing in the aerial photograph from the mid 1950's, and the northerly swale appearing in the late 1960's. It is interesting to note that the Buttonbush Wetland in these photos appears to have maintained a linear westerly edge, and appears to be wooded in the earlier photos, and becomes more of a pronounced wetland feature with upland drainage paths which develop through the 1960s.

In more recent years (since 2000), urbanization of the lands to the northeast and east of the wetland, west of Colonel Talbot Road and south of Southdale Road West are shown at 5 year intervals on Drawing 2B. A wetland pocket (immediately south of Cranbrook Road) was converted into a SWM facility for the lands immediately east of the wetland feature. This pond was part of the broader linear wetland feature shown in the earlier aerial photographs. Urbanization of the upgradient area next to the wetland has resulted in some localized modifications to the physical limits of the wetland, where the development encroaches into the natural feature in sections which appear to have been straightened to accommodate residential lots and road alignments.

2.1.4 Systematic Drainage

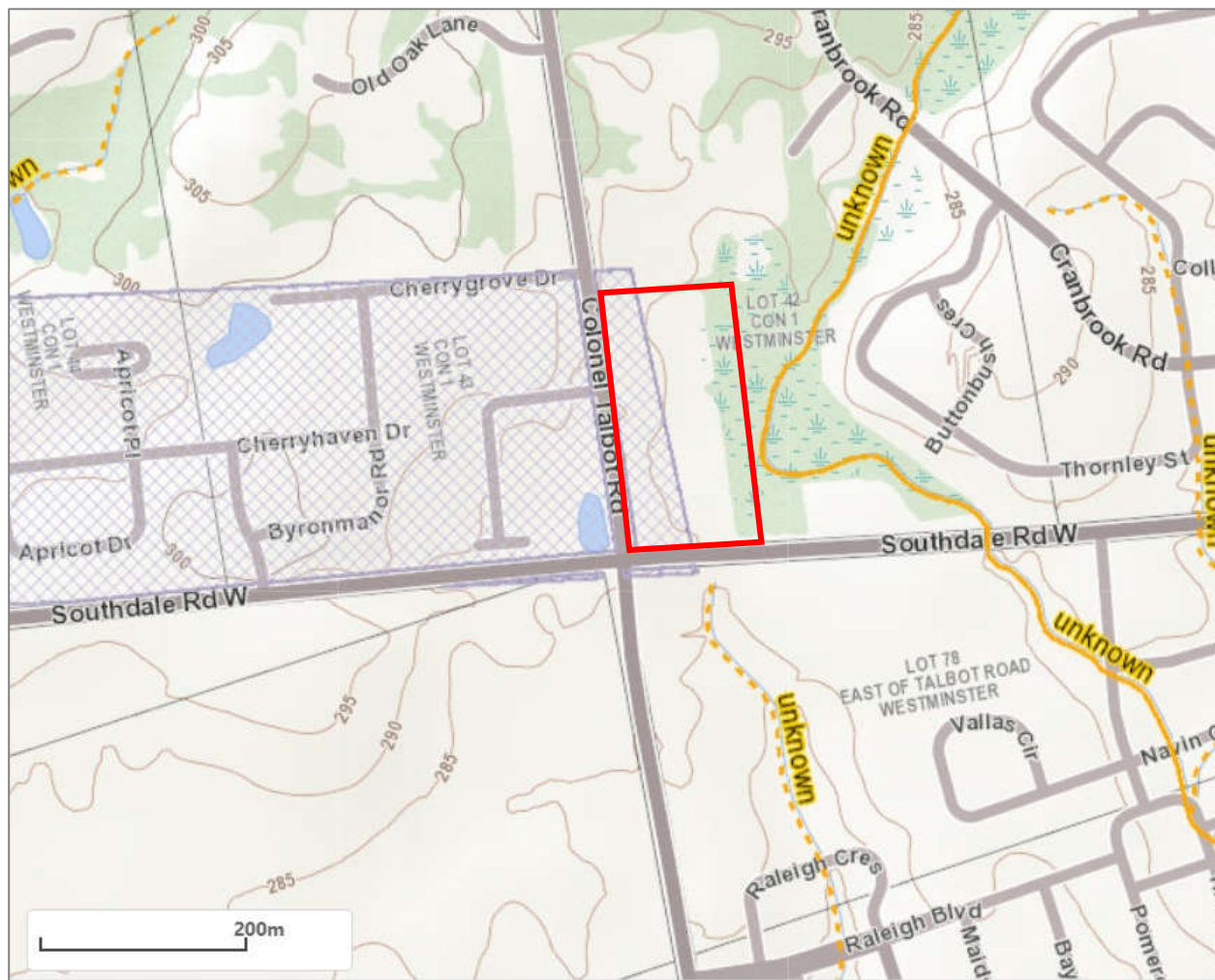
Systematic subsurface tile drainage was present on the western side of the subject property. Tile drains were not encountered in the boreholes drilled at the site, and outlets for a tile drainage system has not been identified during LDS' visits to the site. Drainage mapping (available online from the Ontario Ministry of Agriculture, GIS mapping) identifies that

A closed pipe/tiled drain is identified on the south side of the Southdale Road, immediately south of the site which appears to convey flows in a south and westerly direction, as a tributary to the Dingman Creek. The alignment of this drain can be seen on the aerial photos (pre-

2010) on Drawings 2A and 2B. Since 2010, much of the land on the south side of Southdale Road has been developed, and the ultimate routing of the closed pipe/tile drain south of the site has been altered with the extent of commercial and residential development which has occurred along its former alignment.

The drainage mapping also identifies a drain alignment through the Buttonbush Wetland on the east side of the subject property, as shown on Figure 2, below. The alignment of the easterly drain follows the length of the Buttonbush wetland, and the alignment of the upgradient stormwater management ponds at Cranbrook Road. Similarly to the closed pipe/tile drain noted above, the portion of this drain alignment which extends south of Southdale Road West has been diverted or re-routed as a result of developments which have occurred since 2010. This can be seen on the aerial photographs, as noted above.

Figure 2 – Drainage Mapping Excerpt

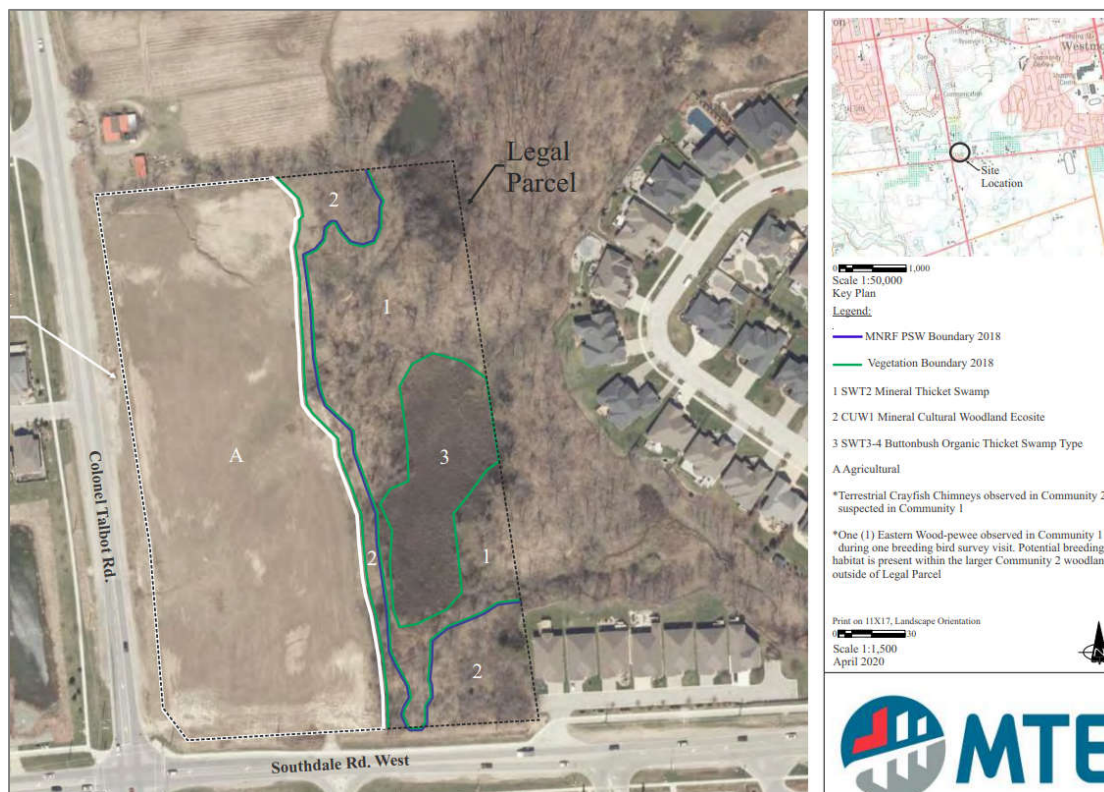


2.2 Natural Heritage Features

As noted previously, under Schedule B1 of the City of London Official Plan, the site does not contain a natural heritage feature overlay over the property. However, Schedule B1 does identify the Buttonbush Wetland (to the east) as a Provincially Significant Wetland, along with unevaluated wetland patches north and northeast of the site. An excerpt of Schedule B1 is provided on Drawing 3, in Appendix A.

The Buttonbush Wetland (South) is located east and north-east of the site, with a drain connection which flows in a southerly direction, crossing Southdale Road. Much of the vegetated area within the Buttonbush Swamp (aka North Talbot Wetland) is also classified as a significant Natural Heritage Feature on the 2014 Middlesex County Natural Heritage study mapping. It is understood that the Buttonbush Wetland has been designated as a Provincially Significant Wetland since July 2006. This wetland area borders the eastern edge of the property, and plant species observed during various LDS visits to the site in the autumn of 2017 and throughout 2018, 2019, 2020 and 2021 have included buttonbush, cat-tails, phragmites, and red maple trees. During various periods, much of the wetland had surface water throughout. The ecological characteristics of the wetland are being further assessed by MTE (formerly Biologic); however, it is understood that the central part of the feature is identified as a Buttonbush mineral thicket swamp, with cultural thickets and woodlands around the perimeter of the swamp area. Figure 3 (refer to the following page) provides an excerpt of the Vegetation Communities mapping which has been prepared by MTE. Within the wetland feature, visual observations of the wetland since 2017 indicate that the wetland swamp has a long hydroperiod, with water being present at least 10 months of the year under typical conditions.

Figure 3: Vegetation Communities Mapping (Excerpt)



The head of the wetland feature is immediately downstream of two stormwater management ponds, accessed from Longworth Road and Gabor Street. The Buttonbush Wetland falls within the Upper Thames River Conservation Authority (UTRCA) Regulated Lands. The UTRCA has Regulated Lands along the eastern boundary and to the north-east of the site. The requirements for development within UTRCA Regulated Lands are discussed further in Section 2.3

The wetland has undergone extensive pressures from urbanization of the area which has occurred in the immediate area over the past 20 years. Development pressures have included residential subdivision developments bordering the wetland feature, as well as road and servicing crossings along the linear stream corridor to the northeast of the site, including the introduction of a culvert at Cranbrook Road which has altered the water levels in the wetland feature from upgradient sources. Various development applications for the general area around the wetland have been submitted in the past 20 years. In various documents available through the City of London published Planning Applications and Reports, it is noted on various occasions that development upgradient of the site has resulted in stormwater management ponds being breached and sending sediment and turbid discharge into the wetland feature.

As such, the development pressures in the area have not just impacted the boundary of the wetland feature, but also the quality of the surface water which provides base flows into the wetland.

Within the tableland of the site, there are two shallow swales which drain towards the wetland feature, the central swale drains flows from Colonel Talbot Road, and historical ecological studies conducted at the site have identified portions of this drainage feature as a meadow marsh feature. However, under the current ecological assessment work completed by MTE, the entirety of the tableland area is identified as agricultural, since it has been actively farmed in recent years.

2.3 UTRCA Considerations

In accordance with the Conservation Authorities Act, the UTRCA regulates development within its Regulation Limit as defined in its Development, Interference with Wetlands and Alteration to Shoreline Regulation. This regulation is intended to ensure public safety, prevent property damage and social disruption due to natural hazards such as flooding and erosion. Ontario Regulation 157/06 is implemented by the local Conservation Authority, by means of permit issuance for works in or near watercourses, valleys, and wetlands.

The Adjacent Lands identified in the UTRCA Environmental Planning Policy Manual (2006) is 120 m for Provincially Significant Wetlands. Since the site is located adjacent to the Buttonbush Wetland, which has been identified as a Provincially Significant Wetland development at the site must have regard for the UTRCA Wetland Policies, which require an Environmental Impact Study (EIS) or an Environmental Assessment to be completed to the satisfaction of the UTRCA to demonstrate no negative impact on the feature or its ecological function. Similarly, studies are required to confirm that proposed development has no impact on the hydrological function of the wetland. An EIS (prepared by others) is also being conducted for the site.

The limits of the UTRCA Regulated lands are shown on Drawing 3, in Appendix A. The Regulation Limit encompasses the site, and extends beyond the site to the north and east. Proposed development within the study area will be subject to the above referenced Regulation. Property owners must obtain permission from UTRCA before beginning any development, site alteration, construction, or placement of fill within the regulated area. Consultation with the local Conservation Authority for review of site-specific development plans is required in this regard.

2.4 Source Water Protection Mapping

LDS has reviewed the MECP Source Water Protection Information Atlas and Thames-Sydenham and Region mapping to determine whether the site is located in any identified areas of source water concern, as they relate to local groundwater quality (current to March 2018).

The following observations were recorded by LDS:

- The Property is located within the Upper Thames River Source Protection Area.
- The Property is not located in any of the following designated areas listed in the MECP Source Protection mapping:
 - Wellhead Protection Area, Wellhead Protection Area E (GUDI), Wellhead Protection Area Q1 or Wellhead Protection Area Q2;
 - Intake Protection Zone or Intake Protection Zone Q;
 - Highly Vulnerable Aquifer;
 - Issue Contributing Area;
 - Event Based Area.
- The southeast corner of the site which is occupied in part by the Buttonbush Wetland is located within an area denoted as a Significant Groundwater Recharge Area, with the scoring of 2 (considered low).

Additional discussion is provided in Section 6 of this report.

2.5 Proposed Development Plans

The site is currently occupied by cultivated land, and is bordered by a mix of commercial and residential lands, with the Buttonbush Wetland to the east. The proposed development at the site is expected to include a mix of commercial and residential land.

The west end of the site is expected to have a series of 3-storey townhouse blocks, with surface parking. The central part of the site is expected to have a large grocery store (approximately 3095 m²), oriented towards Southdale Road West, with a central parking lot area. At the east end of the site, two smaller buildings are planned, potentially housing restaurants, coffee shops, and office space.

A concept plan is provided on Drawing 4, in Appendix A.

3.0 GEOLOGIC SETTING

3.1 Regional Physiography and Geology

Select geological mapping and publications were reviewed for the purposes of reviewing regional characteristics for soil conditions in the area. Findings are summarized below, for reference.

Physiography

Physiographic mapping for Southwestern Ontario (Chapman, L.J. and Putnam, D.F. 2007. Physiography of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 228), indicates that the site is located in the northwest part of the physiographic region known as the Mount Elgin Ridges. The Mount Elgin Ridges consist of the Ingersoll Moraine to the north and the Westminster, St. Thomas, Sparta and Tillsonburg Moraines to the south. The moraines are separated by till plains, and the rolling topography resulting from this configuration controls surface water drainage patterns. The ridges are typically well drained, while the hollows are poorly drained. As a result, the areas between the ridges act as a source of groundwater recharged, where surface water infiltrations into the surficial soils as shallow groundwater.

The site location is near the confluence of a Till Plain, Till Moraine and glacial spillway (to the north). Soils in this area is typically characterised by clayey silt, clay, and occasional silty sand and gravel deposits, with low to moderate relief.

Quaternary Geology

The Quaternary Geology was created by glacial movement approximately 10,000 to 23,000 years ago. The overburden material deposited by the movement and eroding action of the glaciers contributed to the creation of moraines, eskers, drumlins and other topographic features in the Southern Ontario area.

Based on the Quaternary Geology mapping (Ontario Geological Survey 2000. Quaternary geology, seamless coverage of the Province of Ontario; Ontario Geological Survey, Data Set 14---Revised (Google© Earth)), the site is located in an area which transitions from moraine to till plain; which is consistent with the silty soils and occasional sandy layers encountered in the drilling onsite.

The predominant soil in the area is Port Stanley Till, which is described as silty clay till and clayey silt till, with some areas having thin patches of lacustrine silt. The Port Stanley Till includes the Ingersoll and Westminster Moraines. The Port Stanley Till is underlain by Catfish Creek Till, which directly overlies the bedrock surface. The Catfish Creek till contains layers of lacustrine sediments which were deposited between ice sheet advances. These depositional processes result in a mixture of fine-grained layers within the tills that are characterized by low permeability (aquitards) and sandy layers containing aquifers.

Pleistocene Geology Mapping for the area identifies a ‘stream trench’ which crosses the area, roughly in the same alignment of the Buttonbush Wetland - North and Buttonbush Wetland – South feature which is north-east and east of the site. This stream feature is shown to extend south of Southdale Road, and continuing in a southerly direction. Soils within this feature are described as alluvial soils, comprised of silt, sand and gravel, with organics. An excerpt from the Pleistocene Geology mapping showing the trench alignment is provided on Drawing 5, in Appendix A.

Bedrock Geology

Bedrock geology mapping for Southwestern Ontario (Ontario Geological Survey, 1:250 000 scale, Bedrock Geology of Ontario. Ontario Geological Survey, Miscellaneous Release Data 126, Revised 2006) indicates that the bedrock in the general area consists of limestone of the Dundee Formation. The limestone bedrock is part of the Algonquin Arch, which forms a ridge along the southwestern Ontario peninsula between the Michigan Basin (to the northwest) and the Appalachian Basin (to the southwest). The limestone is generally light brown, medium-grained with some minor chert. Based on the Ontario Department of Mines Preliminary Map No. P.482 titled “Bedrock Topography Series, St. Thomas Sheet, Southern Ontario”, the bedrock surface in the vicinity of the site is generally at approximate Elevation 182 to 200 m asl. The typical depth to bedrock within proximity to the study area was confirmed through a review of MECP well records.

3.2 Borehole Findings

A series of boreholes and piezometers have been advanced at the site to assess the soil and groundwater conditions onsite.

Borehole locations were determined by LDS to characterize soil and groundwater conditions across the site, and monitoring well locations were determined as being in proximity to existing surface water features (swales and overland flow paths) and with regard to existing agricultural activities, to help limit disturbance and damage from farm equipment.

Information regarding the borehole, monitoring well and piezometer installations by LDS Consulting Inc. are described in the following sections.

3.2.1 Borehole Field Program

Ten (10) boreholes, and six (6) shallow auger hole were advanced throughout the site by LDS on September 25, 2017, with four (4) of the boreholes being equipped with monitoring wells including a second well at MW5 (one shallow and one deep). On February 10 and 11, 2021, an additional set of boreholes (denoted with 300-series borehole numbering) were advanced at the site. In addition, damaged well casings at BH5 (deep) and BH6 were decommissioned, and the wells were replaced with new well installations within 1 m of the original well installations.

Borehole locations are shown on Drawing 6 in Appendix A, and borehole logs are provided in Appendix B, for reference.

Ground surface elevations at the borehole and auger probe locations were surveyed by LDS using a Trimble© R10 GPS rover and are summarised in the following table.

Table 1: Borehole Locations

ID	Northing	Easting	Ground Surface Elevation, m asl
BH1	4754025.17	474118.77	286.60
BH2	4753908.06	474136.32	284.01
BH3	4753858.53	474135.84	285.99
BH4	4754080.31	474167.12	286.62
BH5 (MW)	4754035.25	474175.45	282.06
BH5 (MW) - Deep	4754034.96	474173.98	282.35
BH6 (MW)	4753959.92	474168.88	282.67
BH7	4753887.32	474209.93	282.56
BH8	4753956.21	474214.69	281.65
BH9 (MW)	4753920.31	474142.64	283.93
BH10 (MW)	4754065.93	474105.43	285.98
AP101	4754056.11	474147.08	283.44
AP102	4754069.47	474134.27	284.60
AP103	4754041.91	474167.78	282.10
AP104	4753924.23	474151.42	283.62
AP105	4753939.80	474158.54	283.36
AP106	4753947.62	474163.13	282.96
BH301 (MW)	4754084.90	474154.91	287.09
BH302 (MW)	4754011.40	474149.52	284.54
BH303 (MW) - Shallow	4753981.82	474118.80	288.70
BH303 (MW) - Deep	4753981.82	474118.80	288.70
BH304 (MW) - Shallow	4753919.66	474211.91	282.26
BH304 (MW) - Deep	4753919.66	474211.91	282.26
BH305 (MW)	4753845.98	474176.36	284.77

Monitoring wells were installed in the boreholes noted above with the ‘MW’ notation. The wells were installed to allow for monitoring the stabilized groundwater level at the site. The Monitoring Wells were constructed of 2-inch (50.8 mm) diameter CPVC screens and riser pipes fitted with an end cap at bottom. The screens on each well are mill-slotted, with a slot spacing of 0.5 mm, and were backfilled with Type 2 Silica Sand. Above the screened depth, the annular space was backfilled with a bentonite slurry, up to ground surface to prevent a hydraulic connection from occurring with the ground surface. The wells and have been

equipped with lockable caps. Details of the monitoring well construction are summarized in Table 2, below.

Table 2: Monitoring Well Construction

Borehole	Ground Surface Elevation, m asl	Top of Screened Interval, m asl	Bottom of Screened Interval, m asl	Screened Length, m	Screened Strata
Shallow Wells					
BH5 (MW) - Shallow	282.06	281.14	279.62	1.52	Sandy Silt
BH6 (MW)	282.67	281.75	279.89	1.52	Sandy Silt
BH9 (MW)	283.93	283.02	279.97	3.05	Silt Till, wet sand seams
BH10 (MW)	285.98	284.46	281.41	3.05	Silty Sand, silt inclusions
BH302 (MW)	284.54	281.49	279.97	1.52	Silt Till, wet sand seams
BH303 (MW) - Shallow	288.70	286.41	284.89	1.52	Silt Till, wet sand seams
BH304 (MW) - Shallow	282.26	279.97	278.45	1.52	Silt, wet sandy silt seams
BH305 (MW)	284.77	282.48	280.96	1.52	Silt Till, wet sand seams
Deep Wells					
BH5 (MW) - Deep	282.35	277.78	279.89	3.05	Fine Sand
BH301 (MW)	287.09	280.99	279.47	1.52	Fine Sand
BH303 (MW) – Deep	288.70	281.08	279.56	1.52	Fine Sand
BH304 (MW) – Deep	282.26	273.11	271.59	1.52	Fine Sand

The monitoring wells have been registered with MECP, in accordance with Ontario Regulation (O.Reg.) 903.

The depth to groundwater seepage and short-term water level measurements were obtained prior to backfilling the remaining boreholes. Boreholes were backfilled with a mixture of bentonite chips and cuttings, to restore holes back to level conditions with the ground surface.

A series of shallow piezometers (PZ 201 and PZ 202) were also installed on the site by LDS on October 20, 2017 in the wetland area. An additional piezometer (PZ 203) was installed at the site on February 10, 2021. Surface water was present in the wetland at the time of piezometer installation. The piezometers were installed to depths between 0.55 to 1.2 m bgs. The piezometer installations are comprised of 50 mm (2-inch) inner diameter (ID) schedule

40 polyvinyl chloride (PVC) risers coupled with No. 10 slot PVC screens. Each well screen was sealed at the bottom using a PVC friction fit cap and each riser was sealed at the top with a lockable J-plug cap. Bentonite was placed in the bottom of the auger hole, to ensure that the screen was set within the water-bearing sand layer.

Ground surface elevations at the LDS monitoring well and piezometer locations were surveyed by LDS using a Trimble R10 GPS rover, and are summarised below.

Table 3: Piezometer Coordinates

ID	Northing	Easting	Ground Surface Elevation, m asl
PZ201 (shallow)	4753940.88	474223.22	281.01
PZ201 (deep)	4753939.81	474220.10	281.09
PZ202A	4754008.53	474252.62	280.96
PZ202B	4754009.85	474254.31	281.19
PZ203 (shallow)	4754047.30	474203.69	281.69
PZ203 (deep)	4754047.22	474203.59	281.66

3.2.2 Observed Soil Conditions

Tableland

As shown on the borehole logs provided in Appendix B, the predominant soil conditions encountered in the boreholes which were drilled through the site comprise of natural sandy silt/silty sand and silt till. The soils encountered near ground surface are described as being mottled in colour, and in a weathered condition in the upper 1.2 to 1.5 m. The silt and silt till soils are described as containing discontinuous sand layers, and/or intermittent fine sand layering. Below the weathered zone, the soils are predominantly brown in colour, becoming grey at variable depths below 3.0 m.

The soil boundaries identified on the borehole logs have been inferred from non-continuous samples and observations of drilling resistance. They may represent a transition from one soil type to another and should not be interpreted to represent exact planes of geological change. Further, the subsurface conditions may vary between and beyond the borehole locations.

Groundwater observations in the open boreholes and a review of soil moisture contents are indicative of the shallow groundwater generally being contained within the sandy soils or weathered silt soils near surface, perched above the less permeable silt and silt till soils. As such, the assessment includes an analysis to estimate the hydraulic conductivity of these water-bearing soils, as presented in the following section.

Wetland

In the wetland area along the east side of the site, the surficial deposits encountered within the wetland piezometers are comprised of topsoil and organics (typically in the range of 0.3 to 1.0 m thick), overlying alluvial (unconsolidated) deposits of sandy silt which contain organic inclusions. The deep piezometers were terminated in compact silt till soils, similar to that observed within the tableland areas of the site.

3.2.3 Estimate of Hydraulic Conductivity / Permeability

The hydraulic conductivity of a soil depends on a number of factors, including particle size distribution, degree of saturation, compactness, adsorbed water (which depends on clay content). The heterogeneous nature of glacial deposits can also contribute to variations in soil permeability where the soil composition may include localised areas with increased fine material or sandy material which can influence soil permeability at different points within the soil strata. Determining soil permeability for subgrade soils at the site has included a review of published data, correlation with laboratory testing, and single well response tests, as outlined below.

Published Data Review

The Groundwater Information Network (online at www.gin.gw-info.net) provides the following table which summarises the porosity and hydraulic conductivities for the soil strata encountered within its well record database for Southwestern Ontario. It is understood that these values are based on published literature.

Table 4: Hydraulic Conductivity based on soil types

Lithology	Porosity (%)	Hydraulic Conductivity (m/s)
Clay	34 to 57	1×10^{-11} to 4×10^{-9}
Silt	34 to 61	1×10^{-9} to 2×10^{-5}
Sand	26 to 53	2×10^{-7} to 6×10^{-3}
Gravel (containing > 30% gravel)	24 to 44	3×10^{-4} to 3×10^{-2}

Correlation with Gradation Analyses

Grain Size analysis was carried out on a sample of silty sand collected from Borehole BH10. The results of the testing are provided below for reference, and shown graphically in Appendix B. To further refine the hydraulic conductivity specifically encountered at the site, the results of the grain size analyses were used to correlate the gradation results to the hydraulic conductivity, using Hazen’s method. This correlation is based on the following relationship:

$$k \text{ (cm/s)} = C(d_{10})^2$$

where, d_{10} is the diameter (size measured in mm) at which 10% of the sample passes; and,

C is an empirical coefficient (average value of 1.0).

Table 5: Gradation Results – Silty Sand

Sample ID	% Clay	% Silt	% Sand	% Gravel	k (m/s)
Silty Sand, BH10, Sample 3	0.0	39.9	57.9	2.2	3.24×10^{-6}
Silty Sand, BH5, Sample 7	0.0	20.4	79.6	0.0	2.92×10^{-5}
Silty Sand, BH301, Sample 6	0.0	10.8	65.3	23.9	4.62×10^{-5}
Silty Sand, BH303, Sample 9	0.0	36.2	63.08	0.0	2.21×10^{-5}

Grain Size analysis was also carried out on a sample of silt collected from Borehole BH4. The results of the testing are provided below for reference, and shown graphically in Appendix B. Based on the gradation results, a value for saturated hydraulic conductivity and infiltration rate has been calculated for the collected sample of silt till, using the Puckett Method and the following expression:

$$k = 4.36 \times 10^{-5} \times e^{-0.1975 \times C}$$

where: k = hydraulic conductivity (m/s)
C = clay content (%)

Table 6: Gradation Results – Sandy Silt

Sample ID	% Clay	% Silt	% Sand	% Gravel	k (m/s)
Sandy Silt, BH4, Sample 1	13.0	52.4	31.6	5.9	3.35×10^{-6}

Both approaches which are presented above yield results which are within a similar range.

Table 7: Saturated Hydraulic Conductivity & Factored Infiltration Rates

Test Method	Sample ID	Saturated Hydraulic Conductivity	Factored Infiltration Rate
Gradation Analysis	Silty Sand, BH10, Sample 3	3.24×10^{-6} m/s	25 mm/hr
Gradation Analysis	Sandy Silt, BH4, Sample 1	3.35×10^{-6} m/s	25 mm/hr

The above factored infiltration rates were calculated using correlation from TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guide protocol which references Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario. A Factor of Safety of 2.5 has been applied, in accordance with TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guide protocol.

Single Well Response Test

A Single Well Response Test (rising head test) was conducted in the deep monitoring well installed at Borehole BH5 on January 25, 2019 to estimate the hydraulic conductivity of the lower water-bearing fine sand layer encountered below 5.8 m depth.

Groundwater level measurements were taken prior to the start of the test. A submersible pressure transducer with a water level logger was inserted into the monitoring well to measure the change in water level for the duration of the test. Use of the data logger allows for high frequency data collection and increased accuracy, compared to manual measurements during the testing.

The Hydraulic conductivity values were estimated from field SWRT data as per the Hvorslev’s method (refer to worksheets provided in Appendix C). A summary of the hydraulic conductivity values estimated from the field SWRT is provided in the table below.

Table 8: Saturated Hydraulic Conductivity & Factored Infiltration Rates

Well ID	Well Depth, m bgs	Screen Length, m	Formation Screened	Estimated Hydraulic Conductivity, m/s	Factored Infiltration Rate mm/hr
BH5	7.65	3.05	Fine Sand	1.48×10^{-8}	6

Similar to the approach noted above, the above factored infiltration rate was calculated using correlation from TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guide protocol, utilizing a Factor of Safety of 2.5.

Onsite Verification During Construction

A number of factors can influence the actual soil permeability and infiltration rate onsite during the site grading activities, including cut-fill activities, and the use of onsite or imported materials to achieve design grades. It is recommended that geotechnical inspection of materials which are used onsite and field testing during the construction phase of the project be carried out to confirm that infiltration rates which have been used for design purposes are appropriate to the actual site conditions.

3.3 Shallow Groundwater Observations

The wells installed into the LDS boreholes were advanced using 6-inch (152.4 mm) outer diameter hollow stem augers. The monitoring wells were constructed with 2-inch (50.8 mm) diameter CPVC pipe. The screens on each well are mill-slotted, with a slot spacing of 0.5 mm, and were backfilled with Type 2 Silica Sand. Above the screened depth, the annular space was backfilled with a Bentonite slurry, up to ground surface.

The Piezometers which were installed at the site are also constructed of 2-inch (50.8 mm) diameter CPVC screens and riser pipes (similar to those used for the monitoring wells) fitted with a drive-point end cap at bottom. Water was present in both wetland piezometers upon completion of installation. The wells and piezometers are equipped with lockable caps.

3.3.1 Manual Groundwater Measurements

Manual water level measurements using a Heron© Level Logger (calibration dates February 10, 2017, February 15, 2018, February 4, 2019, and January 12, 2021), were taken to establish a record of stabilised groundwater levels. The meters are equipped with an electrode connected to a graduated polyethylene tape, where the depth to water can be obtained by slowly lowering the electrode into the well until the buzzer sounds. Water level measurements were recorded in metres to the nearest 0.01 m and converted to elevations above mean sea level (m, asl) using surveyed elevation data. The manual water level data was also used to calibrate and check the accuracy of the data recorded by the dataloggers. A summary of the manual readings taken at the site from 2017 to 2019 are summarized in Table 9 (refer to page 25).

In February 2021, a series of additional monitoring wells and piezometers were installed at the site, and the wells installed at Boreholes BH5 (deep) and BH6 were replaced with new installations. Table 10 (refer to page 26) outlines the water level measurements which have been taken at the site in 2021.

From the initial set of water level measurements collected at the site from 2017 through to 2019, general trends in the water levels generally indicate that the groundwater flow direction generally follows existing topography towards the east, with flows being in the direction of the Buttonbush Swamp/North Talbot Wetland to the east of the site. This was further validated through the water level measurements which have been collected at the site from the existing and newly installed wells in 2021, for both the shallow wells and deep wells at the site.

With the addition of multi-level piezometers at the site, it has been observed that water levels within the wetland area fluctuate seasonally (for longer duration at higher magnitudes) and following significant rain events (for shorter duration at lower magnitudes). The piezometers are located along the perimeter of the wetland, and in that position they document periods of flooding when the water level is at or above the ground surface, and periods when water levels fall approximately 0.3 m below the ground surface. Within the 2021 monitoring period, that fluctuation in the water level has ranged upwards of 0.5 m.

Within the tableland area, which makes up much of the site, the perched groundwater within the near surface sandy soils and weathered silt till soils has similarly varied up to about 0.5 m with the 2021 readings measured to date. This shallow groundwater condition closely corresponds to that observed in the wetland area, regardless of the wells being located within the existing swales which conduct overland flows towards the wetland, or other parts of the

site which are set further away from the swales and wetland area. The horizontal groundwater gradient indicated from the water levels recorded within the shallow wells indicate groundwater flow towards the wetland.

The deeper wells are generally set into wet sandy layers within the silt till. The horizontal groundwater gradient indicated from the water levels recorded within the deeper wells similarly indicate groundwater flow towards the wetland. The groundwater levels within the deep wells have been recorded within the screened interval within the water-bearing soils at each of the respective wells, and no significant vertical upward gradient has been noted.

As additional groundwater measurements are collected at the site, this will continue to be monitored to identify if under seasonal conditions, an upward gradient occurs from this water table.

A Shallow Groundwater Contour Plan during Spring 2018 conditions is provided on Drawing 7; a Shallow Groundwater Contour Plan during Spring 2019 conditions) is provided on Drawing 8, and a Shallow Groundwater Contour Plan during Spring 2021 is provided on Drawings 9A and 9B, differentiating the flows in the shallow and deep wells respectively.

Table 9: 2017-2019 Manual Water Level Measurements

Well Location	Ground Surface Elev. (m)	Depth to Groundwater (m, bgs) Groundwater Elevation (m, asl)																
		13-Oct-2017	20-Oct-2017	23-Oct-2017	08-Nov-2017	01-Dec-2017	10-Jan-2018	06-Feb-2018	27-Feb-2018	21-Mar-2018	23-Apr-2018	16-May-2018	06-Jun-2018	06-Jul-2018	08-Aug-2018	09-Sep-2018	20-Nov-2018	10-Dec-2018
BH5 - shallow	282.06	2.15 279.91		0.30 281.76	0.55 281.51	0.30 281.76	0.22 281.84	0.05 282.01	0.00 282.06	0.05 282.01	0.20 281.86	0.30 281.76	0.48 281.58	1.03 281.03	0.84 281.22	0.86 281.20	0.00 282.06	0.05 282.01
BH5 - deep	282.06	7.50 274.56		7.50 274.56	7.22 274.84	7.32 274.74	7.44 274.62	7.16 274.90	6.67 275.39	6.74 275.32	6.17 275.89	6.30 275.76	6.46 275.60	6.65 275.41	7.09 274.97	6.97 275.09	7.21 274.85	7.33 274.73
BH6	282.67	1.11 281.56		1.01 281.66	0.15 282.52	0.20 282.47	0.22 282.45	0.23 282.44	0.16 282.51	0.22 282.45	0.28 282.39	0.26 282.41	0.25 282.42	0.42 282.25	0.84 281.83	0.84 281.83	0.17 282.50	0.18 282.49
BH9	283.93	0.92 283.01		0.69 283.24	0.28 283.65	0.22 283.71	0.26 283.67	0.38 283.55	0.22 283.71	0.28 283.65	0.34 283.59	0.20 283.73	0.50 283.43	0.80 283.13	0.68 283.25	0.71 283.22	0.28 283.65	0.27 283.66
BH10	285.98	1.21 284.77		1.20 284.78	0.58 285.40	0.70 285.28	0.74 285.24	0.71 285.27	0.52 285.46	0.56 285.42	0.60 285.38	0.66 285.32	0.85 285.13	1.18 284.80	0.90 285.08	0.96 285.02	0.58 285.40	0.57 285.41
PZ201	281.01		0.05 280.96	0.17 280.84	-0.10 281.11	0.00 281.01	frozen	0.24 280.77	0.00 281.01	-0.15 281.16	-0.23 281.24	-0.15 281.16	0.07 280.94	0.06 280.95	-0.18 281.19	-0.16 281.17	-0.01 281.02	0.00 281.01
PZ202	280.96		0.04 280.92	0.18 280.78	-0.03 280.99	0.01 280.95	frozen	0.31 280.65	-0.05 281.01	0.00 280.96	-0.04 281.00	-0.17 281.13	0.04 280.92	0.05 280.91	-0.05 281.01	-0.06 281.02	-0.05 281.01	-0.02 280.98

Well Location	Ground Surface Elev. (m)	Depth to Groundwater (m, bgs) Groundwater Elevation (m, asl)					
		16-Jan-2019	14-Mar-2019	10-Apr-2019	28-May-2019	25-Jun-2019	08-Nov-2019
BH5 - shallow	282.06	0.00 282.06	0.00 282.06	0.04 282.02	0.00 282.06	0.54 281.52	0.00 282.06
BH5 - deep	282.06	7.61 274.45	6.33 275.73	6.00 276.06	5.63 276.43	6.30 275.76	3.05 279.01
BH6	282.67	0.21 282.46	0.26 282.41	0.19 282.48	0.22 282.45	0.63 282.04	0.19 282.48
BH9	283.93	0.13 283.80	0.23 283.70	0.49 283.44	0.30 283.63	0.50 283.43	0.32 283.63
BH10	285.98	0.61 285.37	0.45 285.53	0.65 285.33	0.54 285.44	0.72 285.26	0.50 285.48
PZ201 (Shallow)	281.01	frozen	0.00 281.01	0.00 281.01	-0.30 281.31	-0.02 281.03	-0.04 281.05
PZ202 (Shallow)	280.96	frozen	-0.05 281.01	0.00 280.96	-0.30 281.26	-0.20 281.16	-0.10 281.06

Summary of Water Level Measurements

Location	Minimum Water Level	Maximum Water Level	Net Change
BH5 shallow	279.91 m	282.06 m	2.15 m
BH5 deep	274.45 m	275.89 m	1.44 m
BH6	281.56 m	282.52 m	0.96 m
BH9	283.01 m	283.80 m	0.79 m
BH10	284.77 m	285.53 m	0.76 m
PZ201	280.77 m	281.24 m	0.47 m
PZ202	280.65 m	281.13 m	0.48 m

Notes

1. Negative values in the wetland piezometers are water levels measured up from ground surface.
2. m, bgs denotes metres below ground surface
3. m, asl denotes metres above sea level
4. Grey shading denotes no measurements taken

Table 10: 2021 Manual Water Level Measurements

Well Location	Ground Surface Elev. (m, asl)	22-Jan-2021	18-Feb-2021	01-Mar-2021	25-Mar-2021	27-Apr-2021	30-May-2021	21-Jun 2021	28-Jun-2021
Shallow Wells									
BH5 – shallow	282.06	0.00 <i>282.06</i>	0.00 <i>282.06</i>	0.00 <i>282.06</i>	0.03 <i>282.03</i>	0.32 <i>281.74</i>	0.50 <i>281.56</i>	0.54 <i>281.52</i>	0.56 <i>281.50</i>
BH6	282.67	Damaged	0.34 <i>282.60</i>	0.28 <i>282.66</i>	0.33 <i>282.61</i>	0.62 <i>282.32</i>	0.72 <i>282.22</i>	0.34 <i>282.60</i>	0.43 <i>282.51</i>
BH9	283.93	0.23 <i>283.70</i>	0.25 <i>283.68</i>	0.21 <i>283.72</i>	0.25 <i>283.68</i>	0.44 <i>283.49</i>	0.80 <i>283.13</i>	0.84 <i>283.09</i>	0.66 <i>283.27</i>
BH10	285.98	0.49 <i>285.49</i>	0.51 <i>285.47</i>	0.30 <i>285.68</i>	0.48 <i>285.50</i>	0.74 <i>285.24</i>	0.83 <i>285.15</i>	0.74 <i>285.24</i>	0.53 <i>285.45</i>
MW302	284.54	--	1.33 <i>283.21</i>	0.31 <i>284.23</i>	0.56 <i>283.98</i>	1.30 <i>283.24</i>	2.87 <i>281.67</i>	3.51 <i>281.03</i>	3.45 <i>281.09</i>
MW303 – shallow	288.70	--	2.84 <i>285.86</i>	1.80 <i>286.90</i>	1.82 <i>286.88</i>	1.95 <i>286.75</i>	2.63 <i>286.07</i>	3.02 <i>285.68</i>	2.91 <i>285.79</i>
MW304 – shallow	282.26	--	2.41 <i>279.85</i>	0.52 <i>281.74</i>	0.58 <i>281.68</i>	0.71 <i>281.55</i>	1.04 <i>281.22</i>	1.34 <i>280.92</i>	1.18 <i>281.08</i>
MW305	284.77	--	1.53 <i>283.24</i>	0.31 <i>284.46</i>	0.54 <i>284.23</i>	0.70 <i>284.07</i>	1.02 <i>283.75</i>	1.28 <i>283.49</i>	1.00 <i>283.77</i>
Deep Wells									
BH5 – deep	282.06	Damaged	7.05 <i>275.30</i>	7.06 <i>275.29</i>	6.43 <i>275.92</i>	5.38 <i>276.97</i>	6.68 <i>275.67</i>	6.95 <i>275.40</i>	6.79 <i>275.56</i>
MW301	287.09	--	Dry to <i>279.47</i>	Dry to <i>279.47</i>	Dry to <i>279.47</i>	Dry to <i>279.47</i>	Dry to <i>279.47</i>	Dry to <i>279.47</i>	Dry to <i>279.47</i>
MW303 – deep	288.70	--	Dry to <i>279.56</i>	Dry to <i>279.56</i>	9.08 <i>279.62</i>	9.03 <i>279.67</i>	9.10 <i>279.60</i>	6.03 <i>282.67</i>	Dry to <i>279.56</i>
MW304 – deep	282.26	--	10.32 <i>271.94</i>	10.17 <i>272.09</i>	10.54 <i>271.72</i>	10.66 <i>271.60</i>	Dry to <i>271.59</i>	Dry to <i>271.59</i>	Dry to <i>271.59</i>
Piezometers									
PZ201 – shallow	281.01	-0.50 <i>281.51</i>	0.00 <i>281.01</i>	-0.06 <i>281.07</i>	-0.22 <i>281.23</i>	-0.15 <i>281.16</i>	-0.30 <i>281.31</i>	-0.15 <i>281.16</i>	-0.21 <i>281.22</i>
PZ201 – deep	281.09	--	Installed (frozen)	N/R	-0.11 <i>281.20</i>	0.00 <i>281.09</i>	-0.05 <i>281.14</i>	0.11 <i>280.98</i>	0.02 <i>281.07</i>
PZ202 A	280.96	Frozen	Snow cover	Frozen	-0.03 <i>280.99</i>	-0.10 <i>281.06</i>	-0.20 <i>281.16</i>	-0.15 <i>281.11</i>	0.04 <i>280.92</i>
PZ202 B	281.19	--	Installed (frozen)	Frozen	-0.03 <i>281.22</i>	0.00 <i>281.19</i>	-0.10 <i>281.29</i>	-0.10 <i>281.29</i>	-0.10 <i>281.29</i>
PZ203 – shallow	281.69	--	0.36 <i>281.33</i>	Frozen	-0.02 <i>281.71</i>	0.00 <i>281.69</i>	0.06 <i>281.63</i>	0.25 <i>281.44</i>	0.12 <i>281.57</i>
PZ203 – deep	281.66	--	0.30 <i>281.36</i>	0.06 <i>281.60</i>	-0.05 <i>281.71</i>	-0.10 <i>281.76</i>	0.00 <i>281.66</i>	0.27 <i>281.39</i>	0.12 <i>281.54</i>

Notes:

Depth to Groundwater (m, bgs) provided for each date and location. Groundwater Elevation (m, asl) is denoted in *italics*.

Negative values indicate groundwater level above ground surface.

3.3.2 Continuous Groundwater Measurements – LDS Datalogger Installations

Dataloggers were installed in wetland piezometer PZ202, and monitoring wells MW6, and MW10 following installation, to allow for regular temperature and water level readings. After approximately three months, the data loggers were downloaded, and then on a regular basis thereafter, with manual groundwater measurements collected to confirm the accuracy of the data collected by the dataloggers. Groundwater hydrographs are provided in Appendix C, for reference.

To obtain an accurate measurement of the groundwater level at each well, the water level data obtained from the dataloggers is corrected for atmospheric pressure. Prior to February 6, 2018, this was done using published weather data from the Environment Canada Weather Station from London Airport. After February 6, 2018, an additional datalogger was installed in one of the monitoring wells onsite (suspended above the water table) for the purposes of recording atmospheric pressure for use in correlating the water levels.

Hydrographs also include water temperatures recorded in the monitoring wells with the dataloggers. The temperature range typically sits between 5 and 15 degrees Celsius, with the warmest temperatures recorded in the late summer-early fall months, and lowest temperatures in late winter-early spring months.

The direct comparison of the water levels reported between MW6, MW10, and PZ202 show a typical drop in elevation of approximately 4 m, which supports the opinion that the shallow groundwater flows towards and discharges to the wetland.

When the new monitoring wells were installed at the site in 2021, the following wells were instrumented with dataloggers: MW5 (deep), PZ201 (shallow), MW303 (deep), PZ203 (shallow), MW6, MW304 (shallow). Due to the unseasonably dry spring condition experienced in the spring of 2021, continuous groundwater data is still being collected at the site. As this additional information becomes available, LDS will review the impacts of that data on the current analysis which has been carried out for the site, and will incorporate the additional continuous groundwater monitoring data into the Hydrogeological Report which supports detailed design.

3.3.3 Water Quality - Analytical Testing

Water Samples taken 2017 & 2019

Laboratory testing was carried out on groundwater samples, collected from the monitoring well at BH6, and the piezometer PZ202 on November 13, 2017. A second set of samples were collected from the same locations on February 11, 2019.

The monitoring wells were developed 24 hours in advance of the testing, including the removal of the equivalent of three water-columns of water. Samples were collected by a technician wearing disposable nitrile gloves, and were collected using designated bailer tubes. Water samples were placed in laboratory-supplied sample bottles, labelled with a unique sample number, dated, and recorded on the laboratory chain of custody form. Groundwater samples for metals analyses were field-filtered prior to preservation using dedicated 0.45 micron in-line filters. Samples were immediately placed in a cooler with ice for delivery to an accredited laboratory (Maxxam Analytics depot in London, Ontario) under a Chain of Custody.

The water samples were submitted for testing to assess the general chemistry (RCAP analysis package) of the groundwater. The results of the analyses are provided in Appendix E, for reference and are discussed further in Section 4.3 of this report.

Water Samples taken June 2021

An additional round of groundwater and surface water sampling and testing was carried out in late June 2021. The samples were collected from the following locations: Surface water sample within wetland, PZ202A, BH301, BH302, and BH6.

The monitoring wells were developed 24 hours in advance of the testing, including the removal of the equivalent of three water-columns of water. Samples were collected by a technician wearing disposable nitrile gloves, and were collected using designated bailer tubes. Water samples were placed in laboratory-supplied sample bottles, labelled with a unique sample number, dated, and recorded on the laboratory chain of custody form. Water samples were field-filtered prior to preservation using dedicated 0.45 micron in-line filters. Samples were immediately placed in a cooler with ice for delivery to an accredited laboratory (Paracel depot in London, Ontario) under a Chain of Custody.

The water samples were submitted for testing to assess the general chemistry parameters, including the following:

- Dissolved Metals: Standard Metals Package for General Chemistry;
- Cation and Anion Parameters;
- Nutrients: Nitrate, Nitrite; and,
- General Inorganic Parameters: pH, Total Suspended Solids, Electrical Conductivity, Hardness.

The results of the analyses are provided in Appendix E, for reference and are discussed further in Section 4.3 of this report.

3.4 MECP Well Record Review

A review of MECP well records for this area was carried out to review the water levels recorded in the nearby wells. The location of the water supply wells and observation / test wells (with Well Registration No.) which are approximately 500 m from the site boundaries are shown on a Drawing 10 in Appendix B. Appendix F includes a copy of the well records, which are summarised in the following section of this report.

The following table summarises the well records for water supply wells in proximity to the site. The wells are generally 40 to 135 m deep, set into deep overburden silt till or sand and gravel layer deposits. Static water levels are reported at depths which range 48 - 60 m depth, and pump rates are in the range of 4 to 10 gpm (gallons per minute), with higher pump rates of 18 - 20 gpm for Irrigation wells.

Table 11 - MECP Water Supply Well Summary

Well ID	Type	Well Depth (m)	Date of Completion	Depth Water Found, m	Static Water Level, m	Pump Rate, gpm
4103401	Livestock	70.1	08/07/1966	57	48	4
4103403	Domestic	66.4	06/08/1959	65	60	8
4105170	Domestic	41.5	04/09/1970	39	35	10
7118093	Irrigation	68.9	09/05/2008	56	55	18
7276717	Irrigation	68.3	30/11/2016	62	55	20

Additional wells are identified in the MECP well records as monitoring / observation wells, test holes and abandoned well records. These are included in the MECP well record summary provided in Appendix F.

3.5 Wetland Hydroperiod

As noted previously, a series of piezometers installed along the perimeter of the wetland area, within the site limits. The piezometers include instrumentation to document continuous water levels, to assist in determining the wetland hydroperiod. Based on the information collected to date, the perimeter of the wetland fluctuates between flooding periods where water levels are above ground level, and when water levels fall to a level of up to about 0.3 m below ground level. Where fine sandy soils and organic soils are present near surface, capillary rise effects within these soils results in soil moisture being present near surface to help sustain vegetation within the wetland, even when water levels are below the ground surface. Within the broader wetland feature, visual observations of the wetland since 2017 indicate that the wetland feature has a long hydroperiod, with water being present at least 10 months of the year under typical conditions.

During drier periods, the duration of water being present may be reduced. Continuous data being collected through 2021 may be able to provide additional insight into this, as the spring of 2021 was a relatively dry period. As additional monitoring is being carried out at the site, additional information is expected to be available to supplement the current data when the detailed design work proceeds.

4.0 HYDROGEOLOGICAL SETTING

4.1 Regional Setting

For the purposes of this study, the Middlesex-Elgin Groundwater Study (2004), and the Dingman Creek Subwatershed Study (2005) were reviewed to provide context for the regional setting within the study area. Within the study area and surrounding lands, four aquifers have been identified:

- Shallow unconfined overburden aquifer, typically encountered within 0 to 15 m depth;
- Intermediate confined overburden aquifer, typically encountered at 15 to 30 m depth;
- Deep confined overburden aquifer, typically encountered at 30 to 60 m depth; and,
- Bedrock aquifer.

The shallow groundwater encountered in the shallow monitoring wells installed at the site contact the shallow unconfined overburden aquifer. The shallow unconfined groundwater table follows the local topography, with groundwater flow towards the existing wetland to the east of the site. Regional groundwater flow information for the shallow aquifer is indicative of water levels within the range of Elevation 230 - 260 m, with a groundwater flow direction towards the south-east.

The deeper wells which have been installed at the site, are still within the 15 m depth below ground surface noted above, and is contained within water-bearing sandy soils, which are separated from the near-surface unconfined aquifer by silt and silt till soils which are present at the site. This is consistent with the intermediate overburden aquifer described in the Groundwater Study, which is described as being comprised of silt till deposits, which are generally contained within the Moraine and till plain of the site area. A review of hydrogeological studies and groundwater assessments for the area indicate that the intermediate and deep overburden aquifer (located within the Catfish Creek Till) consists of differentiated sand and gravel layers within the till. This aquifer is generally discontinuous in nature due to the glaciated erosional and depositional conditions.

According to the Groundwater Study mapping, the site is in an area of moderate to low aquifer intrinsic susceptibility. The intermediate Aquifer is less vulnerable to impact from surface contaminants, due to the relative low permeability of clayey silt soils. However, there may be some potential for horizontal infiltration and migration of contaminants in sand and gravel layers nearer to surface in areas of higher relief.

In regional terms, wells that penetrate a few metres into the bedrock are generally interconnected to overlying sand, sand and gravel or fractured bedrock wells, and are referred to as basal aquifers. Wells that penetrate deeper into the bedrock tap into formations with cracks, where water accumulates. The bedrock surface in the vicinity of the site is generally at approximate Elevation 182 to 200 m asl. As such, the potential impact to the aquifer from proposed development at the site is not anticipated to be significant, and no further discussion is provided regarding the bedrock aquifer.

4.2 Shallow Groundwater Conditions

Short term water level observations were recorded in the open boreholes which were advanced at the site by LDS. Five monitoring wells and two piezometers are currently present onsite. The predominant soils encountered in the boreholes are comprised of clayey silt, with intermittent sandy silt or silty sand layers near surface.

Continuous groundwater level measurements and manual groundwater measurements have been collected at the site from the monitoring wells and piezometers for the period between October 2017 and June 2019, by LDS. Ongoing data collection is continuing at the site. The following table summarises the maximum and minimum water levels recorded manually using the Heron water level meter in the monitoring wells at the site.

Table 12 - Groundwater Elevation Fluctuations

Parameter recorded between October 2017 and January 2019	MW 5 shallow	MW 5 deep	MW 6	MW 9	MW10	PZ201	PZ202
Highest Elevation, m	282.06	275.89	282.52	283.80	285.53	281.24	281.13
Lowest Elevation, m	279.91	274.45	281.56	283.01	284.77	280.77	280.65
Difference, m	2.15	1.44	0.96	0.79	0.76	0.47	0.48

Notes: Groundwater Elevation is provided in m, asl.

The shallow groundwater flow direction is in an easterly direction, towards the wetland. It is anticipated that the existing drains and surface water features (swales) contribute to localised variations in the shallow groundwater levels. Groundwater Contour Plans are provided on Drawings 7, 8 and 9, in Appendix A.

Within the area of the proposed development (outside of the wetland area), the average groundwater gradient ranges from about 0.041 m/m under spring conditions, to 0.036 m/m

under summer conditions. Within the wetland area, the average gradient is greatly reduced, ranging from about 0.017 m/m in spring conditions to 0.013 m/m under summer conditions.

Water levels were re-established at the site in February 2021, along with the addition of some new monitoring wells which were installed at the site. Regular water level measurements taken since February 2021 show similar ranges in the manual water level readings, with more significant fluctuations in the shallow unconfined aquifer within the site limits, compared to the water levels within the perimeter of the wetland or compared to the deeper aquifer.

4.3 Groundwater Quality

Discreet water samples were obtained on November 13, 2017 and February 11, 2019 from PZ202 and MW6. In June 2021, a set of water samples were collected from BH5 (deep), BH6, PZ202 (shallow), BH303 (shallow), and a surface water sample from the wetland, near PZ202.

Samples obtained were sent for Laboratory analysis to document the general chemistry of the groundwater encountered in the wetland surface water and groundwater samples collected from the site. The analytical testing included the following sampling parameters.

- Dissolved Metals: Standard Metals Package for General Chemistry;
- Cation and Anion Parameters;
- Nutrients: Nitrate, Nitrite
- General Inorganic Parameters: pH, Total Suspended Solids, Electrical Conductivity, Hardness.

Each well was fitted with a dedicated bailer to allow purging and sampling of the well and avoid cross-contamination. The monitoring well and piezometer were purged of at least 3 times the volume of water prior to sampling. For the samples taken in June 2021, the wells were developed 24 hours in advance of the water sampling. Water samples were collected by a technician wearing disposable Nitrile gloves, and samples were placed in laboratory-supplied sample bottles, labelled with a unique sample number, dated, and recorded on the laboratory chain of custody form. Samples were immediately placed in a cooler with ice for delivery to an accredited laboratory (2017 and 2019 samples were taken to Maxxam Analytics, and 2021 samples were taken to Paracel Laboratories) under the chain of custody.

Copies of the Certificate of Analysis for each round of testing are provided in Appendix E.

The water samples collected from Borehole BH6 have consistently demonstrated some outlier parameters, with elevated chloride and sodium levels. Chloride is widely distributed in nature, generally as the sodium (NaCl) and potassium (KCl) salts. Sodium chloride and, to a lesser extent, calcium chloride (CaCl₂) are also used for snow and ice control in Canada. Elevated concentrations of calcium, magnesium, sodium were noted in samples taken from both locations. Based on the adjacent main roads and the historical agricultural use of the property, this result is unsurprising. The positioning of Borehole BH6 within the surface drainage swale which extends to the site limits along Colonel Talbot Road towards the downstream end of the swale alongside of the drain, shows a significant influence from surface water run-off which has been impacted by the urbanization of the area.

The general chemistry generally results in the other collected water samples illustrate more dilute levels of the various chemical parameters within the wetland piezometer, which suggests a certain amount of water contained therein is surface water or rainfall from within the broader catchment area, which is not influenced by background conditions within the groundwater.

The water samples from the wetland piezometer (PZ202) indicate elevated iron levels, compared to the concentrations observed in the other monitoring wells. The surface water sample collected in 2021 does not show a correlating iron concentration.

The water quality results indicate that the groundwater is considered very hard, with values reported in excess of 750 mg/L.

Overall, there remains good correlation between the water samples obtained within the wetland area and the shallow groundwater observed within the site limits, which supports the opinion that the shallow groundwater discharges to the wetland, and that shallow groundwater also migrates down to the lower aquifer.

4.4 Groundwater and Surface Water Interaction

Groundwater conditions encountered at the site is generally contained within a shallow unconfined groundwater aquifer, based on the variable thickness and permeability of the weathered silt and sandy soils which were encountered at shallow depths within the boreholes. The groundwater is perched near surface above the less permeable silt and silt till soils, and within sandy layers within the silt till soil.

Similar to most shallow aquifer systems, groundwater and surface water at the site have been found to have a close interaction, with consideration of the local topography and the shallow groundwater observed within the boreholes, and the surface water documented in the wetland area. Surface water run-off follows existing ground surface through swales and through infiltration into shallow sandy and weathered subgrade soils, and flows towards the Buttonbush Wetland to the east.

Groundwater contributions to the wetland area arrives from the site from the more permeable surficial soils which are upgradient of the wetland area. The groundwater contours generally follow the trend established by the topography of the site. It was observed at the piezometer locations along the edge of the wetland area, that during the dry summer months, the groundwater table generally lies below the wetland substrate, except in those instances where localized recharge from high volume rainfall events causes groundwater elevations to rise close to, or above, the ground surface. Further into the wetland area (beyond the piezometer locations), limited site observations are indicative of surface water conditions being more persistent under seasonal conditions, which may be indicative of the broader catchment area contributing to base flows within the wetland, and the possibility of upwelling or groundwater contributions within the wetland feature.

Due to the surface water flows that occur under current conditions, and the base flow contributions from upgradient areas around the wetland feature, it is anticipated that both surface water and groundwater contributions help to sustain the form and function, and recharges the wetland feature. Development at the site which alters surface water or groundwater contributions to the wetland could have long term impacts to the nearby portion of the wetland feature which borders the site. The site makes up a small subcatchment area for the Buttonbush Wetland, and is located at the downgradient end of the feature. The broader catchment area on lands to the north and east of the site also contribute flows to the wetland. However, it is important to ensure that proposed development at the site has consideration for providing clean stormwater run-off, and utilizes opportunities to promote groundwater infiltration.

Further, there is a risk that surface water run-off from the site could be responsible for increased salt loading during late winter and early spring periods. As such, consideration should be given to identifying appropriate mitigation measures to reduce potential salt loading associated with the development and control / maintenance during the winter months under post-development conditions.

The deeper monitoring wells which are installed at the site do not demonstrate a significant upward gradient, based on the water level readings recorded to date. As such, the lower water table does not appear to have a significant impact on the surface water conditions. However, it is noted that this lower aquifer is contained within localized sandy soils, and may receive surface and shallow groundwater which slowly migrates down through weathered soils and through sandy seams within the silt till strata.

4.5 Additional Groundwater Monitoring

Ongoing groundwater monitoring is recommended at the site, to collect additional seasonal data from the monitoring wells and piezometers which have been installed at the site. The complete set of wells have been monitored over the period of February to June 2021 and indicate similar trends and characteristics of water levels recorded in the earlier period of data collection (2017 to 2019), however additional monitoring during summer and fall conditions is expected to continue to further validate the conclusions which have been presented based on the information collected to date.

The shallow groundwater is most susceptible to potential impacts from the proposed development, and as such, priority has been given to addressing potential concerns with the stormwater run-off within the existing surface water features onsite, the shallow groundwater conditions present within the unconfined aquifer, and mitigating potential impacts on the Buttonbush Wetland feature which borders the proposed development area, having regard for both water quality and water quantities.

5.0 SOURCEWATER PROTECTION CONSIDERATIONS

Where proposed developments are being planned, it is important to determine the presence of Significant Groundwater Recharge Areas and High Vulnerability Aquifers in the area. These areas are protected under the Clean Water Act (2006).

In general, Significant Groundwater Recharge Areas are defined as areas where water seeps into an aquifer from rain and melting snow, supplying water to the underlying aquifer. A highly vulnerable aquifer occurs where the subsurface material offers limited protection from contamination resulting from surface activities.

The Thames-Sydenham and Region Source Protection Plan (approved September 2015) presents the framework for assessing lands within the City of London and surrounding area. The Source Protection Plan also presents the assessment work which has been done by the Thames-Sydenham and Region Source Protection Committee.

A more detailed discussion is provided below.

5.1 Significant Groundwater Recharge Areas (SGRA)

Groundwater recharge is largely controlled by soil conditions, and typically occurs in upland areas. As discussed previously, regional groundwater flow directions identified in the Middlesex-Elgin Groundwater Study for overburden and bedrock aquifers are typically indicated to be in a southerly or westerly direction.

As defined in the Clean Water Act (2006), an area is a significant groundwater recharge area if,

- the area annually recharges water to the underlying aquifer at a rate that is greater than the rate of recharge across the whole of the related groundwater recharge area by a factor of 1.15 or more; or,
- the area annually recharges a volume of water to the underlying aquifer that is 55% or more of the volume determined by subtracting the annual evapotranspiration for the whole of the related groundwater recharge area from the annual precipitation for the whole of the related groundwater recharge area.

As defined by the Clean Water Act (2006) and identified by the Thames-Sydenham and Region Source Protection Committee, the south-eastern portion of site is located within a

Significant Groundwater Recharge Area (SGRA) with a Vulnerability rating of 2, as demonstrated on Drawing 11 in Appendix A. Vulnerability of SGRA's is determined by cross referencing aquifer vulnerability maps with SGRA mapping. Those areas which have high intrinsic vulnerability are classified as 6, and those with low vulnerability as 4 and 2. The location of this significant groundwater recharge area corresponds with a glacial stream trench identified on the Pleistocene geology mapping, with soils described as alluvial silt, sand, and gravel with organics.

It should be noted that the majority of the site is not included in the SGRA. The low permeability soils onsite are not conducive to significant groundwater recharge. Typically, these lower permeability silty soils result in a higher contribution to runoff rather than infiltration.

5.2 High Vulnerability Aquifers

The susceptibility of an aquifer to contamination is a function of the susceptibility of its recharge area to the infiltration of contaminants.

In the Thames-Sydenham and Region, HVA's were mapped using the Intrinsic susceptibility index (ISI) method, which is an indexing approach using existing provincial Water Well Information System (WWIS) database. The ISI method is described in detail in the MOE's Technical Terms of Reference (2001), and is an empirical scoring system that takes into consideration the unique hydrogeologic conditions at a particular location.

The scores are determined using a combination of the saturated thickness of each unit and an index number related to the soil type, and as such, the scores reflect the susceptibility of the aquifer to contamination. As defined in the MOE's 2008 Technical Rules:

- Low Vulnerability – ISI score greater than 80
- Medium Vulnerability – ISI score of 30 to 80
- High Vulnerability – ISI score less than 30

Using the method described above, the Thames-Sydenham and Region Source Protection Committee has determined, that the Site is not within highly vulnerable aquifer zone.

5.3 Wellhead Protection Area

The Thames-Sydenham and Region Source Protection Report outlines that Wellhead Protection Areas (WHPA's) are defined as the vulnerable areas around groundwater sources that have been delineated using three-dimensional groundwater flow models. The WHPA for each well field (or well) is based on an estimate of the groundwater travel time to the well, with defined zones extending out to a period of 25-years for groundwater travel to the well.

Based on the aforementioned Report, the subject lands are not within or near a WHPA. The nearest WHPA is located in the in the north-west part of the city north of the River Thames approximately 2.7 km north of the site.

5.4 Summary Comments

As noted in the previous discussion, the site is not identified to be within a High Vulnerability Aquifer or Well Head Protection Area. The Site is however identified as having Significant Groundwater Recharge Areas (SGRAs) with a Vulnerability Rating of 2 located on the eastern portion of the Site. As such, development at the site must have regard for the sensitivity of the shallow aquifer, and the design of the proposed development should incorporate suitable measures and design aspects to minimize negative effects to the shallow groundwater aquifer. This can be addressed through strategic stormwater management design, the use of contingency and mitigation measures to limit development impacts.

6.0 WATER BALANCE CONSIDERATIONS

A preliminary water balance assessment has been completed for the site, based on available information. The water balance analysis is based on onsite infiltration and run-off contributions which make up base-flow contributions to the wetland feature along the east side of the site.

Based on information from Stantec, it is understood that Buttonbush Wetland has a contributing drainage area of 77.4 hectares, much of which has been subject to urbanization, and has an approximate impervious level of about 63 percent. It is important to note that this assessment does not consider the broader catchment area for the wetland area, which extends beyond the subject lands. This water balance is based on the onsite contributions, through surface water (stormwater run-off) and onsite infiltration which contribute to the adjacent wetland features. The following table summarizes the recommended elements of the assessment, and provides a reference to the corresponding material within this report.

Table 13: Water Balance Overview

Conservation Authority Recommended Element of the Water Balance Assessment	Reference
Obtain precipitation values from a reliable source such as Environment Canada Meteorological Services for the area (utilize closest station with adequate data)	Environment Canada Climate Normals 1981 – 2010 London Airport Weather Station, Ontario
Estimate of local values for major water balance components (evapotranspiration, surplus, runoff, and infiltration) for pre-development, post-development and post-development with mitigation conditions	Estimated pre and post-development values of evapotranspiration, surplus, runoff, and infiltration are summarized in the following paragraphs. Calculation Work Sheets are provided in Appendix G, which reference values which are based on Table 3.1 of the MECP Stormwater Management Planning and Design Manual, and modified to reflect site conditions, as described.
Calculations of impervious areas that reflect actual conditions based on the proposed site plan or a reasonable range of impervious areas used in those cases where only a conceptual development plan is provided	Total impervious area used for the pre and post-development water balance calculations are based on existing conditions, and the concept plan provided by the client.

Conservation Authority Recommended Element of the Water Balance Assessment	Reference
The water balance is required to take into account the changes to grading / topography and land cover	Variables such as elevation, surficial soils, hydrologic soil group, vegetation, root zone, impervious areas, grading and topography are taken into account when estimating the pre and post-development water balance components, and are presented on the Water Balance Calculation Worksheets in Appendix G.
Grain size analysis for both the fill material and on-site soils to confirm fill material is similar to existing soil conditions (maybe recommended)	Soil permeability values are based on correlation with collected sample gradation results.
Appropriate catchments should be used within the analysis (i.e. delineate catchments based on drainage, grades, vegetation, soils and show how infiltration and runoff will change within these zones for both pre and post-development)	The rationale used to delineate catchment areas, and to estimate infiltration / runoff values within the zones for both pre and post-development areas are summarized in the following paragraphs.
Figure of catchments used within the pre and post-development water balance	Pre and post development water balance catchment areas are provided on the Plans provided in Appendix G.
All calculations should be provided in a table format which clearly demonstrates that inputs (precipitation, additional runoff, water from municipal well, etc.) are equal to outputs (i.e. infiltration runoff, water use)	Calculations are summarized in table format in the following sections of this report.

It is also noted that the analysis presented in the following sections is based on the proposed layout and design information which has been provided by the developer and their civil design team. As detailed design occurs, updates to this analysis may be required to reflect specific changes to the proposed site grading, LID features and other design aspects of the site.

6.1 Catchment Areas

Under existing site conditions, two catchment areas have been identified. These are denoted as Catchment 101 and 102. The limits of these Catchment Areas are shown on Pre-Development Drawing, in Appendix G, and described in the following table.

Table 14: Predevelopment Catchment Areas

Catchment	Area	Description
101	2.59 ha	Comprises of the open field and future development area outside of the wetland area.
102	1.47 ha	Comprises of the wetland area.

Under the proposed development plans, the area is subdivided into four catchment areas, denoted as Catchment 201 through 204. At this time, it is understood that the site does not have a storm sewer outlet, and that it is anticipated that the stormwater generated from the site will be accommodated onsite. A description of the catchment areas, and the specific stormwater management features associated with each catchment are described in the following table.

Table 15: Post Development Catchment Areas

Catchment	Area	Description
201	1.77 ha	Contains the future parking lot and small commercial buildings in the southwest quadrant of the site. It has been assumed that stormwater run-off in this area will be directed to storm sewers for water quality treatment.
202	1.47 ha	Contains the wetland / open space area along the east side of the site.
203	0.27 ha	Contains the future development block in the southeast corner of the site. May be used for future townhouse block, however details for this area are not currently confirmed.
204	0.55 ha	Contains the rooftops of the proposed residential buildings, large grocery store, and commercial building closest to the wetland. It is recommended that stormwater run-off in this area be directed towards an infiltration feature which outlets at the wetland.

The limits of these Catchment Areas are shown on the Post-Development Drawing, in Appendix G. However, since this analysis is preliminary in nature, water directed to the storm sewer system has been identified separately from water which will be directed towards the wetland area, to provide flexibility in the design of the stormwater strategy.

6.2 Water Balance Calculations

For each Catchment Area within the Site; precipitation, evapotranspiration, total runoff, and infiltration was reviewed utilizing a method authored by C. W. Thornthwaite and J. R. Mather in their 1957 paper titled Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance. The methodology can be found in the MECP SWM Planning and Design Manual, Section 3.2.

The basic water balance for a region can be expressed as:

$$P = RO + ET + I + \Delta S$$

Where, P = Precipitation (rain and snow)

RO = Runoff

ET = Evapotranspiration

I = Infiltration (Groundwater Recharge)

ΔS = Change in Storage (assumed to be zero under steady state conditions)

Precipitation is a measured value, with the averages (1981 to 2010) used in this assessment being obtained from the Environment Canada operated London International Airport Climate Station. Evapotranspiration is calculated based on measured air temperatures. Infiltration and runoff are calculated based on precipitation and evapotranspiration, where the difference between these components is the water surplus available for infiltration and recharge.

Within the monthly breakdown portion of the analysis, it was assumed that no infiltration occurs in the months of January through March and in December, because of frozen ground conditions and average daily temperatures which occur through that period. The winter runoff volumes have been applied under spring conditions (50 percent in each of April and May), and winter infiltration volumes are applied under spring conditions with 75 percent occurring in April and 25 percent occurring in May. This is detailed in the calculation worksheets provided in Appendix G.

Table 16 summarizes the existing water balance volumes under existing (pre-development) and post-development conditions, as it relates to base flow contributions to the Buttonbush wetland feature located on the east end of the site.

Table 16: Water Balance Calculation Summary

Receiver	Catchment	Adjusted Evapo-transpiration (mm/year)	Infiltration (m³/year)	Runoff (m³/year)
Predevelopment catchment areas contributing to wetland area	101, 102	558.0	7,757	12,635
Post development catchment areas contributing to wetland area	201, 202, 203, 204	548.8	9,891	10,117
Net Change			↑ 2,134	↓ 2,518

Under the post-development conditions, the analysis indicates that there is a deficit for water being directed towards the wetland under post development conditions, since the decrease in the run-off volumes are not completely offset by the increased infiltration. To help offset the deficit of infiltration contributing to the wetland, ‘clean’ water from the rooftops which make up catchment 204 could be captured and directed towards the wetland in a dedicated stormwater piped system set into infiltration galleries in the greenspace area adjacent to the wetland, or using LID features located in the greenspace area along the east side of the site, between the parking lot and wetland area. The use of an in-ground infiltration-based system would also be helpful to attenuate thermal impacts associated with introducing stormwater run-off towards the natural feature.

When additional information regarding the stormwater management strategy is available for the site, the water balance should be updated to reflect stormwater catchments used in the design. Additional discussion is provided in the following section to assist in the design of the stormwater management strategy.

6.3 Stormwater Management Strategy – Design Considerations

It is understood that the site does not have a municipal stormwater outlet, or access to an external storm sewer connection. As such, stormwater run-off generated from the site is expected to be handled and treated onsite. The following discussion is provided to assist in the design of the stormwater system.

It is anticipated that the wetland feature on the east side of the site is influenced by upstream stormwater facilities; however, it is anticipated that the development will need to have suitable measures in place to help prevent further water quality degradation for water leaving the subject lands which makes its way into the wetland feature.

Drainage mapping (as discussed in Section 2.1.4) identifies that a systematic drainage system is/was in place in the westerly extents of the site. Although field tiles (or drainage outlets) were not encountered or observed during the field program, and existing infrastructure along Col. Talbot Road has likely intersected any formal drainage features from the lands on the west side of the road allowance, there may still be tile drains (or portions thereof) present onsite, unless the overland swales which have been discussed previously provided an outlet conveying flows towards the wetland. Regardless, the systematic drainage of the area has historically provided some base flow contributions to the wetland, whether through overland flow routes or tile drains. Alterations to the site grading, disturbance to subsurface tile drains and introduction of impermeable hard surfaces will alter those base flow contributions, as demonstrated in the water balance calculations noted above. As such, it is important that clean stormwater run-off (such as that collected from roof-tops or landscaped areas), be directed towards features which direct flows towards the wetland area.

To increase post development infiltration and evapotranspiration volumes, low impact development (LID) measures may be incorporated into the stormwater design plan/strategy for the proposed development. From a quantitative standpoint, incorporating effective at-source infiltration structures into final land development design as part of a storm water management strategy is primarily dependent on (but not limited to), native soil infiltration rates and depth to seasonal high groundwater table.

The silty sand and sandy silt soils encountered near ground surface have a factored infiltration rate in the range of 25 mm/hr, as identified in Section 3.2.2. Although sandy soils are generally present near surface, they are generally in a wet to saturated state. The shallow unconfined aquifer being present at shallow depths limit the ability to effectively use LID strategies which require separation from the high groundwater table.

The site grades are generally well below the surrounding roads, and based on preliminary site grading information provided by Stantec, it is anticipated that some significant grading work will be done to raise grades throughout much of the site. In this regard, consideration should be given to using imported soils which have a sandy texture and consistency, to broaden the possible types of LIDs which may be suitable for use at the site.

As noted in the previous section of the report, based on existing grading information and the concept plan for the proposed development, the water balance for maintaining base flow contributions to the wetland area appears to have a deficit. To help offset the deficit of infiltration contributing to the wetland, ‘clean’ water from the rooftops of the larger commercial buildings could be captured and directed towards the wetland in a dedicated stormwater piped system set into infiltration galleries in proximity to the wetland, or using LID features located in the greenspace area along the east side of the site, between the parking lot and wetland area. The use of an in-ground infiltration-based system would be helpful to attenuate thermal impacts associated with introducing stormwater run-off towards the natural feature.

Stantec has proposed the use of two sets of stormwater storage chambers/features at the site (one for the residential area and one for the commercial area), to receive runoff from the paved parking lot areas. To provide water quality of the parking lot run-off, oil grit separator stormceptors are planned, and would be positioned inline ahead of reaching the stormwater chambers. Stormwater chambers should be designed to provide adequate storage capacity, with infiltration capacity provided along an overflow/outlet pipe, directed to the wetland. Preliminary design drawings indicate an outlet adjacent to the edge of the wetland feature with a rip-rap pad. Similarly, a rip-rap pad for roof water conveyed off of the larger commercial building, and discharged towards the wetland. Roof flows are expected to be controlled, as to not overwhelm the outlet.

Table 17 – Proposed Stormwater Storage Features

Parameter	Town Home Storage Facility	Commercial Storage Facility
Minimum Footprint	300 m ³	1000 m ³
Minimum Storage Volume	175 m ³	550 m ³

Based on these volumes, and the water balance discussed in the previous section of this report, the proposed storage features will capture the entirety of a 25 mm storm event (less than design 2 year storm) from approximately 83 percent of the development area. This is suitable to offset the previously described deficit resulting from the introduction of

impermeable surfaces at the site. The water balance analysis assumed that 20% of the run-off would be captured from building rooftops, and this design exceeds that requirement.

The interface between the bottom of the storage system, and the natural soils should be reviewed to ensure that soils are suitable to provide infiltration capacity to supplement the storage system.

