UPPER THAMES RIVER
CONSERVATION AUTHORITY

Meeting of the Upper Thames River Conservation Authority Hearing Committee – Agenda
Tuesday June 20, 2023 12:30pm, 1424 Clarke Rd. London

Memo to Hearing Committee Members: S.Franke, S.Levin, P.Mitchell, B.Petrie, D.Trentowsky

Please be advised that a meeting of the Hearings Committee will be as follows:

1. **Approval of Agenda**

2. **Declaration of Conflicts of Interest**

3. **Minutes of the Previous Meeting: January 21, 2022**

4. **Business Arising from the Minutes**

5. **Hearing Committee Orientation Presentation – J.Allain**

6. **Application #108-23**
   Proposed Interference Within a Wetland and Proposed Development
   Within an Erosion Hazard Associated With a River or Stream Valley and Area
   Regulated by the Conservation Authority
   60 Hogs Back Close, Middlesex Centre (Delaware)

7. **Adjournment**

Tracy Annett, General Manager

NOTICE OF HEARING

IN THE MATTER OF
The Conservation Authorities Act, R.S.O. 1990, Chapter C. 27 as amended;

AND IN THE MATTER OF
An Application By: Jason Dieleman (Application #108-23)

For the permission of the Upper Thames River Conservation Authority pursuant to Regulations made under Section 28 (12) of said Act.

TAKE NOTICE that a hearing before the Hearings Committee of the Upper Thames River Conservation Authority will be held under Section 28 of the Conservation Authorities Act at the offices of said Authority at the UTRCA Administration Office, 1424 Clarke Road, London, Ontario N5V 5B9 at the hour of 1:00 pm, Tuesday, June 20th, 2023 with respect to the application by Jason Dieleman to permit interference with a wetland and to permit development within an erosion hazard associated with a river or stream valley and within an area regulated by the Upper Thames River Conservation Authority under Ontario Regulation 157/06 - *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* made pursuant to Section 28 of the Conservation Authorities Act at 60 Hog Back Close in the Municipality of Middlesex Centre (Delaware), Ontario.

TAKE NOTICE THAT you are invited to make a delegation and submit supporting written material (electronically) to the Hearings Committee for the meeting of June 20, 2023. If you intend to appear and/or submit further written material, please contact Cari Ramsey ((519)-451-2800 ext. 289, e-mail ramseyc@thamesriver.on.ca). Any further written material (submitted electronically) will be required as soon as possible, to enable the Committee members to review the material prior to the meeting.

AND FURTHER TAKE NOTICE that if you do not attend at this Hearing, the Hearings Committee may proceed in your absence, and you will not be entitled to any further notice in the proceedings.

PLEASE NOTIFY THIS OFFICE by 12:00 noon June 16, 2023 (local time) as to whether you and/or your agent(s) will be attending. A copy of Ontario Regulation 157/06 and Section 28 of the Conservation Authorities Act will be made available to you upon request.

DATED the 13th day of June 2023

Registered

The Hearings Committee of
The Upper Thames River Conservation Authority

Tracy Annett, General Manager/Secretary-Treasurer

HEARING PROCEDURES

1. Motion to sit as a Hearings Committee to consider the application by Jason Dieleman, 60 Hog Back Close in the Municipality of Middlesex Centre, Delaware, Ontario (Application 108-23)

2. Chair's opening remarks.

3. Staff will introduce Hearings Committee members (and the UTRCA Solicitor if present) to the applicant/owner, his/her agent and others wishing to speak.

4. Staff will indicate the nature and location of the subject application.

5. Staff will present their report on the application.

6. The applicant and/or his/her agent will speak and also make any comments on the staff report, if he desires.

7. Members of the Hearings Committee will question, if necessary, both the staff and the applicant/agent.

8. The Hearings Committee may make a motion to adjourn and go into camera and/or may make a motion to arrange to visit the subject site.

9. Upon completion of their deliberations, members of the Hearings Committee may make a motion regarding the application or may resolve to defer any decision on the application.

10. A motion will be carried which will culminate in the decision.

11. The Hearings Committee will move out of camera.

12. The Chair will advise the owner/applicant of the Hearings Committee decision, through Conservation Authority staff if the applicant/agent has left the Hearing location or in person if a decision is rendered with the Applicant/agent still on hand at the UTRCA office.

13. If decision is made to "to refuse", the Chair or Acting Chair shall notify the owner/applicant of his right to appeal the decision to the Minister of Natural Resources and Forestry within 30 days of receipt of the reasons for the decision.

14. Motion to move out of the Hearing.

UPPER THAMES RIVER
CONSERVATION AUTHORITY

MEMO

To: Chair and Members of the UTRCA Hearings Committee
From: Jenna Allain, Manager – Environmental Planning and Regulations
Cari Ramsey, Land Use Regulations Officer
Date: June 13, 2023
Filename: ENVP #126511
Agenda #: 6
Subject: Section 28 Permit Application #108/23 for Proposed Interference Within a Wetland and Proposed Development Within an Erosion Hazard Associated With a River or Stream Valley and Area Regulated by the Conservation Authority at 60 Hog Back Close, Municipality of Middlesex Centre (Delaware), Ontario.

RECOMMENDATION

THAT Application #108/23 for the proposed interference with a wetland and proposed development within an erosion hazard associated with a river or stream valley and area regulated by the Conservation Authority at 60 Hog Back Close, Municipality of Middlesex Centre (Delaware), Ontario be denied as it is contrary to UTRCA approved wetland alteration and erosion hazard policies.

The Application

A Section 28 *Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* permit application (No. #108/23) has been submitted for the installation/construction of a flag stone/armour stone fire pit seating area, retaining wall structure and stairs that have been located within the erosion hazard (steep slope) at 60 Hog Back Close in the Municipality of Middlesex Centre (Delaware), Ontario.

Site Information

The property located at 60 Hog Back Close in Delaware is entirely regulated by the Upper Thames River Conservation Authority (in accordance with Ontario Regulation 157/06) due to the presence of: a) riverine flood and erosion hazard lands associated with an unnamed tributary of Dingman Creek; b) wetland features; and, c) the Area of Interference surrounding these wetland features. (While all wetlands – regardless of size and designation - are regulated under Conservation Authority Regulations, the wetland on the subject property is considered an unevaluated wetland, meaning it has neither been designated as Provincially Significant nor Locally Significant. The wetland traverses multiple properties and is greater than 2 hectares in size. Consequently there is a regulated Area of Interference surrounding the wetland features of 120 metres. The wetland is also associated with evaluated wetland features to the north-east that have been designated as Provincially Significant Wetland (PSW).) Woodlands on the properties have been identified as being Significant in the Middlesex County Natural Heritage Systems Study. The properties are zoned as community residential land.

Attachment #1 is a basic location map of the properties. UTRCA Regulation Limit mapping outlines the approximate location of the flood hazards (**Attachment #2**), erosion/slope hazards (**Attachment #3**) and wetland features (**Attachment #4**) on the property. **Attachment #5** outlines the location of the woodlands on the property identified as being of Natural Heritage Significance in the Middlesex County Natural Heritage Systems Study (2014). Contour mapping (**Attachment #6**) provides more detail on slope features on the property. **Attachment #7** outlines the location of an existing slope failure on an adjacent property.

Background

Hog Back Close Lots

Under current regulations the configuration of the lots at Hog Back Close in their current form would not be supported, as new lot creation must now ensure the entire lot is located outside flood and erosion hazards. Lots appear to have been approved by the municipality sometime between 1993 and 1997 through a severance process rather than a plan of subdivision. It is likely the UTRCA did not regulate steep slopes in that area prior to the regulation change of 2006.

Previous Development Approvals

On February 28, 2013 UTRCA staff (K. Winfield) met with the applicant on site to discuss plans for a future single family residence. The property was a vacant lot at that time and still owned by others. Applicant was advised that the entire property fell within the CA regulation limit and was provided with UTRCA Regulation Limit mapping indicating same. UTRCA staff advised that a *CA Act* Section 28 permit would be required prior to any development occurring on site. After viewing the steep slope and the wetland/woodland features, UTRCA staff advised the applicant that no new development would be permitted within the erosion hazard as per provincial and UTRCA hazard policies. The applicant was further advised that in order to determine where new development could be located that:

a) a favourable geotechnical (Slope Stability) assessment would be required;

   and,

b) a favourable Environmental Impact Study (EIS) would be required.

The purpose of a slope stability assessment at this site was to locate the top of stable slope (plus the 6 metre access allowance) and then avoid that area by situating the proposed house and all associated development outside the hazard. The purpose of the EIS at this site was to locate the extent of the wetland and to determine an appropriate setback for any new development.

On March 4, 2013 a follow-up letter **(Attachment #8)** and attached mapping was sent by UTRCA staff to the applicant discussing the potential for development on the vacant lot, advising the property was entirely regulated by the Conservation Authority and advising of the need for CA permits prior to any development commencing.

A geotechnical (slope stability) assessment **(Attachment #9)** for the vacant lot was dropped off at our office (by then current owners of the property) on June 7, 2013. (*Slope Stability Assessment, Proposed Development, 60 Hog Back Close, Delaware, ON, prepared by EXP Services Inc., Project No. KCH00212307-GE*). Our engineering staff provided technical review comments, and there was some back and forth between the consulting engineer (EXP) and our staff in July with additional clarifications provided. On August 7, 2013 (following clarifications provided by the consultant), we provided information to the (then current) landowner and EXP staff that we had accepted the information in the final Slope Stability Assessment Report.

The report detailed the location and extent of the erosion hazard on the property and outlined (pg. 10) the following recommendations and mitigation measures:

4.7 General Comments for Site Works

It is imperative that future development generally not occur within the Erosion Hazard Limit identified at the site. To this end, the following comments are provided and measures are recommended.

- **Spoils from any excavation should be removed from the slope area. Excavated soils should not be placed over the table land near the crest of slope, unless the soil is placed as engineered structural fill. In addition, any fill placement or changes to existing grades in proximity to the site slopes may be subject to review and approval by the Upper Thames River Conservation Authority.**
- **Any buildings and permanent structures associated with the proposed site development must be located outside of the Erosion Hazard Limit, which is identified on the Site Plan. The Cross Section drawings also help identify the location of this line. Exp would be pleased to review the founding elevations and site grading plans for specific development proposals to confirm that this requirement is met.**
- **The site should be graded such that surface water is directed away from the slope, to limit the amount of uncontrolled surface water flow over the face of the slope, which can contribute to surficial erosion damage to the slope surface. If it is necessary to outlet this water from the table land down the slope it should be collected and taken down the slope in a controlled channel or solid pipe. Where required, suitably designed outlets including such measures as rodent screens etc. should be incorporated.**
- **Water from downspouts and perimeter weeping tile etc. must also be collected in a controlled manner and re-directed away from the slope.**
- **Vegetation on the slope should be maintained. A program of plantation where appropriate, including deciduous trees and deep-rooted vegetation is preferred.**

On August 8, 2013 we received an e-mail **(Attachment #10)** from the applicant advising he had been in contact with the (current at that date) landowners and again wanted to know what we would require for development on the vacant lot. We provided the following response the same date:

Hi Jason,

A Conservation Authorities Act - Section 28 permit would be required from the Conservation Authority prior to any development (house, septic, driveway, sheds, etc.) occurring on the

property. Our permit is required prior to the Municipality issuing a building permit. The permit fee will be $750.00 (No HST) and we will require submission of a favourable Geotechnical (Slope Assessment) Report, an Environmental Impact Study (EIS) and site plans/surveys/design drawings (prepared by a qualified professional) that indicate all development will be outside the erosion hazard and will conform to mitigation measures and recommendations outlined in the Geotechnical Assessment.

Thank-you,

Karen Winfield
Land Use Regulations Officer

On August 9, 2013 our office received a preliminary Environmental Impact Study (EIS) for the subject property which was subsequently sent to our ecology staff for technical review. (Preliminary EIS is not included as an attachment to this report given there were subsequent re-submissions.)

On August 13, 2013 we received an email from the applicant asking about the possibility of installing a patio within the erosion hazard and our staff advised (August 16, 2013) that would not be supported **(Attachment #11)**.

While the EIS was still with our staff for review on August 27, 2013 we received preliminary plans for development (**Attachment #12)** and we responded **(Attachment #13)** advising of the need for a permit and that all plans must conform to the recommendations and mitigation measures outlined in the Slope Stability Report and the EIS.

On September 9, 2013 we also received some updated EIS figures from EXP **(Attachment #14)** as we had advised them there appeared to be scale/sizing problems noted with figures from the hard-copy EIS report. After some discussions between our ecology staff and ecology staff from EXP we were provided with the final EIS Report (**Attachment #15** - *58 and 60 Hog Back Close, Delaware, ON, Environmental Impact Study, Project No. KCH-00212307-GE, November 2013*).

To minimize impacts on the adjacent wetland/woodland feature, the EIS included the following requirements and mitigation measures:

Due to the UTRCA requirement, no encroachment will be permitted to the woodland, valley, ravine, or Dingman Creek tributary. The presence of Dingman Creek, adjacent to the Site, identifies that the runoff from the slope likely contributes to the water in the creek. In the case of the Site, a minimum of a 6 m buffer is required to protect the tree drip line and top of slope. It can be expected that the presence of a minimum 6 m buffer with intact vegetation will provide a number of benefits. This area at the top of the slope will allow for the natural runoff of precipitation down the slope, toward Dingman Creek, as is the case at this time. Since no disturbance of existing vegetation is permitted in the 6 m buffer, the intact vegetation will act to naturally filter the runoff from the area. For example, the approximate change in grade from the top of slope at the edge of the significant woodland to the roadway is perhaps about 2 m

(Pg. 38)

influence the existing woodlands, valley, ravines, and Dingman Creek tributary. Application of a 6 m setback from the 100 year erosion hazard line is expected to provide protection from future slope erosion and also protect the woodland and dripline. The apparent absence of SAR from

(Pg. 43)

Once our technical staff had signed off on the final EIS the applicant subsequently provided us with the additional plans and information that was required in order to meet our policies for development of a house and septic system at this location. All development was shown to be outside both the erosion hazard and the setback required as per the EIS. On December 16, 2014 we issued a permit (**Attachment #16** - Application #143-14) for the house, septic system and associated driveway. Permit condition Item #8 read as follows:

All project works must conform to the recommendations and mitigations measures outlined in the Slope Stability Assessment Report (KCH00212307-GE) prepared by Exp Services Inc., dated June 6, 2013.

Slope Failure on Adjacent Property

In March of 2022 UTRCA staff were contacted by the Drainage Superintendent from the Municipality of Middlesex Centre advising us about a slope failure on the property next door to the subject lands. This slope failure impacted both a private property and a municipal stormwater easement and the municipality subsequently hired a consultant to undertake the design of slope remediation works. A geotechnical report and preliminary construction drawings were submitted to our office and our technical staff have met with consultants to discuss the project design. We have also met on site with the consultants and municipal staff to view the slope failure and to discuss site specific project construction details, mitigation measures and "lessons learned" from other slope remediation projects. We are of the understanding that the project is currently out for tender. The slope failure appears to have increased in size since March of 2022. Recent photos **(Attachment #17)** of the slope failure (May 2023) on adjacent property are included with this report.

Development at Top-of-Bank/Crest of Slope

In May of 2023 as part of our review and site meeting for the municipal slope repair and as part of our review for an unrelated private project permit request on neighbouring property, we were made aware of the unauthorized development on the subject property at the top-of-slope. UTRCA staff contacted the current landowner to advise the works did not conform to UTRCA policy and would either have to be removed (under guidance/direction from a qualified professional), or a permit would have to be obtained for the works. The landowner was advised that because the works had been constructed within an existing erosion hazard and did not meet UTRCA policy that any application could not be approved at a staff level and would instead be subject to review by the UTRCA Hearing Committee. A violation letter **(Attachment #18)** was sent to the applicant on May 11, 2023 who was provided the option for a Hearing.

Current Proposal

The Landowner subsequently (June 5, 2023) submitted a permit application form **(Attachment #19)** to our office accompanied by a geotechnical assessment (**Attachment #20**) and a site plan (**Attachment #21**). We note the photos in the geotechnical report more accurately capture the extent of development and vegetation removal at the top-of-slope than is indicated on the site plan.

It should be noted that the design of the retaining wall structure is not in keeping with anything UTRCA staff would have approved in advance. It has been our experience that steel posts hammered in to hold back a wall (and not installed to sufficient depth) at the top of a steep slope do not have longevity and the wall eventually slumps down the bank. We are also not supportive of exposed steel posts or steel rods from a safety perspective. We note the report mentions that no details regarding depth of the supports for the non-engineered retaining wall structure on the slope were known at the time of the report.

Discussion

Copies of the UTRCA Permit Application Form, the geotechnical assessment(s), mapping and photos of the slope failure on the neighbouring property – as well as applicable UTRCA Natural Hazard policies **(Attachment #22)** - are included with this report.

Regulation of Development

The installation of structural hardening of the bank with flagstone, armour stone, steel and metal retaining wall structure, stairs, etc. within the erosion hazard and adjacent the wetland/woodland are considered development (by definition).

Definitions

Development:
(a) the construction, reconstruction, erection or placing of a building or structure of any kind,
(b) any change to a building or structure that would have the effect of altering the use or potential use of the building or structure, increasing the size of the building or structure or increasing the number of dwelling units in the building or structure,
(c) site grading, or
(d) the temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere.
(*Conservation Authorities Act, R.S.O. 1990 c. C.27*)

Through our individual "*Development, Interference With Wetlands and Alterations to Shorelines and Watercourses"* Regulations and *Ontario Regulation 97/04,* Conservation Authorities have a legislated responsibility to regulate development and activities in or adjacent to river or stream valleys, Great Lakes and inland lakes shorelines, watercourses, hazardous lands and wetlands.

Development taking place on these lands within our watershed requires permission from the Conservation Authority.

Section 3 of Ontario Regulation 157/06 states that "*the Authority may grant permission for development in or on the areas described in subsection 2(1) if, in its opinion, the control of flooding, erosion, dynamic beaches, pollution or the conservation of land will not be affected by the development*." These are referred to as the "5 Tests" and these tests must be considered in Conservation Authority decisions on permit applications. (Please note that UTRCA only considers "4 Tests" as without Great Lakes Shoreline there are no dynamic beaches within our watershed.)

Development within the Erosion Hazard

The application has been evaluated for conformity with our general hazard policies and general erosion hazard policies as follows:

4.2.1 General Policies for Hazard Limit

1. *Development* and *site alteration* shall be directed away from *hazard lands* where there is an unacceptable risk to public health or safety or property damage and shall be directed to areas located outside of the defined limits of the hazard.

4.2.3 Riverine Erosion Hazard Policies

1. *Fill* and grading and related *site alteration* activities shall not be permitted in *erosion hazard lands*, unless associated with measures prescribed and/or approved by a municipality or environmental agency specifically intended to remediate *erosion* concerns.

2. The Authority shall encourage the *conservation of land* through the control of construction and placement of *fill* on existing or potentially unstable slopes.

3. Any *development* or *site alteration* proposal which is in close proximity to an *erosion hazard* and located within the *Regulation Limit*, must be supported by a favourable geotechnical report and an *Environmental Impact Study* (EIS) prepared by a qualified professional, to the satisfaction of the UTRCA.

The previous geotechnical report (prepared in 2013 in support of the house development) identified the presence and extent of erosion hazard and indicated a setback from the top-of-bank where development should not occur. Given the height of the slope, the identified erosion hazard in the geotechnical reports, the slope failure on the neighbouring property and that the Delaware area in general has been prone to erosion and slope failures in recent years, UTRCA staff would not be supportive of development at the top-of-bank of a steep slope at this location. In general, the application does not meet erosion hazard policies.

Regulation of Interference With A Wetland

The application has been evaluated for conformity with our general erosion hazard policies (which are based on the "4 Tests"), as well as Section 4.2.4 *Wetland Policies* contained within the *UTRCA Environmental Planning Policy Manual (June 2006)*. There are a variety of policies contained within these sections that would not support the construction/installation of the hardened structures in such close proximity to the wetland. These policies are attached with this report for comparison. Specifically, Section 4.2.4 references wetland policies:

1. **New *development* and *site alteration* is not permitted in wetlands. Some *restricted uses* may be permitted provided that they are supported by an EIS or an Environmental Assessment.**

2. ***Development* and *site alteration* within the *area of interference* of a *wetland* shall only be permitted by the Authority if the applicant can demonstrate that such activity will have no impact on the control of *flooding, erosion*, *pollution* or the *conservation of land.* This will involve a scoping process where the UTRCA and the proponent (with the help of a qualified professional as required) will assess a proposed undertaking, having regard for the sensitivity of the *wetland* features and functions, the extent of encroachment and impact of use. This initial assessment will assist with the formulation of the terms of reference for a *scoped EIS* or a *comprehensive EIS*.**

Again, to minimize impacts on the adjacent wetland/woodland feature the EIS (prepared in 2013 in support of the house development), proposed the retention of a 6 metre vegetated buffer at the top-of-slope. The report mentioned that this 6 metre setback was expected to provide protection from future slope erosion. Development at the top-of-bank and the removal of vegetation to install the hardened structures is not in keeping with the EIS and does not meet UTRCA policy.

Conclusion

The Authority's approval is required for the issuance of permits under Ontario Regulation 157/06 –*Development, Interference with Wetlands and Alterations to Shorelines and Watercourses,* in accordance with Section 28 of the *Conservation Authorities Act*. Applications which conform to this Regulation and board approved policy found within the UTRCA *Environmental Planning Policy Manual* (June 2006) may be recommended for approval by Authority Staff who have been granted responsibility to process such proposals. If applications are submitted which do not conform to board approved policy, Authority Staff cannot approve the application, and a hearing may be requested. The application is then subject to the consent of the UTRCA Hearings Committee. Only the UTRCA Hearings Committee can refuse the application.

This report is provided to the Hearings Committee to advise that the application does not meet our general wetland and erosion hazard policies (Sections 4.2.1, 4.2.3, 4.2.4) of the *UTRCA Environmental Planning Policy Manual* (June 2006). Staff has no choice but to recommend denial of Application #108-23 as it is contrary to policy. The applicant has advised they wish to proceed with a Hearing before the UTRCA Hearings Committee to obtain consent for the

installation/construction of a flag stone/armour stone fire pit seating area, retaining wall structure and stairs.

Recommended by:

Jenna Allain, Manager
Environmental Planning and Regulations

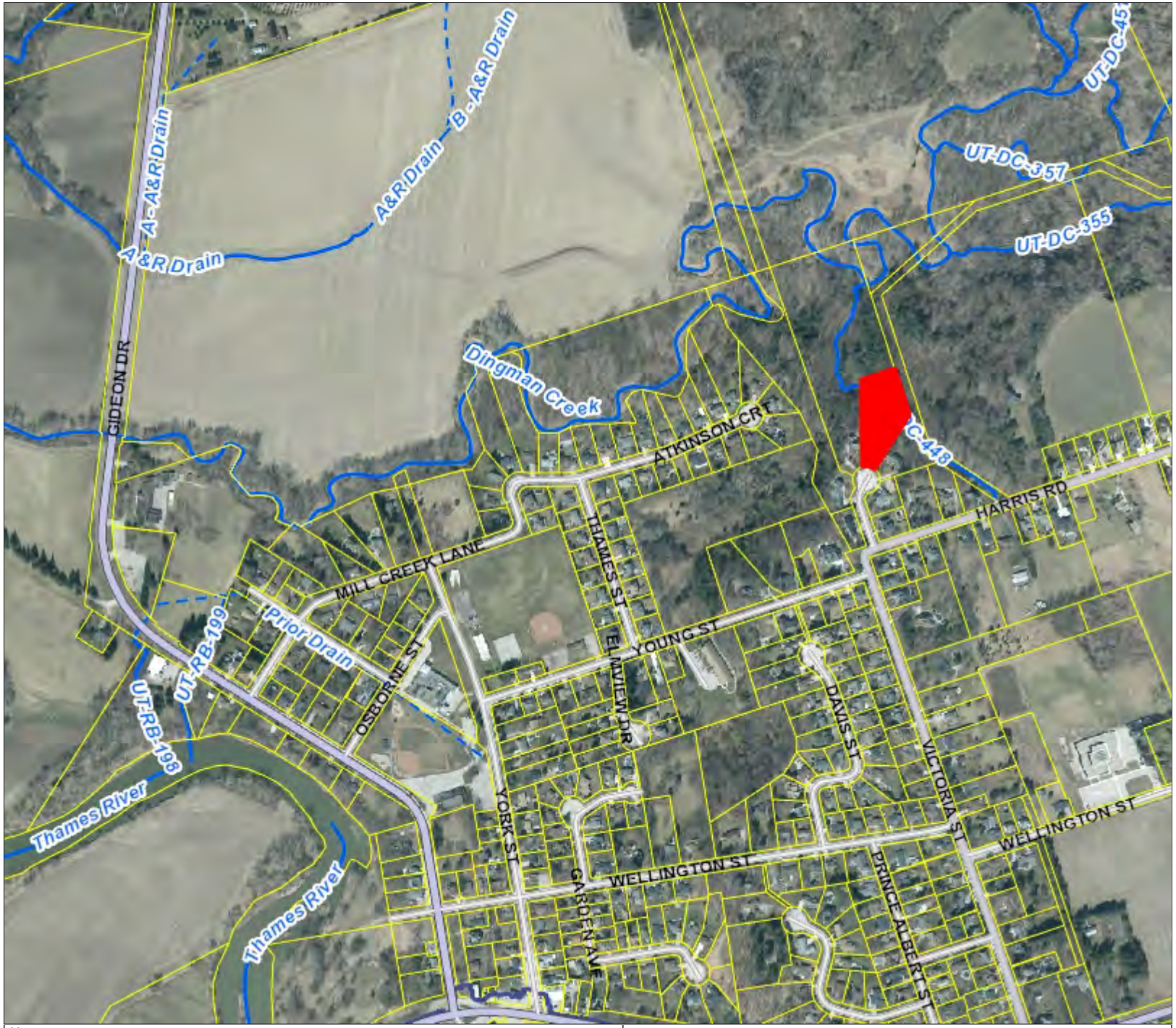
Prepared by:

Cari Ramsey
Land Use Regulations Officer

c.c. Members of the UTRCA Hearings Committee
Tracy Annett, UTRCA
Grant Inglis, UTRCA Solicitor

Attachments:

Notice of Hearing
Hearing Procedures
Attachment #1 – General Location Map
Attachment #2 – 60 Hog Back Close, Delaware (Flood Hazard Mapping)
Attachment #3 – 60 Hog Back Close, Delaware (Erosion Hazard Mapping)
Attachment #4 – 60 Hog Back Close, Delaware (Wetland Hazard Mapping)
Attachment #5 – 60 Hog Back Close, Delaware (NHS Woodlands Mapping)
Attachment #6 – 60 Hog Back Close, Delaware (Contour Mapping)
Attachment #7 – 60 Hog Back Close, Delaware (Adjacent Slope Failure)
Attachment #8 – 60 Hog Back Close, Delaware Letter to Dieleman
Attachment #9 – Slope Stability Study, June 2013
Attachment #10 – Email chain (August 8, 2013)
Attachment #11 – E-mail chain (August 13, 2013 & August 16, 2013)
Attachment #12 – Preliminary Development Plans (2013)
Attachment #13 – Email (September 9, 2013)
Attachment #14 – Fig 1-3, Site Location, ELC, Dripline Map
Attachment #15 - 60 Hog Back Close, Delaware, Environmental Impact Study, (November 13, 2013)
Attachment #16 – UTRCA Permit Application #143-14
Attachment #17 – Slope Failure Photos
Attachment #18 – Email and Notice of Violation – 60 Hog Back Close, Delaware
Attachment #19 – Application for Consent
Attachment #20 – Slope Assessment Opinion Letter (June 2023)
Attachment #21 – 60 Hog Back Close Site Plan
Attachment #22 – Applicable Policy



Notes:
60 Hog Back Close, Delaware - Mapping prepared to show location of subject property.