The use of the stormwater storage features provides an opportunity to help minimize thermal impacts to the wetland, by providing time to stabilize stormwater runoff temperatures to the ground temperature, prior to discharge towards the wetland.

The use of grassed swales and reduced lot grading in the residential area may also be considered to provide some further benefits in greenspace areas, to extend the amount of time that stormwater is detained on the surface, helping to moderate run-off and provide additional infiltration and evapotranspiration opportunities.

7.0 IMPACT ASSESSMENT FOR POTENTIAL RECEPTORS

It is anticipated that the proposed commercial and residential development which is planned for the site can proceed without construction activities or changes in the land-use from causing any adverse effects on the characteristics of the surface and groundwater at the site, and the form and function of the Buttonbush wetland feature which borders the site. To this end, the following discussion is provided to identify potential impacts, and to discuss mitigation measures which can be implemented through the design and construction to avoid adverse impacts.

7.1 Surface Water and Wetland Features

Under existing conditions, stormwater run-off follows the surface topography and is generally directed towards the wetland to the east of the site, with swales directing to both the north-east and the south-east corners of the site directing flows more quickly overland towards the wetland.

Drainage mapping (as discussed in Section 2.1.4) identifies that a systematic drainage system is/was in place in the westerly extents of the site. The systematic drainage of the area has historically provided some base flow contributions to the wetland, whether through overland flow routes or tile drains. As such, it is important that clean stormwater run-off (such as that collected from roof-tops or landscaped areas), be directed towards the wetland area. This was discussed as part of the stormwater management strategy recommendations in Section 6.3,

During the site grading work, suitable sedimentation controls will be required to help control and reduce the turbidity of run-off water which may flow towards the surface water features. As construction work progresses at the site, regular maintenance and additional sedimentation measures will be required to limit the effect of siltation of run-off water in localized areas. If deficiencies are identified in the performance of the sediment and erosion control measures through regular inspection, enhancements beyond the recommended design may be required.

Based on the findings of this report, it is anticipated that the development can proceed with no net negative impact to the Buttonbush Wetland which (located on the east side of the site), provided that clean stormwater run-off is directed into areas where it can be infiltrated or otherwise directed towards the natural feature. Stormwater run-off containing contaminants

(from site pavements) are expected to be captured and directed into a storm sewer system for treatment.

7.2 Wetland Flooding Considerations

Based on the site grading information prepared by Stantec, it is understood that a 3 metre high retaining wall will be required along the easterly limit of the development, next to the Wetland feature. Under current site conditions, when a flood event occurs within the wetland area, flood waters are able to extend into the site, with backwater flows into the existing swales, and into the open field area. Under the proposed development plans, the proposed change in grades at the site and the introduction of the retaining wall will prevent the free flow of water to extend into the site. As such, flood waters in the wetland which extend into the property under current conditions may be diverted/displaced into adjacent lands. It is understood that Stantec is responsible to confirm the applicable flooding elevation and assess the potential for offsite impacts.

Based on information in the EIS Report prepared by MTE, it is understood that Buttonbush Swamp ecology and sensitivity is such that this type of feature is “tolerant to a wide variety of hydrologic changes, including prolonged flooding, and is well adapted to flood events characteristic of disturbed ecosystems”. It is anticipated that flooding associated with frequent storm events (such as the 2 or 5 year storm event) will not yield significant changes to the flooding frequency or duration which would have a significant adverse effect on the wetland features. Small seasonal floods typically contribute a source of nutrients to aquatic ecosystems, and when the nominal increase in the volume of water is assessed over the broad extent of the wetland feature, changes in the flood duration and frequency are not expected to be significant.

For flooding associated with more significant storm events, the volume of flood water which is retained in the wetland may be more likely to have an impact to the ecological features within the wetland. If the ecological assessment indicates that there is a need to attenuate the effects of flooding in the wetland, this could be addressed (in part) through temporarily controls to limit stormwater run-off from the development being directed into the wetland by utilizing onsite storage capability in temporary holding chambers, and/or providing an alternative outlet such as a road crossing / culvert which connects into the stormwater infrastructure which services the lands south of Southdale Road, and/or west of Colonel Talbot Road. In the latter case, there may be an opportunity to incorporate the creation of a

storm overflow/outlet as part of the future road expansion works which are planned along Southdale Road.

7.3 Impacts to Shallow Groundwater

Shallow groundwater and surface water interactions have been described previously. As such, maintaining shallow groundwater contributions to the wetland feature to the east is an important consideration for the proposed development. Limited green-space and buffer areas adjacent to the wetland will continue to provide opportunities for infiltrated surface water (sourced from sheet flow at the site) to travel in the shallow subsurface; however, the introduction of impermeable surfaces which will limit natural infiltration of surface water at the site will directly result in changes to the shallow groundwater contributions from the site. As such, consideration has been given to identifying alternative means to direct stormwater runoff towards the wetland, in lieu of the run-off and infiltration which occurs under current conditions. This is important, since the EIS report prepared by MTE identifies that Buttonbush Swamps are generally less tolerant to drought or other conditions which lower the water table.

7.3.1 Post-Construction Removal of Swales and Reduced Infiltration

The near surface silty sand/sandy silt soils are described as being in a moist to wet state, and contain shallow groundwater. The topsoil and composition of the silty sand/sandy silt soils are conducive to surface water infiltration, and the presence of shallow swales at the site facilitate surface water being conveyed into these soils and towards the wetland feature. Under the proposed post-development conditions, much of the surface will be covered with hard surfaces, comprised of buildings and paved parking, and the swales are expected to be removed as part of the site grading work. The shallow groundwater which exists near surface is expected to be influenced by the restrictions which will exist for surface water to infiltrate directly into the near surface soils.

The shallow groundwater currently contributes base flows to the wetland, and with the presence of hard surfaces, it will be required to direct clean water which can be captured at the site towards the wetland, to help minimize the impact to the shallow groundwater which exists under current conditions. Stormwater run-off from site pavements and parking areas can also be directed into temporary storage and infiltration features which can serve to provide enhanced infiltration of the stormwater run-off, and overflow capacity to support the wetland feature. Filtration and treatment of any stormwater runoff from the site pavements is recommended, to prevent the introduction of contaminants into the subsurface.

7.3.2 Construction Dewatering Considerations

The shallow groundwater is contained within weathered soils and sandy silt typically encountered near surface, and perched above the less permeable silt till. Seasonal high groundwater levels were measured throughout the site at Elevation 282.0 to 285.5 m depth. As noted previously, the deepest excavations are expected to be located at the sanitary sewer connection at Southdale Road, at about Elevation 280.0 m, asl.

Conventional groundwater control methods are expected to be suitable for shallow excavations which remain above the groundwater table at the site; however, excavations which extend below the groundwater table will require positive groundwater control and a comprehensive groundwater dewatering plan.

For substantial excavations which extend below the groundwater table, consideration may be given to utilizing a system of well points for temporary groundwater control. It is generally accepted that the height to which water can be drawn down using a single stage well point system is approximately 6 metres. The close proximity of the Buttonbush Wetland is sensitive to changes in the shallow groundwater table; therefore, it is recommended (where possible) that servicing depths be set as high as possible and work be carried out in seasonally drier periods to limit the amount of construction dewatering which is required. In addition, the use of trench liners and cut-off systems can also assist in reducing the amount of construction dewatering which may be required.

However, given the sensitive nature of the wetland to the east of the site, design of the site grading and servicing should consider ways to limit excavations below the stabilized groundwater table, where possible.

Additional discussion is provided in Section 8.1.

7.4 Impacts to Potable Wells

The proposed development is expected to be provided with full municipal services, including water supply, sanitary and storm sewer services. The development will not be reliant on potable aquifers in the area, as the municipal water supply is sourced from Lake Huron.

Similarly, neighbouring residential and commercial developments are also equipped with municipal water supply. The water supply wells which are identified in the area are typically set into the intermediate and deep overburden aquifers (at depths generally more than 40m below existing grade). Any wells which are still in use are not expected to be impacted by

construction dewatering for site services or typical depth excavations associated with the buildings of the site.

No significant long-term impact is anticipated on the wells, either quantitatively and qualitatively.

Based on the information provided in the MECP water well records, and supplemented by our understanding of the municipal water supply available in the area, a door to door well survey was not completed as part of our assessment.

7.5 Water Quality Considerations

Given the naturally low permeability of the silt till soils which underlie the site, the intermediate and deep overburden aquifers and deep bedrock aquifer is not considered to be vulnerable to contamination from surface sources. However, the shallow groundwater which provides base flow contributions to the wetland area to the east does not have the benefit of a low-permeability protective soil layer above it, and it therefore more susceptible to potential impacts resulting surface activities during construction.

7.5.1 Baseline Conditions

Most pollutants in urban runoff are well retained by infiltration practices and soils and therefore, have a low to moderate potential for groundwater contamination. Two sets of water quality samples have been obtained from the site, to collect baseline water quality data. The results of the testing are discussed in Section 4.4.

The general chemistry of the shallow groundwater indicates elevated levels of sodium and chloride. Given the use of salt-application for road de-icing, the relatively shallow depth to the shallow groundwater, and the location of the site at Southdale Road and Colonel Talbot Road, elevated salt levels are not unexpected.

7.5.2 Snow Removal and Salt Management

Further to the comments above, chloride and sodium from de-icing salts applied to roads and parking areas during winter are not well attenuated in soil and can easily travel to the shallow unconfined groundwater aquifer. Given the importance of mitigating potential impacts to the wetland area, and in an effort to ensure that the proposed development has no net negative impacts to the wetland, consideration should be given to utilizing a Salt-Management Plan for

the proposed development. Contractors used to carry out salting activities should be familiar with best practices to ensure that salt is used only during conditions when it will be effective, and should be able to produce equipment inspection or calibration records to ensure that spreader controls are not over-applying salt.

The introduction of hard surfaces, namely paved parking areas in proximity to the wetland area creates the potential for impacts to the wetland from snow accumulation/storage onsite resulting from parking lot clearing. Snow can be impacted by salts and other ice control chemicals; oil, grease and heavy metals from vehicles; litter and debris; and, dirt, dust and airborne pollutants. If snow is cleared from parking areas and remains onsite, it should be managed to prevent contaminants from reaching the wetland. Further, if snow is pushed into LID areas (such as rain-gardens or grassed swales intended to promote infiltration), snowmelt may result in a release of contaminants, debris and litter into such areas, which can directly impact their effectiveness and have a negative impact to local water quality.

In warm weather conditions, maintenance may be required to remove physical debris and litter. A program of water quality testing in snow storage areas, and/or in the buffer area between the parking lot and wetland feature. Monitoring can be expensive and should be scoped to address specific goals. If after monitoring some parameters it becomes clear that they are not relevant, then they should be discontinued, subject to review by an environmental engineer.

Alternatively, snow accumulation could be removed from the site and taken to a snow disposal area where a snow management plan and treatment (if required) is in place.

7.5.3 Potential Impact from Construction Equipment

Construction activities at the site are not expected to impact the general chemistry or bacteriological properties of the unconfined shallow aquifer. However, the possibility exists that a spill or uncontrolled release of fuel or associated material could occur during construction, which could have a direct impact to the unconfined shallow groundwater aquifer.

A Best Management Practice (BMP) and spill contingency plan (including a spill action response plan) should be in place for fuel handling, storage and onsite equipment maintenance activities. It is recommended that there be a designated equipment fuelling areas located away from the wetland, and implementing a spill contingency plan (including a spill action response plan) for fuel handling, storage and onsite equipment maintenance

activities to minimize the risk of contaminant releases as a result of the proposed construction activities.

It is important to note that if a spill (possible incident) is related to the contractor's activities, the contractor is responsible to report the incident to the Spills Action Centre, and/or notify the local MECP office. Depending on the type of incident, water sampling and quality testing may be warranted to document the extent of the impact. Scoping for the required testing will depend on the incident report.

7.5.4 Thermal Considerations

Numerous studies indicate that urbanisation (and by extension, the increase of impervious surfaces) typically causes temperature increases in stormwater runoff. Asphalt and other impervious surfaces absorb heat energy and during rainfall events the stored heat is transferred to the runoff.

For the stormwater run-off generated from the parking lot areas, the water is expected to be collected and directed into a stormwater storage facility within the respective residential and commercial areas. These features are expected to promote infiltration into the natural subgrade soils, with overflows set to direct discharge towards the wetland feature. As such, the temporary storage of surface water below grade will help to moderate temperatures before discharge. Water which naturally infiltrates into the subgrade soils, is expected to match ground temperatures, mimicking the typical range of temperatures which occur in the shallow groundwater under current conditions.

It is anticipated that stormwater run-off from the large grocery store building will be directed towards the wetland, with roof water being discharged at a controlled rate. To help mitigate thermal impacts before reaching the wetland limits, the use of a partially buried conveyance system and vegetive cover or shading at the rip-rap outlet may be considered.

7.5.5 Potential Impact from Uncontrolled Erosion / Sediment Discharge

Surface water quality can be detrimentally impacted by uncontrolled erosion and sediment discharge from the site. As such, it is imperative that an adequate Sediment and Erosion Control Strategy be established for the site. In addition to implementing sediment and erosion controls during construction, regular inspection and maintenance will also be necessary to ensure that sensitive receptors are not negatively impacted during construction.

Mitigation measures and best management practices are outlined in the Geotechnical Report (LDS, 2020) to limit foreseeable events where contamination or negative impacts to natural features at the site. These are also reiterated (in part), in Table 18 (refer to next page), for those measures which relate to groundwater and surface water quality.

7.6 Monitoring Plan

Development plans are currently at a conceptual stage, and as such, insufficient details are available to prepare a detailed monitoring plan at this time. However, due to the sensitive nature of the wetland area next to the site, it is anticipated that as detailed design information becomes available, that an environmental monitoring program will be prepared, to help ensure that site activities during construction, and in post-development conditions do not have a detrimental impact to the wetland area, from an ecological perspective, and hydrologic perspective. The main objectives of the Environmental Monitoring Plan are expected to include:

- Providing an early indication should any environmental control measures (such as sediment and erosion control measures) or practices fail to achieve prescribed standards;
- Monitoring the performance and effectiveness of mitigation measures;
- Determining project compliance with regulatory requirements and standards and outlining reporting requirements, including timing and distribution;
- Identifying an emergency contact list and response protocol to respond to any issues or concerns identified during construction; and,
- Taking remedial actions if unexpected problems or unacceptable interference or negative impacts arise.

Table 18: Best Management Practices, ESC Controls

Practice / Task	During Site Grading	During Site Servicing	Building Construction & Partial Pavements	Following Construction
Delineate work areas to limit construction activities encroaching into the natural heritage features and setback areas, to prevent unnecessary vegetation removal.	✓	✓	✓	
Monitoring of discharge water (for water quality – turbidity) from stormwater run-off and construction dewatering activities.	✓	✓	✓	
Installing perimeter ESC measures such as silt fence and/or silt sock around temporary soil stockpiles, with dedicated points of access clearly marked onsite.	✓	✓		
Dedicated fuel storage and equipment fuelling areas located away from natural features. Contractors should have an emergency spills management plan.	✓	✓		
Incorporate trench plugs/clay collars in servicing trenches to minimize groundwater migration through granular pipe bedding and disturbed backfill material. The location of such features should be reviewed in the field to confirm that they are placed at appropriate locations where groundwater migration may be expected to occur.		✓		
Re-establishing vegetative cover in disturbed areas. In areas which are susceptible to erosion, additional measures may include the use of sod, mulch, etc.	✓	✓	✓	✓
Maintain perimeter silt fence (and other perimeter ESC measures) in place until disturbed areas and lots are sodded/seeded, and vegetative cover has become established.			✓	✓
Build-up boulevard areas to help limit sediment-laden stormwater run-off from discharging into catchbasins and stormwater infrastructure, and regular inspection and maintenance of silt bags/geotextile filters installed in catchbasins.			✓	
Limit the use of commercial fertilizers in landscaped areas which border the natural areas.				✓
Limit the use of salts or other additives for ice and snow control for site pavements and entrances.				✓

Preliminary recommendations for inspections and monitoring are provided in Section 9.0 of this report. From a preliminary standpoint, the following comments are provided regarding monitoring efforts which are expected to be confirmed and refined as detailed design information becomes available. The Monitoring Plan should be prepared by a Qualified Person (QP) and periodically reassessed and updated by the QP, as appropriate, to ensure that the objectives stated above are effectively and efficiently achieved.

The Contractor and Contract Administrator should endeavour to preserve all monitoring points, where reasonable.

During construction dewatering, weekly water level monitoring of the existing monitoring wells and wetland piezometers should be implemented prior to the start of construction, and continue for at least two months following construction, or until water levels return to 90 percent of the pre-construction water level, or return to typical groundwater levels recorded under similar seasonal conditions. Thermal profiling of the groundwater column in select wells should also be carried out over the same period.

Inspection of sediment and erosion control measures at the site during construction will be incorporated into the environmental monitoring program for the site. The frequency of inspections will depend on weather conditions (such as periods with rainfall or snowmelt). At a minimum, inspections are expected to include checks on siltation barrier installations to confirm that it is properly installed and secured, including inspection for evidence of damage or tears, and overtopping or undermining; checking condition of surface water ponding areas and storm drain inlets, and documenting areas where seeding / sodding / mulching is implemented to re-establish vegetative cover.

While active construction dewatering occurs at the site, a program which includes turbidity monitoring is may be appropriate to confirm that the quality of discharge water will not have adverse impacts to sensitive receptors. In the event that water discharged from the site is considered to have an elevated turbidity level, associated construction activities should be halted until remedial measures can be implemented. Such measures may include enhanced or more robust sediment and erosion control measures, incorporating pooling areas and measures that will reduce suspended solids, temporary storage measures to prevent off-site discharge.

In the event that there is an incident or perceived impact to groundwater quality identified through monitoring at the site, interim water quality testing should be carried out within 24

hours of the reported incident, to document conditions which may have been impacted. Scoping for the required testing will depend on the incident reported.

For general guidance, the following parameters are suggested, however it is important to note that some parameters may be added or removed depending on the site activities and incident reporting.

- General inorganic parameters, such as pH, electrical conductivity, total dissolved and suspended solids, turbidity;
- Major anions and cations;
- Nutrients (including ammonia and nitrogen species);
- A limited selection of dissolved and total metals; and,
- Petroleum hydrocarbons.

Groundwater field parameters, including pH, temperature and EC should also be measured. All monitoring activities and groundwater/surface water sample collection should be conducted by qualified environmental field staff.

8.0 CONSTRUCTION CONSIDERATIONS

8.1 Construction Dewatering

Shallow groundwater encountered at the site is contained within weathered soils and sandy silt typically encountered near surface, and perched above less permeable silt till soils. Seasonal high groundwater levels were measured throughout the site at Elevation 282.0 to 285.5 m depth. The deepest excavations are expected to be located at the sanitary sewer connection at Southdale Road, at about Elevation 280.0 m, asl.

Depending on final design grades, and the amount of fill placement which is carried out to raise grades in low areas, building foundations may be expected to remain above the shallow groundwater level; however, servicing excavations may be expected to encounter the shallow groundwater table.

Conventional groundwater control methods are expected to be suitable for shallow excavations which remain above the groundwater table at the site; however, excavations which extend below the groundwater table will require positive groundwater control and a comprehensive groundwater dewatering plan.

Where possible, construction during the drier summer months is preferred to carry out excavations when stabilized groundwater levels are not elevated under seasonal conditions. If construction occurs during wet-weather conditions or when seasonal water levels are elevated, monitoring the water levels within the monitoring wells during construction can be used to confirm the zone of influence, and to identify changes in the water level while construction dewatering is actively occurring.

The Geotechnical Report (LDS, 2020) provides preliminary zone of influence calculations which are also summarized below, and indicate that the westerly extent of the Buttonbush Wetland could be within the zone of influence associated with construction dewatering. Since this natural feature is sensitive to changes in the shallow groundwater, it is recommended that servicing depths be designed to minimize the need for construction dewatering where possible. In addition, it is recommended that construction staging utilize measures to limit the amount of dewatering required, to keep water taking volumes within 400,000 litres per day, such that the construction dewatering can be carried out under an EASR submission.

EASR Requirements

The EASR requires preparation of a Construction Dewatering and Discharge Plan, which requires information from the contractor carrying out the excavation work, and the contractor responsible for providing groundwater control. The construction methodology, including details for the typical length and depth of service trenches, information about excavation support or cut-off systems (such as trench liner boxes) which may be utilized, and the method of groundwater control which will be utilized. This information is included, to inform the discussion which is provided in the Dewatering Plan, which identifies potential impacts to soil settlement, impact to existing groundwater users and surface water features, along with consideration for extreme weather events.

The Discharge Plan identifies the discharge location for pumped water, including sediment and erosion control measures which will be utilized where water is contained onsite in surface water features, or where filtering of discharge water is planned, for water being outletted to municipal infrastructure. Construction dewatering effluent which is directed to the City's stormwater infrastructure must meet the water quality standards outlined in the City of London Sewer Discharge By-Law. Monitoring and inspection requirements, and contingency plans for treating pumped water to reduce turbidity levels should also be incorporated into the Discharge Plan.

Zone of Influence Calculations

As a preliminary assessment of the zone of influence for potential construction dewatering activities, the Sischart and Kryieleis method has been utilized, which is based on an empirical relationship with the amount of groundwater lowering and the soil permeability. The zone of influence is calculated using the following equation:

$$R_o = 3000 (H-h)(k)^{1/2}$$

where, H = high water level, m

h = lowered water level, m

k = soil permeability, m/s

For the purposes of this preliminary analyses, a soil permeability of 3.0×10^{-6} m/s has been used, based on correlations with the gradation analyses, and the water levels have been measured relative to the lower grey silt till layer, typically encountered below 8.5 m depth.

The following table summarizes the range of distances applicable to various depths of the groundwater lowering.

Table 19: Zone of Influence Distances

Effective Lowering	1.0 m	2.0 m	4.0 m	6.0 m
Zone of Influence, m Based on average $k = 3 \times 10^{-6}$ m/s	5	10	21	31

Variability in the overall zone of influence should be expected, depending on the composition of the soil, and the overall depth of effective lowering of the water table. The use of cut-off walls or similar type systems may be considered for the purposes of minimizing impacts to the stable shallow groundwater table during construction, if a need is identified to limit the zone of influence from open excavations. Confirmation of detailed design information, including site grading information is imperative to have to accurately determine the zone of influence. Field testing can be conducted to confirm design parameters, so that actual site conditions are accurately reflected.

Excavations should be dewatered using appropriately sized pumps placed in properly constructed and filtered sumps located within or near the excavations. Water from sump pumps should be discharged through filter bag(s), rock check dams and/or settlement tanks towards strategically located sediment control measures.

The use of cut-off walls or similar type systems may be considered for the purposes of minimizing impacts to the stable shallow groundwater table during construction.

8.2 Site Grading near the Wetland

Site grading work at the north end of the site, along the east side of the site (next to the wetland), is expected to tie into existing grades. Through the central and southern part of the site, it is anticipated that grades will be raised throughout the site, and the transition area towards the wetland is expected to incorporate a retaining wall structure. In both cases, it is imperative that site grading activities do not extend into the wetland feature, and that the ecological buffer identified by MTE is adhered to. In addition, robust sediment and erosion control measures will be required to prevent sediment discharge towards the wetland feature.

The positioning of the retaining wall will need to allow for sufficient room to ensure that foundations can be properly constructed on natural mineral soils, without excavated materials being stockpiled in proximity to the wetland. The retaining wall structure will require a subdrain system and granular backfill for long-term stability. As such, it is anticipated that the retaining wall will have a positive outlet, to provide drainage of the subdrain system. The positioning of the outlet will be located on the downgradient / wetland-side of the wall, and suitable measures will need to be incorporated into the design to prevent scouring at the outlet, or blockage from icing of the surface water in the wetland. Under flooding conditions within the wetland, it is important to ensure that flooding does not create a backwater effect in the retaining wall subdrainage system. This will need to be assessed as part of the retaining wall design.

A program of environmental monitoring while site grading and construction work is recommended. A detailed Sediment and Erosion Control Plan should be prepared to delineate the extent of sediment and erosion control measures which will be in place during the interim construction period when site grading works are underway. It is important to ensure that the sediment control measures are installed properly, and in accordance with approved design drawings. If deficiencies are identified in its performance through regular inspection, enhancements beyond the recommended design may be required.

8.3 Building Foundations

As noted previously, shallow groundwater conditions are present at the site, and engineered fill placement is expected throughout much of the site to raise grades.

Building foundations for slab-on-grade buildings (set at conventional depths – design frost depths) are expected to be set in the engineered fill, above the shallow groundwater level. The Geotechnical Report (LDS, 2020) provides recommendations for moisture barriers below slab-on-grade floors.

Residential buildings are currently proposed in the north end of the site. It is anticipated that some fill placement will also occur within this area to raise existing grades, particularly along the west side of the residential block. The underside of footing levels for new residences (if constructed with full basements) may extend down into the stabilized groundwater level, particularly during the seasonal high spring conditions. It is recommended that building design be considered to allow for basement levels and residential foundations to remain above the seasonal high groundwater conditions. Foundations (which are set above the high

groundwater table) should be provided with damp-proofing and foundation drainage tiles, in accordance with standard Ontario Building Code (OBC) requirements. Consideration may be given to enhanced damp-proofing measures (such as subfloor drains), where there is reasonable concern that the basement level may encounter the high groundwater level on an intermittent basis.

8.4 Pipe Infiltration/Exfiltration Testing

In general terms, OPSS 410 and OPSS 407 specify that infiltration tests shall be conducted where the groundwater level at the time of testing is 600 mm or more above the crown of the pipe for the entire length of the test section, and exfiltration testing is appropriate where the groundwater level is 600 mm or more above crown of the pipe or the highest point of the highest service connection included in the test section.

Stabilized water levels measured at the site under spring conditions have been measured at variable depths across the site. It is anticipated that the deepest sections of the storm and sanitary sewers along Apricot Drive will extend below the stabilized groundwater levels measured at the site. The remainder of the servicing excavations are expected to generally remain above the stabilized groundwater level.

As noted in the Geotechnical Report (LDS, 2020), suitable water-tight gaskets to prevent infiltration and exfiltration of groundwater and pipe effluent are required at joints and at manhole connections.

When testing is required (in accordance with OPSS 407 and OPSS 410), the test sections are expected to be defined between maintenance access / manhole locations. Infiltration tests shall be conducted where the groundwater level at the time of testing is 600 mm or more above the crown of the pipe for the entire length of the test section. Exfiltration testing is appropriate where the groundwater level is 600 mm or more above crown of the pipe or the highest point of the highest service connection included in the test section.

8.5 Monitoring Well Maintenance & Decommissioning

The information contained within this report is based on LDS' data collection from Autumn 2017 through to November 2019.

The monitoring wells at the site have been maintained for additional and ongoing data collection, which can be used to verify and validate the information and assumptions used to prepare this report.

Wells which are maintained onsite during construction can be used to assess the impacts of construction dewatering activities, if required. In this regard, they can be equipped with data loggers to monitor changes in water level and the lateral extent of the zone of influence of the construction activities, and/or used to collect water quality samples.

Monitoring wells and piezometers which are in proximity to the Wetland may be maintained (where possible) to allow for post-development monitoring, to assess the operation and impact of the completed development condition in proximity to the wetland. Specific regard to thermal impacts can be assessed with continuous groundwater temperature data collection.

A site plan showing any monitoring wells to be maintained and protected at the site should be provided to the contractors working at the site.

When the monitoring wells which are present on the site are determined to be no longer required, they should be properly decommissioned in accordance with Ontario Regulation 903. This regulation identifies that only certified and qualified well drilling technicians are permitted to direct the decommissioning work for existing wells. Decommissioning a well which is no longer in use helps to ensure the safety of those in the vicinity of the well, prevents surface water infiltration into an aquifer via the well, prevents the vertical movement of water within a well, conserves aquifer yield and hydraulic head and can potentially remove a physical hazard.

8.6 Environmental Considerations for Imported Fill

It is important to note that Ontario Regulation 153 provides applicable standards for any fill material which will be brought to site. For the purpose of importing and stockpiling materials at the site, consideration should be given to accepting material which has concentrations consistent with, or less than the standard concentrations identified in O. Reg. 153 (last amended April 15, 2011) for Table 1 (residential land-use) for any fill placed at the site, due to the proximity of the Buttonbush Wetland.

9.0 QUALIFICATIONS OF ASSESSORS

This report was prepared by Ms. P.E. 'Tara' Sieg, BA Env. MA, Geo-Environmental Scientist. Ms. Sieg has over 15 years of experience in conducting Environmental, Geotechnical and Ecological studies under the supervision of Professional Engineers and/or Geoscience QPs, and is routinely engaged in Environmental and Hydrogeological field work.

This assessment was supervised and reviewed by Mrs. Rebecca Walker, P. Eng., QPESA, who has been thoroughly trained in conducting geotechnical and hydrogeological assessments. Mrs. Walker is a licensed professional engineer in the Province of Ontario. She obtained a Bachelor of Applied Science in Geological Engineering from Queen's University in 1998 and is a Qualified Person (QPESA) registered with MECP, under the requirements of Ontario Regulation 153. Rebecca provides geotechnical and geoscience services under the Guideline of Professional Engineers Providing Geotechnical Engineering Services under the Professional Engineers Act in Ontario. Rebecca is qualified to provide geoscience (hydrogeological) services under the Professional Geoscientists Act as an exempted engineer, by virtue of her training and experience, as prescribed by the Professional Engineers Act.

Mrs. Walker has over 20 years of direct experience in the geotechnical and hydrogeological consulting industry. Over 3,800 projects have been completed under her supervision. Mrs. Walker is also a recognized expert in the industry and has testified as an expert witness in Ontario Municipal Board and Local Planning Appeals Tribunal hearings and Municipal Councils related to groundwater hydrogeology and geotechnical matters for land development and construction. She has been retained for many projects, both directly and indirectly by local municipalities as a hydrogeological and geotechnical consultant.

10.0 CLOSING

The information presented in this report is based on a limited investigation designed to provide information to support a preliminary assessment of the hydrogeological setting at the subject property, for the project described in the text of the report.

It is important to note that this assessment involves a limited sampling of the subsurface conditions at specific borehole locations. The conclusions and recommendations presented in this report reflect site conditions existing at the time of the investigation and a review of available information which has been presented in the report. Should subsurface conditions be encountered which vary materially from those observed in the boreholes, we recommend that LDS be consulted to review the additional information and verify if there are any changes to the recommendations and discussion provided in this report.

No portion of this report may be used as a separate entity. It is intended to be read in its entirety. LDS should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented.

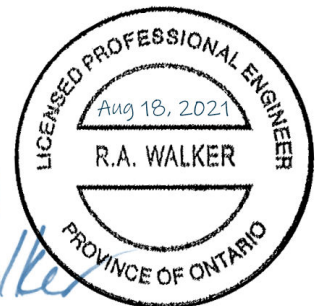
We trust this satisfies your present requirements. If you have any questions or require anything further, please feel free to contact our office.

Respectfully submitted,

LDS CONSULTANTS INC.



Tara Sieg, BA Env.MA
Geo-Environmental Scientist
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tara.sieg@LDSconsultants.ca




Rebecca A. Walker, P. Eng., QP_{ESA}
Principal, Geotechnical Services
Office: 226-289-2952
Cell: 519-200-3742
rebecca.walker@LDSconsultants.ca

APPENDIX A

Drawings



LEGEND
 Surface Water Flow
 (based on site topography)

SOURCE
 Google Earth Pro, Version 7.3.2.5491,
 17T, 474190.38 m E, 4753946.39 m N,
 Imagery Date 7/2/2018



PROJECT NAME
 Proposed Residential &
 Commercial Development

PROJECT LOCATION
 952 Southdale Road
 London, Ontario

DRAWING NAME
 Site Features

SCALE As Shown	PROJECT NO. GE-00085
DATE July 2021	DRAWING NO. 1

1942 Aerial Photo (Dept. of Land and Forests, 1:12,000)



1955 Aerial Photo (Dept. of Land and Forests, 1:15,700)



1967 Aerial Photo (Lockwood Survey Corp, 1:12,000)



1999 Aerial Photo (City of London, database)



SOURCE:

University of Western Ontario, Aerial Photography Database, City of London Air Photo Collection



PROJECT NAME

1739626 Ontario Ltd
Proposed Commercial Development

PROJECT LOCATION

952 Southdale Road West
London, Ontario

DRAWING NAME

Historical Aerial Photographs

SCALE

NTS

PROJECT NO.

GE-00085

DATE

July 2021

DRAWING NO.

2A

2005 Aerial Photo (City of London, database)



2010 Aerial Photograph (City of London, database)



2015 Aerial Photo (City of London, database)



2020 Aerial Photo (City of London, database)



SOURCE:
City of London Air Photo Collection

LDS

PROJECT NAME

1739626 Ontario Ltd
Proposed Commercial Development

PROJECT LOCATION

952 Southdale Road West
London, Ontario

DRAWING NAME

Historical Aerial Photographs

SCALE

NTS

PROJECT NO.

GE-00085

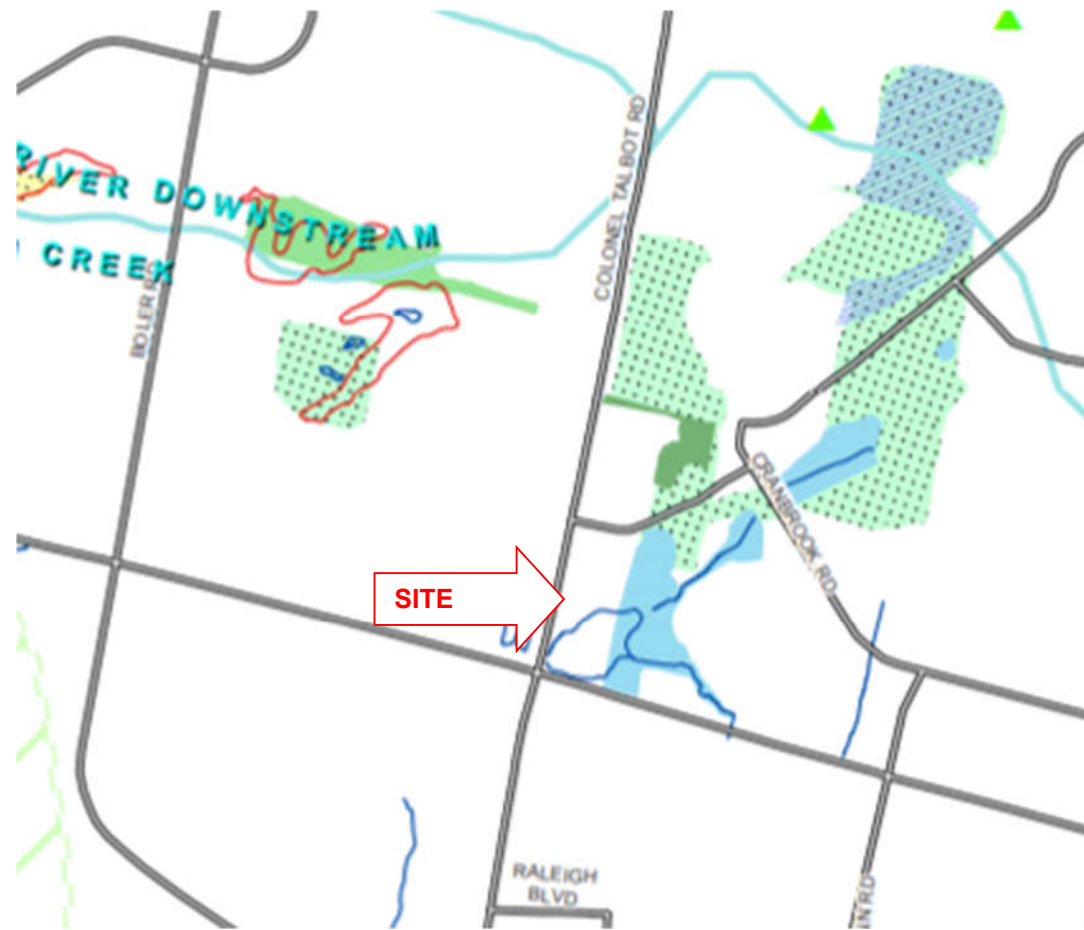
DATE

August 2021

DRAWING NO.

2B

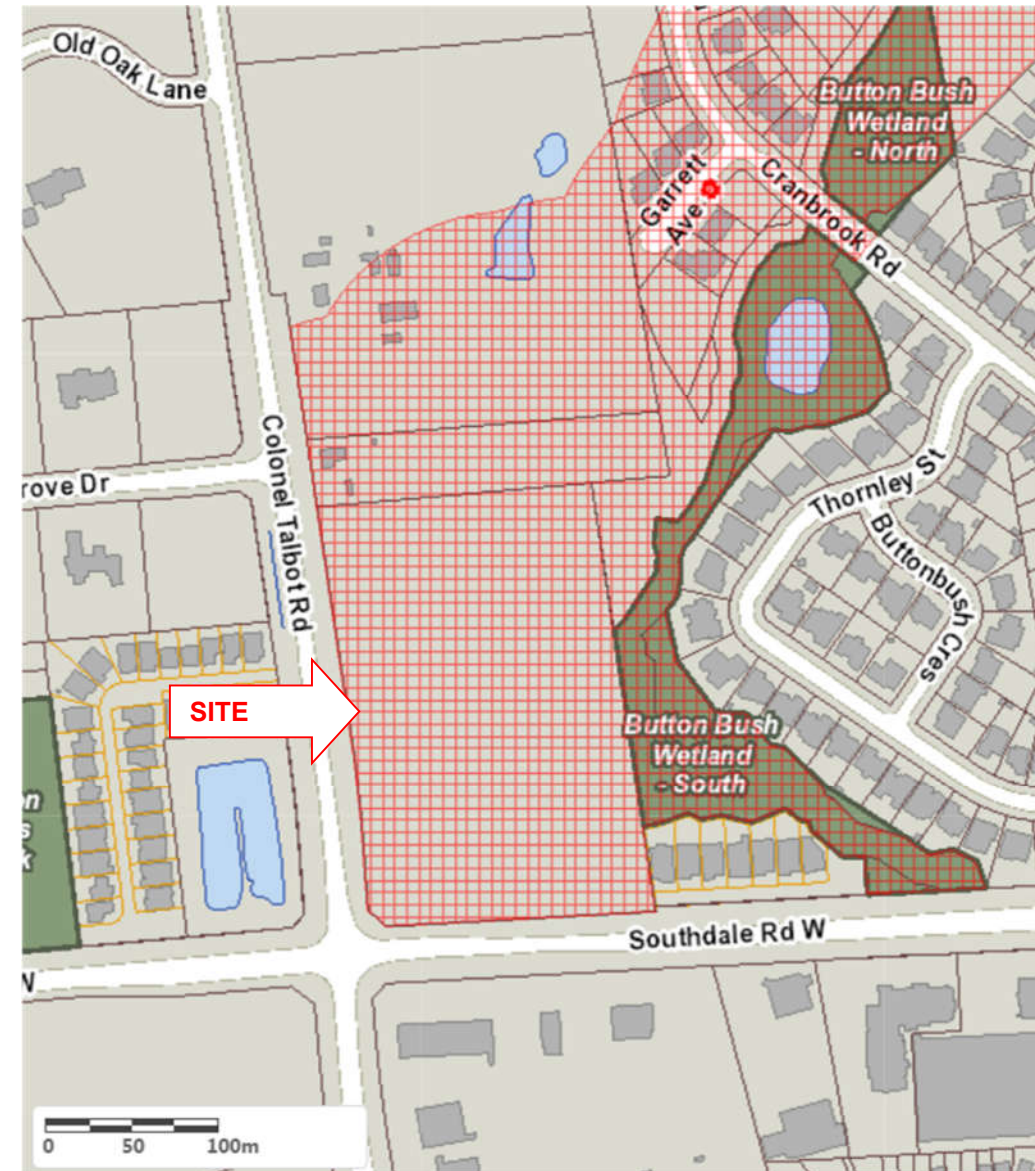
City of London Official Plan (1989) Schedule B1 – Map 6
Natural Heritage Features Overlay



LEGEND

- | | |
|------------------------------|---|
| ESAs | Woodlands |
| Potential ESAs | Unevaluated Vegetation Patches |
| Significant Woodlands | Significant Corridors |
| Unevaluated Corridors | Unevaluated Wetlands |
| Prov Significant Wetlands | Pot Naturalization Area |
| Locally Significant Wetlands | Pot Upland Corridor |
| Ground Water Recharge | SWS Bndry |
| Max Hazard Line | Big Picture Meta-Cores and Meta-Corridors |
| Cons. Authority Bndry | |

UTRCA Regulated Lands



LEGEND

- | | |
|--|-----------------------|
| | UTRCA Regulated Lands |
|--|-----------------------|

SOURCE:

City of London Online Mapping, www.maps.london.ca/CityMap/Index.html?viewer=zoning

Note: Borehole/monitoring well locations are approximate.



PROJECT NAME

Proposed Residential & Commercial Development

PROJECT LOCATION

952 Southdale Road
London, Ontario

DRAWING NAME

Natural Heritage Features and UTRCA Regulated Lands

SCALE

As Shown

PROJECT NO.

GE-00085

DATE

August 2021

DRAWING NO.

3



SOURCE:
 Site Plan, prepared by SRM Architects Inc.,
 dated 08 18 2021.

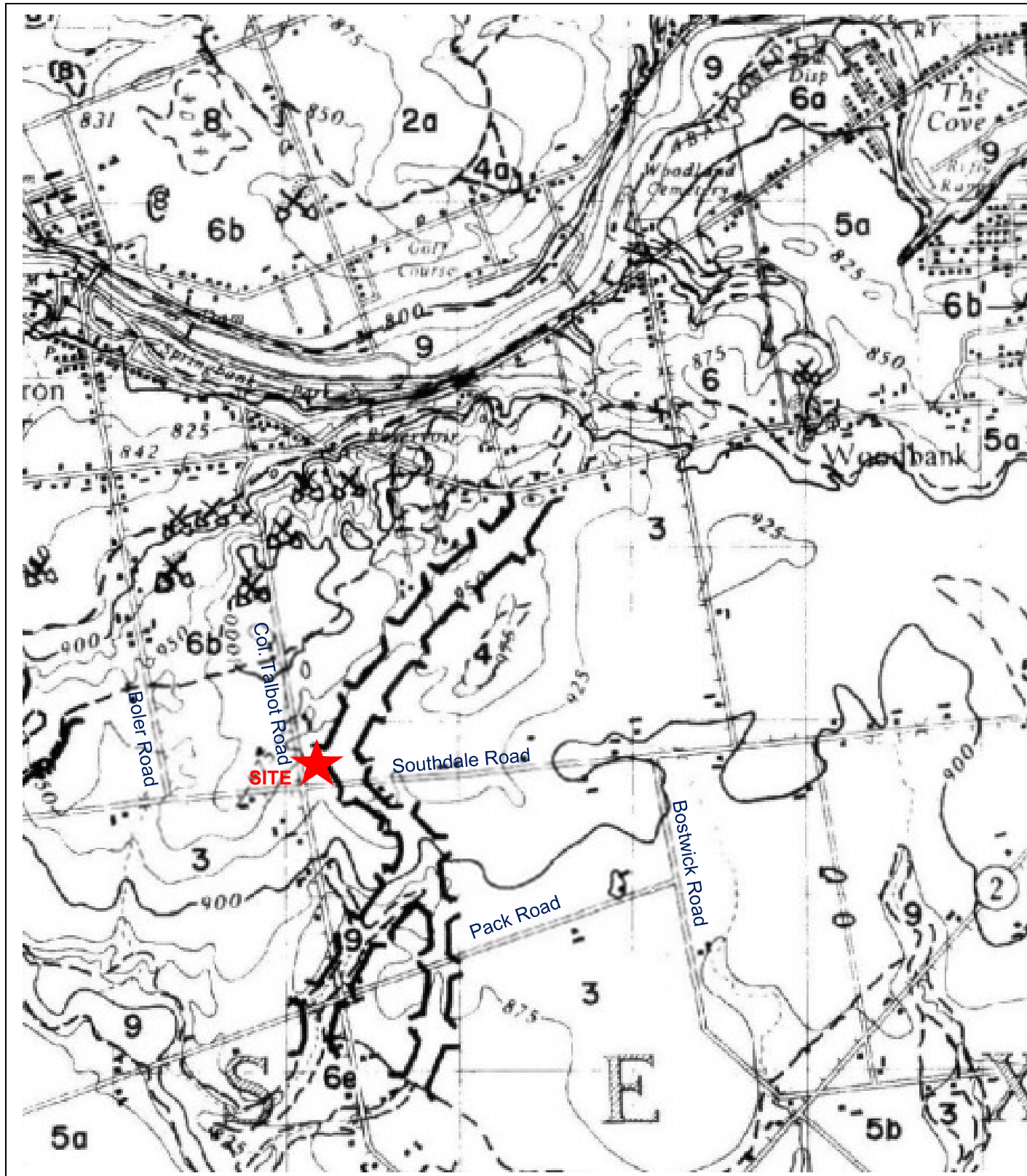


PROJECT NAME
 Proposed Residential &
 Commercial Development

PROJECT LOCATION
 952 Southdale Road
 London, Ontario

DRAWING NAME
 Concept Plan

SCALE As Shown	PROJECT NO. GE-00085
DATE August 2021	DRAWING NO. 4



LEGEND

- Recent
- 9 Modern alluvium: Gravel, sand, and silt, containing organic remains
 - 8 Swamps and bogs: Peat, muck, marl
- Recent and Late Wisconsin
- 7 Aeolian: Fine sand; low dunes and sand plains, mostly in areas of former sandy deltaic, lacustrine and beach deposits, and eastward of them
- Late Wisconsin
- Glacio-lacustrine and Glacio-fluvial
- 6 Gravel and gravelly sand
 - 6e Beach deposits
 - L.Wa.: Lake Warren
 - L.Wh.: Lake Whittlesey
 - L.A.: Lake Arkona
 - L.M.III: Lake Maumee III
 - L.M.II: Lake Maumee II
 - 6d Deltaic deposits in Lake Warren and Lake Arkona
 - 6c Deltaic deposits in Lake Whittlesey
 - 6b Deltaic deposits in Lake Maumee II, covered by a veneer of silty sand of Lake Maumee III; 6b'-older than L.Mau
 - 6a Valley trains
 - 5 Silt, silty sand, and clay; lacustrine deposits; level or slightly hummocky topography (in stagnant ice areas):
 - 5b Silty sand and very fine to fine sand predominates
 - 5a Clay and clayey silt predominates
- Glacio-lacustrine and glacial, undifferentiated
- 4 Stagnant ice moraine: hills and ridges of lacustrine silt and sand, or silty clay till, deposited in crevasses and pits in stagnant ice area, inundated by lake
 - 4a Silt and sand predominates
- Glacial, Erie lobe
- 3 Port Stanley silty clay till and clayey silt till, in places covered by thin patches of lacustrine silt; ground moraine plains and end moraine ridges; slightly undulating topography, except for the more hilly slopes of the Ingersoll end moraine
- SYMBOLS**
- Raised shoreline: Well developed
 - Raised shoreline: Poorly developed
 - Raised shoreline: Modified by associated stagnant ice and lacustrine deposits, particularly silt knolls
 - Stream trench
 - Direction of glacial movement, concluded from alignment of pebbles in till



SOURCE

Ontario Department of Mines, Preliminary Geological Map No. 238, Pleistocene Geology of the St. Thomas Area (West Half), Southern Ontario, issued 1964.



PROJECT NAME

Proposed Residential & Commercial Development

PROJECT LOCATION

952 Southdale Road
London, Ontario

DRAWING NAME

Pleistocene Geology

SCALE
As Shown

PROJECT NO.
GE-00085

DATE
August 2021

DRAWING NO.
5



SOURCE

Google Earth Pro, Version 7.3.2.5491, 17T, 474190.38 m E, 4753946.39 m N, Imagery Date 7/2/2018

NOTES

Borehole locations surveyed by LDS.



PROJECT NAME

Proposed Residential & Commercial Development

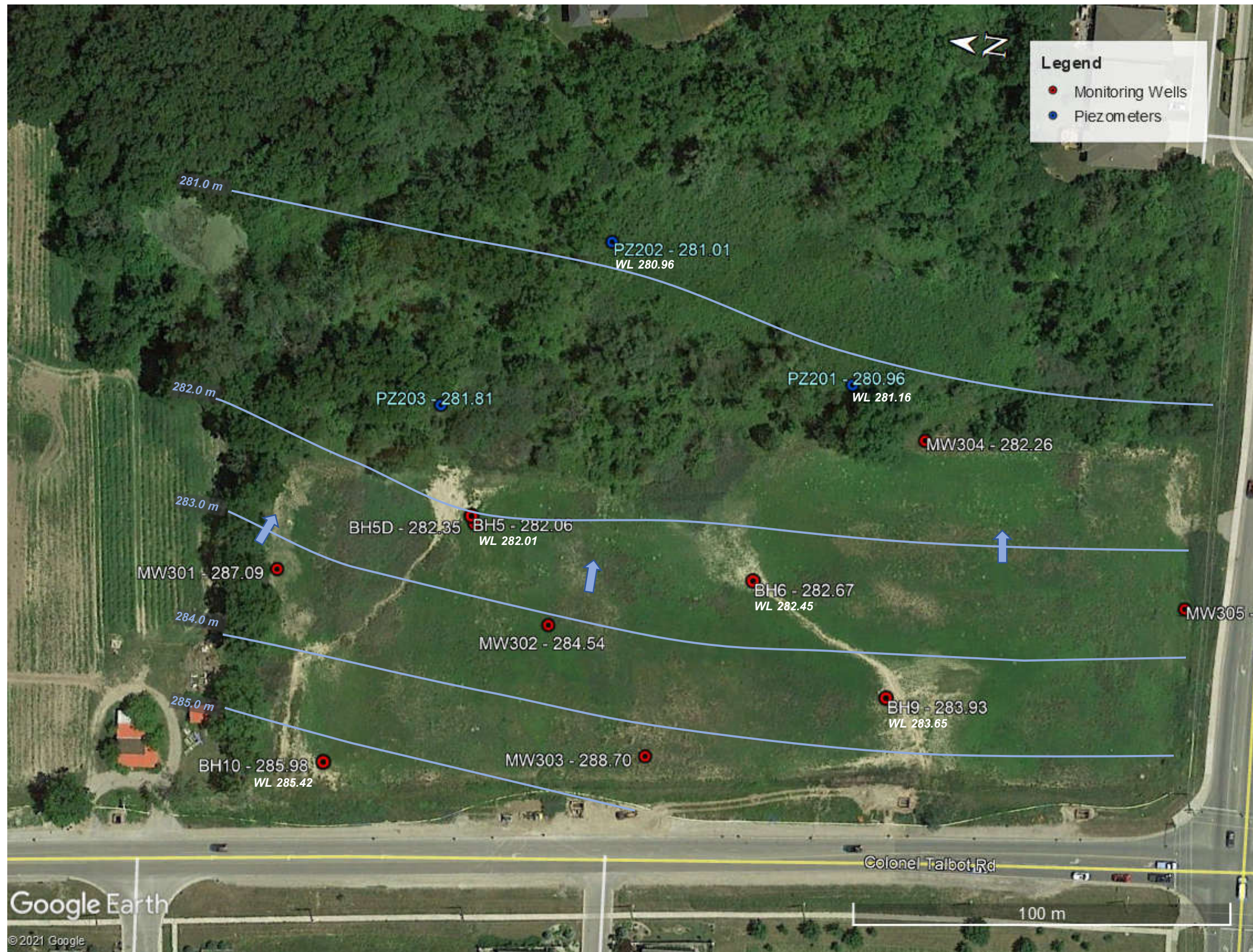
PROJECT LOCATION

952 Southdale Road
London, Ontario

DRAWING NAME

Borehole Location Plan

SCALE As Shown	PROJECT NO. GE-00085
DATE August 2021	DRAWING NO. 6



LEGEND

- Groundwater Piezometric Contour, m
- ➔ Inferred Groundwater Flow Direction

SOURCE

Google Earth Pro, Version 7.3.2.5491,
17T, 474190.38 m E, 4753946.39 m N,
Imagery Date 7/2/2018

NOTES

Borehole locations surveyed by LDS. Water levels measured March 21, 2018.



PROJECT NAME

Proposed Residential &
Commercial Development

PROJECT LOCATION

952 Southdale Road
London, Ontario

DRAWING NAME

Groundwater Contour Plan
Spring 2018

SCALE As Shown	PROJECT NO. GE-00085
DATE August 2021	DRAWING NO. 7



Google Earth

© 2021 Google

Legend

- Monitoring Wells
- Piezometers



LEGEND

- Groundwater Piezometric Contour, m
- ➔ Inferred Groundwater Flow Direction

SOURCE
 Google Earth Pro, Version 7.3.2.5491,
 17T, 474190.38 m E, 4753946.39 m N,
 Imagery Date 7/2/2018

NOTES
 Borehole locations surveyed by LDS. Water
 levels measured May 28, 2019.



PROJECT NAME
 Proposed Residential &
 Commercial Development

PROJECT LOCATION
 952 Southdale Road
 London, Ontario

DRAWING NAME
 Groundwater Contour Plan
 Spring 2019

SCALE As Shown	PROJECT NO. GE-00085
DATE August 2021	DRAWING NO. 8



LEGEND

- Groundwater Piezometric Contour, m
- Inferred Groundwater Flow Direction

SOURCE

Google Earth Pro, Version 7.3.2.5491, 17T, 474190.38 m E, 4753946.39 m N, Imagery Date 7/2/2018

NOTES

Borehole locations surveyed by LDS. Water levels measured March 25, 2021.



PROJECT NAME

Proposed Residential & Commercial Development

PROJECT LOCATION

952 Southdale Road
London, Ontario

DRAWING NAME

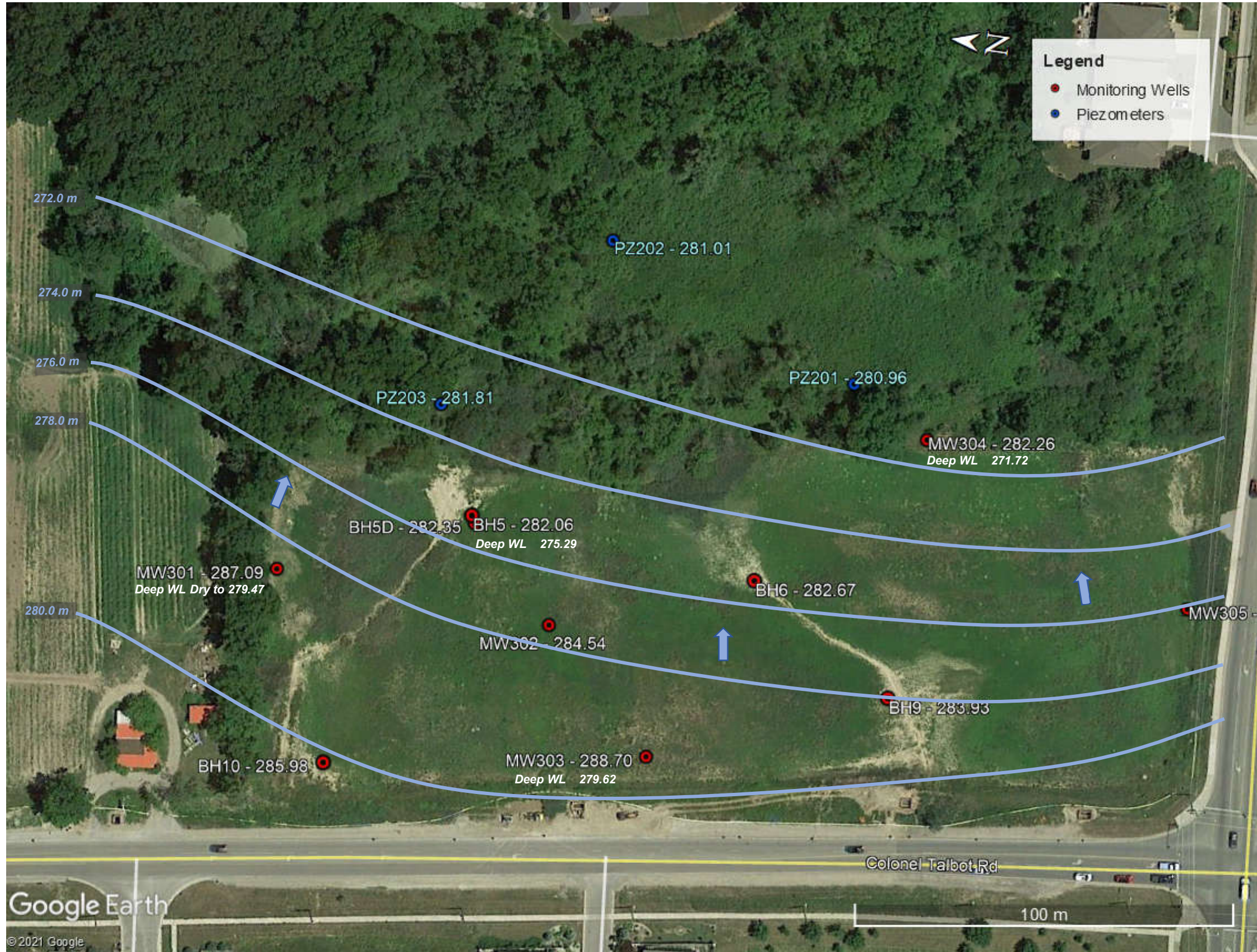
Groundwater Contour Plan
Spring 2021 – Shallow Wells

SCALE
As Shown

PROJECT NO.
GE-00085

DATE
August 2021

DRAWING NO.
9A



LEGEND

- Groundwater Piezometric Contour, m
- ➔ Inferred Groundwater Flow Direction

SOURCE

Google Earth Pro, Version 7.3.2.5491,
 17T, 474190.38 m E, 4753946.39 m N,
 Imagery Date 7/2/2018

NOTES

Borehole locations surveyed by LDS. Water levels measured March 25, 2021.



PROJECT NAME

Proposed Residential & Commercial Development

PROJECT LOCATION

952 Southdale Road
 London, Ontario

DRAWING NAME

Groundwater Contour Plan
 Spring 2021 – Deep Wells

SCALE	PROJECT NO.
As Shown	GE-00085

DATE	DRAWING NO.
August 2021	9B



Legend

- 1. Shallow (<15m)
- 2. Deep (> 30m)
- 3. Not Recorded



LEGEND

● MECP Well Locations & Well Registration No.

NOTE: Water Supply Wells
4103401, 4103403, 4105170,
718093, 7276717

All other wells are identified as observation or monitoring wells, or well abandonment records.



PROJECT NAME

1739626 Ontario Ltd
Proposed Commercial Development

PROJECT LOCATION

952 Southdale Road West
London, Ontario

DRAWING NAME

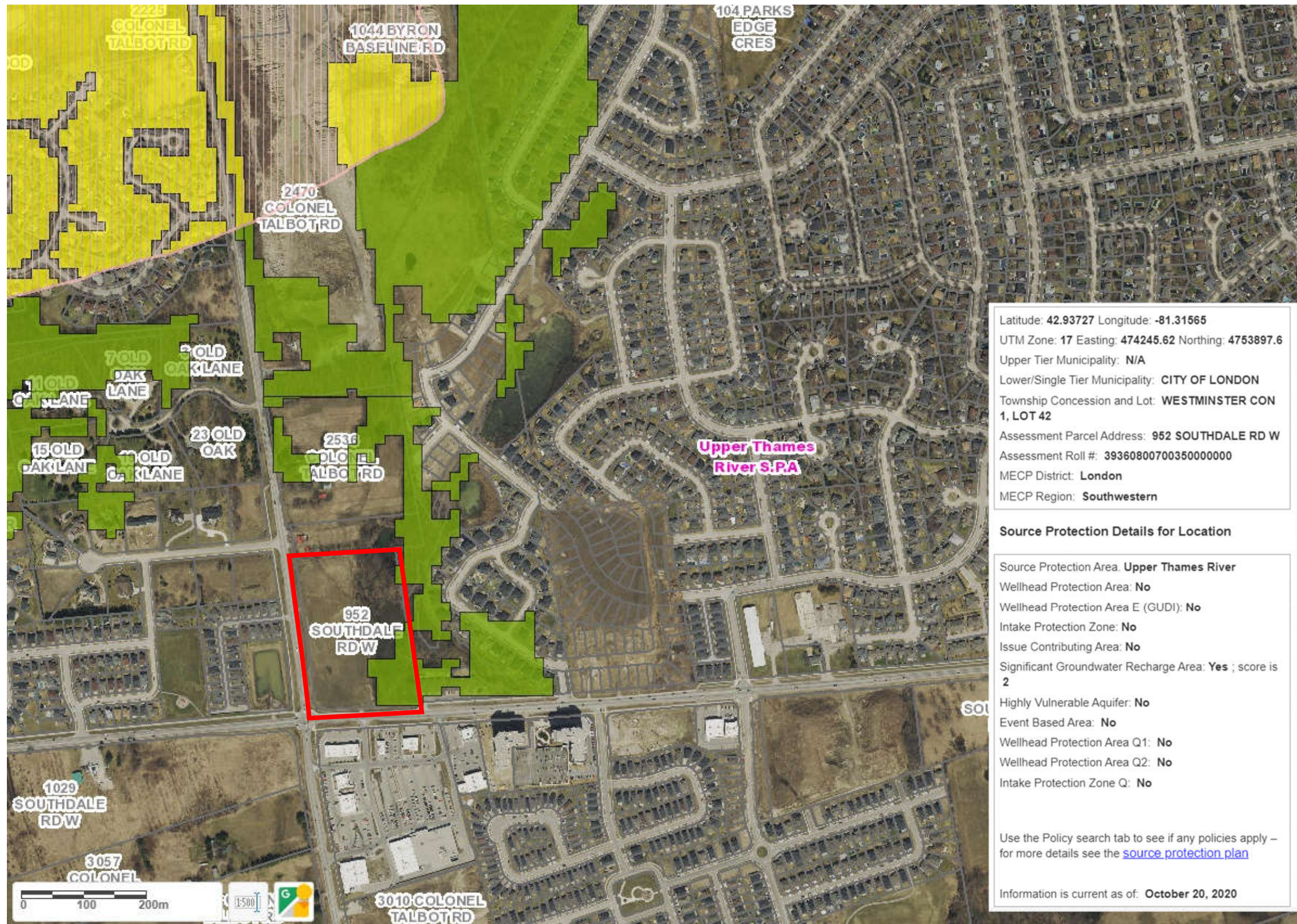
MECP Well Record
Location Plan

SCALE As Shown	PROJECT NO. GE-00085
DATE August 2021	DRAWING NO. 10

Google Earth

600 m





Latitude: 42.93727 Longitude: -81.31565
 UTM Zone: 17 Easting: 474245.62 Northing: 4753897.6
 Upper Tier Municipality: N/A
 Lower/Single Tier Municipality: CITY OF LONDON
 Township Concession and Lot: WESTMINSTER CON 1, LOT 42
 Assessment Parcel Address: 952 SOUTHDALE RD W
 Assessment Roll #: 39360800700350000000
 MECP District: London
 MECP Region: Southwestern

Source Protection Details for Location

Source Protection Area: Upper Thames River
 Wellhead Protection Area: No
 Wellhead Protection Area E (GUDI): No
 Intake Protection Zone: No
 Issue Contributing Area: No
 Significant Groundwater Recharge Area: Yes ; score is 2
 Highly Vulnerable Aquifer: No
 Event Based Area: No
 Wellhead Protection Area Q1: No
 Wellhead Protection Area Q2: No
 Intake Protection Zone Q: No

Use the Policy search tab to see if any policies apply – for more details see the [source protection plan](#)
 Information is current as of: October 20, 2020

LEGEND:

- Significant Groundwater Recharge Area
- 0
- 2
- 4
- 6
- Highly Vulnerable Aquifers

SOURCE:
 Source Protection Information Atlas, MECP
www.gisapplication.lrc.gov.on.ca/SourceWaterProtection/
 Current to October 20, 2020.



PROJECT NAME
 1739626 Ontario Ltd
 Proposed Commercial Development

PROJECT LOCATION
 952 Southdale Road West
 London, Ontario

DRAWING NAME
 Source Water Protection Mapping

SCALE As Shown	PROJECT NO. GE-00009
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DATE August 2021	DRAWING NO. 11
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APPENDIX B

Borehole Logs & Grain Size Analyses

NOTES ON SAMPLE DESCRIPTIONS

- All descriptions included in this report follow the Canadian Foundation Engineering Manual soil classification system, based on visual and tactile examination which are consistent with field identification procedures. Soil descriptions and classifications are based on Unified Soil Classification System (USCS), based on visual and tactile observations. Where grain size analyses have been specified, mechanical grain size distribution has been used to confirm soil classification.

Soil Classification	Terminology & Proportion
Clay: < 0.002 mm	Trace: < 10%
Silt: 0.002 – 0.075 mm	Some: 10-20%
Sand: 0.075 – 4.75 mm	Adjective, sandy, gravelly, etc.: 20-35%
Gravel: 4.75 mm – 75 mm	And, and gravel, and silt, etc.: > 35%
Cobbles: 75 – 200 mm	Noun, Sand, Gravel, Silt, etc.: > 35% and main fraction
Boulders: > 200 mm	

- The compactness of cohesionless soils is based on excavator / drilling resistance, and Standard Penetration Test (SPT) N-values where available. The Canadian Foundation Engineering Manual provides the following summary for reference.

Compactness of Cohesionless Soils	SPT N-Value (# blows per 0.3 m penetration of split-spoon sampler)
Very Loose	0 – 4
Loose	4 – 10
Compact	10 – 30
Dense	30 – 50
Very Dense	50+

- Topsoil Thickness - It should be noted that topsoil quantities should not be established from information provided at test hole locations only. If required, a more detailed analysis with additional test holes may be recommended to accurately quantify the amount of topsoil to be removed for construction purposes.
- Fill material is heterogeneous in nature, and may vary significantly in composition, density and overall condition. Where uncontrolled fill is contacted, it is possible that large obstructions or pockets of otherwise unsuitable or unstable soils may be present beyond test hole locations.
- Where glacial till is referenced, this is indicative of material which originates from a geological process associated with glaciation. Because of this geological process, till must be considered heterogeneous in composition and as such, may contain pockets and / or seams of material such as sand, gravel, silt or clay. Till often contains cobbles or boulders and therefore, contractors may encounter them during excavation, even if they are not indicated on the logs. Where soil samples have been collected using borehole sampling equipment, it should be understood that normal sampling equipment can not differentiate size or type of obstruction. Horizontal and vertical variability occurs in till, therefore the sample description may be applicable to a very limited area.
- Consistency of cohesive soils is based on tactile examination and undrained shear strength where available. The Canadian Foundation Engineering Manual provides the following summary for field identification methods and classification by corresponding undrained shear strength.

Consistency of Cohesive Soils	Field Identification	Undrained Shear Strength (kPa)
Very Soft	Easily penetrated several cm by the fist	0 – 12
Soft	Easily penetrated several cm by the thumb	12 – 25
Firm	Can be penetrated several cm by the thumb with moderate effort	25 – 50
Stiff	Readily indented by the thumb, but penetrated only with great effort	50 – 100
Very Stiff	Readily indented by the thumb nail	100 – 200
Hard	Indented with difficulty by the thumbnail	200+



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
1
 Sheet 1 of 1

Date Drilled	September 25, 2017	Ground Surface Elevation	286.60 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Hollow Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests		
0.0 - 0.5						TOPSOIL - brown sandy loam (75 mm)			
0.5 - 1.0	▲	1	70	17		SILT TILL - brown, some clay, trace sand and fine gravel, very stiff, damp	<i>MC = 16.8</i>		
1.0 - 1.5	▲	2	60	16					
1.5 - 2.5	▲	3	90	18				- some fine sand layering (~50 mm) at 2.5 m depth	<i>MC = 19.1</i>
2.5 - 3.0	▲	4	80	16					
3.0 - 4.5									
4.5 - 5.0	▲	5	80	12					
5.0 - 5.5									
5.5 - 6.0						SANDY SILT TILL - brown, trace fine gravel, trace clay, very dense, moist	<i>MC = 21.2</i>		
6.0 - 6.5	▲	6	80	79					
6.5 - 7.5									
7.5 - 8.0	▲	7	70	87					
8.0 - 8.08						BH Terminated at 8.08 m depth Open and dry upon completion			

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter No well installation</p> <p>Installation Depth --</p> <p>Screen Length --</p> <p>Depth of Bentonite Seal --</p> <p style="text-align: center;">241</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p>
--	---	---



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID

2

Sheet 1 of 1

Date Drilled	September 25, 2017	Ground Surface Elevation	284.01 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Hollow Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						<u>TOPSOIL</u> - brown sandy loam (75 mm)	
1.0	▲	1	70	5	2.15m	<u>SANDY SILT</u> - brown, intermittent topsoil inclusions to 1.4 m depth, loose, moist	MC = 16.5
1.5	▲	2	80	4			
2.0					8.08m	<u>SILT TILL</u> - brown to grey, trace clay, trace gravel, very	MC = 18.9
2.5	▲	3	90	19			
3.0	▲	4	90	18		- becoming grey below 3.0 m depth	
3.5							
4.0							
4.5	▲	5	90	13			
5.0							
6.0	▲	6	80	12		MC = 17.4	
6.5							
7.0							
7.5	▲	7	70	15			
8.0						BH Terminated at 8.08 m depth Open and dry upon completion	

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter **No well installation**
 Installation Depth --
 Screen Length --
 Depth of Bentonite Seal --

242

Additional Notes

MC denotes moisture content



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
3
 Sheet 1 of 1

Date Drilled	September 25, 2017	Ground Surface Elevation	285.99 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Hollow Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown sandy loam (100 mm)	
1.0	▲	1	60	40		SILT - brown, trace sand, dense, damp	MC = 11.5
1.5					1.42m		
2.0	▲	2	75	22		SILT TILL - brown, some clay, trace sand, trace fine gravel, very stiff, moist	MC = 22.4
2.5						- contains some fine sand layering at 2.3 m depth	
3.0	▲	3	70	18			
3.5							MC = 18.7
4.0							
4.5	▲	4	90	22			
5.0						- brown / grey mottled, and stiff below 4.5 m depth	
5.5							
6.0	▲	5	80	14			
6.5						- grey below 6.0 m depth	MC = 19.6
7.0							
7.5	▲	6	70	12			
8.0					8.08m		
						BH Terminated at 8.08 m depth Open and dry upon completion	

Legend SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater	Well Construction Details Pipe Diameter No well installation Installation Depth -- Screen Length -- Depth of Bentonite Seal -- 243	Additional Notes MC denotes moisture content
---	--	--



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
4
 Sheet 1 of 1

Date Drilled	October 2, 2017	Ground Surface Elevation	286.62 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown sandy loam (50 mm)	
1.0						SANDY SILT - brown, trace to some gravel, loose, damp	
1.5	X	1					Sample 1 Gravel - 5.9% Sand - 31.6% Fines - 62.5% MC = 8.3
2.0					2.42m		
2.5						SILT TILL - brown, some clay, trace sand and fine gravel, firm to stiff, moist	
3.0	X	2					
3.5							
4.0							
4.5	X	3					MC = 15.9
5.0	X						
5.5							
6.0	X	4				- some sand present below 6.0 m depth	
6.5	X						
7.0							
7.5	X	5				- becoming grey below 7.5 m depth	MC = 17.6
8.0	X				8.08m		
						BH Terminated at 8.08 m depth Open and dry upon completion	

Legend SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater	Well Construction Details Pipe Diameter No well installation Installation Depth -- Screen Length -- Depth of Bentonite Seal -- 244	Additional Notes MC denotes moisture content
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
**5/MW
 Shallow**

Sheet 1 of 1

Date Drilled	September 25, 2017	Ground Surface Elevation	282.06 m
Drill Rig	LST - Track	Groundwater Level at Completion	DRY
Drilling Method	Hollow Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						SANDY SILT - brown, trace gravel, loose, moist	
1.0		1	60	4			MC = 8.9
1.5							
2.0		2	70	4		- very moist to wet near 1.8 m depth	MC = 14.1
2.24					2.24m		
2.5		3	80	5		SILT TILL - grey, some clay, trace sand and gravel, firm, moist	
3.0		4	70	9		- stiff below 3.1 m depth	MC = 16.2
3.5							
4.0							
4.5		5	90	17		- very stiff, and moist to very moist below 4.5 m depth	
5.0							
5.5					5.80m		
6.0		6	80	34		SAND - brown, fine to medium grained, trace gravel, trace silt, compact to dense, moist to very moist	
6.5						- wet at 6.4 m depth	MC = 14.9
7.0							
7.5		7	70	16		- contains some silt at 7.6 m bgs	MC = 12.9
8.0					8.08m		
						BH Terminated at 8.08 m depth Open and dry upon completion	

Legend		Well 1 - Construction Details		Well 2 - Construction Details	
	SPT Sample	Pipe Diameter	50 mm CPVC	Pipe Diameter	50 mm CPVC
	Bulk Sample	Installation Depth	2.44 m	Installation Depth	7.65 m
	Shelby Tube	Screen Length	1.52 m	Screen Length	3.05 m
	Stabilized Groundwater	Depth of Bentonite Seal	0-0.6 m	Depth of Bentonite Seal	0-4.3m
	Inferred Groundwater	Well Equipped with lockable cap.		Well Equipped with lockable cap.	
		Screen length backfilled with Type 2 filter sand.		Screen backfilled with Type 2 filter sand.	

Note:
Deen well



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
5/MW
Deep
Sheet 1 of 1

Date Drilled	February 10, 2021	Ground Surface Elevation	282.35 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.5						TOPSOIL - brown, sandy loam, 152 mm	
0.5 - 1.0	▲	1	-	-	2.24 m	SILTY SAND - brown, fine grained, wet	
1.0 - 1.5	▲	2	-	-			
1.5 - 2.0	▲	3	-	-	5.80 m	SILT TILL - brown, some clay, trace sand, trace fine gravel, moist	
2.0 - 2.5	▲	4	-	-			
2.5 - 3.0	▲	5	-	-			
3.0 - 3.5	▲	6	-	-		SAND - brown, fine to medium grained, trace gravel, trace silt, very moist	
3.5 - 4.0							
4.0 - 4.5							
4.5 - 5.0	▲	7	-	-			
5.0 - 5.5							
5.5 - 6.0							
6.0 - 6.5	▲						▼ May 30/21 WL - 6.68 m
6.5 - 7.0						- some silt observed below 7.1 m depth	
7.0 - 7.5							
7.5 - 8.0							
8.0					8.08 m	Gradation: 0% Gravel, 90% Sand, 20% Fines (Silt/Clay)	MC - 13.2%
						BH Terminated at 8.08 m MW Installed at 7.62 m - refer to details below	

Legend

- ▲ SPT Sample
- Bulk Sample
- Shelby Tube
- ▼ Stabilized Groundwater
- ⊘ Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 7.62 m
 Screen Length 3.05 m w/ No. 2 filter sand
 Depth of Bentonite Seal 2.44 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 5.38 m bgs
 May 30, 2021 - WL, 6.68 m bgs



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
6 / MW
 Sheet 1 of 1

Date Drilled	September 25, 2017	Ground Surface Elevation	282.67 m
Drill Rig	LST - Track	Groundwater Level at Completion	8.0 m
Drilling Method	Hollow Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						SANDY SILT - brown, trace gravel, loose, moist	
1.0		1	75	7			
1.5							
2.0		2	70	5		- very moist to wet near 1.8 m depth	
2.5							
3.0		3	60	20		SILT TILL - mottled brown to grey to 2.4 m depth, some clay, trace gravel, very stiff, moist	
3.5							
4.0		4	60	22			
4.5							
5.0		5	70	26			
5.5							
6.0		6	80	15			
6.5							
7.0		7	70	19			
7.5							
8.0							
						BH Terminated at 8.08 m depth Open with 50-75mm of water at base	

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter 50 mm CPVC Installation Depth 2.44 m Screen Length 1.52 m Depth of Bentonite Seal 0 to 0.6 m Well Equipped with lockable cap. Screen length backfilled with Type 2 filter sand.</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p> <p>Note: Well reported as damaged in Jan 2021. Refer to reinstallation details (Feb 2021) noted on following page.</p>
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Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
6/MW

Sheet 1 of 1

Date Drilled	February 11, 2021	Ground Surface Elevation	282.94 m asl
Drill Rig	D50 Turbo	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.5						TOPSOIL - brown, sandy loam, 152 mm	
0.5 - 1.0		1	-	-		SILTY SAND - brown, fine grained, saturated	May 30/21 WL - 0.72 m MC - 27.8%
1.0 - 1.5		2	-	-			
1.5 - 2.0		3	-	-			
2.0 - 2.5		3	-	-		SILT TILL - brown, some clay, trace sand, trace fine gravel, moist	
2.5 - 3.0		4	-	-			
3.0 - 3.5		4	-	-			MC - 25.4%
3.5 - 8.0						BH Terminated at 3.51 m MW Installed at 3.05 m - refer to details below	

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 3.05 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 1.53 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 0.62 m bgs
 May 30, 2021 - WL, 0.72 m bgs



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID

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Sheet 1 of 1

Date Drilled	October 2, 2017	Ground Surface Elevation	282.56 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						SANDY SILT - brown, trace clay, trace gravel, loose, moist	
1.0							
1.5	X	1			1.36m	SILT TILL - brown, some clay, trace sand and fine gravel, stiff, moist	MC = 16.8
2.0							
2.5							
3.0	X	2				- becoming grey below 3.5 m depth	
3.5							
4.0							
4.5	X	3				- stiff to very stiff below 4.5 m depth	MC = 18.4
5.0							
5.5							
6.0	X	4					
6.5							
7.0							
7.5	X	5					
8.0					8.08m	BH Terminated at 8.08 m depth Open and dry upon completion	

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter **No well installation**
 Installation Depth --
 Screen Length --
 Depth of Bentonite Seal --

249

Additional Notes

MC denotes moisture content



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
8
 Sheet 1 of 2

Date Drilled	October 2, 2017	Ground Surface Elevation	281.65 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.5						TOPSOIL - brown sandy loam (100 mm)	
0.5 - 1.0						SANDY SILT - brown, loose, moist (150 mm)	
1.0 - 1.5	X	1				SILT TILL - brown, some clay, trace fine gravel, trace sand, firm to stiff, moist - becoming grey and stiff below 2.5 m depth	MC = 20.1
1.5 - 2.0	■	2	90	21			
2.0 - 2.5	X	3					
2.5 - 3.0	■	4	80	28			
3.0 - 3.5							
3.5 - 4.5	■	5	80	24			
4.5 - 6.0	X	6					
6.0 - 7.15							
7.15 - 7.5						SILTY SAND - brown, fine grained, trace gravel, compact, damp to moist	
7.5 - 8.0	X	7					MC = 7.3

BH continued on following page

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter No well installation</p> <p>Installation Depth --</p> <p>Screen Length --</p> <p>Depth of Bentonite Seal --</p> <p style="text-align: center;">250</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p>
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID

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Sheet 2 of 2

Date Drilled	October 2, 2017	Ground Surface Elevation	281.65 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
8.5	X	8			8.52m	SILTY SAND - brown, trace gravel, trace clay, compact, damp to moist	
9.0						SILT TILL - grey, some clay, trace sand, very stiff, moist	
9.5	X	9			10.67m		
10.0							
10.5							
11.0						BH Terminated at 10.67 m depth Open and dry upon completion	
11.5							
12.0							
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter --
 Installation Depth --
 Screen Length --
 Depth of Bentonite Seal --

251

Additional Notes

MC denotes moisture content



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
9 / MW
Sheet 1 of 2

Date Drilled	October 2, 2017	Ground Surface Elevation	283.93 m
Drill Rig	LST - Track	Groundwater Level at Completion	DRY
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5					0.76m	SANDY SILT - brown, trace gravel, trace clay, loose, moist	
1.0						SILT TILL - grey, some clay, trace sand and gravel, firm, moist to very moist	
1.5		1					
2.0							
2.5						- moist, stiff below 2.5 m depth	
3.0		2					
3.5							
4.0							
4.5		3					
5.0							
5.5							
6.0		4				- very stiff below 6.0 m depth	
6.5							
7.0							
7.5		5					
8.0							

BH continued on following page

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter 50 mm CPVC</p> <p>Installation Depth 3.96 m</p> <p>Screen Length 3.05 m</p> <p>Depth of Bentonite Seal 0 to 0.6 m</p> <p>Well Equipped with lockable cap.</p> <p>Screen length backfilled with 252 Type 2 filter sand.</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p>
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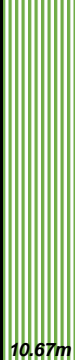
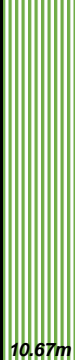
Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**






Borehole ID

9 / MW

Sheet 2 of 2

Date Drilled	October 2, 2017	Ground Surface Elevation	283.93 m
Drill Rig	LST - Track	Groundwater Level at Completion	DRY
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
8.5		8				SILT TILL - grey, some clay, trace sand and gravel, very stiff, moist	
9.0							
9.5		9					
10.0							
10.5					10.67m		
11.0						BH Terminated at 10.67 m depth Open and dry upon completion	
11.5							
12.0							
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							

<p><u>Legend</u></p> <ul style="list-style-type: none">  SPT Sample  Bulk Sample  Shelby Tube  Stabilized Groundwater  Inferred Groundwater 	<p><u>Well Construction Details</u></p> <p>Pipe Diameter 50 mm CPVC Installation Depth 3.96 m Screen Length 3.05 m w/ Type 2 sand Depth of Bentonite Seal 0 to 0.6 m <i>Note: Well equipped with lockable cap</i></p>	<p><u>Additional Notes</u></p> <p>MC denotes moisture content</p>
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
10 / MW
 Sheet 1 of 1

Date Drilled	October 2, 2017	Ground Surface Elevation	285.98 m
Drill Rig	LST - Track	Groundwater Level at Completion	4.5 m
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown sandy loam (75 mm)	MC = 12.6
1.0		1				SANDY SILT - brown, trace gravel, trace clay, loose, moist	
1.5					1.42m		Sample 3 Gravel - 2.2% Sand - 57.9% Fines - 39.9% MC = 11.0
2.0		2			2.22m	SILT - brown / grey mottled, some clay, some sandy silt layering, moist, firm	
2.5		3				SILTY SAND - brown, fine to medium grained, trace clay, loose, moist	
3.0							MC = 20.3
3.5		4			3.51m		
4.0						SILT TILL - grey, some clay, trace sand, stiff to very stiff,	MC = 17.7
4.5		5					
5.0							
5.5							MC = 17.7
6.0		6					
6.5							MC = 17.7
7.0							
7.5							MC = 17.7
8.0		7			8.08m		
						BH Terminated at 8.08 m depth Open to 4.5 m, water at 4.5 m	


Legend SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater	Well Construction Details Pipe Diameter 50 mm CPVC Installation Depth 4.57 m Screen Length 3.05 m Depth of Bentonite Seal 0 to 1.2 m Well Equipped with lockable cap. Screen length backfilled with Type 2 filter sand.	Additional Notes MC denotes moisture content
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	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	101
	Project Number	GE-00085	Sheet 1 of 1

Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25						SANDY SILT - brown, some topsoil and organic inclusions, wet	
0.50							
0.75	⊗	1					
1.00	⊗				1.06m		
1.25						SILT TILL - brown, some clay, moist	
1.50	⊗	2			1.52m		
1.75						Hole Terminated at 1.52 m bgs.	
2.00							


⊗ Bulk Sample

	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	102
	Project Number	GE-00085	Sheet 1 of 1




Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.


Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25						SANDY SILT - brown, some topsoil and organic inclusions, wet	
0.50							
0.75	⊗	1					
1.00	⊗				1.52m		
1.25						SILT TILL - mottled brown-grey, some clay, moist	
1.50							
1.75	⊗	2			1.82m		
2.00						Hole Terminated at 1.82 m bgs.	

⊗ Bulk Sample




	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	103
	Project Number	GE-00085	Sheet 1 of 1


Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25	<input checked="" type="checkbox"/>	1				SANDY SILT - brown, some topsoil and organic inclusions, wet	
0.50							
0.75						SILT TILL - mottled brown-grey, some clay, moist	
1.00							
1.25	<input checked="" type="checkbox"/>	2					<input checked="" type="checkbox"/> Bulk Sample
1.50							
1.75						Hole Terminated at 1.52 m bgs.	
2.00							

	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	104
	Project Number	GE-00085	Sheet 1 of 1


Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25	<input checked="" type="checkbox"/>	1				SANDY SILT - brown, some topsoil and organic inclusions, wet	
0.50							
0.75						SILT TILL - mottled brown-grey, some clay, moist	
1.00							
1.25	<input checked="" type="checkbox"/>	2					<input checked="" type="checkbox"/> Bulk Sample
1.50							
1.75						Hole Terminated at 1.52 m bgs.	
2.00							

	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	105
	Project Number	GE-00085	Sheet 1 of 1

Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25	X	1				SANDY SILT - brown, some topsoil and organic inclusions, wet	
0.50							
0.75							
1.00					1.07m	SILT TILL - mottled brown-grey, some clay, moist	
1.25	X	2			1.52m		
1.50						Hole Terminated at 1.52 m bgs.	
1.75							X Bulk Sample
2.00							

	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	106
	Project Number	GE-00085	Sheet 1 of 1

Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25						SANDY SILT - brown, some topsoil and organic inclusions, wet	
0.50	X	1			0.61m		
0.75							
1.00						SILT TILL - mottled brown-grey, some clay, moist	
1.25	X	2			1.52m		
1.50						Hole Terminated at 1.52 m bgs.	
1.75							X Bulk Sample
2.00							



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Piezometer
201
Shallow
Sheet 1 of 1

Date Drilled	October 20, 2017	Ground Surface Elevation	281.01 m
Drill Rig		Groundwater Level at Completion	0.05 m
Drilling Method	Hand-held Auger	Technician	Rob Walker
Drilling Contractor	LDS Consultants	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25		1				TOPSOIL & ORGANICS - (300 mm)	
0.50		2				SANDY SILT - brown, some topsoil and organic inclusions, saturated	
0.75						Hole Terminated at 0.55 m bgs.	
1.00							
1.25							
1.50							
1.75							
2.00							

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter 50 mm CPVC Installation Depth 0.55 m Screen Length 0.35 m Depth of Bentonite Seal none Piezometer equipped with lockable cap.</p>	<p>Additional Notes</p> <p>Water Levels Oct 20 2017 - 0.05 m depth Oct 23 2017 - 0.17 m depth Nov 08 2017 - 0.10 m above ground Dec 01 2017 - at ground surface Jan 10 2018 - frozen</p>
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Piezometer
201
Deep
Sheet 1 of 1

Date Drilled	February 18, 2021	Ground Surface Elevation	281.09 m
Drill Rig		Groundwater Level at Completion	frozen at surface
Drilling Method	Hand-held Auger	Technician	Rob Walker
Drilling Contractor	LDS Consultants	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25						TOPSOIL & ORGANICS - (300 mm), frozen	
0.50		1				SANDY SILT - brown, some topsoil and organic inclusions, wet	
0.75		2				SILT TILL - mottled, brown-grey, trace sand and fine gravel, wet	
1.00						Hole Terminated at 0.91 m bgs.	
1.25							
1.50							
1.75							
2.00							

Legend SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater	Well Construction Details Pipe Diameter 50 mm CPVC Installation Depth 0.76 m Screen Length 0.45 m Depth of Bentonite Seal none Piezometer equipped with lockable cap.	Additional Notes
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Piezometer
PZ202A

Sheet 1 of 1

Date Drilled	October 20, 2017	Ground Surface Elevation	280.96 m
Drill Rig		Groundwater Level at Completion	0.04 m
Drilling Method	Hand-held Auger	Technician	Rob Walker
Drilling Contractor	LDS Consultants	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25		1				TOPSOIL & ORGANICS - (1.0 m)	
0.75		2					
1.00		3				SANDY SILT - brown, some topsoil and organic inclusions, saturated	
1.25						Hole Terminated at 1.21 m bgs.	
1.50							
1.75							
2.00							

Legend	Well Construction Details
SPT Sample	Pipe Diameter 50 mm CPVC
Bulk Sample	Installation Depth 1.21 m
Shelby Tube	Screen Length 1.06 m
Stabilized Groundwater	Depth of Bentonite Seal none
Inferred Groundwater	Piezometer equipped with lockable cap.



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Piezometer
PZ202B

Sheet 1 of 1

Date Drilled	October 20, 2017	Ground Surface Elevation	284.19 m
Drill Rig		Groundwater Level at Completion	frozen at surface
Drilling Method	Hand-held Auger	Technician	Rob Walker
Drilling Contractor	LDS Consultants	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25						TOPSOIL & ORGANICS - (0.28 m)	
0.50		1				SANDY SILT - brown, some topsoil and organic inclusions, saturated	
0.75							
1.00							
1.25		2				SILT - grey, some sand, damp, compact, wet	
1.50						Hole Terminated at 1.35 m bgs.	
1.75							
2.00							

Legend	Well Construction Details
SPT Sample	Pipe Diameter 50 mm CPVC
Bulk Sample	Installation Depth 1.35 m
Shelby Tube	Screen Length 1.06 m
Stabilized Groundwater	Depth of Bentonite Seal none
Inferred Groundwater	Piezometer equipped with lockable cap.



Project	Proposed Residential & Commercial Development	Borehole ID	PZ203
Project Location	952 Southdale Road, London, ON	Sheet 1 of 1	
Project Number	GE-00085		

Date Drilled	February 10, 2021	Ground Surface Elevation	Shallow - 281.69 m asl
Drill Rig	GeoProbe		Deep - 281.66 m asl
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						<u>TOPSOIL</u> - brown, silty loam, 25 mm	
1.0						<u>SILTY SAND</u> - brown, fine grained, saturated	MC - 18.6%
1.5	▲	1	-	-			MC - 22.0%
2.0							
2.5					2.44 m		
3.0	▲	2	-	-		<u>SILT TILL</u> - grey, trace clay, trace sand, trace fine gravel, damp	
3.5					3.51 m		
4.0						BH Terminated at 3.51 m MW Installed at 3.05 m - refer to details below	
4.5						MC - denotes moisture content	
5.0							
5.5							
6.0							
6.5							
7.0							
7.5							
8.0							

Legend SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater	Well Construction Details (Shallow) Pipe Diameter 50 mm CPVC pipe Installation Depth 1.21 m Screen Length 0.45 m w/ No. 2 filter sand	Well Construction Details (Deep) Pipe Diameter 50 mm CPVC pipe Installation Depth 3.51 m Screen Length 1.52 m w/ sand Depth of Bentonite Seal 1.22 m
	<i>Well equipped with locking J-Plug cap.</i>	



Project	Proposed Residential & Commercial Development	Borehole ID
Project Location	952 Southdale Road, London, ON	301/MW
Project Number	GE-00085	Sheet 1 of 1

Date Drilled	February 10, 2021	Ground Surface Elevation	287.09 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.152						TOPSOIL - brown, sandy loam, 152 mm	
0.152 - 1.5						SILT TILL - brown, some clay, trace sand, trace fine gravel, moist	
1.5	▲	1	-	-			MC - 15.0%
2.5	▲	2	-	-			MC - 15.5%
3.0	▲	3	-	-			MC - 17.4%
4.5	▲	4	-	-			MC - 18.4%
5.48							
5.48 - 6.0						SAND - brown, fine grained, trace to some gravel, trace silt, damp	
6.0 - 6.6	▲	5	-	-		- damp gravelly sand seam encountered at 6.6 m depth	MC - 2.9%
6.6 - 7.0	▲	6	-	-		Gradation: 24% Gravel, 65% Sand, 11% Fines (Silt/Clay)	MC - 1.9%
7.0 - 8.0	▲	7	-	-		- some silt observed below 8.0 m depth	MC - 19.3%
8.0						BH Terminated at 8.08 m MW Installed at 7.62 m - refer to details below	

Legend

- ▲ SPT Sample
- ⊠ Bulk Sample
- ▨ Shelby Tube
- ▬ Stabilized Groundwater
- ▭ Inferred Groundwater

Well Construction Details

Pipe Diameter	50 mm CPVC pipe
Installation Depth	7.62 m
Screen Length	1.52 m w/ No. 2 filter sand
Depth of Bentonite Seal	4.88 m

Well equipped with locking J-Plug cap.

Additional Notes



MC - denotes moisture content
 April 27, 2021 - WL, Dry
 May 30, 2021 - WL, Dry








Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
302/MW
Sheet 1 of 1

Date Drilled	February 10, 2021	Ground Surface Elevation	284.54 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	Seepage at 4.3 m depth
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.5						TOPSOIL - brown, sandy loam, 203 mm	
0.5 - 1.0		1	-	-		SILT TILL - brown/grey, mottled, weathered, trace sand, trace fine gravel, moist	MC - 19.7%
1.0 - 1.5		2	-	-		- becoming brown and less weathered below 1.4 m depth	MC - 16.1%
1.5 - 2.0							
2.0 - 2.5		3	-	-		- silt with trace to some fine sand below 2.4 m depth	MC - 18.6%
2.5 - 3.0							 May 30/21  WL - 2.87 m
3.0 - 3.5		4	-	-			MC - 18.9%
3.5 - 4.0							
4.0 - 4.5						- becoming grey, contains some fine wet sand layering below 4.0 m depth	
4.5 - 5.0		5	-	-			MC - 19.0%
5.0 - 5.5						BH Terminated at 5.03 m MW Installed at 4.57 m - refer to details below	
5.5 - 6.0							
6.0 - 6.5							
6.5 - 7.0							
7.0 - 7.5							
7.5 - 8.0							

Legend

-  SPT Sample
-  Bulk Sample
-  Shelby Tube
-  Stabilized Groundwater
-  Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 4.57 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 2.44 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 1.30 m bgs
 May 30, 2021 - WL, 2.87 m bgs



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
303/MW - Shallow
Sheet 1 of 1

Date Drilled	February 11, 2021	Ground Surface Elevation	288.70 m asl
Drill Rig	D50 Turbo	Groundwater Level at Completion	Seepage at 3.2 m depth
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown, sandy loam, 152 mm	
1.0		1	-	-		SILT TILL - brown/grey, mottled, weathered, some clay, trace sand, trace fine gravel, moist - becoming brown and less weathered below 2.9 m depth, with intermittent fine wet sand seams throughout	MC - 17.9%
1.5		2	-	-			MC - 19.5%
2.0		3	-	-			May 30/21 WL - 2.63 m
2.5		4	-	-			3.2 m
3.0		5	-	-			4.27 m
4.0							MC - 20.3%
4.5						BH Terminated at 4.27 m MW Installed at 3.81 m - refer to details below	
5.0							
5.5							
6.0							
6.5							
7.0							
7.5							
8.0							

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 3.81 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 1.98 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 1.95 m bgs
 May 30, 2021 - WL, 2.63 m bgs



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
303/MW - Deep
Sheet 1 of 2

Date Drilled	February 11, 2021	Ground Surface Elevation	288.70 m asl
Drill Rig	D50 Turbo	Groundwater Level at Completion	8.65 m depth at completion
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.5						TOPSOIL - brown, sandy loam, 152 mm	
0.5 - 1.0	▲	1	-	-		SILT TILL - brown/grey, mottled, weathered, some clay, trace sand, trace fine gravel, moist - becoming brown and less weathered below 2.9 m depth, with intermittent fine wet sand seams throughout	MC - 17.9%
1.0 - 1.5	▲	2	-	-			MC - 19.5%
1.5 - 2.0	▲	3	-	-			MC - 18.0%
2.0 - 2.5	▲	4	-	-			
2.5 - 3.0	▲	5	-	-			
3.0 - 3.5	▲	6	-	-			
3.5 - 4.0	▲	7	-	-			MC - 20.3%
4.0 - 4.5	▲	8	-	-			
4.5 - 5.0	▲						
5.0 - 5.5							
5.5 - 6.0							
6.0 - 6.5	▲	7	-	-			
6.5 - 7.0							
7.0 - 7.5							
7.5 - 8.0	▲	8	-	-		SAND - brown, fine grained, trace gravel, trace silt, very moist	MC - 4.2%
8.0 - 8.65							

continued on the following page

Legend

- ▲ SPT Sample
- ⊠ Bulk Sample
- ▤ Shelby Tube
- ▨ Stabilized Groundwater
- ▩ Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 9.14 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 7.32 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 9.03 m bgs
 May 30, 2021 - WL, 9.10 m bgs



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
303/MW - Deep
Sheet 2 of 2

Date Drilled	February 11, 2021	Ground Surface Elevation	288.70 m asl
Drill Rig	D50 Turbo	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
8.5					▽ 8.65m	<i>continued from previous page</i> - becoming saturated, silty sand below 8.6 m depth	▽ May 30/21 WL - 9.10 m
9.0	■	9	-	-	9.60 m	Gradation: 0% Gravel, 64% Sand, 36% Fines (Silt/Clay)	
9.5						BH Terminated at 9.60 m MW Installed at 9.14 m - refer to details below	
10.0							
10.5							
11.0							
11.5							
12.0							
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							

Legend

- SPT Sample
- ⊠ Bulk Sample
- ▨ Shelby Tube
- ▽ Stabilized Groundwater
- ▽ Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 9.14 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 7.32 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 9.03 m bgs
 May 30, 2021 - WL, 9.10 m bgs



Project	Proposed Residential & Commercial Development	Borehole ID
Project Location	952 Southdale Road, London, ON	304/MW - Shallow
Project Number	GE-00085	Sheet 1 of 1

Date Drilled	February 10, 2021	Ground Surface Elevation	282.26 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown, silty loam, 152 mm	
1.0		1	-	-		SILT - brown, weathered, some sand, damp -wet sandy silt seams below 1.1 m depth	May 30/21 WL - 1.04 m
1.5					1.37 m		
2.0		2	-	-		SILT TILL - brown/grey, mottled, weathered, trace to some fine sand, trace fine gravel, damp	MC - 17.3%
2.5		3	-	-			MC - 20.5%
3.0		4	-	-			MC - 20.6%
3.5						- becoming brown and less weathered below 3.7 m depth	
4.0		5	-	-	4.27 m		MC - 20.1%
4.5						BH Terminated at 4.27 m MW Installed at 3.81 m - refer to details below	
5.0							
5.5							
6.0							
6.5							
7.0							
7.5							
8.0							

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter	50 mm CPVC pipe
Installation Depth	3.81 m
Screen Length	1.52 m w/ No. 2 filter sand
Depth of Bentonite Seal	1.98 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
April 27, 2021 - WL, 0.71 m bgs
May 30, 2021 - WL, 1.04 m bgs



Project	Proposed Residential & Commercial Development	Borehole ID
Project Location	952 Southdale Road, London, ON	304/MW -
Project Number	GE-00085	Deep
		<i>Sheet 1 of 2</i>

Date Drilled	February 10, 2021	Ground Surface Elevation	282.26 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown, silty loam, 152 mm	
1.0		1	-	-	 1.37 m	SILT - brown, weathered, some sand, damp -wet sandy silt seams below 1.1 m depth	MC - 24.0%
1.5		2	-	-		SILT TILL - brown/grey, mottled, weathered, trace to some fine sand, trace fine gravel, damp	MC - 19.5%
2.0							
2.5		3	-	-			MC - 19.9%
3.0		4	-	-			
3.5							- becoming brown and less weathered below 3.7 m depth
4.0		5	-	-			
4.5		6	-	-			MC - 27.8%
5.0							
5.5						- becoming grey below 5.6 m depth	
6.0		7	-	-			MC - 26.6%
6.5							
7.0							
7.5							
8.0		8	-	-			MC - 19.9%

continued on the following page

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 10.67 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 8.53 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, Dry
 May 30, 2021 - WL, Dry



Project	Proposed Residential & Commercial Development	Borehole ID
Project Location	952 Southdale Road, London, ON	304/MW - Deep
Project Number	GE-00085	<i>Sheet 2 of 2</i>

Date Drilled	February 10, 2021	Ground Surface Elevation	282.26 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
8.5						<i>continued from previous page</i>	
9.0		9	-	-			<i>MC - 7.2%</i>
9.5					<i>9.60 m</i>		
10.0						SAND - brown, fine grained, trace gravel, trace silt, damp	
10.5					<i>10.51 m</i>		
11.0		10	-	-		SILT TILL - grey, some clay, trace sand, trace fine gravel, damp	<i>MC - 20.4%</i>
11.0					<i>11.13 m</i>		
11.5						BH Terminated at 11.13 m MW Installed at 10.67 m - refer to details below	
12.0							
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 10.67 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 8.53 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, Dry
 May 30, 2021 - WL, Dry



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
305/MW
Sheet 1 of 1

Date Drilled	February 11, 2021	Ground Surface Elevation	284.77 m asl
Drill Rig	D50 Turbo	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown, silty loam, 152 mm	
1.0		1	-	-		SILT - brown, weathered, some sand, moist	May 30/21 WL - 1.02 m
1.5		2	-	-		- intermittent wet sand seams below 1.8 m depth	MC - 11.7%
2.0						2.13 m	
2.5		3	-	-		SILT TILL - brown/grey, mottled, weathered, some clay, some sand, trace fine gravel, damp - wet sand seams observed in Sample 3	MC - 22.4%
3.0		4	-	-			MC - 21.0%
3.5							
4.0		5	-	-	4.27 m	- becoming brown and less weathered below 4.0 m depth	MC - 19.4%
4.5						BH Terminated at 4.27 m MW Installed at 3.81 m - refer to details below	
5.0							
5.5							
6.0							
6.5							
7.0							
7.5							
8.0							

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 3.81 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 1.98 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 0.70 m bgs
 May 30, 2021 - WL, 1.02 m bgs



Particle Size Distribution Results of Sieve Analysis

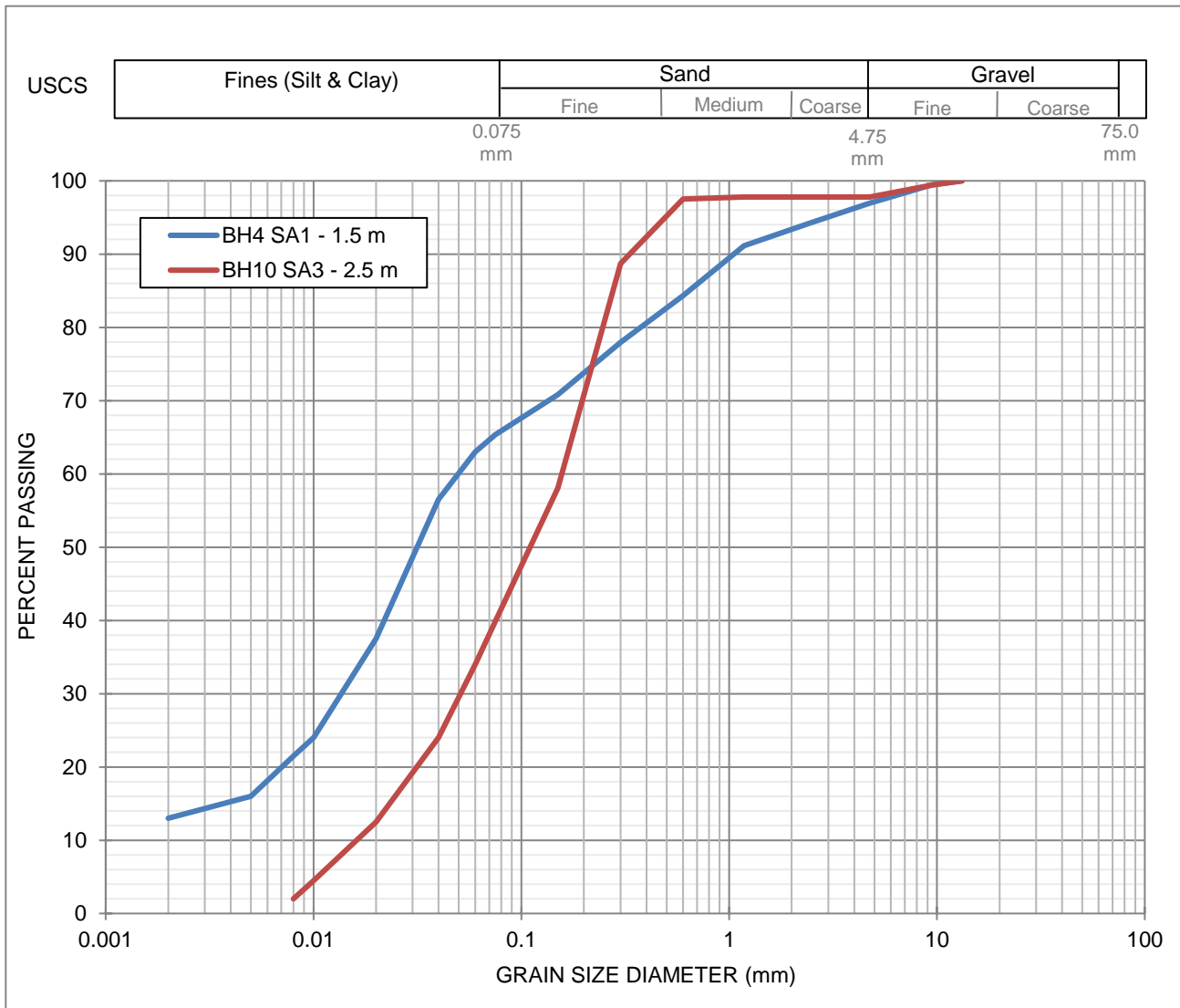
Project Name: 952 Southdale Road

Date: 25-Jan-18

Project Location: London, Ontario

Project No.: GE-00085

Sample ID	Unified Soil Classification				Moisture Content
	% Clay	% Silt	% Sand	% Gravel	
BH4 SA1 - 1.5 m	13.0%	52.4%	31.6%	3.1%	13.8%
BH10 SA3 - 2.5 m		39.9%	57.9%	2.2%	16.9%





Particle Size Distribution Results of Sieve Analysis

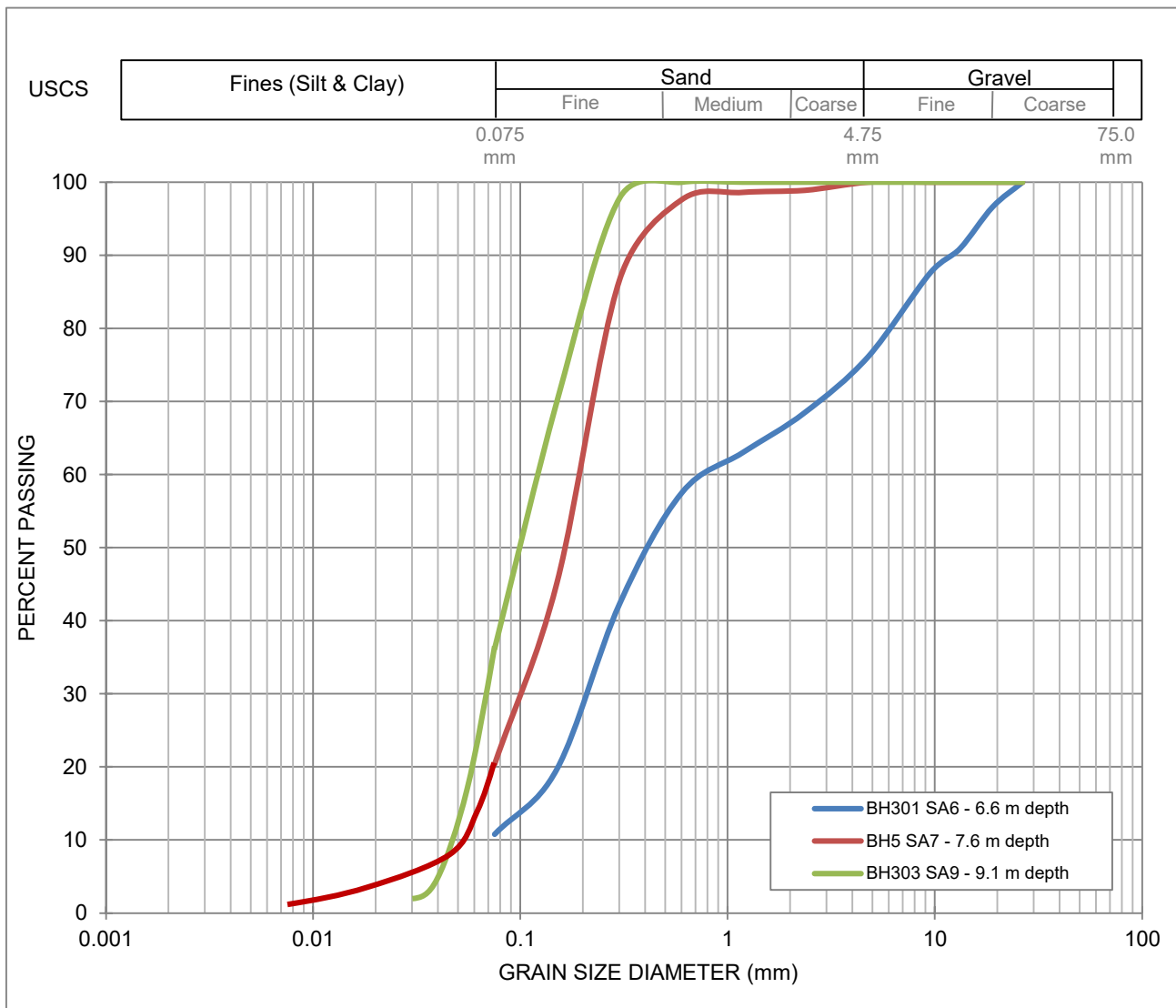
Project Name: Proposed Residential & Commercial Development

Date: 4-Jun-21

Project Location: 952 Southdale Rd, London, Ontario

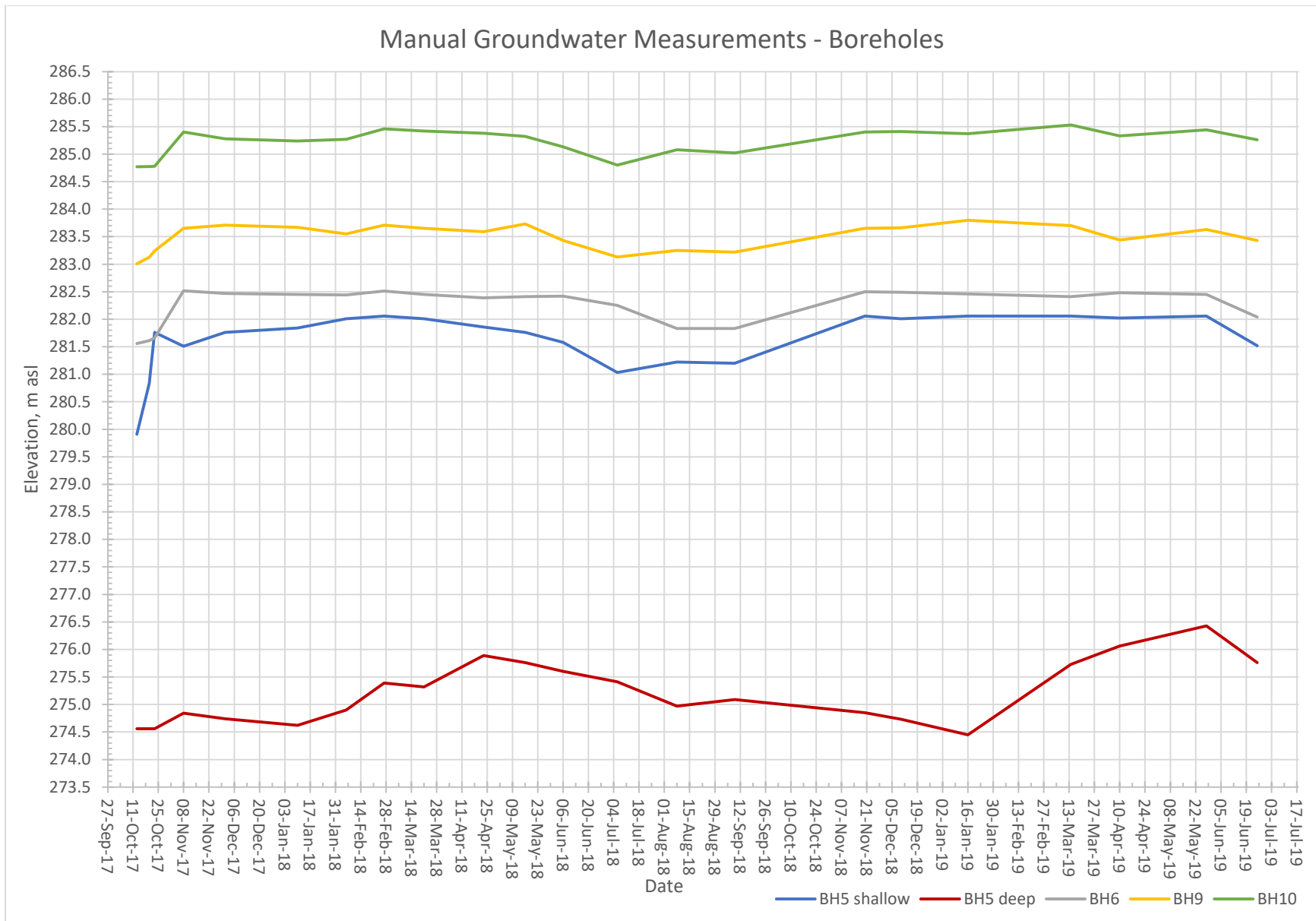
Project No.: GE-00085

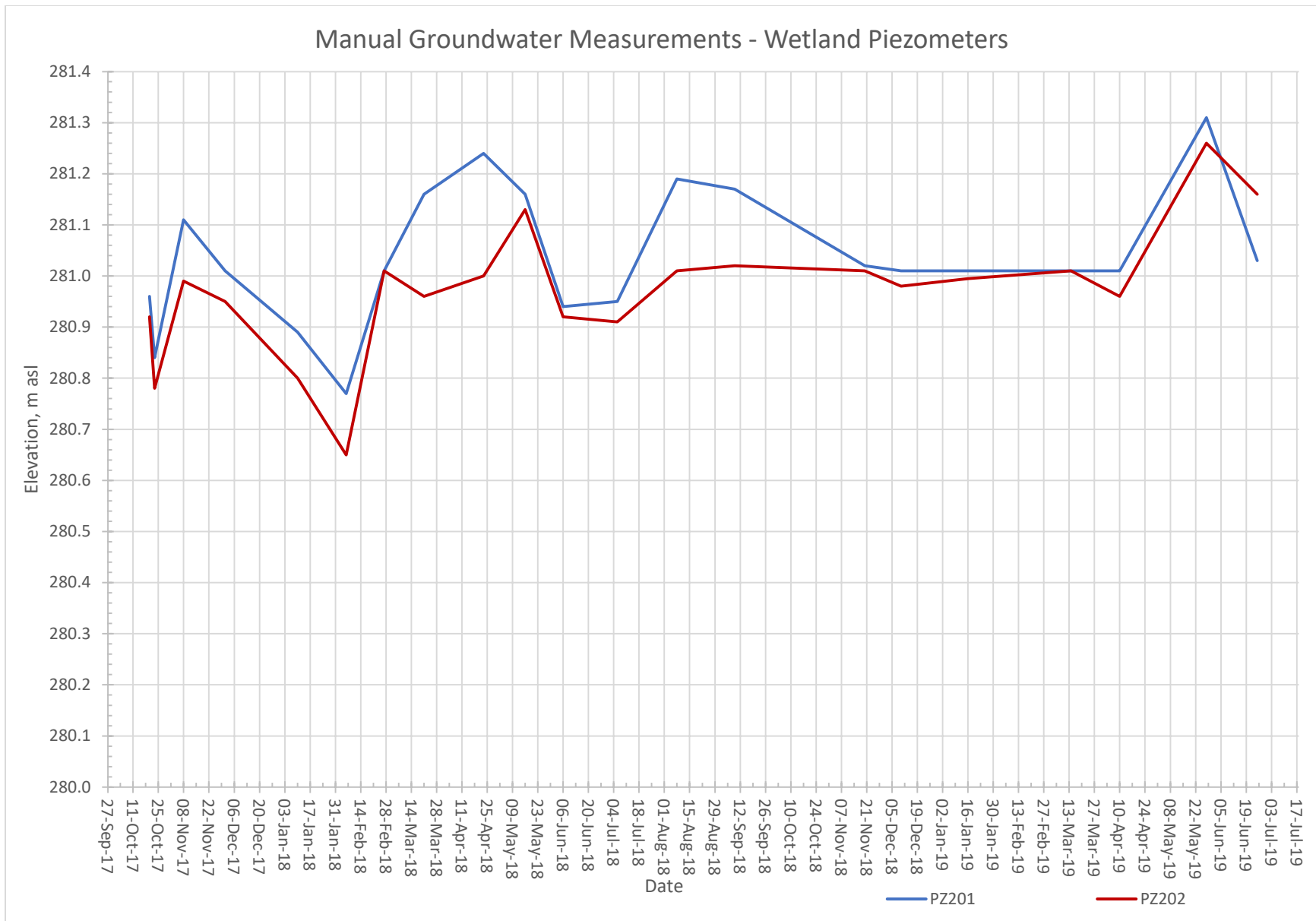
Sample ID	Unified Soil Classification				Moisture Content (%)
	Fines (Silt & Clay)	% Sand	% Gravel	% Cobbles	
BH301 SA6 - 6.6 m depth	10.8%	65.3%	23.9%	0.0%	2.4%
BH5 SA7 - 7.6 m depth	20.4%	79.6%	0.0%	0.0%	12.3%
BH303SA9 - 9.1 m depth	36.2%	63.8%	0.0%	0.0%	5.1%

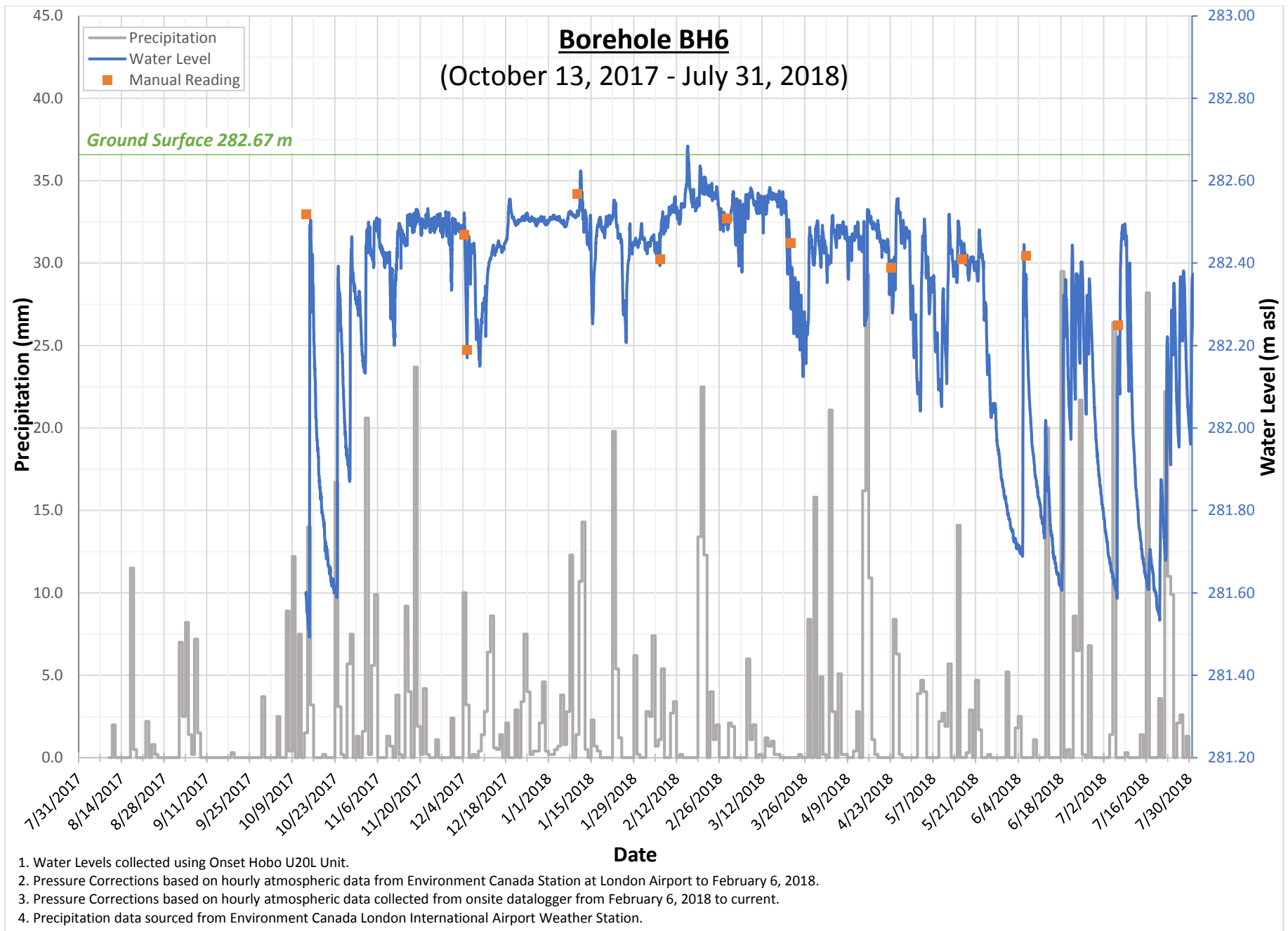


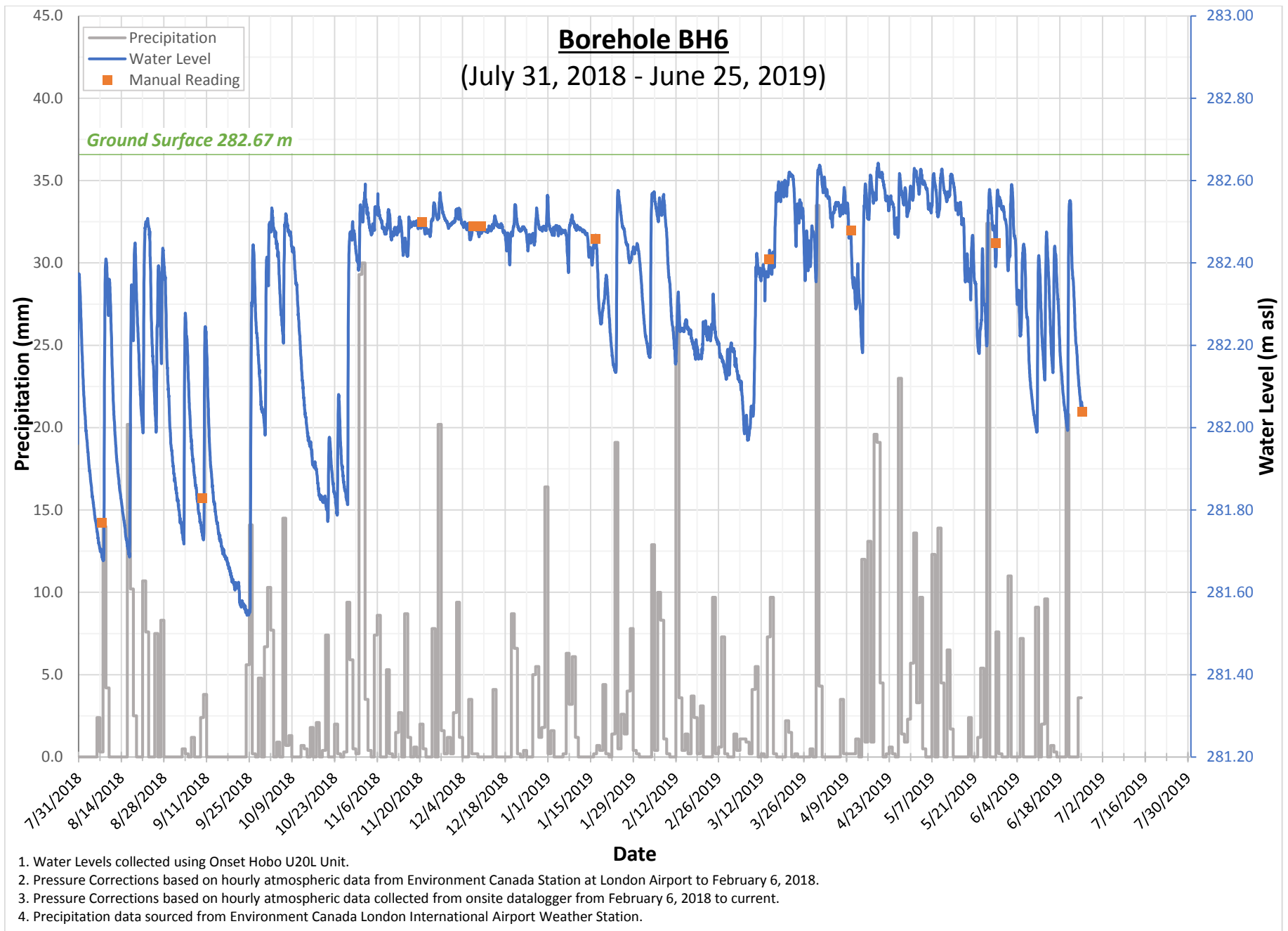
APPENDIX C

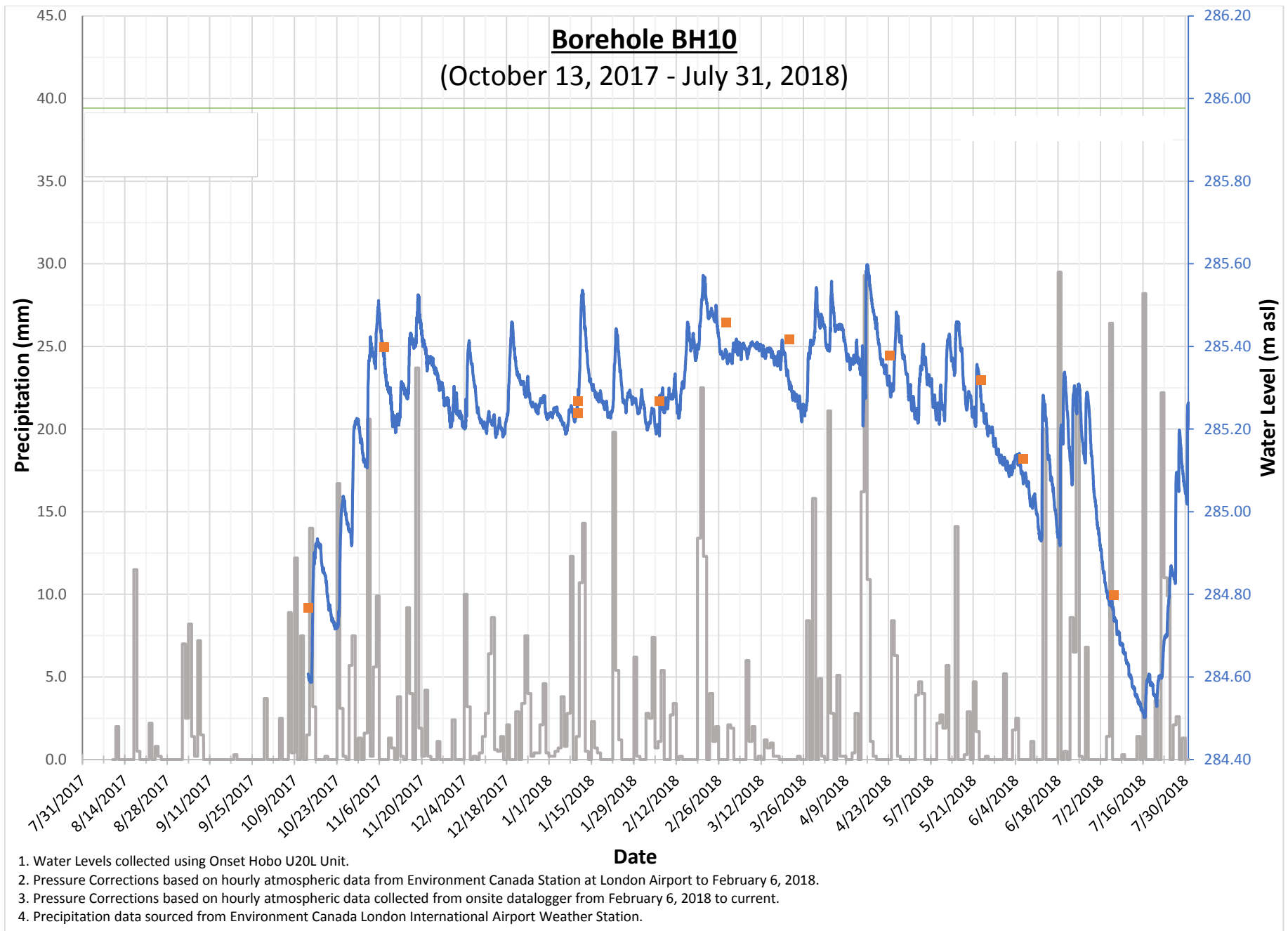
Groundwater Hydrographs

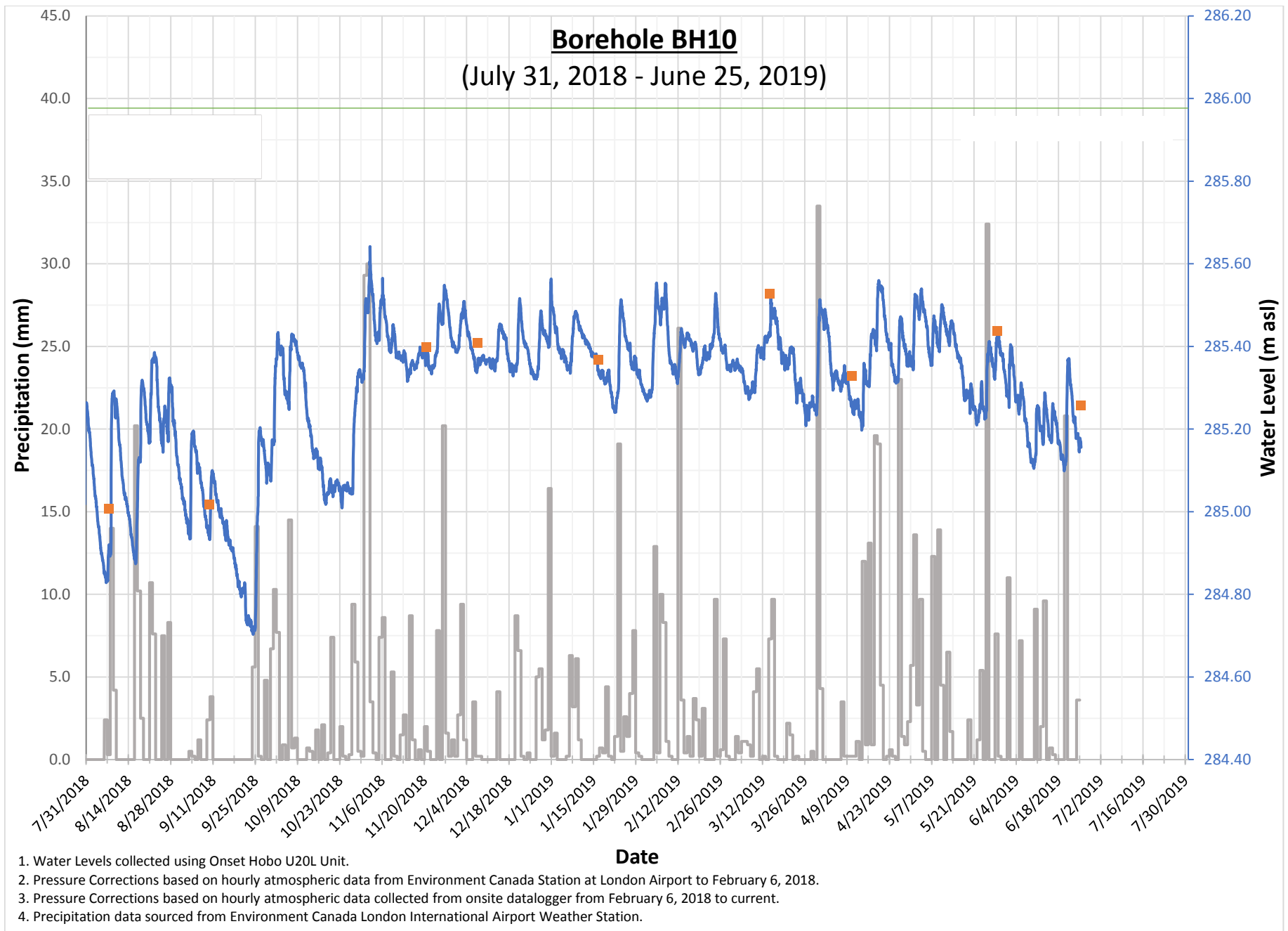












APPENDIX D

Site Photographs

Photographic Log

Wetland onsite



Swamp willow, buckthorn, and dogwood vegetation
East view



Installation of PZ201



Installation of
PZ202

APPENDIX E

Analytical Lab Results

Attention: Rebecca Walker

LDS Consultants Inc
2070 Huron Street East
Suite A
London, ON
CANADA N5V 5A7

Report Date: 2017/11/21

Report #: R4869501

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7P5025

Received: 2017/11/13, 14:32

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	2	N/A	2017/11/15	CAM SOP-00448	SM 22 2320 B m
Carbonate, Bicarbonate and Hydroxide	2	N/A	2017/11/16	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	2	N/A	2017/11/15	CAM SOP-00463	EPA 325.2 m
Conductivity	2	N/A	2017/11/15	CAM SOP-00414	SM 22 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2017/11/15	CAM SOP-00446	SM 22 5310 B m
Hardness (calculated as CaCO3)	2	N/A	2017/11/17	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	1	N/A	2017/11/17	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	1	N/A	2017/11/20	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	2	N/A	2017/11/17		
Anion and Cation Sum	2	N/A	2017/11/17		
Total Ammonia-N	2	N/A	2017/11/17	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	2	N/A	2017/11/15	CAM SOP-00440	SM 22 4500-NO3/NO2B
pH	2	N/A	2017/11/15	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	2	N/A	2017/11/15	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	2	N/A	2017/11/17		
Sat. pH and Langelier Index (@ 4C)	2	N/A	2017/11/17		
Sulphate by Automated Colourimetry	2	N/A	2017/11/15	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	2	N/A	2017/11/17		

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report.

Attention:Rebecca Walker

LDS Consultants Inc
2070 Huron Street East
Suite A
London, ON
CANADA N5V 5A7

Report Date: 2017/11/21
Report #: R4869501
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7P5025

Received on **2017/11/13, 14:32** provide analysis samples provided by using testing methodology report.
Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Christine Gripton, Senior Project Manager
Email: CGripton@maxxam.ca
Phone# (800)268-7396 Ext:250

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

RCAP - COMPREHENSIVE (WATER)

Maxxam ID			FNU365			FNU366		
Sampling Date			2017/11/13 13:30			2017/11/13 14:00		
COC Number			101758			101758		
	UNITS	Criteria	PZ 202	RDL	QC Batch	MW6	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	-	3.94	N/A	5264149	33.8	N/A	5264149
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	130	1.0	5264146	270	1.0	5264146
Calculated TDS	mg/L	-	610	1.0	5264152	1800	1.0	5264152
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	<1.0	1.0	5264146	1.3	1.0	5264146
Cation Sum	me/L	-	23.3	N/A	5264149	31.5	N/A	5264149
Hardness (CaCO3)	mg/L	-	850	1.0	5264147	750	1.0	5264147
Ion Balance (% Difference)	%	-	71.1	N/A	5264148	3.49	N/A	5264148
Langelier Index (@ 20C)	N/A	-	0.923		5264150	0.841		5264150
Langelier Index (@ 4C)	N/A	-	0.675		5264151	0.597		5264151
Saturation pH (@ 20C)	N/A	-	6.92		5264150	6.86		5264150
Saturation pH (@ 4C)	N/A	-	7.16		5264151	7.10		5264151
Inorganics								
Total Ammonia-N	mg/L	-	1.2	0.050	5267791	0.064	0.050	5267791
Conductivity	umho/cm	-	410	1.0	5266401	3700	1.0	5266401
Dissolved Organic Carbon	mg/L	-	31	0.50	5266387	2.4	0.50	5266387
Orthophosphate (P)	mg/L	-	0.031	0.010	5265719	0.014	0.010	5265719
pH	pH	-	7.84		5266402	7.70		5266402
Dissolved Sulphate (SO4)	mg/L	-	11	1.0	5265717	44	1.0	5265717
Alkalinity (Total as CaCO3)	mg/L	-	130	1.0	5266391	270	1.0	5266391
Dissolved Chloride (Cl)	mg/L	790	40	1.0	5265711	970	10	5265711
Nitrite (N)	mg/L	-	<0.010	0.010	5265698	0.020	0.010	5265701
Nitrate (N)	mg/L	-	<0.10	0.10	5265698	0.64	0.10	5265701
Nitrate + Nitrite (N)	mg/L	-	<0.10	0.10	5265698	0.66	0.10	5265701
Metals								
Dissolved Aluminum (Al)	ug/L	-	27	5.0	5273282	9.6	5.0	5266207
Dissolved Antimony (Sb)	ug/L	6.0	<0.50	0.50	5273282	<0.50	0.50	5266207
Dissolved Arsenic (As)	ug/L	25	3.6	1.0	5273282	1.2	1.0	5266207
Dissolved Barium (Ba)	ug/L	1000	100	2.0	5273282	290	2.0	5266207
Dissolved Beryllium (Be)	ug/L	4.0	<0.50	0.50	5273282	<0.50	0.50	5266207
Dissolved Boron (B)	ug/L	5000	28	10	5273282	69	10	5266207
Dissolved Cadmium (Cd)	ug/L	2.7	<0.10	0.10	5273282	<0.10	0.10	5266207
Dissolved Calcium (Ca)	ug/L	-	290000	200	5273282	220000	200	5266207
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)								
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition								
Potable Ground Water- All Types of Property Uses - Coarse Texture Soil								
N/A = Not Applicable								

RCAP - COMPREHENSIVE (WATER)

Maxxam ID			FNU365			FNU366		
Sampling Date			2017/11/13 13:30			2017/11/13 14:00		
COC Number			101758			101758		
	UNITS	Criteria	PZ 202	RDL	QC Batch	MW6	RDL	QC Batch
Dissolved Chromium (Cr)	ug/L	50	<5.0	5.0	5273282	<5.0	5.0	5266207
Dissolved Cobalt (Co)	ug/L	3.8	2.0	0.50	5273282	<0.50	0.50	5266207
Dissolved Copper (Cu)	ug/L	87	2.0	1.0	5273282	1.5	1.0	5266207
Dissolved Iron (Fe)	ug/L	-	6500	100	5273282	240	100	5266207
Dissolved Lead (Pb)	ug/L	10	<0.50	0.50	5273282	<0.50	0.50	5266207
Dissolved Magnesium (Mg)	ug/L	-	30000	50	5273282	49000	50	5266207
Dissolved Manganese (Mn)	ug/L	-	1300	2.0	5273282	320	2.0	5266207
Dissolved Molybdenum (Mo)	ug/L	70	1.5	0.50	5273282	3.1	0.50	5266207
Dissolved Nickel (Ni)	ug/L	100	4.1	1.0	5273282	2.1	1.0	5266207
Dissolved Phosphorus (P)	ug/L	-	120	100	5273282	<100	100	5266207
Dissolved Potassium (K)	ug/L	-	1200	200	5273282	8000	200	5266207
Dissolved Selenium (Se)	ug/L	10	<2.0	2.0	5273282	<2.0	2.0	5266207
Dissolved Silicon (Si)	ug/L	-	7800	50	5273282	6700	50	5266207
Dissolved Silver (Ag)	ug/L	1.5	<0.10	0.10	5273282	<0.10	0.10	5266207
Dissolved Sodium (Na)	ug/L	490000	140000	100	5273282	380000	100	5266207
Dissolved Strontium (Sr)	ug/L	-	460	1.0	5273282	1600	1.0	5266207
Dissolved Thallium (Tl)	ug/L	2.0	<0.050	0.050	5273282	<0.050	0.050	5266207
Dissolved Titanium (Ti)	ug/L	-	<5.0	5.0	5273282	<5.0	5.0	5266207
Dissolved Uranium (U)	ug/L	20	13	0.10	5273282	7.7	0.10	5266207
Dissolved Vanadium (V)	ug/L	6.2	1.8	0.50	5273282	1.6	0.50	5266207
Dissolved Zinc (Zn)	ug/L	1100	5.3	5.0	5273282	<5.0	5.0	5266207
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Criteria: Ontario Reg. 153/04 (Amended April 15, 2011) Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition Potable Ground Water- All Types of Property Uses - Coarse Texture Soil								

GENERAL COMMENTS

Sample FNU365 [PZ 202] : All samples, except the dissolved metals, were received with Trace Settled Sediment (just cover bottom of container). Ion balance out of acceptance. Results confirmed by re-analysis of original container. Cations suspected to be biased high.

Sample FNU366 [MW6] : ortho-Phosphate > Total Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5265698	C_N	Matrix Spike	Nitrite (N)	2017/11/15		99	%	80 - 120	
			Nitrate (N)	2017/11/15		82	%	80 - 120	
5265698	C_N	Spiked Blank	Nitrite (N)	2017/11/15		99	%	80 - 120	
			Nitrate (N)	2017/11/15		101	%	80 - 120	
5265698	C_N	Method Blank	Nitrite (N)	2017/11/15	<0.010		mg/L		
			Nitrate (N)	2017/11/15	<0.10		mg/L		
5265698	C_N	RPD	Nitrite (N)	2017/11/15	0.75		%	20	
			Nitrate (N)	2017/11/15	0.86		%	20	
5265701	C_N	Matrix Spike	Nitrite (N)	2017/11/15		102	%	80 - 120	
			Nitrate (N)	2017/11/15		99	%	80 - 120	
5265701	C_N	Spiked Blank	Nitrite (N)	2017/11/15		102	%	80 - 120	
			Nitrate (N)	2017/11/15		104	%	80 - 120	
5265701	C_N	Method Blank	Nitrite (N)	2017/11/15	<0.010		mg/L		
			Nitrate (N)	2017/11/15	<0.10		mg/L		
5265701	C_N	RPD	Nitrite (N)	2017/11/15	NC		%	20	
			Nitrate (N)	2017/11/15	NC		%	20	
5265711	ADB	Matrix Spike	Dissolved Chloride (Cl)	2017/11/15		100	%	80 - 120	
5265711	ADB	Spiked Blank	Dissolved Chloride (Cl)	2017/11/15		105	%	80 - 120	
5265711	ADB	Method Blank	Dissolved Chloride (Cl)	2017/11/15	<1.0		mg/L		
5265711	ADB	RPD	Dissolved Chloride (Cl)	2017/11/15	6.5		%	20	
5265717	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2017/11/15		NC	%	75 - 125	
5265717	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2017/11/15		103	%	80 - 120	
5265717	ADB	Method Blank	Dissolved Sulphate (SO4)	2017/11/15	<1.0		mg/L		
5265717	ADB	RPD	Dissolved Sulphate (SO4)	2017/11/15	0.19		%	20	
5265719	ADB	Matrix Spike	Orthophosphate (P)	2017/11/15		104	%	75 - 125	
5265719	ADB	Spiked Blank	Orthophosphate (P)	2017/11/15		100	%	80 - 120	
5265719	ADB	Method Blank	Orthophosphate (P)	2017/11/15	<0.010		mg/L		
5265719	ADB	RPD	Orthophosphate (P)	2017/11/15	NC		%	25	
5266207	PBA	Matrix Spike	Dissolved Aluminum (Al)	2017/11/17		101	%	80 - 120	
			Dissolved Antimony (Sb)	2017/11/17		114	%	80 - 120	
			Dissolved Arsenic (As)	2017/11/17		103	%	80 - 120	
			Dissolved Barium (Ba)	2017/11/17		102	%	80 - 120	
			Dissolved Beryllium (Be)	2017/11/17		101	%	80 - 120	
			Dissolved Boron (B)	2017/11/17		93	%	80 - 120	
			Dissolved Cadmium (Cd)	2017/11/17		106	%	80 - 120	
			Dissolved Calcium (Ca)	2017/11/17		NC	%	80 - 120	
			Dissolved Chromium (Cr)	2017/11/17		98	%	80 - 120	
			Dissolved Cobalt (Co)	2017/11/17		99	%	80 - 120	
			Dissolved Copper (Cu)	2017/11/17		99	%	80 - 120	
			Dissolved Iron (Fe)	2017/11/17		101	%	80 - 120	
			Dissolved Lead (Pb)	2017/11/17		98	%	80 - 120	
			Dissolved Magnesium (Mg)	2017/11/17		99	%	80 - 120	
			Dissolved Manganese (Mn)	2017/11/17		103	%	80 - 120	
			Dissolved Molybdenum (Mo)	2017/11/17		107	%	80 - 120	
			Dissolved Nickel (Ni)	2017/11/17		98	%	80 - 120	
			Dissolved Phosphorus (P)	2017/11/17		100	%	80 - 120	
			Dissolved Potassium (K)	2017/11/17		103	%	80 - 120	
			Dissolved Selenium (Se)	2017/11/17		101	%	80 - 120	
			Dissolved Silicon (Si)	2017/11/17		100	%	80 - 120	
			Dissolved Silver (Ag)	2017/11/17		82	%	80 - 120	
			Dissolved Sodium (Na)	2017/11/17		NC	%	80 - 120	
Dissolved Strontium (Sr)	2017/11/17		NC	%	80 - 120				
Dissolved Thallium (Tl)	2017/11/17		101	%	80 - 120				
Dissolved Titanium (Ti)	2017/11/17		103	%	80 - 120				
Dissolved Uranium (U)	2017/11/17		103	%	80 - 120				

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5266207	PBA	Spiked Blank	Dissolved Vanadium (V)	2017/11/17		99	%	80 - 120
			Dissolved Zinc (Zn)	2017/11/17		101	%	80 - 120
			Dissolved Aluminum (Al)	2017/11/17		100	%	80 - 120
			Dissolved Antimony (Sb)	2017/11/17		107	%	80 - 120
			Dissolved Arsenic (As)	2017/11/17		97	%	80 - 120
			Dissolved Barium (Ba)	2017/11/17		97	%	80 - 120
			Dissolved Beryllium (Be)	2017/11/17		97	%	80 - 120
			Dissolved Boron (B)	2017/11/17		94	%	80 - 120
			Dissolved Cadmium (Cd)	2017/11/17		103	%	80 - 120
			Dissolved Calcium (Ca)	2017/11/17		95	%	80 - 120
			Dissolved Chromium (Cr)	2017/11/17		93	%	80 - 120
			Dissolved Cobalt (Co)	2017/11/17		98	%	80 - 120
			Dissolved Copper (Cu)	2017/11/17		99	%	80 - 120
			Dissolved Iron (Fe)	2017/11/17		98	%	80 - 120
			Dissolved Lead (Pb)	2017/11/17		98	%	80 - 120
			Dissolved Magnesium (Mg)	2017/11/17		98	%	80 - 120
			Dissolved Manganese (Mn)	2017/11/17		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2017/11/17		99	%	80 - 120
			Dissolved Nickel (Ni)	2017/11/17		95	%	80 - 120
			Dissolved Phosphorus (P)	2017/11/17		100	%	80 - 120
			Dissolved Potassium (K)	2017/11/17		99	%	80 - 120
			Dissolved Selenium (Se)	2017/11/17		99	%	80 - 120
			Dissolved Silicon (Si)	2017/11/17		97	%	80 - 120
			Dissolved Silver (Ag)	2017/11/17		102	%	80 - 120
			Dissolved Sodium (Na)	2017/11/17		96	%	80 - 120
			Dissolved Strontium (Sr)	2017/11/17		101	%	80 - 120
			Dissolved Thallium (Tl)	2017/11/17		101	%	80 - 120
			Dissolved Titanium (Ti)	2017/11/17		101	%	80 - 120
Dissolved Uranium (U)	2017/11/17		98	%	80 - 120			
Dissolved Vanadium (V)	2017/11/17		93	%	80 - 120			
Dissolved Zinc (Zn)	2017/11/17		98	%	80 - 120			
5266207	PBA	Method Blank	Dissolved Aluminum (Al)	2017/11/17	<5.0		ug/L	
			Dissolved Antimony (Sb)	2017/11/17	<0.50		ug/L	
			Dissolved Arsenic (As)	2017/11/17	<1.0		ug/L	
			Dissolved Barium (Ba)	2017/11/17	<2.0		ug/L	
			Dissolved Beryllium (Be)	2017/11/17	<0.50		ug/L	
			Dissolved Boron (B)	2017/11/17	<1.0		ug/L	
			Dissolved Cadmium (Cd)	2017/11/17	<0.10		ug/L	
			Dissolved Calcium (Ca)	2017/11/17	<200		ug/L	
			Dissolved Chromium (Cr)	2017/11/17	<5.0		ug/L	
			Dissolved Cobalt (Co)	2017/11/17	<0.50		ug/L	
			Dissolved Copper (Cu)	2017/11/17	<1.0		ug/L	
			Dissolved Iron (Fe)	2017/11/17	<100		ug/L	
			Dissolved Lead (Pb)	2017/11/17	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2017/11/17	<50		ug/L	
			Dissolved Manganese (Mn)	2017/11/17	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2017/11/17	<0.50		ug/L	
			Dissolved Nickel (Ni)	2017/11/17	<1.0		ug/L	
			Dissolved Phosphorus (P)	2017/11/17	<100		ug/L	
			Dissolved Potassium (K)	2017/11/17	<200		ug/L	
			Dissolved Selenium (Se)	2017/11/17	<2.0		ug/L	
Dissolved Silicon (Si)	2017/11/17	<50		ug/L				
Dissolved Silver (Ag)	2017/11/17	<0.10		ug/L				
Dissolved Sodium (Na)	2017/11/17	<100		ug/L				
Dissolved Strontium (Sr)	2017/11/17	<1.0		ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5266207	PBA	RPD	Dissolved Thallium (Tl)	2017/11/17	<0.050		ug/L	
			Dissolved Titanium (Ti)	2017/11/17	<5.0		ug/L	
			Dissolved Uranium (U)	2017/11/17	<0.10		ug/L	
			Dissolved Vanadium (V)	2017/11/17	<0.50		ug/L	
			Dissolved Zinc (Zn)	2017/11/17	<5.0		ug/L	
			Dissolved Antimony (Sb)	2017/11/17	NC		%	20
			Dissolved Arsenic (As)	2017/11/17	NC		%	20
			Dissolved Barium (Ba)	2017/11/17	0.56		%	20
			Dissolved Beryllium (Be)	2017/11/17	NC		%	20
			Dissolved Boron (B)	2017/11/17	5.2		%	20
			Dissolved Cadmium (Cd)	2017/11/17	NC		%	20
			Dissolved Chromium (Cr)	2017/11/17	NC		%	20
			Dissolved Cobalt (Co)	2017/11/17	2.7		%	20
			Dissolved Copper (Cu)	2017/11/17	NC		%	20
			Dissolved Iron (Fe)	2017/11/17	1.9		%	20
			Dissolved Lead (Pb)	2017/11/17	NC		%	20
			Dissolved Molybdenum (Mo)	2017/11/17	NC		%	20
			Dissolved Nickel (Ni)	2017/11/17	NC		%	20
			Dissolved Potassium (K)	2017/11/17	1.1		%	20
			Dissolved Selenium (Se)	2017/11/17	NC		%	20
			Dissolved Silver (Ag)	2017/11/17	NC		%	20
			Dissolved Sodium (Na)	2017/11/17	3.0		%	20
Dissolved Thallium (Tl)	2017/11/17	NC		%	20			
Dissolved Uranium (U)	2017/11/17	0.92		%	20			
Dissolved Vanadium (V)	2017/11/17	NC		%	20			
Dissolved Zinc (Zn)	2017/11/17	NC		%	20			
5266387	AHA	Matrix Spike	Dissolved Organic Carbon	2017/11/15		92	%	80 - 120
5266387	AHA	Spiked Blank	Dissolved Organic Carbon	2017/11/15		101	%	80 - 120
5266387	AHA	Method Blank	Dissolved Organic Carbon	2017/11/15	<0.50		mg/L	
5266387	AHA	RPD	Dissolved Organic Carbon	2017/11/15	5.9		%	20
5266391	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2017/11/15		95	%	85 - 115
5266391	SAU	Method Blank	Alkalinity (Total as CaCO3)	2017/11/15	<1.0		mg/L	
5266391	SAU	RPD	Alkalinity (Total as CaCO3)	2017/11/15	0.66		%	20
5266401	SAU	Spiked Blank	Conductivity	2017/11/15		101	%	85 - 115
5266401	SAU	Method Blank	Conductivity	2017/11/15	<1.0		umho/cm	
5266401	SAU	RPD	Conductivity	2017/11/15	0.39		%	25
5266402	SAU	Spiked Blank	pH	2017/11/15		101	%	98 - 103
5266402	SAU	RPD	pH	2017/11/15	0.53		%	N/A
5267791	COP	Matrix Spike	Total Ammonia-N	2017/11/17		103	%	80 - 120
5267791	COP	Spiked Blank	Total Ammonia-N	2017/11/17		98	%	85 - 115
5267791	COP	Method Blank	Total Ammonia-N	2017/11/17	<0.050		mg/L	
5267791	COP	RPD	Total Ammonia-N	2017/11/17	11		%	20
5273282	PBA	Matrix Spike	Dissolved Aluminum (Al)	2017/11/20		107	%	80 - 120
			Dissolved Antimony (Sb)	2017/11/20		112	%	80 - 120
			Dissolved Arsenic (As)	2017/11/20		104	%	80 - 120
			Dissolved Barium (Ba)	2017/11/20		102	%	80 - 120
			Dissolved Beryllium (Be)	2017/11/20		104	%	80 - 120
			Dissolved Boron (B)	2017/11/20		102	%	80 - 120
			Dissolved Cadmium (Cd)	2017/11/20		106	%	80 - 120
			Dissolved Calcium (Ca)	2017/11/20		NC	%	80 - 120
			Dissolved Chromium (Cr)	2017/11/20		97	%	80 - 120
			Dissolved Cobalt (Co)	2017/11/20		101	%	80 - 120
			Dissolved Copper (Cu)	2017/11/20		103	%	80 - 120
			Dissolved Iron (Fe)	2017/11/20		103	%	80 - 120
			Dissolved Lead (Pb)	2017/11/20		95	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Magnesium (Mg)	2017/11/20		NC	%	80 - 120
			Dissolved Manganese (Mn)	2017/11/20		NC	%	80 - 120
			Dissolved Molybdenum (Mo)	2017/11/20		106	%	80 - 120
			Dissolved Nickel (Ni)	2017/11/20		97	%	80 - 120
			Dissolved Phosphorus (P)	2017/11/20		109	%	80 - 120
			Dissolved Potassium (K)	2017/11/20		106	%	80 - 120
			Dissolved Selenium (Se)	2017/11/20		102	%	80 - 120
			Dissolved Silicon (Si)	2017/11/20		108	%	80 - 120
			Dissolved Silver (Ag)	2017/11/20		101	%	80 - 120
			Dissolved Sodium (Na)	2017/11/20		NC	%	80 - 120
			Dissolved Strontium (Sr)	2017/11/20		NC	%	80 - 120
			Dissolved Thallium (Tl)	2017/11/20		102	%	80 - 120
			Dissolved Titanium (Ti)	2017/11/20		107	%	80 - 120
			Dissolved Uranium (U)	2017/11/20		105	%	80 - 120
			Dissolved Vanadium (V)	2017/11/20		103	%	80 - 120
			Dissolved Zinc (Zn)	2017/11/20		99	%	80 - 120
5273282	PBA	Spiked Blank	Dissolved Aluminum (Al)	2017/11/20		100	%	80 - 120
			Dissolved Antimony (Sb)	2017/11/20		105	%	80 - 120
			Dissolved Arsenic (As)	2017/11/20		99	%	80 - 120
			Dissolved Barium (Ba)	2017/11/20		99	%	80 - 120
			Dissolved Beryllium (Be)	2017/11/20		102	%	80 - 120
			Dissolved Boron (B)	2017/11/20		99	%	80 - 120
			Dissolved Cadmium (Cd)	2017/11/20		102	%	80 - 120
			Dissolved Calcium (Ca)	2017/11/20		99	%	80 - 120
			Dissolved Chromium (Cr)	2017/11/20		92	%	80 - 120
			Dissolved Cobalt (Co)	2017/11/20		99	%	80 - 120
			Dissolved Copper (Cu)	2017/11/20		99	%	80 - 120
			Dissolved Iron (Fe)	2017/11/20		99	%	80 - 120
			Dissolved Lead (Pb)	2017/11/20		97	%	80 - 120
			Dissolved Magnesium (Mg)	2017/11/20		102	%	80 - 120
			Dissolved Manganese (Mn)	2017/11/20		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2017/11/20		98	%	80 - 120
			Dissolved Nickel (Ni)	2017/11/20		95	%	80 - 120
			Dissolved Phosphorus (P)	2017/11/20		110	%	80 - 120
			Dissolved Potassium (K)	2017/11/20		102	%	80 - 120
			Dissolved Selenium (Se)	2017/11/20		99	%	80 - 120
			Dissolved Silicon (Si)	2017/11/20		100	%	80 - 120
			Dissolved Silver (Ag)	2017/11/20		98	%	80 - 120
			Dissolved Sodium (Na)	2017/11/20		97	%	80 - 120
			Dissolved Strontium (Sr)	2017/11/20		98	%	80 - 120
			Dissolved Thallium (Tl)	2017/11/20		102	%	80 - 120
			Dissolved Titanium (Ti)	2017/11/20		99	%	80 - 120
			Dissolved Uranium (U)	2017/11/20		101	%	80 - 120
			Dissolved Vanadium (V)	2017/11/20		96	%	80 - 120
			Dissolved Zinc (Zn)	2017/11/20		98	%	80 - 120
5273282	PBA	Method Blank	Dissolved Aluminum (Al)	2017/11/20	<5.0		ug/L	
			Dissolved Antimony (Sb)	2017/11/20	<0.50		ug/L	
			Dissolved Arsenic (As)	2017/11/20	<1.0		ug/L	
			Dissolved Barium (Ba)	2017/11/20	<2.0		ug/L	
			Dissolved Beryllium (Be)	2017/11/20	<0.50		ug/L	
			Dissolved Boron (B)	2017/11/20	<10		ug/L	
			Dissolved Cadmium (Cd)	2017/11/20	<0.10		ug/L	
			Dissolved Calcium (Ca)	2017/11/20	<200		ug/L	
			Dissolved Chromium (Cr)	2017/11/20	<5.0		ug/L	
			Dissolved Cobalt (Co)	2017/11/20	<0.50		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Copper (Cu)	2017/11/20	<1.0		ug/L	
			Dissolved Iron (Fe)	2017/11/20	<100		ug/L	
			Dissolved Lead (Pb)	2017/11/20	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2017/11/20	<50		ug/L	
			Dissolved Manganese (Mn)	2017/11/20	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2017/11/20	<0.50		ug/L	
			Dissolved Nickel (Ni)	2017/11/20	<1.0		ug/L	
			Dissolved Phosphorus (P)	2017/11/20	<100		ug/L	
			Dissolved Potassium (K)	2017/11/20	<200		ug/L	
			Dissolved Selenium (Se)	2017/11/20	<2.0		ug/L	
			Dissolved Silicon (Si)	2017/11/20	<50		ug/L	
			Dissolved Silver (Ag)	2017/11/20	<0.10		ug/L	
			Dissolved Sodium (Na)	2017/11/20	<100		ug/L	
			Dissolved Strontium (Sr)	2017/11/20	1.2, RDL=1.0		ug/L	
			Dissolved Thallium (Tl)	2017/11/20	<0.050		ug/L	
			Dissolved Titanium (Ti)	2017/11/20	<5.0		ug/L	
			Dissolved Uranium (U)	2017/11/20	<0.10		ug/L	
			Dissolved Vanadium (V)	2017/11/20	<0.50		ug/L	
			Dissolved Zinc (Zn)	2017/11/20	<5.0		ug/L	
5273282	PBA	RPD	Dissolved Antimony (Sb)	2017/11/20	NC		%	20
			Dissolved Arsenic (As)	2017/11/20	1.4		%	20
			Dissolved Barium (Ba)	2017/11/20	2.2		%	20
			Dissolved Beryllium (Be)	2017/11/20	NC		%	20
			Dissolved Boron (B)	2017/11/20	0.82		%	20
			Dissolved Cadmium (Cd)	2017/11/20	NC		%	20
			Dissolved Chromium (Cr)	2017/11/20	NC		%	20
			Dissolved Cobalt (Co)	2017/11/20	4.6		%	20
			Dissolved Copper (Cu)	2017/11/20	4.0		%	20
			Dissolved Lead (Pb)	2017/11/20	NC		%	20
			Dissolved Molybdenum (Mo)	2017/11/20	8.4		%	20
			Dissolved Nickel (Ni)	2017/11/20	8.7		%	20
			Dissolved Selenium (Se)	2017/11/20	NC		%	20
			Dissolved Silver (Ag)	2017/11/20	NC		%	20
			Dissolved Sodium (Na)	2017/11/20	2.4		%	20
			Dissolved Thallium (Tl)	2017/11/20	NC		%	20
			Dissolved Uranium (U)	2017/11/20	2.7		%	20
			Dissolved Vanadium (V)	2017/11/20	5.7		%	20
			Dissolved Zinc (Zn)	2017/11/20	NC		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Brad Newman, Scientific Service Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: GE-00085
 Site Location: 952 SOUTHDALE ROAD, LONDON
 Your C.O.C. #: 119154

Attention: Rebecca Walker

LDS Consultants Inc
 15875 Robins Hill Road
 Unit 1
 London, ON
 CANADA N5V 0A5

Report Date: 2019/02/28
 Report #: R5610342
 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B937254
Received: 2019/02/11, 14:50

Sample Matrix: Water
 # Samples Received: 2

Analyses	Quantity	Date	Date	Laboratory Method	Reference
		Extracted	Analyzed		
Alkalinity	2	N/A	2019/02/13	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	2	N/A	2019/02/13	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	2	N/A	2019/02/14	CAM SOP-00463	EPA 325.2 m
Conductivity	2	N/A	2019/02/13	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2019/02/12	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	2	N/A	2019/02/13	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	2	N/A	2019/02/13	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	2	N/A	2019/02/14		
Anion and Cation Sum	2	N/A	2019/02/13		
Total Ammonia-N	1	N/A	2019/02/15	CAM SOP-00441	EPA GS I-2522-90 m
Total Ammonia-N	1	N/A	2019/02/19	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	2	N/A	2019/02/15	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	N/A	2019/02/13	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	2	N/A	2019/02/14	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	2	N/A	2019/02/14		
Sat. pH and Langelier Index (@ 4C)	2	N/A	2019/02/14		
Sulphate by Automated Colourimetry	2	N/A	2019/02/14	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	2	N/A	2019/02/14		

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise

Your Project #: GE-00085
Site Location: 952 SOUTHDALE ROAD, LONDON
Your C.O.C. #: 119154

Attention: Rebecca Walker

LDS Consultants Inc
15875 Robins Hill Road
Unit 1
London, ON
CANADA N5V 0A5

Report Date: 2019/02/28
Report #: R5610342
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B937254

Received: 2019/02/11, 14:50

agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.