Created By: KMW June 12, 2023

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Upper Thames River Conservation Authority

Attachment #1

Legend

- UTRCA Watershed (2017 LiDA
- Assessment Parcel (MPAC)
- Watercourse (UTRCA)
  - Open
  - Tiled

UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority

Attachment #2

Legend

- UTRCA Watershed (2017 LiDA
- Assessment Parcel (MPAC)
- Watercourse (UTRCA)
  - Open
  - Tiled
- Flooding Hazard Limit

Notes:
60 Hog Back Close, Delaware - Mapping prepared to show estimated location of watercourse and associated flood hazard. Flood hazard is a "generic" 15 metre setback at this location.

Created By: KMW June 12, 2023

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UPPER THAMES RIVER CONSERVATION AUTHORITY

Upper Thames River Conservation Authority

Attachment #3

Legend

- UTRCA Watershed (2017 LiDA
- Assessment Parcel (MPAC)
- Watercourse (UTRCA)
  - Open
  - Tiled
- Erosion Hazard Limit
- Estimated Valley Land (Confin
- Potential Slope Hazard

Notes:
60 Hog Back Close, Delaware - Mapping prepared to show estimated location of erosion (steep slope) hazard on the property.

Created By: KMW June 12, 2023

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Attachment #4

Legend

- UTRCA Watershed (2017 LiDA
- Assessment Parcel (MPAC)
- Regulated Wetland

Notes:
60 Hog Back Close, Delaware - Mapping prepared to show estimated location of wetland features on the property.

Created By: KMW June 12, 2023

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UPPER THAMES RIVER CONSERVATION AUTHORITY

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Attachment #5

Legend

- UTRCA Watershed (2017 LiDA
- Assessment Parcel (MPAC)
- Middlesex NHSS Woodland (2
  - Candidate for Ecologically Importan
  - Ecologically Important
  - Significant Ecologically Important

Notes:
60 Hog Back Close, Delaware - Mapping prepared to show estimated location of (Natural Heritage Significant) woodland on the property.

Created By: KMW June 12, 2023

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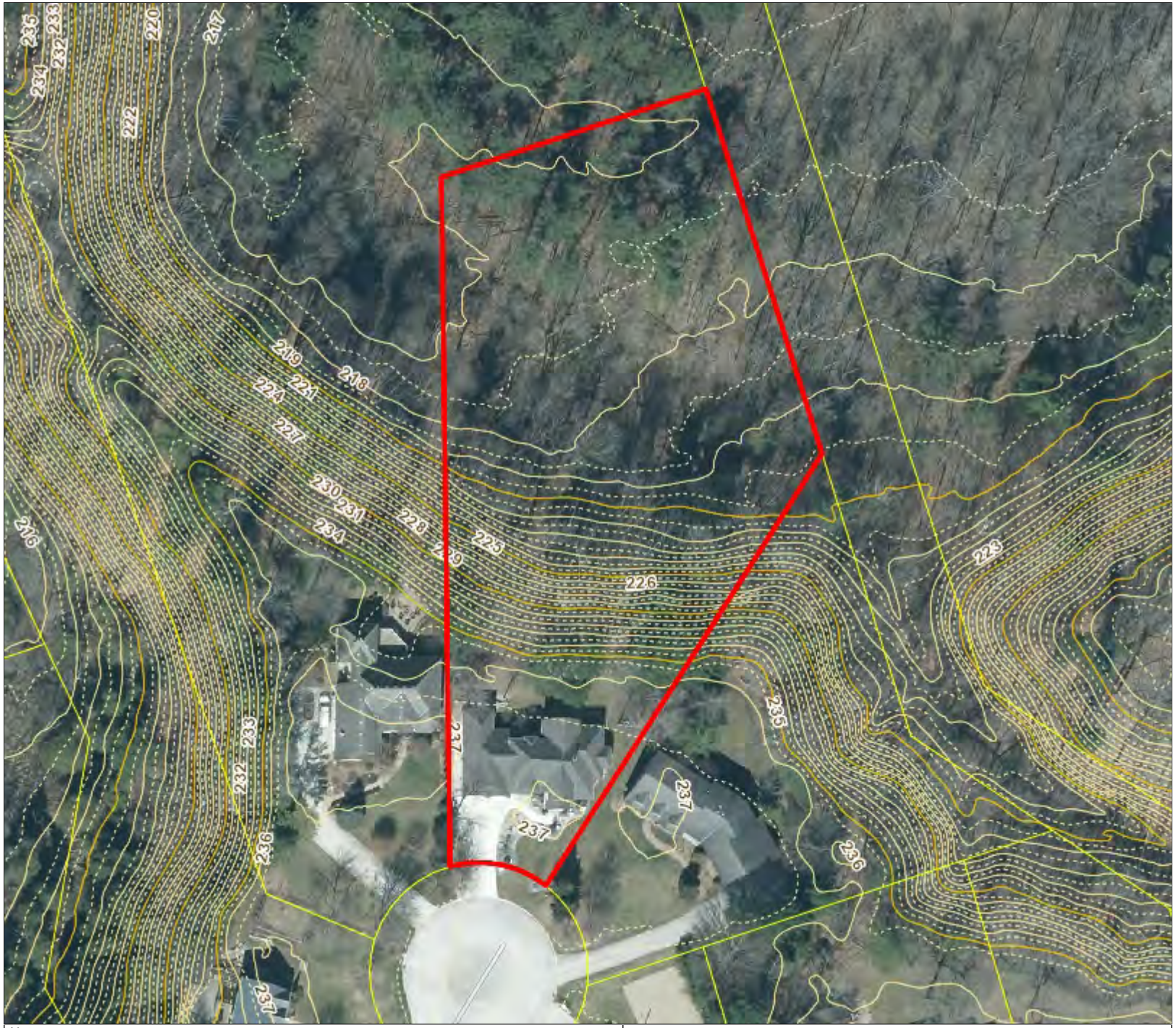

Notes:
60 Hog Back Close, Delaware - Mapping prepared to show estimated contour information for the property.

Created By: KMW June 12, 2023

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Upper Thames River Conservation Authority

Attachment #6

Legend

- UTRCA Watershed (2017 LiDA
- Assessment Parcel (MPAC)
- 0.5 m Contour (UTRCA, 2017)
  - 0.5 m
  - 1 m
  - 5 m

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60 Hog Back Close, Delaware

Legend

- UTRCA Watershed (2017 LiDA
- Assessment Parcel (MPAC)
- 1 m Contour (UTRCA, 2017)
  - 1 m
  - 5 m

Attachment #7

Notes:
60 Hog Back Close, Delaware - Mapping prepared to show location ("red arrow") of existing slope failure on adjacent property.

Created By: KMW June 12, 2023

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UPPER THAMES RIVER CONSERVATION AUTHORITY

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"Inspiring a Healthy Environment"

The Thames
A Canadian
Heritage River

March 4, 2013

[redacted]

Attention: Jason Dieleman – (via e-mail: [redacted])

Dear Mr. Dieleman:

Re: Potential for Development
60 Hog Back Close
Municipality of Middlesex Centre (Delaware)

The Upper Thames River Conservation Authority (UTRCA) is providing this letter following recent inquiries from yourself regarding the possibility of development on property located at 60 Hog Back Close in the Municipality of Middlesex Centre (Delaware). We are of the understanding you are interested in purchasing the property and want to know what would be required to obtain Conservation Authority approval to build a new single family residence and septic on the lot. We offer the following comments under Ontario Regulation 157/06:

1) As you can see from the attached UTRCA Regulation Limit mapping, the subject property is entirely regulated by the Conservation Authority due to the presence of a steep slope (erosion hazard lands) and wetland associated with the Dingman Creek corridor. (Please note: mapping should be printed landscape on legal size (8 ½ x 14 inch) paper for scales to be accurate.)

2) The UTRCA regulates development within the Regulation Limit in accordance with Ontario Regulation 157/06 made pursuant to Section 28 of the *Conservation Authorities Act*. This regulation requires proponents to obtain written approval from the UTRCA prior to undertaking any works in the regulated area including filling, grading, construction, alteration to a watercourse and/or interference with a wetland.

3) UTRCA policies do not support new development in hazard lands. New development will not be permitted within 6 metres from the 100-year erosion hazard. Prior to issuing approval for any new development on 60 Hog Back Close, the UTRCA would require the submission of a favourable geotechnical (slope stability) assessment and an Environmental Impact Study (EIS), prepared by qualified professionals, to the

satisfaction of the UTRCA. The geotechnical slope stability report will need to identify the location of the erosion hazard (100-year erosion hazard plus 6 metre access allowance) in order to determine if there is a developable envelope present on site or if development could be supported on this lot.

4) We also wish to advise that the woodland feature that covers the majority of both lots has been identified as being significant in the Middlesex Natural Heritage Study (2006). UTRCA policy stipulates that new development and site alteration is not permitted in woodlands considered to be significant. Furthermore, new development and site alteration is not permitted on adjacent lands to significant woodlands (within 50 metres) unless an EIS, prepared by a qualified professional, has been completed to the satisfaction of the UTRCA.

5) We note the presence of the wetland on the subject property would also warrant the submission of an EIS. Please note that the UTRCA regulates the Wetland proper and the Area of Interference surrounding the Wetland. The Area of Interference is 120 m for all Provincially Significant Wetlands and Wetlands greater than 2 hectares in size and 30 m for Wetlands that are not provincially significant and less than 2 hectares in size. UTRCA policy stipulates that new development and site alteration is not permitted in wetlands. The potential for development and site alteration within the area of interference of a wetland shall be determined through the completion of an EIS, prepared by a qualified professional, to the satisfaction of the UTRCA.

6) For details on our policies regarding works in areas regulated by the Conservation Authority, you may wish to refer to the *Environmental Planning Policy Manual for the Upper Thames River Conservation Authority (June 2006)*, available on our website at:

   www.thamesriver.on.ca/Planning_Permits_and_Maps/env_planning_policy_manual.htm

We suggest there may be constraints to development on the 60 Hog Back Close property and caution that the above noted studies may confirm there is an insufficient developable envelope for a new house and septic. We trust this information is satisfactory for your purposes. If you have any questions regarding the above information, please contact the undersigned.

Please note: We are also providing Drinking Water Source Protection information for all projects occurring in areas identified as vulnerable. To that end, please review the attached Drinking Water Source Protection information (Appendix A).

Yours truly,
UPPER THAMES RIVER CONSERVATION AUTHORITY

Karen M. Winfield

Karen Winfield
Land Use Regulations Officer

Encl. - Appendix A (Drinking Water Source Protection Information applicable to 60 Hog Back Close, Municipality of Middlesex Centre (Delaware))

Appendix A – Drinking Water Source Protection Information applicable to 60 Hog Back Close, Municipality of Middlesex Centre (Delaware)

DRINKING WATER SOURCE PROTECTION

The *Clean Water Act* (CWA), 2006 is intended to protect existing and future sources of drinking water. The Act is part of the Ontario government's commitment to implement the recommendations of the Walkerton Inquiry as well as protecting and enhancing human health and the environment. The CWA sets out a framework for source protection planning on a watershed basis with Source Protection Areas established based on the watershed boundaries of Ontario's 36 Conservation Authorities. The Upper Thames River, Lower Thames Valley and St. Clair Region Conservation Authorities have entered into a partnership for The Thames-Sydenham Source Protection Region. Drinking Water Source Protection represents the first barrier for protecting drinking water including surface and ground water from becoming contaminated or overused thereby ensuring a sufficient, clean, safe supply now and for the future.

Assessment Reports:

The Thames-Sydenham Source Protection Region has prepared *Assessment Reports* which contain detailed scientific information that:

- identifies vulnerable areas associated with drinking water systems;
- assesses the level of vulnerability in these areas; and
- identifies activities within those vulnerable areas which pose threats to the drinking water systems, and assess the risk due to those threats.

The Assessment Report for the Upper Thames watershed delineates three types of vulnerable areas: Wellhead Protection Areas, Highly Vulnerable Aquifers and Significant Groundwater Recharge Areas. We wish to advise that the subject property contains areas identified as being a Highly Vulnerable Aquifer and Significant Groundwater Recharge Area.

Mapping which shows these areas is available at:

Highly Vulnerable Aquifers:
http://www.sourcewaterprotection.on.ca/downloads/assessment_reports/UTRCA/Appendices/A1-Maps/Map4-3-2_Highly%20Vulnerable%20Aquifers.pdf

Significant Groundwater Recharge Areas
http://www.sourcewaterprotection.on.ca/downloads/assessment_reports/UTRCA/Appendices/A1-Maps/Map4-2-2%20SGRA%20Vulnerability.pdf

Source Protection Plans:

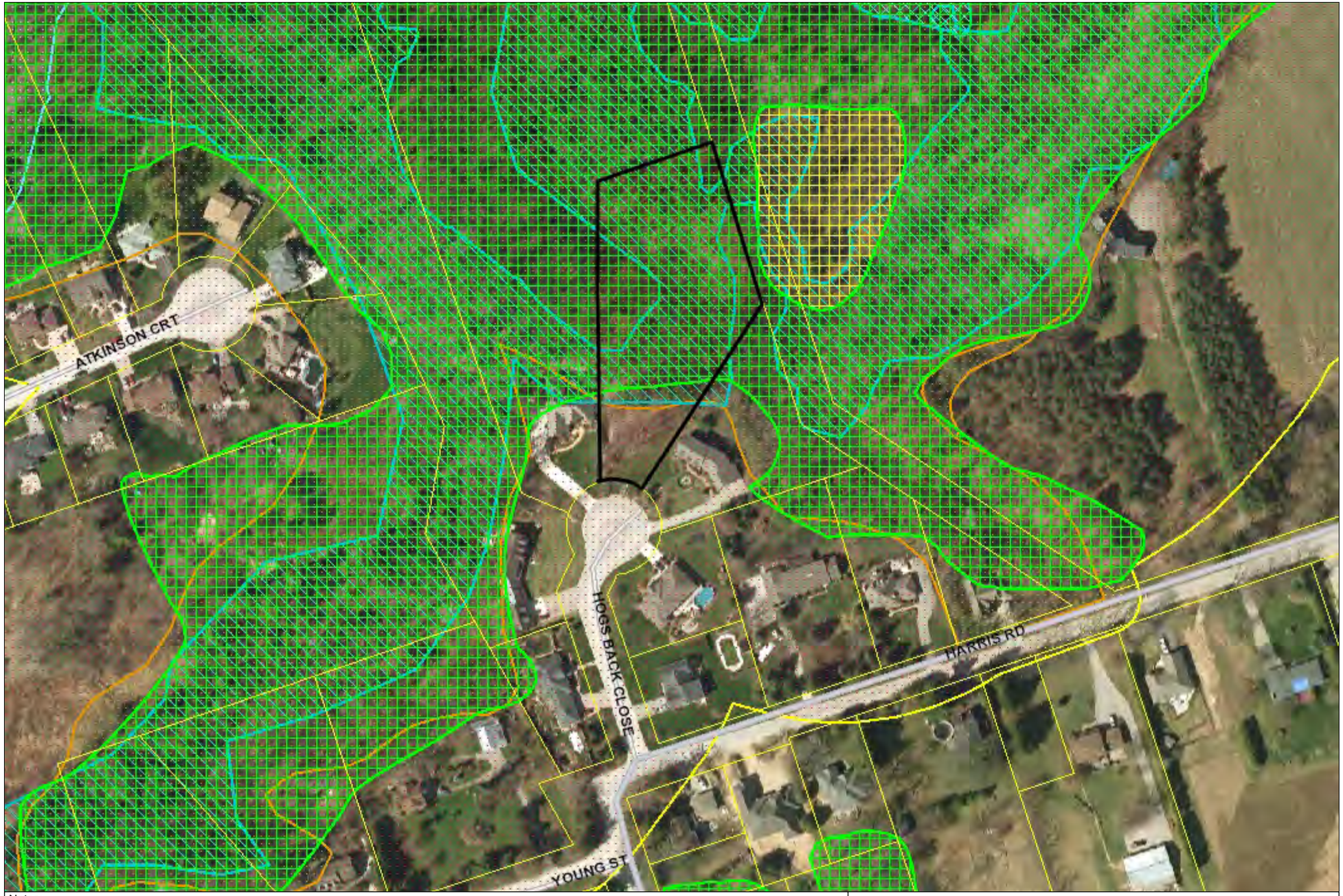
Using the information in the Assessment Report, a Source Protection Plan is being developed for the Upper Thames watershed. It is anticipated that this Plan will consist of a range of policies that together, will reduce the risks posed by the identified water quality and quantity threats in the vulnerable areas. These policies will include a range of voluntary and regulated approaches to manage or prohibit activities which pose a threat to drinking water. Activities that can lead to; low, medium and significant threats have been identified in Appendix 10 of the Upper Thames River Source Protection Area Assessment Report, dated August 12, 2011. Available at:

http://www.sourcewaterprotection.on.ca/downloads/assessment_reports/UTRCA/Appendices/A10-Threats%20and%20Risk%20Assessment.pdf

AREA OF VULNERABILITY	VULNERABILITY SCORE	THREATS & CIRCUMSTANCES
Highly Vulnerable Aquifer (HVA)	6	Moderate & Low threats
Significant Groundwater Recharge Area (SGRA)	6	Moderate & Low threats
Wellhead Protection Area (WHPA)	n/a	n/a

NOTE: Certain Activities on this property may be considered *Moderate or Low* threats to drinking water.

As indicated, the *Source Protection Plan* is currently being developed and as such, the UTRCA cannot speculate what the *Plan* might dictate for such areas. Under the CWA, the Source Protection Committee has the authority to include policies in the *Source Protection Plan* that may prohibit or restrict activities identified as posing a *significant threat* to municipal drinking water supplies. Municipalities may also have or be developing policies that apply to vulnerable areas when reviewing development applications. Proponents considering land use changes, site alteration or construction in these areas need to be aware of this possibility.



Regulation Limit

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

- Road Labels (1:64K)
- Road (1:64K)
  - Freeway
  - Expressway / Highway
  - Arterial
  - Collector
  - Local Street
  - Ramp
- Assessment Parcel
- Middlesex NHS Woodland
  - No Criteria Met
  - 1+ Criteria Met
- MNR Wetland Unit (May 2011)
- Unevaluated Wetland (UTRCA)
- Flooding Hazard
- Erosion Hazard
- Wetland Interference
- Regulation Limit

Attachment #8b

The Regulation Limit depicted on this map schedule is a representation of O.Reg 157/06 under O.Reg 97/04.

The Regulation Limit is a conservative estimation of the hazard lands within the UTRCA watershed. Depending on the specific characteristics of the hazard land and the land use proposed, the Regulation Limit may be subject to change.

The UTRCA disclaims explicitly any warranty, representation or guarantee as to the content, sequence, accuracy, timeliness, fitness for a particular purpose, merchantability or completeness of any of the data depicted and provided herein.

The UTRCA assumes no liability for any errors, omissions or inaccuracies in the information provided herein and further assumes no liability for any decisions made or actions taken or not taken by any person in reliance upon the information and data furnished hereunder.

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

UPPER THAMES RIVER CONSERVATION AUTHORITY

Notes:

60 Hogs Back Close, Municipality of Middlesex Centre (Delaware)

Created By: KW5 February 20, 2013

* 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.

0 20 40 80

metres

1:2,000

N

Attachment #9

Slope Stability Assessment
Proposed Development
60 Hog Back Close
Delaware, Ontario

Prepared for:

Bob and Carla Kelly
58 Hog Back Close
Delaware, Ontario
N0L 1E0

exp Services Inc.
The new identity of Trow Associates Inc.

15701 Robin's Hill Road, Unit 2
London, Ontario
N5V 0A5
T: 519-453-1480
F: 519-453-1551
E: London@exp.com

KCH00212307-GE
June, 2013

Table of Contents

1. Introduction

This report presents the findings of a Slope Stability Assessment carried out in conjunction with the proposed development to be located at 60 Hog Back Close in Delaware, Ontario.

It is understood that the client requires a letter of permission to develop the land at the top of the slope at 60 Hog Back Close. As illustrated on Drawing 1, attached, the proposed development area is traversed by a valley slope associated with a tributary of Dingman Creek along its northern edge. Accordingly, a slope assessment was requested to determine the site suitability for the proposed development.

The proposed development is within an area regulated by the Upper Thames River Conservation Authority. As a result, consent from the Conservation Authority is required prior to construction of the proposed addition at the site.

1.1 Terms of Reference

Authorization to proceed with the investigation was received from Mrs. Carla Kelly on May 21, 2013.

The purpose of this investigation was to assess the physical conditions of the slope on the property and based on an assessment of these observations to provide comments on slope stability, set backs and potential impact of the proposed development.

Based on an interpretation of the factual borehole data, a review of the topographic survey data by AGM Surveying and Engineering and a review of soil and groundwater information from a test hole excavated at the site, **exp** Services Inc. has provided engineering guidelines for the geotechnical design and construction of the proposed development.

This report is provided on the basis of the terms of reference presented above, and on the assumption that the design will be in accordance with applicable codes and standards. More specifically, **exp** has referenced the Natural Hazards Manual and Technical Guides prepared by the Ontario Ministry of Natural Resources for geotechnical and slope assessment purposes.

If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning geotechnical aspects of the codes and standards, this office should be contacted to review the design.

The information in this report in no way reflects on the environmental aspects of the soil. Should specific information in this regard be needed, additional testing may be required.

2. Procedure

2.1 Site Reconnaissance

A site visit was conducted on May 9, 2013 to examine the current conditions of the slopes at the site. The valley slope located along the northern edge of the site was reviewed using the 'Slope Stability Rating Chart' (created by MNR), which summarizes the site observations, and empirically scores various elements which contribute to slope stability, to provide an assessment of the potential for slope instabilities at the site. A rating chart for the cross section examined is provided for review and consideration. A photographic record of the slope conditions was obtained during the site visit; select photographs are shown below.

Photo 1 *– From crest of slope looking north west.*

Photo 2– *From bottom of slope looking south east.*

2.2 Methodology

One boreholes were advanced using a locally subcontracted truck-mounted CME-55 drilling unit equipped with continuous flight hollow stem augers, soil sampling and soil testing equipment. The Borehole was drilled to a maximum depth of 21.8 m below ground surface to provide information throughout the entire slope height as well as below the toe and creek elevation.

Within the borehole, Standard Penetration Tests (SPTs) were performed to assess the compactness or consistency of the underlying soils and to obtain representative samples. During the drilling, the stratigraphy in the borehole was examined and logged in the field by **exp** geotechnical personnel.

Short-term groundwater level observations within the open borehole, and observations pertaining to groundwater conditions at the test hole location are recorded in the borehole log found in Appendix A. Following the drilling, the water level was measured in the open borehole, following which the borehole was backfilled with the excavated materials and bentonite, to satisfy the requirements of O.Reg. 903.

Representative samples of the various soil strata encountered at the test location were taken to our laboratory in London for further examination by a geotechnical engineer and laboratory classification testing. Laboratory testing for this investigation comprised of routine moisture content determinations, with results presented on the borehole log found in Appendix A. A grain size analysis was also conducted on a selected silt till sample.

Samples remaining after the classification testing will be stored for a period of three months following the date of sampling (i.e., until August 2013). After this time, they will be discarded unless prior arrangements have been made for longer storage.

2.3 Review of Topographic Data

The work program for the slope assessment included a review of historic aerial photographs and the topographic survey (actual survey spot elevations) provided by AGM Surveying and Engineering. The topographic survey information from the site plan was utilized to create the cross section for use in confirming the location of the Erosion Hazard Limit, which defines the development setback limit. Using sound engineering judgement and technical experience, a cross section (which is considered to be representative of typical site conditions) has been reviewed. Consideration has also been given to incorporate potential slope sections which have a higher potential for slope instability which may be indicated by the presence of more steeply inclined slopes or the localized presence of seepage zones.

Examination of factors of safety using Bishop's Simplified methods were carried out and analyzed by computer methods utilizing the Slope/W computer program. Topographic information used for the slope section is taken from the topographic mapping prepared by AGM Surveying and Engineering for the site. Soil strength parameters used in the analyses were based on our observations and experience with similar soil and groundwater conditions, and are consistent with typical values in literature sources. A copy of **exp's** borehole log (Borehole BH1) is provided in Appendix A.

The MNR Rating Chart was utilized for the slope section to summarize the site observations and empirically score various elements which contribute to slope stability, to provide an assessment of the potential for slope instabilities at the site. This tool is intended to provide guidance on the

level of investigation work to assess the risk of instability. Soil and groundwater information from **exp's** field program were incorporated into the rating chart. Based on the values recorded on the Slope Stability Rating Chart, the site slope is considered to have a slight potential for instability indicated by Slope Instability Rating of 30.

Once the stable slope profile is determined, additional setbacks for erosion and access allowance are applied, as required for site specific conditions. This analysis is carried out where there are changes in the soil and groundwater conditions and where there are significant changes in the slope inclination and surface topography.

3. Site and Subsurface Conditions

3.1 Site Description and Geology

The site for the proposed development (see Drawing 1) is located on the north side of Hog Back Close within the property of MN60 in Delaware, Ontario. It is understood that permission to develop the lot is required for sale of the property and that the proposed development may consist of single family residence. The site is bounded by the existing residential dwellings to the east, west and south along Hog Back Close and by a valley slope associated with a tributary of Dingman Creek along the north edge of the site.