(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Christine Gripton, Senior Project Manager

Email: CGripton@maxxam.ca

Phone# (800)268-7396 Ext:250

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IYR709			IYR710		
Sampling Date		2019/02/11			2019/02/11		
COC Number		119154			119154		
	UNITS	PZ102	RDL	QC Batch	BH6	RDL	QC Batch
Calculated Parameters							
Anion Sum	me/L	25.2	N/A	5969143	48.2	N/A	5969143
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	530	1.0	5969141	300	1.0	5969141
Calculated TDS	mg/L	1500	1.0	5969146	2700	1.0	5969146
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.4	1.0	5969141	<1.0	1.0	5969141
Cation Sum	me/L	31.2	N/A	5969143	46.0	N/A	5969143
Hardness (CaCO3)	mg/L	1100	1.0	5969142	1000	1.0	5969142
Ion Balance (% Difference)	%	10.7	N/A	5969132	2.31	N/A	5969132
Langelier Index (@ 20C)	N/A	1.11		5969144	0.798		5969144
Langelier Index (@ 4C)	N/A	0.868		5969145	0.556		5969145
Saturation pH (@ 20C)	N/A	6.32		5969144	6.73		5969144
Saturation pH (@ 4C)	N/A	6.57		5969145	6.97		5969145
Inorganics							
Total Ammonia-N	mg/L	1.4	0.25	5972927	<0.050	0.050	5974965
Conductivity	umho/cm	2400	1.0	5971310	5100	1.0	5971310
Dissolved Organic Carbon	mg/L	15	0.50	5970986	1.9	0.50	5970986
Orthophosphate (P)	mg/L	0.016	0.010	5973672	<0.010	0.010	5973672
pH	pH	7.44		5971309	7.53		5971309
Dissolved Sulphate (SO4)	mg/L	29	1.0	5973636	36	1.0	5973636
Alkalinity (Total as CaCO3)	mg/L	530	1.0	5971306	300	1.0	5971306
Dissolved Chloride (Cl-)	mg/L	500	5.0	5973633	1500	15	5973633
Nitrite (N)	mg/L	<0.010	0.010	5973400	<0.010	0.010	5973400
Nitrate (N)	mg/L	<0.10	0.10	5973400	0.12	0.10	5973400
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	5973400	0.12	0.10	5973400
Metals							
Dissolved Aluminum (Al)	ug/L	9700	5.0	5972713	<5.0	5.0	5972713
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	5972713	<0.50	0.50	5972713
Dissolved Arsenic (As)	ug/L	11	1.0	5972713	<1.0	1.0	5972713
Dissolved Barium (Ba)	ug/L	450	2.0	5972713	490	2.0	5972713
Dissolved Beryllium (Be)	ug/L	2.3	0.50	5972713	<0.50	0.50	5972713
Dissolved Boron (B)	ug/L	20	10	5972713	43	10	5972713
Dissolved Cadmium (Cd)	ug/L	2.8	0.10	5972713	<0.10	0.10	5972713
Dissolved Calcium (Ca)	ug/L	360000	200	5972713	300000	200	5972713
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	5972713	<5.0	5.0	5972713
Dissolved Cobalt (Co)	ug/L	4.7	0.50	5972713	<0.50	0.50	5972713
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable							

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IYR709			IYR710		
Sampling Date		2019/02/11			2019/02/11		
COC Number		119154			119154		
	UNITS	PZ102	RDL	QC Batch	BH6	RDL	QC Batch
Dissolved Copper (Cu)	ug/L	62	1.0	5972713	3.6	1.0	5972713
Dissolved Iron (Fe)	ug/L	39000	100	5972713	<100	100	5972713
Dissolved Lead (Pb)	ug/L	46	0.50	5972713	<0.50	0.50	5972713
Dissolved Magnesium (Mg)	ug/L	36000	50	5972713	63000	50	5972713
Dissolved Manganese (Mn)	ug/L	3700	2.0	5972713	220	2.0	5972713
Dissolved Molybdenum (Mo)	ug/L	<0.50	0.50	5972713	0.76	0.50	5972713
Dissolved Nickel (Ni)	ug/L	12	1.0	5972713	27	1.0	5972713
Dissolved Phosphorus (P)	ug/L	1800	100	5972713	<100	100	5972713
Dissolved Potassium (K)	ug/L	700	200	5972713	6400	200	5972713
Dissolved Selenium (Se)	ug/L	<2.0	2.0	5972713	<2.0	2.0	5972713
Dissolved Silicon (Si)	ug/L	9100	50	5972713	5400	50	5972713
Dissolved Silver (Ag)	ug/L	<0.10	0.10	5972713	<0.10	0.10	5972713
Dissolved Sodium (Na)	ug/L	170000	100	5972713	590000	100	5972713
Dissolved Strontium (Sr)	ug/L	560	1.0	5972713	1600	1.0	5972713
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	5972713	<0.050	0.050	5972713
Dissolved Titanium (Ti)	ug/L	88	5.0	5972713	<5.0	5.0	5972713
Dissolved Uranium (U)	ug/L	25	0.10	5972713	3.1	0.10	5972713
Dissolved Vanadium (V)	ug/L	63	0.50	5972713	<0.50	0.50	5972713
Dissolved Zinc (Zn)	ug/L	58	5.0	5972713	59	5.0	5972713
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							

GENERAL COMMENTS

Revised report (2019/02/28): Includes project details as requested.

Sample IYR709 [PZ102] : Elevated ion balance was confirmed by re-analysis. The sample bottle submitted for dissolved metals contained sediment covering almost the entire bottom of the bottle.

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5970986	KRM	Matrix Spike	Dissolved Organic Carbon	2019/02/12		92	%	80 - 120
5970986	KRM	Spiked Blank	Dissolved Organic Carbon	2019/02/12		100	%	80 - 120
5970986	KRM	Method Blank	Dissolved Organic Carbon	2019/02/12	<0.50		mg/L	
5970986	KRM	RPD	Dissolved Organic Carbon	2019/02/12	2.2		%	20
5971306	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2019/02/13		97	%	85 - 115
5971306	SAU	Method Blank	Alkalinity (Total as CaCO3)	2019/02/13	<1.0		mg/L	
5971306	SAU	RPD	Alkalinity (Total as CaCO3)	2019/02/13	1.0		%	20
5971309	SAU	Spiked Blank	pH	2019/02/13		102	%	98 - 103
5971309	SAU	RPD	pH	2019/02/13	0.27		%	N/A
5971310	SAU	Spiked Blank	Conductivity	2019/02/13		102	%	85 - 115
5971310	SAU	Method Blank	Conductivity	2019/02/13	<1.0		umho/cm	
5971310	SAU	RPD	Conductivity	2019/02/13	0.22		%	25
5972713	ADA	Matrix Spike	Dissolved Aluminum (Al)	2019/02/13		101	%	80 - 120
			Dissolved Antimony (Sb)	2019/02/13		102	%	80 - 120
			Dissolved Arsenic (As)	2019/02/13		100	%	80 - 120
			Dissolved Barium (Ba)	2019/02/13		96	%	80 - 120
			Dissolved Beryllium (Be)	2019/02/13		102	%	80 - 120
			Dissolved Boron (B)	2019/02/13		97	%	80 - 120
			Dissolved Cadmium (Cd)	2019/02/13		99	%	80 - 120
			Dissolved Calcium (Ca)	2019/02/13		NC	%	80 - 120
			Dissolved Chromium (Cr)	2019/02/13		99	%	80 - 120
			Dissolved Cobalt (Co)	2019/02/13		101	%	80 - 120
			Dissolved Copper (Cu)	2019/02/13		102	%	80 - 120
			Dissolved Iron (Fe)	2019/02/13		100	%	80 - 120
			Dissolved Lead (Pb)	2019/02/13		93	%	80 - 120
			Dissolved Magnesium (Mg)	2019/02/13		NC	%	80 - 120
			Dissolved Manganese (Mn)	2019/02/13		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2019/02/13		105	%	80 - 120
			Dissolved Nickel (Ni)	2019/02/13		94	%	80 - 120
			Dissolved Phosphorus (P)	2019/02/13		99	%	80 - 120
			Dissolved Potassium (K)	2019/02/13		103	%	80 - 120
			Dissolved Selenium (Se)	2019/02/13		101	%	80 - 120
			Dissolved Silicon (Si)	2019/02/13		99	%	80 - 120
			Dissolved Silver (Ag)	2019/02/13		71 (1)	%	80 - 120
			Dissolved Sodium (Na)	2019/02/13		NC	%	80 - 120
			Dissolved Strontium (Sr)	2019/02/13		NC	%	80 - 120
			Dissolved Thallium (Tl)	2019/02/13		95	%	80 - 120
			Dissolved Titanium (Ti)	2019/02/13		100	%	80 - 120
			Dissolved Uranium (U)	2019/02/13		91	%	80 - 120
			Dissolved Vanadium (V)	2019/02/13		97	%	80 - 120
			Dissolved Zinc (Zn)	2019/02/13		98	%	80 - 120
5972713	ADA	Spiked Blank	Dissolved Aluminum (Al)	2019/02/13		100	%	80 - 120
			Dissolved Antimony (Sb)	2019/02/13		102	%	80 - 120
			Dissolved Arsenic (As)	2019/02/13		101	%	80 - 120
			Dissolved Barium (Ba)	2019/02/13		100	%	80 - 120
			Dissolved Beryllium (Be)	2019/02/13		97	%	80 - 120
			Dissolved Boron (B)	2019/02/13		97	%	80 - 120
			Dissolved Cadmium (Cd)	2019/02/13		100	%	80 - 120
			Dissolved Calcium (Ca)	2019/02/13		96	%	80 - 120
			Dissolved Chromium (Cr)	2019/02/13		99	%	80 - 120
			Dissolved Cobalt (Co)	2019/02/13		103	%	80 - 120
			Dissolved Copper (Cu)	2019/02/13		101	%	80 - 120
			Dissolved Iron (Fe)	2019/02/13		101	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Lead (Pb)	2019/02/13		98	%	80 - 120
			Dissolved Magnesium (Mg)	2019/02/13		98	%	80 - 120
			Dissolved Manganese (Mn)	2019/02/13		100	%	80 - 120
			Dissolved Molybdenum (Mo)	2019/02/13		103	%	80 - 120
			Dissolved Nickel (Ni)	2019/02/13		96	%	80 - 120
			Dissolved Phosphorus (P)	2019/02/13		105	%	80 - 120
			Dissolved Potassium (K)	2019/02/13		103	%	80 - 120
			Dissolved Selenium (Se)	2019/02/13		99	%	80 - 120
			Dissolved Silicon (Si)	2019/02/13		100	%	80 - 120
			Dissolved Silver (Ag)	2019/02/13		96	%	80 - 120
			Dissolved Sodium (Na)	2019/02/13		97	%	80 - 120
			Dissolved Strontium (Sr)	2019/02/13		101	%	80 - 120
			Dissolved Thallium (Tl)	2019/02/13		100	%	80 - 120
			Dissolved Titanium (Ti)	2019/02/13		101	%	80 - 120
			Dissolved Uranium (U)	2019/02/13		93	%	80 - 120
			Dissolved Vanadium (V)	2019/02/13		96	%	80 - 120
			Dissolved Zinc (Zn)	2019/02/13		98	%	80 - 120
5972713	ADA	Method Blank	Dissolved Aluminum (Al)	2019/02/13	<5.0		ug/L	
			Dissolved Antimony (Sb)	2019/02/13	<0.50		ug/L	
			Dissolved Arsenic (As)	2019/02/13	<1.0		ug/L	
			Dissolved Barium (Ba)	2019/02/13	<2.0		ug/L	
			Dissolved Beryllium (Be)	2019/02/13	<0.50		ug/L	
			Dissolved Boron (B)	2019/02/13	<10		ug/L	
			Dissolved Cadmium (Cd)	2019/02/13	<0.10		ug/L	
			Dissolved Calcium (Ca)	2019/02/13	<200		ug/L	
			Dissolved Chromium (Cr)	2019/02/13	<5.0		ug/L	
			Dissolved Cobalt (Co)	2019/02/13	<0.50		ug/L	
			Dissolved Copper (Cu)	2019/02/13	<1.0		ug/L	
			Dissolved Iron (Fe)	2019/02/13	<100		ug/L	
			Dissolved Lead (Pb)	2019/02/13	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2019/02/13	<50		ug/L	
			Dissolved Manganese (Mn)	2019/02/13	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2019/02/13	<0.50		ug/L	
			Dissolved Nickel (Ni)	2019/02/13	<1.0		ug/L	
			Dissolved Phosphorus (P)	2019/02/13	<100		ug/L	
			Dissolved Potassium (K)	2019/02/13	<200		ug/L	
			Dissolved Selenium (Se)	2019/02/13	<2.0		ug/L	
			Dissolved Silicon (Si)	2019/02/13	<50		ug/L	
			Dissolved Silver (Ag)	2019/02/13	<0.10		ug/L	
			Dissolved Sodium (Na)	2019/02/13	<100		ug/L	
			Dissolved Strontium (Sr)	2019/02/13	<1.0		ug/L	
			Dissolved Thallium (Tl)	2019/02/13	<0.050		ug/L	
			Dissolved Titanium (Ti)	2019/02/13	<5.0		ug/L	
			Dissolved Uranium (U)	2019/02/13	<0.10		ug/L	
			Dissolved Vanadium (V)	2019/02/13	<0.50		ug/L	
			Dissolved Zinc (Zn)	2019/02/13	<5.0		ug/L	
5972713	ADA	RPD	Dissolved Aluminum (Al)	2019/02/13	NC		%	20
			Dissolved Antimony (Sb)	2019/02/13	NC		%	20
			Dissolved Arsenic (As)	2019/02/13	3.2		%	20
			Dissolved Barium (Ba)	2019/02/13	5.2		%	20
			Dissolved Beryllium (Be)	2019/02/13	NC		%	20
			Dissolved Boron (B)	2019/02/13	2.3		%	20
			Dissolved Cadmium (Cd)	2019/02/13	NC		%	20

QUALITY ASSURANCE REPORT(CONT'D)



QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Calcium (Ca)	2019/02/13	2.3		%	20
			Dissolved Chromium (Cr)	2019/02/13	NC		%	20
			Dissolved Cobalt (Co)	2019/02/13	NC		%	20
			Dissolved Copper (Cu)	2019/02/13	NC		%	20
			Dissolved Iron (Fe)	2019/02/13	2.7		%	20
			Dissolved Lead (Pb)	2019/02/13	NC		%	20
			Dissolved Magnesium (Mg)	2019/02/13	2.7		%	20
			Dissolved Manganese (Mn)	2019/02/13	3.0		%	20
			Dissolved Molybdenum (Mo)	2019/02/13	2.0		%	20
			Dissolved Nickel (Ni)	2019/02/13	7.0		%	20
			Dissolved Phosphorus (P)	2019/02/13	NC		%	20
			Dissolved Potassium (K)	2019/02/13	1.6		%	20
			Dissolved Selenium (Se)	2019/02/13	NC		%	20
			Dissolved Silicon (Si)	2019/02/13	1.8		%	20
			Dissolved Silver (Ag)	2019/02/13	NC		%	20
			Dissolved Sodium (Na)	2019/02/13	1.1		%	20
			Dissolved Strontium (Sr)	2019/02/13	3.2		%	20
			Dissolved Thallium (Tl)	2019/02/13	NC		%	20
			Dissolved Titanium (Ti)	2019/02/13	NC		%	20
			Dissolved Uranium (U)	2019/02/13	0.14		%	20
			Dissolved Vanadium (V)	2019/02/13	NC		%	20
			Dissolved Zinc (Zn)	2019/02/13	NC		%	20
5972927	C_N	Matrix Spike	Total Ammonia-N	2019/02/15		93	%	75 - 125
5972927	C_N	Spiked Blank	Total Ammonia-N	2019/02/15		102	%	80 - 120
5972927	C_N	Method Blank	Total Ammonia-N	2019/02/15	<0.050		mg/L	
5972927	C_N	RPD	Total Ammonia-N	2019/02/15	NC		%	20
5973400	C_N	Matrix Spike	Nitrite (N)	2019/02/15		99	%	80 - 120
			Nitrate (N)	2019/02/15		NC	%	80 - 120
5973400	C_N	Spiked Blank	Nitrite (N)	2019/02/15		101	%	80 - 120
			Nitrate (N)	2019/02/15		95	%	80 - 120
5973400	C_N	Method Blank	Nitrite (N)	2019/02/15	<0.010		mg/L	
			Nitrate (N)	2019/02/15	<0.10		mg/L	
5973400	C_N	RPD	Nitrite (N)	2019/02/15	0.31		%	20
			Nitrate (N)	2019/02/15	8.9		%	20
5973633	DRM	Matrix Spike	Dissolved Chloride (Cl-)	2019/02/14		NC	%	80 - 120
5973633	DRM	Spiked Blank	Dissolved Chloride (Cl-)	2019/02/14		103	%	80 - 120
5973633	DRM	Method Blank	Dissolved Chloride (Cl-)	2019/02/14	<1.0		mg/L	
5973633	DRM	RPD	Dissolved Chloride (Cl-)	2019/02/14	2.9		%	20
5973636	DRM	Matrix Spike	Dissolved Sulphate (SO4)	2019/02/14		NC	%	75 - 125
5973636	DRM	Spiked Blank	Dissolved Sulphate (SO4)	2019/02/14		104	%	80 - 120
5973636	DRM	Method Blank	Dissolved Sulphate (SO4)	2019/02/14	<1.0		mg/L	
5973636	DRM	RPD	Dissolved Sulphate (SO4)	2019/02/14	1.8		%	20
5973672	ADB	Matrix Spike	Orthophosphate (P)	2019/02/14		106	%	75 - 125
5973672	ADB	Spiked Blank	Orthophosphate (P)	2019/02/14		101	%	80 - 120
5973672	ADB	Method Blank	Orthophosphate (P)	2019/02/14	<0.010		mg/L	
5973672	ADB	RPD	Orthophosphate (P)	2019/02/14	NC		%	25
5974965	COP	Matrix Spike	Total Ammonia-N	2019/02/19		94	%	75 - 125
5974965	COP	Spiked Blank	Total Ammonia-N	2019/02/19		104	%	80 - 120
5974965	COP	Method Blank	Total Ammonia-N	2019/02/19	<0.050		mg/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC									
Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits	
5974965	COP	RPD	Total Ammonia-N	2019/02/19	NC		%	20	
<p>N/A = Not Applicable</p> <p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)</p> <p>NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).</p> <p>(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.</p>									

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

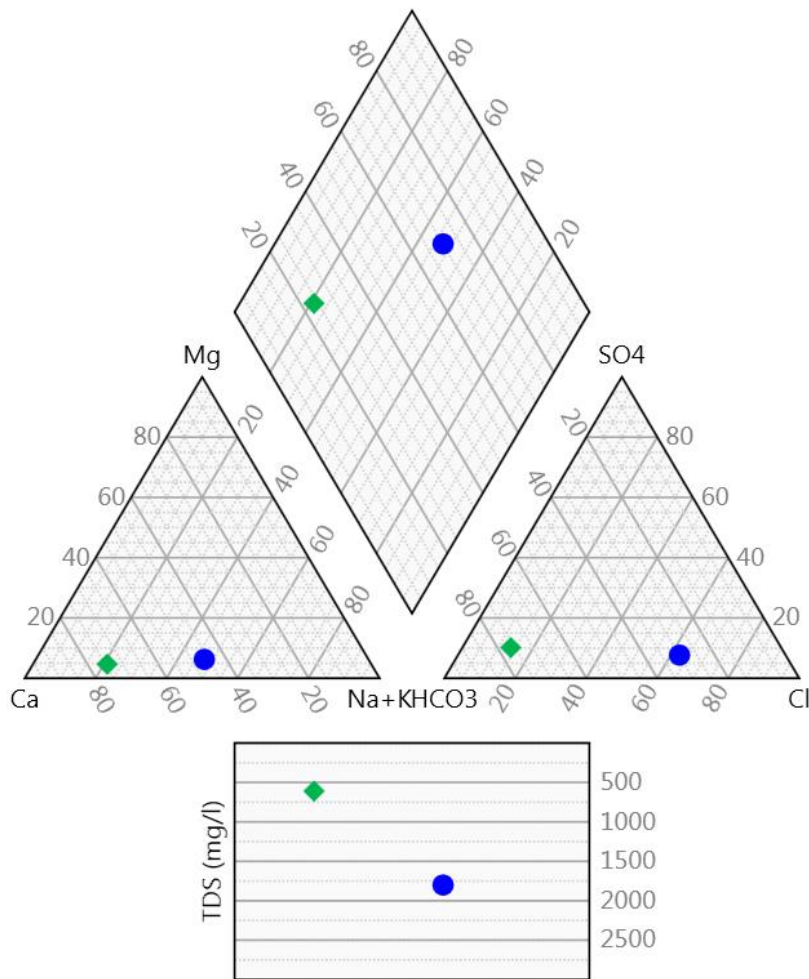
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GE-00085 - 952 Southdale Road

Piper Diagram

LEGEND

- ◆ PZ202
- MW6



Certificate of Analysis

LDS Consultants Inc. (London)

15875 Robins Hill Road, Unit 1
London, ON N5V 0A5
Attn: Rebecca Walker

Client PO:
Project: GE-00085
Custody: 61751

Report Date: 7-Jul-2021
Order Date: 29-Jun-2021

Order #: 2127383

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2127383-01	BH5 deep
2127383-02	BH6
2127383-03	PZ202 Shallow
2127383-04	BH303 Shallow
2127383-05	Surface

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 07-Jul-2021

Client: LDS Consultants Inc. (London)

Order Date: 29-Jun-2021

Client PO:

Project Description: GE-00085

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, bicarbonate	calculated from EPA 310.1 - Titration to pH 4.5	2-Jul-21	2-Jul-21
Alkalinity, carbonate	calculated from EPA 310.1 - Titration to pH 4.5	2-Jul-21	2-Jul-21
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	2-Jul-21	2-Jul-21
Ammonia, as N	EPA 351.2 - Auto Colour	30-Jun-21	5-Jul-21
Anion Sum	Calculated	7-Jul-21	7-Jul-21
Nitrate + Nitrite as N	calculated from EPA 300.1 - IC	30-Jun-21	1-Jul-21
Anions	EPA 300.1 - IC	30-Jun-21	1-Jul-21
Cation Sum	Calculated	7-Jul-21	7-Jul-21
Conductivity	EPA 9050A- probe @25 °C	2-Jul-21	2-Jul-21
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	30-Jun-21	30-Jun-21
Hardness	Hardness as CaCO ₃	2-Jul-21	2-Jul-21
Ion Balance	Calculated	7-Jul-21	7-Jul-21
Langeliers Index	Calculated	7-Jul-21	7-Jul-21
Metals, ICP-MS	EPA 200.8 - ICP-MS	2-Jul-21	2-Jul-21
pH	EPA 150.1 - pH probe @25 °C	2-Jul-21	2-Jul-21
Saturation pH, calculated	Calculated	7-Jul-21	7-Jul-21
Solids total dissolved, calculated	Calculated	7-Jul-21	7-Jul-21

Certificate of Analysis

Report Date: 07-Jul-2021

Client: LDS Consultants Inc. (London)

Order Date: 29-Jun-2021

Client PO:

Project Description: GE-00085

Client ID:	BH5 deep	BH6	PZ202 Shallow	BH303 Shallow
Sample Date:	29-Jun-21 12:00	29-Jun-21 12:00	29-Jun-21 12:00	29-Jun-21 12:00
Sample ID:	2127383-01	2127383-02	2127383-03	2127383-04
MDL/Units	Water	Water	Water	Water

Calculated Parameters

	MDL/Units	BH5 deep	BH6	PZ202 Shallow	BH303 Shallow
Anion Sum	0.01 mEq/L	7.54	68.8	3.45	13.3
Cation Sum	0.01 mEq/L	7.12	64.7	3.14	9.21
Ion balance	0.1 %	-2.9	-3.1	-4.6	-18 [2]
Solids, total dissolved - calc.	10.0 mg/L	362	3810	176	607
Langlier Index	0.01 S.I.	0.78	0.47	-0.43	0.69
Saturation pH	0.10 pH Units	6.92	6.70	7.83	6.91

General Inorganics

	MDL/Units	BH5 deep	BH6	PZ202 Shallow	BH303 Shallow
Alkalinity, total	5 mg/L	343	344	114	358
Hardness	mg/L	334	1040	102	437
Alkalinity, bicarbonate	5 mg/L	342	343	113	357
Alkalinity, carbonate	5 mg/L	<5	<5	<5	<5
Ammonia as N	0.01 mg/L	0.12	0.23	0.22	0.05
Dissolved Organic Carbon	0.5 mg/L	2.5	5.0	14.1	2.7
Conductivity	5 uS/cm	717	7760	540	1380
pH	0.1 pH Units	7.7	7.2	7.4	7.6

Anions

	MDL/Units	BH5 deep	BH6	PZ202 Shallow	BH303 Shallow
Chloride	1 mg/L	13	2170	40	188
Nitrate as N	0.1 mg/L	1.3	<0.1	<0.1	1.3
Nitrite as N	0.05 mg/L	<0.05	<1.00 [1]	<0.05	<0.05
Nitrate + Nitrite as N	0.150 mg/L	1.32	-	<0.150	1.33
Nitrate + Nitrite as N	1.10 mg/L	-	<1.10	-	-
Phosphate as P	0.2 mg/L	<0.2	<0.2	<0.2	<0.2
Sulphate	1 mg/L	11	34	2	37

Metals

	MDL/Units	BH5 deep	BH6	PZ202 Shallow	BH303 Shallow
Aluminum	1 ug/L	4	5	259	4
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	<1	<1	2	<1
Barium	1 ug/L	41	372	21	102
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	25	20	26	26
Cadmium	0.1 ug/L	<0.1	0.2	<0.1	<0.1
Calcium	100 ug/L	102000	339000	35400	119000
Chromium	1 ug/L	<1	<1	<1	<1
Cobalt	0.5 ug/L	<0.5	0.8	<0.5	<0.5
Copper	0.5 ug/L	1.2	1.5	1.2	0.8

Certificate of Analysis

Report Date: 07-Jul-2021

Client: LDS Consultants Inc. (London)

Order Date: 29-Jun-2021

Client PO:

Project Description: GE-00085

	Client ID: Sample Date: Sample ID:	BH5 deep 29-Jun-21 12:00 2127383-01 Water	BH6 29-Jun-21 12:00 2127383-02 Water	PZ202 Shallow 29-Jun-21 12:00 2127383-03 Water	BH303 Shallow 29-Jun-21 12:00 2127383-04 Water
	MDL/Units				
Iron	100 ug/L	<100	<100	843	<100
Lead	0.1 ug/L	<0.1	<0.1	0.5	<0.1
Magnesium	200 ug/L	19600	47700	3230	33900
Manganese	5 ug/L	<5	760	265	53
Molybdenum	0.5 ug/L	<0.5	<0.5	<0.5	1.2
Nickel	1 ug/L	<1	4	<1	<1
Potassium	100 ug/L	681	5140	3650	2280
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	9560	1000000	23500	9420
Strontium	10 ug/L	169	793	75	223
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Tin	5 ug/L	<5	<5	<5	<5
Titanium	5 ug/L	<5	<5	6	<5
Tungsten	10 ug/L	<10	<10	<10	<10
Uranium	0.1 ug/L	0.6	2.1	0.2	2.5
Vanadium	0.5 ug/L	<0.5	0.7	1.0	<0.5
Zinc	5 ug/L	<5	6	<5	<5

Certificate of Analysis

Report Date: 07-Jul-2021

Client: LDS Consultants Inc. (London)

Order Date: 29-Jun-2021

Client PO:

Project Description: GE-00085

Client ID:	Surface	-	-	-
Sample Date:	29-Jun-21 12:00	-	-	-
Sample ID:	2127383-05	-	-	-
MDL/Units	Water	-	-	-

Calculated Parameters

Anion Sum	0.01 mEq/L	3.51	-	-	-
Cation Sum	0.01 mEq/L	3.39	-	-	-
Ion balance	0.1 %	-1.7	-	-	-
Solids, total dissolved - calc.	10.0 mg/L	181	-	-	-
Langlier Index	0.01 S.I.	0.05	-	-	-
Saturation pH	0.10 pH Units	7.75	-	-	-

General Inorganics

Alkalinity, total	5 mg/L	122	-	-	-
Hardness	mg/L	112	-	-	-
Alkalinity, bicarbonate	5 mg/L	122	-	-	-
Alkalinity, carbonate	5 mg/L	<5	-	-	-
Ammonia as N	0.01 mg/L	0.15	-	-	-
Dissolved Organic Carbon	0.5 mg/L	11.8	-	-	-
Conductivity	5 uS/cm	400	-	-	-
pH	0.1 pH Units	7.8	-	-	-

Anions

Chloride	1 mg/L	36	-	-	-
Nitrate as N	0.1 mg/L	<0.1	-	-	-
Nitrite as N	0.05 mg/L	<0.05	-	-	-
Nitrate + Nitrite as N	0.150 mg/L	<0.150	-	-	-
Phosphate as P	0.2 mg/L	<0.2	-	-	-
Sulphate	1 mg/L	2	-	-	-

Metals

Aluminum	1 ug/L	7	-	-	-
Antimony	0.5 ug/L	<0.5	-	-	-
Arsenic	1 ug/L	1	-	-	-
Barium	1 ug/L	22	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-
Boron	10 ug/L	27	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-
Calcium	100 ug/L	37700	-	-	-
Chromium	1 ug/L	<1	-	-	-
Cobalt	0.5 ug/L	<0.5	-	-	-
Copper	0.5 ug/L	2.1	-	-	-
Iron	100 ug/L	<100	-	-	-

Certificate of Analysis

Report Date: 07-Jul-2021

Client: LDS Consultants Inc. (London)

Order Date: 29-Jun-2021

Client PO:

Project Description: GE-00085

	Client ID:	Surface	-	-	-
	Sample Date:	29-Jun-21 12:00	-	-	-
	Sample ID:	2127383-05	-	-	-
	MDL/Units	Water	-	-	-
Lead	0.1 ug/L	<0.1	-	-	-
Magnesium	200 ug/L	4250	-	-	-
Manganese	5 ug/L	128	-	-	-
Molybdenum	0.5 ug/L	<0.5	-	-	-
Nickel	1 ug/L	<1	-	-	-
Potassium	100 ug/L	2560	-	-	-
Selenium	1 ug/L	<1	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-
Sodium	200 ug/L	25300	-	-	-
Strontium	10 ug/L	73	-	-	-
Thallium	0.1 ug/L	<0.1	-	-	-
Tin	5 ug/L	<5	-	-	-
Titanium	5 ug/L	<5	-	-	-
Tungsten	10 ug/L	<10	-	-	-
Uranium	0.1 ug/L	0.1	-	-	-
Vanadium	0.5 ug/L	<0.5	-	-	-
Zinc	5 ug/L	5	-	-	-

Certificate of Analysis

Report Date: 07-Jul-2021

Client: LDS Consultants Inc. (London)

Order Date: 29-Jun-2021

Client PO:

Project Description: GE-00085

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Phosphate as P	ND	0.2	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Alkalinity, total	ND	5	mg/L						
Alkalinity, bicarbonate	ND	5	mg/L						
Alkalinity, carbonate	ND	5	mg/L						
Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Conductivity	ND	5	uS/cm						
Metals									
Aluminum	ND	1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Calcium	ND	100	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Iron	ND	100	ug/L						
Lead	ND	0.1	ug/L						
Magnesium	ND	200	ug/L						
Manganese	ND	5	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Potassium	ND	100	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Strontium	ND	10	ug/L						
Thallium	ND	0.1	ug/L						
Tin	ND	5	ug/L						
Titanium	ND	5	ug/L						
Tungsten	ND	10	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						

Certificate of Analysis

Report Date: 07-Jul-2021

Client: LDS Consultants Inc. (London)

Order Date: 29-Jun-2021

Client PO:

Project Description: GE-00085

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	516	5	mg/L	504			2.3	10	
Nitrate as N	0.98	0.1	mg/L	0.96			2.2	10	
Nitrite as N	ND	0.05	mg/L	ND			NC	10	
Phosphate as P	ND	0.2	mg/L	ND			NC	10	
Sulphate	113	1	mg/L	111			2.2	10	
General Inorganics									
Alkalinity, total	338	5	mg/L	343			1.6	14	
Alkalinity, bicarbonate	336	5	mg/L	342			1.6	14	
Alkalinity, carbonate	ND	5	mg/L	ND			NC	14	
Ammonia as N	0.112	0.01	mg/L	0.113			1.2	18	
Dissolved Organic Carbon	2.6	0.5	mg/L	2.7			1.8	37	
Conductivity	330	5	uS/cm	338			2.4	5	
pH	7.8	0.1	pH Units	7.8			0.3	3.3	
Metals									
Aluminum	564	1	ug/L	600			6.3	20	
Antimony	1.03	0.5	ug/L	0.70			NC	20	
Arsenic	1.4	1	ug/L	1.3			6.1	20	
Barium	18.5	1	ug/L	18.1			2.2	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	28	10	ug/L	27			3.3	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Calcium	34000	100	ug/L	33100			2.8	20	
Chromium	1.0	1	ug/L	1.0			0.6	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	3.83	0.5	ug/L	3.97			3.4	20	
Iron	673	100	ug/L	651			3.3	20	
Lead	0.68	0.1	ug/L	0.59			14.8	20	
Magnesium	6220	200	ug/L	5510			12.0	20	
Manganese	64.5	5	ug/L	62.4			3.2	20	
Molybdenum	8.32	0.5	ug/L	7.82			6.3	20	
Nickel	2.9	1	ug/L	2.0			NC	20	
Potassium	3350	100	ug/L	3250			2.9	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	10900	200	ug/L	10700			1.7	20	
Strontium	462	10	ug/L	444			4.0	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Tin	ND	5	ug/L	ND			NC	20	
Titanium	12.4	5	ug/L	14.3			14.1	20	
Tungsten	ND	10	ug/L	ND			NC	20	
Uranium	1.0	0.1	ug/L	0.9			10.3	20	
Vanadium	1.86	0.5	ug/L	2.02			7.9	20	
Zinc	11	5	ug/L	11			0.7	20	

Certificate of Analysis

Report Date: 07-Jul-2021

Client: LDS Consultants Inc. (London)

Order Date: 29-Jun-2021

Client PO:

Project Description: GE-00085

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	44.5	1	mg/L	36.3	81.8	77-123			
Nitrate as N	1.90	0.1	mg/L	0.96	94.2	79-120			
Nitrite as N	0.990	0.05	mg/L	ND	99.0	84-117			
Phosphate as P	5.67	0.2	mg/L	ND	113	59-141			
Sulphate	119	1	mg/L	111	76.9	74-126			
General Inorganics									
Ammonia as N	0.355	0.01	mg/L	0.113	96.8	81-124			
Dissolved Organic Carbon	13.4	0.5	mg/L	2.7	108	60-133			
Metals									
Aluminum	53.9	1	ug/L	ND	108	80-120			
Antimony	41.1	0.5	ug/L	0.70	80.7	80-120			
Arsenic	40.2	1	ug/L	ND	80.5	80-120			
Barium	60.6	1	ug/L	18.1	84.9	80-120			
Beryllium	39.7	0.5	ug/L	ND	79.2	80-120			QM-07
Boron	42	10	ug/L	ND	83.1	80-120			
Cadmium	47.9	0.1	ug/L	ND	95.8	80-120			
Calcium	7970	100	ug/L	ND	79.7	80-120			QS-02
Chromium	47.0	1	ug/L	1.0	91.9	80-120			
Cobalt	46.2	0.5	ug/L	ND	91.5	80-120			
Copper	47.7	0.5	ug/L	3.97	87.6	80-120			
Lead	40.8	0.1	ug/L	0.59	80.4	80-120			
Magnesium	8030	200	ug/L	ND	80.3	80-120			
Manganese	105	5	ug/L	62.4	85.6	80-120			
Molybdenum	55.6	0.5	ug/L	7.82	95.5	80-120			
Nickel	46.1	1	ug/L	2.0	88.1	80-120			
Selenium	44.6	1	ug/L	ND	89.2	80-120			
Silver	41.0	0.1	ug/L	ND	81.9	80-120			
Strontium	48	10	ug/L	ND	95.8	80-120			
Thallium	42.1	0.1	ug/L	ND	84.0	80-120			
Tin	43.3	5	ug/L	ND	86.0	80-120			
Titanium	57.1	5	ug/L	14.3	85.6	80-120			
Tungsten	47.7	10	ug/L	ND	95.0	80-120			
Uranium	44.6	0.1	ug/L	0.9	87.5	80-120			
Vanadium	48.3	0.5	ug/L	2.02	92.7	80-120			
Zinc	47	5	ug/L	ND	94.7	80-120			

Certificate of Analysis

Report Date: 07-Jul-2021

Client: **LDS Consultants Inc. (London)**

Order Date: 29-Jun-2021

Client PO:

Project Description: **GE-00085**

Qualifier Notes:

- 1 : Elevated detection limit because of dilution required due to the presence of high levels of non-target analytes.
- 2 : Ion balance calculation is greater than typically accepted limits. Major cation and ion results have been confirmed by re-analysis. The high result is likely due to matrix effects or elevated components not normally included in the calculation.

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

QS-02 : Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated



Client Name: **LDS Consultants**
 Contact Name: **Rebecca Walker**
 Address: **15875 Robins Hill Rd**
 Telephone:

Project Ref: **GE-00085**
 Quote #: **LDS Consultants Water Quality Package**
 PO #:
 E-mail:

Page **1** of **1**
 Turnaround Time
 1 day 3 day
 2 day Regular
 Date Required:

REG 153/04		REG 406/19		Other Regulation		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)			Required Analysis				
<input type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	<input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG,558	<input type="checkbox"/> PWQO	<input type="checkbox"/> CCME	<input type="checkbox"/> MISA							
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Comm	<input type="checkbox"/> Coarse	<input type="checkbox"/> SU - Sani	<input type="checkbox"/> SU - Storm									
<input type="checkbox"/> Table 3	<input type="checkbox"/> Agri/Other		Mun: _____										
For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Other:											
Sample ID/Location Name						Matrix	Air Volume	# of Containers	Sample Taken		Date		Time
1	BH 5 deep					GW		6	June 29, 2021		PM		
2	BH 6					GW		6					
3	202 s												
4	PZ 202 shallow					GW		6					
5	PZ 203 shallow					GW		6					
6	surface					SW		6					
7													
8													
9													
10													

Comments: **- all bottles were field filtered.**

Method of Delivery: **Walk-in**

Relinquished By (Sign): **Rob Walker** Received By (Driver/Depot): **[Signature]** Received at Lab: **Suneeper** Verified By: **Dohman**

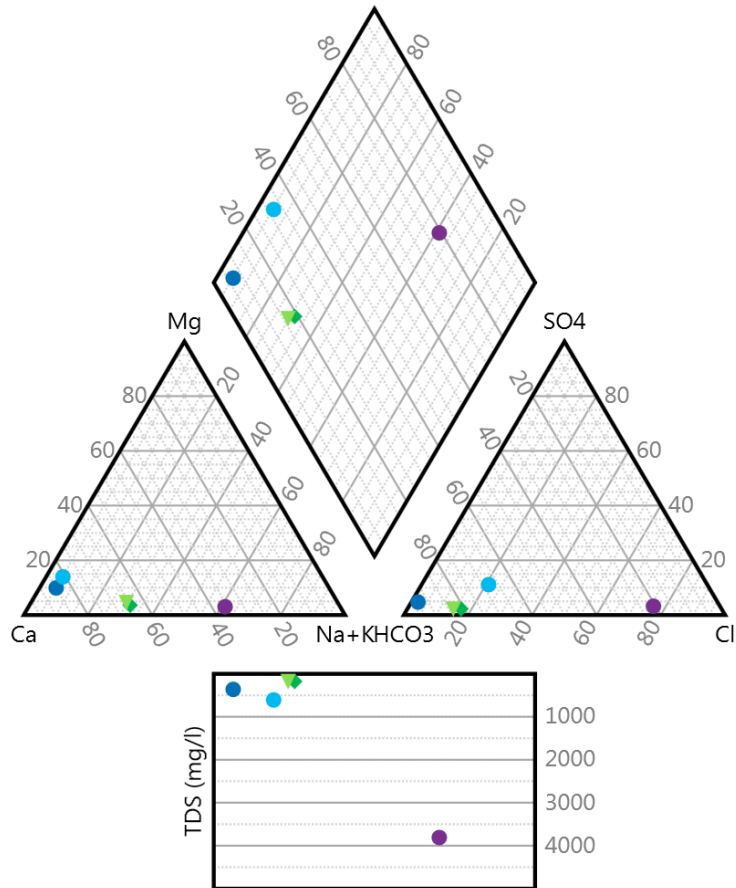
Relinquished By (Print): **Rob Walker** Date/Time: **29 JUN-2021 16:00** Date/Time: **JUN 30, 2021 10:36** Date/Time: **11:35 JUN 30 2021**

Date/Time: **June 29, 2021** Temperature: **18** °C Temperature: **7.3** °C pH Verified: **[Signature]** By:

Piper Diagram – 07/07/2021 Water Samples

GE-00085 952 Southdale Road, London

Piper Diagram



LEGEND

- BH5 deep
- BH6
- ◆ PZ202 Shallow
- BH303 Shallow
- ▼ Surface

APPENDIX F

MECP Well Records

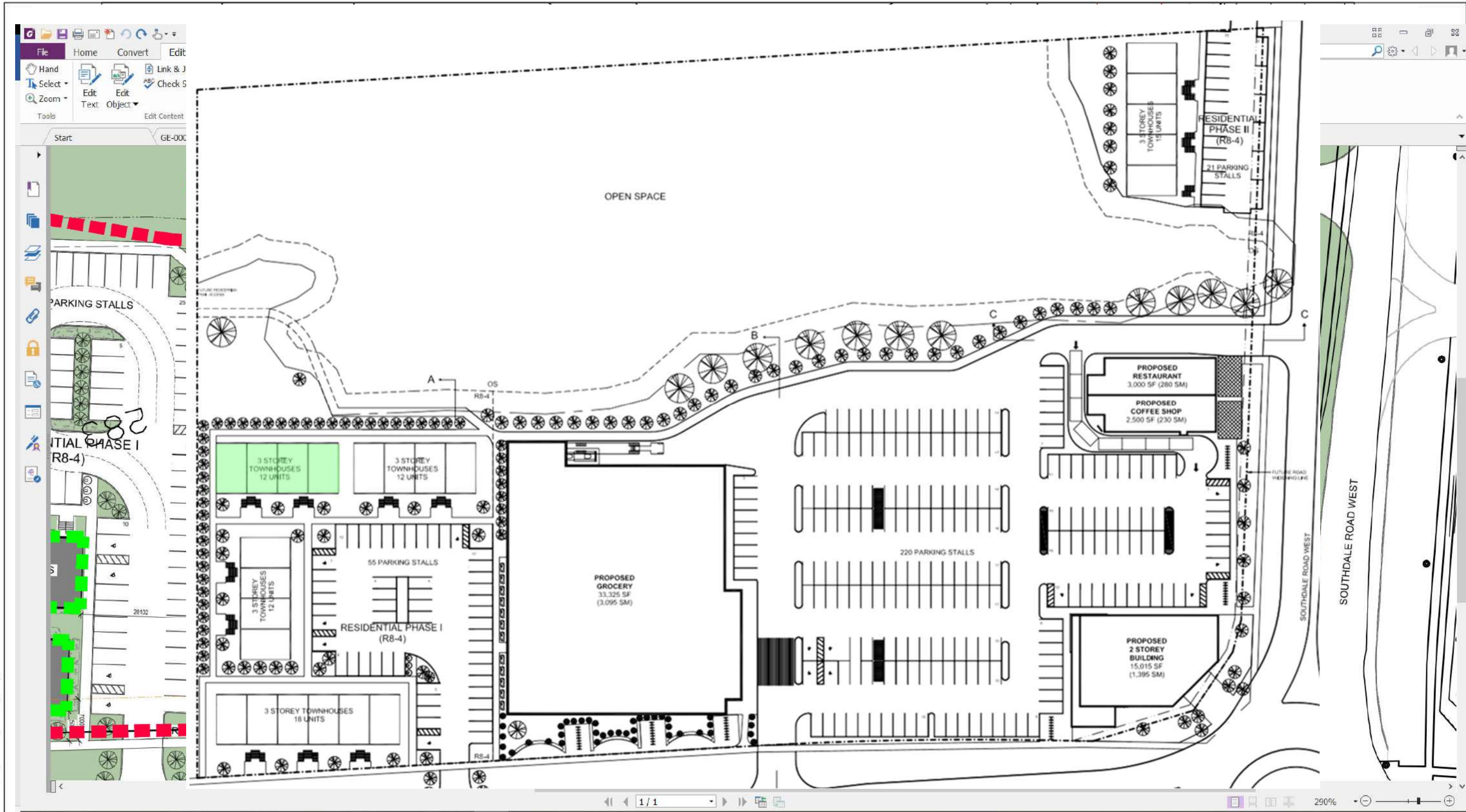
SUMMARY OF MECP WELL RECORDS

MECP Well ID	Completion Date	Type	Depth of Well (m)	Water Found (m)	Static Level (m)	Pump Rate (L/min)	Northing, m N	Easting, m E
4103401	08/07/1966	Water Supply	70.1	56.7	47.5	11.4	4754063.00	474133.50
4103403	06/08/1959	Water Supply	66.4	64.6	59.7	26.6	4753983.00	473938.50
4105170	04/09/1970	Water Supply	41.5	39.0	35.4	38.0	4753803.00	474673.50
7118093	09/05/2008	Water Supply	68.9	55.8	54.9	57.0	4753989.78	473945.97
7276717	30/11/2016	Water Supply	68.3	61.6	55.2	68.4	4754073.00	473681.00
7103981	12/03/2008	Observation Wells	6.5	NR	NR	NR	4754065.00	474199.00
7146806	19/02/2010	Observation Wells	6.1	NR	NR	NR	4754393.00	474418.00
7193997	11/12/2012	Observation Wells	NR	NR	NR	NR	4754435.00	474387.00
7197509	09/01/2013	Observation Wells	6.1	NR	NR	NR	4754345.00	474395.00
4116132	29/06/2005	Abandoned-Other	62.8	NR	NR	NR	4754057.00	473890.00
7152898	09/09/2010	Abandoned-Other	56.4	NR	NR	NR	4754161.00	473931.00
7196001	04/01/2013	Abandoned-Other	37.2	NR	NR	NR	4753699.00	474108.00
4114929	21/01/2002		NR	NR	NR	NR	4753626.00	474204.00
4114930	21/01/2002		NR	NR	NR	NR	4753628.00	474202.00
4114931	21/01/2002		NR	NR	NR	NR	4753628.00	474203.00

Refer to Drawing 7, in Appendix A for MECP Well Location Plan

APPENDIX G

Water Balance Worksheets



 PROPOSED CATCHMENT
 ROOFTOPS TO BE INFILTRATED

101 CATCHMENT ID
 9.961
 AREA (ha) % IMPERVIOUS

POST DEVELOPMENT CONDITIONS
 PROJECT: GE-00085 SCALE: N.T.S. FIGURE 2



Site Parameters		Month	Pre Development Condition												
			Temperature °C	Precipitation (mm)	Actual Evapotranspiration (mm)	Adjusted ET (mm)	Soil Storage (mm)	Surplus Water (mm)	Potential Infiltration (mm)	Actual infiltration		Potential Runoff (mm)	Actual Runoff		
										depth (mm)	Volume (m ³)		depth (mm)	Volume (m ³)	
Area (ha):	4.1	January	-6.4	72.48	8.72	8.72	390.25	63.76	25.50	0.00	0.00	38.26	0.00	0.00	
Impervious	0%	February	-5.5	59.84	10.44	10.44	392.03	49.39	19.76	0.00	0.00	29.64	0.00	0.00	
Soil Type	C	March	-0.4	76.67	20.14	20.14	393.89	56.52	22.61	0.00	0.00	33.91	0.00	0.00	
Soil Moisture Capacity (mm)	400	April	6.4	81.57	37.43	37.43	396.57	44.14	17.66	91.94	3732.61	26.48	100.76	4091.03	
Total Meadow Area, C101 (ha):	2.59	May	13.1	82.73	69.78	69.78	392.18	12.95	5.18	29.94	1215.56	7.77	106.65	4329.99	
Total Wetland/Forest Area, C102(ha):	1.47	June	18.0	85.72	98.94	98.94	372.73	-13.23	-5.29	0.00	0.00	-7.94	0.00	0.00	
INFILTRATION FACTOR		July	20.5	80.91	112.12	112.12	335.58	-31.21	-12.48	0.00	0.00	-18.72	0.00	0.00	
Topography factor	0.1	August	19.6	82.25	89.15	89.15	324.38	-6.90	-2.76	0.00	0.00	-4.14	0.00	0.00	
Soils Factor	0.15	September	15.3	97.33	54.17	54.17	342.63	43.16	17.27	17.27	700.96	25.90	25.90	1051.44	
Cover Factor	0.15	October	9.1	81.48	30.74	30.74	368.94	50.73	20.29	20.29	823.88	30.44	30.44	1235.81	
Total INFIL Factor	0.4	November	3.3	95.32	16.23	16.23	392.56	79.08	31.63	31.63	1284.33	47.45	47.45	1926.50	Check
		December	-3.0	88.03	10.10	10.10	396.91	77.93	31.17	0.00	0.00	46.76	0.00	0.00	P=ET+I+R
		Total:		984.31	557.971875	557.97			170.54	191.07	7,757.34	255.80	311.20	12,634.77	984.31

Site Parameters		Month	Post Development Condition												
			Temperature °C	Precipitation (mm)	Actual Evapotranspiration (mm)	Adjusted ET (mm)	Soil Storage (mm)	Surplus Water (mm)	Potential Infiltration (mm)	Actual infiltration		Potential Runoff (mm)	Actual Runoff		
										depth (mm)	Volume (m ³)		depth (mm)	Volume (m ³)	
Area (ha):	4.1	January	-6.4	72.48	8.72	8.72	384.26	63.76	30.60	0.00	0.00	33.15	0.00	0.00	
Impervious	0%	February	-5.5	59.84	10.44	10.44	388.88	49.39	23.71	0.00	0.00	25.68	0.00	0.00	
Soil Type	C	March	-0.4	76.67	20.14	20.14	393.24	56.52	27.13	0.00	0.00	29.39	0.00	0.00	
Soil Moisture Capacity (mm)	400	April	6.4	81.57	37.43	37.43	395.78	44.14	21.19	110.33	4479.36	22.95	87.33	3545.73	
Total C201 Area (ha):	1.77	May	13.1	82.73	69.66	69.66	386.49	13.06	6.27	35.98	1460.95	6.79	71.17	2889.61	
Total C202 Area (ha):	1.47	June	18.0	85.72	98.15	98.15	356.01	-12.43	-5.97	0.00	0.00	-6.47	0.00	0.00	
Total C203 Area (ha):	0.27	July	20.5	80.91	108.93	108.93	311.31	-28.02	-13.45	0.00	0.00	-14.57	0.00	0.00	
Total C204 Area (ha):	0.55	August	19.6	82.25	85.44	85.44	290.75	-3.19	-1.53	0.00	0.00	-1.66	0.00	0.00	
INFILTRATION FACTOR		September	15.3	97.33	52.97	52.97	306.24	44.36	21.29	21.29	1005.01	23.07	23.07	936.52	
Topography factor	0.1	October	9.1	81.48	30.53	30.53	333.71	50.94	24.45	24.45	1154.11	26.49	26.49	1075.46	
Soils Factor	0.15	November	3.3	95.32	16.23	16.23	370.49	79.08	37.96	37.96	1791.74	41.12	41.12	1669.63	Check
Cover Factor	0.1	December	-3.0	88.03	10.09	10.09	386.44	77.94	37.41	0.00	0.00	40.53	0.00	0.00	P=ET+I+R
Total INFIL Factor	0.35	Total:		984.31	548.75	548.75			209.07	230.02	9,891.16	226.49	249.19	10,116.94	984.31

Summary	Units	Notes
Runoff	2,517.83	m ³
Infiltration	2,133.82	m ³



General Assumptions

- Infiltration factor is applied to surplus water
- When surplus is negative, moisture is drawn from the soil
- No Infiltration or runoff in winter months (<0°C)
- Winter runoff volumes is runoff in April (50%) and May (50%)
- Winter infiltration volumes infiltrated in April (75%), and May (25%)
- Actual ET is adjusted based on increased evaporation from the pond surface, (pond area noted above)
- 25mm event represents 90% of annual runoff.
- To increase flows contributing to the local wetland additional runoff will be redirected
 - 20% of Post development runoff will be added to the infiltration total
 - This represents the runoff from select rooftops (C204, area = 0.55ha)

Infiltration Factors

TOPOGRAPHY	Flat Land, average slope < 0.6 m/km (<0.1%)	0.30
	Rolling Land, average slope 2.8 m to 3.8 m/km (0.3%)	0.20
	Hilly Land, average slope 28 m to 47 m/km (5%)	0.10
SOILS	Fine sand	0.40
	Fine sandy loam	0.30
	Silt loam	0.20
	Clay loam	0.15
	Clay	0.10
COVER	Urban lawns / Shallow rooted crops	0.05
	Moderately rooted crops	0.10
	Pasture and shrubs	0.15
	Mature forest	0.20

† Infiltration factors after Ontario Ministry of the Environment, 2003. Stormwater Management Planning and Design Manual. March 2003.

LDS CONSULTANTS INC.

15875 Robins Hill Road, Unit 1
London, Ontario N5V 0A5

www.ldsconsultants.ca



952 Southdale Road

Tree Preservation Report

Project Location:

952 Southdale Road, London, ON

Prepared for:

Westdell Development Corporation
782 Richmond Street, London, ON

Prepared by:

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June 19, 2020

MTE File No.: 45606-100





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1.0 Introduction

MTE Consultants Inc. (MTE) was retained by Westdell Development Corporation to complete the Tree Preservation Report for the proposed type development to be constructed 952 Southdale Road in the City of London [Figure 1].

Located at the intersection of Colonel Talbot Road and Southdale Road, the property is bounded to the north by an asparagus farm, and to the east by part of the North Talbot Wetlands PSW and the Buttonbush Swamp-South ESA. Current land use is agriculture. Further information on the development can be found in the Environmental Impact Study Report (MTE 2020).

The existing conditions and tree preservation details for the site are illustrated on the enclosed MTE drawings: TP1 and TP2.

Figure 1.0 – Site Location (1:2500)



2.0 Criteria

This report has been prepared to conform to the City of London ‘Tree Protection By-law C.P.-1515-228 – Passed August 30, 2016, Consolidated as of July 25, 2017.

3.0 Tree Inventory

On June 10, 2020 a total of 29 trees were reviewed for this Tree Preservation Report along the north property limit of the site. Trees along the east boundary of the development lands are treated as a single group as they are in a wooded setting and will be protected from the development by the 5m buffer to the North Talbot Wetlands PSW boundary.

The most dominant species on site is Black Walnut (*Juglans nigra*). Other native species found on the development lands include Sugar Maple (*Acer saccharum*), Bitternut Hickory (*Carya cordiformis*), Hawthorn (*Crataegus sp.*) and Black Cherry (*Prunus serotina*). [Table 3.1].

No trees within the development lands were found to be wildlife trees or bat habitat trees.

Table 3.1: Tree Inventory

Tree No.	DBH (cm)	Botanical Name	Common Name	Notes	Recommendation
1	65	<i>Acer saccharum</i>	Sugar Maple	50% decline. Near hydro pole	remove
2	48	<i>Juglans nigra</i>	Black Walnut	construction conflict	remove
3	32	<i>Juglans nigra</i>	Black Walnut	construction conflict	remove
4	66	<i>Juglans nigra</i>	Black Walnut	co-dominant 2-stem	remove
5	43	<i>Juglans nigra</i>	Black Walnut	30% decline	retain
6	36	<i>Juglans nigra</i>	Black Walnut	co-dominant 3-stem	retain
7	12	<i>Carya cordiformis</i>	Bitternut Hickory	good vigour	retain
8	11	<i>Carya cordiformis</i>	Bitternut Hickory	healthy tree	retain
9	10	<i>Juglans nigra</i>	Black Walnut	healthy tree	retain
10	12	<i>Crataegus species</i>	Hawthorn	healthy tree	retain
11	27	<i>Juglans nigra</i>	Black Walnut	40% decline	remove
12	56	<i>Carya cordiformis</i>	Bitternut Hickory	construction conflict	remove
13	54	<i>Juglans nigra</i>	Black Walnut	construction conflict	remove
14	11	<i>Crataegus species</i>	Hawthorn	construction conflict	remove
15	11	<i>Acer saccharum</i>	Sugar Maple	healthy tree	retain
16	11	<i>Carya cordiformis</i>	Bitternut Hickory	construction conflict	remove
17	32	<i>Juglans nigra</i>	Black Walnut	10% decline	retain
18	17	<i>Juglans nigra</i>	Black Walnut	construction conflict	remove
19	41	<i>Juglans nigra</i>	Black Walnut	construction conflict	remove
20	10	<i>Carya cordiformis</i>	Bitternut Hickory	healthy tree	retain
21	11	<i>Crataegus species</i>	Hawthorn	construction conflict	remove
22	11	<i>Crataegus species</i>	Hawthorn	construction conflict	remove
23	22	<i>Prunus serotina</i>	Black Cherry	construction conflict	remove
24	60	<i>Acer saccharum</i>	Sugar Maple	20% decline but good tree	retain

Tree No.	DBH (cm)	Botanical Name	Common Name	Notes	Recommendation
25	37	Juglans nigra	Black Walnut	healthy tree	retain
26	14	Acer saccharum	Sugar Maple	healthy tree	retain
27	38	Juglans nigra	Black Walnut	healthy tree	retain
28	46	Juglans nigra	Black Walnut	healthy tree	retain
29	19	Juglans nigra	Black Walnut	healthy tree	retain

4.0 Development Proposal

The proposed development will be multi-family residential in the north part of the site and commercial in the south part of the site. Half of the trees surveyed are in good health and can be preserved during development. Trees 1, 11 and 23 are in declining health and are candidates for removal. Tree 1 is exhibiting severe decline, possibly from increased road salt spray resultant from increased traffic on Colonel Talbot Road. Trees 11 and 23 are also exhibiting canopy decline due to unknown circumstances. Trees 1-29 are located on and/or near the shared property line with 2574 Colonel Talbot Road to the north. The owner of 2574 Colonel Talbot Road must be notified prior to any tree removals along this property line. Trees 2, 3, 4, 12, 13, 14, 16, 18, 19, 21, 22, and 23 will be within the proposed grading envelope for the development and are also candidates for removal.

5.0 Tree Protection Measures

5.1 Standard Protection Measures

The contractor shall meet with the consultant on site prior to commencing operations to review tree protection requirements and mark the Tree Protection Zone (TPZ). Tree protection measures shall be in accordance with Section 12 of the City of London Design Specifications & Requirements Manual.

Overall tree protection measures shall be implemented prior to any tree removals, land clearing, demolition, excavation, construction or grading operations within 30m of the TPZ. The TPZ shall be established according to the Tree Preservation Plans (TP2). The TPZ shall be delineated by tree protection fencing which shall be 1.2m high, orange vinyl snow fencing secured at 2.4m intervals with 2.0m high iron T-posts driven 0.60m into the ground or an approved alternate. A 2X4 wood top-rail will be affixed at either end to the T-post.

The consultant shall be contacted to inspect the tree protection fencing once it has been installed and prior to any further site works.

During construction, no equipment, materials or tools shall be stored within the TPZ.

Unless noted otherwise, tree protection fencing shall remain in place until all construction work is completed. The consultant shall be contacted should work within the TPZ be required for any reason during the development process.

The consultant shall be informed if any temporary haul or access roads must pass over the root area of trees to remain. A road bed of mulch shall be installed and maintained to a depth of 15cm to prevent compaction of the root zone. Access should be limited or restricted in periods of high soil moisture.

Any damage to trees to remain that may happen as a result of demolition or construction related operations shall be reported to the consultant as soon as possible so that appropriate treatments can be applied.

Care shall be taken to avoid damaging any trees on neighbouring properties.

Tree tags shall be removed from all trees to remain when tree protection measures are removed.

5.2 Tree Removals

Trees shall be felled so as to fall outside of the TPZ.

Trees to be removed which have branches extending into the canopies of trees to remain should be removed by a qualified arborist. The arborist shall remove trees in such a way as to not injure trees in the TPZ or the remaining understory.

Trees shall be removed and disposed of off-site.

In order to comply with the Migratory Birds Convention Act, tree removals should not occur within the migratory bird breeding season (May 1-August 31) without prior clearance from a qualified biologist.

5.3 Pruning

All pruning (if applicable) shall be completed by a qualified arborist.

Pruning cuts greater than 10cm, except for dead wood, shall be avoided.

If temporary access is needed, branches shall be tied back to hold them out of the clearance zone.

5.4 Excavations

Excavations at the edge of the TPZ may be conducted carefully using a backhoe or excavator until roots greater than 4cm in diameter are encountered. Any roots greater than 4cm in diameter should be exposed using less invasive methods (hand shoveling, air spade, hydro-excavating) and cut cleanly, by hand with clean tools. Care should be taken to avoid exposing excess root mass of trees to remain.

Any roots >4cm in diameter, which may be damaged during excavations shall be exposed to sound tissue and cut cleanly with a saw.

Exposed roots should be backfilled or covered as soon as possible. In hot, dry weather, when roots may be exposed for even a short period of time, it may be necessary to periodically wet exposed roots to prevent them drying out.

6.0 Conclusions and Recommendations

Based on the proposed development plan, it is concluded that:

- i. fourteen trees within the developable lands will be removed to accommodate the development; and
- ii. 15 trees within the developable lands will be preserved as part of the development; and
- iii. all trees within the ESA on the east side of the site will be preserved

It is recommended that:

- iv. the tree preservation fencing be installed according to the location and details shown on the enclosed tree preservation drawings; and
- v. consideration be given to adjusting the sidewalk locations to reduce impacts to and ultimately preserve trees along the north property line; and
- vi. tree preservation fencing be inspected by MTE Consultants Inc. prior to and during construction to ensure that it is working properly

All of which is respectfully submitted,

MTE Consultants Inc.



Will Huys

ISA Certified Arborist ON-1183A
519-204-6510 ext. 2246
whuys@mte85.com

WLH:

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KEY PLAN N.T.S.