Based on site observations and the provided topographic survey information, the site is traversed by a slope with a height typically of about 14.5 metres. Slope inclinations range between about 4.2H:1V to a maximum inclination of about 1.8H:1V.

The slopes are well vegetated with shrubs and mature trees. No evidence of active erosion on the slope faces resulting from drainage over the slope was observed, no evidence of seepage zones was observed on the slope face, nor was evidence of toe erosion resulting from stream flow at the base of the slopes observed.

A brief summary of the soil stratigraphy encountered at the borehole location follows.

3.2 Soil Stratigraphy

The detailed stratigraphy encountered in the borehole is detailed in the borehole log found in Appendix A, and summarized in the following paragraphs. It must be noted that boundaries of soil indicated in the borehole log are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect transition zones for the purposes of geotechnical design and should not be interpreted as exact planes of geological change.

Topsoil

A 300 mm thick layer of topsoil was observed at ground surface. The topsoil soils were generally described as a black silty sand loam, and in a loose state, based on drilling resistance.

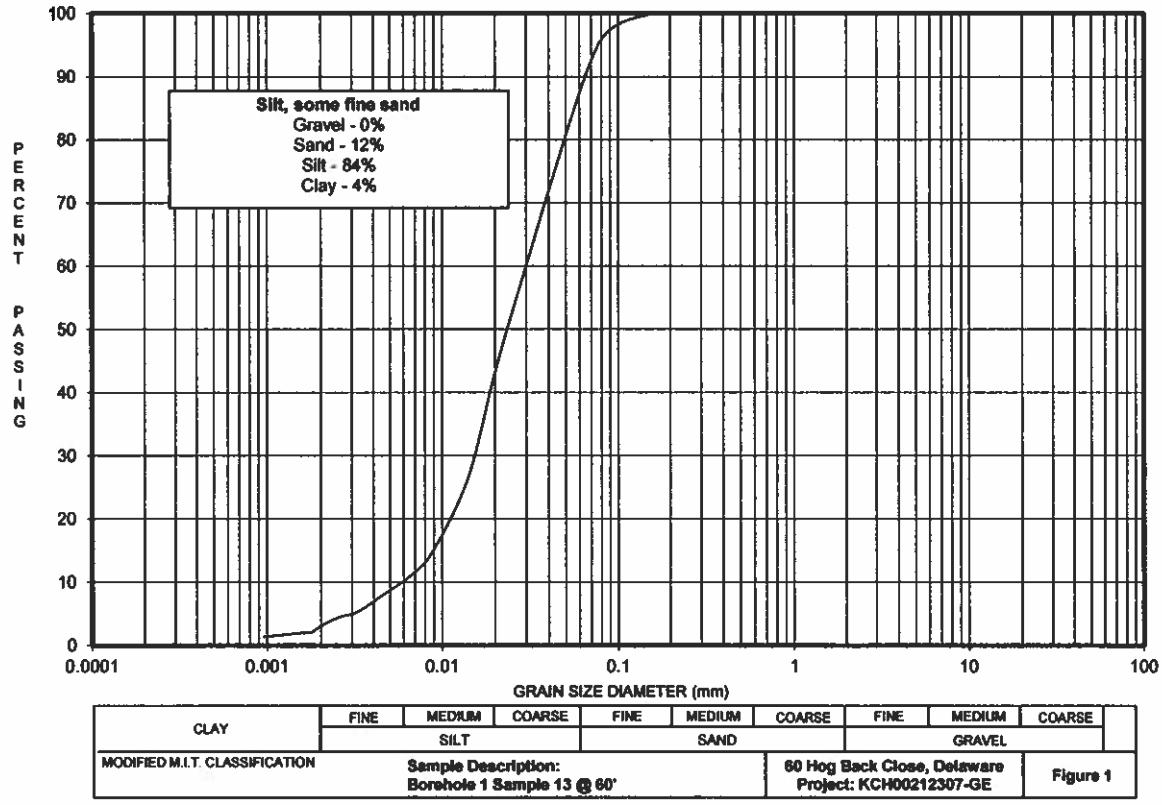
Sand

Below the topsoil was a layer of sand extending to a total depth of about 9.1 m below ground surface. The sand is described as brown in colour, fine-grained and containing some silt to silty and trace gravel. The sand is in a compact to dense state, based on Standard Penetration Tests (SPT) N-values in the range of 13 to 32 blows per 300 mm penetration of the split-spoon sampler. A loose layer was observed from 3.1 m to 4.6 m depth based on a SPT N-value of 7 blows per 300 mm of the split-spoon sampler. *In situ* moisture contents in the sand were in the range of 3 to 24 percent, indicative of moist to very moist conditions.

Glacial Till

The predominant natural soil contacted throughout the site is silt till, which extends below the base of the borehole. The silt till is described as brown to grey with depth in colour, containing trace to some fine sand with wet sand layering throughout.

A gradation was carried out on a sample of the silt till taken from 18.3 m (60 feet) depth (SA13) in the borehole. The results are provided and represented graphically in the following figure.



The silt till has a compact to very dense consistency based on SPT N-values which range between 17 and 54 blows per 300 mm penetration of the split-spoon sampler. Moisture contents in the silt till are generally in the range of 21 to 35 percent, indicating very moist to wet conditions.

3.3 Groundwater Conditions

Details of the groundwater conditions observed within the borehole are provided on the attached Borehole Log. Measurement of the water level and moisture contents of selected samples are also recorded on the attached Borehole Log.

Within the completed borehole, caving of the sand material closed the hole at a depth of 15.5 m. It is noted that insufficient time was allowed for the measurement of the depth to the stabilized groundwater table prior to backfilling the borehole.

It is further noted that the depth to the groundwater table may vary in response to climatic or seasonal conditions, and as such, may differ at the time of construction, with higher levels in wet seasons. Capillary rise effects should also be anticipated in fine-grained soil deposits.

4. Slope Stability

4.1 General

The purpose of this investigation was to determine a safe setback distance from the existing slope which traverses the site using the information which is currently available. It is important to mention that specific details regarding the proposed development, layout and site grading have not been examined as part of the current scope of work. The overall Erosion Hazard Limit for the site slopes is determined by evaluating the slope stability, considering surficial seepage and shallow failures, allowance for potential for toe erosion along the base of the slope, and providing an access allowance.

The slope was evaluated using the method prescribed by Ministry of Natural Resources in the Technical Guide for Assessing the Erosion Hazard Limit for River and Stream Systems. A Slope Stability Rating Chart has been completed and is attached. The ratings suggest that a slight potential for instability exists.

4.2 Erosion Access Allowance

A tributary of Dingman Creek is located at the base of the slope at the north of the property. Where detailed slope stability analyses have not been carried out, the Natural Hazards Manual by Ministry of Natural Resources indicates that a minimum toe erosion allowance of 1 m is recommended where the bankfull width is less than 5 metres and no evidence of active erosion is present.

At present, there is very little water in the tributary. When water is present, the watercourse is marshy in nature, with very low velocity water rather than a stream condition with higher water flow velocities. Signs of active erosion along the watercourse are not present. Since this watercourse contains intermittent and typically low-velocity flows, an erosion allowance of 4 m is generally considered to be appropriate along the base of this slope.

The surficial soils on the face of the slope also experience minor long-term erosion due to weathering (wetting/drying and freezing/thawing cycles). The extent of potential erosion damage is a function of the competence of the natural subgrade soils, the type and quality of vegetative cover, and the frequency with which the slope is subject to erosive forces. Serious erosion of the soil on the face of the slope could be caused by run-off water washing over the face of the slope (such as tile drains or redirected surface water which is directed onto existing slopes), as well as human disturbance, both of should be minimized where possible.

4.3 Stable Slope Geometry

The stability of the slope was investigated for a number of conditions. The examinations involve an assessment of the natural slope with and without the influence of perched groundwater and the effects of possible construction in proximity to the site slopes. The various types of failures analyzed include shallow slumping failures, medium depth rotational failures near the crest of the slope, and deep rotational failures through the entire height of the slope. The analyses were undertaken by computer methods utilizing the Slope/W computer program for select slope profiles.

The soil parameters used were conservative to build in an added safety factor for the analyses. The following table summarizes the parameters for the predominant soils which were used in **exp's** evaluation of the stable slope configuration:

Soil Type	Density	Cohesion	Angle of Internal Friction
Sand	20.5 kN/m^3	0 kPa	34°
Silt Till	20 kN/m^3	5 kPa	28°

In order to determine an appropriate development setback from the crest of the slope, a minimum factor of safety of 1.4 was used as indicated in the report "Geotechnical Principles for Stable Slopes" prepared for the Ministry of Natural Resources, for infrastructure and public use (Section 4.3.3.1 in the MNR Technical Guide). The minimum overall factor of safety under the existing conditions was 1.5 which is above this requirement. The findings were in general agreement with observations of the local slope (vegetated and treed slope which is beneficial for protection against shallow slides).

As noted above, the slopes are generally inclined at about 1.8H:1V, water depths adjacent to the slopes within the watercourse are shallow (less than 125 mm as shown below), and have been considered in the overall stability of the existing site slopes.

The soil conditions encountered in the borehole were generally found to comprise of sand underlain by dense silt glacial till deposits. In determining suitable input soil and groundwater parameters, consideration has been given to incorporating the presence of groundwater within the subsurface soil strata. Local changes and variations in the groundwater level were also considered when carrying out the analyses, to examine possible post-development effects. Changes in the groundwater level may result from a number of causes, included (but not limited to) possible site grading activities, changes to site drainage, use of at-source infiltration, or types of surface cover.

To ensure that a satisfactory factor of safety is applied for the Erosion Hazard Limit along the slopes at the site, the stable slope geometry is defined by a line which extends upwards from the toe of the slope or from the toe erosion allowance limit, at an inclination of approximately 2.0 horizontal to 1 vertical.

In addition to the stable slope geometry, an emergency access allowance should also be applied. This is described in the following section.

4.4 Emergency Access Allowance

The Ontario Government provides planning guidelines for development adjacent to slopes. The 2005 Provincial Policy Statement (PPS Section 3.1.3) requires that an access allowance be included as part of the Erosion Hazard Limit. In accordance with PPS, 6 to 15 m setback is required in addition to the erosion and stability setbacks, which are discussed in the following sections. It is understood that this access allowance is required to ensure that there is a large enough safety zone for people and vehicles to enter and exit an area during an emergency, such as slope failure and flooding.

Since the subsurface conditions within the study area are generally considered to be geologically stable, we recommend that at a minimum, a planning setback of 6 m be applied to existing slopes. This setback is shown on Slope Cross Section Drawing 2.

4.5 Erosion Hazard Limit

The Erosion Hazard Limit includes the following 3 elements in determining the setback limits from a geotechnical standpoint:

- Erosion Allowance
- Stable Slope Setback
- Emergency Access Allowance (6 m)

Ultimately, the Erosion Hazard Limit also defines the development limit for the site. Additional setbacks may also be required based on EIS or studies prepared by others.

The setback distance from the slope crest varies slightly along the slope, based on the overall slope height and inclination, and the type and amount of toe erosion at the base of the slopes. Further, the inferred location of the Erosion Hazard Limit setback line is provided on Drawing 1 for review and consideration.

4.6 UTRCA Generic Regulation

In May 2006, Ontario Regulation 157/06 came into effect in the Upper Thames River Conservation Authority (UTRCA) watershed, which locally implements the Generic Regulation (Development, Interference with Wetlands and Alterations to Shoreline and Watercourses). This regulation replaces the former Fill, Construction and Alteration to Waterways regulations, and 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, wetlands, or shorelines, when required.

Property owners must obtain permission from the UTRCA before beginning any development, site alteration, construction, or placement of fill within the regulated area. Permits are also required for any wetland interference, or for altering, straightening, diverting or interfering in any way with the existing channel of a creek, stream or river. Proposed development within the study area will be subject to the above referenced Regulation. Consultation with the local Conservation Authority for review of site-specific development plans is recommended in this regard.

4.7 General Comments for Site Works

It is imperative that future development generally not occur within the Erosion Hazard Limit identified at the site. To this end, the following comments are provided and measures are recommended.

- Spoils from any excavation should be removed from the slope area. Excavated soils should not be placed over the table land near the crest of slope, unless the soil is placed as engineered structural fill. In addition, any fill placement or changes to existing grades in proximity to the site slopes may be subject to review and approval by the Upper Thames River Conservation Authority.

- Any buildings and permanent structures associated with the proposed site development must be located outside of the Erosion Hazard Limit, which is identified on the Site Plan. The Cross Section drawings also help identify the location of this line. **Exp** would be pleased to review the founding elevations and site grading plans for specific development proposals to confirm that this requirement is met.

- The site should be graded such that surface water is directed away from the slope, to limit the amount of uncontrolled surface water flow over the face of the slope, which can contribute to surficial erosion damage to the slope surface. If it is necessary to outlet this water from the table land down the slope it should be collected and taken down the slope in a controlled channel or solid pipe. Where required, suitably designed outlets including such measures as rodent screens etc. should be incorporated.

- Water from downspouts and perimeter weeping tile etc. must also be collected in a controlled manner and re-directed away from the slope.

- Vegetation on the slope should be maintained. A program of plantation where appropriate, including deciduous trees and deep-rooted vegetation is preferred.

Final design drawings including building locations, services etc. should be reviewed by a geotechnical consultant to ensure that the Erosion Hazard Limit is properly interpreted. Geotechnical inspection and testing is recommended during construction to confirm that all recommendations set out will be followed.

5. General Comments

The comments given in this report are intended only for the guidance of design engineers. The number of test holes required to determine the localized underground conditions between test holes affecting construction costs, techniques, sequencing, equipment, scheduling, etc. would be much greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

Exp Services Inc. should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not afforded the privilege of making this review, **exp** Services Inc. will assume no responsibility for interpretation of the recommendations in this report.

We trust that this report is satisfactory to your present requirements and we look forward to assisting you in the completion of this project. Should you have any questions, please contact the undersigned at your convenience.

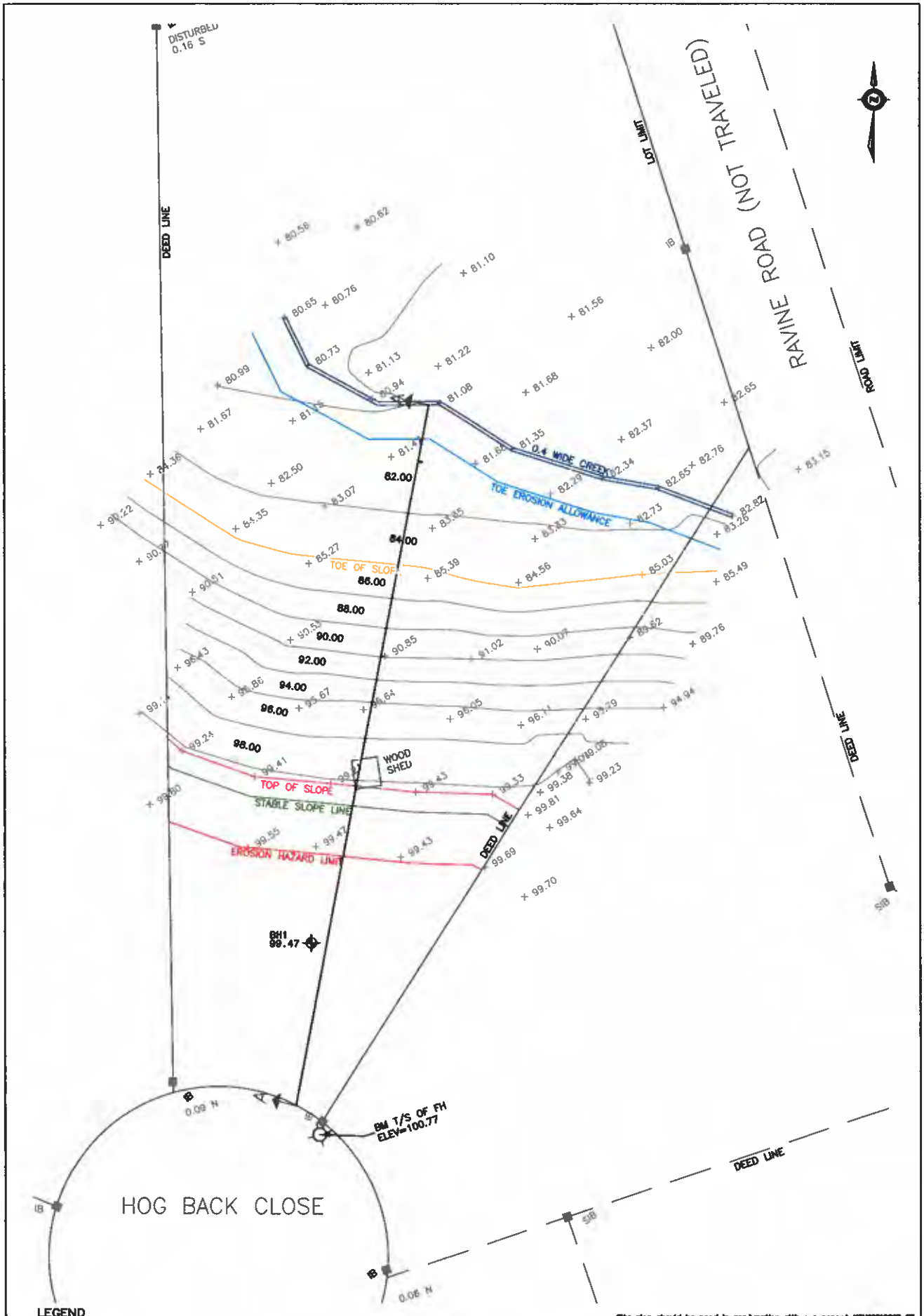
All the foregoing and attachments respectfully submitted,

Exp Services Inc.

Craig Swinson, P. Eng.
Geotechnical Services

Rebecca Walker, P. Eng.
Head, Geotechnical Services

Drawings



LEGEND

BH1 99.47 Approximate Borehole Location, Borehole Ground Surface Elevation

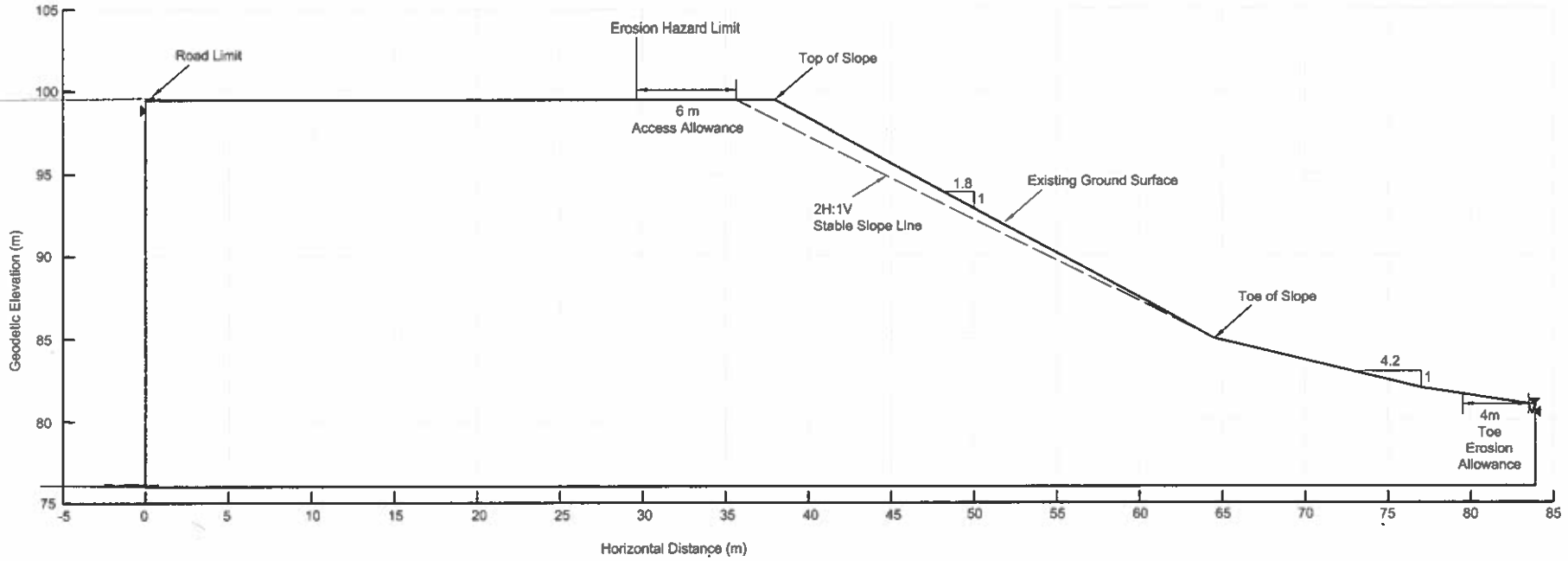
- Erosion Hazard Limit
- Stable Slope Line
- Top of Slope
- Toe of Slope
- Toe Erosion Allowance

Site plan should be read in conjunction with exp report KCH-003212307-GE

-NOTES-

1. The boundaries and soil types have been established only at test hole locations. Variations between test holes may be encountered and may be subject to consideration above.
2. Soil samples will be retained in storage for 3 months and then disposed unless client advises that an extended time period is required.
3. Topsoil quantities should not be established from the information provided at the test hole locations.

CLIENT	BOB & CARLA KELLY
PROJECT	60 HOG BACK CLOSE SLOPE STABILITY
TITLE	SITE PLAN
exp	exp Services Inc. 1679A Robin's Hill Road, London, Ontario N5V 0A8
DATE	JUNE 2013
SCALE	1:400
PROJECT NO.	KCH-003212307-GE
DWG	1



-NOTES-

1. Drawing should be read in conjunction with exp report KCH-00212307-GE.
2. Ground surface elevations provided by AGM Surveying and Engineering.

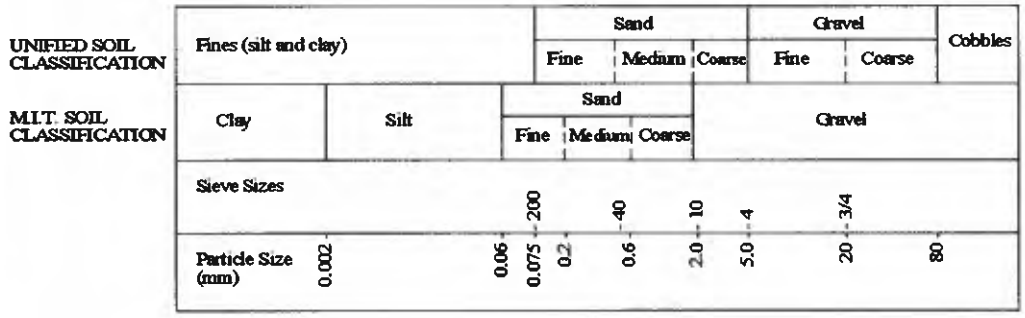
	BOB & CARLA KELLY
	60 HOG BACK CLOSE SLOPE STABILTY
	CROSS SECTION A – A
exp	exp Services Inc. 15781 Robin's Hill Road, London, Ontario N6V 0A8
JUNE 2013	1:250

Appendix A

Borehole Log

NOTES ON SAMPLE DESCRIPTIONS

1. All descriptions included in this report follow the 'modified' Massachusetts Institute of Technology (M.I.T.) soil classification system. The laboratory grain-size analysis also follows this classification system. Others may designate the Unified Classification System as their source; a comparison of the two is shown for your information. Please note that, with the exception of those samples where the grain size analysis has been carried out, all samples are classified visually and the accuracy of the visual examination is not sufficient to differentiate between the classification systems or exact grain sizing. The M.I.T. system has been modified and the TROW classification includes a designation for cobbles above the 75 mm size and boulders above the 200 mm size.



2. **Fill**: Where fill is designated on the borehole log, it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description therefore, may not be applicable as a general description of the site fill material. All fills should be expected to contain obstructions such as large concrete pieces or subsurface basements, floors, tanks, even though none of these obstructions may have been encountered in the borehole. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact and correct composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. The fill at this site has been monitored for the presence of methane gas and the results are recorded on the borehole logs. The monitoring process neither indicates the volume of gas that can be potentially generated or pinpoints the source of the gas. These readings are to advise of a potential or existing problem (if they exist) and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic waste that renders the material unacceptable for deposition in any but designated land fill sites; unless specifically stated, the fill on the site has not been tested for contaminants that may be considered hazardous. This testing and a potential hazard study can be carried out if you so request. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common, but not detectable using conventional geotechnical procedures.

3. **Glacial Till**: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process, the 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 (75 to 200 mm in diameter) or boulders (greater than 200 mm diameter) and therefore, contractors may encounter them during excavation, even if they are not indicated on the borehole logs. It should be appreciated that normal sampling equipment can not differentiate the size or type of obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited area; therefore, caution is essential when dealing with sensitive excavations or dewatering programs in till material.

BOREHOLE LOG

BH1
Sheet 1 of 1

PROJECT **Hog Back Close Slope Stability Assessment** PROJECT NO. **KCH00212307-GE**
CLIENT **Bob and Carla Kelly** DATUM **Geodetic**
DRILL TYPE/METHOD **Hollow Stem Auger** DATES: Boring **May 27, 2013** Water Level **May 27/13**

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or (%)	SAMPLES N VALUE (blows) or RQD (%)	OTHER TESTS
0	~~99.47~~ 99.17	**TOPSOIL**, Silty Sand, dark brown, rootlets, loose, moist		S1	80	7	
1		**SAND**, brown, fine-grained, some silt to silty, trace gravel, compact moist		S2	70	13	
2				S3	60	18	
		-some clayey layering at 2.3 m depth		S4	50	14	
3		-becoming loose at 3.1 m depth		S5	60	7	
4				S6	100	7	
5		-becomnig compact at 4.6 m depth		S7	70	29	
6		-becoming dense at 6.1 m depth		S8	70	32	
7							
8				S9	70	23	
9	90.37						
10		**SILT TILL**, grey, trace fine sand, dense, moist		S10	80	43	
11							
12		-becoming very dense at 12.2 m depth		S11	80	54	
13							
14							
15		-becoming grey and dense with some very moist to wet layering at 15.2 m depth		S12	80	30	
16							
17							
18		-becoming compact at 18.3 m depth		S13	80	17	
19							
20							
21							
	77.68	-becoming dense at 21.3 m depth		S14	80	36	
22		**End of Borehole at 21.79 m depth**					

SHEAR STRENGTH
✚ S Field Vane Test (#=Sensitivity) ▲ Penetrometer ■ Torvane
100 200 kPa
Atterberg Limits and Moisture
W_P W W_L
● SPT N Value × Dynamic Cone
10 20 30 40

NOTES

1) Borehole interpretation requires assistance by exp before use by others. Borehole Logs must be read in conjunction with exp Report KCH00212307-GE. For definition of terms used on logs, see sheets prior to logs.

2) Borehole open to 15.5 m depth upon completion; groundwater measured at 15.2 m depth upon completion of drilling.

3) Ground surface elevation surveyed by AGM Surveying and Engineering.

SAMPLE LEGEND
☒ AS Auger Sample ▨ SS Split Spoon ■ ST Shelby Tube
▥ Rock Core (eg. BQ, NQ, etc.) ▩ VN Vane Sample

OTHER TESTS
G Specific Gravity — C Consolidation
H Hydrometer — CD Consolidated Drained Triaxial
S Sieve Analysis — CU Consolidated Undrained Triaxial
γ Unit Weight — UU Unconsolidated Undrained Triaxial
P Field Permeability — UC Unconfined Compression
K Lab Permeability — DS Direct Shear

WATER LEVELS
▽ Apparent ▼ Measured ▲ Artesian (see Notes)

Appendix B

Slope Rating Chart

Slope Stability Rating Chart

Geotechnical Principles for Stable Slopes
Ontario Ministry of Natural Resources

Site Location: 60 Hog Back Close	**Project No.: KCH00212307-GE**
Town/City: Delaware, Ontario	**Inspection Date: May 9, 2013**
Inspected by: CS	**Weather: Sunny**

	Rating Value	Slope Rating
Slope Inclination		
degrees or less (3H:1V or flatter)	0	
to 28 degrees (2H:1V to 3H:1V)	6	
degrees or more (steeper than 2H:1V)	16	**16**
Soil Stratigraphy		
shale / limestone	0	
sand, gravel	6	**6**
till	9	
clay, silt	12	
fill	18	
leda clay	24	
Seepage from Slope Face		
none, or near bottom only	0	**0**
near mid-slope only	6	
near crest only, or from several levels	12	
Slope Height		
2 m or less	0	
2.1 to 5 m	2	
5.1 to 10 m	4	
more than 10 m	8	**8**
Vegetation Cover on Slope Face		
well vegetated: heavy shrubs or forested with mature trees	0	**0**
light vegetation: grass, weeds, occasional trees, shrubs	4	
no vegetation: bare	8	
Table Land Drainage		
table land flat, no apparent drainage over slope	0	**0**
minor drainage over slope, no active erosion	2	
drainage over slope, active erosion, gullies	4	
Proximity of Watercourse to Slope Toe		
15 m or more from slope toe	0	**0**
Less than 15 m from slope toe	6	
Previous Landslide Activity		
No	0	**0**
Yes	6	
Slope Instability Rating		**30**

Low Potential	< 24	Site Inspection only, confirmation, report letter
Slight Potential	25-35	Site Inspection and surveying, preliminary study, detailed report
Moderate Potential	> 35	BH Investigation, piezometers, lab tests, surveying, detailed report

Notes:
Is there is a water body (stream, creek, river, pond, bay, lake) at the toe of slope?
If YES - the potential for toe erosion and undercutting should be evaluated in detail.

Karen Winfield - RE: 60 Hog Back Close, Municipality of Middlesex Centre (Delaware)

From: Karen Winfield <WinfieldK@thamesriver.on.ca>
To: Jason Dieleman <[redacted]
Date: 08/08/2013 12:01 PM
Subject: RE: 60 Hog Back Close, Municipality of Middlesex Centre (Delaware)
Attachments: TEXT.htm; IMAGE.JPG; IMAGE.jpeg

Hi Jason,

A *Conservation Authorities Act* - Section 28 permit would be required from the Conservation Authority prior to any development (house, septic, driveway, sheds, etc.) occurring on the property. Our permit is required prior to the Municipality issuing a building permit. The permit fee will be $750.00 (No HST) and we will require submission of a favourable Geotechnical (Slope Assessment) Report, an Environmental Impact Study (EIS) and site plans/surveys/design drawings (prepared by a qualified professional) that indicate all development will be outside the erosion hazard and will conform to mitigation measures and recommendations outlined in the Geotechnical Assessment.

Thank-you,

Karen Winfield
Land Use Regulations Officer
1424 Clarke Road London, Ontario, N5V 5B9
519.451.2800 Ext. 237 | Fax: 519.451.1188
winfieldk@thamesriver.on.ca

UPPER THAMES RIVER
CONSERVATION AUTHORITY

>>> "Jason Dieleman" <[redacted]> 8/8/2013 11:53 AM >>>

Hi Karen, I received some information from Kelly and I thought I should follow up with you. As far as UTRCA is concerned how much involvement would you have in the building of a house on that lot? Would you be signing off on the location, design etc and would you also be signing off on the septic system and is there costs involved if so? If you could let me know it would be greatly appreciated.

Thanks

From: Karen Winfield [WinfieldK@thamesriver.on.ca]
Sent: March-04-13 11:09 AM

To: [redacted]
Subject: 60 Hog Back Close, Municipality of Middlesex Centre (Delaware)

Hi Jason,

Please see attached UTRCA comments and Regulation Limit mapping regarding the property located at 60 Hog Back Close, Municipality of Middlesex Centre (Delaware).

Thank-you,

Karen Winfield
Land Use Regulations Officer
1424 Clarke Road London, Ontario, N5V 5B9
519.451.2800 Ext. 237 | Fax: 519.451.1188
winfieldk@thamesriver.on.ca

UPPER THAMES RIVER
CONSERVATION AUTHORITY

Attachment #11

Karen Winfield - Re: Hog Back

From: Karen Winfield <WinfieldK@thamesriver.on.ca>
To: Jason Dieleman <[redacted]>
Date: 16/08/2013 10:51 AM
Subject: Re: Hog Back
Attachments: TEXT.htm; IMAGE.JPG

Hi Jason,

Sorry, but nothing can occur beyond the 100 year erosion hazard line.

Karen Winfield
Land Use Regulations Officer
1424 Clarke Road London, Ontario, N5V 5B9
519.451.2800 Ext. 237 | Fax: 519.451.1188
winfieldk@thamesriver.on.ca

UPPER THAMES RIVER
CONSERVATION AUTHORITY

>>> "Jason Dieleman" <[redacted]> 8/13/2013 12:47 PM >>>
Afternoon Karen, I was working on a preliminary drawing for a building envelop and I was wondering if a flag stone patio or stamped concrete patio could encroach past the 100 year slope hazard line as it will not be attached to the house and would not go past the tree drip line nor will it have any footings? There currently is flag stone / pea stone already existing there but before I put forward a drawing I want to be accurate with my drawing. Let me know.

Thanks

Jason Dieleman
[redacted]

Attachment #12a

BOS Engineering & Environmental Services Inc.
46 Donnybrook Road London ON N5X 3C8 Ph: (519) 850-9987 Fax: (519)663-8057 e-mail: a.bos@sympatico.ca

August 26, 2013

Mr. Jason Dieleman
[redacted]

Dear Sir, **RE: Residential Wastewater Treatment System Assessment – 60 Hog Back Close (Delaware) Middlesex Centre**

We have reviewed the data provided as undertaken by exp consultants. We have also reviewed an air photo of the property and have attended the site with a contracted backhoe service to dig and sample/test the upper soils in which the future septic system will be based. We also surveyed spot elevations of the upper table land from the road curb to the approximate top of slope, since significant grade changes on this lot will impact the required setbacks from the lot lines and the stable slope allowance.

Please find attached a site sketch that documents all of the data that we have reviewed and collected overlain on a sketch prepared by exp consultants that identifies the slope setback.

Based on your previous correspondence, your goal is to build a 4-bedroom home with living area of approximately 2000 ft^2 (186 m^2) and 3 bathrooms with living area over the garage.

The soil test pit was dug in the area of the proposed sewage system at the front of the home. This allows the bed to use some of the front yard area that is already required for the municipal setback from the road. The soil was classified as “Poorly Graded SAND” with an estimated percolation time of 5 to 8 min/cm.

Also on the drawing are some tables that outline the proposed home characteristics and assumptions used for sizing the sewage system. We have selected a filter bed sewage system design, which has the smallest footprint of any conventional sewage system. We have also defined an upper limit for the sewage load of 3000 L/day, since the bed size calculation changes drastically above this value and would then require a much larger footprint than indicated for the sewage system.

We have derived that a rectangular building envelope is possible with dimensions of 22.3m by 14.9m. Although the available footprint is 332 m^2 in size, the maximum living

area within the home (excluding basement and garage) cannot exceed 300m^2 unless the number of bedrooms is decreased from 4. Note that the living area in the sewage system calculations must also include the living area of the finished or unfinished living space over the garage. We understand that you are planning at least a partial second floor. Hence the actual house footprint may not extend to the limits of the defined envelope. Four washrooms are possible as the fixture units are not the governing factor in the sewage load assumptions.

The Conservation Authority does not allow significant grade alterations along the erosion hazard line. Hence, if you plan to build adjacent this limit, the current grades must be retained and these grades would be approximately 70cm lower than those proposed at the front of the home. We propose the grade at the front of the home to be raised to achieve a 2% slope to the road. You are advised to direct roof water toward the street rather than over the slope. You may also need to indicate erosion and sediment control measures on your final development plan.

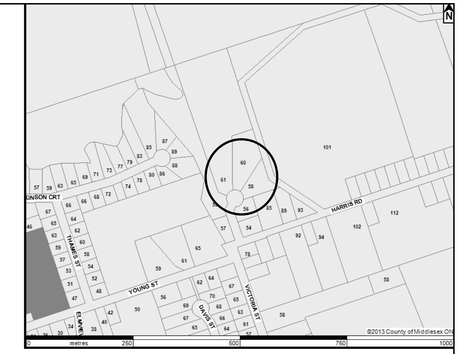
I trust this answers your questions in considering the purchase of this lot for your new home and enclose your account for services, as per our correspondence. Please feel free to contact me if further assistance is required.

Sincerely,
BOS Engineering & Environmental Services Inc.

Art W. Bos P. Eng.
Encls/

Attachment #12b

N



SOIL TEST PIT INFORMATION
(BOS Engineering Inc. - TEST PITS AUG, 2013)

TEST PIT	DEPTH (cm)	SOIL TYPE
TP 3	0 - 28	TOPSOIL & SILT
Elev: 99.94	28 - 71	SILT
	71 - 152	SAND (sample)

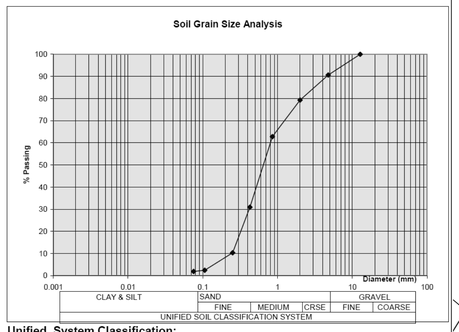
WATER TABLE NOT ENCOUNTERED.

BOS Engineering Environmental Services

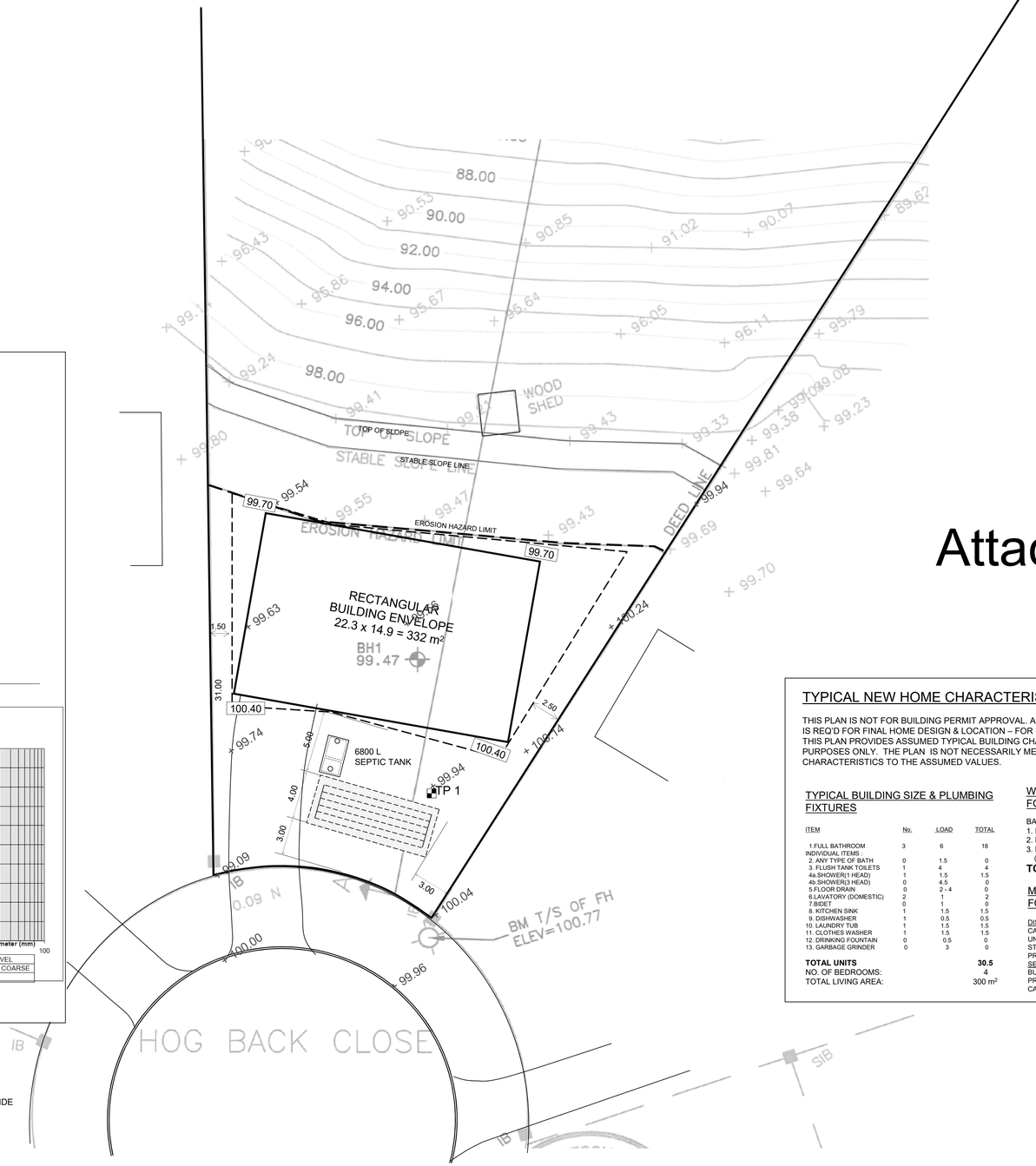
Project :	Native	*Client :*	Jason Dieleman
Test Pit :	TP1	*RE:*	Hog Back Close
Depth :	61 to 155 cm	*Proj. No .*	1308-06
Dry Mass:	304.1 g	*Date:*	Aug 19/13

CHART DATA

Seive No.	Mass	Cum. Mass	Diam. (d)	% Passing
	0.0	0	12.7	100
4	28.6	28.6	4.75	91
10	34.4	63	2	79
20	50.3	113.3	0.85	63
40	96.9	210.2	0.425	31
60	62.6	272.8	0.25	10
140	24.0	296.8	0.106	2
200	1.5	298.3	0.075	2



Unified System Classification:
"SP" Poorly Graded Medium Sand (2% Fines)
Est. Percolation Time: T= 5 to 8 min/cm



ZONING (CR1)
INTERIOR SIDEYARD SETBACK = 1.5m ON ONE SIDE & 2.5m ON THE OTHER SIDE
MIN.FRONT YARD SETBACK = 8.0m
MAX. HEIGHT = 12.0m
MAX. LOT COVERAGE (MAIN BUILDING) = 35%

STANDARD DRAWING SYMBOLS

CB1	= STANDARD CATCHBASIN
99.80	= EXISTING ELEVATION (m.)
99.80	= PROPOSED ELEVATION (m)
	= EXISTING PROPERTY BOUNDARY
	= PROPOSED SEPTIC SYSTEM SAND BASE
C	= CORRUGATED STEEL PIPE
F.H.	= FIRE HYDRANT
	= WATER VALVE
MH	= MANHOLE/CATCHBASIN MANHOLE
	= WATER MAIN OR SERVICE
	= DRAINAGE DIRECTION OR SWALE
TP 1	= TEST PIT LOCATION
	= TREES/SHRUBS (APPROXIMATE)
	= EXISTING CONTOUR 0.50m INTERVAL)
HP	= UTILITY POLE
	= FENCE
	= SWALE

TYPICAL NEW HOME CHARACTERISTICS & RELATED WASTEWATER TREATMENT SYSTEM DESIGN

THIS PLAN IS NOT FOR BUILDING PERMIT APPROVAL. A SPECIFIC LOT SITE/WASTE/GRADING PLAN IS REQ'D FOR FINAL HOME DESIGN & LOCATION – FOR BUILDING PERMIT APPROVAL.
THIS PLAN PROVIDES ASSUMED TYPICAL BUILDING CHARACTERISTICS AND IS PROVIDED FOR PLANNING PURPOSES ONLY. THE PLAN IS NOT NECESSARILY MEANT TO LIMIT THE PROPOSED BUILDING SIZE OR CHARACTERISTICS TO THE ASSUMED VALUES.

TYPICAL BUILDING SIZE & PLUMBING FIXTURES

ITEM	No.	LOAD	TOTAL
1.FULL BATHROOM	3	6	18
INDIVIDUAL ITEMS :			
2. ANY TYPE OF BATH	0	1.5	0
3. FLUSH TANK TOILETS	1	4	4
4a.SHOWER(1 HEAD)	1	1.5	1.5
4b.SHOWER(3 HEAD)	0	4.5	0
5.FLOOR DRAIN	0	2 - 4	0
6.LAVATORY (DOMESTIC)	2	1	2
7.BIDET	0	1	0
8. KITCHEN SINK	1	1.5	1.5
9. DISHWASHER	1	0.5	0.5
10. LAUNDRY TUB	1	1.5	1.5
11. CLOTHES WASHER	1	1.5	1.5
12. DRINKING FOUNTAIN	0	0.5	0
13. GARBAGE GRINDER	0	3	0
TOTAL UNITS			**30.5**
NO. OF BEDROOMS:			4
TOTAL LIVING AREA:			300 m²

WASTE SYSTEM - DESIGN CAPACITY FOR THE ABOVE BUILDING CHARACTERISTICS

BASE LOAD (4 BEDROOM):	2000
1. F. U. OPTION (31 - 20) X 50 :	550
2. L. A. OPTION (300-200)/10 X 100:	1000
3. L.A. ADDED (300 - 400)/10 X 75: (TO BE ROUNDED UP)	0

TOTAL SEWAGE LOAD = 3000 L/DAY

MINIMUM WASTE SYSTEM SETBACKS (m.) FOR SPECIFIED SEWAGE SYSTEMS

DISTRIBUTION SYSTEM	
CASED WELL OR WATERCOURSE	15
UNCASED WELL	30
STRUCTURES	5
PROPERTY LINE	3
SEPTIC TANKS	
BUILDING	1.5
PROPERTY LINE	3
CASED/UNCASED WELL	15

FILTER BED DESIGN CALCULATIONS AND DIMENSIONS:

1. DESIGN LOAD = 3000 L/DAY (SEE BELOW)
2. MIN. CONTACT AREA: 3000 X 8/850 = 28.2 m²
3. MIN. FILTER AREA: 3000/75L/m²/DAY = 40.0 m²
4. THEREFORE USE 1 FILTER BED: 4.00 X 10.00 , (40.0 m²)
5. DISTRIBUTION PIPES EACH BED: 6 RUNS X 9.00 m. LONG @ 0.60 m. SPACING, (KEEPING ALL PIPES 50cm FROM EDGES OF FILTER)
7. TANK: MIN. CAPACITY = 6000 L THEREFORE USE STANDARD 6800 L CONCRETE (2-COMPARTMENT)TANK FITTED WITH POLYLOK PL-122 EFFL. FILTER (OR EQUIV.) RISERS TO GRADE

NOTE:
1. WATER SERVICE & OTHER SERVICES ARE TO BE JOGGED AROUND THE SEPTIC SYSTEM AREA.
2. SEWAGE DESIGN LOAD FROM THE PROPOSED HOME IS NOT TO EXCEED 3000 L/DAY

AS CONSTRUCTED NOTES	AS CONSTRUCTED SERVICES	COMPLETION		No.	REVISIONS	DATE	BY
				0	SKETCH FOR PLANNING ONLY	26-Aug-13	AWB

BOS Engineering & Environmental Services Inc.
46 Donnybrook Rd. London Ontario N5X 3C8 Phone : 519 850-9987 Fax : (519) 663-8057

ENGINEER'S STAMP
PROFESSIONAL ENGINEER PROVINCE OF ONTARIO 26-Aug-13 BOS

CORPORATION OF THE
MUNICIPALITY OF
MIDDLESEX CENTRE
COUNTY OF MIDDLESEX
ONTARIO, CANADA

PLAN VIEW SCALE ONLY
SCALE – 1 : 200
2 0 4

CLIENT: JASON DIELEMAN (519) 685-2224 / (519) 494-2209

WASTEWATER TREATMENT SYSTEM – PRELIMINARY PLANNING – 60 HOG BACK CLOSE

PROJECT No. 1308-06
SHEET No. 1
PLAN FILE No.

Attachment #13

Karen Winfield - RE: Hog Back

From: Karen Winfield <WinfieldK@thamesriver.on.ca>
To: Jason Dieleman [redacted]>
Date: 09/09/2013 2:06 PM
Subject: RE: Hog Back
CC: Arnie Marsman <marsmana@middlesexcentre.on.ca>
Attachments: TEXT.htm; IMAGE.JPG; IMAGE.jpeg

Hi Jason,

As per our phone conversation, the UTRCA has reviewed the geotech report and the submitted drawings. It does appear the UTRCA would be comfortable approving a house and septic in this footprint. Building in this location will require a permit from the Conservation Authority and the future house drawings would need to conform to the recommendations and mitigation measures outlined in the Slope Stability Assessment and Environmental Impact Study.

If/when you purchase the property, call me and I will work you through the permit process. As the geotech and EIS are the property of the current owners.... make sure you negotiate rights to these documents as part of the purchase agreement.

Thank-you,

Karen Winfield
Land Use Regulations Officer
1424 Clarke Road London, Ontario, N5V 5B9
519.451.2800 Ext. 237 | Fax: 519.451.1188
winfieldk@thamesriver.on.ca

UPPER THAMES RIVER
CONSERVATION AUTHORITY

>>> "Jason Dieleman" <[redacted] 8/27/2013 12:24 PM >>>
Thanks Karen, please see attached preliminary drawings for review. I am not looking for full approval only a "verbal approval" that you do not see any other issues at this time and we would be able to build a house in the proposed building envelop base on the provided drawing. If so I will be proceeding with an offer to the owner.

Let me know.

Thanks

From: Karen Winfield [WinfieldK@thamesriver.on.ca]
Sent: August-16-13 10:51 AM

To: Jason Dieleman
Subject: Re: Hog Back

Hi Jason,

Sorry, but nothing can occur beyond the 100 year erosion hazard line.

Karen Winfield
Land Use Regulations Officer
1424 Clarke Road London, Ontario, N5V 5B9
519.451.2800 Ext. 237 | Fax: 519.451.1188
winfieldk@thamesriver.on.ca

UPPER THAMES RIVER
CONSERVATION AUTHORITY

>>> "Jason Dieleman" [redacted] 8/13/2013 12:47 PM >>>
Afternoon Karen, I was working on a preliminary drawing for a building envelop and I was wondering if a flag stone patio or stamped concrete patio could encroach past the 100 year slope hazard line as it will not be attached to the house and would not go past the tree drip line nor will it have any footings? There currently is flag stone / pea stone already existing there but before I put forward a drawing I want to be accurate with my drawing. Let me know.

Thanks

Jason Dieleman
[redacted]

N

Attachment #14a

Legend

- Erosion Hazard Limit
- Creek
- Top of Slope
- Bottom of Slope
- Topographic Contour (major)
- Topographic Contour (minor)
- Site Boundary

0 5 10 20 30 40 50 m

(approx.)

exp Services Inc.
80 BANCROFT STREET
HAMILTON, ONTARIO
L8E 2W5
T 0(905) 57304000
F 0(905) 5730 9693

PROJECT TITLE:

ENVIRONMENTAL IMPACT STUDY
60 HOG BACK CLOSE,
DELAWARE ONTARIO

DRAWING TITLE:

SITE LOCATION
&
EROSION HAZARD LIMITS

PROJECT No.: KCH000212307GE	DWN: JF
SCALE: AS NOTED	CHKD: DF
DATE: JULY 2013	FIG. No.: 1

0 5 10 20 30 40 50 Meters

(approx.)

N

Attachment #14b

Legend

- Site Boundary
- Parcels
- Erosion Hazard Limit
- Creek

ELC Classifications

Deciduous Plantation	CUP1
Dry*Fresh Deciduous Forest Ecosite	FOD4
Fresh*Moist Lowland Deciduous Forest	FOD7
Deciduous Swamp	SWD

exp Services Inc.
80 BANCROFT STREET
HAMILTON, ONTARIO
L8E 2W5
T * (905) 573*4000
F * (905) 573*9693

PROJECT TITLE:

ENVIRONMENTAL IMPACT STUDY
60 HOG BACK CLOSE,
DELAWARE ONTARIO

DRAWING TITLE:

ECOLOGICAL LAND
CLASSIFICATION (ELC) MAP

PROJECT No.: KCH*00212307*GE	DWN: JF
SCALE: AS NOTED	CHKD: DF
DATE: JULY 2013	FIG. No.: 2

N

Legend

- Cultural Plantation Dripline
- Woodland Dripline
- Site Boundary
- Erosion Hazard Limit
- Major Topography
- Minor Topography
- Creek
- Parcels
- Top of Slope
- Toe Erosion Allowance

Attachment #14c

0 5 10 20 30 40 50 Meters

(approx.)

exp Services Inc.
80 BANCROFT STREET
HAMILTON, ONTARIO
L8E 2W5
T 1(905) 57314000
F 1(905) 57319693

PROJECT TITLE:

ENVIRONMENTAL IMPACT STUDY
60 HOG BACK CLOSE,
DELAWARE ONTARIO

DRAWING TITLE:

SIGNIFICANT WOODLAND
&
CULTURAL PLANTATION DRIPLINE

PROJECT No.: KCH1002123071GE	DWN: JF
SCALE: AS NOTED	CHKD: DF
DATE: JULY 2013	FIG. No.: 3

DOCUMENT # 105949 DEC 2 0 2013

Attachment #15

December 10, 2013

Karen Winfield
Land Use Regulations Officer
Upper Thames River Conservation Authority
1424 Clark Road
London, Ontario
N5V 5B9

Dear Ms. Winfield:

RE: Submission of the revised Environmental Impact Study 60 Hog Back Close, Delaware, ON N0L 1E0 to UTRCA

Thank you for the follow up response this past week that the revised Environmental Impact Study (EIS) for 60 Hog Back Close, Delaware, ON N0L 1E0 was identified by the Ecologist there as complete and satisfactory.