NOTE TO CONTRACTOR :
 DO NOT SCALE DRAWINGS.
 CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE DESIGNER BEFORE PROCEEDING WITH THE WORK.
 ALL DRAWINGS REMAIN THE PROPERTY OF THE DESIGNER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE DESIGNER'S WRITTEN PERMISSION.
 THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

1	FOR 1st SUBMISSION	WLH	17/06/20
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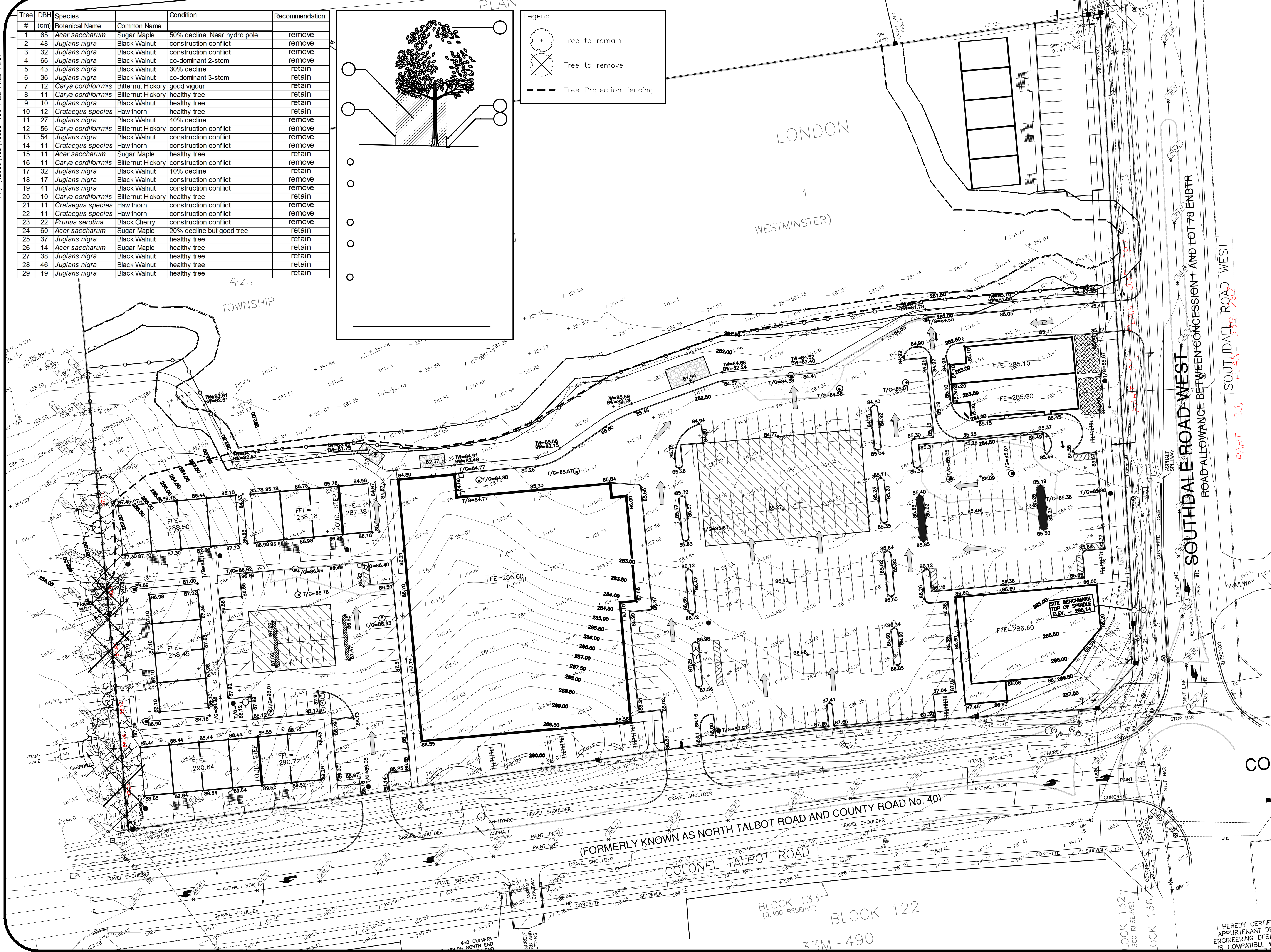
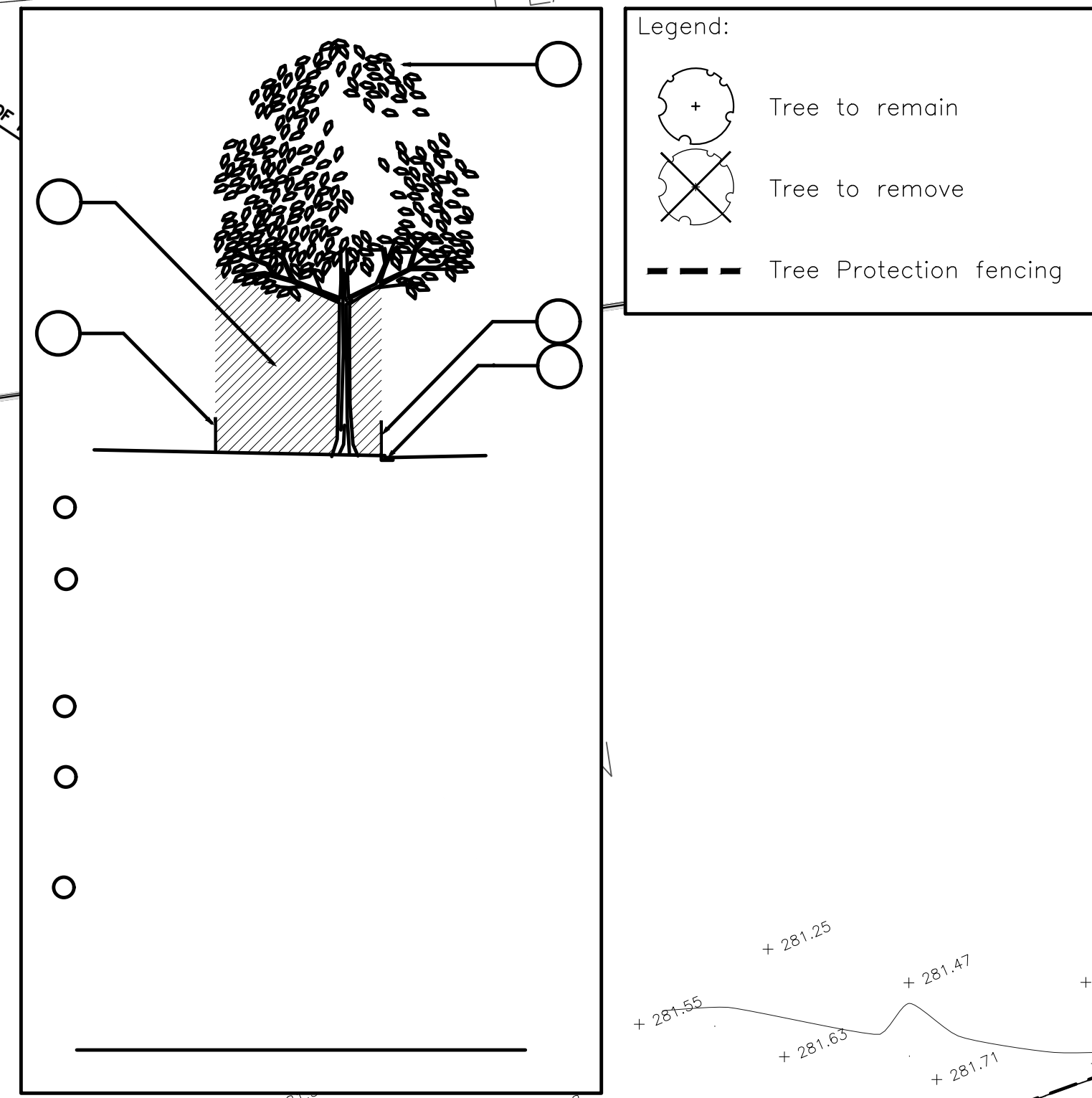
Tree #	DBH (cm)	Species	Botanical Name	Common Name	Condition	Recommendation
1	65	Acer saccharum	Acer saccharum	Sugar Maple	50% decline. Near hydro pole	remove
2	48	Juglans nigra	Juglans nigra	Black Walnut	construction conflict	remove
3	32	Juglans nigra	Juglans nigra	Black Walnut	construction conflict	remove
4	66	Juglans nigra	Juglans nigra	Black Walnut	co-dominant 2-stem	remove
5	43	Juglans nigra	Juglans nigra	Black Walnut	30% decline	retain
6	36	Juglans nigra	Juglans nigra	Black Walnut	co-dominant 3-stem	retain
7	12	Carya cordiformis	Carya cordiformis	Bitternut Hickory	good vigour	retain
8	11	Carya cordiformis	Carya cordiformis	Bitternut Hickory	healthy tree	retain
9	10	Juglans nigra	Juglans nigra	Black Walnut	healthy tree	retain
10	12	Crataegus species	Crataegus species	Haw thorn	healthy tree	retain
11	27	Juglans nigra	Juglans nigra	Black Walnut	40% decline	remove
12	56	Carya cordiformis	Carya cordiformis	Bitternut Hickory	construction conflict	remove
13	54	Juglans nigra	Juglans nigra	Black Walnut	construction conflict	remove
14	11	Crataegus species	Crataegus species	Haw thorn	construction conflict	remove
15	11	Acer saccharum	Acer saccharum	Sugar Maple	healthy tree	retain
16	11	Carya cordiformis	Carya cordiformis	Bitternut Hickory	construction conflict	remove
17	32	Juglans nigra	Juglans nigra	Black Walnut	10% decline	retain
18	17	Juglans nigra	Juglans nigra	Black Walnut	construction conflict	remove
19	41	Juglans nigra	Juglans nigra	Black Walnut	construction conflict	remove
20	10	Carya cordiformis	Carya cordiformis	Bitternut Hickory	healthy tree	retain
21	11	Crataegus species	Crataegus species	Haw thorn	construction conflict	remove
22	11	Crataegus species	Crataegus species	Haw thorn	construction conflict	remove
23	22	Prunus serotina	Prunus serotina	Black Cherry	construction conflict	remove
24	60	Acer saccharum	Acer saccharum	Sugar Maple	20% decline but good tree	retain
25	37	Juglans nigra	Juglans nigra	Black Walnut	healthy tree	retain
26	14	Acer saccharum	Acer saccharum	Sugar Maple	healthy tree	retain
27	38	Juglans nigra	Juglans nigra	Black Walnut	healthy tree	retain
28	46	Juglans nigra	Juglans nigra	Black Walnut	healthy tree	retain
29	19	Juglans nigra	Juglans nigra	Black Walnut	healthy tree	retain

EXISTING CONDITIONS PLAN

Project Manager	WLH	Project No.	45606-100
Design By	WLH	Checked By	WLH
Drawn By	WLH	Checked By	WLH
Surveyed By		Drawing No.	TP1
Date	Jun.11/20		
Scale	1:400	Sheet	1 of 2

P:\P\45606\100\45606-100 TREE PRES PLAN

Tree #	DBH (cm)	Species	Common Name	Condition	Recommendation
1	65	<i>Acer saccharum</i>	Sugar Maple	50% decline. Near hydro pole	remove
2	48	<i>Juglans nigra</i>	Black Walnut	construction conflict	remove
3	32	<i>Juglans nigra</i>	Black Walnut	construction conflict	remove
4	66	<i>Juglans nigra</i>	Black Walnut	co-dominant 2-stem	remove
5	43	<i>Juglans nigra</i>	Black Walnut	30% decline	retain
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24	60	<i>Acer saccharum</i>	Sugar Maple	20% decline but good tree	retain
25	37	<i>Juglans nigra</i>	Black Walnut	healthy tree	retain
26	14	<i>Acer saccharum</i>	Sugar Maple	healthy tree	retain
27	38	<i>Juglans nigra</i>	Black Walnut	healthy tree	retain
28	46	<i>Juglans nigra</i>	Black Walnut	healthy tree	retain
29	19	<i>Juglans nigra</i>	Black Walnut	healthy tree	retain



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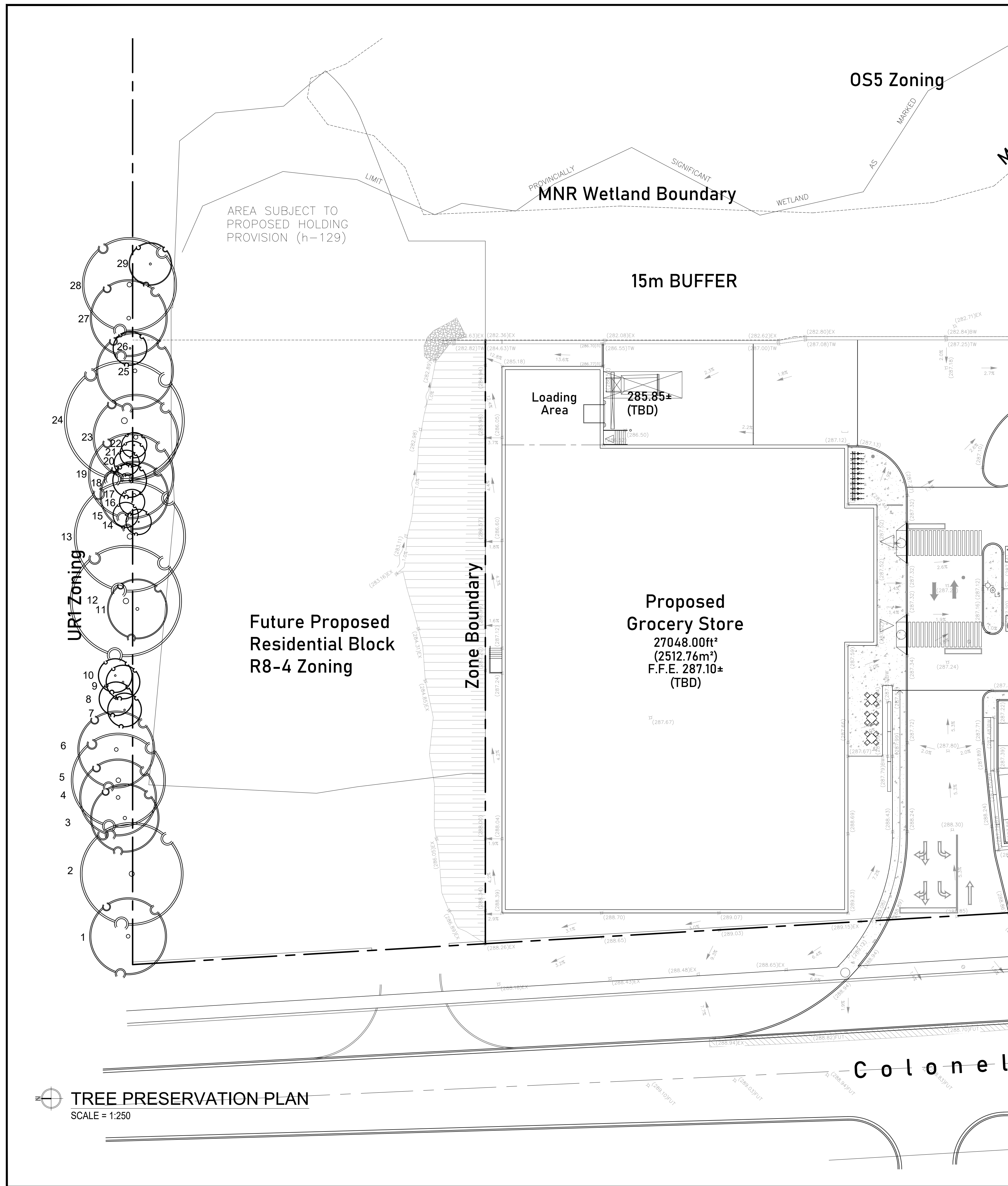
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DRAWING		TREE PRESERVATION PLAN	
Project Manager	WLH	Project No.	45606-100
Design By	WLH	Checked By	WLH
Drawn By	WLH	Checked By	WLH
Surveyed By		Drawing No.	TP2
Date	Jun.11/20		
Scale	1:400		
		Sheet 2 of 2	

PRELIMINARY



CONSTRUCTION IMPACT MITIGATION RECOMMENDATIONS

PRE-CONSTRUCTION RECOMMENDATIONS

- a) PRIOR TO ANY CONSTRUCTION ACTIVITY, TREE PRESERVATION FENCING IS TO BE INSTALLED AS PER THE ATTACHED TREE PRESERVATION DRAWINGS AND DETAIL.
- b) TREES APPROVED FOR REMOVAL ARE TO BE CLEARLY INDICATED IN THE FIELD (MARKED WITH SPRAY PAINT OR OTHER AGREED UPON METHOD) BY THE PROJECT ARBORIST OR LANDSCAPE ARCHITECT PRIOR TO ANY TREE REMOVAL OPERATIONS. ALL REMOVALS TO BE UNDERTAKEN BY AN ISA CERTIFIED ARBORIST.
- c) IN ACCORDANCE WITH THE MIGRATORY BIRDS CONVENTION ACT, 1994, ALL REMOVALS MUST TAKE PLACE BETWEEN SEPTEMBER 1ST AND MARCH 31ST TO AVOID DISTURBING NESTING MIGRATORY BIRDS. IF TREE REMOVAL OCCURS BETWEEN APRIL 1ST AND AUGUST 31ST, A BIOLOGIST IS REQUIRED TO COMPLETE A SEARCH FOR NESTS. ONCE CLEARED, THE CONTRACTOR HAS 48 HOURS TO REMOVE. IF REMOVAL DOES NOT OCCUR WITHIN 48 HOURS, ANOTHER SEARCH WILL BE REQUIRED.
- d) CARE SHOULD BE TAKEN DURING THE FELLING OPERATION TO AVOID DAMAGING THE BRANCHES, STEMS, TRUNKS, AND ROOTS OF NEARBY TREES TO BE PRESERVED. WHERE POSSIBLE, ALL TREES ARE TO BE FELLED TOWARDS THE CONSTRUCTION ZONE TO MINIMIZE IMPACTS ON ADJACENT VEGETATION. ALL REMOVALS TO BE UNDERTAKEN BY AN ISA CERTIFIED ARBORIST.
- e) IT IS RECOMMENDED THAT THE EXISTING GROUND-LAYER VEGETATION AT THE BASE OF TREES TO BE PRESERVED REMAIN INTACT WITHIN THE CRITICAL ROOT ZONE SO AS NOT TO DISTURB THE SOIL AROUND THE BASE OF THE EXISTING TREES.
- f) FINAL SITE GRADING PLANS SHOULD ENSURE THAT THE EXISTING SOIL MOISTURE CONDITIONS ARE MAINTAINED.

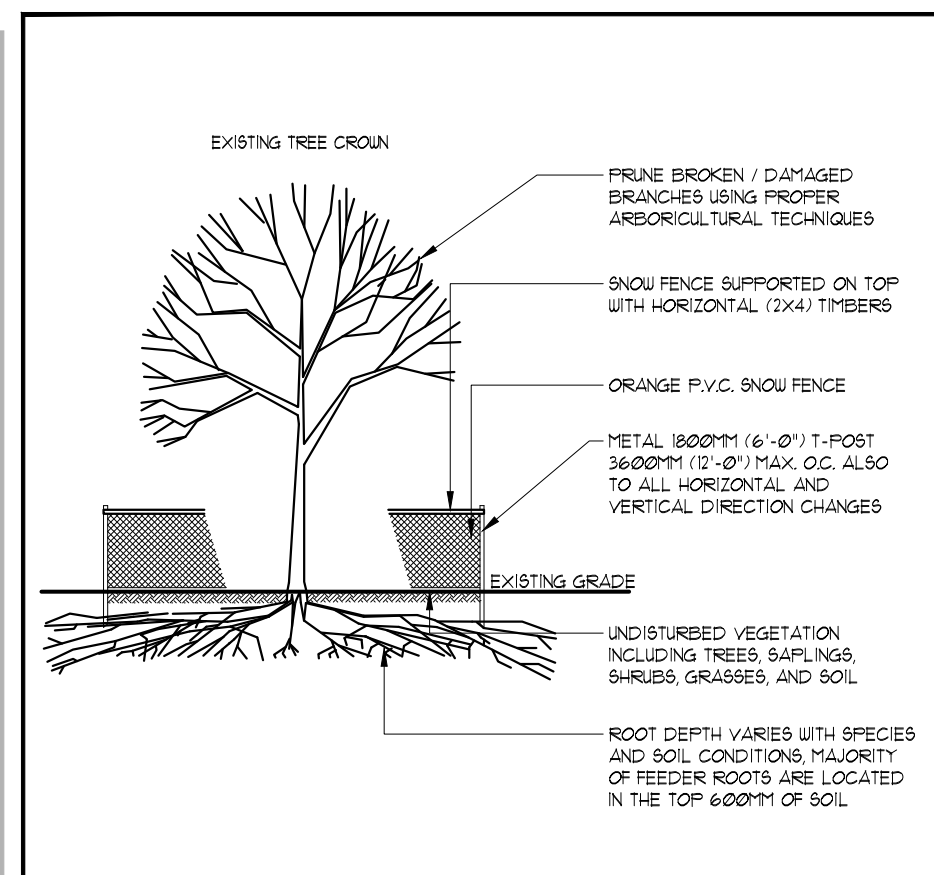
RECOMMENDATIONS RELATED TO THE CONSTRUCTION PROCESS

- a) TREE PRESERVATION FENCING IS TO BE MAINTAINED IN GOOD CONDITION AND EFFECTIVE FOR THE DURATION OF CONSTRUCTION UNTIL ALL CONSTRUCTION ACTIVITY IS COMPLETE OR AS PER THE PROJECT ARBORIST OR LANDSCAPE ARCHITECT.
- b) TREE PRESERVATION FENCING IS TO REMAIN INTACT AS PER THE TREE PRESERVATION DRAWINGS, AND CAN ONLY BE TEMPORARILY REMOVED WITH THE EXPRESS WRITTEN CONSENT FROM THE PROJECT ARBORIST OR LANDSCAPE ARCHITECT. SHOULD TREE PRESERVATION FENCING BE TEMPORARILY RELOCATED OR MOVED, IT IS TO BE REINSTATED AS PER THE TREE PRESERVATION PLANS AS SOON AS POSSIBLE.
- c) NO CONSTRUCTION, EXCAVATION, ADDING OF FILL, STOCKPILING OF CONSTRUCTION MATERIAL, OR HEAVY EQUIPMENT IS PERMITTED WITHIN THE CRITICAL ROOT ZONE WITHIN THE TREE PRESERVATION FENCING.
- d) WHEN EXCAVATION NEAR A TREE IS REQUIRED, AND IT IS ANTICIPATED THAT ROOTS WILL BE SEVERED AND EXPOSED, DURATION OF EXPOSURE IS TO BE MINIMIZED TO PREVENT ROOT DESICCATION.
- e) DURING THE EXCAVATION PROCESS, ROOTS 75MM OR LARGER THAT ARE SEVERED AND EXPOSED SHOULD BE HAND PRUNED TO LEAVE A CLEAN-CUT SURFACE. TO BE UNDERTAKEN BY AN ISA CERTIFIED ARBORIST. EXPOSED SEVERED ROOTS THAT CANNOT BE COVERED IN SOIL ON THE SAME DAY AS THE CUTS ARE MADE ARE TO BE KEPT MOIST. EXPOSED ROOTS ARE TO BE KEPT MOIST BY COVERING THEM WITH WATER SOAKED BURLAP OR ANY OTHER MEANS AVAILABLE TO PREVENT THEM FROM DRYING OUT.
- f) AVOID IDLING HEAVY EQUIPMENT UNDER OR WITHIN CLOSE PROXIMITY TO TREES TO BE PRESERVED TO PREVENT CANOPY DAMAGE FROM EXPOSURE TO THE HEAT OF THE EXHAUST.
- g) BROKEN BRANCHES ON TREES WITHIN THE SUBJECT SITE TO BE PRESERVED SHOULD BE CLEANLY CUT AS SOON AS POSSIBLE AFTER THE DAMAGE HAS OCCURRED, TO BE UNDERTAKEN BY AN ISA CERTIFIED ARBORIST. SHOULD BRANCHES ON CITY OWNED TREES BE DAMAGED BY OR DURING CONSTRUCTION, THE CONTRACTOR IS TO NOTIFY CITY OF LONDON FORESTRY OPERATIONS AS SOON AS POSSIBLE. NO PERSON(S) OTHER THAN CITY STAFF OR THE CITY'S DESIGNATED CONTRACTOR MAY PERFORM WORK ON ANY CITY TREE.

POST-CONSTRUCTION RECOMMENDATIONS

- a) AVOID DISCHARGING RAIN WATER LEADERS ADJACENT TO RETAINED TREES, AS THIS MAY RESULT IN AN OVERLY MOIST ENVIRONMENT WHICH CAN CAUSE ROOT ROT.
- b) AFTER ALL WORK IS COMPLETED, TREE PRESERVATION FENCES AND ANY OTHER IMPACT MITIGATION PARAPHERNALIA MUST BE REMOVED.
- c) A FINAL REVIEW MUST BE UNDERTAKEN BY THE PROJECT ARBORIST TO ENSURE THAT ALL MITIGATION MEASURES AS DESCRIBED ABOVE HAVE BEEN MET.

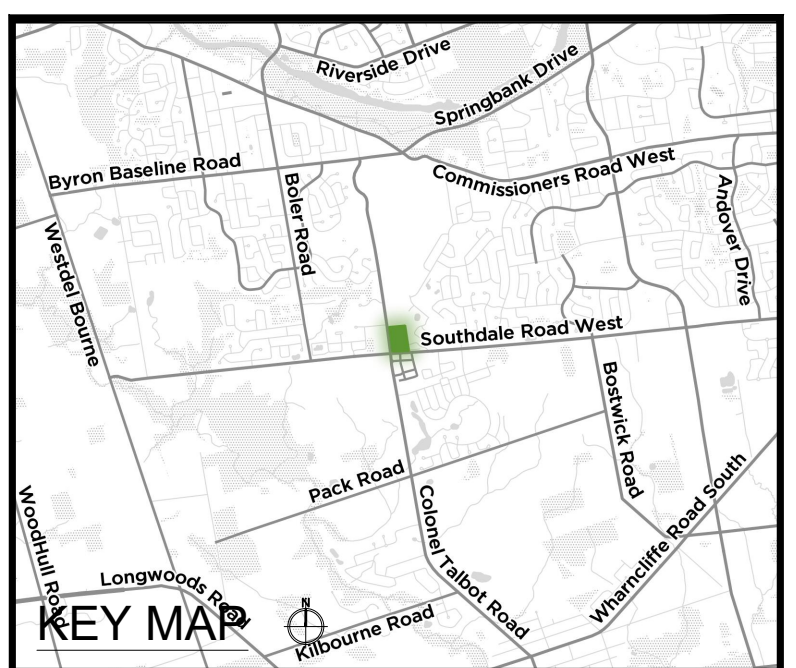
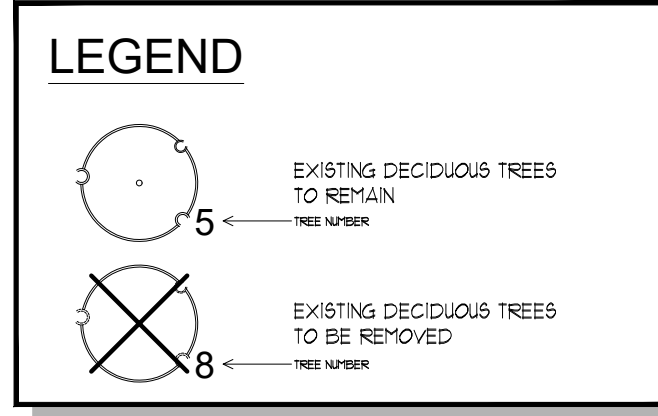
GENERAL INFORMATION			SIZE		HEALTH		RECOMMENDATION	
ID #	BOTANICAL NAME	COMMON NAME	DGH (cm)	CANOPY RADIUS (m)	CROWN CONDITION	COMMENTS	PROPOSED ACTION	RATIONALE
1	<i>Acer saccharum</i>	Sugar Maple	65	5	3	Near hydro pole	preserve	NA
2	<i>Asplens nigra</i>	Black Walnut	48	6	5	Co-dominant 2-stem	preserve	NA
3	<i>Asplens nigra</i>	Black Walnut	32	4	5		preserve	NA
4	<i>Asplens nigra</i>	Black Walnut	66	5	5	Co-dominant 3-stem	preserve	NA
5	<i>Asplens nigra</i>	Black Walnut	45	6	4	good vigour	preserve	NA
6	<i>Asplens nigra</i>	Black Walnut	36	5	5		preserve	NA
7	<i>Carya carolinensis</i>	Bitternut Hickory	12	2	5		preserve	NA
8	<i>Carya carolinensis</i>	Bitternut Hickory	11	2	5		preserve	NA
9	<i>Asplens nigra</i>	Black Walnut	10	2	5		preserve	NA
10	<i>Castanopsis</i> sp.	Hawthorn	12	2	5		preserve	NA
11	<i>Asplens nigra</i>	Black Walnut	27	4	3		preserve	NA
12	<i>Carya carolinensis</i>	Bitternut Hickory	56	7	5		preserve	NA
13	<i>Asplens nigra</i>	Black Walnut	54	7	5		preserve	NA
14	<i>Castanopsis</i> sp.	Hawthorn	11	2	5		preserve	NA
15	<i>Acer saccharum</i>	Sugar Maple	11	2	5		preserve	NA
16	<i>Carya carolinensis</i>	Bitternut Hickory	11	2	5		preserve	NA
17	<i>Asplens nigra</i>	Black Walnut	32	4	4		preserve	NA
18	<i>Asplens nigra</i>	Black Walnut	17	2	5		preserve	NA
19	<i>Asplens nigra</i>	Black Walnut	41	5	5		preserve	NA
20	<i>Carya carolinensis</i>	Bitternut Hickory	10	2	5		preserve	NA
21	<i>Castanopsis</i> sp.	Hawthorn	11	2	5		preserve	NA
22	<i>Castanopsis</i> sp.	Hawthorn	11	2	5		preserve	NA
23	<i>Prunus serotina</i>	Cherry Black	22	5	5		preserve	NA
24	<i>Acer saccharum</i>	Sugar Maple	60	7	4	20% decline but good tree	preserve	NA
25	<i>Asplens nigra</i>	Black Walnut	37	5	5		preserve	NA
26	<i>Acer saccharum</i>	Sugar Maple	14	2	5		preserve	NA
27	<i>Asplens nigra</i>	Black Walnut	38	5	5		preserve	NA
28	<i>Asplens nigra</i>	Black Walnut	46	6	5		preserve	NA
29	<i>Asplens nigra</i>	Black Walnut	19	3	5		preserve	NA



NOTES:

- EXISTING TREES ARE TO BE PROTECTED FROM CONSTRUCTION WITH THE INSTALLATION OF A 1000MM (4'-0") HIGH SNOW FENCE HELD IN PLACE WITH 3600MM (12'-0") T-BAR.
- THE BARRIER IS TO BE INSTALLED PRIOR TO ANY CONSTRUCTION AND MUST REMAIN IN PLACE UNTIL ALL CONSTRUCTION IS COMPLETED.
- ALL SUPPORTS AND BRACINGS SHOULD BE INSIDE THE TREE PROTECTION ZONE. ALL SUCH SUPPORTS SHOULD MINIMIZE DAMAGING ROOTS IN THE TREE PROTECTION ZONE.
- NO CONSTRUCTION ACTIVITY, GRADE CHANGES, SURFACE TREATMENT, OR EXCAVATION OF ANY KIND IS PERMITTED WITHIN THE TREE PROTECTION ZONE.
- NO MOVEMENT OF EQUIPMENT, STORAGE OF BUILDING SUPPLIES, CLEANING OR EQUIPMENT, OR DUMPING OF SOLVENTS, GASOLINE, ETC. MAY OCCUR WITHIN THIS FENCE LINE.
- WHERE HIGH QUALITY STRENGTHS OCCUR ADJACENT TO AREAS SUBJECTED TO INTENSIVE CONSTRUCTION ACTIVITY, WOODEN CRIBBING SHOULD BE INSTALLED TO PROTECT TRUNKS FROM DAMAGE IN THE EVENT THAT HEAVY EQUIPMENT BREAKS DOWN THE SNOW FENCING. FENCE TO BE INSPECTED BY ENVIRONMENTAL CONSULTANT ON A REGULAR BASIS AND BE MAINTAINED BY THE SUBDIVIDER / BUILDER.

TEMP. TREE PROTECTION BARRIER - N.T.S.



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THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION OR TENDER PURPOSES UNLESS SIGNED AND DATED BY BARRY R. MURPHY, O.A.L.A. C.S.L.A. LANDSCAPE ARCHITECT, LONDON, ONTARIO (519) 667-3322.

Barry R. Murphy, O.A.L.A. C.S.L.A. DATE



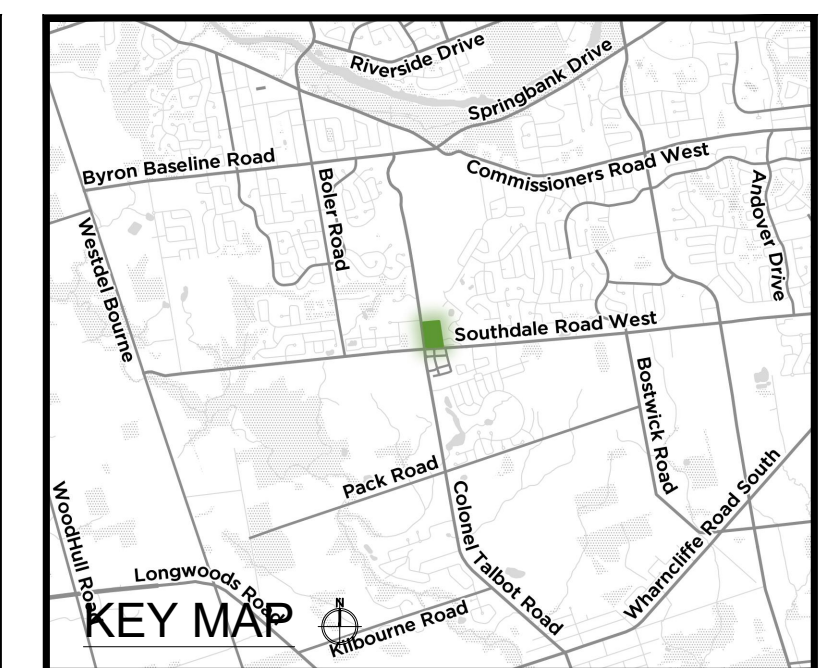
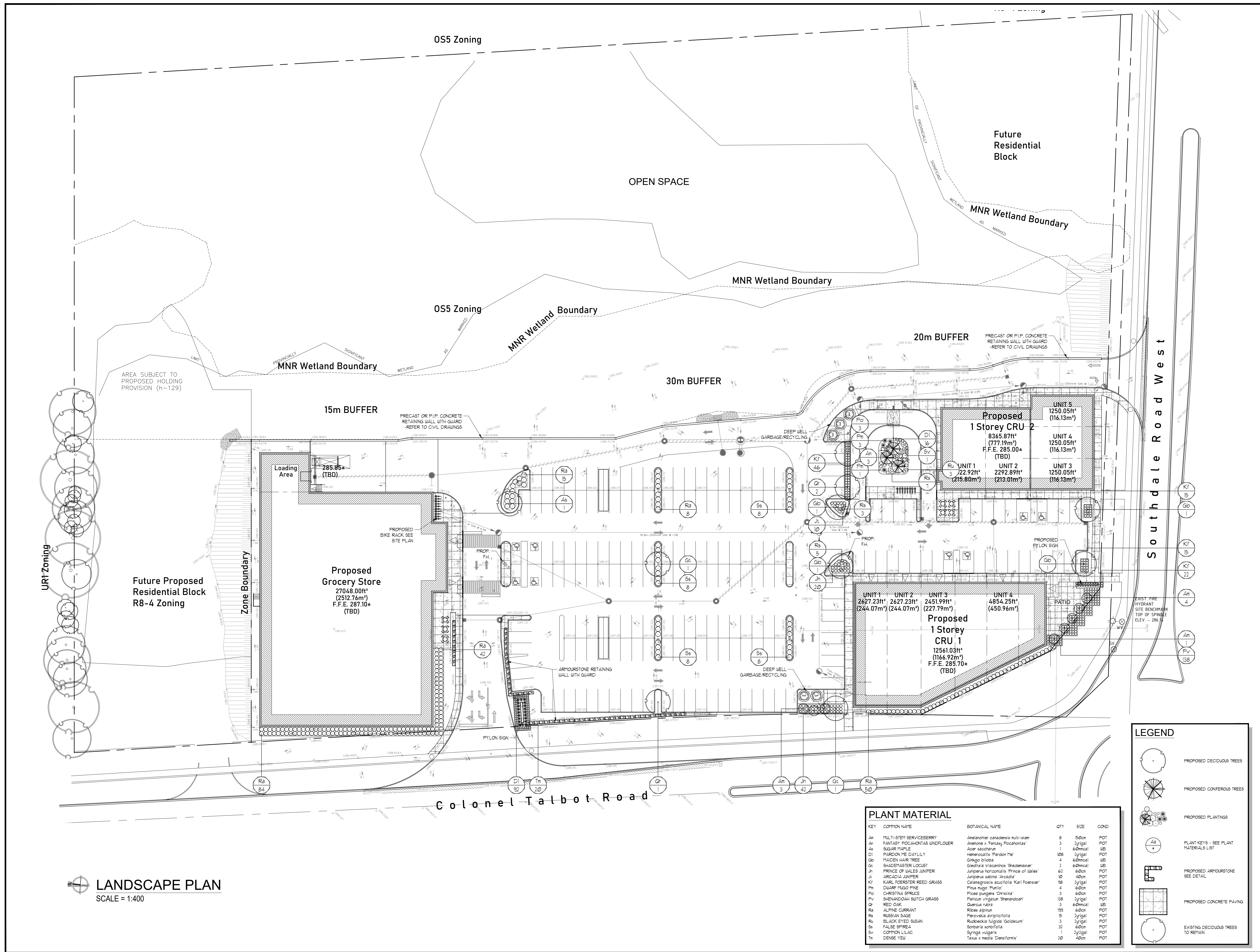
DATE	DESCRIPTION	No.
MAR1223	ISSUED FOR SPA	3.
MAR1323	ISSUED FOR REVIEW	2.
FEB2323	ISSUED FOR REVIEW	1.

PLOTTING INFORMATION:
 PLOTTED DATE: MARCH 11, 2023
 PLOTTED SCALE: 1/1

PROJECT TITLE:
PROPOSED COMMERCIAL
 952 SOUTHDALE RD W
 LONDON, ONTARIO

DRAWING TITLE:
TREE PRESERVATION PLAN

DATE: JANUARY 2023	SCALE: AS NOTED	DRAWING No.:
DRAWN: RKL/A Inc.	CHECKED BY: B.R.M.	T-1
PROJECT No.:	22-304FL SPA	

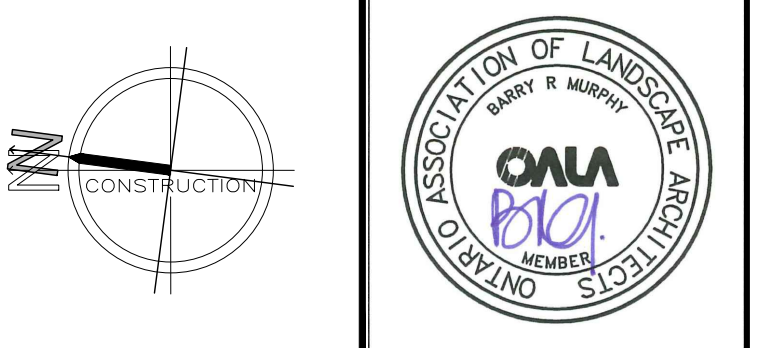


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Barry R. Murphy, O.A.L.A. C.S.L.A. DATE

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FEB1323	ISSUED FOR REVIEW	1.
DATE	DESCRIPTION	No.

PLOTTING INFORMATION
PLOTTED DATE + MARCH 11, 2023
PLOTTED SCALE + 1:1



PROJECT TITLE:
PROPOSED COMMERCIAL
952 SOUTHDAL RD W
LONDON, ONTARIO

DRAWING TITLE:
LANDSCAPE PLAN

DATE:	SCALE:	DRAWING No.
JANUARY 2023	AS NOTED	
DRAWN: RKL/A Inc.	CHECKED BY: B.R.M.	L-1
PROJECT No. 22-304Lf SPA		

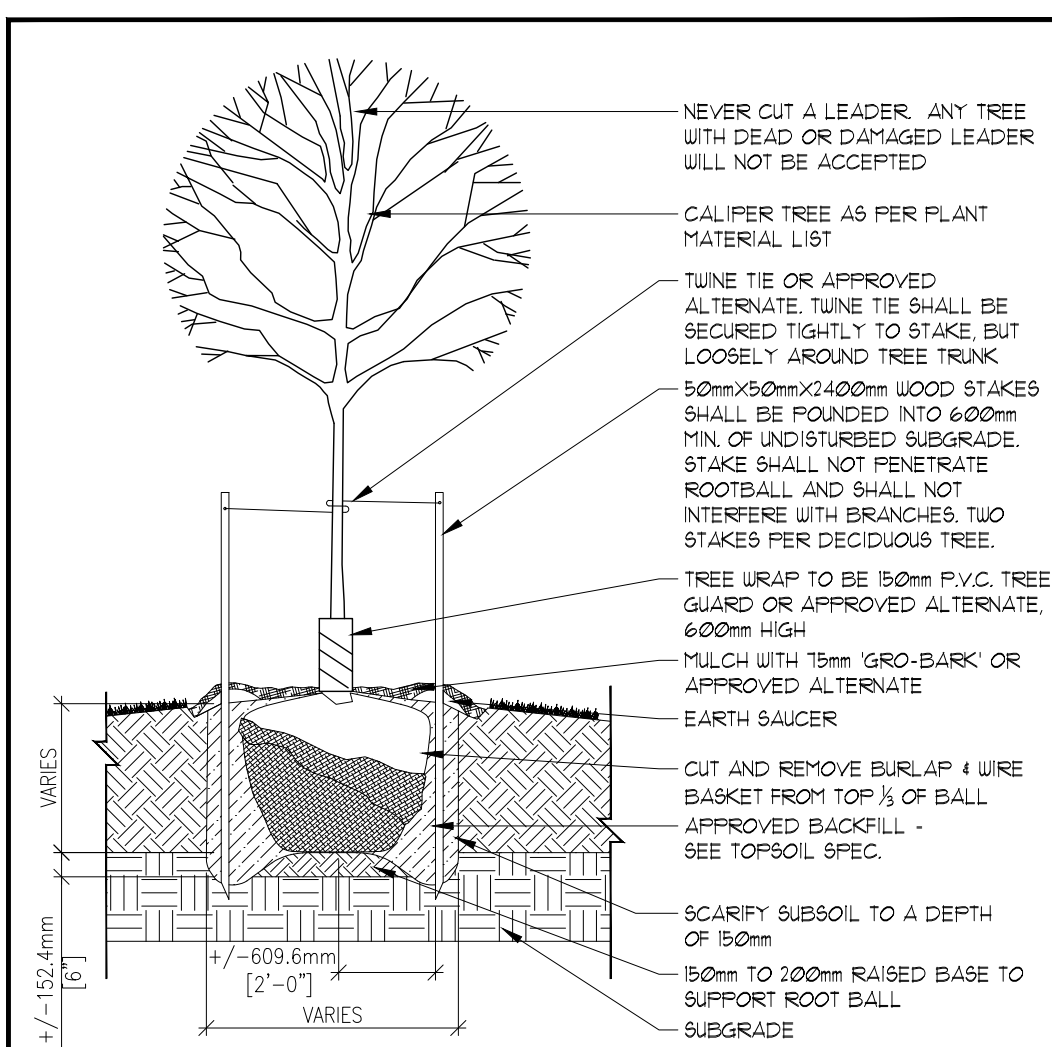
LEGEND

- Proposed Deciduous Trees
- Proposed Coniferous Trees
- Proposed Plantings
- Plant Keys - See Plant Materials List
- Proposed Armourstone (See Detail)
- Proposed Concrete Paving
- Existing Deciduous Trees to Remain

PLANT MATERIAL

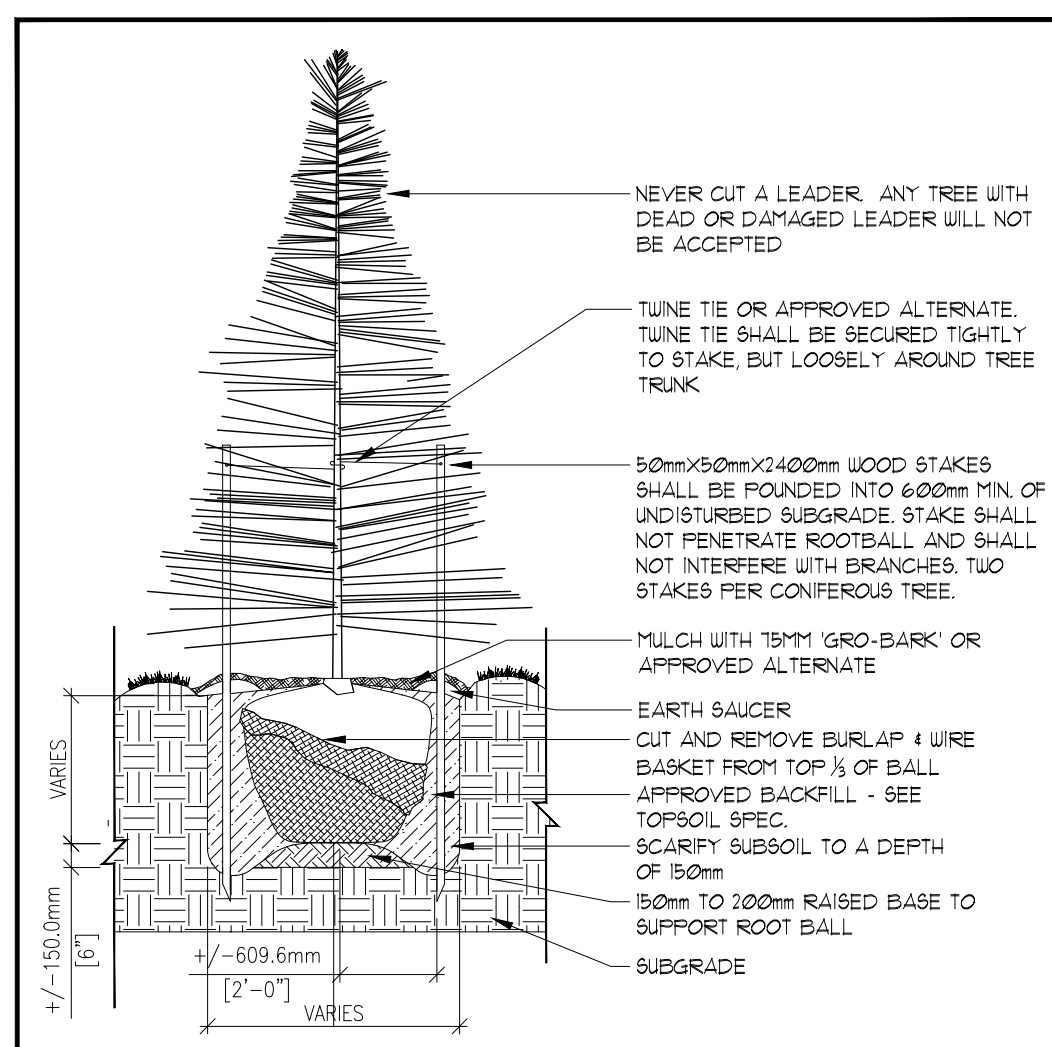
KEY	COMMON NAME	BOTANICAL NAME	QTY	SIZE	COND
Am	MULTI-STEM SERVICEBERRY	<i>Amelanchier canadensis multi-stem</i>	8	150cm	POT
As	FANTASY PICOCHONTAS UNDFLOWER	<i>Arenaria x Fendley Picochontas</i>	3	2y(gal)	POT
As	SUGAR MAPLE	<i>Acer saccharum</i>	1	60cmcal	UB
DI	PARDON ME DAYLILY	<i>Hemerocallis 'Pardon Me'</i>	100	2y(gal)	POT
Gd	MAIDEN HAIR TREE	<i>Ginkgo biloba</i>	4	60cmcal	UB
Gt	SHADEMASTER LOCUST	<i>Gleditsia triacanthos 'Shademaster'</i>	2	60cmcal	UB
Jh	PRINCE OF WALES JUNIPER	<i>Juniperus horizontalis 'Prince of Wales'</i>	62	60cm	POT
Jl	ARCADIA JUNIPER	<i>Juniperus sabina 'Arcadia'</i>	10	40cm	POT
Kf	KARL FOERSTER REED GRASS	<i>Calamagrostis acutifolia 'Karl Foerster'</i>	98	2y(gal)	POT
Pn	DWARF MUGO PINE	<i>Pinus mugo 'Pumilo'</i>	4	60cm	POT
Po	CHRISTINA SPRUCE	<i>Picea pungens 'Christina'</i>	3	60cm	POT
Pv	SHENANDOAH SWITCH GRASS	<i>Panicum virgatum 'Shenandoah'</i>	138	2y(gal)	POT
Qr	RED OAK	<i>Quercus rubra</i>	3	60cmcal	UB
Ra	ALPINE CURRANT	<i>Ribes alpinum</i>	99	60cm	POT
Rb	RUSSIAN SAGE	<i>Perovskia atriplicifolia</i>	5	2y(gal)	POT
Ru	BLACK EYED SUSAN	<i>Rudbeckia fulgida 'Goldsum'</i>	3	2y(gal)	POT
Ss	FALSE SPirea	<i>Spiraea spirifolia</i>	32	60cm	POT
Sv	COMMON LILAC	<i>Syringa vulgaris</i>	1	2y(gal)	POT
Tn	DENSE YEW	<i>Taxus x media 'Densiformis'</i>	20	40cm	POT

LANDSCAPE PLAN
SCALE = 1:400



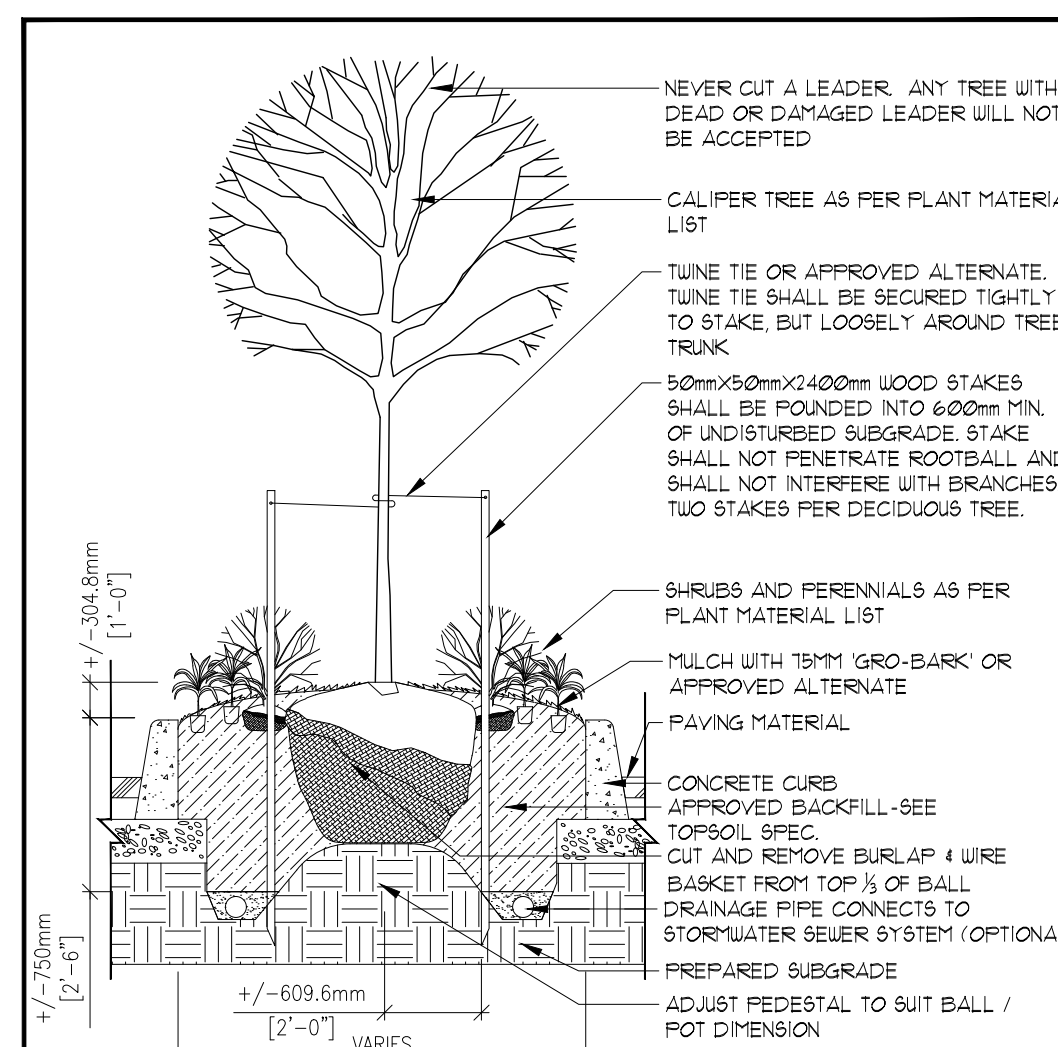
- NOTES:**
- CONTRACTOR TO REFER TO ALL SPECIFICATIONS.
 - ALL PLANTS TO CONFORM TO CNLA - CANADIAN STANDARDS FOR NURSERY STOCK.
 - GIVE LANDSCAPE ARCHITECT 48 HOURS NOTICE PRIOR TO INSTALLATION TO INSPECT PLANT MATERIAL AND PIT PREPARATION - SEE GENERAL SPECIFICATIONS.
 - DO NOT ALLOW AIR POCKETS WHEN BACKFILLING.
 - TREE PIT SIZE TO BE MIN. 500mm WIDER ALL AROUND THAN ROOT BALL.
 - TREE SHALL BEAR SAME RELATION TO GRADE AS IT BORE TO ITS PREVIOUS EXISTING GRADE.
 - PLANT TREE 50 - 100mm ABOVE DESIRED GRADE TO ALLOW FOR SOME SETTLING.
 - DO NOT DAMAGE MAIN ROOTS WHEN INSTALLING STAKES.
 - TREES UNDER 10mm CALIFER REQUIRE TWO STAKES. TREES 10mm CALIFER AND GREATER REQUIRE THREE STAKES. REMOVE STAKES AFTER 2 YEARS.
 - NO TREE PIT SHALL BE LEFT OPEN OVERNIGHT.
 - THE ABOVE DOES NOT REPRESENT ANY PARTICULAR SPECIES.
 - ALL DIMENSIONS SHOWN IN MILLIMETERS.
 - INSTALL 15mm OF APPROVED MULCH.

DECIDUOUS TREE PLANTING DETAIL - N.T.S.



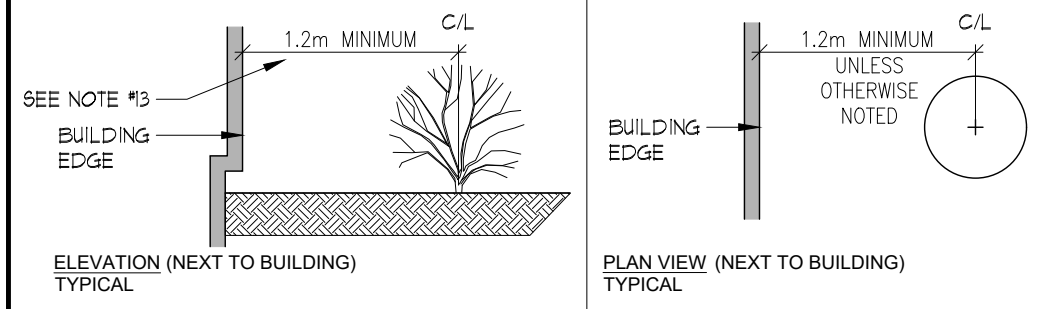
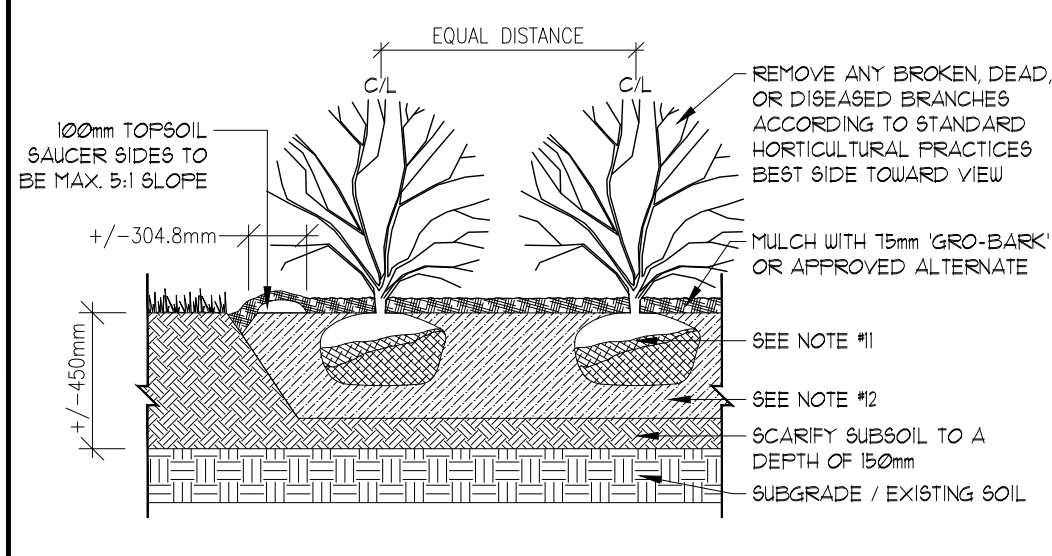
- NOTES:**
- CONTRACTOR TO REFER TO ALL SPECIFICATIONS.
 - ALL PLANTS TO CONFORM TO CNLA - CANADIAN STANDARDS FOR NURSERY STOCK.
 - GIVE LANDSCAPE ARCHITECT 48 HOURS NOTICE PRIOR TO INSTALLATION TO INSPECT PLANT MATERIAL AND PIT PREPARATION - SEE GENERAL SPECIFICATIONS.
 - DO NOT ALLOW AIR POCKETS WHEN BACKFILLING.
 - POSITION CROWN OF ROOT BALL 50mm ABOVE FINISHED GRADE TO ALLOW FOR SETTLING.
 - TREE PIT SIZE TO BE MIN. 500mm WIDER ALL AROUND THAN ROOT BALL.
 - TREES UNDER 4500mm HIGH REQUIRE TWO STAKES. TREES 4500mm HIGH AND GREATER REQUIRE THREE STAKES. ALL STAKES TO BE REMOVED AFTER 2 YEARS.
 - DO NOT DAMAGE MAIN ROOTS WHEN INSTALLING STAKES.
 - NO TREE PIT SHALL BE LEFT OPEN OVERNIGHT.
 - ALL CONIFEROUS TREES TO BE WRAPPED FOR THE FIRST WINTER AFTER INSTALLATION.
 - THE ABOVE DOES NOT REPRESENT ANY PARTICULAR SPECIES.
 - ALL DIMENSIONS SHOWN IN MILLIMETERS.
 - INSTALL 15mm OF APPROVED MULCH.

CONIFEROUS TREE PLANTING DETAIL - N.T.S.



- NOTES:**
- CONTRACTOR TO REFER TO ALL SPECIFICATIONS.
 - ALL PLANTS TO CONFORM TO CNLA - CANADIAN STANDARDS FOR NURSERY STOCK.
 - GIVE LANDSCAPE ARCHITECT 48 HOURS NOTICE PRIOR TO INSTALLATION TO INSPECT PLANT MATERIAL AND PIT PREPARATION - SEE GENERAL SPECIFICATIONS.
 - DO NOT ALLOW AIR POCKETS WHEN BACKFILLING.
 - POSITION CROWN OF ROOT BALL 50mm ABOVE FINISHED GRADE TO ALLOW FOR SETTLING.
 - TREE PIT SIZE TO BE MIN. 500mm WIDER ALL AROUND THAN ROOT BALL.
 - TREES UNDER 4500mm HIGH REQUIRE TWO STAKES. TREES 4500mm HIGH AND GREATER REQUIRE THREE STAKES. REMOVE STAKES AFTER 2 YEARS.
 - NO TREE PIT SHALL BE LEFT OPEN OVERNIGHT.
 - THE ABOVE DOES NOT REPRESENT ANY PARTICULAR SPECIES.
 - ALL DIMENSIONS SHOWN IN MILLIMETERS.
 - INSTALL 15mm OF APPROVED MULCH.

TYPICAL ISLAND PLANTING DETAIL - N.T.S.



- NOTES:**
- CONTRACTOR TO REFER TO ALL SPECIFICATIONS.
 - ALL PLANTS TO CONFORM TO CNLA - CANADIAN STANDARDS FOR NURSERY STOCK.
 - GIVE LANDSCAPE ARCHITECT 48 HOURS NOTICE PRIOR TO INSTALLATION TO INSPECT PLANT MATERIAL AND PIT PREPARATION - SEE GENERAL SPECIFICATIONS.
 - DO NOT ALLOW AIR POCKETS WHEN BACKFILLING.
 - POSITION CROWN OF ROOT BALL 50mm ABOVE FINISHED GRADE TO ALLOW FOR SETTLING.
 - PLANTING METHOD ILLUSTRATED SHALL APPLY TO BARE ROOT STOCK AND BALLED STOCK.
 - SHRUBS PLANTED IN GROUPS SHALL BE SET IN CONTINUOUS BED.
 - THE ABOVE DETAIL DOES NOT REPRESENT ANY PARTICULAR SPECIES.
 - ALL DIMENSIONS SHOWN IN MILLIMETERS.
 - INSTALL 15mm OF APPROVED MULCH.
 - FEEL BACK TOP 1/3 OF BURLAP. DO NOT REMOVE. CUT AND REMOVE ALL ROPE FROM TOP HALF OF ROOT BALL (BARE PLANT MATERIALS). REMOVE PLANTS FROM PLASTIC CONTAINERS (CONTAINER GROWN MATERIALS).
 - PREPARED TOPSOIL TO BE 50% NATIVE TOPSOIL, FREE OF STONES, LUMPS OF CLAY GREATER THAN 25mm (1 INCH) AND ALL ROOTS OR OTHER EXTRANEOUS MATERIAL. AMEND WITH 50% TRIPLE MIX. MAX. 1/3 OF PLANTING BED DEPTH MAY BE ABOVE GRADE WHERE SOILS ARE HEAVILY COMPACTED. TOPSOIL TO BE TAMED TO MINIMIZE SETTLEMENT.
 - ALL SHRUBS TO BE PLANTED A MINIMUM OF 12m ON CENTER AWAY FROM ALL BUILDING EDGES UNLESS OTHERWISE NOTED.

SHRUB PLANTING DETAIL - N.T.S.

GENERAL PLANTING SPECIFICATIONS:

- BASE INFORMATION SUPPLIED BY WESTDELL CORP.
 - ENGINEERING INFORMATION SUPPLIED BY MTE.
 - CONTRACTOR TO MAKE THEMSELVES FAMILIAR WITH ALL RELATED SPECIFICATIONS.
 - CONTRACTORS ARE RESPONSIBLE FOR REVIEW OF ALL SPECIFICATIONS AND RELATED DRAWINGS WITH SELECTED SUB-CONTRACTORS AS THEY PERTAIN TO WORK AS OUTLINED ON LANDSCAPE ARCHITECTURAL WORKING DRAWINGS AND SPECIFICATIONS.
 - REPORT ALL DISCREPANCIES TO THE LANDSCAPE ARCHITECT DURING TENDERING PROCESS. ERRORS AND/OR OMISSIONS WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.
 - CONTRACTOR SHALL MAINTAIN ALL LANDSCAPED AREAS UNTIL OWNER ACCEPTANCE OF PROJECT. CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT IN WRITING ON COMPLETION OF PROJECT FOR A SITE WORK COMPLETION CERTIFICATE AS WELL AS THE COMPLETION OF THE ACCEPTANCE OF PROJECT.
 - ALL WORKMANSHIP TO BE GUARANTEED FOR ONE YEAR UNLESS OTHERWISE STATED. WARRANTY PERIOD WILL BEGIN ON FINAL ACCEPTANCE OF PROJECT.
 - ALL WORKMANSHIP TO COMPLY WITH THE CANADIAN LANDSCAPE STANDARDS.
 - ALL NURSERY STOCK TO BE "NURSERY GROWN AND MUST COMPLY WITH THE CANADIAN NURSERY LANDSCAPE ASSOCIATION'S 'CANADIAN NURSERY STOCK STANDARDS' LATEST EDITION.
 - ALL LANDSCAPING IS TO BE INSTALLED PRIOR TO THE END OF THE FIRST GROWING SEASON FOLLOWING THE OCCUPANCY OF THE SITE DEVELOPMENT UNLESS OTHERWISE STATED.
 - CONTRACTOR IS RESPONSIBLE FOR ALL UNDERGROUND UTILITIES AND MUST SUPPLY THE LANDSCAPE ARCHITECT WITH COPIES OF LOCATE CERTIFICATES PRIOR TO COMMENCEMENT OF WORK.
- GRADING**
- CONTRACTOR TO ENSURE POSITIVE DRAINAGE IN ALL AREAS.
 - ALL GRADING TO BE IN ACCORDANCE WITH SITE ENGINEER'S DRAWINGS.
 - SOIL SHALL BE SCARIFIED FREE OF ALL STONES, ROOTS, BRANCHES LARGER THAN 1" (25MM) AND COMPACTED TO 85% R.P.D.
 - ALL SUBSOIL TO BE SCARIFIED TO A DEPTH OF 6" (150MM) PRIOR TO THE INSTALLATION OF TOPSOIL TO ENSURE NO HARDPAN CONDITIONS.
 - CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT PRIOR TO INSTALLATION OF TOPSOIL TO APPROVE SUBBASE.
 - DIRECT ALL RAINLEADERS AND SUMP LEADERS AWAY FROM PLANTING BEDS AND TO THE DESIGNATED SWALES.
 - NOTIFY LANDSCAPE ARCHITECT IN WRITING OF ANY SUBSTANTIAL ILET CONDITIONS.
- TOPSOIL**
- AT THE CONTRACTOR'S EXPENSE A SOIL TEST IS TO BE COMPLETED BY A REPUTABLE LABORATORY. THE SOIL TEST IS TO BE COMPLETED AND IF NECESSARY, RECOMMENDATIONS FROM THE LABORATORY ARE TO BE INCLUDED. THE RESULTS OF SOIL TESTS AND RECOMMENDATIONS ARE TO BE PROVIDED TO THE LANDSCAPE ARCHITECT FOR APPROVAL ONE WEEK PRIOR TO WORK COMMENCING.
 - TOPSOIL FOR PLANTING BEDS IS TO BE A FERTILE, FRIABLE NATURAL LOAM TO A MINIMUM DEPTH OF 6" (150MM) AND A MINIMUM DEPTH OF 4" (100MM) FOR TURF AREAS - UNLESS OTHERWISE STATED - TOPSOIL SHALL CONTAIN NOT LESS THAN 4% ORGANIC MATTER FOR CLAY LOAMS AND NOT LESS THAN 2% ORGANIC MATTER FOR SANDY LOAM TO A MAXIMUM OF 8% AND CAPABLE OF SUSTAINING VIGOROUS PLANT GROWTH FREE OF SUBSOIL CONTAMINATION, ROOTS AND STONES OVER 30MM DIAMETER, REASONABLY FREE OF WEEDS, AS DETERMINED BY THE LANDSCAPE ARCHITECT, AND HAVING A pH RANGING FROM 6.0 TO 7.0.
 - IF TOPSOIL IS TO BE STOCKPILED FOR USE ON SITE DEVELOPMENT, AVOID MIXING TOPSOIL WITH SUBSOIL. LIMIT HEIGHT OF STOCKPILE TO 2M TO RETAIN SOIL MICROORGANISMS AND SOIL VIABILITY AND FERTILITY.
 - IF APPLICABLE, ALL WORK IN ANY ROAD ALLOWANCE SHALL MEET THE MINIMUM SPECIFICATIONS OF THE MUNICIPALITY. ENSURE A MINIMUM OF 100MM TOPSOIL IS INSTALLED IN BOULEVARDS.
 - PROTECT THE MUNICIPALITY OWNED ROAD ALLOWANCE(S)/BOULEVARD(S) FROM COMPACTION OR SOIL CONTAMINATION.
- MULCH**
- ALL TREES, SHRUBS AND PLANTING AREAS TO BE MULCHED UNLESS OTHERWISE NOTED.
 - CONTRACTOR TO INSTALL 5" (125MM) OF GRO-BARK MEDIUM MULCH IN ALL AREAS.
 - ALTERNATIVES MAY BE ACCEPTED - CONTRACTOR TO PROVIDE 3 SAMPLES FOR WRITTEN APPROVAL TO THE LANDSCAPE ARCHITECT.
- PLANT MATERIALS**
- CONTRACTOR TO VERIFY ALL PLANT MATERIAL ON DRAWING(S) AND PLANT MATERIAL LIST(S). REPORT ALL DISCREPANCIES AT TENDERING PROCESS.
 - SUBSTITUTIONS WILL NOT BE ACCEPTED WITHOUT WRITTEN CONFIRMATION BY THE LANDSCAPE ARCHITECT.
 - PLANTINGS MAY BE ADJUSTED TO SUIT UTILITIES CONCERNS AND AESTHETIC CONCERNS. ADJUSTMENTS ARE TO BE MADE UNDER THE DIRECTION OF THE LANDSCAPE ARCHITECT. ADJUSTMENTS TO PLANTING WITHOUT CONSENT OF LANDSCAPE ARCHITECT AND/OR PROJECT MANAGER MAY NOT MEET INTENT OF DESIGN AND/OR MUNICIPAL APPROVALS. PLANT MATERIAL THAT HAS TO BE RELOCATED AS A RESULT WILL BE AT THE COST OF THE CONTRACTOR.
 - LANDSCAPE ARCHITECT TO INSPECT ALL PLANT MATERIAL ON SITE OR AT ITS SOURCE PRIOR TO INSTALLATION. CONTRACTOR IS TO GIVE LANDSCAPE ARCHITECT 48 (48H) NOTICE FOR INSPECTION.
 - CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT IN WRITING IF ADVERSE WEATHER MAY IMPACT THE HEALTH OF THE PLANT MATERIALS AT TIME OF PLANTING - I.E. TEMPERATURE, PRECIPITATION.
 - ALL TREE PITS SHALL BE AT LEAST 2 FT. (600MM) WIDER THAN BALL OF THE TREE TO BE PLANTED AND SHALL BE DEEP ENOUGH SO THAT THE TOP OF BALL IS AT THE SAME LEVEL AS SURROUNDING GRADE. A MINIMUM OF 6" (150MM) OF BACKFILL SHALL BE PLACED UNDER BALL. TREE PITS ARE NOT TO BE LEFT OPEN OVER NIGHT.
 - SHRUB BEDS SHALL BE EXCAVATED TO A DEPTH OF 8" (150MM) AND FILLED WITH APPROVED BACKFILL MATERIAL. SHRUB BEDS ARE NOT TO BE LEFT OPEN OVER NIGHT.
 - ALL TREES SHALL HAVE AN EARTH SAUCER AT ITS BASE WITH A DIAMETER AS LARGE AS EXCAVATED AREA AND SHAPED TO RETAIN WATER (SEE DETAIL). EARTH SAUCER TO BE APPROVED. MULCH INSTALLED TO A MINIMUM DEPTH OF 25" (635MM).
 - ALL BURLAP SHALL BE CUT AND BURIED BELOW SURFACE DURING PLANTING.
 - ALL EVERGREENS ARE TO BE WRAPPED THE FIRST WINTER AT THE EXPENSE OF THE LANDSCAPE CONTRACTOR.
 - ALL SHRUBS PLANTED WITHIN 4' OF SALTED ROADWAYS, PARKING AND SIDEWALKS TO BE PROTECTED WITH SILT FENCING THROUGHOUT THE FIRST WINTER AFTER INSTALLATION AT THE EXPENSE OF THE LANDSCAPE CONTRACTOR (OPTIONAL).
 - DIRECT ALL RAINLEADERS AND SUMP LEADERS AWAY FROM PLANTING BEDS AND TO DESIGNATED DRAINAGE SWALES.
 - DO NOT INSTALL PLANT MATERIAL IN DRAINAGE SWALES.
 - CONTRACTOR IS TO REMOVE ALL STAKES AND GUY WIRES AFTER 2 FULL GROWING SEASONS.
- SOD**
- ALL LANDSCAPED AREAS TO BE SOODED TO THE STREET CURB (S) UNLESS OTHERWISE STATED.
 - CONTRACTOR TO ENSURE (WHERE APPLICABLE) ALL PLANTING BEDS ADJACENT TO TRAFFIC ISLANDS, INTERIOR SITE CURBING, AND SIDEWALKS HAVE A 30(100) SOD MAINTENANCE STRIP INSTALLED.
 - ANY SODDING OR WORKS ON LANDS ADJUTING THE PROPERTY FROM THE LOTLINES TO SIDEWALK AND CURBING SHALL BE COMPLETED OR REPAIRED TO THE SATISFACTION OF THE LANDSCAPE ARCHITECT, CITY, AND/OR REGIONAL MUNICIPALITY UNLESS OTHERWISE STATED.
 - SOD SHALL BE CERTIFIED #1 CULTIVATED TURF GRASS GROWN AND SOLD IN ACCORDANCE WITH THE CLASSIFICATIONS OF THE NURSERY SOD GROWERS ASSOCIATION OF ONTARIO AT TIME OF SALE. IT SHALL HAVE A STRONG FIBROUS ROOT SYSTEM AND SHALL BE CUT IN PIECES APPROXIMATELY ONE SOYD (3000 M2) IN AREA WITH THE SOIL PORTION BEING 3/4" (19MM).
 - SOD TO BE FERTILIZED AT THE APPROPRIATE RATES AS INDICATED BY SOIL TESTS COMPLETED BY A REPUTABLE SOILS LABORATORY.
 - UPON INSTALLATION AREAS SHOULD BE WATERED SO AS TO SATURATE SOD AND THE UPPER 4" (100MM) OF BACKFILL TOPSOIL. AFTER SOD AND SOIL HAVE DRIED SUFFICIENTLY TO PREVENT DAMAGE, IT SHALL BE ROLLED WITH A ROLLER PROVIDING 1500 LBS. (68KG) PRESSURE PER SOFT.
 - CONTRACTOR TO REPAIR ALL DAMAGED AREAS TO THE SATISFACTION OF THE LANDSCAPE ARCHITECT AND/OR CLIENT.
- WATERING**
- DURING THE WARRANTY PERIOD, BETWEEN MAY 15 AND SEPTEMBER 15 OF EACH YEAR, WATERING OF ALL PLANTS SHALL BE CARRIED OUT NO LESS THAN 6 TIMES PER YEAR IN ACCORDANCE WITH THE WATERING SCHEDULE TO BE DETERMINED BY THE OWNER UNLESS OTHERWISE STATED ON THE DRAWINGS. CRITICAL WATERING MONTHS ARE JUNE, JULY & AUGUST.
 - IF NO AUTOMATED IRRIGATION SYSTEM HAS BEEN PROVIDED FOR WATERING OPERATIONS, CONTRACTOR TO PROVIDE WATER TO THE SITE IF HOSE BIBS WITHIN THE BUILDING ENVELOPE ARE NOT AVAILABLE.
 - MANUAL WATERING SHOULD ENSURE DEEP WATERING OF TREES, SHRUBS, GROUND COVERS AND GRASSSED AREAS. WATERING OF GRASSSED AREAS TO COMPECE ON A REGULAR BASIS AND CONTINUE WITH INTENSITY DEPENDING ON AMOUNT OF RAINFALL. NEW SOD THAT HAS BEEN LAID SHOULD BE KEPT MOIST FOR 4-10 DAYS UNTIL IT HAS FIRMLY ROOTED INTO THE EXISTING SOIL.
 - ALL CONIFEROUS TREES SHALL BE WATERED IN LATE FALL, JUST PRIOR TO FREEZE-UP.
 - WATER SHALL BE APPLIED SO THAT THE WASHING OF THE SOIL OR DISLCOING OF MULCH OR TREE GUARDS DOES NOT OCCUR. DAMAGE SHALL BE IMMEDIATELY REPAIRED TO THE SATISFACTION OF THE OWNER AT NO ADDITIONAL COST.
- DECORATIVE ROCKERY STONE**
- CONTRACTOR TO SUPPLY AND INSTALL LARGE LIMESTONE (OR APPROVED ALTERNATE) LANDSCAPE BOLDERS AS INDICATED ON PLANS AND SPECIFICATIONS ONLY - EXACT PLACEMENT TO BE COMPLETED UNDER THE DIRECT SUPERVISION OF THE LANDSCAPE ARCHITECT. BOLDERS ARE TO BE OF THE FOLLOWING SIZES:
80% - 1200 x 600 x 600
10% - 600 x 600 x 600
 - 2 ROCKS ARE TO BE BURIED BELOW GRADE AND BACKFILLED IN 80MM LIFTS. CONTRACTOR TO INSTALL LANDSCAPE FABRIC BEHIND BOLDERS TYPICAL.



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THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION OR TENDER PURPOSES UNLESS SIGNED AND DATED BY BARRY R. MURPHY, O.A.L.A. C.S.L.A. LANDSCAPE ARCHITECT, LONDON, ONTARIO (519) 667-3322.

DATE	DESCRIPTION	No.
MAR1223	ISSUED FOR SPA	3.
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PLOTTING INFORMATION:
PLOTTED DATE: MARCH 11, 2023
PLOTTED SCALE: 1/1



PROJECT TITLE:
PROPOSED COMMERCIAL
952 SOUTHDALE RD W
LONDON, ONTARIO

DRAWING TITLE:
LANDSCAPE DETAILS

DATE:	SCALE:	DRAWING No.
JANUARY 2023	AS NOTED	
DRAWN:	CHECKED BY:	L-2
RKL.A Inc.	ERM.	
PROJECT No.		

22-304LF SPA



1739626 Ontario Ltd.
1701 Richmond Street, Suite 3B
London, Ontario N5X 3Y2

GE-00085
January 16, 2023

Attention: Dave Traher, Vice President, Planning and Development
dtraher@westdellcorp.com

**Re: Geotechnical Assessment
Retaining Wall Design
952 Southdale Road, London**

Introduction

This report has been prepared by LDS Consultants Inc. (LDS) to provide geotechnical comments and recommendations for the construction of the proposed retaining wall structure which will be located along the easterly side of the development, adjacent to the Button Bush Wetland feature which borders the site.

The subject lands are located at the north-east junction of Colonel Talbot Road and Southdale Road in West London, Municipal Number (MN 952) Southdale Road East. The Button Bush wetland feature which is located on the east side of the site has been identified as a Provincially Significant Wetland. A key plan showing the site location is provided below as Figure 1, for reference.

Figure 1: Key Plan



LDS CONSULTANTS INC.
2323 Trafalgar Street
London, Ontario N5V 0E1

LDS has had extensive involvement at the site, carrying out geotechnical and hydrogeological background studies in support of the mixed use redevelopment for the site. As part of the conceptual development plans, the proposed commercial development through the bulk of the site will require significant site grading activities. Upwards of 3 m of fill are anticipated through portions of the site. To accommodate the fill placement, and to minimize disturbance to the natural features which border the east side of the site, a retaining wall structure is being planned. This letter report has been prepared to provide geotechnical comments and recommendations as it pertains to the proposed retaining wall at the subject site.

Background Studies

As noted previously, LDS is familiar with the soil conditions at the subject site, having been involved with site characterization work at this property since 2017. LDS prepared the Geotechnical Report (dated October, 2020) outlining geotechnical comments and recommendations related to the proposed site development. Additionally, LDS prepared the Preliminary Hydrogeological Assessment (dated April 6, 2022) for the purposes of examining hydrogeologic (groundwater) and hydrologic (surface water) characteristics of the site; and to determine if the proposed commercial site development could result in adverse / negative impacts to natural features in the area.

Based on the existing soils and groundwater data which is available from the existing geotechnical and hydrogeological reports, it is anticipated that no further boreholes or monitoring well installations will be required at the site to complete this geotechnical review.

Summarized Conditions

A series of ten boreholes (denoted as BH1 through BH10), and six shallow auger holes (denoted as AP101 through AP106) were advanced throughout the site on September 25, 2017. Four of the boreholes were equipped with monitoring wells including a second well at MW5 (one shallow and one deep). A series of shallow piezometers (PZ 201 and PZ 202) were installed at the site on October 20, 2017 in the wetland area. On February 10 and 11, 2021, an additional set of boreholes (denoted as BH301 through BH305) were advanced at the site. Each of the boreholes being equipped with monitoring wells, a second well was installed at MW303 and MW304 (one shallow and one deep). Damaged well casings at BH5 (deep) and BH6 were decommissioned, new wells were installed at each location, within 1 m of the original well.

A plan showing all of the borehole, monitoring well, and piezometer locations is included on Drawing 1, and the borehole logs are appended, for reference. Geotechnical lab testing on collected soil samples includes five (5) gradation analysis and routine moisture content determinations, with estimated hydraulic conductivity values ranging between 10^{-5} and 10^{-6} m/s.

Soil Conditions

Subgrade soils within the tableland area were generally described as surficial topsoil, underlain by natural sandy silt/silty and silt till soils. The soils encountered near ground surface are described as being mottled in colour, and in a weathered condition in the upper 1.2 to 1.5 m. The silt and silt till soils are described as containing discontinuous sand layers, and/or intermittent fine sand layering. Below the weathered zone, the soils are predominantly brown in colour, becoming grey at variable depths below 3.0 m.

In the wetland area, the surficial deposits encountered within the wetland piezometers are comprised of topsoil and organics (typically in the range of 0.3 to 1.0 m thick), overlying alluvial (unconsolidated) deposits of sandy silt which contain organic inclusions. The deep piezometers were terminated in compact silt till soils, similar to that observed within the tableland areas of the site.

The manual and continuous groundwater measurements recorded in the monitoring wells installed across the tableland confirm a local groundwater flow direction in an easterly direction, towards the wetland. This is demonstrated on the Groundwater Contour Plans for Spring 2021, provided on Drawings 2 and 3, appended.

Geotechnical Comments and Recommendations

The following geotechnical comments are provided to assist with the design and construction of retaining wall structures at the site, which are being considered along the eastern limits of the subject property, proximal to the wetland area.

At present, the specific retaining wall design is unknown. However, it is anticipated that a gravity-based structure using natural armourstone blocks or manufactured segmental blocks will be utilized to accommodate the grade separation between the tableland area where fill will be placed to accommodate the proposed development, and the lower grades which exist along the edge of the wetland feature. Consideration may also be given to utilizing a manufactured wall system (such as Envirolok) which can provide a more naturalized transition by incorporating plantings to the face of the wall.

Erosion and Sediment Control

It is acknowledged that for work in proximity to any sensitive feature, that it is important to establish a comprehensive ESC strategy which addresses the various stages of construction, and the activities planned onsite. The strategy must consider construction staging and sequencing, as well as seasonal conditions which are anticipated, and materials being used, particularly when imported soils and/or soil stockpiling is anticipated.

Rigorous inspection and a robust maintenance and repair plans are required to ensure that ESC measures perform, as intended. Mitigation measures and best management practices are outlined in the Geotechnical Report previously prepared by LDS.

When construction activities are complete, it is important to ensure that a plan to re-establish vegetative cover is implemented to help stabilize disturbed soils. In this regard, the use of hydroseed and bonded-fibre mix, and the possible use of erosion control blankets in proximity to the wall are recommended.

Subgrade Preparation

Due to the limited height of the wall, extensive tie-backs are not anticipated, and the working area required to install this wall is expected to be localized to the footprint of the wall and the landward backfilling zone. Further, construction of the retaining wall can be conducted on the tableland side of the wall, limiting disturbance to the wetland feature or the associated buffer area.