At this time, we at **exp Services Inc.** (**exp**) are providing one (1) paper copy of the EIS, as requested.

Sincerely,

exp Services Inc.

Dean G. Fitzgerald, M.Sc., Ph.D.
Team Leader, Ecological Services

1595 Clark Boulevard, Brampton, ON L6T 4V1, Canada
T: 1.905.793.9800 www.exp.com

Carla and Bob Kelly

58 and 60 Hog Back Close
Delaware, ON

Environmental Impact Study
60 Hog Back Close
Delaware, ON N0L 1E0

Project Number:
KCH-00212307-GE

Prepared By:

exp Services Inc.
1595 Clark Boulevard
Brampton, Ontario
L6T 4V1

Date Submitted:
November, 2013

Legal Notification

This report was prepared by **exp** Services Inc. for **Carla and Bob Kelly, owners of 58 and 60 Hog Back Close, Delaware.**

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties unless a reliance letter has been addressed to, or otherwise provides reliance to, such third party. **Exp** Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

Executive Summary

Ms Carla Kelly retained **exp** Services Inc. (**exp**) to conduct an Environmental Impact Study (EIS) to assess the possibility of development on a vacant lot at 60 Hog Back Close in the Municipality of Middlesex Centre (Delaware, Ontario), (hereinafter referred to as the 'Site'). The intent of the EIS is to document the natural heritage features of the Site and the relationship of these features with adjacent lands. This documentation will allow for the identification of land that is available for future development compared with other land that may be unavailable for future development, due to existing natural heritage features. Such future development may involve lots 58 and 60 on Hog Back Close and thereby requires consideration of both lots. The approach used for this EIS follows guidance provided by Upper Thames River Conservation Authority (UTRCA). Specifically, UTRCA stated that two main studies were to be required for lots 58 and 60, to assess natural heritage and geotechnical features. Hence, this EIS uses the recently completed geotechnical study to resolve the land available for future development.

The UTRCA identified this approach for both lots 58 and 60, as they are entirely regulated due to the close proximity to erosion hazard lands and a wetland associated with the Dingman Creek Corridor. It was stated by UTRCA that any development within regulated areas requires written approval from the UTRCA prior to undertaking any activities. Due to these policies, additional information provided by UTRCA stated that no future development is permitted within six (6) metres from the 100-year erosion hazard. Therefore, in order to obtain written approval for any future development involving lots 58 and 60, the UTRCA requested the integration of geotechnical (slope stability) assessment and an EIS to determine if the six (6) metre setback from the 100-year erosion hazard will allow for delineation of developable envelope present.

For lots 58 and 60, the UTRCA identified the presence of significant woodlands adjacent to these lands. It is noteworthy that UTRCA policy does not permit development within significant woodlands, and typically instills a 50 metre buffer, unless an EIS is prepared. A wetland was also documented by the UTRCA in proximity to lots 58 and 60. Hence, any future development must conform to required buffer requirements listed by the UTRCA, and preparation of an EIS.

This EIS identifies the key environmental and physical features of the Site, documents these features, and proposes methods to reduce possible negative effect(s) of the future development plans. The identification of a mitigation strategy for the Site will be based on best management practices (BMPs) that are known to reduce the effect(s) from the expected disturbance. The following activities were completed to assess the Site:

- Review of Site maps, aerial photos, and background information;
- Review of the Natural Heritage Information Centre (NHIC) Biodiversity Explorer;
- Review of the Middlesex Natural Heritage Study (2006);
- Review of the Ontario Breeding Bird Atlas (OBBA) & Significant Wildlife Habitat Ecoregion Criterion Schedule;
- Review of Ontario legislation regarding natural heritage features, such as the Ontario Planning Act, Ontario Endangered Species Act, Conservation Authorities Act and Environmental Protection Act;
- Completed Site investigations to document the physical and natural heritage features including topography, vegetation communities, amphibians, breeding birds, and incidental wildlife; and,

- Generated an EIS report outlining existing natural heritage features, anticipated adverse impacts to these features, and identified Best Management Practices (BMPs) and mitigation measures to minimize impacts of the proposed project.

For this study, we completed multiple Site visits between May and July, 2013. These visits used information provided from the UTRCA and other sources, and allowed for an ecological inventory of the Site. This inventory included physical and natural heritage features. These visits confirmed the existence of distinct built features on tablelands near the adjacent road, Hog Back Close. Also, the Site includes, at a distance from the road, relatively undisturbed natural heritage features including woodlands, slope, valley and ravine, and tributary of Dingman Creek.

Ecological communities found on-Site include those that are cultural (i.e. formed by anthropogenic disturbance), and natural areas represented by forest and swamp. Limited signs of disturbance in the form of recreational use, or recent forestry were evident on-Site in the woodlands etc. It was also identified that the historical land use of area, pre-residential development, was agriculture pasture for livestock or horses.

Key findings from these Site investigations revealed that it is located in ecoregion 7E. Field visits revealed no evidence for rare, threatened, endangered species or species of special concern in the tableland areas. The plant community present on-Site has been influenced by past residential land development. Features such as gardens, planted trees, and manicured lawn do not represent a natural extension of the adjacent woodland due to the absence or very low density of wildlife and evidence of high density of non-native plants on the tablelands compared with low density of non-native plants in the woodlands and valley. The various surveys only identified breeding birds, vegetation, and wildlife that are typical of disturbed habitats. Also, there are no areas of natural or scientific concern located on-Site.

This information allowed for the identification of recommendations for future land development, based on available information. The integration of this information identified that future development must be excluded from the woodlands and use the tablelands only. Further, Any future development will require a minimum setback from the 100-year erosion hazard line, as reported in a separate technical report. This requirement for a minimum setback from the erosion hazard line is also expected to protect the existing woodlands. Future construction on tablelands should occur on-Site after July 1, to allow any migratory birds that may use the habitats of the gardens etc. to complete breeding in that calendar year. The use of appropriate sediment and erosion control measures along with other appropriate BMPs is required to provide protection to adjacent woodlands and other natural heritage features.

Overall, it is **exp's** opinion that if the recommendations identified in this EIS are followed, the possible effects of future development on the tablelands will be limited to the existing residential area. This residential area is dominated by manicured lawn, flower beds, and greenhouse origin native and non-native trees. If the future development limitation focuses on the tablelands with setback from the erosion hazard line, the adjacent woodlands, valley ravines, and tributary of Dingman Creek can be expected to be excluded from any future disturbance(s). Thus, this information on the Site and recommended environmental management actions are expected to reduce or eliminate the potential impacts from the proposed development on the tablelands of the Site, and thereby result in greater protection of the adjacent natural heritage features.

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Report distributed to:

Karen Winfield, Land Use Regulations Officer
Upper Thames River Conservation Authority
1424 Clark Road
London, Ontario
N5V 5B9

1 – Introduction and Background

1 Introduction and Background

Carla and Bob Kelly retained **exp** Services Inc. (**exp**) to conduct an Environmental Impact Study (EIS) to assess the possibility of development on a vacant lot at 60 Hog Back Close in the Municipality of Middlesex Centre (Delaware, Ontario). It should be noted the Kelly's own 60 Hog Back Close and reside at Lot 58, directly to the east of Lot 60. Thus, the lots at 58 and 60 Hog Back Close represent the focus of this study (hereinafter, referred to as the Site). The intent of the EIS is to gain approval by the Upper Thames River Conservation Authority (UTRCA) to allow the development of a house on the vacant table lands of Lot 60.

The UTRCA stated in a letter (included as **Appendix A**) that future land development was restricted for Lot 58, despite the presence of existing residential lands to the east and west that are 20+ years old. The UTRCA stated the Site requires detailed studies to define the land that may be available for future development. The boundaries of land availability are defined by the requirement for a minimum 6 m setback from the stable slope (i.e., 100 year erosion hazard line), and also any setback from the existing significant natural heritage features. The required analysis of the slope and erosion hazards was recently completed by Staff from the London **exp** office. This EIS integrates the findings from the analysis of slope and erosion hazards.

This EIS identifies the key environmental and physical features of the Site using varied field and literature studies, provides an interpretation of these features, and then proposes methods to reduce possible negative effect(s) from future development. The identification of a mitigation strategy for future development at the Site includes best management practices (BMPs), to enhance environmental management. It is important to note that plans for future developments do not exist. Hence, the mitigation strategy and BMPs identified in this EIS represent preliminary recommendations. Any future development plans require approval from UTRCA.

1.1 Legislative Framework

This EIS is framed under the requirements set out by the UTRCA in accordance with Ontario Regulation 157/06 (i.e., Upper Thames River Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses) made under the *Conservation Authorities Act*. These regulations identify that both Lot 58 and 60 are regulated due to the presence of erosion hazard lands associated with the Dingman Creek Corridor. Hence, any future development within regulated areas required written approval from the UTRCA prior to undertaking any activities. As noted, these regulations require no development within six (6) metres from the 100-year erosion hazard. Therefore, in order to obtain written approval, the UTRCA requested a geotechnical (slope stability) assessment and an EIS to define the land available for future development.

In addition to regulated areas, the UTRCA identifies significant woodlands in accordance with the Middlesex Natural Heritage Study completed in 2006 exist in close proximity to the Site. The UTRCA policy does not permit development within significant woodlands, and typically instills a 50 metre buffer, unless an EIS is prepared that justifies a smaller buffer.

This EIS is also governed by the Ontario *Endangered Species Act* (ESA), the *Environmental Protection Act* (EPA), and the Ontario *Planning Act* as explained in the Provincial Policy Statement (PPS) (MMAH, 2005). It is understood that if species that are identified as threatened (THR) or endangered (END) under the Species at Risk in Ontario (SARO) list are found on-Site, then both species and their respective habitats will be protected under the ESA. If a species identified as special concern (SC) is found on-Site, the Ontario Ministry of Natural Resources (OMNR) Alymer District Office should be contact prior to project initiation in order to identify BMPs to protect both species and their habitats.

Under the PPS, a number of other natural features are also identified including significant wetlands, significant woodlands, significant valleylands, significant wildlife habitat, significant areas of natural and scientific interest (ANSI), and fish habitat. Proposed development and/or site alteration activities in or adjacent to these natural features require an EIS.

1.2 Scope of Work

The following scope of work was undertaken as a part of this EIS:

- Review of existing OMNR, Natural Heritage Information Centre (NHIC); OBBA, Middlesex County Official Plan to identify Species-at-Risk (SAR) and other significant natural heritage features that are known to occur in proximity to the Site;
- Review of the Middlesex Official Plan (M-OP, 2006)
- Review of the Middlesex Natural Heritage Study (MNHS, 2006);
- Consultation with UTRCA and OMNR regarding EIS requirements, in addition to SAR, natural heritage features and regulatory limits in the study area;
- Site visits over several seasons (from spring to early summer) to inventory and assess ecological and physical features including:
    - Botanical inventory, and Ecological Land Classification (ELC) of vegetation communities;
    - Two (2) bird and nest surveys according to the Ontario Breeding Bird Atlas (OBBA) protocol;
    - Two (2) amphibian calling surveys according to UTRCA guidance and the Marsh Monitoring Program (MMP) protocol; and,
    - Incidental observations of other wildlife, such as reptiles and mammals.
- Preparation of a report that will include all aspects of the EIS with the following components:
    - Comment on existing residence in relation to nearby environmental features;
    - Description of any consultation that was undertaken, and the results;
    - Documentation of existing Site conditions based on record review and Site visits;
    - Map outlining key ecological and physical features based on Site inventories;
    - Assessment of the potential effect(s) that a proposed development may have on nearby key ecological and physical features;
    - Provide interpretation of slope stability and erosion hazard analysis, reported by exp (2013);
    - Evaluation of the significance of all predicted negative and positive effects on various ecological and physical features; and
    - Recommendation of BMPs and other impact avoidance or mitigation measures that can be used to prevent or minimize the predicted negative effect(s) of a future development.

This EIS is based on the available data and current Site conditions, and is intended to provide an assessment of the natural heritage features. Then this information is integrated with the geotechnical study (i.e., slope stability and erosion hazards), to define the land available for future development.

2 – Methodology

2 Methodology

The methodology for this EIS was defined in part by information provided by the UTRCA and OMNR, as well as by regulatory requirements contained within legislation and policies such as the *Conservation Authorities Act*, ESA, EPA and the *Planning Act*. This guidance was collectively integrated to define the methods used to complete this EIS. A copy of the letter from UTRCA is included in **Appendix A**.

2.1 Agency Consultations and Scoping Study

The area around the Site was scoped prior to conducting Site visits. This scoping involved the review of existing records for natural features present in the area surrounding the Site. Records that were referenced for information on natural features include:

- M-OP (2006);
- MNHS (2006);
- OMNR-NHIC Biodiversity Explorer;
- Preliminary Screening from OMNR;
- Land Information Ontario (LIO) geospatial data; and,
- Ontario Breeding Bird Atlas (OBBA).

The UTRCA provided a letter regarding the Site on March 4, 2013. This letter included comments that were also used to define the EIS:

1. Lots 58 and 60 are both entirely within the Regulation Limit due to the presence of a steep slope and a wetland associated with the Dingman Creek corridor.
2. Proponents require written approval from the UTRCA before any works are started in accordance with Ontario Regulation 157/06, pursuant to Section 28 (1) of the *Conservation Authority Act.*
3. Requirement for a slope stability study (i.e., 100 year erosion hazard) and an EIS;
4. The woodland feature that covers most of the lot has been identified as significant in the Middlesex Natural Heritage Study (2006) and new development and site alteration is not permitted within 50 m of a significant natural heritage feature(s), unless an EIS has been completed to the satisfaction of the UTRCA.
5. There is a wetland documented on-Site, and UTRCA regulates the wetland and the area of interference around the wetland.
6. The subject property contains areas identified as Highly Vulnerable Aquifers and Significant Groundwater recharge Area by UTRCA.

Initial contact with the UTRCA was made via email on May 27 to seek guidance on EIS requirements and key natural features located at or near the Site. A follow-up call was made to Karen Winfield, UTRCA Land Use Regulations Officer, on May 28. Ms. Winfield informed that she had forwarded our email request to Tracy Annett, Land Use Planner at UTRCA. On May 30, Tara Tchir, Ecologist at UTRCA emailed back requesting dates that associated surveys on Site will be conducted, and that she wanted to see a breeding bird and nest survey as well as a summer plant inventory. Staff from **exp** responded to Ms. Tchir with an email on June 7 stating we conducted an amphibian calling survey on May 22, and had planned a breeding bird and nest survey for May 31. We also explained that future plans would involve conducting a second survey for amphibians in mid-June, a second bird survey between June 21 and June 30 (weather dependent), a summer vegetation survey, and a reconnaissance level survey of the water feature at the bottom of the ravine.

A request for a preliminary screening of SAR in the area in and around the Site was made to OMNR via email on May 27, 2013. A response was received from Amanda McCloskey, District Planner, OMNR Alymer District on June 4, 2013. Ms. McCloskey requested results obtained from the NHIC search conducted for the Site, to generate additional information on natural heritage features. Information was sent to Ms. McCloskey on the same day. A response was received from Ms. McCloskey on June 5, 2013 indicating the information request will be circulated to the appropriate individuals. A preliminary screening of the Site was received from Ms. McCloskey on June 26, 2013. This preliminary screening was used in this EIS.

2.2 Site Visit Methods

2.2.1 Overview

A number of Site visits were completed for this EIS in response to guidance from the UTRCA. These Site visits were conducted over the span of two seasons, from mid-spring to early summer. These surveys included all elements required by UTRCA for this EIS. Photographs from the Site visits are included in **Appendix B**.

It should be noted that the Site includes table land adjacent to Hog Back Close, and the houses and gardens exist on these tablelands. The backyards of these residences end at the top of the slope, and this slope includes a dense forest. Hence, the forest acts as the ecotone to separate the valley from the tableland.

Survey of on-Site ecological, physical and anthropogenic features was completed by starting at the proposed development site on the tablelands, near the existing house at Lot 60. The lands associated with Lots 58 and 60, in proximity to the existing residence, were also walked. This walk allowed for visual inspection of natural heritage features on-Site. When the Site was inspected, the general features were identified, and confirmed the presence of manicured lawns, well-kept flower gardens, an area of gravel with a large-scale chess board with flowers, sidewalks, a garage, and a driveway. These inspections also included the top of slope, where the manicured lawn meets the forest. This ecotone of lawn and forest was well established, and the nature of the vegetation indicated very limited intrusion to the forest from the lawn area during the past. This information from initial inspections was then used to resolve the best strategy to inventory the natural heritage features of the Site. Thus, the future visits to the Site allowed for the inventories to focus on documentation of existing built features such as the house, grass, gardens, along with other natural heritage features, and potential wildlife habitats. This inventory work followed specific standardized protocols for vegetation and wildlife.

2.2.2 Vegetation Community Classification

Vegetation communities were identified and delineated with the use of aerial photographs and during Site visits by applying the *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (ELC) (Lee *et al.*, 1998). This ELC approach identifies the Site as being located in Ecoregion 7E, Lake Ontario-Lake Erie corridor, and Ecodistrict 7E-2. Historical information exists regarding this Ecoregion and Ecodistrict that was used as background for the EIS. During the Site visits, an inventory of dominant plant and tree species was prepared. To complete this preparation and ensure the accuracy of identifications, some voucher specimens were returned to the office for final identification. As well, observations of tree height, species abundance, vegetation cover and community age were also noted during Site visits. This information was collectively used to classify and describe on-Site and nearby vegetation communities. Observations on other existing natural and anthropogenic disturbances were also made.

2.2.3 Wildlife and Wildlife Habitat

2.2.3.1 Birds

Standard surveys were completed in order to identify birds present at the Site. This identification process followed the Ontario Breeding Bird Atlas (OBBA) protocol (2001). Surveys were conducted during the main breeding season for birds in the spring and early summer. For this Site, surveys for breeding birds and nests were conducted on May 31 and July 4, 2013. We should note that the UTRCA recommendation was for the second survey to occur from June 21 to June 23 but the weather was not suitable on these dates. Breeding bird surveys were completed in the early morning hours between 7:00 AM and 9:00 AM. A listening period of five (5) minutes was completed at various point locations across the Site. All observations were recorded. While walking across the Site, observations were also made, to document bird nests or other evidence of reproduction, such as discarded egg shells.

2.2.3.2 Amphibians

Two amphibian calling surveys were completed in order to identify amphibians present at the Site. These surveys followed the Marsh Monitoring Program (MMP) (2008). The MMP requires surveys to occur when air temperatures exceed 10 °C, rain has been observed within the previous 24 hours, and the winds are absent or light. The first survey was completed on May 22, 2013, when night-time air temperature was approximately 22° C, rain had been observed during the previous day, and the winds were essentially absent. A second survey was conducted on June 10, again with temperatures of approximately 17° C, rain had been observed during the previous day and light rain fell during the survey, and winds were light. Hence, the environmental conditions on both dates matched the requirements identified by the MMP.

During the initial Site visit, the amphibian calling survey was conducted on the tablelands at five (5) stations. Specifically, Station 1 was on the manicured lawn adjacent to the road, Station 2 was in the centre of the lawn, and Stations 3-5 were located at equal distances apart, along the top of the slope, at the ecotone of lawn and forest Therefore, stations were located within 500 m of each other for the first survey.

The second survey used the same five stations with a sixth station, next to Dingman Creek.

For the first and second surveys, a minimum of four (4) listening periods were conducted at each of the stations. Each listening period lasted for a period of three (3) minutes. An unlimited distance, 180° arc sampling area was at each point count station. Call levels for each species was categorized under four (4) levels:

- Level 1 – No calls heard, no species seen;
- Level 2 – Frog(s) or toad(s) seen or heard with unknown total numbers;
- Level 3 – Frog(s) or toad(s) can be counted, calls do not overlap;
- Level 4 – Frog(s) or toads can be counted, while others are overlapping; or,
- Level 5 – Full chorus, continuous and overlapping, difficult to identify frogs or toads.

2.2.3.3 Other Wildlife

Incidental observations of other wildlife, such as reptiles and mammals, and their habitats were made and recorded during each Site visit. Presence of fish in the tributary at the bottom of the ravine was surveyed through visual observations from the banks (and dip netting if individuals were observed or if suitable refuge habitat was encountered (e.g. pools) during the Site visits. In addition, UTRCA advised that detailed sample collections were not required for the forest or creek valley, as no future development was forecast for these natural areas.

2.2.4 Species at Risk

Information available for SAR in Ontario was reviewed and used to identify preliminary lists of species that may occur in proximity to the Site. These reviews used different sources, including NHIC, and communications with MNR, as noted. This approach generated a list of possible SAR for the area of the Site regarded as complete. Hence, this information was used as a guide for the surveys at the Site, to ensure any SAR that was possibly observed would be documented. However, MNR guidance did state that since any future development would not extend to the significant forest or valley of Dingman Creek, it was not necessary to complete dedicated surveys for SAR. This is why documentation of incidental sightings of SAR was identified as the approach to use during this EIS.

3 – Existing Site Conditions

3 Existing Site Conditions

Site visits for this EIS were completed between May 22 and July 4, 2013 to compile observations across different seasons, to generate representative summaries of the ecological and physical features. These visits extended from spring to early summer seasons. The extension of Site visits over an extended period of time increases the probability that all resident species will be observed and documented. In addition, knowledge of possible SAR in the area allowed for an awareness of the possible presence of these rare species in the general area.

3.1 Site Description

The Site is located at the north end of the cul-de-sac, Hog Back Close in Delaware, Ontario. Existing conditions on the tablelands at 60 Hog Back Close include a manicured lawn with ornamental plants and shrubs. There are also clusters of large-toothed aspen (*Populus grandidentata*) in the west center of the lawn that were planted by landowner and current resident of 58 Hog Back Close. These trees range in height from approximately 10 to 20 metres, and range in age to a maximum of about 20 years. The property owner stated during a Site visit that the land where the existing residence is located was previously used as a pasture for horses. Then, after they built the residence, they planted the large-toothed aspen to shade a portion of the property. A small wooden shed is located at the edge of the slope and tablelands, along with various other garden structures such as statues and a large-size chess board. The lawn and aspen area also includes chairs and benches surrounded by planted flowers.

To the north and east of the Site, expansive woodlands are evident. These adjacent woodlands were previously designated as significant during 2006 (Middlesex Natural Heritage Study, 2006). The woodlands transcend down a steep slope into a bottomland area. The trees that compose this woodland show large size although many specimens show a coppice growth form, with multiple stems originating from one root mass. The presence of the coppiced growth form indicates the presence of past forestry on the slope. However, the large size of the trees strongly suggests forestry has not been completed in the woodland for at least 50 years or more. Due to the external features of these large trees, such as absence of balding bark, the presence of branches close to the ground indicating little shade from a closed-canopy forest in the past, it is inferred the majority of the trees in this woodland are less than 140 years old. This is the age criterion that is used to designate trees as old growth in Ontario under ELC (Lee *et al.*, 1998) and also matches the general age noted in other literature that represents old growth forest (e.g., Leverett, 1996; Pederson, 2010). Some technical information on the estimation of approximate tree age as presented by Pederson (2010) is included in **Appendix** C.

The tree species that exist within this woodland are typical of the forests found within Ecodistrict 7E-2 (Middlesex Natural Heritage Study, 2006). Inspection of the trees from the top of the slope to the interior of the woodland, perhaps 250+ m from the base of slope, revealed the largest trees were farthest from the slope. In addition, stumps and coppiced trees exist across this entire area. These stumps and coppiced trees confirm the presence of past forestry across the entire woodland area. These trees that exist through the woodland also have other morphological features that indicate they are predominantly in the 50 to 140 year category rather than having a canopy dominated by mature trees that are likely >140 years old. For example, the bark features, the root mass, the branching patterns, and others characteristics suggest an age that is features In addition, there are some small trees that are likely

Within this woodland is a ravine with a small creek, Dingman Creek in the valley, as well as a well developed wetland that is associated with the Dingman Creek corridor. In summary, the residential development on Lots 58 and 60 focuses on the table land that is found between the

top of slope to the roadway. Very limited disturbance has occurred in the forest edge area, and is predominantly evident within the first 10 metres of forest. Otherwise, the forest is undisturbed as it goes down slope to Dingman Creek.

According to the Middlesex County Official Plan, the general land use designation for the Site in Schedule A is: agricultural and residential land use. According to Schedule C, Natural Heritage Features, the Site is located within an aggregate resources area, and is situated in proximity to significant woodlands. In addition, wetlands are associated with the valley area.

3.2 Proposed Development

As noted, the owners of 60 Hog Back Close reside at Lot 58, the lot to the east of Lot 60. The owner wishes to sell the two (2) lots separately and an approved EIS by the UTRCA would allow the purchaser of Lot 60 to develop a structure on the existing table land. At this time, no Development Plan has been identified, as the two parcels are still for sale. Any proposed development plan would be restricted to the designated development parcel as dictated by UTRCA, and restrictions based on slope stability assessment and the ecological constraints stated within the EIS. A plan with Site boundaries is presented in **Figure 1**.

3.3 Slope Stability Study, 2013

As noted, the UTRCA requested the completion of a Slope Stability Study for the Site. This Study was completed during June, 2013 (**exp**, 2013) and used methods identified by OMNR, titled: "Technical Guide for Assessing the Erosion Hazard Limit for River and Stream Systems". Such assessments evaluate slope stability through consideration of surficial seepage of groundwater, presence of soil failures and cracks, allowance for future erosion of the base of the slope, and areas to allow for future access to the site, presumably a road. The report by **exp** (2013) identified that the slope shows a ratio of 1.8 Horizontal:1 Vertical. At the base of the slope, a tributary of Dingman Creek is evident, and it includes a small channel that is very shallow and well defined in nature. Due to the size and shape of the channel and observed flow rates, an allowance of 4 m is considered appropriate at the base of the slope for this tributary. Soils found on the slope exhibited typical patterns of minor erosion, likely attributable to annual freeze-thaw cycles. However, the presence of extensive vegetation on the entire slope and absence of any sources of water, such as drainage pipes from historical agricultural use in the area, indicated the future risk of serious soil erosion on this slope was low.

This study revealed the native soils of the slope were predominantly organic loam and sand underlain by dense silt glacial till. The soil components were assessed for future erosion and/or slumping, using computer models. These observations and interpretations resulted in the determination: "Since the subsurface conditions within the study area are generally considered to be geologically stable, we recommend that at a minimum, a planning setback of 6 m be applied to existing slopes." Hence, **exp** (2013) recommended that any future development be set back a minimum of 6 m from the top of slope. This recommendation matches the minimum setback required in Ontario's PPS and minimum requirement from UTRCA. The setback identified by **exp** (2013) is presented in **Figure 1**.

3.4 Site Visit Timing and Conditions

Site visits were completed between May 22 and July 4, 2013. These different dates were selected to match the survey requirements for plants and wildlife that may be present on or near the Site, and the design of follow up ecological studies used information obtained from the initial visit, on May 9, 2013. Ecological studies started on May 22, 2013. A summary of temperature and weather conditions present during each of the Site visits are presented in **Table 3-1**.

Table 3-1: Description of Site visit temperature and weather conditions during 2013 visits

Date	Survey	Temperature (°C)	Weather	Time (24 hr)
May 9	Initial visit by exp Staff	14	Partly cloudy	11:00
May 22	Amphibian Calling	22	Overcast then clear	20:10 to 21:40
May 31	Breeding Bird / Nest Survey	18	Sunny	7:00 – 9:00
June 10	Amphibian Calling; Inspect Dingman Creek tributary	17	Light fog	20:30 – 21:30
July 4	Breeding Bird / Nest Survey; Vegetation Inventory	20	Overcast/periodic rain	7:00 – 11:00

3.5 Ecological Land Classification

The Ecological Land Classification (ELC) is an approach that identifies the distribution and groupings of plant species, and categorizes, organizes and names ecosystems. The goal of the Ontario ELC program is to establish a comprehensive and consistent province wide approach for ecosystem description, inventory and interpretation. When complete, the ELC can be used to improve the collective ability to manage both natural resources and the information about those resources. The following sections are components of the ELC which describes and classifies the Site, as identified in OMNR's *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee *et al.*, 1998).

Observations and notes were compiled during Site visits in order to gather information on stand characteristics, vegetation communities, plant species and disturbance present at the Site.

3.5.1 Stand Characteristics

A stand characteristic is the classification of a collection of plants having a relatively uniform composition and structure. The purpose of identifying the stand characteristics at a given Site is to categorize the type of habitats present in order to determine the types of natural features present and to investigate the wildlife expected to be at the Site.

The Site visits confirmed the tablelands were heavily landscaped with composition consisting of an abundance of ornamental and non-native shrubs and herbaceous plants. A number of large-toothed aspen were planted within the garden areas that were between 10 to 20 metres in height, and are associated with an age of 20 years or so. In addition, dead fall and snags within the Site were absent due to the high maintenance activities. Age of trees on-Site ranged from young to mature shade trees near the residence and on the manicured lawn.

Further into the Site, within the upland areas of the slope, composition contained both coniferous and deciduous species, although deciduous community type was dominant. Further downslope, at the bottom of the ravine, was comprised of a deciduous swamp, with large gaps. This then transitioned into another deciduous forest type further north and east. These mature trees were primarily native species.

A number of dead ash trees (*Fraxinus* spp.) were observed pm the slope, with evidence of invasive Emerald ash borer (*Agrilus planipennis*) on tree trunks. Due to the presence of this invasive insect species, it is likely more ash trees in the area will perish. Very little deadfall and snags were observed within the ravine. Trees along the slope in the ravine ranged from mid-age to very mature, with trees in the canopy ranging between 20 and 30 metres in height.

3.5.2 Community Classification and Description

The organizational framework contained within the ELC (Lee *et al.*, 1998) protocol describes communities according to six (6) nested levels: Site Region, System, Community Class, Community Series, Ecosite, and Vegetation Type. These nested levels vary in spatial scale, with the Site Region classifying communities at the largest spatial scale, to Vegetation Type which describes communities at the finest spatial scale.

There are two (2) Site Regions in Southern Ontario: 6E and 7E (Lee et al., 1998). The Site is situated within Site Region 7E – the Lakes Erie – Ontario Site Region. This region is known to be dominated by deciduous tree species such as Sugar maple (*Acer saccharum*), White elm (*Ulmus americana*), Beech (*Fagus grandifolia*), Black cherry (*Prunus serotina*), White ash (*Fraxinus americana*), Red oak (*Quercus rubra*), White oak (*Quercus alba*), and Walnut (*Juglans nigra*). Other less common trees include Sassafras (*Sassafras albidum*), Butternut (*Juglans cinerea*), Big shellbark hickory (*Carya laciniosa*), Black oak (*Quercus velutina*), and Pin oak (*Quercus palustris*) (Lee et al., 1998).

The System used in ELC is an organizational level that helps to reduce a complex natural landscape into a small number of community-based units. The System identified on-Site is classified as Terrestrial.

The Community Class is useful in organizing communities into groups with similar ecological patterns and processes (Lee *et al.*, 1998). The Community Series breaks down Community Classes further, and are based on the type of vegetation cover or the plant form that make up the community, such as open, treed, or shrub; deciduous, coniferous, or mixed. The purpose of identifying the community types at a given Site is to categorize the overall habitat of the area, and determine the types of natural features and wildlife expected to be at the Site.

There were a number of different Community Classes present on-Site. The visits to the Site confirmed the presence of the following communities: Forest, Plantation, and Swamp. The community series found on the tablelands of the Site included Plantation. The cultural gardens were not classified within this framework but are included under Plantation.

Further, the ELC is categorized into an Ecosite and Vegetation Type. An Ecosite is defined as "a part of an ecosection having relatively uniform parent material, soil and hydrology, and a chronosequence of vegetation" (Lee *et al.*, 1998). Thus, it is a landscape unit with a consistent set of environmental factors and vegetation characteristics. Vegetation Type is the finest level of resolution in the ELC, representing plant species assemblages associated with an Ecosite.

The Ecosite and Vegetation Types found across the entire Site include:

- Deciduous Plantation – CUP1
- Dry-Fresh Deciduous Forest Ecosite – FOD4
- Deciduous Swamp – SWD
- Fresh-Moist Lowland Deciduous Forest – FOD7

For Ecosite and Vegetation Type polygons refer to **Figure 2**.

3.5.3 Vegetation Communities

A plant community is a unit of vegetation within a given area. Identifying a plant community within a Site is necessary to determine the type of environment present (e.g. shade-tolerant area) and to identify the type(s) of habitat that may be present. These communities will aid in the identification of sensitive habitat area(s), along with finding species of local, regional or SAR status. Proper management of any such species is required.

3.5.3.1 Deciduous Plantation (CUP1)

The Deciduous Plantation Ecosite (CUP1) is the community on-Site located on the tablelands. This plantation extends along the north and east areas of the Site, with additional patches of landscaped areas to the south. Trees and shrubs located in this area have been planted in areas around the existing residence, and include ornamental species along with large-toothed aspen planted in a grove. Additional native and non-native species are found on Lot 58.

Species found within the landscaped areas of the lawn at the Site also include Common lilac (*Syringa vulgaris*), several juniper species (*Juniperus* sp.), Black walnut, Colorado blue spruce (*Picea pungens*), Periwinkle (*Vinca minor*), European mulberry (*Morus* sp.) and various ornamental floweirg herbaceous species. Those trees located on Lot 58 include Large-toothed aspen, Norway maple (*Acer platanoides*), White pine (*Pinus strobus*), Round-leaved dogwood (*Cornus rugosa*), White spruce (*Picea glauca*), Norway spruce (*Picea abies*), and Red oak.

A summary of species in the Deciduous Plantation is provided in **Table 3-2**.

Table 3-2: Summary of dominant vegetation observed within CUP1

Species Type	Scientific Name	Common Name
Upper canopy	*Populus gradidentata*	Large-toothed aspen
	Picea abies	Norway spruce
	Quercus rubra	Red oak
	Picea glauca	White spruce
	Acer platanoides	Norway maple
	Pinus strobus	White pine
Sub canopy	*Syringa vulgaris*	Common lilac
	Juniperus sp.	Juniper
	Juglans nigra	Black walnut
	Cornus rugosa	Round-leaved Dogwood
	Morus sp.	Ornamental Mulberry sp.
	Picea pungens	Colorado blue spruce
Ground cover	*Vinca minor*	Periwinkle
	Poa sp.	Grasses

3.5.3.2 Dry-Fresh Deciduous Forest Ecosite (FOD4)

The Dry-Fresh Deciduous Forest Ecosite (FOD4) was comprised of a mixture of different species. Species dominance was relatively even along the slope, with a dominance of deciduous trees. A number of Red pine (*Pinus resinosa*) was observed at the top of the slope, with an absence of coniferous species mid-slope, and no conifers within the bottomland areas.

Those species associated with upper canopy of this ecosite included Large-tooth aspen, Red oak, Black oak, White ash, Black ash (*Fraxinus nigra*), Green ash (*Fraxinus pennsylvanica*), Black walnut (*Juglans nigra*), Black cherry, Blue beech (*Carpinus caroliniana*), Ironwood (*Ostrya*

virginiana), American basswood (*Tilia americana*), and sporadic sightings of Sugar maple, and Common hackberry (*Celtis occidentalis*). Sub canopy species and new growth included saplings of ash, Alternative-leaved dogwood (*Cornus alternifolia*), Eastern red elderberry (*Sambucus pubcens*), Juniper species, Norway maple, Manitoba maple (*Acer negundo*), Red baneberry (*Actaea rubra*), non-native mulberry (Morus sp.), and Wild red raspberry (*Rubus* sp.). Ground cover consisted of various herbaceous plants such as Common burdock (*Arctium minus*), Wild columbine (Aquilegia Canadensis), Christmas fern (*Polystichum acrostichoides*), Garlic mustard (*Alliaria petiolata*), Star-flowered soloman's seal (*Maianthemum stellatum*), Wild ginger (*Asarum canadense*) and Sharp-lobed hepatica (*Anenome acutiloba*).

A summary of the species within the Dry-Fresh Deciduous Forest is provided in **Table 3-3**.

Table 3-3: Summary of dominant vegetation observed within FOD4

Species Type	Scientific Name	Common Name
Upper canopy	*Populus gradidentata*	Large-tooth aspen
	Quercus rubra	Red oak
	Quercus velutina	Black oak
	Fraxinus americana	White ash
	Fraxinus nigra	Black ash
	Fraxinus pennsylvanica	Green ash
	Juglans nigra	Black walnut
Upper canopy	*Prunus serotina*	Black cherry
	Carpinus caroliniana	Blue beech
	Ostrya virginiana	Ironwood
	Tilia americana	American basswood
	Pinus resinosa	Red pine
	Acer saccharum	Sugar maple
	Celtis occidentalis	Common hackberry
Sub canopy	*Cornus alternifolia*	Alternate-leaved dogwood
	Juniperus sp.	Juniper sp.
	Sambucus pubcens	Eastern red elderberry
	Acer platanoides	Norway maple
	Acer negundo	Manitoba maple
	Actaea rubra	Red baneberry
	Morus sp.	Mulberry sp.
	Rubus sp.	Wild raspberry
Ground cover	*Arctium minus*	Common burdock
	Aquilegia canadensis	Wild columbine
	Polystichum acrostichoides	Christmas fern
	Alliaria petiolata	Garlic mustard
	Maianthemum stellatum	Star-flowered soloman's seal
	Asarum canadense	Wild ginger
	Anenome acutiloba	Sharp-lobed hepatica

3.5.3.3 Deciduous Swamp (SWD)

Towards the lower end of the slope within the ravine the community changes into a deciduous swamp; comprised of species that can tolerate water-logged soils. This swawp is perhaps ~100 m downslope from the tablelands and shows very little evidence for recent human disturbance. Gaps within this area do exist, but swamp-type vegetation cover the majority of the area. Dominant species observed within the upper canopy include Yellow birch (*Betula alleghaniensis*), Blue beech, Black walnut, American basswood, Sugar maple, Red maple, Norway maple, and Black ash. All of these species are known to use habitats with poorly drained soils, in valleys.

Dominant species observed within the sub-canopy included Witch hazel (*Hamamelis virginiana*), various viburnum sp. (*Viburnum* sp.), Hawthorns (*Crataegus* sp.), and various patches of Wild red raspberry (*Rubus* sp.).

Ground cover was largely dominated by Skunk cabbage (*Lysichiton americanus*), Star-flowered soloman's seal, Zig zag goldenrod (*Solidago flexicaulis*), Marsh marigold (*Caltha palustris*), Red trillium (*Trillium erectum*), Jack-in-the-pulpit (*Arisaema triphyllum*), Wild columbine, Wild ginger, Goldenrod (*Solidago* sp.), Garlic mustard (*Alliaria petiolata*), Christmas fern, Sensitive fern (*Onoclea sensibilis*), Interrupted fern (*Osmunda claytoniana*), Northern holly fern (*Polystichum lonchitis*), Blood root (*Sanguinaria canadensis*), Running strawberry bush (*Euonymus obovata*), Enchanters nightshade (*Circaea lutetiana*), Lily-of-the-valley (*Convallaria majalis*), Grape vine (*Vitis* sp.), Poison ivy (*Toxicodendron* sp.), Jewelweed (*Impatiens capensis*), Herb robert (*Geranium robertianum*), False nettle (*Boehmeria cylindrica*), Hog peanut (*Amphicarpaea bracteata*), Virginia creeper (*Parthenocissus quinquefolia*), Wood horsetail (*Equisetum sylvaticum*), Wild basil (*Clinopodium vulgare*), Naked mitrewort (*Mitella nuda*), Violet species (*Viola* sp.), Bedstraw (*Galium* sp.), Lamb's quarter white goose foot pigweed (*Chenopodium album*), and various grasses (*Poa* sp.).

A summary of dominant species in the Deciduous Swamp is presented in **Table 3-4.**

Table 3-4: Summary of dominant vegetation observed within SWD

Species Type	Scientific Name	Common Name
Upper canopy	*Betula alleghaniensis*	Yellow birch
	Carpinus caroliniana	Blue beech
	Juglans nigra	Black walnut
	Tilia Americana	American basswood
	Acer saccharum	Sugar maple
	Acer rubrum	Red maple
	Acer platanoides	Norway maple
	Fraxinus nigra	Black ash
Sub canopy	*Hamamelis virginiana*	Witch hazel
	Viburnum sp.	Viburnum sp.
	Crataegus sp.	Hawthorn sp.
	Rubus sp.	Wild raspberry
Ground cover	*Lysichiton americanus*	Skunk cabbage
	Maianthemum stellatum	Star-flowered soloman's seal
	Solidago flexicaulis	Zig zag goldenrod
	Caltha palustris	Marsh marigold

Species Type	Scientific Name	Common Name
	Trillium erectum	Red trillium
	Arisaema triphyllum	Jack-in-the pulpit
	Aquilegia canadensis	Wild columbine
	Asarum canadense	Wild ginger
	Solidago sp.	Goldenrod
	Alliaria petiolata	Garlic mustard
	Polystichum acrostichoides	Christmas fern
	Onoclea sensibilis	Sensitive fern
	Osmunda claytoniana	Interrupted fern
Ground cover	*Polystichum lonchitis*	Northern holly fern
	Sanguinaria canadensis	Blood root
	Euonymus obovata	Running strawberry-bush
	Circaea lutetiana	Enchanter's nightshade
	Convallaria majalis	Lily-of-the-valley
Ground cover	*Vitis sp.*	Grape vine
	Toxicodendron sp.	Poison ivy
	Impatiens capensis	Jewelweed
	Geranium robertianum	Herb robert
	Boehmeria cylindrical	False nettle
	Amphicarpaea bracteata	Hog peanut
	Parthenocissus quinquefolia	Virginia creeper
	Equisetum sylvaticum	Wood horsetail
	Clinopodium vulgare	Wild basil
	Mitella nuda	Naked mitrewort
	Viola sp.	Violet sp.
	Galium sp.	Bedstraw
	Chenopodium album	Lamb's quarter white goose foot pigweed
	Poa sp.	Grass sp.

3.5.3.4 Fresh – Moist Lowland Deciduous Forest Ecosite (FOD7)

Further north into the Site is a Fresh - Moist Lowland Deciduous Forest Ecosite (FOD7). This community was dominantly deciduous, with sporadic sightings of Red pine. Species observed within this area included Black ash, Green ash and White ash, Red maple, Black walnut, and Common hackberry. Additional species observed within the sub canopy and ground cover layers included Spice bush (*Lindera benzoin*), Sharp-lobed hepatica, Poison ivy, May apple (*Podophyllum peltatum*), Jack-in-the-pulpit, Wild basil, Violet sp. Naked miterwort, Blood root, Goldenrod, Sensitive fern, Interrupted fern, Lily (*Lilium* sp.), Wild strawberry (*Fragaria* sp.), Lily-of-the-valley, Herb robert and varies grasses.

A summary of dominant species in the Fresh – Moist Lowland Deciduous Forest Ecosite is provided in **Table 3-5**.

Table 3-5: Summary of dominant vegetation observed within FOD7

Species Type	Scientific Name	Common Name
Upper canopy	*Fraxinus nigra*	Black ash
	Fraxinus americana	White ash
	Pinus resinosa	Red pine
	Acer rubrum	Red maple
	Juglans nigra	Black walnut
	Celtis occidentalis	Common hackberry
Sub Canopy	*Lindera benzoin*	Spice bush
	Fragaria sp.	Wild strawberry
Ground cover	*Anenome acutiloba*	Sharp-lobed hepatica
	Toxicodendron sp.	Poison ivy
	Podophyllum peltatum	May apple
	Arisaema triphyllum	Jack-in-the pulpit
	Clinopodium vulgare	Wild basil
	Viola sp.	Violet sp.
Ground cover	*Mitella nuda*	Naked mitrewort
	Sanguinaria canadensis	Blood root
	Solidago sp.	Goldenrod
	Onoclea sensibilis	Sensitive fern
	Osmunda claytoniana	Interrupted fern
	Lilium sp.	Lily sp.
	Poa sp.	Grasses
	Geranium robertianum	Herb robert
	Convallaria majalis	Lily-of-the-valley

3.5.4 Extent of Disturbance

A Site can also be described by the extent and intensity by which management or disturbance has occurred on the Site. It is important to note disturbance as it can influence community structure and function. Anthropogenic disturbances are usually more selective, and directly affect one (1) or several specific species, where as physical forces such as earthquakes or drought can affect the entire plant community.

Disturbances such as alien species, gaps in forest canopy, plantations, tracks and trails, noise, disease and death of trees as well as wind throw (blow down) are recorded and observed at a given Site location.

There is limited existing disturbance associated with the Site. Due to the Sites location in a cul-de-sac, limited noise and additional anthropogenic disturbance is present. Alien non-native species do exist on-Site, mainly the manicured lawn. Extensive widespread evidence of landscaping is present, which includes the incorporation of a number of ornamental non-native species. No signs of dead trees or snags were present in this area as well.

In terms of the slope and ravine areas, some disturbance in the form of natural wind throw has occurred in the recent past. In addition, some dead ash trees were observed, along with evidence of emerald ash borer. It is likely that additional ash trees present within the ravine

may become infected over time. Very few snags were observed within the two dominant communities. Gaps are present within SWD in the bottomland area as the base of the ravine. This area is dominated by Skunk cabbage, with additional herbaceous plants. Other non-native plant species exist in proximity to the plantation habitats but the number of non-native species in the valley is quite low.

No visual observations of flooding, dumping, recreational use, fire or ice damage was observed on Lots 58 or 60. In addition, very little deer browse was observed on the plants, however a large female White-tailed deer (*Odocoileus virginianus*) was seen at the top of the slope within CUP1, indicating their presence.

3.6 Wildlife and Wildife Habitat

In terms of wildlife and wildlife habitat, the Site may contain elements that can provide suitable habitats for wildlife. For example, small mammals and birds often inhabit soils or use fallen logs. In addition, the presence of trees, or species of trees that produce fruits such as nuts or berries, may prove to be an important food source for some species.

The Site is adjacent to a woodland area with a valleyland and stream. This area likely contains habitat for abundant wildlife. In addition, the Site does contain tree species that produce fruit and seeds that local birds and wildlife may feed upon. The tablelands that include the residence, gardens, planted native and non-native trees and other features was reported by Carla Kelly as formerly used as pasture for agricultural livestock, such as horses. Hence, when the residence was constructed, the entire tablelands were dominated by grasses. No ground level photographs of the area were found for this EIS but adjacent non-urban lands are either composed of woodlands or agricultural fields.

3.6.1 Bird Surveys

Due to the nature of the Site and the surrounding areas, a number of birds used habitats at the existing residence. Breeding bird surveys were conducted on May 31 and July 4 2013. A total of 21 species were documented either through visual or auditory observation during the bird surveys. In addition, two species were noted only during the June amphibian survey. The total list includes American crow (*Corbus brachyrhynchos*), American robin (*Turdus migratorius*), American goldfinch (*Carduelis tristis*), Black-capped chickadee (*Poecile atricapillus*), Blue jay (*Cyanocitta cristata*), Downy Woodpecker (*Picoides pubescens*) Song sparrow (*Melospiza melodia*), Red-breasted nuthatch (*Sitta canadensis*), Mourning dove (*Zenaida macroura*), Common grackle (*Quiscalus quiscula*), Northern cardinal (*Cardinalis cardinalis*), Hairy woodpecker (*Picoides villosus*), Rose breasted grosbeak (*Pheucticus ludovicianus*), Scarlet tanager (*Piranga olivacea*), Red-eyed vireo (*Vireo olivaceus*), Cedar waxwing (*Bombycilla cedrorum*), White-breasted nuthatch (*Sitta carolinensis*), House sparrow (Passer domesticus), Baltimore oriole (*Icterus galbula*), Carolina wren (*Thryothorus ludovicianus*), Great crested flycatcher (*Myiarchus crinitus*), and Gray catbird (*Dumetella carolinensis*).

There were remnants of an older nest within a large tree near the base of the ravine. No signs of occupancy observed in this nest. No other bird nests were noted in the tablelands.

None of the bird species documented on-Site are listed as SAR in Ontario.

A summary of the 23 bird species observed during the Site surveys along with additional sightings is provided in **Table 3-6**.

Table 3-6: Birds species detected during breeding bird surveys

Scientific Name	Common Name	Date Observed (2013)		Ontario Rank (S-Rank)	General Observations
		May 31	July 4		
Corvus brachyrhynchos	American crow	√	√	S5B	Heard calling within FOD7 during both surveys.
Carduelis tristis	American goldfinch			S5B	Observed during June amphibian survey
Poecile atricapillus	Black-capped chickadee	√	√	S5	Heard calling within SWD during both surveys.
Turdus migratorius	American robin	√	√	S5B	Observed visually within CUP1, as well as heard within FOD4 and SWD during both surveys.
Melospiza melodia	Song sparrow	√		S5B	Observed visually within trees on the manicured lawn (CUP1).
Sitta canadensis	Red-breasted nuthatch	√	√	S5	Heard calling within SWD and FOD7 during both surveys.
Zenaida macroura	Mourning dove	√	√	S5	Heard calling in areas adjacent to CUP1 during both surveys.
Quiscalus quiscula	Common grackle	√	√	S5B	Observed visually within CUP1 during both surveys.
Cyanocitta cristata	Blue jay	√	√	S5	Observed visually during the first survey and heard calls within FOD4 during the second survey.
Cardinalis cardinalis	Northern cardinal	√	√	S5	Observed visually and heard calls within CUP1, FOD4, SWD and FOD7 during both surveys.
Picoides pubescens	Downy Woodpecker			S5	Observed during June amphibian survey
Picoides villosus	Hairy woodpecker	√	√	S5	Heard calls within CUP1 and FOD4 during both surveys.
Pheucticus ludovicianus	Rose-breasted grosbeak	√		S4B	Heard calls within FOD4.
Piranga olivacea	Scarlet tanager	√	√	S4B	Observed visually within CUP1 during the first survey and heard within SWD and FOD7 during the second survey.
Vireo olivaceus	Red-eyed vireo	√	√	S5B	Heard calls within FOD4, SWD and FOD7 during both surveys.
Bombycilla cedrorum	Cedar waxwing		√	S5B	Observed visually within SWD.
Sitta carolinensis	White-breasted nuthatch		√	S5	Observed visually within FOD4.
Passer domesticus	House sparrow		√	SNA	Observed visually within CUP1.

Scientific Name	Common Name	Date Observed (2013)		Ontario Rank (S-Rank)	General Observations
		May 31	July 4		
Icterus galbula	Baltimore oriole		√	S4B	Observed visually within CUP1.
Thryothorus ludovicianus	Carolina wren	√	√	S4	Heard calls with SWD and FOD7 during both surveys.
Myiarchus crinitus	Great crested flycatcher		√	S4B	Heard calls within FOD4 and SWD.
Dumetella carolinensis	Gray catbird		√	S4B	Heard calls within FOD4.
Colaptes auratus	Northern flicker		√	S4B	Heard calls within FOD4.

Note: Ontario Rank (S-Rank): S1: Extremely rare; S2: Very rare; S3: Rare to Uncommon; S4: Uncommon to Common; S5: Secure (Very Common to Abundant); S#B: Breeding population; SNA: Not applicable

3.6.2 Amphibian Surveys

Two amphibian calling surveys were conducted at the Site on May 22 and June 10. Both surveys started at least one half hour after sunset and were completed before midnight, as reviewed in **Table 3-7**. Light rain had occurred throughout the day prior to both surveys.

The May 22 survey was conducted across five (5) point count stations on the tablelands. No frogs or toads were seen or heard during the May 22 survey. That is, at each of five stations, at least four sets of point counts were conducted.

On June 10, at the edge of the slope faint calls were heard in the distance. Calls were too faint to estimate the number of frogs or toads present. One (1) American toad was visually observed in the area in the ecotone between FOD4 and the backyard lawn of Lot 58. A station was also set up at the bottom of the valley during the June 10 survey, as a way to follow the faint calls heard from the lawn. After walking in to the valley, the observer waited a few minutes, and then a full chorus was heard including American toad (*Anaxyrus americanus*) and Leopard frog (*Lithobates pipiens*). Due to the number of calls, it was not possible to identify the number of specimens present. In addition, due to the loud chorus of these two species, it was difficult to resolve if other species were also calling. Hence, it is possible that more frogs may use the valley. No other wildlife was observed in the valley and that may explain the loud chorus.