Timing of the subgrade preparation and wall construction should have regard for potential flooding conditions. In this regard, the work is best coordinated for drier periods (i.e. summer and fall months) when flooding conditions within the wetland are less likely to occur.

Prior to the placement of retaining wall structures, the subgrade soils should be examined by a geotechnical inspector. Any buried topsoil, or otherwise unsuitable or unstable subgrade soils should be removed, and restored with compacted granular material. In this regard, a Granular B (consistent with OPSS 1010 Granular B aggregate) is recommended. The granular material should be within 3 percent of optimum moisture content, and uniformly compacted to a minimum 100 percent Standard Proctor maximum dry density (SPMDD). The use of heavy vibratory equipment may be limited by space constraints, and proximity of the existing wetland area. As such, in areas where fill is required, the granular material should be placed in maximum 200 mm thick lifts.

Additional precautions, effort, and measures may be required, when and where construction is undertaken when the temperature and climatic conditions have an adverse influence on the standard construction practices or during periods of inclement weather. Imported materials that contain ice, snow, or any frozen material should not be used. It may be necessary to suspend the placement of engineered fill during periods of cold, where ambient temperatures are -5°C or less, exist. Overnight frost penetration may occur, even in granular fill materials, where precipitation and ground surface runoff pools and accumulates, and freezing temperatures exist. Any frozen materials should be removed prior to placing subsequent lifts of engineered fill. Breaking the frost in-situ is not considered acceptable.

If seasonal weather conditions limit the ability to prepare the subgrade in dry conditions, the use of a mud-mat below the base of the retaining wall may be used as an alternative, to ensure that the wall is constructed on a stable base, less susceptible to disturbance from the construction activities.

Excavated materials and construction materials must be stockpiled on the landward side of the wall, and not in proximity to the wetland feature.

Soil Design Parameters

The proposed retaining wall structures should be founded on natural undisturbed subgrade soils, or approved structural fill material. Based on the soil conditions observed onsite, a design pressure of 150 kPa is considered appropriate for the sandy subgrade soils which are in a compact state. Site inspection by a geotechnical inspector is recommended during construction to verify the suitability of the subgrade soils.

For the purposes of designing the proposed retaining walls, the following soil parameters are suggested, based on our review of the soil conditions onsite, and our experience with similar soils in the area. Parameters are also provided for imported granular backfill material, as noted.

Soil	ϕ	γ (kN/m ³)	c (kPa)
Compacted Granular Fill (OPSS 1010 Granular B or approved equivalent)	34.0	21.0	0
Weathered Silt/Silt Till	27.0	18.0	5
Compact to Dense Silt Till	28.0	19.0	5
Compact to Dense Sand	33.0	19.5	0

Where: γ = total unit weight (kN/m³), ϕ = soil friction angle (°), c = cohesion (kPa)

In the event that during construction, that soils appear to vary materially from the above soils, the geotechnical consultant should review the soil conditions to confirm the design parameters.

The design of the retaining wall will need to be checked with a global stability analysis, to assess the potential risk for sliding (translational movement) or rotational (overturning) failures. The analysis should include any loading associated with traffic, buildings or structures located in proximity to the retaining wall structure.

Prior to construction, a detailed engineering design (shop drawings) of the retaining wall incorporating final proposed grades and selected retaining wall block products should be provided by the contractor selected to construct the retaining wall, for review and approval by the developer and their consulting engineers.

Backfilling and Lateral Support

The manufacturer's instructions should be followed for the installation of drainage and backfilling material behind the wall. However, the following geotechnical recommendations are provided from a geotechnical standpoint.

- The use of granular backfill, such as OPSS 1010 Granular B or approved sand fill is recommended behind the wall, to facilitate drainage. As a minimum requirement, the granular backfill should be placed in the wedge-shaped zone defined by a 45 degree line extending up and back from the bottom of the rear face of the bottom of the retaining wall footing.
- The backfill zone should be placed and compacted to a minimum 98% Standard Proctor Maximum Dry Density (SPMDD). The granular backfill should be placed and compacted in conjunction with the placement of any tie-backs, ensuring that the lateral reinforcement is installed in accordance with the design recommendations and meeting the minimum embedment depth requirements.
- Depending on the final design of the wall, the use of geogrid tie-backs may be required to provide lateral support to the wall. In this regard, a biaxial geogrid product is expected to be used. The geogrid layer should be pulled tight and secured in place at the design heights and checked for overall length. The placement of the geogrid tie-backs is expected to be coordinated with the backfilling of soil on the

development-side of the wall. Care shall be taken to not operate equipment directly on the reinforcing to minimize potential for damage.

- Where the backfill interfaces the natural subgrade soils, it is recommended that the fill be benched into the natural subgrade, to prevent the creation of preferential rotational failure planes within the backfill zone.

Field review to check subgrade soils, verify compaction of the backfill zone, and installation of geogrid tie-backs is recommended.

Drainage

Manual and continuous groundwater measurements were recorded in the monitoring wells and piezometers installed across the site from 2017 to 2021, and are summarized in the Hydrogeological Report. The retaining walls should be provided with a subdrain system equipped with a positive outlet for any infiltrated surface water which accumulates behind the wall, throughout the retaining wall system.

Subdrains placed within the backfill zone should be comprised of minimum 100 mm diameter perforated pipe, wrapped with a sock to help minimize movement of fines into the drainage system. The drain should be sloped (minimum 1% fall, where possible) and drain to a positive frost-free controlled outlet.

The positioning of the outlet will be located on the downgradient / wetland-side of the wall, and suitable measures will need to be incorporated into the design to prevent scouring at the outlet, or blockage from icing of the surface water in the wetland. The use of geotextile and rip-rap stone placement may be helpful in this regard.

Under flooding conditions within the wetland, it is important to ensure that flooding does not create a backwater effect in the retaining wall subdrainage system. This will need to be reviewed as part of the retaining wall design.

It is recommended that drainage swales or site grading on the tableland-side of the wall have regard for the need to intercept and redirect stormwater run-off to prevent overtopping of the retaining wall. It is important to note that subdrainage systems associated with the site pavements and driveways for the site should not be tied into the drainage system for the retaining wall.

Establishing Vegetation in Disturbed Areas

Once the wall construction is complete, the area can be vegetated by means of broadcast or hydroseeding. Complete coverage is recommended. The seed mixture should contain a grass variety which is easily germinated, and robust enough to handle intermittent flooding conditions.

If live planting or live staking is planned, the plants should be positioned in such a way that the structural integrity of the wall is not compromised.

Closing

The geotechnical recommendations provided in this report are applicable to the project described in the text. LDS would be pleased to provide a review of design drawings and specifications to ensure that the geotechnical comments and recommendations provided in this report have been accurately and appropriately interpreted.

The comments given in this report are intended to provide guidance for design engineers.

The conclusions and recommendations presented in this report reflect site conditions existing at the time of the investigation and a review of available information which has been presented in the report. Should subsurface conditions be encountered which vary materially from those observed in the boreholes, we recommend that LDS be consulted to review the additional information and verify if there are any changes to the geotechnical recommendations.

No portion of this report may be used as a separate entity. It is intended to be read in its entirety.

Contractors making use of this report are responsible for their construction methods and practices, and should seek confirmation or additional information if required, to ensure that they understand how subsurface soil and groundwater conditions may affect their work.

We trust this satisfies your present requirements. If you have any questions or require anything further, please feel free to contact our office.

Respectfully Submitted,

LDS CONSULTANTS INC.

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Geotechnical Services
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Cell: 519-537-0039
shaun.hadden@LDSconsultants.ca



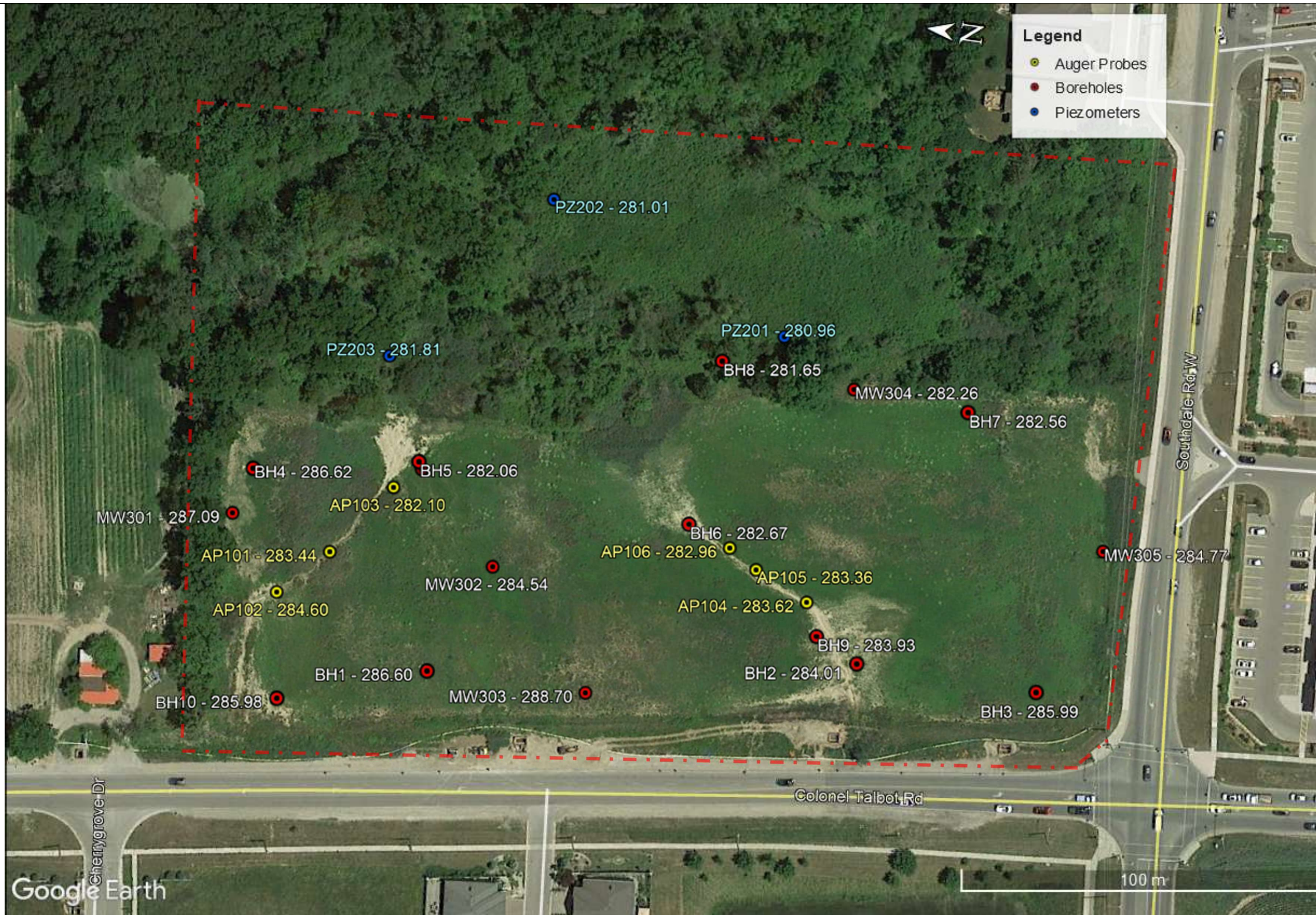
Rebecca A. Walker, P. Eng., QP^{ESA}
Principal, Geotechnical Services
Office: 226-289-2952
Cell: 519-200-3742
rebecca.walker@LDSconsultants.ca

Attachments:

Appendix A - Drawings
Appendix B - Borehole Logs

APPENDIX A

Drawings



Google Earth

Legend

- Auger Probes
- Boreholes
- Piezometers



SOURCE
 Google Earth Pro, Version 7.3.2.5491,
 17T, 474190.38 m E, 4753946.39 m N,
 Imagery Date 7/2/2018

NOTES
 Borehole locations surveyed by LDS.



PROJECT NAME	
Proposed Residential & Commercial Development	
PROJECT LOCATION	
952 Southdale Road London, Ontario	
DRAWING NAME	
Borehole Location Plan	
SCALE As Shown	PROJECT NO. GE-00085
DATE March 2022	DRAWING NO. 1



Legend

- Monitoring Wells
- Piezometers



LEGEND

- Groundwater Piezometric Contour, m
- Inferred Groundwater Flow Direction

SOURCE
 Google Earth Pro, Version 7.3.2.5491,
 17T, 474190.38 m E, 4753946.39 m N,
 Imagery Date 7/2/2018

NOTES
 Borehole locations surveyed by LDS. Water
 levels measured March 25, 2021.



PROJECT NAME
 Proposed Residential &
 Commercial Development

PROJECT LOCATION
 952 Southdale Road
 London, Ontario

DRAWING NAME
 Groundwater Contour Plan
 Spring 2021 – Shallow Wells

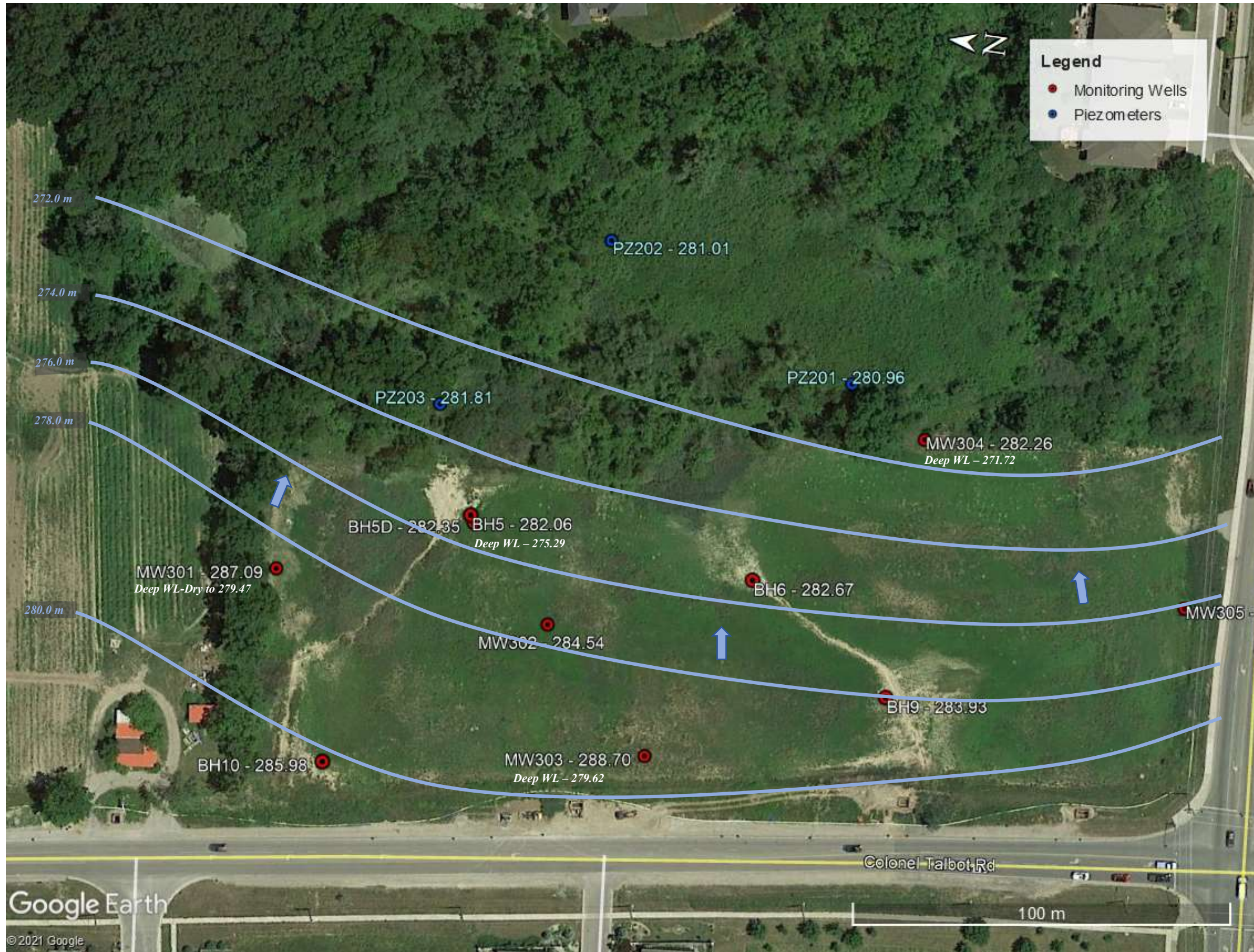
SCALE As Shown	PROJECT NO. GE-00085
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DATE March 2022	DRAWING NO. 2
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Google Earth
 © 2021 Google

Colonel Talbot Rd.

100 m



Google Earth
© 2021 Google

Legend

- Monitoring Wells
- Piezometers



LEGEND

- Groundwater Piezometric Contour, m
- ➔ Inferred Groundwater Flow Direction

SOURCE
Google Earth Pro, Version 7.3.2.5491,
17T, 474190.38 m E, 4753946.39 m N,
Imagery Date 7/2/2018

NOTES
Borehole locations surveyed by LDS. Water
levels measured March 25, 2021.



PROJECT NAME	
Proposed Residential & Commercial Development	
PROJECT LOCATION	
952 Southdale Road London, Ontario	
DRAWING NAME	
Groundwater Contour Plan Spring 2021 – Deep Wells	
SCALE As Shown	PROJECT NO. GE-00085
DATE March 2022	DRAWING NO. 3

APPENDIX B

Borehole Logs & Grain Size Analyses

NOTES ON SAMPLE DESCRIPTIONS

1. All descriptions included in this report follow the Canadian Foundation Engineering Manual soil classification system, based on visual and tactile examination which are consistent with field identification procedures. Soil descriptions and classifications are based on Unified Soil Classification System (USCS), based on visual and tactile observations. Where grain size analyses have been specified, mechanical grain size distribution has been used to confirm soil classification.

Soil Classification	Terminology & Proportion
Clay: < 0.002 mm	Trace: < 10%
Silt: 0.002 – 0.075 mm	Some: 10-20%
Sand: 0.075 – 4.75 mm	Adjective, sandy, gravelly, etc.: 20-35%
Gravel: 4.75 mm – 75 mm	And, and gravel, and silt, etc.: > 35%
Cobbles: 75 – 200 mm	Noun, Sand, Gravel, Silt, etc.: > 35% and main fraction
Boulders: > 200 mm	

2. The compactness of cohesionless soils is based on excavator / drilling resistance, and Standard Penetration Test (SPT) N-values where available. The Canadian Foundation Engineering Manual provides the following summary for reference.

Compactness of Cohesionless Soils	SPT N-Value (# blows per 0.3 m penetration of split-spoon sampler)
Very Loose	0 – 4
Loose	4 – 10
Compact	10 – 30
Dense	30 – 50
Very Dense	50+

3. Topsoil Thickness - It should be noted that topsoil quantities should not be established from information provided at test hole locations only. If required, a more detailed analysis with additional test holes may be recommended to accurately quantify the amount of topsoil to be removed for construction purposes.
4. Fill material is heterogeneous in nature, and may vary significantly in composition, density and overall condition. Where uncontrolled fill is contacted, it is possible that large obstructions or pockets of otherwise unsuitable or unstable soils may be present beyond test hole locations.
5. Where glacial till is referenced, this is indicative of material which originates from a geological process associated with glaciation. Because of this geological process, till must be considered heterogeneous in composition and as such, may contain pockets and / or seams of material such as sand, gravel, silt or clay. Till often contains cobbles or boulders and therefore, contractors may encounter them during excavation, even if they are not indicated on the logs. Where soil samples have been collected using borehole sampling equipment, it should be understood that normal sampling equipment can not differentiate size or type of obstruction. Horizontal and vertical variability occurs in till, therefore the sample description may be applicable to a very limited area.
6. Consistency of cohesive soils is based on tactile examination and undrained shear strength where available. The Canadian Foundation Engineering Manual provides the following summary for field identification methods and classification by corresponding undrained shear strength.

Consistency of Cohesive Soils	Field Identification	Undrained Shear Strength (kPa)
Very Soft	Easily penetrated several cm by the fist	0 – 12
Soft	Easily penetrated several cm by the thumb	12 – 25
Firm	Can be penetrated several cm by the thumb with moderate effort	25 – 50
Stiff	Readily indented by the thumb, but penetrated only with great effort	50 – 100
Very Stiff	Readily indented by the thumb nail	100 – 200
Hard	Indented with difficulty by the thumbnail	200+



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
1
 Sheet 1 of 1

Date Drilled	September 25, 2017	Ground Surface Elevation	286.60 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Hollow Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.5						TOPSOIL - brown sandy loam (75 mm)	
0.5 - 1.0	▲	1	70	17		SILT TILL - brown, some clay, trace sand and fine gravel, very stiff, damp	MC = 16.8
1.0 - 1.5	▲	2	60	16			
1.5 - 2.0	▲	3	90	18			
2.0 - 2.5	▲	4	80	16		- some fine sand layering (~50 mm) at 2.5 m depth	MC = 19.1
2.5 - 3.0	▲						
3.0 - 3.5	▲						
3.5 - 4.0	▲						
4.0 - 4.5	▲						
4.5 - 5.0	▲	5	80	12			
5.0 - 5.5	▲						
5.5 - 6.0	▲						
6.0 - 6.5	▲	6	80	79		SANDY SILT TILL - brown, trace fine gravel, trace clay, very dense, moist	MC = 21.2
6.5 - 7.0	▲						
7.0 - 7.5	▲						
7.5 - 8.0	▲	7	70	87			
8.0 - 8.08							
						BH Terminated at 8.08 m depth Open and dry upon completion	

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter No well installation</p> <p>Installation Depth --</p> <p>Screen Length --</p> <p>Depth of Bentonite Seal --</p> <p style="text-align: center;">353</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p>
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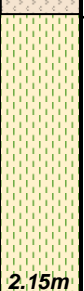
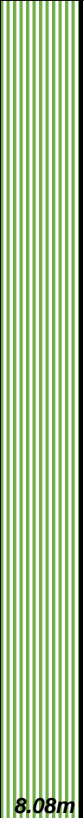
Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**






Borehole ID

2

Sheet 1 of 1

Date Drilled	September 25, 2017	Ground Surface Elevation	284.01 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Hollow Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						<u>TOPSOIL</u> - brown sandy loam (75 mm)	
1.0	▲	1	70	5		<u>SANDY SILT</u> - brown, intermittent topsoil inclusions to 1.4 m depth, loose, moist	MC = 16.5
1.5	▲	2	80	4			
2.0					2.15m		
2.5	▲	3	90	19		<u>SILT TILL</u> - brown to grey, trace clay, trace gravel, very	MC = 18.9
3.0	▲	4	90	18		- becoming grey below 3.0 m depth	
3.5							
4.0							
4.5	▲	5	90	13			
5.0							
5.5							
6.0	▲	6	80	12			MC = 17.4
6.5							
7.0							
7.5	▲	7	70	15			
8.0					8.08m		
						BH Terminated at 8.08 m depth Open and dry upon completion	

<p>Legend</p> <ul style="list-style-type: none">  SPT Sample  Bulk Sample  Shelby Tube  Stabilized Groundwater  Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter No well installation</p> <p>Installation Depth --</p> <p>Screen Length --</p> <p>Depth of Bentonite Seal --</p> <p style="text-align: center;">354</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p>
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID

3

Sheet 1 of 1

Date Drilled	September 25, 2017	Ground Surface Elevation	285.99 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Hollow Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown sandy loam (100 mm)	
1.0	▲	1	60	40		SILT - brown, trace sand, dense, damp	MC = 11.5
1.5					1.42m		
2.0	▲	2	75	22		SILT TILL - brown, some clay, trace sand, trace fine gravel, very stiff, moist	MC = 22.4
2.5						- contains some fine sand layering at 2.3 m depth	
3.0	▲	3	70	18			
3.5							MC = 18.7
4.0							
4.5	▲	4	90	22			
5.0						- brown / grey mottled, and stiff below 4.5 m depth	
5.5							
6.0	▲	5	80	14			
6.5						- grey below 6.0 m depth	MC = 19.6
7.0							
7.5	▲	6	70	12			
8.0					8.08m		
						BH Terminated at 8.08 m depth Open and dry upon completion	

<p>Legend</p> <ul style="list-style-type: none"> ▲ SPT Sample ⊠ Bulk Sample ▨ Shelby Tube ▼ Stabilized Groundwater ▽ Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter No well installation</p> <p>Installation Depth --</p> <p>Screen Length --</p> <p>Depth of Bentonite Seal --</p> <p style="text-align: center;">355</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p>
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
4
 Sheet 1 of 1

Date Drilled	October 2, 2017	Ground Surface Elevation	286.62 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						<u>TOPSOIL</u> - brown sandy loam (50 mm)	
1.0						<u>SANDY SILT</u> - brown, trace to some gravel, loose, damp	
1.5	⊗	1					Sample 1 Gravel - 5.9% Sand - 31.6% Fines - 62.5% MC = 8.3
2.0					2.42m		
2.5						<u>SILT TILL</u> - brown, some clay, trace sand and fine gravel, firm to stiff, moist	
3.0	⊗	2					
3.5							
4.0							
4.5	⊗	3					MC = 15.9
5.0							
5.5							
6.0	⊗	4				- some sand present below 6.0 m depth	
6.5							
7.0							
7.5	⊗	5				- becoming grey below 7.5 m depth	MC = 17.6
8.0					8.08m		
						BH Terminated at 8.08 m depth Open and dry upon completion	

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter No well installation</p> <p>Installation Depth --</p> <p>Screen Length --</p> <p>Depth of Bentonite Seal --</p> <p style="text-align: center;">356</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p>
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
**5/MW
 Shallow**

Sheet 1 of 1

Date Drilled	September 25, 2017	Ground Surface Elevation	282.06 m
Drill Rig	LST - Track	Groundwater Level at Completion	DRY
Drilling Method	Hollow Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						SANDY SILT - brown, trace gravel, loose, moist	
1.0		1	60	4			MC = 8.9
1.5							
2.0		2	70	4		- very moist to wet near 1.8 m depth	MC = 14.1
2.24					2.24m		
2.5		3	80	5		SILT TILL - grey, some clay, trace sand and gravel, firm, moist	
3.0		4	70	9		- stiff below 3.1 m depth	MC = 16.2
3.5							
4.0							
4.5		5	90	17		- very stiff, and moist to very moist below 4.5 m depth	
5.0							
5.5					5.80m		
6.0		6	80	34		SAND - brown, fine to medium grained, trace gravel, trace silt, compact to dense, moist to very moist	
6.5						- wet at 6.4 m depth	MC = 14.9
7.0							
7.5		7	70	16		- contains some silt at 7.6 m bgs	MC = 12.9
8.0					8.08m		
						BH Terminated at 8.08 m depth Open and dry upon completion	

Legend SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater	Well 1 - Construction Details		Well 2 - Construction Details	
	Pipe Diameter	50 mm CPVC	Pipe Diameter	50 mm CPVC
	Installation Depth	2.44 m	Installation Depth	7.65 m
	Screen Length	1.52 m	Screen Length	3.05 m
	Depth of Bentonite Seal	0-0.6 m	Depth of Bentonite Seal	0-4.3m
	Well Equipped with lockable cap.		Well Equipped with lockable cap.	
	Screen length backfilled with Type 2 filter sand.		Screen backfilled with Type 2 filter sand.	

Note:
Deen well



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
5/MW
Deep
Sheet 1 of 1

Date Drilled	February 10, 2021	Ground Surface Elevation	282.35 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.5						TOPSOIL - brown, sandy loam, 152 mm	
0.5 - 1.0	█	1	-	-	2.24 m	SILTY SAND - brown, fine grained, wet	
1.0 - 1.5	█	2	-	-			
1.5 - 2.0	█	3	-	-	5.80 m	SILT TILL - brown, some clay, trace sand, trace fine gravel, moist	
2.0 - 2.5	█	4	-	-			
2.5 - 3.0	█	5	-	-			
3.0 - 3.5	█	6	-	-	8.08 m	SAND - brown, fine to medium grained, trace gravel, trace silt, very moist	▼ May 30/21 WL - 6.68 m
3.5 - 4.0	█	7	-	-		- some silt observed below 7.1 m depth	
4.0 - 4.5							
4.5 - 5.0							
5.0 - 5.5							
5.5 - 6.0							
6.0 - 6.5							
6.5 - 7.0							
7.0 - 7.5							
7.5 - 8.0							
8.0						Gradation: 0% Gravel, 90% Sand, 20% Fines (Silt/Clay)	MC - 13.2%
						BH Terminated at 8.08 m MW Installed at 7.62 m - refer to details below	

Legend

- █ SPT Sample
- Bulk Sample
- Shelby Tube
- ▼ Stabilized Groundwater
- ⊘ Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 7.62 m
 Screen Length 3.05 m w/ No. 2 filter sand
 Depth of Bentonite Seal 2.44 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 5.38 m bgs
 May 30, 2021 - WL, 6.68 m bgs



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
6 / MW
 Sheet 1 of 1

Date Drilled	September 25, 2017	Ground Surface Elevation	282.67 m
Drill Rig	LST - Track	Groundwater Level at Completion	8.0 m
Drilling Method	Hollow Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						SANDY SILT - brown, trace gravel, loose, moist	
1.0		1	75	7			
1.5						- very moist to wet near 1.8 m depth	
2.0		2	70	5	2.13m		
2.5		3	60	20		SILT TILL - mottled brown to grey to 2.4 m depth, some clay, trace gravel, very stiff, moist	
3.0		4	60	22			
3.5							
4.0							
4.5							
5.0		5	70	26			
5.5							
6.0							
6.5		6	80	15			
7.0							
7.5							
8.0		7	70	19	8.08m		
						BH Terminated at 8.08 m depth Open with 50-75mm of water at base	

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter 50 mm CPVC</p> <p>Installation Depth 2.44 m</p> <p>Screen Length 1.52 m</p> <p>Depth of Bentonite Seal 0 to 0.6 m</p> <p>Well Equipped with lockable cap.</p> <p>Screen length backfilled with Type 2 filter sand.</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p> <p>Note: Well reported as damaged in Jan 2021. Refer to reinstallation details (Feb 2021) noted on following page.</p>
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Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
6/MW

Sheet 1 of 1

Date Drilled	February 11, 2021	Ground Surface Elevation	282.94 m asl
Drill Rig	D50 Turbo	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.5						TOPSOIL - brown, sandy loam, 152 mm	
0.5 - 1.0		1	-	-		SILTY SAND - brown, fine grained, saturated	May 30/21 WL - 0.72 m MC - 27.8%
1.0 - 1.5		2	-	-			
1.5 - 2.0		2	-	-			
2.0 - 2.5		3	-	-			
2.5 - 3.0		3	-	-	2.44 m	SILT TILL - brown, some clay, trace sand, trace fine gravel, moist	
3.0 - 3.5		4	-	-	3.51 m		MC - 25.4%
3.5 - 8.0						BH Terminated at 3.51 m MW Installed at 3.05 m - refer to details below	

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 3.05 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 1.53 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 0.62 m bgs
 May 30, 2021 - WL, 0.72 m bgs



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
7
 Sheet 1 of 1

Date Drilled	October 2, 2017	Ground Surface Elevation	282.56 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						SANDY SILT - brown, trace clay, trace gravel, loose, moist	
1.0							
1.5	X	1			1.36m	SILT TILL - brown, some clay, trace sand and fine gravel, stiff, moist	MC = 16.8
2.0							
2.5							
3.0	X	2				- becoming grey below 3.5 m depth	
3.5							
4.0							
4.5	X	3				- stiff to very stiff below 4.5 m depth	MC = 18.4
5.0							
5.5							
6.0	X	4					
6.5							
7.0							
7.5	X	5					
8.0					8.08m		
						BH Terminated at 8.08 m depth Open and dry upon completion	

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter No well installation</p> <p>Installation Depth --</p> <p>Screen Length --</p> <p>Depth of Bentonite Seal --</p> <p style="text-align: center;">361</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p>
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
8
 Sheet 1 of 2

Date Drilled	October 2, 2017	Ground Surface Elevation	281.65 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.1						TOPSOIL - brown sandy loam (100 mm)	
0.1 - 0.2						SANDY SILT - brown, loose, moist (150 mm)	
0.2 - 1.0	X	1				SILT TILL - brown, some clay, trace fine gravel, trace sand, firm to stiff, moist - becoming grey and stiff below 2.5 m depth	<i>MC = 20.1</i>
1.0 - 1.5	▲	2	90	21			
1.5 - 2.5	X	3					
2.5 - 3.5	▲	4	80	28			
3.5 - 4.5							
4.5 - 5.0	▲	5	80	24			
5.0 - 6.0	X	6					
6.0 - 7.15							
7.15 - 7.5						SILTY SAND - brown, fine grained, trace gravel, compact, damp to moist	
7.5 - 8.0	X	7					<i>MC = 7.3</i>

BH continued on following page

Legend SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater	Well Construction Details Pipe Diameter No well installation Installation Depth -- Screen Length -- Depth of Bentonite Seal -- 362	Additional Notes MC denotes moisture content
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID

8

Sheet 2 of 2

Date Drilled	October 2, 2017	Ground Surface Elevation	281.65 m
Drill Rig	LST - Track	Groundwater Level at Completion	None observed
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
8.5	X	8			8.52m	SILTY SAND - brown, trace gravel, trace clay, compact, damp to moist	
9.0						SILT TILL - grey, some clay, trace sand, very stiff, moist	
10.0	X	9			10.67m	BH Terminated at 10.67 m depth Open and dry upon completion	
10.5							
11.0							
11.5							
12.0							
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter --</p> <p>Installation Depth --</p> <p>Screen Length --</p> <p>Depth of Bentonite Seal --</p> <p style="text-align: center;">363</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p>
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
9 / MW
Sheet 1 of 2

Date Drilled	October 2, 2017	Ground Surface Elevation	283.93 m
Drill Rig	LST - Track	Groundwater Level at Completion	DRY
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5					0.76m	SANDY SILT - brown, trace gravel, trace clay, loose, moist	
1.0						SILT TILL - grey, some clay, trace sand and gravel, firm, moist to very moist	
1.5		1					
2.0							
2.5						- moist, stiff below 2.5 m depth	
3.0		2					
3.5							
4.0							
4.5		3					
5.0							
5.5							
6.0		4				- very stiff below 6.0 m depth	
6.5							
7.0							
7.5		5					
8.0							

BH continued on following page

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter 50 mm CPVC</p> <p>Installation Depth 3.96 m</p> <p>Screen Length 3.05 m</p> <p>Depth of Bentonite Seal 0 to 0.6 m</p> <p>Well Equipped with lockable cap.</p> <p>Screen length backfilled with Type 2 filter sand.</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p>
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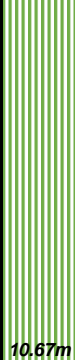
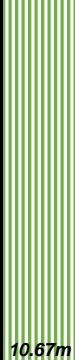
Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**






Borehole ID

9 / MW

Sheet 2 of 2

Date Drilled	October 2, 2017	Ground Surface Elevation	283.93 m
Drill Rig	LST - Track	Groundwater Level at Completion	DRY
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
8.5		8				SILT TILL - grey, some clay, trace sand and gravel, very stiff, moist	
9.0							
9.5		9					
10.0							
10.5					10.67m		
11.0						BH Terminated at 10.67 m depth Open and dry upon completion	
11.5							
12.0							
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							

<p><u>Legend</u></p> <ul style="list-style-type: none">  SPT Sample  Bulk Sample  Shelby Tube  Stabilized Groundwater  Inferred Groundwater 	<p><u>Well Construction Details</u></p> <p>Pipe Diameter 50 mm CPVC Installation Depth 3.96 m Screen Length 3.05 m w/ Type 2 sand Depth of Bentonite Seal 0 to 0.6 m <i>Note: Well equipped with lockable cap</i> 365</p>	<p><u>Additional Notes</u></p> <p>MC denotes moisture content</p>
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Borehole ID
10 / MW
 Sheet 1 of 1

Date Drilled	October 2, 2017	Ground Surface Elevation	285.98 m
Drill Rig	LST - Track	Groundwater Level at Completion	4.5 m
Drilling Method	Solid Stem Augers	Technician	Nick Houlton
Drilling Contractor	London Soil Test Ltd	Checked By	R. Walker, P.Eng.


Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown sandy loam (75 mm)	MC = 12.6
1.0		1				SANDY SILT - brown, trace gravel, trace clay, loose, moist	
1.5					1.42m		Sample 3 Gravel - 2.2% Sand - 57.9% Fines - 39.9% MC = 11.0
2.0		2			2.22m	SILT - brown / grey mottled, some clay, some sandy silt layering, moist, firm	
2.5		3				SILTY SAND - brown, fine to medium grained, trace clay, loose, moist	
3.0							MC = 20.3
3.5		4			3.51m		
4.0						SILT TILL - grey, some clay, trace sand, stiff to very stiff,	MC = 17.7
4.5		5					
5.0							
5.5							MC = 17.7
6.0		6					
6.5							MC = 17.7
7.0							
7.5							MC = 17.7
8.0		7			8.08m		
						BH Terminated at 8.08 m depth Open to 4.5 m, water at 4.5 m	

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter 50 mm CPVC</p> <p>Installation Depth 4.57 m</p> <p>Screen Length 3.05 m</p> <p>Depth of Bentonite Seal 0 to 1.2 m</p> <p>Well Equipped with lockable cap.</p> <p>Screen length backfilled with Type 2 filter sand.</p>	<p>Additional Notes</p> <p>MC denotes moisture content</p>
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	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	101
	Project Number	GE-00085	Sheet 1 of 1


Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25						SANDY SILT - brown, some topsoil and organic inclusions, wet	<input checked="" type="checkbox"/> Bulk Sample
0.50							
0.75	X	1			1.06m		
1.00	X						
1.25						SILT TILL - brown, some clay, moist	
1.50	X	2			1.52m		
1.75						Hole Terminated at 1.52 m bgs.	
2.00							




	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	102
	Project Number	GE-00085	Sheet 1 of 1


Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25						SANDY SILT - brown, some topsoil and organic inclusions, wet	<input checked="" type="checkbox"/> Bulk Sample
0.50							
0.75	X	1					
1.00	X				1.52m		
1.25						SILT TILL - mottled brown-grey, some clay, moist	
1.50							
1.75	X	2			1.82m		
2.00						Hole Terminated at 1.82 m bgs.	




	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	103
	Project Number	GE-00085	Sheet 1 of 1


Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25	<input checked="" type="checkbox"/>	1				SANDY SILT - brown, some topsoil and organic inclusions, wet	<input checked="" type="checkbox"/> Bulk Sample
0.50							
0.75						SILT TILL - mottled brown-grey, some clay, moist	
1.00							
1.25	<input checked="" type="checkbox"/>	2					
1.50							
1.75						Hole Terminated at 1.52 m bgs.	
2.00							

	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	104
	Project Number	GE-00085	Sheet 1 of 1


Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25	<input checked="" type="checkbox"/>	1				SANDY SILT - brown, some topsoil and organic inclusions, wet	<input checked="" type="checkbox"/> Bulk Sample
0.50							
0.75						SILT TILL - mottled brown-grey, some clay, moist	
1.00							
1.25	<input checked="" type="checkbox"/>	2					
1.50							
1.75						Hole Terminated at 1.52 m bgs.	
2.00							

	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	105
	Project Number	GE-00085	Sheet 1 of 1

Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25	<input checked="" type="checkbox"/>	1				SANDY SILT - brown, some topsoil and organic inclusions, wet	
0.50							
0.75							
1.00					1.07m	SILT TILL - mottled brown-grey, some clay, moist	
1.25	<input checked="" type="checkbox"/>	2					
1.50					1.52m		
1.75						Hole Terminated at 1.52 m bgs.	
2.00							<input checked="" type="checkbox"/> Bulk Sample

	Project	Hydrogeological Assessment	Auger Probe
	Project Location	952 Southdale Road West, London	106
	Project Number	GE-00085	Sheet 1 of 1

Date Drilled	October 2, 2017	Drilling Contractor	London Soil Test Ltd
Drill Rig	LST - Track	Technician	Nick Houlton
Drilling Method	Solid Stem Augers	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25						SANDY SILT - brown, some topsoil and organic inclusions, wet	
0.50	<input checked="" type="checkbox"/>	1					
0.75							
1.00						SILT TILL - mottled brown-grey, some clay, moist	
1.25	<input checked="" type="checkbox"/>	2					
1.50					1.52m		
1.75						Hole Terminated at 1.52 m bgs.	
2.00							<input checked="" type="checkbox"/> Bulk Sample



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Piezometer
201
Shallow
Sheet 1 of 1

Date Drilled	October 20, 2017	Ground Surface Elevation	281.01 m
Drill Rig		Groundwater Level at Completion	0.05 m
Drilling Method	Hand-held Auger	Technician	Rob Walker
Drilling Contractor	LDS Consultants	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25	X	1			▼	TOPSOIL & ORGANICS - (300 mm)	
0.50	X	2			■	SANDY SILT - brown, some topsoil and organic inclusions, saturated	
0.75						Hole Terminated at 0.55 m bgs.	
1.00							
1.25							
1.50							
1.75							
2.00							

<p>Legend</p> <ul style="list-style-type: none"> SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater 	<p>Well Construction Details</p> <p>Pipe Diameter 50 mm CPVC Installation Depth 0.55 m Screen Length 0.35 m Depth of Bentonite Seal none Piezometer equipped with lockable cap.</p>	<p>Additional Notes</p> <p>Water Levels Oct 20 2017 - 0.05 m depth Oct 23 2017 - 0.17 m depth Nov 08 2017 - 0.10 m above ground Dec 01 2017 - at ground surface Jan 10 2018 - frozen</p>
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Piezometer
201
Deep
Sheet 1 of 1

Date Drilled	February 18, 2021	Ground Surface Elevation	281.09 m
Drill Rig		Groundwater Level at Completion	frozen at surface
Drilling Method	Hand-held Auger	Technician	Rob Walker
Drilling Contractor	LDS Consultants	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25						TOPSOIL & ORGANICS - (300 mm), frozen	
0.50		1				SANDY SILT - brown, some topsoil and organic inclusions, wet	
0.75		2				SILT TILL - mottled, brown-grey, trace sand and fine gravel, wet	
1.00						Hole Terminated at 0.91 m bgs.	
1.25							
1.50							
1.75							
2.00							

Legend SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater	Well Construction Details Pipe Diameter 50 mm CPVC Installation Depth 0.76 m Screen Length 0.45 m Depth of Bentonite Seal none Piezometer equipped with lockable cap.	Additional Notes
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Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Piezometer
PZ202A

Sheet 1 of 1

Date Drilled	October 20, 2017	Ground Surface Elevation	280.96 m
Drill Rig		Groundwater Level at Completion	0.04 m
Drilling Method	Hand-held Auger	Technician	Rob Walker
Drilling Contractor	LDS Consultants	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25		1				TOPSOIL & ORGANICS - (1.0 m)	
0.75		2					
1.00		3				SANDY SILT - brown, some topsoil and organic inclusions, saturated	
1.25						Hole Terminated at 1.21 m bgs.	
1.50							
1.75							
2.00							

Legend	Well Construction Details
SPT Sample	Pipe Diameter 50 mm CPVC
Bulk Sample	Installation Depth 1.21 m
Shelby Tube	Screen Length 1.06 m
Stabilized Groundwater	Depth of Bentonite Seal none
Inferred Groundwater	Piezometer equipped with lockable cap.



Project **Hydrogeological Assessment**
 Project Location **952 Southdale Road West, London**
 Project Number **GE-00085**

Piezometer
PZ202B

Sheet 1 of 1

Date Drilled	October 20, 2017	Ground Surface Elevation	284.19 m
Drill Rig		Groundwater Level at Completion	frozen at surface
Drilling Method	Hand-held Auger	Technician	Rob Walker
Drilling Contractor	LDS Consultants	Checked By	R. Walker, P.Eng.

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.25						TOPSOIL & ORGANICS - (0.28 m)	
0.50	X	1				SANDY SILT - brown, some topsoil and organic inclusions, saturated	
0.75							
1.00							
1.25	X	2				SILT - grey, some sand, damp, compact, wet	
1.50						Hole Terminated at 1.35 m bgs.	
1.75							
2.00							

Legend	Well Construction Details
SPT Sample	Pipe Diameter 50 mm CPVC
Bulk Sample	Installation Depth 1.35 m
Shelby Tube	Screen Length 1.06 m
Stabilized Groundwater	Depth of Bentonite Seal none
Inferred Groundwater	Piezometer equipped with lockable cap.



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
PZ203

Sheet 1 of 1

Date Drilled	February 10, 2021	Ground Surface Elevation	Shallow - 281.69 m asl
Drill Rig	GeoProbe		Deep - 281.66 m asl
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown, silty loam, 25 mm	
1.0						SILTY SAND - brown, fine grained, saturated	MC - 18.6%
1.5	▲	1	-	-			MC - 22.0%
2.0							
2.5					2.44 m		
3.0	▲	2	-	-		SILT TILL - grey, trace clay, trace sand, trace fine gravel, damp	
3.5					3.51 m		
4.0						BH Terminated at 3.51 m MW Installed at 3.05 m - refer to details below	
4.5						MC - denotes moisture content	
5.0							
5.5							
6.0							
6.5							
7.0							
7.5							
8.0							

Legend

- ▲ SPT Sample
- ⊠ Bulk Sample
- ▨ Shelby Tube
- ▼ Stabilized Groundwater
- ▽ Inferred Groundwater

Well Construction Details (Shallow)

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 1.21 m
 Screen Length 0.45 m w/ No. 2 filter sand

Well equipped with locking J-Plug cap.

Well Construction Details (Deep)

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 3.51 m
 Screen Length 1.52 m w/ sand
 Depth of Bentonite Seal 1.22 m

Well equipped with locking J-Plug cap.



Project	Proposed Residential & Commercial Development	Borehole ID
Project Location	952 Southdale Road, London, ON	301/MW
Project Number	GE-00085	Sheet 1 of 1

Date Drilled	February 10, 2021	Ground Surface Elevation	287.09 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.152						TOPSOIL - brown, sandy loam, 152 mm	
0.152 - 1.5						SILT TILL - brown, some clay, trace sand, trace fine gravel, moist	
1.5	▲	1	-	-			MC - 15.0%
2.5	▲	2	-	-			MC - 15.5%
3.0	▲	3	-	-			MC - 17.4%
4.5	▲	4	-	-			MC - 18.4%
5.48					5.48 m		
5.48 - 6.0						SAND - brown, fine grained, trace to some gravel, trace silt, damp	
6.0 - 6.6	▲	5	-	-		- damp gravelly sand seam encountered at 6.6 m depth	MC - 2.9%
6.6 - 7.0	▲	6	-	-		Gradation: 24% Gravel, 65% Sand, 11% Fines (Silt/Clay)	MC - 1.9%
7.0 - 8.0	▲	7	-	-		- some silt observed below 8.0 m depth	MC - 19.3%
8.0					8.08 m		
						BH Terminated at 8.08 m MW Installed at 7.62 m - refer to details below	

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter	50 mm CPVC pipe
Installation Depth	7.62 m
Screen Length	1.52 m w/ No. 2 filter sand
Depth of Bentonite Seal	4.88 m

Well equipped with locking J-Plug cap.

Additional Notes



MC - denotes moisture content
 April 27, 2021 - WL, Dry
 May 30, 2021 - WL, Dry








Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
302/MW
Sheet 1 of 1

Date Drilled	February 10, 2021	Ground Surface Elevation	284.54 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	Seepage at 4.3 m depth
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.5						TOPSOIL - brown, sandy loam, 203 mm	
0.5 - 1.0		1	-	-		SILT TILL - brown/grey, mottled, weathered, trace sand, trace fine gravel, moist	MC - 19.7%
1.0 - 1.5		2	-	-		- becoming brown and less weathered below 1.4 m depth	MC - 16.1%
1.5 - 2.0							
2.0 - 2.5		3	-	-		- silt with trace to some fine sand below 2.4 m depth	MC - 18.6%
2.5 - 3.0							 May 30/21  WL - 2.87 m
3.0 - 3.5		4	-	-			MC - 18.9%
3.5 - 4.0							
4.0 - 4.5						- becoming grey, contains some fine wet sand layering below 4.0 m depth	
4.5 - 5.0		5	-	-			MC - 19.0%
5.0 - 5.5						BH Terminated at 5.03 m MW Installed at 4.57 m - refer to details below	
5.5 - 6.0							
6.0 - 6.5							
6.5 - 7.0							
7.0 - 7.5							
7.5 - 8.0							

Legend

-  SPT Sample
-  Bulk Sample
-  Shelby Tube
-  Stabilized Groundwater
-  Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 4.57 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 2.44 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 1.30 m bgs
 May 30, 2021 - WL, 2.87 m bgs



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
303/MW - Shallow
Sheet 1 of 1

Date Drilled	February 11, 2021	Ground Surface Elevation	288.70 m asl
Drill Rig	D50 Turbo	Groundwater Level at Completion	Seepage at 3.2 m depth
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown, sandy loam, 152 mm	
1.0		1	-	-		SILT TILL - brown/grey, mottled, weathered, some clay, trace sand, trace fine gravel, moist - becoming brown and less weathered below 2.9 m depth, with intermittent fine wet sand seams throughout	MC - 17.9%
1.5		2	-	-			MC - 19.5%
2.0		3	-	-			May 30/21 WL - 2.63 m
2.5		4	-	-			3.2 m
3.0		5	-	-			4.27 m
4.0						BH Terminated at 4.27 m MW Installed at 3.81 m - refer to details below	
4.5							
5.0							
5.5							
6.0							
6.5							
7.0							
7.5							
8.0							

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 3.81 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 1.98 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 1.95 m bgs
 May 30, 2021 - WL, 2.63 m bgs



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
303/MW - Deep
Sheet 1 of 2

Date Drilled	February 11, 2021	Ground Surface Elevation	288.70 m asl
Drill Rig	D50 Turbo	Groundwater Level at Completion	8.65 m depth at completion
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown, sandy loam, 152 mm	
1.0	▲	1	-	-		SILT TILL - brown/grey, mottled, weathered, some clay, trace sand, trace fine gravel, moist	MC - 17.9%
1.5	▲	2	-	-		MC - 19.5%	
2.0	▲	3	-	-		MC - 18.0%	
2.5	▲	4	-	-		- becoming brown and less weathered below 2.9 m depth, with intermittent fine wet sand seams throughout	
3.0	▲	5	-	-			
3.5	▲	6	-	-			
4.0	▲	7	-	-			MC - 20.3%
4.5	▲	8	-	-			
5.0							
5.5							
6.0							
6.5							
7.0					7.09 m		
7.5						SAND - brown, fine grained, trace gravel, trace silt, very moist	
8.0	▲	8	-	-			MC - 4.2%

continued on the following page

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 9.14 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 7.32 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 9.03 m bgs
 May 30, 2021 - WL, 9.10 m bgs



Project	Proposed Residential & Commercial Development	Borehole ID
Project Location	952 Southdale Road, London, ON	303/MW - Deep
Project Number	GE-00085	Sheet 2 of 2

Date Drilled	February 11, 2021	Ground Surface Elevation	288.70 m asl
Drill Rig	D50 Turbo	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
8.5					▽ 8.65m	<i>continued from previous page</i> - becoming saturated, silty sand below 8.6 m depth	▽ May 30/21 WL - 9.10 m
9.0	■	9	-	-	9.60 m	Gradation: 0% Gravel, 64% Sand, 36% Fines (Silt/Clay)	
9.5						BH Terminated at 9.60 m MW Installed at 9.14 m - refer to details below	
10.0							
10.5							
11.0							
11.5							
12.0							
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							

Legend SPT Sample Bulk Sample Shelby Tube Stabilized Groundwater Inferred Groundwater	Well Construction Details Pipe Diameter 50 mm CPVC pipe Installation Depth 9.14 m Screen Length 1.52 m w/ No. 2 filter sand Depth of Bentonite Seal 7.32 m <i>Well equipped with locking J-Plug cap.</i>	Additional Notes MC - denotes moisture content April 27, 2021 - WL, 9.03 m bgs May 30, 2021 - WL, 9.10 m bgs
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Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
304/MW - Shallow
Sheet 1 of 1

Date Drilled	February 10, 2021	Ground Surface Elevation	282.26 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown, silty loam, 152 mm	
1.0		1	-	-		SILT - brown, weathered, some sand, damp -wet sandy silt seams below 1.1 m depth	May 30/21 WL - 1.04 m
1.5					1.37 m		
2.0		2	-	-		SILT TILL - brown/grey, mottled, weathered, trace to some fine sand, trace fine gravel, damp	MC - 17.3%
2.5		3	-	-			MC - 20.5%
3.0		4	-	-			MC - 20.6%
3.5						- becoming brown and less weathered below 3.7 m depth	
4.0		5	-	-	4.27 m		MC - 20.1%
4.5						BH Terminated at 4.27 m MW Installed at 3.81 m - refer to details below	
5.0							
5.5							
6.0							
6.5							
7.0							
7.5							
8.0							

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 3.81 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 1.98 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 0.71 m bgs
 May 30, 2021 - WL, 1.04 m bgs



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
304/MW - Deep
Sheet 1 of 2

Date Drilled	February 10, 2021	Ground Surface Elevation	282.26 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.0 - 0.5						TOPSOIL - brown, silty loam, 152 mm	
0.5 - 1.0		1	-	-	 1.37 m	SILT - brown, weathered, some sand, damp -wet sandy silt seams below 1.1 m depth	MC - 24.0%
1.0 - 1.5		2	-	-		SILT TILL - brown/grey, mottled, weathered, trace to some fine sand, trace fine gravel, damp	MC - 19.5%
1.5 - 2.0		3	-	-			MC - 19.9%
2.0 - 2.5		4	-	-			
2.5 - 3.0		5	-	-			- becoming brown and less weathered below 3.7 m depth
3.0 - 3.5		6	-	-			
3.5 - 4.0		7	-	-			
4.0 - 4.5		8	-	-			
4.5 - 5.0							MC - 27.8%
5.0 - 5.5							
5.5 - 6.0						- becoming grey below 5.6 m depth	
6.0 - 6.5		7	-	-			MC - 26.6%
6.5 - 7.0							
7.0 - 7.5							
7.5 - 8.0		8	-	-			MC - 19.9%

continued on the following page

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 10.67 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 8.53 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, Dry
 May 30, 2021 - WL, Dry



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
304/MW - Deep
Sheet 2 of 2

Date Drilled	February 10, 2021	Ground Surface Elevation	282.26 m asl
Drill Rig	GeoProbe	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
8.5						<i>continued from previous page</i>	
9.0		9	-	-			<i>MC - 7.2%</i>
9.5					9.60 m		
10.0						SAND - brown, fine grained, trace gravel, trace silt, damp	
10.5					10.51 m		
11.0		10	-	-		SILT TILL - grey, some clay, trace sand, trace fine gravel, damp	<i>MC - 20.4%</i>
11.0					11.13 m		
11.5						BH Terminated at 11.13 m MW Installed at 10.67 m - refer to details below	
12.0							
12.5							
13.0							
13.5							
14.0							
14.5							
15.0							
15.5							
16.0							

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 10.67 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 8.53 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, Dry
 May 30, 2021 - WL, Dry



Project **Proposed Residential & Commercial Development**
 Project Location **952 Southdale Road, London, ON**
 Project Number **GE-00085**

Borehole ID
305/MW
Sheet 1 of 1

Date Drilled	February 11, 2021	Ground Surface Elevation	284.77 m asl
Drill Rig	D50 Turbo	Groundwater Level at Completion	
Drilling Method	Hollow Stem Auger	Technician	Rob Walker
Drilling Contractor	London Soil Test	Checked By	S. Hadden, EIT

Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT N-value (blows/0.3 m)	Graphic Log	Material Description	Remarks and Other Tests
0.5						TOPSOIL - brown, silty loam, 152 mm	
1.0		1	-	-		SILT - brown, weathered, some sand, moist	May 30/21 WL - 1.02 m
1.5		2	-	-		- intermittent wet sand seams below 1.8 m depth	MC - 11.7%
2.0						2.13 m	
2.5		3	-	-		SILT TILL - brown/grey, mottled, weathered, some clay, some sand, trace fine gravel, damp - wet sand seams observed in Sample 3	MC - 22.4%
3.0		4	-	-			MC - 21.0%
3.5							
4.0		5	-	-	4.27 m	- becoming brown and less weathered below 4.0 m depth	MC - 19.4%
4.5						BH Terminated at 4.27 m MW Installed at 3.81 m - refer to details below	
5.0							
5.5							
6.0							
6.5							
7.0							
7.5							
8.0							

Legend

- SPT Sample
- Bulk Sample
- Shelby Tube
- Stabilized Groundwater
- Inferred Groundwater

Well Construction Details

Pipe Diameter 50 mm CPVC pipe
 Installation Depth 3.81 m
 Screen Length 1.52 m w/ No. 2 filter sand
 Depth of Bentonite Seal 1.98 m

Well equipped with locking J-Plug cap.

Additional Notes

MC - denotes moisture content
 April 27, 2021 - WL, 0.70 m bgs
 May 30, 2021 - WL, 1.02 m bgs



Particle Size Distribution Results of Sieve Analysis

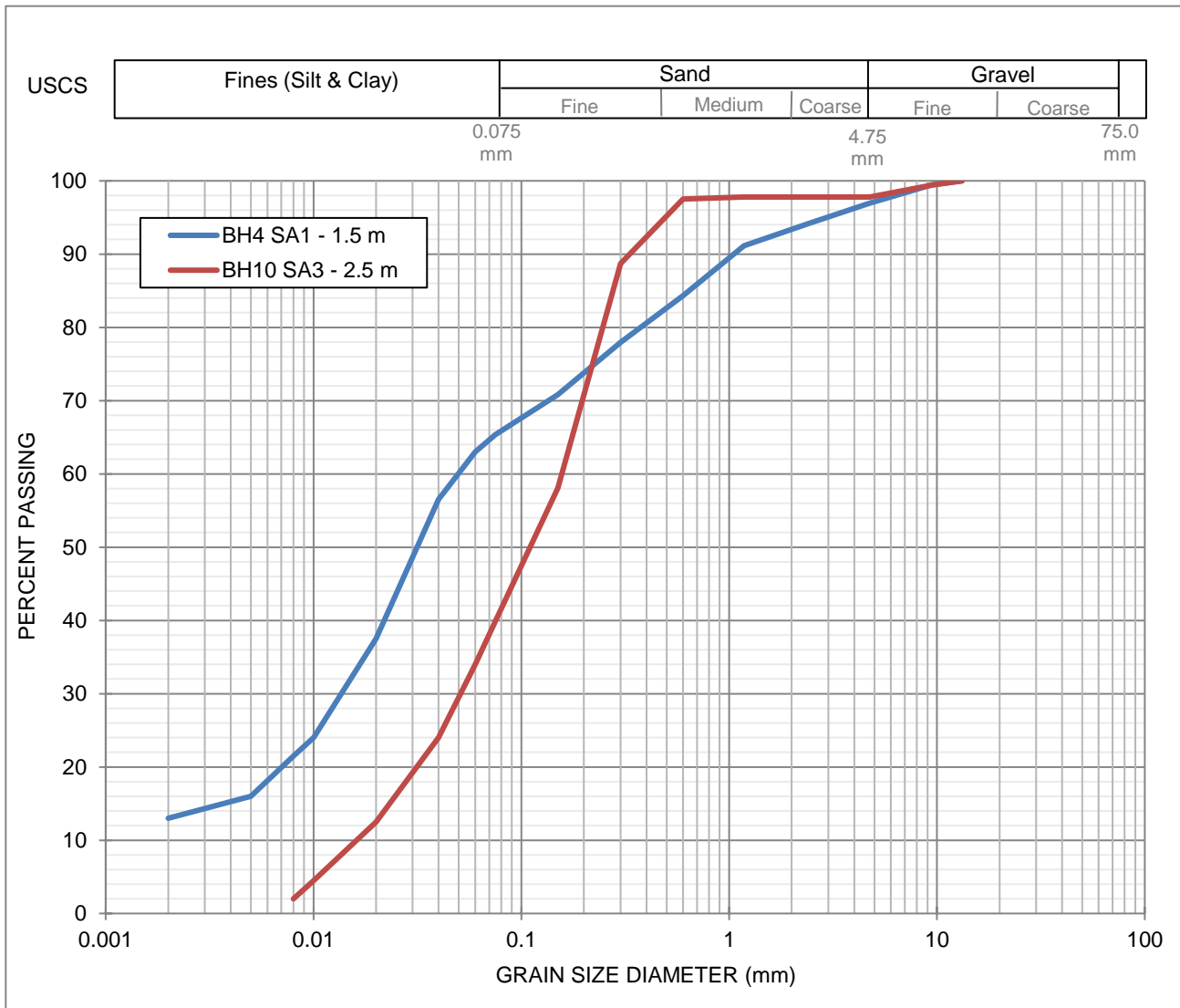
Project Name: 952 Southdale Road

Date: 25-Jan-18

Project Location: London, Ontario

Project No.: GE-00085

Sample ID	Unified Soil Classification				Moisture Content
	% Clay	% Silt	% Sand	% Gravel	
BH4 SA1 - 1.5 m	13.0%	52.4%	31.6%	3.1%	13.8%
BH10 SA3 - 2.5 m		39.9%	57.9%	2.2%	16.9%





Particle Size Distribution Results of Sieve Analysis

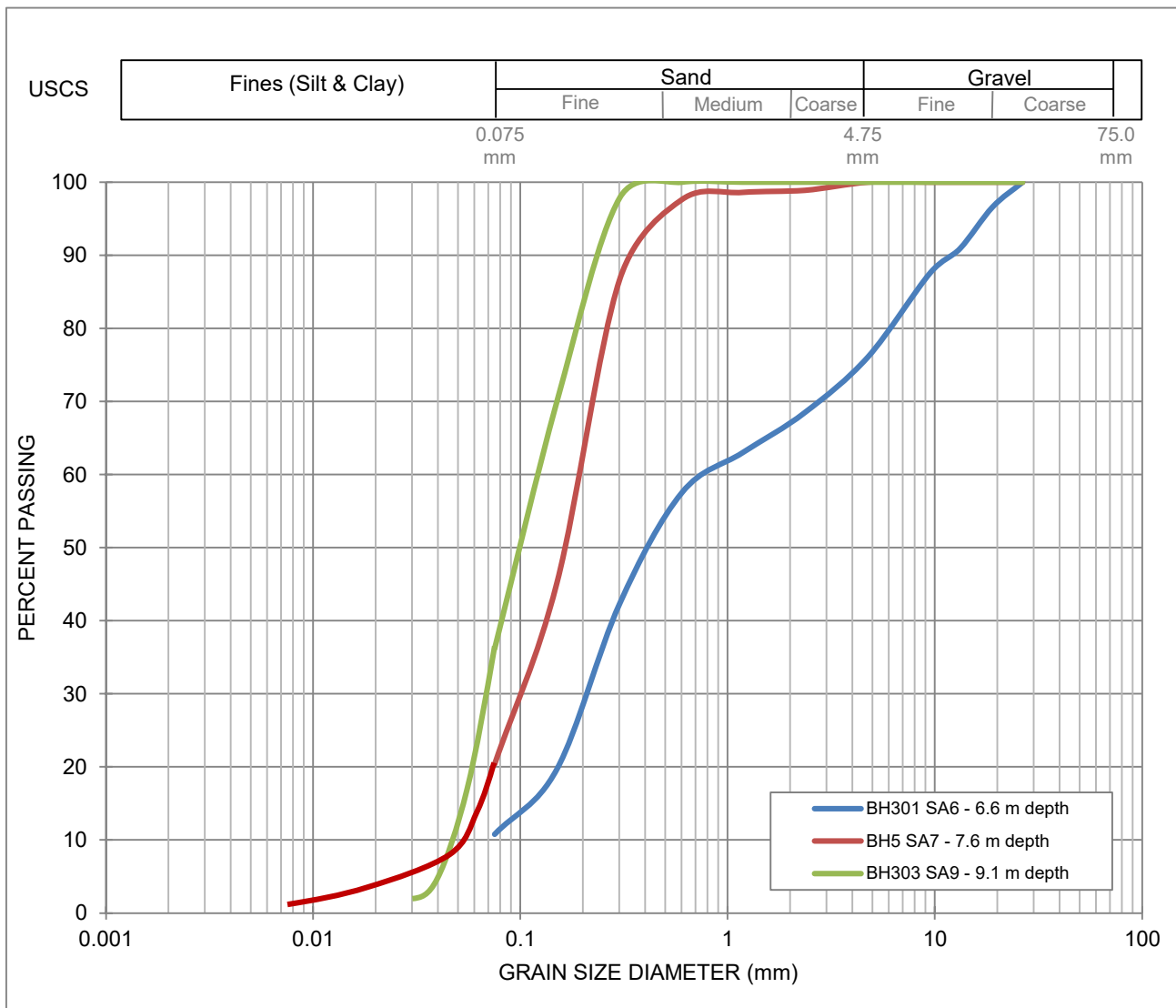
Project Name: Proposed Residential & Commercial Development

Date: 4-Jun-21

Project Location: 952 Southdale Rd, London, Ontario

Project No.: GE-00085

Sample ID	Unified Soil Classification				Moisture Content (%)
	Fines (Silt & Clay)	% Sand	% Gravel	% Cobbles	
BH301 SA6 - 6.6 m depth	10.8%	65.3%	23.9%	0.0%	2.4%
BH5 SA7 - 7.6 m depth	20.4%	79.6%	0.0%	0.0%	12.3%
BH303SA9 - 9.1 m depth	36.2%	63.8%	0.0%	0.0%	5.1%



LDS CONSULTANTS INC.

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London, Ontario N5V 0A5

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Colonel Talbot Road NE of Southdale Road

Environmental Impact Study Update (EIS Update)

Project Location:

Colonel Talbot Road NE of Southdale Road

Prepared for:

1739626 Ontario Ltd.
c/o Westdell
1701 Richmond Street, Suite 3B
London, ON N5X 3Y2

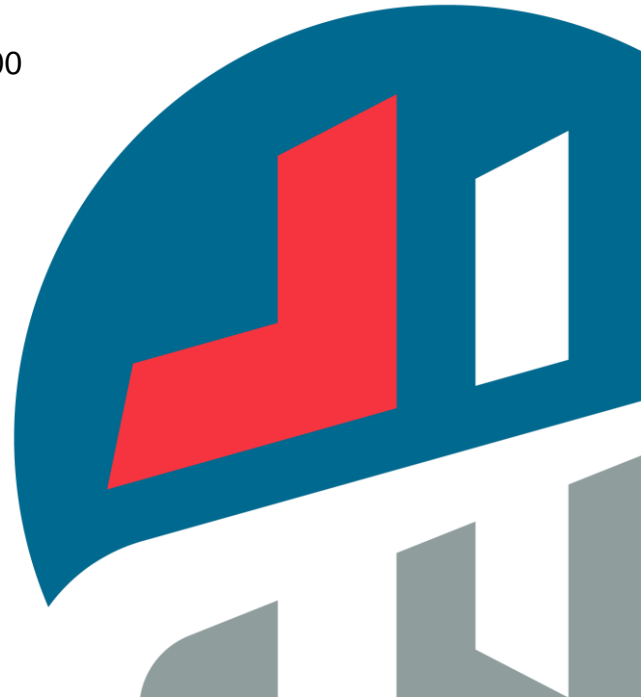
Prepared by:

MTE Consultants Inc.
123 St. George Street
London, ON N6A 3A1

August 19, 2021

Revised: May 1, 2023

MTE File No.: 45606-100





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1.0 Introduction

1739626 Ontario Limited (the proponent) is now completing the site plan process for commercial and residential development at the northeast corner of Colonel Talbot Rd and Southdale Rd in the City of London. There has been a settlement agreement on the Official Plan schedules as part of the London Plan settlement process to permit these uses. This EIS also updates the settlement agreement and information into this EIS to consolidate the ongoing discussions leading to this Site Plan submission under one document. Figures 1 through 7 of the prior EIS have remained unchanged in this EIS with the remaining figures updated to reflect a revised site plan which has been produced to incorporate responses to City comments as outlined in a letter (June 27 2022) to support the application and to address council direction as part of their zoning approval (December 2022).

The property is located on Concession 1, Part Lot 42 RP33R8507 Part 1. The area of proposed development is referred to as the Subject Lands for the purpose of this report with the lands that remain, identified as part of the larger Legal Parcel [Figure 1]. The entire Legal Parcel was studied but the separation allows, in our view, a clearer review of development plans in context with additional lands owned by the applicant which largely represent the natural features where no development is planned.

Life science data collection on the Subject Lands and remaining Legal Parcel was completed in 2017 and 2018. This report compiles the data collection for those years.

1.1 Report Objective

This report is an updated Environmental Impact Study (EIS), to address changes to the site plan and address relevant comments provided by the City of London and UTRCA as part of the zoning application [Appendix A]. This EIS is an update to a previous SLSR/EIS (scoping meeting September 17, 2020) for the Site plan to finalize development limits and zone boundaries.

This report contains recommendations to guide site plan for avoidance of impacts, mitigation of impacts, environmental management strategies, construction phasing approaches and monitoring requirements to protect the significant natural heritage features and functions.

The process and reporting are also designed to provide a support document to subsequent site alteration permit applications that may be submitted to the Upper Thames River Conservation Authority (UTRCA). Policies and procedures referenced in the prior EIS report have been maintained to simplify the review process rather than a full update to recent policy changes at the provincial level.

1.2 Format

Natural heritage features and functions identified in this EIS are evaluated through a review of the Natural Heritage Reference Manual (NHRM, 2010) for policy 2.1 of the Provincial Policy Statement (MAH, 2020), and Chapter 6 of the London Plan (2021)

This report will be circulated to the City of London and UTRCA for agency review and comment on the findings and recommendations.

This EIS contains the following components, in accordance with the standards noted above:

- Section 2.0 Land Use Setting
- Section 3.0 Triggers for EIS
- Section 4.0 Description of the Natural Environment
- Section 5.0 Natural Heritage Policy Considerations
- Section 6.0 Description of Development
- Section 7.0 Mitigation and Recommendation
- Section 8.0 Summary and Conclusion

1.3 Background Documents

The following additional study was used to review the current environment.

- Dingman Creek Subwatershed: Stormwater Servicing Study (Aquafor-Beech, DRAFT 2020)

1.4 Pre-Consultation

The development proposal included in this EIS update reflects the modifications of previous plans to incorporate changes in the plan as a result of site layout and agency comments from the Zoning submission. The main natural heritage feature to consider for this development is the adjacent wetland and that boundary has been staked and agreed to with the MNRF. The North Talbot Community Plan has been completed, which included these lands, and as a result, there is sufficient servicing in place for development.

A feature-based staking of the wetland was not completed as setbacks were agreed upon through negotiations with the City and the clear topographic boundary of the wetland feature.

2.0 Land Use Settings

The proposal is for the development of a mixed residential and commercial development within the 2.6ha area of the Subject Lands. The Subject Lands are located at 952 Southdale Road West, Part Lot 42, Concession 1, City of London, at the intersection of Southdale Road West and Colonel Talbot Road [Figure 1].

The region is primarily residential with agricultural lands at the southwest corner of Southdale Rd. W. and Colonel Talbot Rd. Components of the North Talbot PSW are located at the east edge of the Subject Lands within the larger overall Legal Parcel with additional wooded areas interspersed (to the northeast and northwest) in the surrounding landscape.

2.1 Environmental Designations

2.1.1 City of London Official Plan, Schedule B (2015)

The wetland boundary as registered with MNRF have not been updated on Map 5 at the time of this report writing and so Schedule B of the City of London Official Plan (which shows the correct boundary) is being used for this EIS [Figure 2]. There is a Provincially Significant Wetland (North Talbot PSW) along the eastern section of the Subject Lands with contiguous portions of the wetland further east and north [Figure 2] (City of London Official Plan Schedule B, 2015).

2.2 Land Use Designations

2.2.1 City of London Official Plan, Schedule A (2015)

The appropriate land use changes as a result of the settlement agreement have not yet been updated on Map 1 at the time of this reports writing and so Schedule A of the City of London Official Plan, which better reflects settlement) is being used for this EIS [Figure 3]. The Subject Lands are designated as Multi Family, Medium Density Residential with Commercial land also now permitted on the Subject Lands (settlement agreements). The area of the North Talbot PSW is designated as Open Space, extending north as well as east/southeast towards Southdale Road [Figure 3].

2.3 Zoning Bylaws

The Subject Lands have updated zoning since the last EIS to reflect those zone amendments [Figure 4 - updated]. The Subject Lands are now zoned (Commercial Shopping Area (CSA 1 (6 with holding provisions h for the tableland and h-129 along the east boundary. The h provision is in place to ensure conditions of zone approval are met while the h-129 provision is to ensure completion of a hydraulic floodway analysis. The north portion of the Subject Lans is zoned Residential (R8-4(80) with the same h and h-129 holding provisions as the CSA zone.

2.4 Upper Thames River Conservation Authority (UTRCA) Regulation

The Upper Thames River Conservation Authority (UTRCA) regulates the Subject Lands under Ontario Regulation 157 /06. This regulation area is associated with the North Talbot PSW and flood hazard [Figure 5]. The area is also identified as a Dingman Creek Screening Area (under review) by the UTRCA online regulatory mapping (2018).

3.0 Triggers for EIS

When a development proposal requires a Planning Act application (ie. Draft Plan submission, or amendments to the Official Plan and/or zoning by-law), the City of London requires an EIS to be completed if the Subject Lands are adjacent to or within natural heritage components (London Plan – Chapter 6).

The proponent is planning a mixed commercial and medium density residential development at the northeast corner of Colonel Talbot Rd and Southdale Rd.

Based on Official Plan schedules, the triggers for the Environmental Impact Study (EIS) as a result of the proposed development are as follows:

- Proposed development within 120m of a Provincially Significant Wetland
- Proposed development within 120m of unevaluated vegetation patch

As well, application for a permit under the UTRCA Ontario Regulation 157/06 may require an EIS.

- Subject Lands are within the UTRCA's regulation limits.

In addition, the *Endangered Species Act* (2007) protects species and habitat not specifically identified on Official Plan Schedules. To be consistent with the Provincial Policy Statement (Ministry of Municipal Affairs and Housing (MMAH), 2020), the requirements for an additional study can be triggered without any adjacent features identified on the Official Plan schedules.

The following section (Section 4) reviews the natural heritage setting of the Subject Lands. Section 5 reviews the proposed land use change in conjunction with generic natural heritage issues that may require consideration in the application process.

4.0 Description of the Natural Environment

The following section reviews the abiotic and biotic features on and directly adjacent to the Subject Lands that contribute to the overall natural heritage features and functions. This review provides relevant background information for interpreting environmental features and functions on the Subject Lands for the evaluation in Section 5.

4.1 Physical Setting

4.1.1 Physiography

Bedrock, 100-118m below grade, is Middle Devonian-aged limestone and dolostone of the Dundee Formation (LDS, 2021). The Subject Lands are underlain by Port Stanley silty clay till and clayey silt till with slightly undulating topography (Dreimanis, 1963).

4.1.2 Soils

The predominate soil type in the area of the Subject Lands is Muriel that consists of Muriel, Gobles and Kelvin associates. Muriel soil type is described as silty clay loam, silty clay, and occasionally clay loam glacial till deposited by glaciation from the Lake Erin basin (Hagerty & Kingston, 1992). These soils typically exhibit moderately well to imperfect drainage characteristics.

On a site-specific level, soils identified within the boreholes on the Subject Lands were comprised of clayey silt, with intermittent sandy silt or silty sand layers near surface (LDS, 2021).

4.1.3 Topography

In the general vicinity of the Subject Lands, the topography is very gently sloping (Hagerty & Kingston, 1992). On a site-specific scale, the north, west and south sides of the property slope down, generally to the middle of the Subject Lands. A small, somewhat flat area is present within the centre of property.