Table 3-7: Amphibian survey results

Date	Time	Weather	Observation	Call Level *
May 22	20:40-22:00	Cloudy then clear; air temp. 22 °C; light rain on previous day	No frogs or toads were seen or heard	1
June 10	20:45-23:15	Cloudy, periodic light rain early with fog patches; 17 °C	Frogs or Toads herd as faint calls from valley, while listening at edge of lawn	2
			One (1) American toad observed on edge of forest, above valley	3
			American toad calling in ravine. Unknown numbers; full chorus	5
			Leopard frog calling in ravine; Unknown numbers; full chorus	5

** Call level 1 = no calls heard; 2 = frog(s)/toad(s) seen or heard; 3 = frog(s)/toad(s) can be counted, calls do not overlap; 4 = frog(s)/toad(s) can be counted, while others are overlapping; 5 = full chorus, continuous and overlapping calls, difficult to distinguish frog(s)/toad(s).*

3.6.3 Fish Habitat

Although not identified as a scoped study feature of the EIS, the small tributary to Dingman Creek at the bottom of the ravine was visited during the amphibian survey on June 10 and again during the vegetation survey on July 4. One June 10, during low light conditions, the creek was observed to be approximately one (1) metre in width, with thick stand of Skunk cabbage on both sides of the creek. On this date, the typical depth was about 0.1 metre. Substrate consisted mainly of silt, clay and sand and the morphology can be described as a linear channel with poor riffle pool sequences evident. No fish were observed in the channel within the limits of the Lot. However, this was only a visual inspection with no fishing gear used.

Additional observations of this tributary were conducted on July 4. Very little water was observed in the creek and mean wetted width was approximately 50 centimetres to one (1) metre, with a mean wetted depth of two (2) centimetres.

It is probable that fish exist in this tributary of Dingman Creek but no fish sampling was completed during the EIS.

3.6.4 Incidental Wildlife Observations

Incidental wildlife species that were observed during field visits were recorded. Active viewing of the ground, canopy and sky were continued throughout the field visits in order to detect incidental wildlife. Overall, limited activity concerning incidental sightings occurred at the Site.

During surveys conducted on May 31 and July 4, several chipmunks (*Tamias* spp.) and Eastern gray squirrels (*Sciurus carolinensis*) with the brown colour phenotype were observed foraging within FOD4. On July 4, a large female white tailed deer was in CUP1.

The residents of Lot 58 own domestic cats (*Felis catus*). On several visits, these cats were observed roaming the areas of the lawn and the edge of the forest and valley, within FOD4 during various Site visits.

A summary of incidental wildlife is provided in **Table 3-8**.

Table 3-8: Incidental wildlife observations

Scientific Name	Common Name	Observation
Tamias	Chipmunk	Foraging within FOD4 on May 31 and July 4
Sciurus carolinensis	Brown squirrel	Foraging within FOD4 on May 31 and July 4
Odocoileus virginianus	Female White tailed deer	Observed at the top of the slope in CUP1

4 – Natural Heritage Features

4 Key Natural Heritage Features

Key Natural Heritage features and like areas are defined as those that contain wetlands, fish habitat, woodlands, valleylands, habitat for endangered and threatened species, wildlife habitat, and Areas of Natural and Scientific Interest (ANSIs). These features are important for their environmental and social values as a legacy of the natural landscapes of an area as defined within Ontario's *Planning Act* and explained within the PPS (MMAH, 2005).

4.1 Surface Water Features, Wetlands and Fish Habitat

Wetlands are defined as areas that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface (Lee *et al.*, 1998). A significant wetland is an area identified as provincially significant by the OMNR using evaluation procedures established by the province, as amended from time to time (Lee *et al.,* 1998).

Fish habitats are identified as spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly and or indirectly in order to carry out their life processes (Lee *et al.,* 1998). Fish can be identified as fish, shellfish, crustaceans, and marine animals, at all stages of their life cycle (MMAH, 2005). Lakes, rivers, streams, ponds and wetlands are known fish habitats (Lee *et al.*, 1998). Fish habitats commonly occur in many other natural heritage areas such as wetlands, valleylands, woodlands and ANSIs.

A small creek is located at the bottom of the valley at a distance of approximately 50 metres from the top of slope at the Site. This small creek is a tributary to Dingman Creek. The confluence of the tributary and Dingman Creek is located 180 metres northwest of the west lot line. Dingman Creek then flows into the Thames River 1.5 kilometres to the west. No fish were observed within the creek.

It was communicated by UTRCA that a wetland is also located on the subject property. A large wetland mapped according to Land Information Ontario (LIO) exists farther north, outside of the land parcel for both Lots 58 and 60. This wetland exists in the areas that surround Dingham Creek. Further, preliminary information provided by the OMNR Alymer District Office indicated that no provincially significant wetlands are located on-Site. They have indicated that a provincially significant wetland [Circle R Ranch (UT 62)] is within adjacent lands.

A deciduous swamp was observed at the bottom of the ravine. This area was dominated by various deciduous tree species and Skunk cabbage. Additional hydrophytic herbaceous species were also observed. This swamp area showed very little evidence of disturbance.

4.2 Woodlands

Woodlands are treed areas that provide environmental or economic benefits such as erosion prevention, water retention, recreation and the sustainable harvest of woodland products. Woodlands include treed areas, woodlots or forested areas, and vary in their level of significance (PPS, 2005). Woodland significance is typically determined by evaluating key criteria which relate to woodland size, ecological function, uncommon woodland species, and economic and social value.

Larger woodlands are more likely to contain a greater diversity of plant and animal species and communities than smaller woodlands, and are better buffered against edge effects or agricultural and urban activities.

The LIO geospatial data indicates that the north 75% of the lot is situated in woodland including swamp features. These features have been identified as significant in the Middlesex Natural Heritage Study (2006), and within the Middlesex Official Plan.

The woodland is comprised of both upland and lowland forest communities that consist of Dry-Fresh Deciduous Forest (FOD4), Deciduous Swamp (SWD) and Fresh-Moist Lowland Deciduous Forest Ecosite (FOD7). A cultural deciduous plantation is present on the tablelands. The dripline of the existing woodland and cultural plantation is presented in **Figure 3.**

It is well documented that the majority of southern Ontario forests were harvested for lumber or burned for agriculture, between the 1760s and late 1800s (Lambert, 1967). As such, the majority of large trees in southern Ontario are younger than the 140 year criterion for classification as old growth. The trees in the significant woodland adjacent to the Site show evidence of forestry that pre-dates the existing residential development. This implies the previous land use, farming, involved some harvest of trees from the woodland. During the inspections of this woodland, the external characteristics of some trees suggest selected specimens are perhaps in excess of 100 years of age but the vast majority does not convey an appearance that suggests an age greater than 140 years (Leverett, 1996; Lee et al. 1998; Pederson, 2010). For this reason, the woodland can be described as significant but in regeneration from past forestry. Due the observation that this woodland is regenerating, it justifies management activities that avoid future disturbance from adjacent land use(s).

Any plans for future development on the tablelands are not expected to have any impact on the forest communities, as the UTRCA has requested a minimum of six (6) metre buffer from the 100-year erosion hazard line as determined by the geotechnical (slope stability) assessment. The establishment of a setback from the erosion hazard line of at least six metres will act to protect the root systems of the existing woodland, given the location of the dripline (**Figure 3**). As such, the use of the erosion hazard line to define future development can be inferred to provide protection to the existing woodlands.

4.3 Valleylands

The PPS (MMAH, 2005) identifies significant valleylands as a "natural area that occurs in a valley or landform depression that has water flowing through or standing for some period of the year". As noted, Lots 58 and 60 are fully regulated by the UTRCA in accordance with Ontario Regulation 157/06 as part of the *Conservation Authorities Act*, due to the presence of a steep slope (erosion hazard lands) and wetland associated with the Dingman Creek Corridor.

Site observations revealed the presence of a valleyland that is situated within significant woodlands as mapped by the Middlesex Official Plan and Middlesex Natural Heritage Study. Given the characteristics of the valley, the size of the riparian area adjacent to the water course and the natural vegetation cover this valleyland would be considered significant.

4.4 Areas of Natural and Scientific Interest

Significant ANSI are defined as areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education.

An area is identified as provincially significant by the OMNR using evaluation procedures established by the province, as amended from time to time (PPS, 2005). The ANSIs are divided into two (2) types: life science ANSI and earth science ANSI. Specifically, a life science ANSI can contain specific types of forests, valleys, prairies and wetlands of ecological importance. That is, they represent examples that are relatively undisturbed in terms of vegetation community and/or landforms associated with that vegetation. Those listed as provincially significant life science ANSIs are the best examples of the particular natural heritage features in the province. In contrast, earth science ANSIs includes representative examples by bedrock, fossil, and landforms in Ontario, and on-going geological processes.

The NHIC Biodiversity Explorer and OMNR Alymer District Office have indicated that there are no ANSIs located in or in proximity to the Site. The closest ANSI is approximately one (1) kilometer south of the Site, known as Delaware Woodlot Life Science Site, which contains a provincially significant woodland and wetland.

4.5 Wildlife Habitat

Wildlife habitats are defined as areas where plants, animals and other organisms live and are able to find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a point in their annual life cycle, and those areas which are important to migratory and non-migratory species.

A wildlife habitat is referred to as significant if it is deemed ecologically important in terms of feature, function, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System (MMAH, 2005).

A significant wildlife habitat is described under four (4) categories:

- Seasonal concentrations of animals;
- Rare vegetation communities or specialized habitats for wildlife;
- Wildlife movement corridors; and,
- Habitats of species of conservation concern.

4.5.1 Seasonal Concentration Areas

Areas of seasonal concentrations of animals are defined as "areas where animals occur in relatively high densities at specific periods in their life cycle and/or particular seasons" (Lee *et al.*, 1998; PPS, 2005). Areas of seasonal concentrations are typically small in comparison to larger habitat areas that the species uses at other times of the year.

An assessment of the potential for the Site to contain wildlife seasonal concentration areas was carried out. The NHIC Biodiversity Explorer records revealed that there are no wildlife concentration areas in the one (1) to two (2) kilometer area in and surrounding the Site. However, resources provided in the OMNR Significant Wildlife Habitat (SWH) Technical Guide (2000), and Draft SWH Ecoregion 7E Criterion Schedule (OMNR, 2012) were used during the Site visit to evaluate potential seasonal concentration areas in and around the Site. ELC communities that occur in each of the seasonal concentration areas and observations of these features in and around the Site are presented in **Table 4-1**.

Table 4-1: Seasonal concentration areas present at the Site

Habitat	ELC Communities	Observation
Waterfowl Stopover & Staging Areas (Terrestrial)	Mineral Cultural Meadow & Thicket (CUM1, CUT1) with annual spring flooding	No CUM1 or CUT1 are present at the Site or in adjacent areas. Therefore, this habitat is absent.
Waterfowl Stopover & Staging Areas (Aquatic)	Meadow Marsh (MAM1-6), Shallow Marsh (MAS1-3), Shallow Water (SAS1, SAM1, SAF1), & Deciduous Swamp (SWD1-7)	An SWD community is located at the bottom of the ravine. The creek includes limited suitable habitat (mean wetted width < 1 m; mean wetted depth < 1m). No waterfowl observed during Site visits.

Habitat	ELC Communities	Observation
Shorebird Migratory Stopover Area	Beach/Bar (BBO1-2, BBS1-2, BBT1-2), Sand Dune (SDO1, SDS1, SDT1), & Meadow Marsh (MAM1-5)	No relevant ELC communities were observed on-Site. Therefore, this habitat is absent.
Raptor Wintering Area	Combination of Forest (FOD, FOM, FOC) and upland Cultural Sites (CUM; CUT; CUS; CUW)	Forest communities (FOD) were observed on-Site, however no suitable upland cultural communities are present. The CUP and manicured lawn would not be suitable habitat as it constantly maintained and too small in size.
Bat Hibernacula	Crevice (CCR1-2) & Cave (CCA1-2)	No suitable habitat observed.
Bat Maternity Colonies	Mature Deciduous or Mixed Forests (FOD, FOM) with >10 large diameter (>25 cm dbh) trees per hectare	Mid-age to mature deciduous forest stands are present (FOD). However, no visible observations of abundant snags in large mature trees were made.
Bat Migratory Stopover Area	No specific ELC types	No bats observed during Site visits.
Turtle Wintering Areas	Snapping & Midland painted turtles: Community Class: Swamp (SW); Marsh (MA); Open and Shallow water (OA and SA). Community Series: Open Fen (FEO) and Open Bog (BOO). Northern map turtle – Open water	A deciduous swamp (SWD) is located at the bottom of the ravine. Water in the creek was pretty shallow during the Site visits that took place in May and June 2013, with chances for freezing during winter. Site may not be suitable for turtle wintering.
Snake Hibernaculum	Any Ecosite in Southern Ontario other than very wet ones. Talus (TA), Rock Barren (RB), Crevice and Cave (CC) and Alvar (AL) Sites.	No snakes were observed on-Site. Rocks and other suitable ELC communities were absent.
Colonially-Nesting Bird Breeding Habitat (Bank & Cliff)	Mineral Cultural (CUM1, CUT1, CUS1), Bluff (BLO1, BLS1, BLT1), Carbonate Cliff (CLO1, CLS1, CLT1), & other areas with eroding banks, sandy hills, borrow pits, steep slopes, sand piles, cliff faces, bridge abutments, silos or barns	No relevant ELC communities present. Therefore, this habitat is absent.
Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs)	Deciduous & Mixed Swamp (SWD1-7, SWM2-3, SWM5-6), & Treed Fen (FET1)	A swamp community (SWD) is present at the bottom of the ravine. This swamp community was small in size and would not likely sustain a large population. However, suitable habitat may be connected to these areas, as large expansive forests from the Site extend to wetlands and Dingman Creek further north.
Colonially-Nesting Bird Breeding Habitat (Ground)	Meadow & Shallow Marsh (MAM1-6, MAS1-3), & Cultural (CUM, CUS, CUT) with rocky islands or peninsulas or in close proximity to watercourse	No suitable ELC communities. Therefore this habitat is absent from the Site.

Habitat	ELC Communities	Observation
Migratory Butterfly Stopover Areas	Combination of Cultural field (CUM, CUS, CUT) & Forest/Plantation (FOD, FOM, FOC, CUP) that are >10 ha & within 5 km of Lake Erie	The Site does not contain any meadows or suitable stopover areas, and it is not located within five (5) kilometres of Lake Erie.
Landbird Migratory Stopover Areas	Forest (FOD, FOM, FOC), & Swamp (SWD, SWM, SWC) that are >5 ha & within 5 km of Lake Erie	The forested areas on-Site extend out from the Site boundary and are greater than 5 ha. However the Site is not located within five (5) km of Lake Erie.
Deer Winter Congregation Areas	Forest (FOD, FOM, FOC), & Swamp (SWD, SWM, SWC) that are >100 ha. Conifer plantations (CUP) smaller than 50 ha may also be used.	Forested communities due exist, but they are not greater than 100 ha. In addition, information from OMNR did not indicate potential for Deer wintering areas. Therefore, this habitat is likely absent.

4.5.2 Rare Vegetation Communities or Specialized Habitats

Rare or specialized habitats include certain vegetation communities. These specialized areas may also provide habitat for rare animal species. According to the SWH Technical Guide (2000), the following definition of each was provided:

Rare vegetation communities include:

- Areas that contain a provincially rare vegetation communities or habitat that is rare within a planning area.

Specialized Habitats include:

- Areas that support wildlife species that have highly specific habitat requirements;
- Areas with high species and community diversity; and,
- Areas that provide habitat that greatly enhance species survival.

Habitats that meet these definitions of rare vegetation communities or specialized habitats were considered during the Site visits. The NHIC Biodiversity Explorer records revealed that there are no rare plant communities in the one (1) to two (2) kilometer area in and surrounding the Site. Guidelines contained within the SWH Technical Guide (OMNR, 2000) and the Draft SWH Ecoregion 7E Criterion Schedule (OMNR, 2012) were used to direct investigations of these habitats at the Site. The ELC communities that occur in the rare vegetation communities or specialized habitats, and these features are presented in **Table 4-2** and **Table 4-3**.

Table 4-2: Rare vegetation communities present at the Site

Habitat	ELC Communities	Observation
Cliffs & Talus Slopes	Open, Shrub & Treed Talus (TAO, TAS, TAT) Open, Shrub & Treed Cliff (CLO, CLS, CLT)	No relevant ELC communities exist.
Sand Barren	Open, Shrub & Treed Sand Barren (SBO1, SBS1, SBT1)	No relevant ELC communities exist.
Alvar	Open, Shrub & Treed Alvar (ALO1, ALS1, ALT1)	No relevant ELC communities exist.

Habitat	ELC Communities	Observation
Old Growth Forest	Deciduous, Coniferous & Mixed Forest (FOD, FOC, FOM)	The forests present on-Site are not old-growth. The MNR defines old growth as an abundance of canopy trees that are equal to or in excess of 140 years old. It is possible that some trees in the valley are at least 140 years old but such specimens would be rare. This determination of the status of old growth in the valley adjacent to the Site reflects the external morphology of the majority of the canopy trees. That is, there are numerous tree stumps in the area and many canopy trees show a coppice (i.e., multiple stems coming from one root base). The presence of coppice growth of canopy trees confirms presence of past forestry. These general features and the stumps suggests forestry in the recent past. Other observations on the external morphology of these trees to infer the age was commonly less than 140 years used the guide included in Leverett (1996) and Pederson (2010). Also see Section 3.1.
Savannah	Tallgrass Savannah (TPS1, TPS2) Tallgrass Woodland (TPW1, TPW2) Bedrock Cultural Savannah (CUS2)	No relevant ELC communities exist.
Tallgrass Prairie	Open Tallgrass Prairie (TPO1; TPO2)	No relevant ELC communities exist.
Other Rare Vegetation Communities	Provincially rare S1, S2 and S3 communities.	No rare communities were observed during the Site visits.

Table 4-3: Specialized wildlife habitat present at the Site

Habitat	ELC Communities	Observation
Waterfowl Nesting Area	Includes all upland areas that are adjacent to wetland communities: Meadow & Shallow Marsh (MAM, MAS), Shallow Water (SA), Bedrock & Mineral Thicket Swamp (SWT1, SWT2), & Mineral Deciduous Swamp (SWD1, SWD2, SWD3, SWD4)	There is a wetland community associated with Dingman Creek further north, off the Site boundary. The Site is within 120 metres of mapped wetlands according to LIO, as such habitat may be present near the north end of the Site. In addition, waterfowl nesting area may be present in SWD located at the bottom of the ravine.
Bald Eagle & Osprey Nesting, Foraging & Perching Habitat	Deciduous, Mixed & Coniferous Forest (FOD, FOM, FOC), & Deciduous, Mixed & Coniferous Swamp (SWD, SWM, SWC) directly adjacent to riparian areas of rivers, lakes, ponds and wetlands.	Deciduous forests and swamps are present on-Site, and are connected through extensive forest to Dingman Creek valley. Potential for nesting, foraging and perching exists.

Habitat	ELC Communities	Observation
Woodland Raptor Nesting Habitat	All forested ELC Ecosites: Deciduous, Mixed & Coniferous Forest (FOD, FOM, FOC), Deciduous, Mixed & Coniferous Swamp (SWD, SWM, SWC), & Coniferous Plantation (CUP3)	Although no raptors were observed during the Site visits, it is possible that woodland raptor nesting may be present in surrounding areas of the Site, as they require a larger interior habitat.
Turtle Nesting Areas	Exposed mineral soil adjacent (<100m) or within Meadow Marsh (MAM1-6); Submerged Shallow Aquatic (SAS1); Mixed Shallow Aquatic (SAM1); Floating-leaved Shallow Aquatic (SAF1); Open Bog (BOO1); Open Fen (FEO1)	Due to the size of the creek, and water depth, suitable nesting habitat is likely absent at the Site.
Seeps & Springs	Often found within headwater areas within forested habitats.	No seeps of springs were observed during the Site visits.
Amphibian Breeding Habitat (Woodland)	Deciduous, Mixed & Coniferous Forest (FOD, FOM, FOC), & Deciduous, Mixed & Coniferous Swamp (SWD, SWM, SWC	Amphibian surveys revealed a number of amphibians to be located at the bottom of the valley. Amphibian woodland breeding habitat is present at the Site.
Amphibian Breeding Habitat (Wetlands)	Swamp (SW), Marsh (MA), Fen (FE), Bog (BO), Open water (OA) & Shallow Water (SA). Wetlands are >120 m from woodland habitats.	One small swamp community was observed on-Site. This area is within close proximity to woodland habitats. Therefore, this habitat is deemed absent from the Site.

Overall no rare vegetation communities were observed on-Site. Potential exists for specialized wildlife habitat, and Amphibian Woodland Breeding Habitat. Due to the Sites proximity to significant wetlands, and woodland canopy, potential exists for waterfowl nesting adjacent to the Site, Bald eagle (*Haliaeetus leucocephalus*) and Osprey nesting, foraging or perching, and woodland raptor nesting. None of these species were observed during the Site visits, but potential for them to exist either on Site, or adjacent to the Site remains.

The woodland shows significant features and is thereby consistent with past assessment (Middlesex Natural Heritage Study, 2006). Evidence of past forestry suggests it does not represent an old growth forest, as the majority of trees are likely younger than 140 years old. It is feasible that some trees may exceed this age criterion but such specimens do not dominate the forest canopy.

It is important to note however, that no future developments will damage or destroy existing woodlands, as the development envelope must remain a minimum of six (6) metres from the top-of bank that identifies the 100 year erosion hazard line. Hence, any future development that would occur on tablelands would be expected to have no effect on these natural heritage features found in the woodlands and Dingman Creek valley.

4.5.3 Wildlife Movement Corridors

Wildlife movement corridors are habitats that link two (2) or more other wildlife habitats that are critical to the maintenance of a population of a particular species or group of species. The key ecological function of wildlife movement corridors is to enable wildlife to move to and between

areas of significant habitat or core natural areas with minimum mortality. They can provide critical links between shelter, feeding, watering, growing and nesting locations (Lee *et al.*, 1998).

Wildlife and/or habitat corridors can help increase genetic diversity and aid in the re-establishment of populations after random events such as fires or disease outbreaks. These corridors can help to increase biodiversity and population stabilization (Lee *et al.*, 1998).

According to the SWH Ecoregion 7E Criterion Schedule animal movement corridors to be considered on-Site include amphibian movement corridors (OMNR, 2012). Amphibian movement corridors may be present in all eco-sites that are associated with water. These corridors link breeding and summer habitats, and may be extremely important for local populations. Due to presence of woodlands and wetland communities, in addition to Dingman Creek, the Site can be considered an amphibian movement corridor. Field studies indicated a spatial disparity of amphibian distribution with limited specimens near the existing residential development with a high concentration in the ravine, near the creek.

4.5.4 Habitats of Species of Conservation Concern

Habitats for species of conservation concern include:

- Habitat of species that are rare or substantially declining, or have high percentage of their global population in Ontario and are rare or uncommon in the planning area;
- Species that are rare within the planning area, even though they may not be provincially rare;
- Special Concern (SC) species identified under the ESA or the SARO List (formerly referred to as vulnerable);
- Species that are listed as rare or historical in Ontario based on records kept by the NHIC (S1 is extremely rare, S2 is very rare, S3 is rare to uncommon, SH is historical);
- Species identified as nationally endangered or threatened by the COSEWIC, which are not protected in regulation under Ontario's ESA; and,
- Excludes habitats of endangered and threatened species.

A summary of the ELC communities that occur in each of the species of conservation concern habitats, and observations of these features on and around the Site are presented in **Table 4-5.**

Table 4-5: Habitat of species of special concern present at the Site

Habitat	ELC Communities	Observation
Marsh Bird Breeding Habitat	Meadow Marsh (MAM1-6); Submerged Shallow Aquatic (SAS1); Mixed Shallow Aquatic (SAM1); Floating-leaved Shallow Aquatic (SAF1); Open Bog (BOO1); Open Fen (FEO1). For Green heron all SW; MA and CUM1 Sites.	No relevant ELC communities are present.
Woodland Area-Sensitive Bird Breeding Habitat	All Ecosites associated with Deciduous, Mixed & Coniferous Forest (FOD, FOM and FOC), & Deciduous, Mixed & Coniferous Swamp (SWD, SWM, SWC)	Habitat for area sensitive species exists. Species observed include: Hairy woodpecker, Red and White-breasted nuthatches; and Scarlet tanager.

Open Country Bird Breeding Habitat	Mineral & Bedrock Cultural Meadow (CUM1, CUM2)	No relevant ELC communities are present.
Shrub/Early Successional Bird Breeding Habitat	Cultural Thicket (CUT1, CUT2), Cultural Savannah (CUS1, CUS2), & Cultural Woodland (CUW1, CUW2)	No relevant ELC communities are present.
Terrestrial Crayfish	Meadow Marsh (MAM) & Shallow Marsh (MAS)	No relevant ELC communities are present.
Special Concern (SC) & Rare (S1-S3, SH) Wildlife Species	Ecosites associated with any SC, S1-S3 or SH plant or animal element occurrences within 1 or 10 km from project location	No rare species were observed during the Site visits.

A geographical search for significant, threatened or endangered species and associated habitat was conducted using the OMNR NHIC Biodiversity Explorer for SAR. A search of the NHIC database was conducted on the one (1) km^2 area surrounding the Site. It is understood that the NHIC information is based on public regional reports, and habitat boundaries may be variable.

The NHIC search revealed a total of 45 species. For the most part, many of these species have not been observed or documented within the last two (2) decades. However, species such as the Bald eagle, Spiny softshell (*Apalone spinifera*) turtle have been observed recently. During the Site visits, no species of conservation concern were observed, although suitable habitat does exist on adjacent lands.