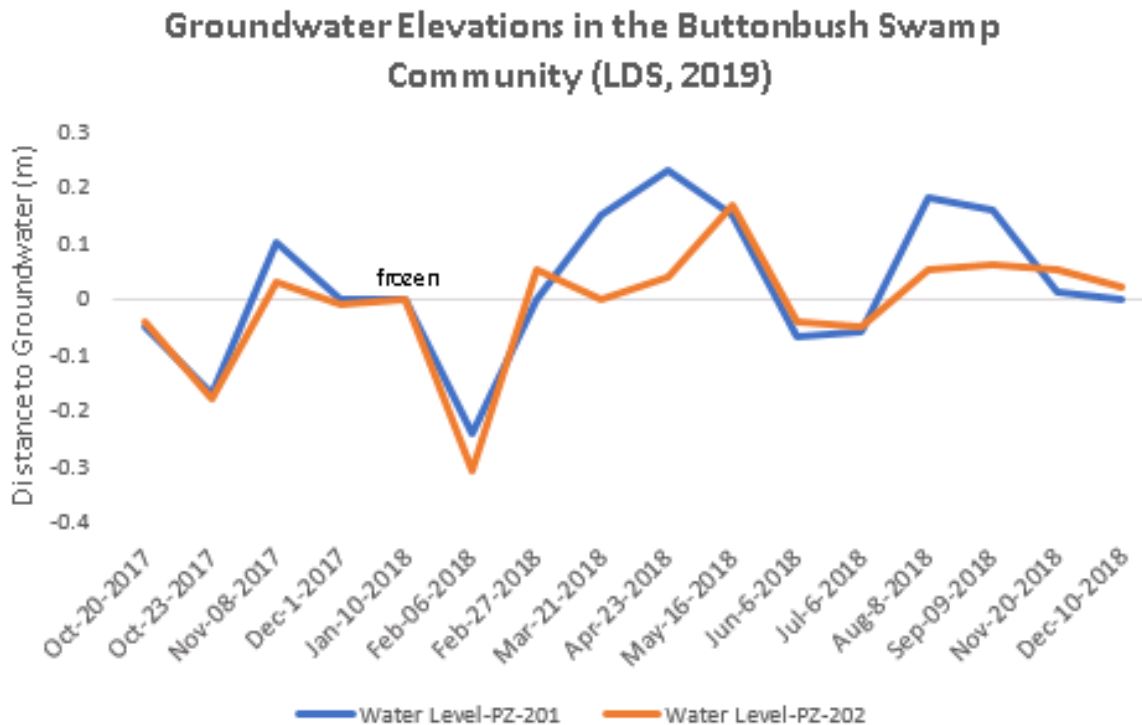
4.1.4 Hydrology

A hydrogeological study has been completed for the Subject Lands and information from the hydrogeological assessment has been incorporated into this report. Groundwater is found in the sandy silt and silt till units between 0-15m below ground surface (BGS) within the Subject Lands [LDS, 2021 - Appendix B], dependent on topographical position. Within the Buttonbush Swamp wetland feature, two piezometers (PZ-201 and 202) were used to measure shallow groundwater levels between 2017 and 2018 [Figure 5a]. Shallow groundwater was measured between 0.3m below ground and 0.2m above ground over the sampling dates [Graph 1 below from Appendix B data]. Both the groundwater and surface slope to the southeast towards the wetland. Water levels within the piezometers fluctuated above and below existing ground with higher levels in the fall and spring months, and below between June and July and generally through the late fall and winter [Graph 1 of their report – reproduced below]

An intermediate overburden aquifer, separated from the surface by silt till deposits, was identified between 15-30m BGS and a deep overburden aquifer was encountered between 30-60m BGS. A review of the hydrology of the area indicates that the intermediate and deep

overburden aquifers consist of differentiated sand and gravel layers within the till (Appendix B; LDS, 2021). However, these aquifers are separated from surface and do not influence site conditions.

The adjacent PSW is primarily influenced by surface water that collects into existing swales that flow west to east through the site. Groundwater contributions to the wetland also arrive from more permeable soils upgradient of the wetland area, but this is marginal relative to surface water contributions from the Subject Lands and developed land to the northeast and east.



Graph 1: Piezometer measurements of shallow groundwater elevations within the Buttonbush Swamp community. A positive value indicates water observed above or at the surface and negative values are groundwater.

4.2 Biological Setting

No Areas of Natural and Scientific Interest (ANSI) or Environmentally Significant Areas (ESA) are located within or adjacent to the Subject Lands within 120m.

A review of the Natural Heritage Information Centre (NHIC) database identifies the North Talbot Wetlands [Provincially Significant Wetland (PSW)] on and within 1km of the Subject Lands [Figure 5a]. The wetland boundary is current as of the time of this reports writing.

The NHIC identifies sections of the wooded area, associated with the PSW to the east, as a Woodland. Development has occurred for much of the lands to the northwest and the NHIC map reflect this while Schedule B1 [Figure 2], does not.

A Preliminary Screening Request was submitted to the Ministry of Environment, Conservation, and Parks (MECP) for project review under the Endangered Species Act (ESA, 2007) in 2019. This screening request included the submission of the information from the completed life

science inventories. MECP determined that the activities associated with the project would likely not contravene the ESA (2007). Mitigation measures were provided by MECP [Appendix H] as a condition of their approval response and are discussed further under Section 7.0.

4.2.1 Vegetation

The vegetation communities within the Subject Lands were assessed by Will Huys, certified to conduct ELC in Southern Ontario, on June 11, 2018 [Figure 6]. ELC information sheets are provided in Appendix C. All communities listed in Table 1 are secure in Ontario (NHIC, 2020) with the Buttonbush Swamp component ranked as S3 in Ontario [Table 1].

Table 1: Ecological Land Classifications for the Subject Lands

Community Type	Polygon	ELC Code	Description	S-rank	Area (ha)
Wetland Communities					
Wetland	1	SWT2	Mineral Thicket Swamp	n/a	1.4
	3	SWT3-4	Buttonbush Organic Thicket Swamp	S3	0.3
Cultural Communities					
Cultural	2	CUW1	Mineral Cultural Woodland Ecosite	n/a	0.25

Community 1 is a Mineral Thicket Swamp (SWT2) dominated by Common Buckthorn, Willow species, and Dogwood species. Wetland sedges and herbaceous wetland plants are the dominant ground-layer. Occasional taller Willow and Black Walnut make up the canopy. Invasive *Phragmites* is occasional within this community.

Community 2 is a Black Walnut dominant Cultural Woodland (CUW1). This cultural woodland transects the property in a north/south direction and functions as an edge/buffer type community between the agricultural lands to the west and the wetland to the east. Tatarian Honeysuckle and Chokecherry are common understory plants. Wild Bergamot, Goldenrods and Raspberries are typical ground-layer plants.

Community 3 is a Buttonbush Organic Thicket Swamp (SWT3-4) dominated by Buttonbush. This vegetation community is considered rare to uncommon but can be locally abundant in Ontario (S3). Surface water ponding was observed in this community on all of the completed life science investigation dates. Occasional Willow species (4-5m tall) were observed within this community. Sedges and wetland grasses are common at the edges of the community. The MNR delineated wetland boundary includes Vegetation Communities 1 and 3.

Historically, the agricultural area within the Subject Lands was actively farmed row crops. This area has been farmed as recently as last year with plans to farm again this year (per com D. Traher, Westdell Developments, 2020). Additional areas of agriculture have been added in areas that were historically too wet. This agricultural addition did not require tree removal and can be observed on air photos.

4.3 Wildlife Habitat

4.3.1 Significant Wildlife Habitat

MNR Significant Wildlife Habitat (SWH) Criteria Schedules for Ecoregion 7E (January 2015) uses ELC ecosite codes and habitat criteria (e.g., Size of ELC polygon, location of ELC

polygon) to identify candidate significant wildlife habitat. This is the first step in the process of identifying SWH and the following candidate SWH was noted [Appendix D].

Candidate Seasonal Concentration of Animals

Turtle Wintering Area

Candidate Specialized Habitats of Wildlife Considered SWH

Amphibian Breeding Habitat (Wetlands)

Waterfowl Nesting Areas

Candidate Habitats for Species of Conservation Concern Considered SWH

Shrub/Early-Successional Bird Breeding Habitat

Terrestrial Crayfish

Special Concern and Rare Wildlife Species

Using site-specific life science information collected for the above, candidate SWH is further evaluated in Section 4 based on the defining criteria (species presence, abundance, and diversity) to make the final determination of the presence of SWH. This analysis (Section 5) follows the life science overview below.

4.4 Floral Site Inventories

A review of the NHIC database and correspondence with the Ministry of Environment, Conservation, and Parks (MECP) identified the following floral species protected under the *Endangered Species Act (ESA, 2007)* that are found or potentially found within the area of the Subject Lands:

- American Chestnut [END]
- Eastern Flowering Dogwood [END]
- False Hop Sedge [END]
- Butternut [END]

Will Huys completed floral site investigations on September 29, 2017, May 7, June 11, June 28, and July 18, 2018, within the Subject Lands [Appendix E]. None of the above noted floral species protected under the *ESA (2007)* were identified during site investigations. No species of provincial interest [Special Concern or S1-S3 ranked] were identified within the Subject Lands.

4.5 Faunal Site Investigations

A review of the NHIC database and correspondence with the MECP identified the following faunal species protected under the *Endangered Species Act (ESA, 2007)* that are found or potentially found within the area of the Subject Lands:

- American Badger [END]
- Barn Swallow [THR]
- Bank Swallow [THR]
- Eastern Meadowlark [THR]
- Protected Bat species

A breeding bird survey, an amphibian breeding survey, and general observations of habitat suitability for American badger [END] were completed on the Subject Lands.

4.5.1 Avifauna

Habitat for Eastern Meadowlark is not present within the legal parcel. Will Huys conducted the standard two-visit breeding bird survey on June 11 and June 28, 2018, guided by the protocols outlined in the Ontario Breeding Bird Atlas (OBBA) (Cadman *et al.*, 2007). None of the above noted avian species protected under the *ESA* (2007), nor suitable habitat for these species, were identified within the Subject Lands [Appendix F].

Outside of the Subject Lands but within the larger legal parcel, one (1) Eastern Wood-pewee [SC] was heard calling within Community 1 during one of the two visits of the breeding bird survey. This species does not receive protection under the *ESA* (2007) but is discussed further under the context of SWH and the *Provincial Policy Statement* (2020) [Section 5.0].

4.5.2 Amphibians

Laura McLennan conducted amphibian call surveys on April 12, May 11, and June 12, 2017, guided by the Marsh Monitoring Program (MMP) protocol. No frogs or toads were heard calling within the area of proposed development (agricultural lands) in the Subject Lands. Spring Peeper and Gray Treefrog Call Code Level 2 were the only species heard calling from within the PSW community to the east with no summer breeding frogs were noted [Appendix G].

4.5.3 Mammal Burrows

No animal burrows were identified within the Subject Lands during completed life science inventories. No evidence of American Badger [END] (large burrows) was present within the Subject Lands.

4.5.4 Terrestrial Crayfish

No Terrestrial Crayfish chimneys were observed within the agricultural lands on the Subject Lands. Terrestrial Crayfish chimneys were observed along the edge of Community 2 during site investigations [Figure 6].

4.5.5 Aquatic

There is an unnamed, watercourse that is noted on some of the background maps [Figure 2, 3 and 5] within the Buttonbush Swamp on the Subject Lands. Based on orthographic imagery interpretation and review of drainage maps (OMAFRA, 2020) this unnamed watercourse is piped at Southdale Road West for approximately 600m downstream before out letting to a SWM pond within the North Talbot Community.

There is no additional aquatic habitat within the Subject Lands. Previously noted surficial water that flowed west to east across the Subject Lands was not observed in recent years following a fix of blockage in the culvert at Colonel Talbot Road. However, there is likely still flow after large storm events as these flow paths pick up roadside and development runoff from lands to the north. These surficial water features that are seasonally present do not provide habitat for fish species.

A review of the Fisheries and Oceans Canada (DFO) Species at Risk mapping did not identify any aquatic species at risk nor critical habitat for species at risk within 1km of the Subject Lands (DFO, 2020).

5.0 Natural Heritage Policy Considerations

This section reviews the provincial, municipal and Conservation Authority regulatory policies within the project location with respect to Natural Heritage considerations.

The provincial and municipal natural heritage policies provide guidelines that determine appropriate land uses on and adjacent to natural heritage features and functions.

Policies that pertain to this site include:

- the 2020 Provincial Policy Statement from MAH, Section 2.1
 - these have been reviewed with the Natural Heritage Reference Manual (NHRM) (MNR, 2010),
- the London Plan, Chapter 6,
- the City of London Environmental Management Guidelines (2007), and
- the UTRCA Regulations.

The natural features and functions identified in Section 4 of this EIS are applied to the above policies in order to determine which components of the natural heritage system will require additional consideration.

5.1 Provincial Policy

The Provincial Policy considerations are based on Provincial Policy Statement from MAH, 2020, section 2.1 and reviewed using the Natural Heritage Reference Manual (Sections 5-11) (MNR, 2010).

2.1.4

a), b) Significant Wetlands/Coastal Wetlands

Section 6 - Significant Wetlands and Significant Coastal Wetlands

The North Talbot PSW is located within 120m of the Subject Lands. A section of the PSW is within the legal parcel, adjacent to the Subject Lands. The PSW boundary confirmation request was submitted to MNR on August 17, 2017. MNR (Jason Webb) was out on-site June 11, 2018, to stake the boundary with Will Huys. LIO mapping has the most up to date wetland boundary as noted on OP Schedules [Figure 2].

2.1.5

b) Significant Woodlands

Section 7 - Significant Woodlands

No vegetation within the legal parcel has been identified as woodland or Environmental Review on Schedule B. Any other unevaluated vegetation patches are beyond the legal parcel on areas owned by others. Some of the unevaluated woodlands have been developed and Schedule B1 has not been updated to reflect this change.

c) Significant Valleylands

Section 8 - Significant Valleylands

There are no significant valleylands within or adjacent to the Subject Lands.

d) Significant Wildlife Habitat

Section 9 - Significant Wildlife Habitat

Candidate significant wildlife habitat (SWH) is based on ELC communities that were identified in Section 4.3.1. Confirmed significant wildlife habitat is determined through appropriate field

investigations and evaluation of species use in accordance with specific criterion outlined in the Ecoregion Criteria Schedules 7E (MNR, 2015).

Turtle Wintering Areas

No incidental observations of turtles or evidence of turtle nesting were identified within the Subject Lands during completed life science inventories. It is expected that the deeper standing water within the wetland community (Community 3) within the remaining legal parcel could be used for turtle overwintering areas.

Not SWH – Confirmed in Subject Lands

Candidate SWH – Not Confirmed in Remaining Legal Parcel (Turtle Overwintering)

Waterfowl Nesting Areas

Breeding bird surveys completed in 2018 confirm that the following defining criterion for significance is not met:

- 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 American Black Duck

No waterfowl species were observed within the Subject Lands or the legal parcel during breeding bird surveys.

Not SWH – Confirmed

Candidate Amphibian Breeding Habitat (Wetland)

Amphibian monitoring completed in 2017 confirm that the following defining criterion for significance is not met:

- Presence of breeding population of 2 or more listed frog species with Call Level Codes of 3.

Not SWH – Confirmed

There is disagreement on the interpretation of how this SWH is evaluated. However, while no visual surveys were conducted given the auditory-based Marsh Monitoring Protocols were followed, the wetland is being protected in the remaining legal parcel. The EIS reviews impacts and mitigations to protect this wetland feature which will ensure a sustained amphibian population in the post development setting.

Shrub/Early-Successional Bird Breeding Habitat

Breeding bird surveys completed in 2018 confirm that the following defining criterion for significance is not met:

- Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species

Not SWH – Confirmed

Candidate Terrestrial Crayfish

Observations made in 2018 during completed life science inventories confirm that the following defining criteria for significance is met:

- Presence of 1 or more individuals of species or their chimneys (burrows) in suitable meadow marsh, swamp, or moist terrestrial sites

Terrestrial crayfish burrows were observed along the edge of Community 2 adjacent to the wetland communities [Figure 6]. Surveys for crayfish were not completed within Community 1 as this feature is well outside of the development footprint. It is likely that additional terrestrial crayfish chimneys may be present in this community but will not be impacted.

SWH – Confirmed (edge of Community 2)

Candidate SWH – Not Confirmed (Community 1)

Special Concern and Rare Wildlife Species

No species of Special Concern or Rare Wildlife Species were identified within the Subject Lands during site investigations. Within the larger Legal Parcel, one (1) Eastern Wood-pewee [Special Concern] was observed during a single visit of the 2018 breeding bird survey in Community 1. Higher-level breeding confirmation (carrying food, nest with young) was not identified. Habitat within the Subject Lands is limited for this species, with more suitable habitat within the larger Community 2 woodland located off site.

Not SWH – Confirmed (Subject Lands)

Candidate SWH – Unconfirmed woodlands on Adjacent Lands.

e) Areas of Natural and Scientific Interest

Section 10 - Significant Areas of Natural and Scientific Interest

There are no ANSI's within or adjacent to the Subject Lands.

2.1.6

Fish Habitat

Section 11 - Fish Habitat - Broad Scale

Broad scale fish habitat, for the purposes of this review, considers downstream fisheries. Based on orthographic imagery interpretation and review of drainage maps (OMAFRA, 2020), the unnamed watercourse that flows southeast through the Buttonbush Swamp is piped at Southdale Road West for approximately 600m downstream before out-letting to a SWM pond. Downstream fish habitat will not need to be considered in this EIS.

Section 11 - Fish Habitat - Detailed Scale

Detailed scale fish habitat, for the purposes of this review, considered fisheries habitat within the Subject Lands. There is no suitable habitat for fish within the Subject Lands and will not need to be considered in this EIS.

2.1.7

Habitat of Endangered Species and Threatened Species

Section 5 - Significant Habitat of Endangered and Threatened Species

No floral or faunal species protected under the *ESA* (2007) were identified within the Subject Lands during completed site investigations. MECP determined in their review of the project that the proposed works would likely not contravene the *ESA* (2007).

Summary – Provincial Policy

This EIS will need to consider the natural heritage features and functions within and adjacent to the Subject Lands including Significant Wetlands and Significant Wildlife Habitat to address Provincial Planning Policy.

5.2 Municipal Policy

Since the previous submission of this report, chapters of the London Plan (May 28, 2021) have been approved including Chapter 6 – Environmental Policies. The relevant policy sections have been included in brackets. It should be noted that The London Plan Map 5 has a different boundary for the PSW. MNRF staff (Jason Webb) were on site June 11, 2018, to stake the boundary with Will Huys (MTE). The boundary revision was submitted to MNRF on August 17, 2017, and is accurate as of 2021. The wetlands shown on Map 5 of the London Plan are under appeal.

Environmentally Significant Areas (1367-1371)

There are no Environmentally Significant Areas (ESA) within or adjacent to the Subject Lands.

Wetlands (1330-1336)

A Buttonbush Swamp community, that is part of the larger North Talbot PSW, is located within the legal parcel, adjacent to the Subject Lands. Additional areas of the North Talbot PSW are contiguous and within 120 m (Adjacent Lands) to the Subject Lands. Boundary delineation guidelines include Community 2 as an existing buffer to the wetland feature.

Areas of Natural and Scientific Interest (1356-1360)

There are no ANSI's within or adjacent to the Subject Lands.

Habitat of Endangered, Threatened and Vulnerable Species (1325-1329)

There are no floral or faunal species protected under the *ESA* (2007) nor suitable habitat for the listed SAR species within the Subject Lands. MECP has given approval that the proposed project is not likely to contravene the *ESA* (2007).

Woodlands (1337-1343)

There are no woodlands identified on City of London Official Plan maps within the Subject Lands or Legal Parcel [Figure 2].

Corridors (1372-1377)

There are no significant or unevaluated corridors within or adjacent to the Subject Lands.

Significant Wildlife Habitat (1352-1355)

- a) The Significant Wildlife Habitat Technical Guidebook (MNRF, 2000) has been updated with the wildlife schedules (MNRF, 2015). We have reviewed the wildlife habitat to determine significance with the more recent wildlife schedules and have confirmed SWH.
- b) The Subject Lands do not have a high diversity of species that are of value for research, conservation, education, and passive recreation opportunities.

There are also no areas of Significant Wildlife Habitat identified on Schedule B1 of the City of London Official Plan. Terrestrial Crayfish burrows and candidate Eastern Wood-pewee habitat were identified adjacent to the Subject lands.

Fish Habitat (1323-1324)

There is no suitable habitat for fish within the Subject Lands. The watercourse within the Buttonbush Wetland acts as a flow path for water to leave the wetland and is disconnected from downstream habitat.

Groundwater Recharge Areas, Headwaters, and Aquifers (1361-1365)

The Thames-Sydenham and Region Source Protection Committee has determined that the Subject Lands are not within a highly vulnerable aquifer zone. The southeastern portion of the Legal Parcel

Subject Lands is located within a Significant Groundwater Recharge Area (SGRA) with a vulnerability, score of two (2). A vulnerability score of 2 is considered low. The low permeability of the soils on site are not conducive to groundwater recharge and limit the significance of this feature as a recharge area (LDS, 2021). This is discussed further under Section 7.0.

Water Quality and Quantity (1366)

Water quality and quantity contributions from the Subject Lands to the adjacent North Talbot PSW will need to be considered further in this EIS.

Potential Naturalization Areas (1378-1381)

There are no Potential Naturalization Areas mapped on Schedule B1 of the City of London Official Plan.

Carolinian Canada Big Picture Concept (1418-1420)

There are no areas Big Picture Meta-Cores and Meta-Corridors within or adjacent to the Subject Lands. These corridors are represented conceptually and are not rigid boundary delineations nor a component of London's Natural Heritage System (City of London OPA 438, 2011).

Unevaluated Vegetation Patches (1383-1384)

There are no additional unevaluated vegetation patches within the Subject Lands. Additional vegetation patches identified on the City of London Official Plan Schedule B (Unevaluated Vegetation Patches on Schedule B1) are over 100m to the north on lands owned by others. These have not been reviewed.

Other Woodland Patches larger than 0.5 Hectares (1385-1386)

There are no other Woodland Patches larger than 0.5ha within or adjacent to the Subject Lands. Community 2, which is 0.25 ha has been included within the preliminary 10m offset to the wetland.

Other Drainage Features (1387)

There are no other drainage features on the Subject Lands not previously discussed in this report.

Summary - Municipal Policy:

This EIS will need to consider significant natural heritage features and functions including Wetlands, Significant Wildlife Habitat, and Groundwater Recharge to address municipal planning policy.

5.3 Policy Considerations and Regulated Lands

5.3.1 Conservation Authority Regulation Limit

The entire Subject Lands are within the regulation limit of the UTRCA associated with the North Talbot PSW and flood hazards. However, the wetland feature does not meet the definition of a regulated wetland under the Conservation Authorities Act, specifically, this wetland does not:

“directly contribute to the hydrological function of a watershed through connection with a surface watercourse” (Conservation Authorities Act – Section 28(25)).

The water is piped under Southdale Road and becomes part of a stormwater sewer system that ultimately leads to the regional Stormwater Management Facilities in the North Talbot Community. Therefore, the adjacent wetland does not provide any direct contribution. Nevertheless, the water balance studies have been completed through the City of London application requirements and as a result, the wetlands will be protected through that process.

However, any development proposed within the flood hazard area regulated by UTRCA will require a permit.

Summary - Conservation Authority Regulations

This EIS has considered the wetland and water balance for the Buttonbush Swamp and this documentation will be provided as part of the required Section 28 Permit Application for flood hazards when submitted to the Upper Thames River Conservation Authority (UTRCA).

5.4 Summary of Identified Features and Functions

The features and functions in Table 2, have been identified through the policy review as requiring further consideration in an EIS.

Table 2: Environmental Considerations for the Subject Lands

Policy Category	Environmental Consideration	Adjacent Natural Heritage Feature
Provincial Policy Statement	Provincially Significant Wetland	North Talbot PSW (Buttonbush Swamp)
	Significant Wildlife Habitat	Turtle Wintering Area – Not Confirmed; Communities 1 and 3 (PSW) Terrestrial Crayfish (Community 2) – Confirmed Eastern Wood-pewee, not confirmed in adjacent wetland habitat. Heard further north..
The London Plan (2021)	Wetlands	North Talbot PSW (Buttonbush Swamp)
	Significant Wildlife Habitat	Candidate Turtle Wintering Area – Not Confirmed; Communities 1 and 3 (PSW) Terrestrial Crayfish – Confirmed Eastern Wood-pewee (to the north)
	Groundwater Recharge Areas, Headwaters and Aquifers	Southeast portion of the Subject Lands is within a SGRA
	Water Quality and Quantity	Water quality and quantity contributions to Buttonbush Swamp
UTRCA Regulations	Flood Hazard	Flood Hazards

5.5 Ecological Buffers and Pre-Development Considerations

Based on the above review, the most critical component of the natural heritage system that defines the adjacent feature is the Buttonbush Swamp community within the legal parcel, next to the Subject Lands. This component is part of the North Talbot Community PSW complex.

A review of the TRCA Wetland Water Balance Risk Evaluation document (TRCA 2017), indicates Buttonbush Swamps are typically slow to recover from hydrological changes (2017), although hydrologic change is not separated between not enough water and too much water in the TRCA document. The Michigan Natural Features Inventory (MNFI—<https://mnfi.anr.msu.edu>) in conjunction with the Field Guide to the Natural Communities of Michigan (Cohen *et al.*, 2014) provides a more detailed description of Buttonbush Swamp ecology and sensitivity. These documents identify Buttonbush Swamps as tolerant to a wide variety of hydrologic changes (including prolonged flooding), stating that:

“Buttonbush seedlings are highly tolerant of flooding, exhibiting several adaptations to inundation, rapid changes in water level, and low oxygen availability and is well adapted to flood events characteristic of disturbed ecosystems” (Cohen et al., 2014).

However, Buttonbush Swamps are less tolerant of conditions that result in lower water levels (drought or lower water table).

This document also describes Buttonbush as a desirable species for use in urban and disturbed ecosystem restoration because of its tolerance to flooding and nutrient loading, stating that:

“In addition, buttonbush increases its biomass in response to nutrient inputs, making the species desirable for use in urban and disturbed wetland systems for its flood tolerance and ability to assimilate nutrients, including wastewater” (Cohen et al., 2014).

Evidence of Buttonbush ability to handle stormwater inputs can be observed in other Buttonbush Swamp communities nearby. To the north, within the “Crestwood Subdivision” stormwater management facilities were retroactively added to an approved development in the early days of stormwater management requirements. These ponds were undersized for water quantity management based on stormwater design standards but approved to allow the development to proceed with some treatment. These ponds took several years to reach full functional capabilities with much of the stormwater bypassing these facilities during the construction phase of development. However, upon site inspection this year, the upper Buttonbush feature remains. A culvert crossing downstream of this feature appears to be set too high and may be backing water up more than should be the case, yet the Buttonbush community remains. Further south, in the north Talbot community plan area, a wetland feature that receives major storm water to assist in quantity control has converted from a horse pastured wet meadow beforehand, to Buttonbush community today. Therefore, based on literature support and local evidence, the Buttonbush Swamp communities are not highly susceptible to minor to moderate increase in water inputs. Not enough water appears to be the main impairment concern for post development.

Provided surface water and groundwater inputs to existing Buttonbush Swamp features is met, these communities will continue to persist post development.

5.5.1 Public Ownership/Acquisition (1404-1407)

In this ownership policy section of the London Plan, the City recognizes not all natural heritage areas will be brought into public ownership. The remaining legal parcel may remain in private ownership.

5.5.2 Stewardship (1408-1411)

Under the stewardship policies of the London Plan, protection is encouraged for natural heritage systems that remain in private lands. These protection efforts can include stewardship agreements, Conservation easements, education, land trusts, tax incentives, signage, and other suitable techniques. Such efforts will be discussed in conjunction with the post development setting in context of mitigation measures and their contribution to the refinement of setbacks and buffers.

5.5.3 Ecological Buffers (1412-1416)

The City of London has developed guidelines to establish recommended ecological buffer and setback limits for developments adjacent to natural heritage features. These guidelines were developed and ultimately formalized in 2004. The objective of the guidelines is to provide setbacks which provide a physical distance between “a developed area to an identifiable natural feature” and buffers to protect key ecological functions.

“Key ecological functions may include, but are not limited to, acting as a filter to minimize impacts from adjacent land use, proving linkage as a wildlife corridor around or between habitats, functioning as a windbreak to protect sensitive habitat and contributing to habitat and species diversity” (City of London, 2004) .

In the Buffer Guideline Document, there is acknowledgement that fixed width buffers and site-specific buffers have their merits with fixed widths seen as arbitrary and site-specific widths more flexible but requiring expertise. The guideline document opted for fixed width minimum buffers based on limited data and effectiveness research at the time, recognizing these buffers can be adjusted based on site specific information in the EIS. A suggested minimum width of 5m is suggested in the document as a starting point. Other set widths in the document suggest 10m from woodlands to protect root zones and 30m from wetland for water quality benefits. While the guideline recognizes buffers widths can vary based on land use and site sensitivity, the guideline does not speak to the various stages of potential impact from pre- to post-development.

In current conditions, the site is an agricultural field that slopes steeply towards the wetland/woodland complex to the east. In addition, road runoff and flows from developments to the northwest (across Colonel Talbot Road, and northeast drain to the feature complex. These impacts will be mitigated in the post-development setting through stormwater management water quality and quantity controls.

Therefore, it is during construction when the greatest potential impact to the adjacent feature can occur as the site is graded. Above and beyond sediment and erosion control measures, grading works within 30m – 50m of the wetland require a very high level of management. Interim stormwater management during site grading and construction will also be critical.

Once the stormwater issues have been addressed, we turn our minds to the physical separation (setbacks) and buffers needed for the type of use proposed. Shallow root zones that extend beyond the tree dripline along the feature edge have been impacted by the plough depths of the agricultural field. There is already an existing edge of woodland thicket adjacent to the Buttonbush Swamp, but some additional setback is warranted. Provided there is some Common Buckthorn management along the edge habitat, a 10m from the wetland edge is suggested as a reasonable distance to expand the edge habitat (this distance is greater than that City proposed Southdale Road widening whereby not only the buffer edge, but part of the North Talbot PSW will be impacted).

However, as part of the discussions for zoning approvals with the previous EIS, an agreed buffer distance [Figure 9] was established (between 15 and 32m to the wetland). It is this agreed buffer distance that is presented in this EIS update.

6.0 Description of the Development

1739626 Ontario Limited. (The proponent) is proposing a commercial and medium density residential development at the northeast corner of Colonel Talbot Rd and Southdale Rd W. in the City of London [Figure 7 and 8]. The site plan has been updated from the one provided to the City previously part of the zoning approval as a modification to accommodate changes to layout efficiency and comments from agency staff through the zoning approval process.

The Legal Parcel is described as Concession 1, Part Lot 42 RP33R8507 Part 1. The west two thirds of the Subject Lands were historically agricultural and currently there are no buildings on the property. The identified natural heritage features and functions are shown on Figure 6, 7, and 8. The setbacks on the site plan have accommodated the final buffer distances agreed to with the City during the zoning approvals [Figure 9].

Detailed design has been completed and the site will be fully serviced with municipal sanitary sewers and water supply (MTE, 2023). Stormwater will be managed on-site with a mixture of surface ponding, oil and grit separators and an underground storage system [MTE, 2023] The grocery store rooftop will drain directly to the underground storage to provide clean water to the PSW. Water will be released from the storage area slowly and the outlet will spill to stilling basin to help diffuse the velocity of the flow and minimize erosion [Figure 10].

To accommodate a minor filling of some backwater flood storage, a cut and fill balance was proposed in the zoning submission (Stantec, 2023). The area of cut involves a 2% grade from 15m offset to wetland, to the development limits (Civil Drawing Set C2.2) which will be top dressed with topsoil and planted with native species mix.

A retaining wall will be required on the eastern boundary of the development to accommodate the amount of fill needed to create more accessible grading and slopes within the site. This retaining wall is set at 15 to 32m from the wetland edge [Figure 9 and 10].

Development of the Subject Lands without the above noted stormwater management strategy and the use of LID measures would result in a loss of infiltration and an increase in runoff across the site annually. The direction of stormwater towards dissipation areas which then discharge to the adjacent PSW will effectively increase infiltration to address the deficit. Additional LID measures have been recommended to ensure that adequate infiltration is achieved. These measures may include but are not limited to the use of grass swales in greenspace areas, infiltration trenches, and reduced lot grading (LDS, 2021).

Water Balance and Quality

With the proposed commercial and residential development, an infiltration deficit is expected and is addressed with a combination of Stormceptor underground storage areas, direct stormwater drainage from roofs to the adjacent wetland, and LID measures [Figure 8 and 10]. The wetland to the east of the proposed development is fed primarily by surface water runoff and to a lesser degree the shallow aquifer, which flows from the upgradient area of the wetland (LDS, 2021). Given the low permeability of the silt till soils on site, contamination of the deeper aquifers within the Subject Lands is not anticipated. Oil-grit separators, catch-basin hoods, grassed swales, and rip-rap pads at stormwater outlets will provide quality controls for

stormwater directed towards the adjacent PSW. Green space and buffer areas adjacent to the wetland will continue to allow for surface water infiltration to help with water balance values.

Given the proximity of the proposed development to the adjacent PSW, consideration for hydrological and grading impacts was a priority. To ensure that features are protected from sedimentation during development, a fill and grading construction staging plan will need to be finalized to conform to the final site plan design.

With the proposed stormwater management strategy and LID measures, the adjacent wetland feature will continue to receive surface water inputs from the area where development is proposed. Should these wetland communities receive additional inputs from the surrounding landscape or from increased surface runoff of the Subject Lands, the Buttonbush Swamp component of the North Talbot PSW will persist and thrive, given the ecology of the species described above. Additional recommendations have been provided to further protect the adjacent wetland feature.

7.0 Impacts and Mitigation

This section reviews the development proposal [Figures 7 and 8] and identifies potential direct and indirect impacts to the significant natural heritage features within and adjacent to the development footprint. Appropriate avoidance, protection and mitigation measures for the impacts are also presented. Most recommendations remain the same as the prior EIS to guide site plan design.

Based on the analysis in Section 5.0, the significant features identified are summarized in Table 3. In addition, a net effects table has been prepared for the proposed development application (see page 43) [Table 4].

Table 3: Significant Natural Heritage Features

Environmental Consideration	Related Feature or Function on the legal parcel
Significant Wetland	North Talbot PSW (Buttonbush Swamp)
Significant Wildlife Habitat	Candidate Turtle Wintering Area – Not Confirmed Terrestrial Crayfish – Confirmed Eastern Wood-pewee
Groundwater Recharge Areas, Headwaters, and Aquifers	Southeast portion of Subject Lands in a SGRA
Water Quality and Quantity	Quality and quantity contributions of the Subject Lands will need to be managed
Wetland and Wetland Interference	Associated with the North Talbot PSW (Buttonbush Swamp)

With the proposed commercial and residential development, the North Talbot PSW (Buttonbush Swamp), the buffering cultural woodland Community 2, and significant wildlife habitat are physically protected within the future Open Space boundary [Figure 9, Figure 10].

7.1 Direct Impacts

7.1.1 North Talbot PSW (Buttonbush Swamp) and Buffer

Based on the detailed hydrogeological investigations and stormwater management design which will provide more detail for water balance purposes, the hydrology changes as a result of development will be mitigated. The original 10m preliminary buffer to the wetland has been expanded along the entire length, ranging from 15 to 32m. The City has agreed to allow the road connection closer to the Colonel Talbot intersection than previously indicated in the zoning submission. As a result, the road edge is now 20m from the wetland boundary. A retaining wall will be constructed at the edge of the development zone.

The only area of direct impact into the buffer is the installation of dissipation outlets for the drainage to the north of the development and from the Stormwater outlet for this development. These dissipation outlets can be designed to provide a vegetative cover to minimize the visual impact of the energy dissipation measures.

Recommendation 1:

Finalize LID measure design to reflect water balance needs and landscape these measures to minimize visual impact. This detail can be finalized as part of the site plan approval process once site plan comments from the initial design phase have been provided and addressed.

Recommendation 2:

The buffer area between the proposed development and the designated setbacks will be actively naturalized with native tree and shrub species to improve the ecological function of the area and to provide a natural buffer to the wetland. Additional recommendations for construction of the road entrance are provided later in the report.

Recommendation 3:

Invasive plant species that are identified within the proposed naturalization area should be removed and best management practices for limiting the spread of floral invasive species should be followed during development. A landscape plan will be provided as part of the site plan approval process.

7.2 Indirect Impacts

Grading

A retaining wall structure has been proposed along the eastern boundary of development zone at distances of 15 to 32m from the wetland. However, some excavation within the ultimate buffer will create a temporary impact as material is removed to allow for more flood storage before flowing into the buried storm sewer downstream (Stantec, 2023). A robust sediment and erosion control plan has been proposed at this flood plain excavation limit which will remain 15m or more from the wetland edge [Figure 10] to prevent sedimentation into the adjacent PSW and the associated natural heritage features.

Recommendation 4:

Installation of the robust sediment and erosion control fencing will be completed prior to retaining wall construction. The retaining wall should be constructed prior to any additional site grading work to provide a physical barrier between construction activities and the adjacent feature.

Recommendation 5: Restoration of the floodplain excavation area to native species will be required. As an interim measure, the excavation area needs to be seeded with annual rye and/or erosion control blanket (snake friendly) to quickly stabilize the buffer.

Recommendation 6:

A detailed interim stormwater management plan is needed to guide the construction phase. Stormwater must be discharged away from the adjacent wetland feature until adequate treatment has been provided. More detail is required as part of the Second Submission package.

Construction Related Impacts

The most critical time for the protection of natural heritage features is during the construction phase. For all works and especially those within 30m of adjacent natural heritage features, substantial sediment and erosion control measures will be required to ensure that indirect impacts to the adjacent wetland and the other natural heritage features identified in this report are mitigated.

Recommendation 7:

A phased approach for fill placement is recommended to provide additional protection of the buffer area (following flood plain cut and fill works). More detail is required as part of the construction phasing plan to be developed after design studies issues have been addressed.

Recommendation 8:

During construction, the lands between the sediment and erosion control fencing should be maintained. The fence at the eastern boundary should remain in place until construction is complete and the remainder of the natural areas to remain are sodded or seeded and naturalized.

Recommendation 9:

Soil stockpiles should be established on the tableland in locations where natural drainage is away from the PSW. No soil should be stockpiled in the area of close proximity (30m) to the PSW without additional erosion control measures in place. The stockpile locations should be reviewed at detailed design.

Recommendation 10:

Sediment and erosion control fencing should be inspected prior construction to ensure it was installed correctly and during construction to ensure that the fencing is being maintained and functioning properly. Any issues that are identified are resolved in the same day.

Recommendation 11:

Sediment and erosion control fencing will be installed according to the Guidelines for Erosion and Sediment Control for Urban Construction Sites (OMNR, 1987) and the applicable standards established in the Ontario Provincial Standard Specification/Ontario Provincial Standard Drawings (OPSS/OPSD) documents. The sediment and erosion control fencing will also be installed according to the City of London Design Specifications and Requirements Manual specifications (2017).

Recommendation 12:

Sediment and erosion control fencing should not be removed until adequate re-vegetation and site stabilization has occurred. Additional re-vegetation plantings and/or more time for

vegetation to establish may be required; however, two growing seasons are typically sufficient to stabilize most sites.

Recommendation 13:

All disturbed areas should be re-seeded as soon as possible to maximize erosion protection and to minimize volunteer populations of invasive species which may spread to the adjacent feature.

Recommendation 14:

Roof runoff to bare ground can generate considerable sediment movement beyond the construction limits. Until the grounds have been vegetated and stable for housing and development adjacent to vegetation, roof leaders should be directed to the streets or nearby stabilized vegetated areas.

Recommendation 15:

Installation of permanent fencing feature is recommended for the eastern boundary of the proposed development. This fencing will deter encroachment into the adjacent PSW and will trap garbage. Details for the height and material of fencing required will be recommended by the City of London.

Recommendation 16:

In consultation with the City of London, a stewardship agreement and/or a conservation easement should be implemented at detailed design for the actively naturalized area and the remaining area of the legal parcel to protect the features post-development.

Recommendation 17:

Regular cleanup of the Subject Lands must be completed during construction and post-construction to ensure the adjacent natural heritage features are not degraded.

Wildlife

Nesting migratory birds are protected under the Migratory Birds Convention Act (MBCA), 1994. No work is permitted to proceed that would result in the destruction of active nests (nests with eggs or young birds), or the wounding or killing of birds, of species protected under the Migratory Birds Convention Act, 1994 and/or Regulations under that Act.

Killdeer are a migratory bird species that may make use of un-maintained areas as they frequently make nests on construction sites and other disturbed areas near bodies of water. Killdeer and other ground nesting birds may utilize the disturbed areas of the Subject Lands for nesting during the active breeding season.

Recommendation 18:

Avoid vegetation clearing and site disturbance during migratory bird breeding season (April to August 31) to ensure that no active nests will be removed or disturbed, in accordance with the Migratory Birds Convention Act and/or Regulations under that Act. If works are proposed within the breeding season, prior to any vegetation removal or ground disturbance, the area should be checked for nesting birds. If there are any nesting birds, works within the nesting area should not proceed until after August 31.

Landowner(s) Education

Recommendation 19:

Develop an information package to educate the landowner(s) and landscape contractor on appropriate ways to dispose of landscaping and lawn maintenance waste, garbage, and protect

the natural heritage components beyond the property boundaries. This is important for preservation of the adjacent PSW.

Recommendation 20:

The installation of educational signage on permanent fencing post-development is recommended to inform/remind landowners and customers of the significance of the adjacent PSW feature.

7.3 Monitoring Plan

Avoidance of direct impacts to the significant natural heritage features is achieved with the proposed Site Plan. Mitigation and compensation measures recommended in this EIS aim to minimize the indirect impacts to the significant natural heritage features and functions. The monitoring plan is recommended to document the implementation of the mitigation and compensation measures during construction and post-construction.

The monitoring plan will be 2-phase and will consist of a construction monitoring plan and a long-term post-construction plan. The construction monitoring plan will monitor for construction-related impacts, document successes or deficiencies of the implemented mitigation measures and provide guidance on remedial actions for circumstances when mitigation is not successful [e.g., Erosion and Sedimentation Control (ESC) measures]. This plan should continue from clearing and grubbing through to home and commercial building construction until rear yards and grounds adjacent to natural features are vegetated and stabilized. This plan will be developed further through the detailed design stage. Reports should be made available to the UTRCA and City design services staff.

Long-term post-construction monitoring shall evaluate the success of the proposed active naturalization efforts of the setback area. This plan should include remedial actions that are triggered if effects exceed pre-determined thresholds (e.g., supplemental plantings if survival rates are low). Monitoring requirements should be determined at the detailed design stage in consultation with agency staff. Recommendations for monitoring include, but are not limited to:

- Survival success of the naturalization of the naturalized edge
- Encroachment activities and correction – once the development is at 80% build-out, annual reporting to the City of London should be completed for two years.
- Invasive species observations in the buffer and adjacent wetland with adaptive management measures and work plan, in cooperation with the city to manage.
- Water balance monitoring by others to ensure wetland feature.

8.0 Summary and Conclusions

1739626 Ontario Limited. (The proponent) is proposing a commercial and residential development at the northeast corner of Colonel Talbot Rd and Southdale Rd in the City of London.

The proposed development avoids direct impact to the features and functions of the PSW at the east edge of the Subject Lands. The eastern retaining wall will limit the amount of grading while providing a developable footprint on the Subject Lands. Water balance requirements will be met with the proposed LID measures and possible modifications through design studies to maintain infiltration to the wetland. The 15m to 30+m setback distances mitigate indirect impacts to the PSW and protects the adjacent potential fish habitat and significant wildlife habitat (confirmed

and treated as confirmed). The setback area should be naturalized to establish an enhanced buffer between the proposed development and the adjacent significant natural heritage features and functions. The PSW and the buffer area should be protected as Open Space.

This EIS has set out recommendations to protect the adjacent significant natural heritage features from indirect impacts. Provided these are met, it is our opinion that the proposed development can proceed through the design studies phase.

MTE seeks comments from the City of London with respect to the contents of the EIS. Formal comments can be submitted in writing to MTE of behalf of the client. Should you wish to clarify any questions or require additional information as part of the review of this EIS, do not hesitate to contact us.

All of which is respectfully submitted,

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Figures





Figure 1: Site Location
(2017 City of London Air Photo)



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Scale 1:50,000
Key Plan

Print on 11X17, Landscape Orientation

0 160

Scale 1:8,000
April 2020



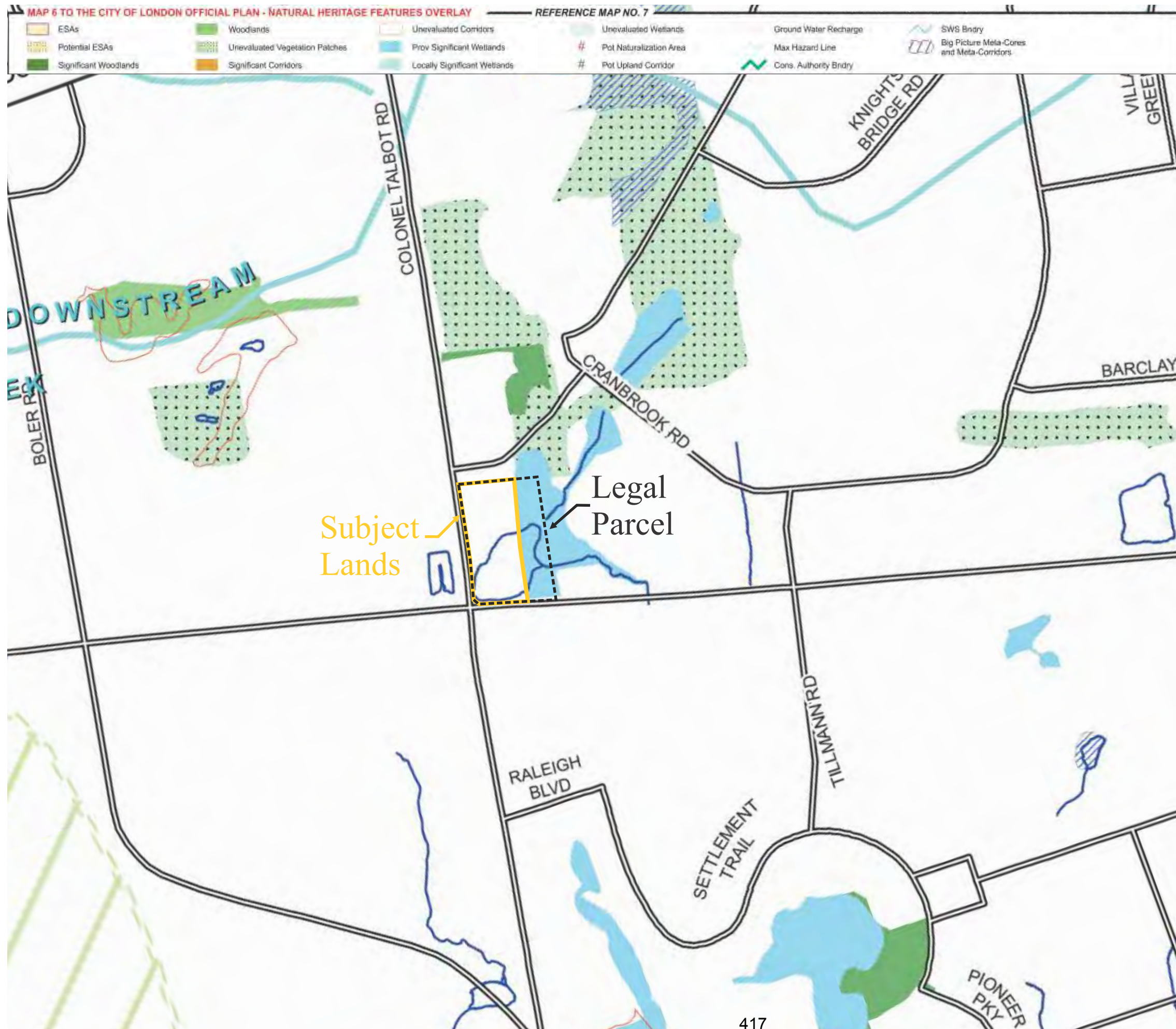
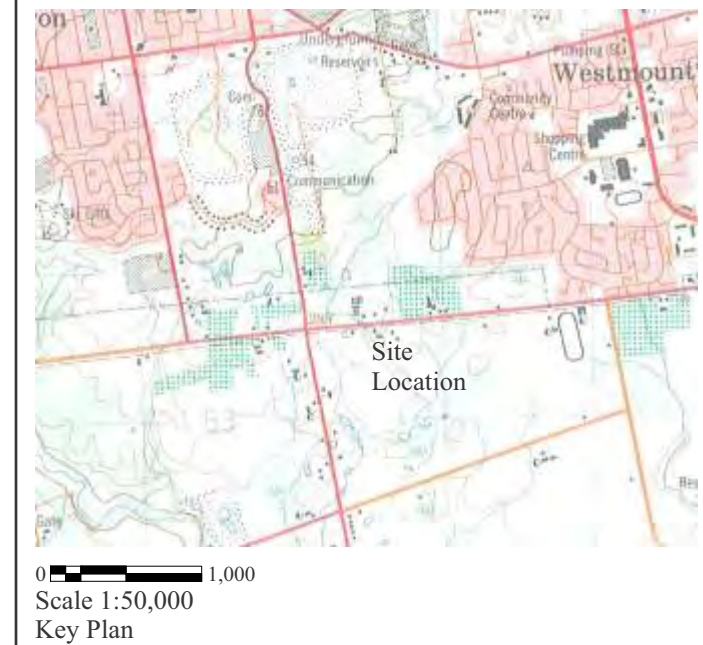


Figure 2: Natural Features
[City of London Official Plan Schedule B (September 2015)]



Print on 11X17, Landscape Orientation
Scale 1:8,000
April 2020



- | | | | | | | |
|---------------------------------|--|-------------------------|----------------------|--------------------|---------------------------------|-----------------------|
| Community Commercial Node | Auto-Oriented Commercial Corridor | Low Density Residential | Office Business Park | Regional Facility | Urban Reserve Community Growth | Environmental Review |
| Neighbourhood Commercial Node | Multi-Family, High Density Residential | Office Area | General Industrial | Community Facility | Urban Reserve Industrial Growth | Agricultural |
| Main Street Commercial Corridor | Multi-Family, Medium Density Residential | Office/Residential | Light Industrial | Open Space | Rural Settlement | Urban Growth Boundary |

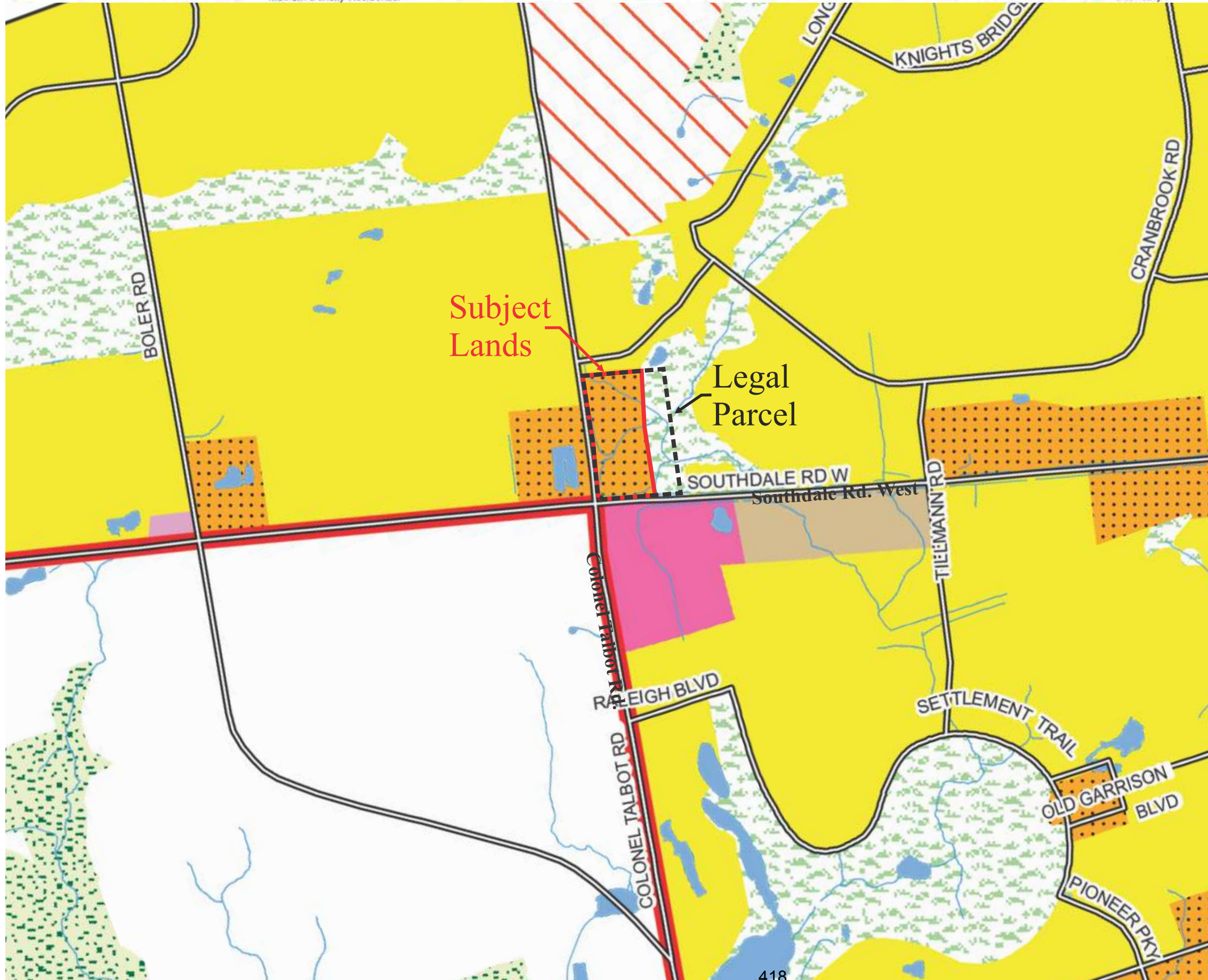
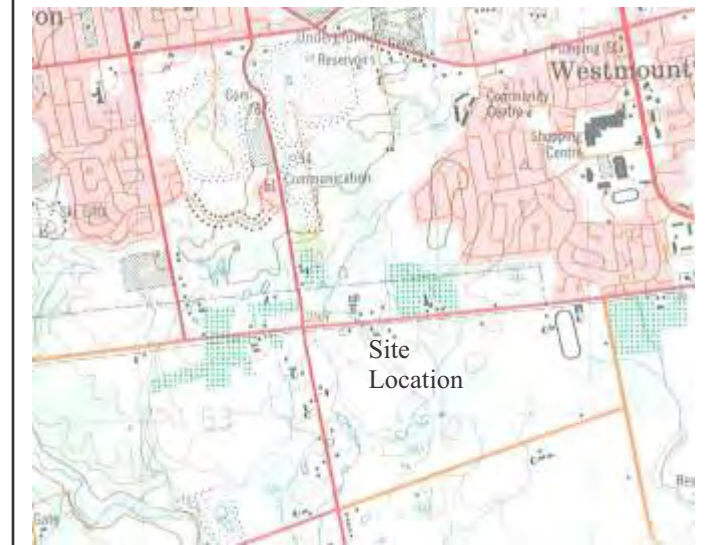


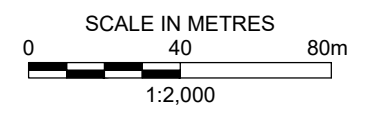
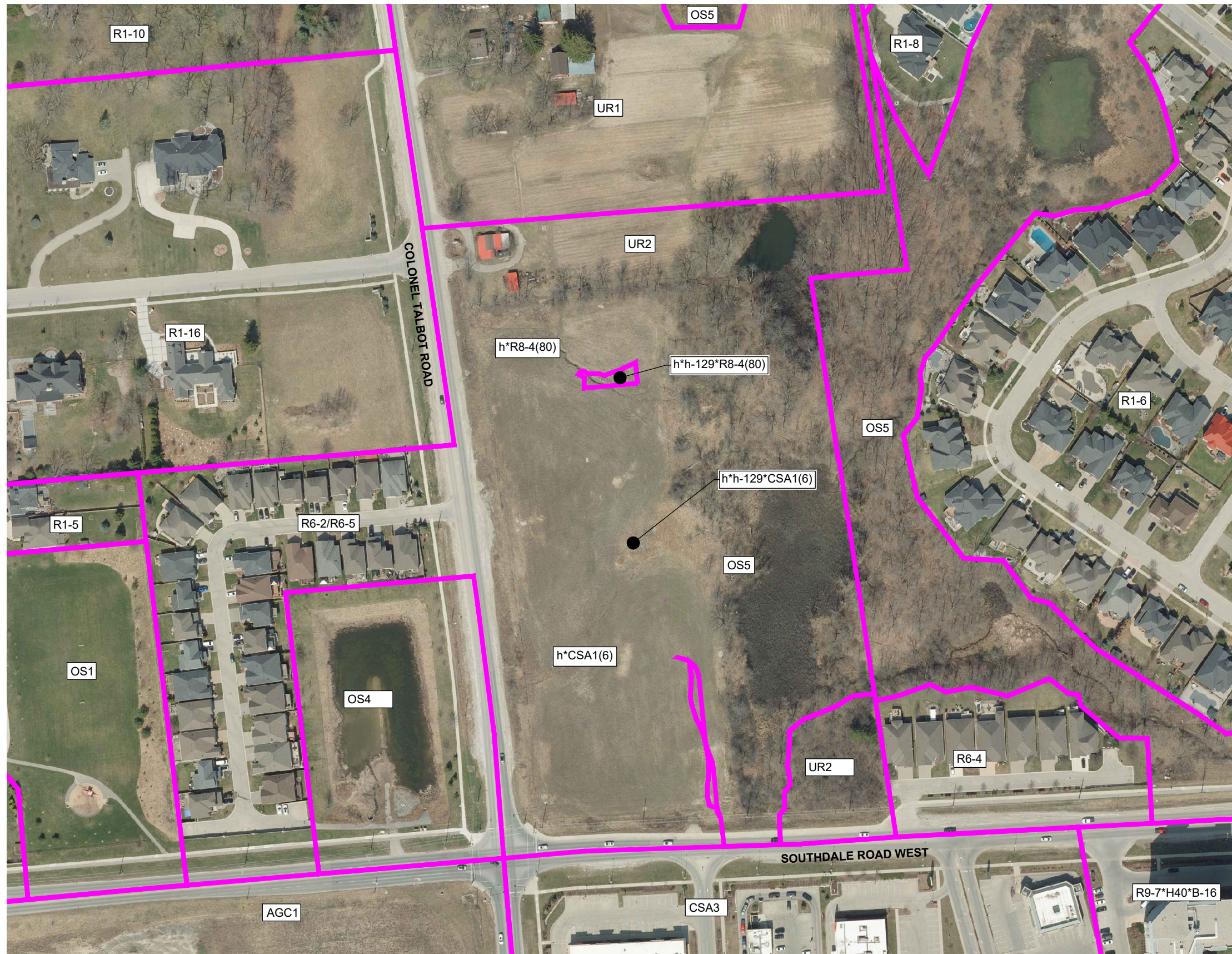
Figure 3: Land Use
[City of London Official Plan Schedule A (September 2015)]



0 1,000
Scale 1:50,000
Key Plan

Print on 11X17, Landscape Orientation
0 160
Scale 1:8,000
April 2020





LEGEND


— ZONING BOUNDARY

REFERENCES

CITY OF LONDON OPEN DATA SET, 2021; AND
 AUTOCAD FILE "952 SOUTHDALE-COL.TALBOT RD SP34 March 31, 2022.dwg",
 PROVIDED BY WESTDELL DEVELOPMENT CORPORATION, MARCH 31 - 2022.

NOTES

THIS FIGURE IS SCHEMATIC ONLY AND TO BE READ IN
 CONJUNCTION WITH ACCOMPANYING TEXT.
 ALL LOCATIONS ARE APPROXIMATE.



PROJECT
SUBJECT LAND STATUS REPORT
 SOUTHDALE ROAD AND
 COLONEL TALBOT ROAD
 LONDON, ONTARIO

TITLE
ZONING

Drawn	JAC	Scale	AS SHOWN
Checked		Project No.	45606-100
Date	Apr 25/23	Rev No.	0

FIGURE 4



Figure 5: NHIC
(2020 NHIC Make a Map)



0 1,000
Scale 1:50,000
Key Plan

Legend

-  - Wetland
-  - Woodland

Print on 11X17, Landscape Orientation

0 80

Scale 1:4,000
April 2020





Figure 5a: PSW Boundary
(2019 City of London Air Photo)



0 1,000

Scale 1:50,000

Key Plan

Legend:

— MNRF PSW Boundary 2018

● Peizometer Location (LDS, 2019)

Print on 11X17, Landscape Orientation

0 30

Scale 1:1,500

April 2020



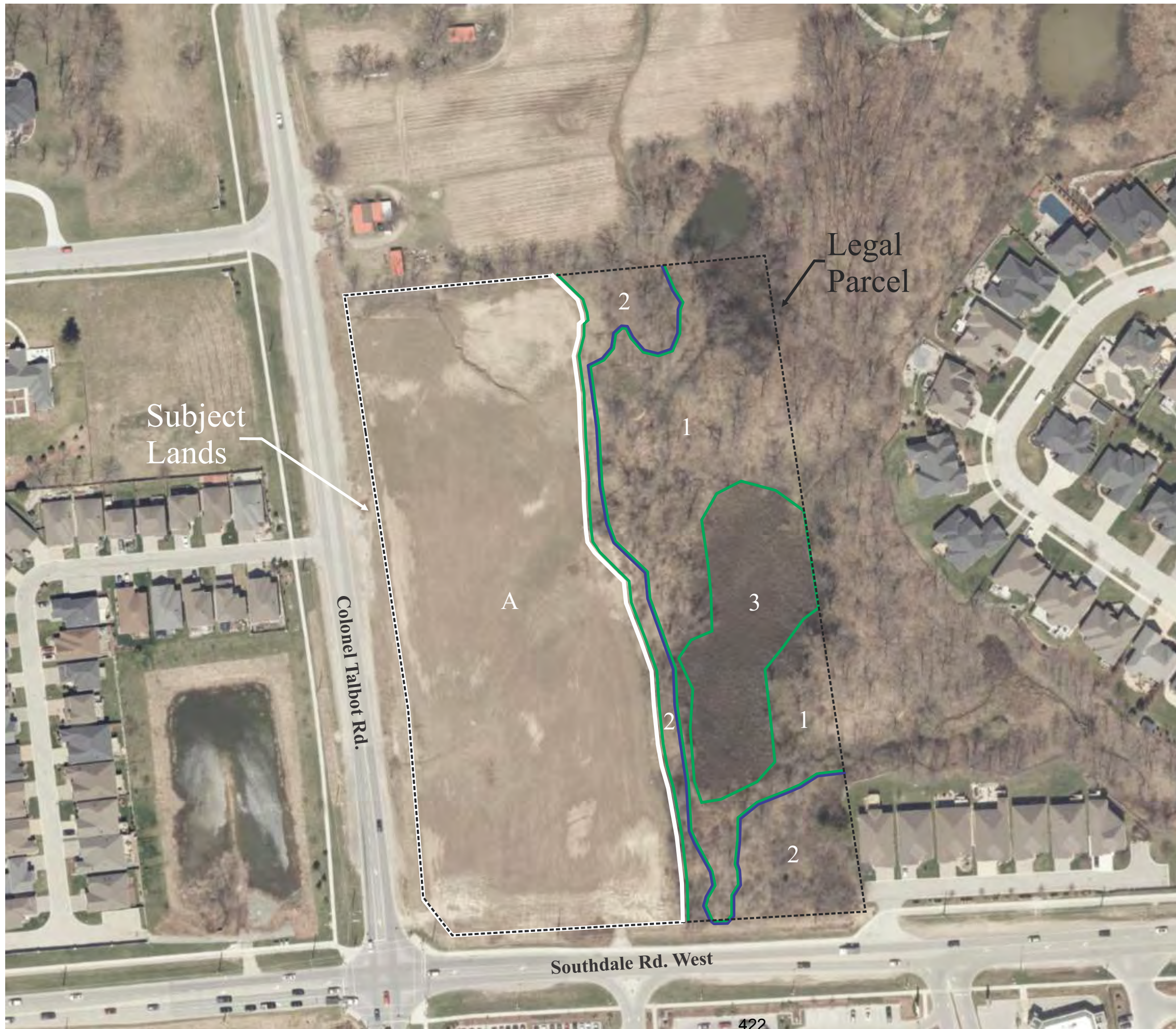


Figure 6: Vegetation Communities
(2019 City of London Air Photo)



0 1,000
Scale 1:50,000
Key Plan

Legend:

- MNRF PSW Boundary 2018
- Vegetation Boundary 2018
- 1 SWT2 Mineral Thicket Swamp
- 2 CUW1 Mineral Cultural Woodland Ecosite
- 3 SWT3-4 Buttonbush Organic Thicket Swamp Type

A Agricultural

*Terrestrial Crayfish Chimneys observed in Community 2 and suspected in Community 1

*One (1) Eastern Wood-pewee observed in Community 1 during one breeding bird survey visit. Potential breeding habitat is present within the larger Community 2 woodland outside of Legal Parcel

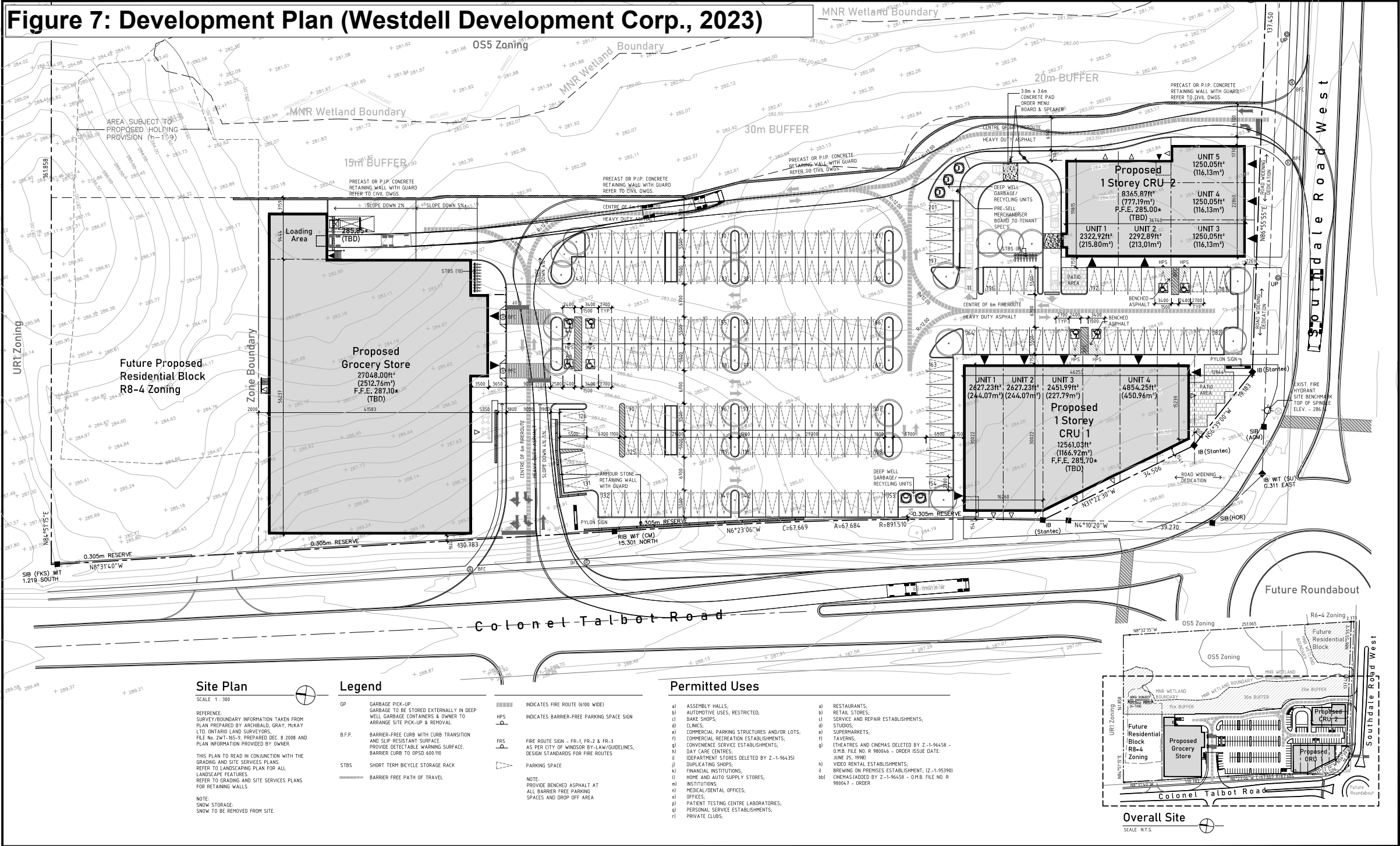
Print on 11X17, Landscape Orientation

0 30

Scale 1:1,500
April 2020



Figure 7: Development Plan (Westdell Development Corp., 2023)



DO NOT SCALE DRAWINGS.
 CONTRACTOR AND SUBCONTRACTORS SHALL CHECK ALL DIMENSIONS AND REPORT TO THE OWNERS ANY DISCREPANCIES PRIOR TO PROCEEDING WITH WORK.
 ALL WORKMANSHIP AND MATERIALS MUST CONFORM WITH CODES AND CANIAN STANDARDS AND BE APPROVED BY OWNER.

THIS DRAWING IS THE PROPERTY OF THE CONSULTANT AND SHALL NOT BE COPIED OR REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF THE CONSULTANT.

No.	DATE	REVISION
1	JAN 21/23	REVISE SITE PER TRUCK MOVEMENT ANALYSIS
2	JAN 24/23	MOVE GROC PARKING WEST 100 - 512 SETBACK
3	JAN 27/23	3RD DRG. SETBACK/GROC REDUCE GROC AND PARK.



R.Tomé & Associate Inc.
 51 Wimbledon Court
 London ON N6C 5C9
 T. 519.672.6622
 r_tome@bellnet.ca



Project Name
 952 Southdale Road West, Proposed Commercial Development

1025 Elgin Street West, CRU #1
 Cobourg, Ontario

Drawing Title
 Site Plan Proposal

DATE: JAN. 1, 2023
 SCALE: AS NOTED
 DRAWN: C.T.
 REVIEWED: B.K.
 FILE NO: 2023-####K100WG
 PROJECT NO: 2023-####

SP1.0 SPA

Site Plan
 SCALE: 1:300

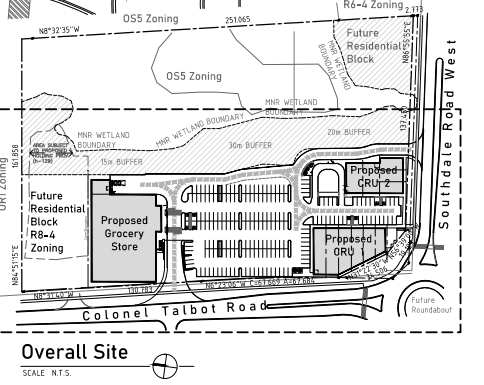
REFERENCE:
 SURVEY/BOUNDARY INFORMATION TAKEN FROM PLAN PREPARED BY ARCHIBALD, GRAY, MCKAY LTD. ONTARIO LAND SURVEYORS.
 FILE NO. 2M1-165-1. PREPARED DEC. 8 2008 AND PLAN INFORMATION PROVIDED BY OWNER.

THIS PLAN TO READ IN CONJUNCTION WITH THE GRADING AND SITE SERVICES PLANS.
 REFER TO LANDSCAPING PLAN FOR ALL LANDSCAPE FEATURES.
 REFER TO GRADING AND SITE SERVICES PLANS FOR RETAINING WALLS.

NOTE:
 SNOW STORAGE.
 SNOW TO BE REMOVED FROM SITE.

- Legend**
- GP GARBAGE PICK-UP
 GARBAGE TO BE STORED EXTERNALLY IN DEEP WELL GARBAGE CONTAINERS & OWNER TO ARRANGE SITE PICK-UP & REMOVAL.
 - B.F.P. BARRIER-FREE CURB WITH CURB TRANSITION AND SLIP RESISTANT SURFACE.
 PROVIDE DETECTABLE WARNING SURFACE. BARRIER CURB TO OPSD 600 TO.
 - STBS SHORT TERM BICYCLE STORAGE RACK
 - BARRIER FREE PATH OF TRAVEL
 - INDICATES FIRE ROUTE (6100 WIDE)
 - HPS INDICATES BARRIER-FREE PARKING SPACE SIGN
 - FPS FIRE ROUTE SIGN - FR-1, FR-2 & FR-3 AS PER CITY OF WINDSOR BY-LAW/GUIDELINES, DESIGN STANDARDS FOR FIRE ROUTES.
 - PARKING SPACE
 - NOTE:
 PROVIDE BENCHED ASPHALT AT ALL BARRIER FREE PARKING SPACES AND DROP OFF AREA.

- Permitted Uses**
- a) ASSEMBLY HALLS;
 - b) AUTOMOTIVE USES, RESTRICTED;
 - c) BAKE SHOPS;
 - d) CLINICS;
 - e) COMMERCIAL PARKING STRUCTURES AND/OR LOTS;
 - f) COMMERCIAL RECREATION ESTABLISHMENTS;
 - g) CONVENIENCE SERVICE ESTABLISHMENTS;
 - h) DAY CARE CENTRES;
 - i) DEPARTMENT STORES DELETED BY Z-1-964/51
 - j) DUPLICATING SHOPS;
 - k) FINANCIAL INSTITUTIONS;
 - l) HOME AND AUTO SUPPLY STORES;
 - m) INSTITUTIONS;
 - n) MEDICAL/DENTAL OFFICES;
 - o) OFFICES;
 - p) PATIENT TESTING CENTRE LABORATORIES;
 - q) PERSONAL SERVICE ESTABLISHMENTS;
 - r) PRIVATE CLUBS;
 - s) RESTAURANTS;
 - t) RETAIL STORES;
 - u) SERVICE AND REPAIR ESTABLISHMENTS;
 - v) STUDIOS;
 - w) SUPERMARKETS;
 - x) TAVENS;
 - y) THEATRES AND CINEMAS DELETED BY Z-1-964/58 - O.M.B. FILE NO. R 980046 - ORDER ISSUE DATE JUNE 29, 1998
 - z) VIDEO RENTAL ESTABLISHMENTS;
 - aa) BREWING ON PREMISES ESTABLISHMENT (Z-1-953/90)
 - ab) CINEMAS (ADDED BY Z-1-964/58 - O.M.B. FILE NO. R 980047 - ORDER



LEGEND

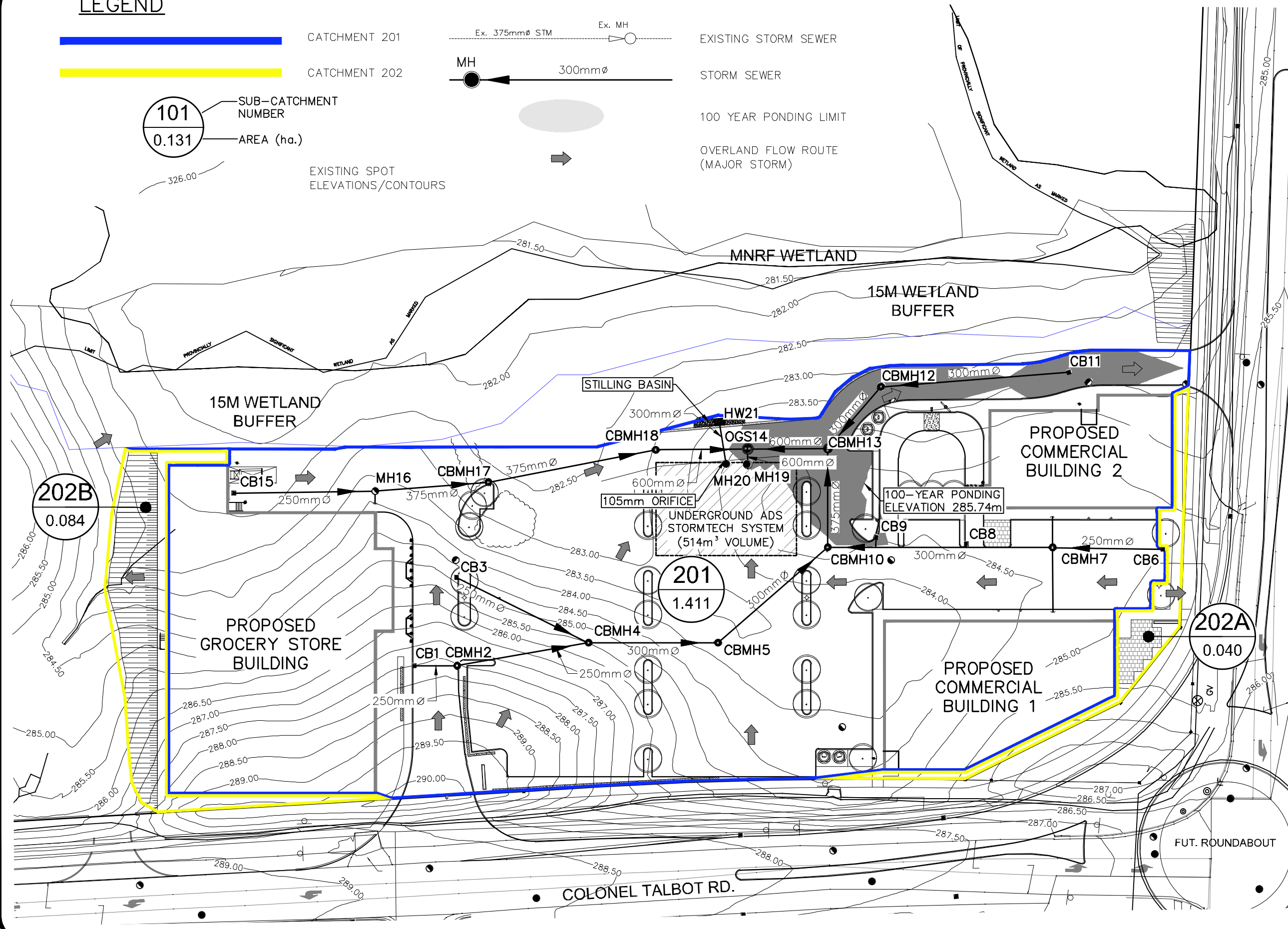
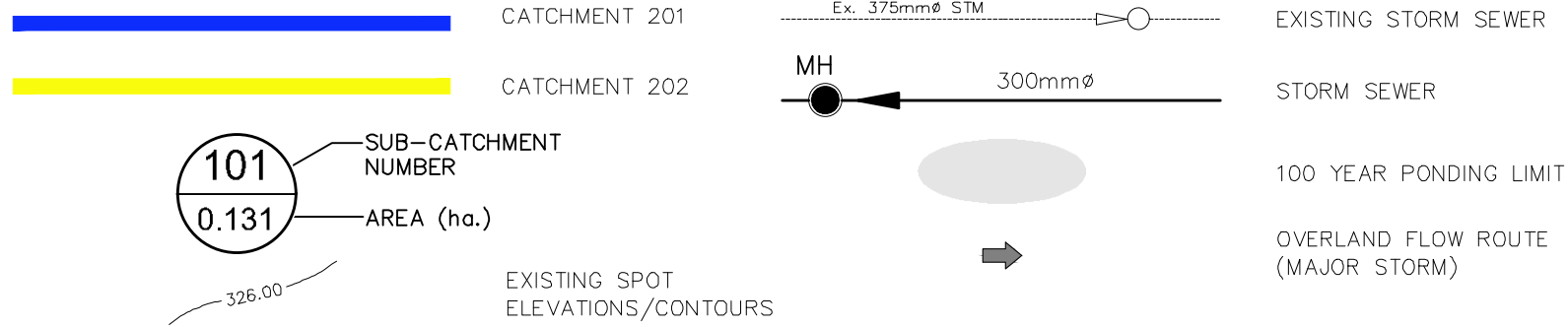
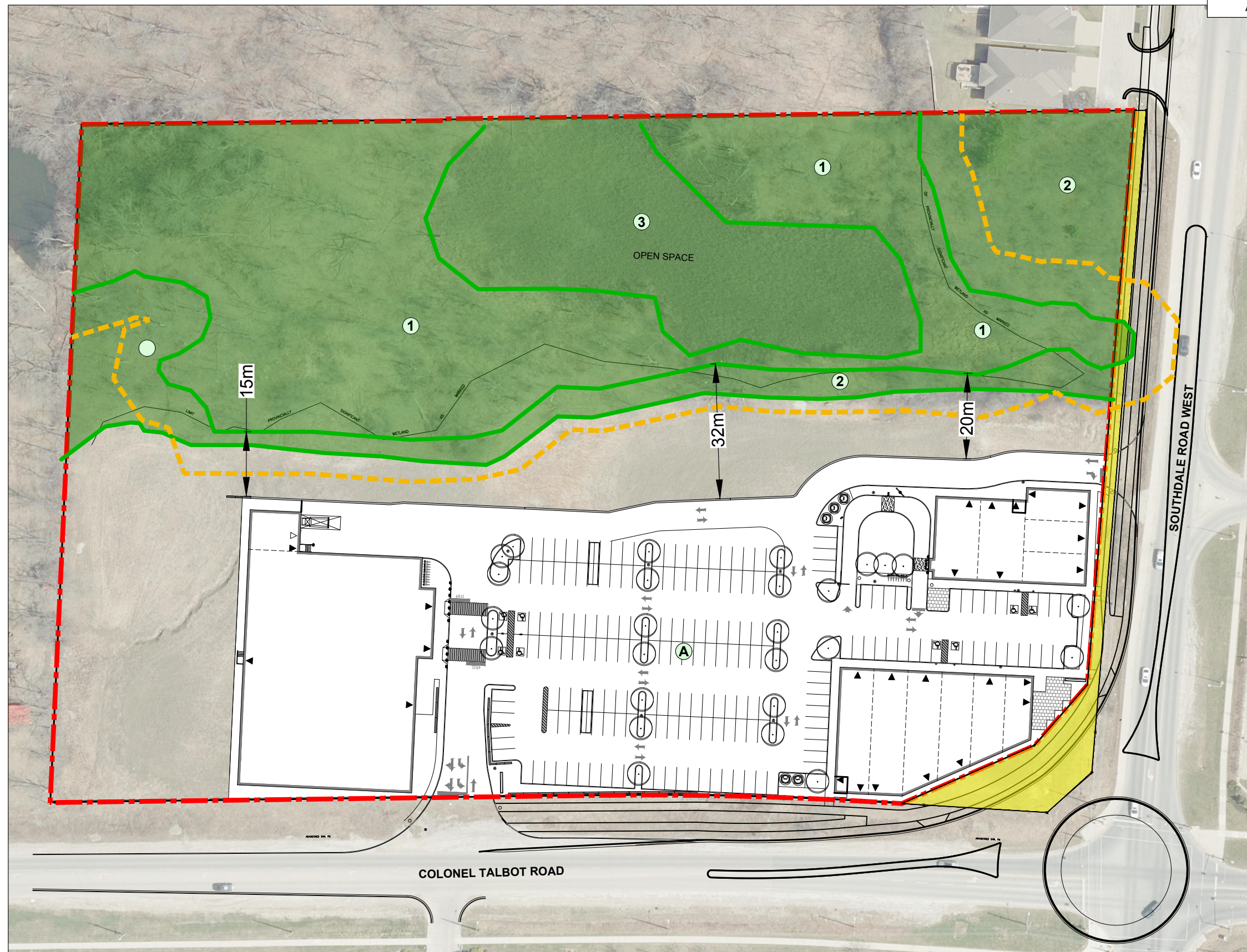


FIG 2 Date: FEB.17/23 Scale: 1:750

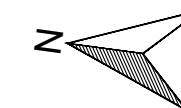
POST DEVELOPMENT CATCHMENTS

Engineers, Scientists, Surveyors

Project No.: 52756-100



ELC NUMBER	ELC CODE	DESCRIPTION
1	SWT2	MINERAL THICKET SWAMP
2	CUW1	MINERAL CULTURAL WOODLAND ECOSITE
3	SWT3-4	BOTTOM BUSH ORGANIC THICKET SWAMP TYPE
A		AGRICULTURAL



LEGEND

- SUBJECT LANDS
- VEGETATION COMMUNITY
- 10m OFFSET
- AREA OF FUTURE ROAD WIDENING (CITY OF LONDON)

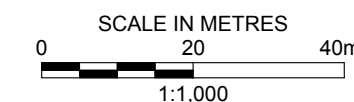
REFERENCES

CITY OF 2021 LONDON PARCEL AND AERIAL IMAGERY, OPEN DATA SET; AND STANTECT DRAFT PLAN OF SUBDIVISION, PROJECT No. 161403241, DRAWING No. 1, MARCH 9 - 2023.

NOTES

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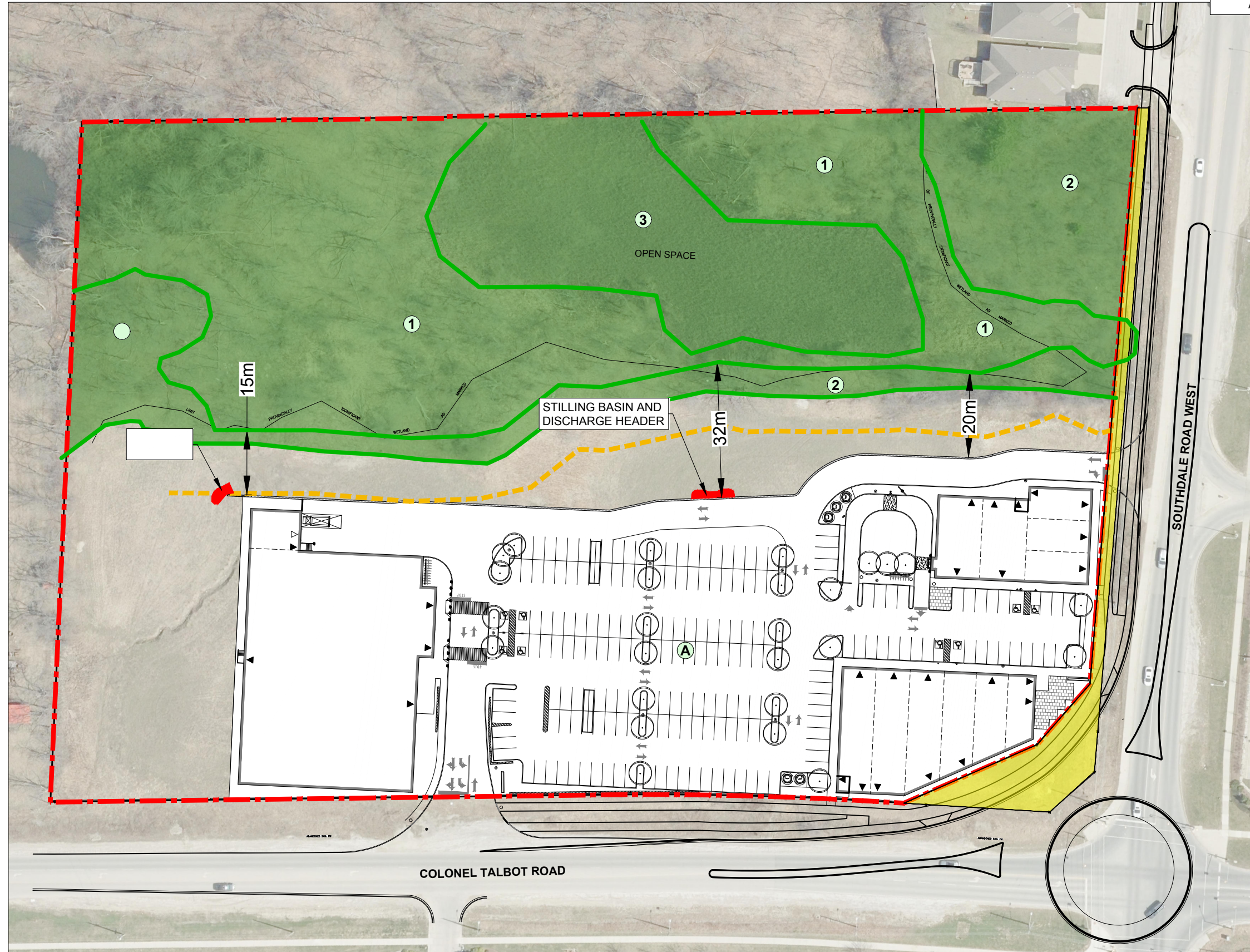


PROJECT
SUBJECT LAND STATUS REPORT
 SOUTHDAL ROAD AND
 COLONEL TALBOT ROAD
 LONDON, ONTARIO

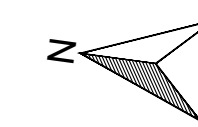
TITLE
VEGETATION COMMUNITIES
 (DEVELOPMENT OVERLAY)

Drawn	DCH	Scale	AS SHOWN
Checked		Project No.	45606-100
Date	Apr 25/23	Rev No.	0

FIGURE 9



ELC NUMBER	ELC CODE	DESCRIPTION
1	SWT2	MINERAL THICKET SWAMP
2	CUW1	MINERAL CULTURAL WOODLAND ECOSITE
3	SWT3-4	BOTTOM BUSH ORGANIC THICKET SWAMP TYPE
A		AGRICULTURAL



LEGEND

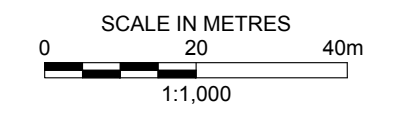
- SUBJECT LANDS
- VEGETATION COMMUNITY
- ROBUST SEDIMENT EROSION CONTROL FENCE
- AREA OF FUTURE ROAD WIDENING (CITY OF LONDON)

REFERENCES

CITY OF 2021 LONDON PARCEL AND AERIAL IMAGERY, OPEN DATA SET; AND STANTECT DRAFT PLAN OF SUBDIVISION, PROJECT No. 161403241, DRAWING No. 1, MARCH 9 - 2023.

NOTES

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PROJECT		SUBJECT LAND STATUS REPORT SOUTHDALE ROAD AND COLONEL TALBOT ROAD LONDON, ONTARIO	
TITLE		DETAILED ENGINEERING & MITIGATION PLAN	
Drawn	JAC	Scale	AS SHOWN
Checked		Project No.	45606-100
Date	Apr 25/23	Rev No.	0

FIGURE 10

Appendix A

Record of Pre-Application Consultation

Good morning Dave,

Please confirm that your ecologist will submit a combined Subject Land Status Report and Environmental Impact Study to ensure that the City's ecological concerns will be addressed.

Regards,



Michael Tomazincic, MCIP, RPP
Manager, Current Planning
Development Services
City of London

206 Dundas Street, London, Ontario N6A 1G7
P: 519.661.CITY (2489) x 4693 | Fax: 519.661.661-5397
mtomazin@london.ca | www.london.ca

From: dtraher@westdellcorp.com [<mailto:dtraher@westdellcorp.com>]
Sent: Wednesday, March 6, 2019 1:59 PM
To: Tomazincic, Michael <mtomazin@London.ca>; Debbert, Barb <bdebbert@London.ca>
Cc: 'lyman Meddoui' <imeddoui@westdellcorp.com>; MacKay, James <jmackay@london.ca>
Subject: RE: 952 Southdale submission

Hi Michael

Thanks for getting back to us so quickly. As mentioned, our ecologist does feel that the EIS covers these items off already. It is possible to instruct the city's ecologist to accept perhaps a limited scope SLSR, given that the EIS will provide this detail as well, as they will be submitted at the same time?

Dave

David Traher | Vice President, Planning/Development Westdell Corp.
dtraher@westdellcorp.com | O: 519 850 0000 | C: 519 619 1913 | F: 226 777 1989
782 Richmond Street, London ON N6A 3H5



www.westdellcorp.com

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From: Tomazincic, Michael <mtomazin@London.ca>
Sent: March 6, 2019 1:15 PM
To: dtraher@westdellcorp.com; Debbert, Barb <bdebbert@London.ca>
Cc: 'lyman Meddoui' <imeddoui@westdellcorp.com>; MacKay, James <jmackay@london.ca>
Subject: RE: 952 Southdale submission

Good afternoon David,

We had a closer look at your request and features of the property and had good discussion in consideration of your request. We do not like to ask for any reports and studies that are not necessary for Staff to make an informed opinion to Council. However, in this case, we believe that the submission of an SLSR is a critical piece of information needed to prepare the Staff report.

The objective of the SLSR is to inventory, evaluate, assess significance of features and functions, delineate boundaries and make recommendations for designation. While the site already has a PSW designation which covers a large portion of the property, it is my understanding that an exercise has already taken place to redraw that PSW boundary in consultation with the MNR. The evaluation of any other potential features that would require identification as a Significant Natural Heritage feature under Section 15.4 of the Official Plan and relevant policies of the London Plan is required. Other Significant Natural Heritage features may be present on the subject site. Once all Natural Heritage features have been properly identified, delineated, and accepted by the City of London, the project can proceed to an EIS for a proposed development based on the City approved SLSR and in accordance with the City's Environmental Management Guidelines.

The City's Ecologist would be happy to discuss the scoping of required field work and reporting requirements for the completion of the SLSR.



Michael Tomazincic, MCIP, RPP
Manager, Current Planning
Development Services
City of London

206 Dundas Street, London, Ontario N6A 1G7
P: 519.661.CITY (2489) x 4693 | Fax: 519.661.661-5397
mtomazin@london.ca | www.london.ca

From: dtraher@westdellcorp.com [<mailto:dtraher@westdellcorp.com>]
Sent: Monday, March 4, 2019 8:08 AM
To: Debbert, Barb <bdebbert@London.ca>; Tomazincic, Michael <mtomazin@London.ca>
Cc: 'lyman Meddoui' <imeddoui@westdellcorp.com>
Subject: 952 Southdale submission

Good Morning Barb and Michael

We are preparing the various materials for submission for the ZBA/OPA and in speaking with our environmental consultant, he is of the opinion that the Subject Lands Status Report is not applicable in this instance, and that the EIS will address the same items. He further commented that the SLSR is for sites without any prior planning, yet this site has SWM and designations so the report may not be appropriate.

As we are submitting the EIS anyway, can we forego the SLSR?

Please advise

Thanks

David Traher | Vice President, Planning/Development Westdell Corp.

dtraher@westdellcorp.com | O: 519 850 0000 | C: 519 619 1913 | F: 226 777 1989
782 Richmond Street, London ON N6A 3H5



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APPENDIX A

Environmental Impact Study ISSUES SUMMARY CHECKLIST REPORT

Application Title: 952 Southdale Road West
Date Submitted: September 17, 2020
Proponent: 1739626 Ontario Limited

Qualifications

Primary Consultant: MHBC Planning
Key Contact Person: Scott Allen
Other Consultants/ field personnel:
Hydrogeology/ Hydrology: LDS
Biological – Flora: MTE Consultants
Biological – Fauna: MTE Consultants
Other:

Context for Background Information

Subwatershed: Dingman Creek
Tributary Fact Sheet Number:
Planning / Policy Area:

Technical Advisory Review Team

Ecologist Planner James MacKay
 Planner for File Barb Debbert
 EEPAC Sandy Levin
 Conservation Authority UTRCA
 Ministry of Natural Resources & MECP - N/A
 Ministry of Municipal Affairs and Housing
 Ministry of Agriculture and Food

Other Review Groups (e.g., Community Associations, Field Naturalists)

1.0 DESCRIPTION OF THE ENVIRONMENT (Features)

Purpose: To have a clear understanding of the current status of the land, and the proposed "development" or land use change.

1.1 Mapping (Location and Context)

Current aerial photography

- Land Use – Excerpts of the Official Plan for the City of London Ontario Schedules A, B, showing a 5-10 km radius of subject site
- Terrain setting @ 1:10,000 – 1:15,000 scale showing landscape features, subwatershed divides
- Existing Environmental Resources showing @1:2,000 – 1:5,000 showing Vegetation, Hydrology, contours, linages.
- Environmental Plan or Strategy from Subwatershed reports (tributary fact sheet), Community (Area) Plans, or other

1.2 Description of Site, Adjacent lands, Linage with Natural Heritage System

List all supporting studies and reports available to provide background summary (e.g. subwatershed, hydrological, geo-technical, natural heritage etc.).

Dingman Creek Subwatershed Study (2005), Southdale Road Widening EA (2018)

Check the first box if the information is relevant and required as part of this study. Check the second box if sufficient data is available.

1.2.1

Terrain Setting

- | | | |
|-------------------------------------|-------------------------------------|---------------------------------------|
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Soils (surface and subsurface) |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Glacial geomorphology – landform type |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Subwatershed |

- Topographic features
- Ground water discharge
- Shallow ground water/baseflow
- Ground water discharge/aquifer
- Aggregate resources

1.2.2 **Hydrology**

- Hydrological catchment boundary and of wetlands
- Surface drainage pattern
- Watercourses (Permanent, Intermittent)
- Stream order (Headwater, 1st, 2nd, 3rd or higher)
- Agricultural Drains
- Downstream receiving watercourse
- Hazard Line (Map 6)

1.2.3 **Natural Hazards**

- 100 year Erosion Line
- Floodline mapping
- Max line mapping + UTRCA text based regulated areas

1.2.4 **Vegetation**

- Vegetation Patch Number
- System (Terrestrial, Wetland, Aquatic)
- Cover (Open, Shrub, Treed)
- Community Type(s)
- ELC Community Class (Bluff, Forest, Swamp, Tallgrass Prairie, Savannah & Woodland, Fen, Bog, Marsh, Open Water, Shallow Water)
- ELC Community Series
- Rare Vegetation Communities

1.2.5

Flora

Flora (inventory dates, source)

Full 3-season required

Rare flora (National, Provincial, Regional)

*NHIC / MNRF / MECP
Oldham (2017)*

1.2.6

Fauna

Fauna (Inventory dates; sources)

Bat Habitat assessment

Breeding Birds

Migratory Birds

Amphibians

Reptiles

Mammals

Butterflies

Odonata

Other

Partners In Flight (PIF)

Rare Fauna

1.2.7

Wildlife Habitat

*95 Per MNRF 2015 criteria + all applicable
official Plan/
London Plan
Policies*

- Species-At-Risk Regulated Habitat critical habitat mapping
- Winter habitat for deer, wild turkey
- Waterfowl Habitat (wetlands, poorly drained landscape – bottomlands, beaver ponds, seasonally flooded areas, staging areas, feeding areas)
- Colonial Birds Habitat
- Hibernacula
- Habitat for Raptors
- Forests with springs or seeps
- Ephemeral ponds
- Wildlife trees (snags, cavities, x-large trees > 65 cm DBH)
- Forest Interior Birds
- Area-sensitive birds

1.2.8

Aquatic Habitat

(SWS Aquatic Resources Management Reports)

- Fish communities
- Fish spawning areas
- Fish migration routes
- Thermal refuge for fish

*to be confirmed
by UTRCA &/or
assumed to be
present in PSW*

- Benthic inventory
- Substrate
- Riparian habitat (extent and type)

1.2.9

Linkages and Corridors

(The diversity of natural features in an area, and the natural connections between them should be maintained, and improved where possible. PPS 2.3.3)

- Valleylands
- Significant Watercourses (Thames River, Stoney Creek, Medway Creek, Dingman Creek, Pottersburg Creek, Wabuno Creek, Mud Creek, Stanton Creek (Drain), Kelly Creek (Drain))
- Upland Corridors / species migration routes
- Big Picture Cores and Corridors
- Linkages between aquatic and terrestrial areas (riparian habitat, runoff)
- Groundwater connections
- Patch clusters (mosaic of patches in the landscape)

1.3 Social Values

1.3.1

Human Use Values

- Recreational linkages for hiking, walking
- Nature appreciation, aesthetics
- Education, research
- Cultural / traditional heritage
- Social (parks and open space)
- Resources Products (e.g. timber, fish, furbearers, peat)
- Aggregate Resources

1.3.2

Land Use - Cultural

- Archaeological (pre 1500)
- Historical (post 1500 – present)
- Adjacent historical and archeological
- Future

*Std Archaeological
Requirement if identified
with application*

1.3.3

Land Use - Active

- Archaeological (pre 1500)
- Historical (post 1500 – present)
- Adjacent historical and archeological
- Future

1.3.4

Other

2.0 EVALUATION OF SIGNIFICANCE

Components of the Natural Heritage System

The policies in Section 15.4 apply to recognized and potential components of the natural heritage system as delineated on Schedule 'B' or features that may be considered for inclusion on Schedule 'B'. They also address the protection of environmental quality and ecological function with respect to water quality, fish habitat, groundwater recharge, headwaters and aquifers.

- A component of a Subject Lands Status Report that is required to be included in the EIS is the evaluation of significance of all potential natural heritage features and areas recognized by In-force London Plan policies and/ or Official Plan policies.**
- A component of a Subject Lands Status Report that is required to be included in the EIS is the confirmation and mapping of boundaries of all natural heritage features and areas.**

2.1 Environmentally Significant Areas

- Identified Environmentally Significant Areas (ESA)

Name

- Potential ESAs – Expansion of an Existing ESA

Name

- Potential ESA – Area not associated with an existing ESA

Name

2.2 Wetlands

- Provincially Significant Wetlands

Name North Talbot PSW Complex

- Wetlands

Name

- Unevaluated Wetlands

2.3 Areas of Natural and Scientific Interest

- Provincial Life Science ANSI
- Regional Life Science ANSI
- Earth Science ANSI

2.4 Habitat of Species-At-Risk (SAR)

- Endangered
- Threatened
- Vulnerable / Special Concern

2.5 Woodlands and Vegetation Patches

- Significant Woodlands
- Unevaluated Vegetation Patches and/ or other patches > 0.5ha

2.6 Corridors and Linkages

- River, Stream and Ravine Corridors
- Upland Corridors
- Naturalization and Anti-fragmentation Areas

3.0 IDENTIFICATION AND DESCRIPTION OF FUNCTIONS

Ecological Functions the natural processes, products or services that species and non-living environments provide or perform within or between ecosystems and landscapes. Check those functions that will be required to assess for the study (key and supporting functions).

3.1 Biological Functions

- Habitat (provision of food, shelter for species)
- Limiting habitat

- Species life histories (reproduction and dispersal)
- Habitat guilds
- Indicator species
- Keystone species
- Introduced species
- Predation / parasitism
- Population dynamics
- Vegetation structure, density and diversity
- Food chain support
- Productivity
- Diversity
- Carbon cycle
- Energy cycling
- Succession and disturbance processes
- Relationships between species and communities

3.2 Hydrological and Wetland Functions

- Groundwater recharge and discharge (hydrogeology)
- Water storage and release (fluvial geomorphology)
- Maintaining water cycles (water balance)
- Water quality improvement
- Flood damage reduction
- Shoreline stabilization / erosion control
- Sediment trapping
- Nutrient retention and removal / biochemical cycling
- Aquatic habitat (fish, macroinvertebrates)

3.3 Landscape Features and Functions

- Size
- Connections, corridors and linkages
- Proximity to other areas / natural heritage features (e.g. woodlands, wetlands, valleylands, water, etc.)
- Fragmentation

3.4 Functions, Benefits and Values of Importance to Humans

- Contributing to healthy and productive landscapes
- Improving air quality by supplying oxygen and absorbing carbon dioxide
- Converting and storing atmospheric carbon
- Providing natural resources for economic benefit
- Providing green space for human activities
- Aesthetic and quality-of-life benefit
- Environmental targets and/or environmental management strategies

4.0 ADDITIONAL COMPONENTS AND NOTES

- EIS to show and demonstrate conformity with the Provincial Policy Statement (2020), in-force London Plan policies, and current Official Plan policies (1989), Environmental Management Guidelines (2006).
- Full Hydrogeological study and water balance for all features – scope to be determined through discussions with the UTRCA and approved by the UTRCA and City of London.
- EIS to integrate and speak to Hydrogeological study and water balance findings and recommendations for the short and long-term protection of the features and functions.
- EIS to address Section 28 regulated areas requirements that are present on the subject site as confirmed by the UTRCA.
- Natural heritage features and areas boundaries to be staked and GPS located in the field with City of London and UTRCA staff.
- EIS to address buffers, additional mitigation and/or compensation based on the proposed development.
- EIS to address potential wetland interference/ removal on edge/ within feature limits as identified on City of London 2020 air photos.

Appendix B

Hydrogeological Assessment (LDS, Project # GE-00085, April 6, 2022)

**Separate Report
Available upon Request**

Appendix C

Ecological Land Classification Information

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>Wetland</u>	POLYGON: <u>1</u>	<u>Thicket Sw</u>
	SURVEYOR(S): <u>WH</u>	DATE: <u>June 11</u>	TIME: start finish
	UTMZ: <u>17</u>	UTME:	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input type="checkbox"/> TERRESTRIAL <input checked="" type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK. <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK.	<input type="checkbox"/> LACUSTRINE RIVERINE <input checked="" type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL. UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input checked="" type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input checked="" type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input type="checkbox"/> WOODLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE			COVER		
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK			<input type="checkbox"/> OPEN <input checked="" type="checkbox"/> SHRUB <input type="checkbox"/> TREE		

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	2	1	<u>FRApenn = ACE rubr > SUb nigr = ACEnegr</u>
2 SUB-CANOPY	3	2	<u>SAL alba =</u>
3 UNDERSTOREY	3	3	<u>RHAcath = CORace = CORseri = VIBopul</u>
4 GRD. LAYER	6	4	<u>CAR spp = LER spp = GLY stri = ONO scns</u>

HT CODES: 1 = >25m 2 = 10<HT 25m 3 = 2<HT 10m 4 = 1<HT 2m 5 = 0.5<HT 1m 6 = 0.2<HT 0.5m 7 = HT<0.2m
CVR CODES: 0 = NONE 1 = 0% < CVR 10% 2 = 10 < CVR 25% 3 = 25 < CVR 60% 4 = CVR > 60%

STAND COMPOSITION: BA: _____

SIZE CLASS ANALYSIS:

< 10	10 - 24	25 - 50	> 50
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STANDING SNAGS: < 10 10 - 24 25 - 50 > 50

DEADFALL / LOGS: < 10 10 - 24 25 - 50 > 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE: PIONEER YOUNG MID-AGE MATURE OLD GROWTH

SOIL ANALYSIS:

TEXTURE: DEPTH TO MOTTLES / GLEY g = G =

MOISTURE: DEPTH OF ORGANICS: (cm)

HOMOGENEOUS / VARIABLE DEPTH TO BEDROCK: (cm)

COMMUNITY CLASSIFICATION: ELC CODE

COMMUNITY CLASS:	<u>SWAMP</u>	<u>SW</u>
COMMUNITY SERIES:	<u>THICKET</u>	<u>SWT</u>
ECOSITE:	<u>MINERAL</u>	<u>SWT2</u>
VEGETATION TYPE:		
INCLUSION		
COMPLEX		

Notes:

ELC MANAGEMENT / DISTURBANCE	SITE: <u>Wetland</u>	POLYGON: <u>1</u>	<u>Thicket Swamp</u>
	SURVEYOR(S): <u>WH</u>	DATE: <u>June 11</u>	
	UTMZ: <u>17</u>	UTME:	UTMN:

DISTURBANCE EXTENT	0	1	2	3	SCORE †
TIME SINCE LOGGING	> 30 YRS	15 - 30 YRS	5 - 15 YRS	0 - 5 YEARS	0
INTENSITY OF LOGGING	NONE	FUEL WOOD	SELECTIVE	DIAMETER LIMIT	0
EXTENT OF LOGGING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
SUGAR BUSH OPERATIONS	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF OPERATIONS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
GAPS IN FOREST CANOPY	NONE	SMALL	INTERMEDIATE	LARGE	0
EXTENT OF GAPS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
LIVESTOCK (GRAZING)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF LIVESTOCK	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
ALIEN SPECIES	NONE	OCCASIONAL	ABUNDANT	DOMINANT	2
EXTENT OF ALIEN SPECIES	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
PLANTING (PLANTATION)	NONE	OCCASIONAL	ABUNDANT	DOMINANT	0
EXTENT OF PLANTING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
TRACKS AND TRAILS	NONE	FAINT TRAILS	WELL MARKED	TRACKS OR	0
EXTENT OF TRACKS/TRAILS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
DUMPING (RUBBISH)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF DUMPING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
EARTH DISPLACEMENT	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF DISPLACEMENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
RECREATIONAL USE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF RECR. USE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
NOISE	NONE	SLIGHT	MODERATE	INTENSE	0
EXTENT OF NOISE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
DISEASE/DEATH OF TREES	NONE	LIGHT	<u>MODERATE</u>	HEAVY	4
EXTENT OF DISEASE / DEATH	NONE	LOCAL	<u>WIDESPREAD</u>	EXTENSIVE	0
WIND THROW (BLOW DOWN)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF WIND THROW	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
BROWSE (e.g. DEER)	NONE	LIGHT	MODERATE	HEAVY	4
EXTENT OF BROWSE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
BEAVER ACTIVITY	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF BEAVER	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
FLOODING (pools & puddling)	NONE	LIGHT	MODERATE	<u>HEAVY</u>	9
EXTENT OF FLOODING	NONE	LOCAL	WIDESPREAD	<u>EXTENSIVE</u>	0
FIRE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF FIRE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
ICE DAMAGE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF ICE DAMAGE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0
OTHER	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	0

† INTENSITY x EXTENT = SCORE

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Colonel Talbot	POLYGON: 2 edge
	SURVEYOR(S): WH	DATE: June 11, 2018
	UTMZ: (7)	UTME:
	TIME: start finish	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input checked="" type="checkbox"/> TERRESTRIAL <input type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK. <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK.	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input checked="" type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input type="checkbox"/> GRAMINOID <input type="checkbox"/> MARSH <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input checked="" type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input checked="" type="checkbox"/> WOODLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE		COVER			
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input checked="" type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK		<input type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input type="checkbox"/> TREE			

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	2	3	JUGnigr > ACEnggr > FRApenn
2 SUB-CANOPY	3	3	JUGnigr > ACEnggr >> FRApenn = MALsp.
3 UNDERSTOREY	3	3	CONtata > CORrca > ROSmult = UTRipa
4 GRD. LAYER	6	4	ALLpti = MONfist > GElalle = LElvulg

HT CODES: 1=>25 m 2=10<HT 25 m 3=2<HT 10 m 4=1<HT 2 m 5=0.5<HT 1 m 6=0.2<HT 0.5 m 7=HT<0.2 m
 CVR CODES 0=NONE 1=0%<CVR 10% 2=10<CVR 25% 3=25<CVR 60% 4=CVR>60%

STAND COMPOSITION: BA:

SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50
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STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50
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DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50
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ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE: PIONEER YOUNG MID-AGE MATURE OLD GROWTH

SOIL ANALYSIS:

TEXTURE: DEPTH TO MOTTLES / GLEY g = G =
 MOISTURE: DEPTH OF ORGANICS: (cm)
 HOMOGENEOUS / VARIABLE DEPTH TO BEDROCK: (cm)

COMMUNITY CLASSIFICATION: ELC CODE

COMMUNITY CLASS:	CULTURAL	CY
COMMUNITY SERIES:	WOODLAND	CWU
ECOSITE:	MINERAL	CWU1
VEGETATION TYPE:		
INCLUSION		
COMPLEX		

Notes:

ELC MANAGEMENT / DISTURBANCE	SITE: Westdell Colonel Talbot				
	POLYGON: 2 edge				
	DATE: June 11				
	SURVEYOR(S): WH				
DISTURBANCE EXTENT	0	1	2	3	SCORE †
TIME SINCE LOGGING	> 30 YRS	15 - 30 YRS	5 - 15 YRS	0 - 5 YEARS	2
INTENSITY OF LOGGING	NONE	FUEL WOOD	SELECTIVE	DIAMETER LIMIT	
EXTENT OF LOGGING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	1
SUGAR BUSH OPERATIONS	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF OPERATIONS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
GAPS IN FOREST CANOPY	NONE	SMALL	INTERMEDIATE	LARGE	4
EXTENT OF GAPS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
LIVESTOCK (GRAZING)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF LIVESTOCK	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ALIEN SPECIES	NONE	OCCASIONAL	ABUNDANT	DOMINANT	2
EXTENT OF ALIEN SPECIES	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
PLANTING (PLANTATION)	NONE	OCCASIONAL	ABUNDANT	DOMINANT	0
EXTENT OF PLANTING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
TRACKS AND TRAILS	NONE	FAINT TRAILS	WELL MARKED	TRACKS OR	0
EXTENT OF TRACKS/TRAILS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DUMPING (RUBBISH)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF DUMPING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
EARTH DISPLACEMENT	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF DISPLACEMENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
RECREATIONAL USE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF RECR. USE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
NOISE	NONE	SLIGHT	MODERATE	INTENSE	0
EXTENT OF NOISE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DISEASE/DEATH OF TREES	NONE	LIGHT	MODERATE	HEAVY	4
EXTENT OF DISEASE / DEATH	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
WIND THROW (BLOW DOWN)	NONE	LIGHT	MODERATE	HEAVY	2
EXTENT OF WIND THROW	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BROWSE (e.g. DEER)	NONE	LIGHT	MODERATE	HEAVY	4
EXTENT OF BROWSE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BEAVER ACTIVITY	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF BEAVER	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FLOODING (pools & puddling)	NONE	LIGHT	MODERATE	HEAVY	1
EXTENT OF FLOODING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FIRE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF FIRE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ICE DAMAGE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF ICE DAMAGE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
OTHER	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	

† INTENSITY x EXTENT = SCORE

Appendix D

Significant Wildlife Habitat Table

ELCs: SWT2 (Community 1), CUW1 (Community 2), SWT3-4 (Community 3)

Seasonal Concentration of Animals

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH
Waterfowl Stopover and Staging Areas (Terrestrial)	None present	- none present	No
Waterfowl Stopover and Staging Areas (Aquatic)	None present	- none present	No
Shorebird Migratory Stopover Area	None present	- beach areas, bars, seasonally flooded, muddy and un-vegetated shoreline habitat not available	No
Raptor Wintering Area	None present	- combination of forest and fields is not large enough (need to be >20ha)	No
Bat Hibernacula	None present	- none present	No
Bat Maternity Colonies	None present	-no candidate maternity roost trees identified within surveyed communities	No
Turtle Wintering Areas	SWT3-4, SWT2	-over-wintering sites are permanent water bodies, large wetlands, and bogs and fens with adequate dissolved oxygen	Candidate
Reptile Hibernaculum	all other than really wet	-none present	No
Colonially-Nesting Bird Breeding Habitat (Bank / Cliff)	None present	-none present	No
Colonially-Nesting Bird Breeding Habitat (Trees/Shrubs)	None present	-breeding bird surveys did not identify any heronries or species of heron within the Study Area.	No
Colonially-Nesting Bird Breeding Habitat (Ground)	None present	-none present	No
Migratory Butterfly Stopover Areas	None present	-a butterfly stopover area will be >10ha in size with a combination of forest (FOD) and field (CUM/CUT). Criteria not met.	No
Land Bird Migratory Stopover Areas	None present	-woodlots >5ha in size and within 5km of Lake Ontario and Lake Erie. Criteria not met.	No
Deer Winter Congregation Areas	None present	-woodlots >100ha in size. Criteria not met.	No

Rare Vegetation Communities

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH
Cliffs and Talus Slopes	Not Present		No
Sand Barren	Not Present		No
Alvar	Not Present		No
Old Growth Forest	Not Present		No
Savannah	Not Present		No
Tallgrass Prairie	Not Present		No
Other Rare Vegetation	SWT3-4	-Buttonbush Organic Thicket Swamp (S3)	Confirmed

Specialized Habitats of Wildlife considered SWH

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH
Waterfowl Nesting Area	SWT2	- breeding bird studies did not identify the presence of 3 or more nesting pairs for listed species excluding Mallards	No
Bald Eagle and Osprey Nesting, Foraging, Perching	None present	- no stick nests observed	No
Woodland Raptor Nesting Habitat	None present	- natural or conifer plantation woodlands/forest stands >30ha with >4ha of interior habitat. Criteria not met.	No
Turtle Nesting Areas	None Present	- no exposed mineral soil adjacent to wetlands	No
Springs and Seeps	None present	-none present	No
Amphibian Breeding Habitat (Woodland)	None present	- wetland within or adjacent (within 120m) to woodland	No
Amphibian Breeding Habitat (Wetlands)	SWT2, SWT3-4	- wetlands not >120m from woodland ecosites; wetlands >500m ² , supporting high species diversity are significant -amphibian breeding surveys did not meet criteria for significance	Candidate
Woodland Area-Sensitive Bird Breeding Habitat	None present	-habitats where interior forest breeding birds are breeding; large mature (>60yrs old) forest stands or woodlots >30ha - community is too small; too narrow for interior forest habitat (at least 200m from forest edge)	No

Habitats of Species of Conservation Concern considered SWH

Wildlife Habitat	ELC Codes Triggers	Additional Habitat Criteria	Candidate SWH
Marsh Breeding Bird Habitat	None Present	-none present	No
Open Country Bird Breeding Habitat	None Present	- natural and cultural fields >30ha are not present	No
Shrub/Early Successional Bird Breeding Habitat	None present	- no large fields succeeding to shrub and thicket habitats > 10ha in size -no target species observed during breeding birds survey	No
Terrestrial Crayfish	CUW1	- wet meadow and edges of shallow marshes	Candidate
Special Concern and Rare Wildlife Species (NHIC and MNRF pre-consultation)		- One (1) Eastern Wood-pewee [SC] observed during one visit of a two visit breeding bird survey. -no higher level confirmed breeding evidence noted (carrying food, nest with young)	No

Animal Movement Corridors

Wildlife Habitat	ELC Codes Triggers*	Additional Habitat Criteria	Candidate SWH
Amphibian Movement Corridors	None present	-Movement corridors are determined when there is confirmed amphibian breeding habitat	No

SWH exceptions

Wildlife Habitat	Ecosites	Habitat Criteria and Information	Candidate SWH
Bat Migratory Stopover Area	no triggers	- site is not near Long Point	No

Appendix E

Floral Inventory Data

Floral Inventory-Community 1							
Scientific Name	Common Name	CW	GRank	COSEWIC	Nrank	SARO	SRank
<i>Acer rubrum</i>	Red Maple	0.0	G5		N5		S5
<i>Agrimonia gryposepala</i>	Hooked Agrimony	-3.0	G5		N5		S5
<i>Agrostis stolonifera</i>	Creeping Bentgrass	-3.0	G5		N5		SE5
<i>Anemone quinquefolia</i>	Wood Anemone	0.0	G5		N5		S5
<i>Anemone virginiana</i>	Tall Anemone	-3.0	G5		NNR		S5
<i>Bidens frondosa</i>	Devil's Beggarticks	-3.0	G5		N5		S5
<i>Boehmeria cylindrica</i>	False Nettle	-5.0	G5		N5		S5
<i>Carex bebbii</i>	Bebb's Sedge	-5.0	G5		N5		S5
<i>Carex cristatella</i>	Crested Sedge	-3.0	G5		N5		S5
<i>Carex gracillima</i>	Graceful Sedge	3.0	G5		N5		S5
<i>Carex gynandra</i>	Nodding Sedge	-5.0	G5		N5		S5
<i>Carex normalis</i>	Larger Straw Sedge	-3.0	G5		NNR		S4
<i>Carex vulpinoidea</i>	Fox Sedge	-5.0	G5		N5		S5
<i>Cephalanthus occidentalis</i>	Eastern Buttonbush	-5.0	G5		NNR		S5
<i>Chelone glabra</i>	White Turtlehead	-5.0	G5		N5		S5
<i>Cicuta maculata</i>	Spotted Water-hemlock	-5.0	G5		N5		S5
<i>Cirsium muticum</i>	Swamp Thistle	-5.0	G5		N5?		S5
<i>Dipsacus fullonum</i>	Common Teasel	3.0	GNR		NNA		SE5
<i>Echinochloa crus-galli</i>	Large Barnyard Grass	-3.0	GNR		NNA		SE5
<i>Epilobium hirsutum</i>	Hairy Willowherb	-3.0	GNR		NNA		SE5
<i>Equisetum arvense</i>	Field Horsetail	0.0	G5		N5		S5
<i>Erigeron annuus</i>	Annual Fleabane	3.0	G5		N5		S5
<i>Euonymus obovatus</i>	Running Strawberry Bush	3.0	G5		N5		S4
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	0.0	G5		N5		S5
<i>Frangula alnus</i>	Glossy Buckthorn	0.0	GNR		NNA		SE5
<i>Fraxinus pennsylvanica</i>	Green Ash	-3.0	G5		N5		S4
<i>Geum canadense</i>	White Avens	0.0	G5		N5		S5
<i>Glyceria striata</i>	Fowl Mannagrass	-5.0	G5		N5		S5
<i>Hesperis matronalis</i>	Dame's Rocket	3.0	G4G5		NNA		SE5
<i>Impatiens capensis</i>	Spotted Jewelweed	-3.0	G5		N5		S5
<i>Iris versicolor</i>	Harlequin Blue Flag	-5.0	G5		N5		S5
<i>Juncus effusus</i>	Soft Rush	-5.0	G5		N5		S5
<i>Leersia oryzoides</i>	Rice Cutgrass	-5.0	G5		N5		S5
<i>Lycopus americanus</i>	American Water-horehound	-5.0	G5		N5		S5
<i>Lysimachia ciliata</i>	Fringed Loosestrife	-3.0	G5		N5		S5
<i>Onoclea sensibilis</i>	Sensitive Fern	-3.0	G5		N5		S5
<i>Oxalis stricta</i>	Upright Yellow Wood-sorrel	3.0	G5		N5		S5
<i>Persicaria lapathifolia</i>	Pale Smartweed	-3.0	G5		N5		S5
<i>Phalaris arundinacea</i>	Reed Canary Grass	-3.0	G5		N5		S5
<i>Phragmites australis</i>	Common Reed	-3.0	G5		N5		S4?
<i>Poa compressa</i>	Canada Bluegrass	3.0	GNR		NNA		SE5
<i>Poa palustris</i>	Fowl Bluegrass	-3.0	G5		N5		S5
<i>Rhamnus cathartica</i>	Common Buckthorn	0.0	GNR		NNA		SE5
<i>Ribes triste</i>	Swamp Red Currant	-5.0	G5		N5		S5
<i>Rubus idaeus ssp. idaeus</i>	Common Red Raspberry	3.0	G5T5		NNR		SE1
<i>Rubus odoratus</i>	Purple-flowering Raspberry	-5.0	G5		N5		S5
<i>Rumex crispus</i>	Curly Dock	0.0	GNR		NNA		SE5
<i>Salix alba</i>	White Willow	-3.0	G5		NNA		SE4
<i>Sambucus canadensis</i>	Common Elderberry	-3.0	G5		NNR		S5
<i>Scirpus atrovirens</i>	Dark-green Bulrush	-5.0	G5		N5		S5
<i>Scirpus cyperinus</i>	Cottongrass Bulrush	-5.0	G5		N5		S5
<i>Solanum dulcamara</i>	Bittersweet Nightshade	0.0	G5		NNA		SE5
<i>Solidago gigantea</i>	Giant Goldenrod	-3.0	G5		N5		S5
<i>Symphotrichum lanceolatum var. interior</i>	Interior White Aster	-3.0	G5T5		NNR		S4S5
<i>Symphotrichum novae-angliae</i>	New England Aster	-3.0	G5		N5		S5
<i>Symphotrichum pilosum</i>	White Heath Aster	3.0	G5		N5		S5
<i>Symphotrichum puniceum</i>	Swamp Aster	-5.0	G5		N5		S5
<i>Tussilago farfara</i>	Colt's-foot	3.0	GNR		NNA		SE5
<i>Typha angustifolia</i>	Narrow-leaved Cattail	-5.0	G5		N5		SE5
<i>Verbena urticifolia</i>	White Vervain	0.0	G5		N5		S5
<i>Viburnum opulus ssp. opulus</i>	Cranberry Viburnum	-3.0	G5TNR		NNA		SE3?
<i>Vitis riparia</i>	Riverbank Grape	0.0	G5		N5		S5
<i>Xanthium strumarium</i>	Rough Cocklebur	0.0	G5		N5		S5

Floral Inventory-Community 2							
Scientific Name	Common Name	CW	GRank	COSEWIC	Nrank	SARO	SRank
<i>Acer negundo</i>	Manitoba Maple	0.0	G5		N5		S5
<i>Acer saccharum</i>	Sugar Maple	3.0	G5		N5		S5
<i>Agrimonia gryposepala</i>	Hooked Agrimony	3.0	G5		N5		S5
<i>Agrostis gigantea</i>	Redtop	-3.0	G4G5		NNA		SE5
<i>Alliaria petiolata</i>	Garlic Mustard	0.0	GNR		NNA		SE5
<i>Ambrosia artemisiifolia</i>	Common Ragweed	3.0	G5		N5		S5
<i>Anemone virginiana</i>	Tall Anemone	3.0	G5		NNR		S5
<i>Asclepias syriaca</i>	Common Milkweed	5.0	G5		N5		S5
<i>Bromus inermis</i>	Smooth Brome	5.0	G5		NNA		SE5
<i>Carex lacustris</i>	Lake Sedge	-5.0	G5		N5		S5
<i>Carya cordiformis</i>	Bitternut Hickory	0.0	G5		N5		S5
<i>Carya ovata</i>	Shagbark Hickory	3.0	G5		N5		S5
<i>Centaurea jacea</i>	Brown Knapweed	5.0	GNR		NNA		SE5
<i>Circaea canadensis ssp. canadensis</i>	Canada Enchanter's Nightshade	3.0	GNR		NNR		S5
<i>Cornus racemosa</i>	Gray Dogwood	0.0	G5		N5		S5
<i>Cornus sericea</i>	Red-osier Dogwood	-3.0	G5		N5		S5
<i>Crataegus punctata</i>	Dotted Hawthorn	5.0	G5		N5		S5
<i>Dactylis glomerata</i>	Orchard Grass	3.0	GNR		NNA		SE5
<i>Dryopteris carthusiana</i>	Spinulose Wood Fern	-3.0	G5		N5		S5
<i>Epilobium hirsutum</i>	Hairy Willowherb	-3.0	GNR		NNA		SE5
<i>Erigeron annuus</i>	Annual Fleabane	3.0	G5		N5		S5
<i>Erythronium americanum</i>	Yellow Trout-lily	5.0	G5		N5		S5
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	0.0	G5		N5		S5
<i>Fraxinus pennsylvanica</i>	Green Ash	-3.0	G5		N5		S4
<i>Galium palustre</i>	Marsh Bedstraw	-5.0	G5		NNR		S5
<i>Geum aleppicum</i>	Yellow Avens	0.0	G5		N5		S5
<i>Hackelia virginiana</i>	Virginia Stickseed	3.0	G5		N5		S5
<i>Hypericum punctatum</i>	Spotted St. John's-wort	0.0	G5		N5		S5
<i>Iris virginica</i>	Southern Blue Flag	-5.0	G5		N5		S5
<i>Juglans nigra</i>	Black Walnut	3.0	G5		N4		S4?
<i>Leersia virginica</i>	Virginia Cutgrass	-3.0	G5		N4N5		S4
<i>Leucanthemum vulgare</i>	Oxeye Daisy	5.0	GNR		NNA		SE5
<i>Ligustrum vulgare</i>	European Privet	3.0	GNR		NNA		SE5
<i>Linaria vulgaris</i>	Butter-and-eggs	5.0	GNR		NNA		SE5
<i>Lonicera tatarica</i>	Tartarian Honeysuckle	3.0	GNR		NNA		SE5
<i>Monarda fistulosa</i>	Wild Bergamot	3.0	G5		N5		S5
<i>Phragmites australis</i>	Common Reed	-3.0	G5		N5		S4?
<i>Poa palustris</i>	Fowl Bluegrass	-3.0	G5		N5		S5
<i>Rhamnus cathartica</i>	Common Buckthorn	0.0	GNR		NNA		SE5
<i>Rubus occidentalis</i>	Black Raspberry	5.0	G5		N5		S5
<i>Salix amygdaloides</i>	Peach-leaved Willow	-3.0	G5		N5		S5
<i>Salix discolor</i>	Pussy Willow	-3.0	G5		N5		S5
<i>Solidago canadensis</i>	Canada Goldenrod	3.0	G5		N5		S5
<i>Sonchus arvensis</i>	Field Sow-thistle	3.0	GNR		NNA		SE5
<i>Symphotrichum ericoides</i>	White Heath Aster	3.0	G5		N5		S5
<i>Symphotrichum lateriflorum</i>	Calico Aster	0.0	G5		N5		S5
<i>Symphotrichum novae-angliae</i>	New England Aster	-3.0	G5		N5		S5
<i>Tilia americana</i>	American Basswood	3.0	G5		N5		S5
<i>Tussilago farfara</i>	Colt's-foot	3.0	GNR		NNA		SE5
<i>Verbena urticifolia</i>	White Vervain	0.0	G5		N5		S5
<i>Viola sororia</i>	Woolly Blue Violet	0.0	G5		N5		S5
<i>Vitis riparia</i>	Riverbank Grape	0.0	G5		N5		S5

Appendix F

Breeding Bird Survey



AVIFAUNAL SURVEY INFORMATION SUMMARY SHEET

Project: Westdell - Colonel Talbot Collector(s): WH
 Visit 1 Date: 11-Jun-18 Visit 2: 28-Jun-18
 Start: 5:20 End: 6:00 Start: 8:45 End: ?
 Weather: 14°C breezy, cool, clear sky Weather: 18°C cloud cover 5/10
 Wind 3 Wind 3

Species Code	Species Name	Evidence Code		No.		S Rank	ESA Status	PIF Status	Community	Notes
		vis 1	vis 2	vis 1	vis 2					
HOWR	House Wren	VO		1		S5			1	
RWBL	Red-winged Blackbird	VO	P, FY	4	3	S4			1,2	
YWAR	Yellow Warbler	VO		2		S5			2	
GRCA	Gray Catbird	VO	SM	2	3	S4			1,2	
AMRO	American Robin	VO	FY	2	3	S5			1,2	
SOSP	Song Sparrow	VO	SM	1	1	S5			1,2	
COGR	Common Grackle	AE	VO	2	1	S5		RC	1,2	
NOCA	Northern Cardinal	VO	CA	2	1	S5			1,2	
RBGR	Rose-breasted Grosbeak	T		1		S4			1	
AMGO	American Goldfinch	P	P	2	3	S5			1,2	
BHCO	Brown-headed Cowbird	VO	P	1	2	S4			1,2	
EAWP	Eastern Wood-Pewee	SM		1		S4	SC		1	
CEDW	Cedar Waxwing		P		2	S5			2	
AMWO	American Woodcock		OB		1	S4			1,2	
MODO	Mourning Dove		P		2	S5			1,2	
DOWO	Downy Woodpecker		VO		1	S5			1	
RCKI	Ruby-crowned Kinglet		VO		1	S4			1	

Appendix G

Amphibian Breeding Survey Data



GENERAL SITE INFORMATION FIELD SHEET

Project: York Southdale / C. Talbot
 Date: April 12, 2017 Project Manager: LM
 Collector(s): LM Visit #: _____
 Time started: 9:20pm Time finished: 9:35pm Combined collectors' hours: _____
 NHIC List MNR EO's none not provided to collector

WEATHER CONDITIONS				WIND SCALE			
Temp. <u>7°C</u>	Wind: _____	Cloud Cover (%) <u>Ø</u>	Precipitation Today: <u>N/A</u> Yesterday: <u>2mm</u>	0	Calm		
Direction: _____				1	Smoke Drifts		
				2	Wind Felt on Face		
DATA FOCUS				3	Leaves in constant motion		
<input type="checkbox"/> Birds 1__2__ Mig__	<input type="checkbox"/> ELC's	<input type="checkbox"/> Dripline/Tree Survey	<input type="checkbox"/> Aquatic - Physical	4	Wind raises dust and paper		
<input type="checkbox"/> Mammals	<input type="checkbox"/> Floral V__S__A__	<input type="checkbox"/> Aquatic - Biological	<input type="checkbox"/> Faunal Habitat	5	Small trees sway		
<input checked="" type="checkbox"/> Amphibians 1 <u>✓</u> 2__3__	<input type="checkbox"/> Wetland	<input type="checkbox"/> Faunal Habitat	<input type="checkbox"/> Other - see notes	6	Large branches sway		
<input type="checkbox"/> Reptiles	<input type="checkbox"/> Butternut			7	Lots of resistance when walking into		
<input type="checkbox"/> Invertebrates	<input type="checkbox"/> other SAR			8	Limbs breaking off trees		
FEATURES (with GPS co-ordinates where applicable)				Mapped	Follow-up Req'd		
Man-made Structures: <input type="checkbox"/> None observed				UTM	Yes	No	Who
Yes No							
<input type="checkbox"/>	<input type="checkbox"/>	Barns/Footings/Wells/other(list)					
<input type="checkbox"/>	<input type="checkbox"/>	Rock Piles					
<input type="checkbox"/>	<input type="checkbox"/>	Garbage					
Natural Vegetation: <input type="checkbox"/> None observed							
<input type="checkbox"/>	<input type="checkbox"/>	Fallen Logs outside woods (#'s)					
<input type="checkbox"/>	<input type="checkbox"/>	Brush Piles					
<input type="checkbox"/>	<input type="checkbox"/>	Snags (raptor perch)					
<input type="checkbox"/>	<input type="checkbox"/>	Tree Cavities (nesting)					
<input type="checkbox"/>	<input type="checkbox"/>	Sentinel Trees					
<input type="checkbox"/>	<input type="checkbox"/>	Mast Trees (6E)	Berry Shrubs (6E)				
Wildlife Features: <input type="checkbox"/> None observed							
<input type="checkbox"/>	<input type="checkbox"/>	Waterfowl nesting (large #'s, # of species)					
<input type="checkbox"/>	<input type="checkbox"/>	Exposed Banks (nesting swallows)					
<input type="checkbox"/>	<input type="checkbox"/>	Stick Nests					
<input type="checkbox"/>	<input type="checkbox"/>	Animal Burrows (>10cm)					
<input type="checkbox"/>	<input type="checkbox"/>	Heronry					
<input type="checkbox"/>	<input type="checkbox"/>	Crayfish mounds					
<input type="checkbox"/>	<input type="checkbox"/>	Sand/gravel on site					
<input type="checkbox"/>	<input type="checkbox"/>	Marsh/open country/shrub					
<input type="checkbox"/>	<input type="checkbox"/>	Winter Deer yards					
<input type="checkbox"/>	<input type="checkbox"/>	Corridor from pond to woods (ampibian movement)					
<input type="checkbox"/>	<input type="checkbox"/>	Bat corridor (shorelines, escarpments)					
<input type="checkbox"/>	<input type="checkbox"/>	Bat hibernacula (caves, mines, crevices, etc.)					
Aquatic Features:							
<input type="checkbox"/>	<input type="checkbox"/>	Perm. pond in woodland	<input type="checkbox"/> emergents/submergents/logs	<input type="checkbox"/>	temp.		
<input type="checkbox"/>	<input type="checkbox"/>	Perm. pond in open	<input type="checkbox"/> emergents/submergents/logs	<input type="checkbox"/>	temp.		
<input type="checkbox"/>	<input type="checkbox"/>	Water in woodland	<input type="checkbox"/> pools <input type="checkbox"/> flowing <input type="checkbox"/> dry				
<input type="checkbox"/>	<input type="checkbox"/>	Waterways	flowing dry pools				
<input type="checkbox"/>	<input type="checkbox"/>	natural stream	<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	swale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None observed	
<input type="checkbox"/>	<input type="checkbox"/>	open drain	<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	Seeps/Springs	<input type="checkbox"/>	<input type="checkbox"/>			
Incidental Observations/Notes:							
<p><i>Peepers calling to east in butternut wetland</i></p> <p><i>- water in drainage ditch on site @ N</i></p> <p><i>- flow path ~ centre from pipe under Colonel Talbot Rd.</i></p> <p><i>- No frogs on site</i></p>							

Graphic Attached or Name _____ Checked by Project Manager Date: _____
 N:\Projects\Templates\Other Templates\Field Sheets\BioLogic_General Field Sheet



GENERAL SITE INFORMATION FIELD SHEET

Project: York Southdale @ Colonel Talbot

Date: May 11, 2017

Project Manager: LM

Collector(s): LM

Visit #: _____

Time started: 11:03 Time finished: 11:15 Combined collectors' hours: _____

NHIC List MNR EO's none not provided to collector

WEATHER CONDITIONS				WIND SCALE			
Temp.	Wind:	Cloud Cover (%)	Precipitation	0	Calm		
<u>10.5C</u>	Direction: <u>Ø</u>	<u>Ø</u>	Today: <u>1.3mm</u> Yesterday: <u>Ø</u>	1	Smoke Drifts		
DATA FOCUS				2	Wind Felt on Face		
<input type="checkbox"/>	Birds 1__2__ Mig__	<input type="checkbox"/>	ELC's	<input type="checkbox"/>	Dripline/Tree Survey		
<input type="checkbox"/>	Mammals	<input type="checkbox"/>	Floral V__S__A_	<input type="checkbox"/>	Aquatic - Physical		
<input checked="" type="checkbox"/>	Amphibians 1_2_3_	<input type="checkbox"/>	Wetland	<input type="checkbox"/>	Aquatic - Biological		
<input type="checkbox"/>	Reptiles	<input type="checkbox"/>	Butternut	<input type="checkbox"/>	Faunal Habitat		
<input type="checkbox"/>	Invertebrates	<input type="checkbox"/>	other SAR	<input type="checkbox"/>	Other - see notes		
FEATURES (with GPS co-ordinates where applicable)				Mapped		Follow-up Req'd	
Man-made Structures: <input type="checkbox"/> None observed				UTM	Yes	No	Who
Yes No							
<input type="checkbox"/>	<input type="checkbox"/>	Barns/Footings/Wells/other(list)					
<input type="checkbox"/>	<input type="checkbox"/>	Rock Piles					
<input type="checkbox"/>	<input type="checkbox"/>	Garbage					
Natural Vegetation: <input type="checkbox"/> None observed							
<input type="checkbox"/>	<input type="checkbox"/>	Fallen Logs outside woods (#s)					
<input type="checkbox"/>	<input type="checkbox"/>	Brush Piles					
<input type="checkbox"/>	<input type="checkbox"/>	Snags (raptor perch)					
<input type="checkbox"/>	<input type="checkbox"/>	Tree Cavities (nesting)					
<input type="checkbox"/>	<input type="checkbox"/>	Sentinel Trees					
<input type="checkbox"/>	<input type="checkbox"/>	Mast Trees (6E)	Berry Shrubs (6E)				
Wildlife Features: <input type="checkbox"/> None observed							
<input type="checkbox"/>	<input type="checkbox"/>	Waterfowl nesting (large #'s, # of species)					
<input type="checkbox"/>	<input type="checkbox"/>	Exposed Banks (nesting swallows)					
<input type="checkbox"/>	<input type="checkbox"/>	Stick Nests					
<input type="checkbox"/>	<input type="checkbox"/>	Animal Burrows (>10cm)					
<input type="checkbox"/>	<input type="checkbox"/>	Heronry					
<input type="checkbox"/>	<input type="checkbox"/>	Crayfish mounds					
<input type="checkbox"/>	<input type="checkbox"/>	Sand/gravel on site					
<input type="checkbox"/>	<input type="checkbox"/>	Marsh/open country/shrub					
<input type="checkbox"/>	<input type="checkbox"/>	Winter Deer yards					
<input type="checkbox"/>	<input type="checkbox"/>	Corridor from pond to woods (amphibian movement)					
<input type="checkbox"/>	<input type="checkbox"/>	Bat corridor (shorelines, escarpments)					
<input type="checkbox"/>	<input type="checkbox"/>	Bat hibernacula (caves, mines, crevices, etc.)					
Aquatic Features:							
<input type="checkbox"/>	<input type="checkbox"/>	Perm. pond in woodland	<input type="checkbox"/> emergents/submergents/logs	<input type="checkbox"/>	temp.		
<input type="checkbox"/>	<input type="checkbox"/>	Perm. pond in open	<input type="checkbox"/> emergents/submergents/logs	<input type="checkbox"/>	temp.		
<input type="checkbox"/>	<input type="checkbox"/>	Water in woodland	<input type="checkbox"/> pools <input type="checkbox"/> flowing <input type="checkbox"/> dry				
<input type="checkbox"/>	<input type="checkbox"/>	Waterways	flowing dry pools				
<input type="checkbox"/>	<input type="checkbox"/>	natural stream	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>				
<input type="checkbox"/>	<input type="checkbox"/>	swale	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	None observed		
<input type="checkbox"/>	<input type="checkbox"/>	open drain	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>				
<input type="checkbox"/>	<input type="checkbox"/>	Seeps/Springs	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>				
Incidental Observations/Notes:							
<u>Peepers in Button Bush wetland to east</u>							

Graphic Attached or Name _____ Checked by Project Manager Date: _____
 N:\Projects\Templates\Other Templates\Field Sheets\BioLogic_General Field Sheet

Appendix H

Preliminary Screening Report Response from MECP

Laura McLennan

From: Erin Boynton
Sent: Friday, August 30, 2019 2:37 PM
To: Dave Hayman
Cc: Laura McLennan
Subject: FW: Stage 1 Report: Westdell - Colonel Talbot

Laura, I believe you are the PM for this file? I have updated the Stage 1 tracking folders and list and added this response to the correspondance in the public folders.

Client First | Right Solution | Work Together

Erin Boynton
Assistant Biologist/ Aquatic Technician
London x2243

From: Species at Risk (MECP) [mailto:SAROntario@ontario.ca]
Sent: Friday, August 30, 2019 1:59 PM
To: dtraher@westdellcorp.com
Cc: Erin Boynton <EBoynton@mte85.com>
Subject: RE: Stage 1 Report: Westdell - Colonel Talbot

To Whom It May Concern,

The Ministry of Environment, Conservation and Parks (MECP) has reviewed the information that was provided on the proposed development project to assess the potential impacts of the proposal on endangered or threatened species and their habitats. From the information provided, it is our understanding that the proposed project falls within these parameters:

- a) The project is located at the northeast corner of Southdale Road West and Colonel Talbot Road (Part Lot 42, Concession 1, Westminster) in the City of London.
- b) The proposed project involves:
 - The construction of a commercial building, a 6-storey residential building and above-ground and ground-level parking.
 - The western portion of the property is active agriculture. The eastern portion is naturally vegetation and is designated as Provincially Significant Wetland.
 - The development footprint will not impact the Provincially Significant Wetland.
- c) The proposed project will begin upon receipt of all necessary approvals.
- d) MECP has reviewed species at risk (SAR) occurrence information on file and determined there are known occurrences for the following species at risk in the general area of the property:
 - American Chestnut (endangered) – receives species and general habitat protection
 - Butternut (endangered) – receives species and general habitat protection
 - SAR bats (endangered) – receives species and general habitat protection
 - Bank Swallow (threatened) – receives species and general habitat protection
 - Barn Swallow (threatened) – receives species and general habitat protection
 - Eastern Meadowlark (threatened) – receives species and general habitat protection

Based on a review of the above information, MECP has determined that the activities associated with the project, as currently proposed, will likely not contravene section 9 (species protection) and/or section 10 (habitat protection) of the Endangered Species Act, 2007 (ESA 2007) provided the following recommendations are implemented:

- 1) Any species listed as endangered or threatened on the Species at Risk in Ontario (SARO) List that is encountered at the project location must be protected from all harm and harassment.
- 2) Any SAR individual (presumed to be unharmed) that is incidentally encountered in the project location must be allowed to leave on its own accord. Activities within 30 metres must cease until the individual disperses. Construction machinery/equipment must maintain a minimum operating distance of 30 metres from the individual until it disperses from the project area on its own accord.
- 3) If an injured or deceased SAR is found or a SAR individual is incidentally encountered, the specimen must be placed in a non-airtight container that is maintained at an appropriate temperature and a Wildlife Custodian (authorized under the Fish and Wildlife Conservation Act) should be contacted. A list of authorized Wildlife Custodians, their locations and their specialties (e.g. reptiles) is available at <https://www.ontario.ca/page/find-wildlife-rehabilitator>. MECP (contact information below) must be contacted immediately after the occurrence.
- 4) Any SAR individual that is present at the project site should be reported to the MECP staff (contact information below) within 48 hours of the observation or the next working day, whichever comes first.
- 5) Any proposed tree removal activities should avoid the bat active season, i.e. the time period when bats are likely to be using treed habitat to support foraging and roosting (generally corresponds to May 1 to September 1 in a given year).
- 6) If maternity roost sites are found within the proposed project site and are planned for removal, MNRF recommends the installation of bat boxes at a 2:1 ratio (i.e. 8 bat boxes installed for the 4 cavity trees removed) in suitable habitat.
- 7) Bank Swallow nests in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits such as stockpiled sand/silt material and excavated trenches. Construction activities should avoid the creation of vertical faces and stockpiles or excavated areas. The guidance document entitled [Best Management Practices for the Protection, Creation and Maintenance of Bank Swallow Habitat in Ontario](#) should be followed to avoid creation of Bank Swallow habitat during construction..

If the above recommendations are implemented, the activity will likely not contravene section 9 (species protection) and/or section 10 (habitat protection) of the ESA 2007.

This guidance is valid until December 31st, 2020.

Should any of the project parameters change, please notify the Permissions and Compliance Section immediately to obtain guidance on whether additional actions will need to be taken to remain in compliance with the ESA 2007. Also, if any SAR species and/or habitats are observed in the project area, please contact the Permissions and Compliance Section as soon as possible.

Please visit <https://www.ontario.ca/page/species-risk> for more information on SAR species and habitat.

It is important to note that changes may occur in both species and habitat protection which could affect whether proposed projects may have adverse effects on SAR. The ESA 2007 applies to

endangered and threatened species listed on the Species at Risk in Ontario (SARO) List (<http://www.ontario.ca/environment-and-energy/species-risk-ontario-list>). The Committee on the Status of Species at Risk in Ontario (COSSARO) meets regularly to evaluate new species for listing and/or re-evaluate species already on the SARO List. As a result, species designations may change, which could in turn change the level of protection they receive under the ESA 2007. Also, habitat protection provisions for a species may change if a species-specific habitat regulation comes into effect.

Please be advised that it is your responsibility to comply with all other relevant provincial or federal legislation, municipal by-laws or required approvals from other agencies.

If you have any concerns or questions regarding this letter, please contact me by email at SAROntario@ontario.ca.

Regards,

Kathryn Markham

Management Biologist
Permissions and Compliance Section, Species at Risk Branch
Ministry of Environment, Conservation and Parks

From: Erin Boynton <eboynton@biologic.ca>
Sent: February 5, 2019 11:07 AM
To: ESA-Aylmer (MNRF) <ESA.Aylmer@ontario.ca>
Cc: Dave Hayman <dhayman@biologic.ca>
Subject: Stage 1 Report: Westdell - Colonel Talbot

To Whom It May Concern:

Please find attached a Stage 1 Information Request for proposed commercial buildings and 6 storey residential building with above and below ground parking.

A confirmation of receipt would be appreciated to confirm that the document is in the queue for review.

The attached documents are submitted as part of our discussions with MNRF with respect to the Endangered Species Act. Until a final decision has been rendered with respect to this application, it is our expectation these documents will be treated as Personal and Confidential. Thank you for your time.

Erin Boynton
BioLogic
201-110 Riverside Dr.
London, ON N6H 4S5
P-519-434-1516 xt 103
F-519-434-0575
E- eboynton@biologic.ca

Kensington Bridge EA

EXECUTIVE SUMMARY

ECAC has concerns about how aquatic impacts will be avoided and mitigated. Many aquatic SAR inhabit this study area. It is unclear to ECAC the degree to which in-water work will be conducted, if any. If no in-water work is being proposed, it is still unclear what sediment control/mitigation measures will be put in place to prevent/monitor disturbance to aquatic habitat below the bridge (runoff from construction, falling debris, etc.).

Kensington Bridge is a highly popular nesting area for Barn Swallows. ECAC has concerns regarding construction timing and displacement of Barn Swallow nests.

RECOMMENDATION: Regardless of whether in-water work is to be conducted (but especially if so), ECAC recommends that additional mussel sampling and fish/fish habitat assessments be included in the work plan both upstream and downstream of study area.

RECOMMENDATION: Review timing window requirements based on the habitat assessment completed.

RECOMMENDATION: Any bridge construction to be conducted outside Barn Swallow breeding times to minimize impacts to nesting Barn Swallows. Any minor design modifications to improve the habitat in the area.

RECOMMENDATION: After construction, ECAC suggests the implementation of improved barn swallow nesting structures under the bridge (i.e. nest cups).

Ecological Community Advisory Committee

Report

5th Meeting of the Ecological Community Advisory Committee
April 20, 2023

Attendance PRESENT: S. Levin (Chair), P. Baker, E. Dusenge, S. Evans, T. Hain, S. Hall, R. McGarry, K. Moser, G. Sankar and S. Sivakumar and J. Bunn (Acting Committee Clerk)

ABSENT: B. Krichker, K. Lee, M. Lima, S. Miklosi and V. Tai

ALSO PRESENT: Councillor S. Franke; S. Butnari, K. Edwards, M. Shepley and B. Westlake-Power

The meeting was called to order at 4:31 PM

1. Call to Order

1.1 Disclosures of Pecuniary Interest

That it BE NOTED that no pecuniary interests were disclosed.

2. Scheduled Items

None.

3. Consent

3.1 4th Report of the Ecological Community Advisory Committee

That it BE NOTED that the 4th Report of the Ecological Community Advisory Committee, from its meeting held on March 16, 2023, was received.

4. Sub-Committees and Working Groups

None.

5. Items for Discussion

5.1 Trails Advisory Group Representative and Alternate

That K. Moser and S. Hall BE APPOINTED as Representative and Alternate to the Trails Advisory Group.

5.2 Goldfish Brochure

That it BE NOTED that the Ecological Community Advisory Committee held a general discussion with respect to the Goldfish brochure.

5.3 (ADDED) Working Group Comments - 735 Southdale Road West

That the Working Group comments relating to the property located at 735 Southdale Road West BE FORWARDED to the Civic Administration for review and consideration

5.4 (ADDED) Kensington Bridge EIS

That a Working Group consisting of P. Baker and G. Sankar BE ESTABLISHED to review and report back on the Kensington Bridge Environmentally Significant Area.

6. Adjournment

The meeting adjourned at 5:05 PM.



NOTICE OF PLANNING APPLICATION

Zoning By-Law Change

New Comprehensive Zoning By-law – ReThink Zoning



File: Z-9619

Applicant: Corporation of the City of London

What is Proposed?

New City-Wide Comprehensive Zoning By-law

- specific rules for all properties that restrict the use, intensity and form of land, buildings, or structures.
- implements the policy direction of the City's newest Official Plan, known as The London Plan
- replaces and repeals the existing comprehensive Zoning By-law, known as Zoning By-law No. Z.-1

LEARN MORE & PROVIDE INPUT

Please provide any comments by **October 2023**

ReThink Zoning Project Team

ReThinkZoning@london.ca

519-930-3500

Planning & Development, City of London

300 Dufferin Avenue, 6th Floor,

London ON PO Box 5035 N6A 4L9

File: Z-9619

london.ca/planapps

**If you are a landlord, please post a copy of this notice where your tenants can see it.
We want to make sure they have a chance to take part.**

Application Details

Requested Zoning By-law Change

The Corporation of the City of London is considering a new comprehensive Zoning By-law that will affect all lands within the municipal boundary of the City of London. The purpose and effect of the proposed new comprehensive Zoning By-law is to establish the rules that restrict the use, intensity and form of land, buildings, or structures in the City of London.

“Use” is the main purpose or activity on a property or in a building or structure. “Intensity” is how much activity and the size of building or structure. “Form” is the shape and location of a building or structure. The proposed new comprehensive Zoning By-law may include rules that provide alternative standards to incentivize certain forms of development to achieve municipal housing goals, positive climate actions and improve resiliency to climate change impacts.

The proposed new comprehensive Zoning By-law is an implementation tool that will implement the policies of the City of London’s newest Official Plan – The London Plan and repeal and replace the existing comprehensive Zoning By-law No. Z.-1.

The existing Zoning By-law is available at london.ca.

Planning Policies

The proposed new comprehensive Zoning By-law must conform to the policies of the Official Plan, London’s long-range planning document. The proposed new comprehensive Zoning By-law will apply city-wide to all properties that are located in all Place Types in The London Plan

How Can You Participate in the Planning Process?

You have received this Notice because someone has applied to change the zoning of land located within 120 metres of a property you own, or your landlord has posted the notice of application in your building. The City reviews and makes decisions on such planning applications in accordance with the requirements of the Planning Act. The ways you can participate in the City’s planning review and decision making process are summarized below.

See More Information

You can review additional information and material about this application by:

- Contacting the Rethink Zoning Project Team listed on the first page of this Notice; or
- Viewing the application-specific page at london.ca/planapps
- Opportunities to view any file materials in-person by appointment can be arranged through the file Planner.

Reply to this Notice of Application

We are inviting your comments. The next opportunity for consultation will be from June 2023 to October 2023 on a proposed working draft Zoning By-law document. Comments received will be considered prior to the completion of the proposed new comprehensive Zoning By-law and as we prepare a report that will include Planning & Developments staff’s recommendation to the City’s Planning and Environment Committee. Planning considerations usually include such matters as land use, development intensity, and form of development.

Attend an Open House Meeting

An Open House will be scheduled later for the purpose of providing interested members of the public an opportunity to review and ask questions about the proposed new comprehensive Zoning By-law. The City will send you another notice inviting you to attend this Open House, which is required by the Planning Act. Notice of this Open House and a future Public Meeting described below, may be given together or separately. Attendance at this Open House meeting does not create a right to appeal the decision of Council to the Ontario Land Tribunal.

Attend a Future Public Participation Meeting

The Planning and Environment Committee will consider the proposed new comprehensive Zoning By-law on a date that has not yet been scheduled. The City will send you another notice inviting you to attend this Public Meeting, which is required by the Planning Act. You will also be invited to provide your comments at this Public Participation Meeting. A neighbourhood or community association may exist in your area. If it reflects your views on this application, you may wish to select a representative of the association to speak on your behalf at the Public Participation Meeting. Neighbourhood Associations are listed on the Neighbourgood website. The Planning and Environment Committee will make a recommendation to Council, which will make its decision at a future Council meeting.

What Are Your Legal Rights?

Notification of Council Decision

If you wish to be notified of the decision of the City of London on the new comprehensive Zoning By-law, you must make a written request to the City Clerk, 300 Dufferin Ave., P.O. Box 5035, London, ON, N6A 4L9, or at docservices@london.ca. You will also be notified if you speak to the Planning and Environment Committee at the Public Meeting about this application and leave your name and address with the Clerk of the Committee.

Right to Appeal to the Ontario Land Tribunal

If a person or public body would otherwise have an ability to appeal the decision of the Council of the Corporation of the City of London to the Ontario Land Tribunal but the person or public body does not make oral submissions at a Public Meeting or make written submissions to the City of London before the by-law is passed, the person or public body is not entitled to appeal the decision.

If a person or public body does not make oral submissions at a Public Meeting or make written submissions to the City of London before the by-law is passed, the person or public body may not be added as a party to the hearing of an appeal before the Ontario Land Tribunal unless, in the opinion of the Tribunal, there are reasonable grounds to do so.

For more information go to <https://olt.gov.on.ca/appeals-process/forms/>.

Notice of Collection of Personal Information

Personal information collected and recorded at the Public Participation Meeting, or through written submissions on this subject, is collected under the authority of the Municipal Act, 2001, as amended, and the Planning Act, 1990 R.S.O. 1990, c.P.13 and will be used by Members of Council and City of London staff in their consideration of this matter. The written submissions, including names and contact information and the associated reports arising from the public participation process, will be made available to the public, including publishing on the City's website. Video recordings of the Public Participation Meeting may also be posted to the City of London's website. Questions about this collection should be referred to Evelina Skalski, Manager, Records and Information Services 519-661-CITY(2489) ext. 5590.

Accessibility

Alternative accessible formats or communication supports are available upon request. Please contact plandev@london.ca for more information.