Table 4-6: Species of conservation concern NHIC results

Taxonomic Group	Scientific Name	Common Name	Ontario Rank	COSEWIC	SARO	Last Date Observed
Mammals	*Myotis leibii*	Small-footed bat	S2S3			1929
	Myotis septentrionalis	Northern long-eared bat	S3			1930
Birds	*Haliaeetus leucocephalus*	Bald eagle	S2N,S4B	NAR	SC	2002
	Vireo griseus	White-eyed vireo	S2B			1985
	Dendroica cerulea	Cerulean warbler	S3B	END	SC	1928
	Seiurus motacilla	Louisiana waterthrush	S3B	SC	SC	1900
	Icteria virens	Yellow-breasted chat	S2B	SC	SC	1971
	Ammodramus henslowii	Henslow's sparrow	SHB	END	END	1975
Reptiles and Turtles	*Emydoidea blandingii*	Blanding's turtle	S3	THR	THR	1965
	Graptemys geographica	Northern Map turtle	S3	SC	SC	1987
	Apalone spinifera	Spiny softshell	S3	THR	THR	2008

Taxonomic Group	Scientific Name	Common Name	Ontario Rank	COSEWIC	SARO	Last Date Observed
Fish	*Erimystax x-punctatus*	Gravel chub	SX	EXP	EXP	1923
	Notropis photogenis	Silver shiner	S2S3	SC	SC	1989
	Moxostoma erythrurum	Golden redhorse	S4	NAR	NAR	1936
	Ammocrypta pellucida	Eastern sand darter	S2	THR	END	1998
Butterflies and Skippers	*Asterocampa celtis*	Hackberry emperor	S2			1977
	Asterocampa clyton	Tawny emperor	S2S3			1977
Moncotyledons	*Aletris farinosa*	Colicroot	S2	THR	THR	1891
	Arisaema dracontium	Green dragon	S3	SC	SC	1973
	Carex tetanica	Rigid sedge	S3			1993
Moncotyledons	*Carex trichocarpa*	Hairy-fruited sedge	S3			1993
	Dichanthelium clandestinum	Deer-tongue panic grass	S2			1993
	Isotria verticillata	Large whorled pogonia	S1	END	END	1879
	Sparganium androcladum	Branching burreed	SH			1882
	Spiranthes magnicamporum	Great plains ladies'-tresses	S3?			1993
	Spiranthes ochroleuca	Yellow ladies'-tresses	S2			1928
Ferns and Fern Allies	*Cystopteris protrusa*	Lowland brittle fern	S2			1984
Dicotyledons	*Arnoglossum plantagineum*	Tuberous indian-plantain	S3	SC	SC	1993
	Cornus florida	Eastern flowering dogwood	S2?	END	END	1984
	Desmodium canescens	Hoary tick-trefoil	S2			1888
	Desmodium illinoense	Illinois tick-trefoil	SX	EXP	EXP	1888
	Draba reptans	Carolina whitlow-grass	S3			1896
	Euonymus atropurpureus	Burning bush	S3			1987
	Eurybia schreberi	Schreber's wood aster	S2S3			1993
	Fraxinus quadrangulata	Blue ash	S3	SC	SC	1993
	Gentianella	Stiff gentian	S2			1898

Taxonomic Group	Scientific Name	Common Name	Ontario Rank	COSEWIC	SARO	Last Date Observed
	quinquefolia					
	Hybanthus concolor	Eastern green-violet	S2			1982
	Hydrophyllum appendiculatum	Appendaged waterleaf	S2			n/a
	Lupinus perennis	Sundial lupine	S3			1936
	Monarda punctata	Spotted beebalm	S1			1984
	Morus rubra	Red mulberry	S2	END	END	1984
	Polygonum erectum	Erect knotweed	SH			1934
	Pterospora andromedea	Woodland pinedrops	S2			1888
Dicotyledons	*Valeriana edulis*	Hairy valerian	S1			1934
	Zizia aptera	Heart-leaved alexanders	S1			1891

COSEWIC: Committee on the status of Endangered Wildlife in Canada; SARO: Species-at-Risk Ontario; S1: Extremely rare; S2: Very rare; S3: Rare to Uncommon; S4: Uncommon to Common; S5: Secure (Very Common to Abundant); S#B: Breeding population; S#N: Staging areas non-breeding; SH: Historical; END: Endangered; THR: Threatened; SC: Special Concern

The OMNR Alymer district was contacted in order to provide some preliminary information on the Site. The OMNR has indicated that there are no known occurrences for SAR on both Lot 58 and Lot 60, however occurrences are in the area, and potential exists for species to occur on Site or in adjacent lands. Species mentioned by OMNR are provided in **Table 4-7**.

Table 4-7: Species of conservation concern OMNR results

Taxonomic Group	Scientific Name	Common name	Ontario S-Rank	COSEWIC	SARO
Birds	*Hirundo rustica*	Barn swallow	S4B		THR
	Haliaeetus leucocephalus	Bald eagle	S2N,S4B	NAR	SC
	Seiurus motacilla	Louisiana waterthrush	S3B	SC	SC
Reptiles	*Heterodon platirhinos*	Eastern hog-nosed snake	S3	THR	THR
	Emydoidea blandingii	Blanding's turtle	S3	THR	THR
	Sternotherus odoratus	Stinkpot turtle	S3	THR	THR
	Graptemys geographica	Northern map turtle	S3	SC	SC
	Chelydra serpentina	Snapping turtle	S3	SC	SC
	Apalone spinifera	Spiny softshell	S3	THR	THR
Dicotyledon	*Castanea dentata*	American chestnut	S2	END	END
	Cornus florida	Eastern flowering dogwood	S2?	END	END
	Fraxinus quadrangulata	Blue ash	S3	SC	SC

During the Site visits, no SAR listed in **Tables 4-6 and 4-7** were observed. Potential habitat for SAR turtles may exist within the ravine areas of the valley, as soft substrates and ample cover

were visible, however this creek. Since the Site is more than 120 metres away from Dingman Creek, there is no perceived risk of disturbance on the creek or ravine area.

Potential habitat for Bald eagle and Osprey (*Pandion haliaetus*) foraging, nesting and perching may also be present due to the size of the woodland at the Site and its connection with woodlands in the surrounding areas and significant wetlands. Again, there is no risk to this habitat, due to the distance between the Site and ravine area.

Potential habitat for Louisiana water thrush and Eastern hog-nosed snake may exist on adjacent lands, as suitable habitats may be available in surrounding areas. However, no future disturbance of this habitat is forecast.

No suitable habitat for Barn swallow was visible at the Site, as no grasslands fields or pastures were evident. There is also limited nesting opportunities and limited areas for foraging.

4.6 Interpretation of Natural Heritage Features

Varied studies on-Site documented the habitat features, dominant plant species, distribution of amphibian species and birds, and incidental wildlife observations. These studies also indicated no presence of SAR plants or wildlife on-Site. Due to the proposed future development plan for tablelands only, no disturbance to significant woodlands or wetlands and associated habitats are expected. This expectation of no disturbance to the woodlands or wetlands is directly related to the minimum setback requirement of 6 m from the erosion hazard line. For this reason, future development in the woodlands is not expected to result in disturbance. In addition, a setback of 6 m from the erosion hazard line also identifies that the tree drip line of the woodland will be also protected from future development of the tablelands. With this approach, development on the tablelands that includes gardens, chess board, and planted vegetation would be expected to cause no effects on the natural heritage features of the adjacent woodlands or wetlands. This expectation is considered in detail within **Section 5**.

5 – Impact Avoidance and Mitigation Measures

5 Impact Avoidance and Mitigation Measures

Site visits over May and June 2013 identified the composition of the physical and natural heritage features along with the flora and fauna at and around the Site. The identification of these features and species then allowed for the sensitivity of these features to disturbance to be designated from high to medium to low. It is now feasible to assess the expected effects of the proposed development on these features in detail. Then with this assessment, opportunities for the application of mitigation measures can then be presented.

5.1 Relationship between Proposed Project and Natural Features

Any future development has the potential to cause effects on the natural heritage features of the Site. This study identified the significant woodland, valley, ravine, and tributary represent key sensitive features that require management, to reduce possible effects from a future proposed project. The significant woodland, valley, and ravine covers a relatively large area at the Site; whereas, the tributary with the breeding amphibians includes a smaller portion of the Site. Thus, efforts in the form of mitigation and impact avoidance measures can be made in order to manage, retain and/or minimize impact to these features. **Table 5-1** summarizes these features, and the expected effect(s) of the proposed development on these features. The expected possible effect(s) of future development on the components is evaluated with different endpoints. First, the area of expected disturbance (from small to large) and land use type are identified, and then the expected direct effects of the future development are also identified.

Table 5-1: Summary of the expected effects of the proposed project on the feature components of the Site. Each of these habitat components initially identified as non-sensitive (i.e., Low), somewhat sensitive (i.e., Moderate), or sensitive (i.e., High).

Feature	Sensitivity	Area of Possible Disturbance	Land Use	Expected Effect
Significant Woodland	High	Small	Natural feature/Habitat	Minor disturbance to wildlife during future construction activities but no encroachment to woodlands expected. Hence disturbance as absent or minor and of short duration, due to 6m setback from top-of-slope.
Tree drip line of Woodland	High	Small	Natural feature/Habitat	No disturbance of drip line expected, due to 6 m setback from top-of-slope.
Valley/Ravine	High	Small	Natural feature/Habitat	Minor disturbance to wildlife during future construction activities, but no encroachment expected. Hence disturbance expected to be absent or minor and short duration.
Dingman Creek	High	Small	Natural feature/Habitat	None. No disturbance to woodlands, valley, and ravine identifies no expected disturbance of Dingman Creek tributary. The retention of woodlands will ensure drainage down the ravine.

5.2 Recommendations for Management of Natural Features

As noted in **Section 5.1**, selected natural heritage and physical features of the Site require additional management to reduce or eliminate the risk of environmental disturbance and effects. **Table 5-2** summarizes these features, the expected effect(s) of the proposed development, and recommendations of mitigation measures to prevent or reduce the impact on these features.

Due to the UTRCA requirement, no encroachment will be permitted to the woodland, valley, ravine, or Dingman Creek tributary. The presence of Dingman Creek, adjacent to the Site, identifies that the runoff from the slope likely contributes to the water in the creek. In the case of the Site, a minimum of a 6 m buffer is required to protect the tree drip line and top of slope. It can be expected that the presence of a minimum 6 m buffer with intact vegetation will provide a number of benefits. This area at the top of the slope will allow for the natural runoff of precipitation down the slope, toward Dingman Creek, as is the case at this time. Since no disturbance of existing vegetation is permitted in the 6 m buffer, the intact vegetation will act to naturally filter the runoff from the area. For example, the approximate change in grade from the top of slope at the edge of the significant woodland to the roadway is perhaps about 2 m (manicured lawn currently slopes toward the road, as shown in Photographs 7 and 8 and other photographs of **Appendix B**). This existing slope on the Site thereby results in the drainage from the manicured lawn to flow, by gravity, toward the adjacent roadway. By extension, this existing drainage identifies that the precipitation that lands on the manicured lawn currently drains away from the Dingman Creek valley. However, the future preservation of the vegetation along the buffer at the top of bank confirms that any precipitation in this area at present will still have an opportunity to capture this water and then allow it to drain toward the creek during the future development activities. This grade from the top of bank exists across most of the Site, and currently drains water from the manicured lawn and gardens to the roadway. Thus, no change in flow volumes or water quality can be expected to occur during future development scenarios, as the areas that receive precipitation and allow it to drain to the creek valley will be retained in the future. Since water volumes and water quality are to be maintained, no negative effects on wildlife or Dingman Creek valley are expected.

Due to an absence of future encroachment to the significant woodland and SWD, and no observation of SAR non-significant effects. A summary of this interpretation and possible mitigation methods available for use is presented in **Table 5-2**.

Table 5-2: Recommended mitigation measures to prevent or reduce the impact of the proposed development on natural features at the Site.

Feature	Expected Effect	Proposed Mitigation
Significant Woodland	Minor disturbance to wildlife at woodland edge during future construction. Temporary in nature.	Noise from future development will disturb woodland. Thus, timing restrictions during breeding bird window should be used. Also, silt fence should be used to provide barrier and thereby avoid encroachment on woodland.
Tree drip line of Woodland	None, due to 6 m setback from top-of-slope	Install sediment fence to protect tree drip line from vehicle traffic.
Valley / Ravine	Minor disturbance to wildlife at south bank during construction. Temporary in nature.	Timing restrictions during breeding bird window; light duty silt fence on lawn and gardens to direct runoff to adjacent street drainage.

Tributary	None	Light duty silt fence on tablelands to direct runoff to adjacent street drainage or allow natural drainage to flow to valley. The retention of 6 m vegetation buffer at top of slope will continue to allow precipitation to drain toward the creek valley and be filtered through existing vegetation. Hence, no decline in water volumes or water quality is expected. With no change in volume or water quality, no effects on wildlife species are expected.

5.3 Impact Avoidance Measures

This study has identified key natural features at and near the Site, and determined the potential effects of the proposed development on these features. Such a determination also is predicated on the absence of SAR species from the tablelands area of the Site, in proximity to the long-established residential areas that include lawns, gardens, planted trees, sidewalks, garages, and residences. Determination of possible effects allows for the identification of BMPs to mitigate negative effects that may result from proposed future development at the Site. This process of effect avoidance is preferable to the implementation of mitigation measures after effects have already been created. Where possible, avoidance measures should be implemented before resorting to mitigation, and lastly rehabilitation to minimize negative effects on natural features after disturbance. As such, the following BMPs are identified as available for implementation for this proposed development. If the BMPs are implemented, they will likely reduce the possible effects from the proposed development on features such as the significant woodland and Dingman Creek. The identification of these BMPs represents an opportunity to avoid the negative effects of future development. However, these are only recommendations, as future development is not yet defined.

Standard BMPs for construction activities should be used to mitigate other types of disturbance on the environment, including the generation of dust, noise and water runoff from the Site. The use of these mitigation measures is expected to reduce the extent and duration of the negative effects of the proposed development. In addition, prescribed mitigation measures with respect to natural heritage features observed at or adjacent to the Site are presented. After these BMPs are noted, the timing of development activities at the Site is considered.

5.3.1 Construction Timing Window

Due to the presence of a significant woodland and SWD adjacent to the Site, the construction timing windows normally associated with fish (in-water works) are applicable. Since Dingman Creek is a warmwater habitat, the timing window for no disturbance in the area would extend from April 1 to July 1 during a calendar year. This window is intended to protect spawning activities of warm water fishes. In addition, due to the presence of breeding birds in the area, it is appropriate to identify that no disturbance should occur until after July 15. For example, it would be prudent to remove the planted large-toothed aspen from the manicured lawn after July 15, when the breeding bird season for colonial and shrub nesting birds, waterfowl, bald eagle, osprey, woodland raptors and those of special conservation concern ends. It would also be appropriate for future construction to ideally avoid the spring season, when large runoff events

are more common, due to snow and/or rain, as the potential for runoff down slope may be higher during the spring compared with other times of the year with less precipitation and generally drier conditions.

5.3.2 Sediment and Erosion Control

It is important to recognize the difference between erosion control and sediment control measures when preparing drainage control plans. The difference between erosion and sediment control methods is defined and summarized for the purposes of this document:

- Erosion control is the process by which the potential for erosion is minimized; and,
- Sedimentation control is the process by which the potential for eroded soil to be transported and/or deposited beyond the limits of the construction site is minimized.

Measures to address both erosion control and sedimentation control are required. Both measures are required due to the presence of the SWD and Dingman Creek in proximity to the Site. The methods proposed for use herein follow standard approaches for sediment and erosion control near sensitive habitats such as creeks, by MTO (2007). Therefore, the design of erosion and sedimentation control measures is expected to be flexible and evolve throughout the construction process. For construction projects adjacent to natural areas for this Site, a number of approaches are identified, as reviewed in **Table 5-3**. In general, a sediment fence should be installed around the entire perimeter of the construction zone to prevent any potential sediment-laden water to flow to the valley, adjacent properties, and also to the cul-de-sac and associated storm sewers. Various BMPs can be applied to limit the effects of erosion and sedimentation associated with the proposed development. These measures are used to limit effects on adjacent natural areas from disturbance. During future communications with UTRCA, the development plans will likely have environmental management methods identified for use.

All BMPs should be regularly inspected to ensure functionality. For example, inspections should occur after rain events to ensure they are functioning as designed. It is also important that construction staff pay attention to weather forecasts. To prepare for upcoming rain events, operators should walk around the construction site to ensure that BMPs are operating properly. This preparation should verify that dumpsters are covered, paint and other chemicals are covered, and no oil spills are present or possible. Operators should also visually inspect all BMPs when the site will be inactive for several days, such as weekends or holidays. This will help to prepare for rain events that may occur when workers are off-Site. These planned preparation procedures with help minimize the risk of on or off-Site property damage.

Table 5-3: Best management practices for sediment and erosion control for Sites in proximity to wetlands or creeks (see Table 5-3 of MTO (2007) for additional information)

BMP	Advantage	Limitation
Silt Fence	• Effective way to prevent off-site transport • Relatively inexpensive • Reduces runoff and sediment transport • Mitigates erosion	• Must be installed properly to prove effective • Not suitable in areas with concentrated runoff volumes • Not suitable on rock or hard surfaces • Not suitable in areas exposed to high wind • Regular inspection required
Sodding or Sod Buffer Strips	• Provides rapid vegetation establishment • Highly effective sediment trapping efficiency • Allows filtered runoff to enter adjacent natural area(s) • Reduces erosion	• Watering is required after placement • Expensive • Time Consuming • Difficult to store for quick use
Sediment Basin & Rock Dams	• Effective at capturing sediment from stormwater runoff • Gradual slow release of water reducing erosion and runoff rates • Used for larger areas (5 - 100 acres) • Can be temporary or permanent	• Can be costly • Can create habitat if structure is retained on permanent basis • May require installation of outlet structure for basin and discharge channel
Vegetative Buffer	• Retains existing vegetation • Reduces erosion • Allows filtered runoff to enter adjacent natural area(s) • Filters air	• Ensure protective measures are taken • Space consuming depending on size • Can be costly if buffer covers large area of land
Straw Bales	• Mitigates erosion • Relatively inexpensive • Retains sediment and allows filtered runoff to flow downstream	• Must be installed properly to prove effective • Not suitable in areas with concentrated runoff volumes • Require some maintenance
Dust Mitigation	• Reduces the amount of airborne dust particles • Reduces the amount of sedimentation and by association water pollution to nearby water bodies. • Reduces the impact on respiratory systems	• Can be costly • May increase muddy conditions on-Site
Spill Prevention	• Reduces the amount of pollution	• Requires Site preparation • Space consuming depending on size • Time consuming

6 – Summary and Conclusions

6 Summary and Conclusions

Field visits from May to July 2013 allowed for a detailed inventory of the physical and natural heritage features of the Site. These visits confirmed the existence of distinct built features on tablelands and existence of relatively undisturbed natural heritage features in the woodlands, valley/ravine, and tributary of Dingman Creek. These visits also allowed for the preparation of species inventories that revealed no presence of SAR wildlife or birds.

The Site features and results of this EIS can be summarized as follows:

- Historical land use of area, pre-residential development, was agriculture with pasture;
- Visual evidence suggests past selective forestry in significant woodland, prior to residential development in the area;
- External features of trees in woodland indicate it does not represent an old growth forest;
- Slope stability study recommended a setback of 6 m from 100 year erosion hazard line;
- The plant community present on-Site has been influenced by past residential land development, with extensive planting of ornamental herbaceous and woody plants;
- Ornamental features include perennial flowers, annual flower gardens, planted trees, and manicured lawn do not represent a natural extension of the adjacent woodland, due to the absence or very low density of wildlife and evidence of high density of non-native plants on the tablelands compared with low density of non-native plants in woodlands;
- No rare, threatened, endangered or species of special concern observed on-Site;
- There are no areas of natural or scientific concern located on-Site;
- Field visits revealed a number of breeding birds and other wildlife on-Site but all species are typical of disturbed habitats;
- Any future development must exclude the woodlands and use the tablelands only
- Any future development will require a minimum setback from the 100 year Erosion hazard line, and this will act to protect the existing woodlands;
- If the minimum setback is used for the 100 year Erosion hazard line, this distance will act to protect the dripline of the woodland
- Protection of the woodland dripline will help maintain the existing woodland features during any future development scenario;
- Future construction on tablelands should occur on-Site after July 15, to allow any migratory birds that may use the habitats of the gardens etc. to complete breeding; and
- Use of appropriate sediment and erosion control measures along with other BMPs is required to provide protection to adjacent woodlands, Dingman Creek, and other natural heritage features.

Overall, it is **exp's** opinion that if the recommendations identified in this EIS are followed, the possible effects of future development on the tablelands will be limited, and will not significantly influence the existing woodlands, valley, ravines, and Dingman Creek tributary. Application of a 6 m setback from the 100 year erosion hazard line is expected to provide protection from future slope erosion and also protect the woodland and dripline. The apparent absence of SAR from the tablelands identifies that SAR that may exist in the woodlands or valley will also not be influenced by any future development. Thus, this available information on the Site and identified erosion and sediment control measures along with other BMPs are expected to reduce or eliminate the potential impacts from the proposed development on the tablelands of the Site.

7 – General Limitations and Closure

7 General Limitations and Closure

Information in this report is considered to be privileged and confidential and has been prepared exclusively for **Carla and Bob Kelly**.

The information presented in this document is based on an environmental inventory and site assessment which was designed to provide information to support and resolve any potential effect(s) the proposed development activities on-Site will have on the natural environment. The conclusions and recommendations presented in this report reflect Site conditions existing at the time of the investigation.

The environmental impact study was carried out under the guidance provided by the Upper Thames River Conservation Authority and Ontario Ministry of Natural Resources to address the intent of applicable provincial Regulations, Guidelines, Policies, Standards, Protocols, Statutes and Objectives administered by the Conservation Authority, Ministry of the Environment, and/or Ministry of Natural Resources, and identify best management practices which include mitigation measures.

It should also be noted that current environmental Regulations, Guidelines, Policies, Standards, Protocols, Statutes and Objectives are subject to change, and such changes, when put into effect, could alter the conclusions and recommendations noted throughout this report. Achieving the study objectives stated in this report has required us to arrive at conclusions based upon the best information presently known to us. No investigative method can completely eliminate the possibility of obtaining partially imprecise or incomplete information; it can only reduce the possibility to an acceptable level. Professional judgment was exercised in gathering and analyzing information obtained and in the formulation of the conclusions. Like all professional persons rendering advice, we do not act as absolute insurers of the conclusions we reach, but we commit ourselves to care and competence in reaching those conclusions.

Our undertaking at **exp**, therefore, is to perform our work within limits prescribed by our clients, with the usual thoroughness and competence of the engineering profession. It is intended that the outcome of this investigation assist in reducing the client's risk associated with environmental impairment. Our work should not be considered 'risk mitigation'. No other warranty or representation, either expressed or implied, is included or intended in this report.

This report was prepared for the exclusive use of **Carla and Bob Kelly** and may not be reproduced in whole or in part, without written consent of **exp**, or used or relied upon in whole or in part by other parties for any purposes whatsoever. Any use which a third party makes of this report, or any part thereof, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. **Exp** Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Closure

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Yours truly,

exp Services Inc.

Annette Maher, M.A.Sc.
Environmental Scientist
Environmental Sciences Division

David Praskey, B.Sc.
Aquatic Ecologist
Environmental Sciences Division

Dean Fitzgerald, Ph.D.
Team Leader, Ecological Services of Ontario
Environmental Sciences Division

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Figures

Appendix A: Letter from UTRCA

UPPER THAMES RIVER
CONSERVATION AUTHORITY

"Inspiring a Healthy Environment"

The Thames
A Canadian
Heritage River

March 4, 2013

Royal LePage Triland Realty Brokerage
334 Wellington Street
London, Ontario
N6C 4P6

Attention: Terry Stevens – (via e-mail: tstevens@royallepage.ca)

Dear Ms. Stevens:

Re: **Property & Development Inquiries**
58 & 60 Hog Back Close
Municipality of Middlesex Centre (Delaware)

The Upper Thames River Conservation Authority (UTRCA) is providing this letter following recent inquiries from potential buyers regarding the possibility of development on property located at 60 Hog Back Close in the Municipality of Middlesex Centre (Delaware). Following discussions with the potential purchasers we are of the understanding Lots 58 & 60 are currently for sale and while Lot 58 has an existing single family residence on site, Lot 60 is being offered for sale separately as a buildable lot. We offer the following comments under Ontario Regulation 157/06:

1) As you can see from the attached UTRCA Regulation Limit mapping, both properties are entirely regulated by the Conservation Authority due to the presence of a steep slope (erosion hazard lands) and wetland associated with the Dingman Creek corridor. (Please note: mapping should be printed landscape on legal size (8 ½ x 14 inch) paper for scales to be accurate.)

2) The UTRCA regulates development within the Regulation Limit in accordance with Ontario Regulation 157/06 made pursuant to Section 28 of the *Conservation Authorities Act*. This regulation requires proponents to obtain written approval from the UTRCA prior to undertaking any works in the regulated area including filling, grading, construction, alteration to a watercourse and/or interference with a wetland.

3) UTRCA policies do not support new development in hazard lands. New development will not be permitted within 6 metres from the 100-year erosion hazard. Prior to issuing approval for any new development on 60 Hog Back Close, the UTRCA would require the submission of a favourable geotechnical (slope stability) assessment and an

Environmental Impact Study (EIS), prepared by qualified professionals, to the satisfaction of the UTRCA. The geotechnical slope stability report will need to identify the location of the erosion hazard (100-year erosion hazard plus 6 metre access allowance) in order to determine if there is a developable envelope present on site or if development could be supported on this lot.

4) We also wish to advise that the woodland feature that covers the majority of both lots has been identified as being significant in the Middlesex Natural Heritage Study (2006). UTRCA policy stipulates that new development and site alteration is not permitted in woodlands considered to be significant. Furthermore, new development and site alteration is not permitted on adjacent lands to significant woodlands (within 50 metres) unless an EIS, prepared by a qualified professional, has been completed to the satisfaction of the UTRCA.

5) We note the presence of the wetland on the subject property would also warrant the submission of an EIS. Please note that the UTRCA regulates the Wetland proper and the Area of Interference surrounding the Wetland. The Area of Interference is 120 m for all Provincially Significant Wetlands and Wetlands greater than 2 hectares in size and 30 m for Wetlands that are not provincially significant and less than 2 hectares in size. UTRCA policy stipulates that new development and site alteration is not permitted in wetlands. The potential for development and site alteration within the area of interference of a wetland shall be determined through the completion of an EIS, prepared by a qualified professional, to the satisfaction of the UTRCA.

6) For details on our policies regarding works in areas regulated by the Conservation Authority, you may wish to refer to the *Environmental Planning Policy Manual for the Upper Thames River Conservation Authority (June 2006)*, available on our website at:

   www.thamesriver.on.ca/Planning_Permits_and_Maps/env_planning_policy_manual.htm

We suggest there may be constraints to development on the 60 Hog Back Close property and caution that the above noted studies may confirm there is an insufficient developable envelope for a new house and septic. We recommend you disclose the above information to the current landowner and potential purchasers. If you have any questions regarding the above information, please contact the undersigned.

Please note: We are also providing Drinking Water Source Protection information for all projects occurring in areas identified as vulnerable. To that end, please review the attached Drinking Water Source Protection information (Appendix A).

Yours truly,
UPPER THAMES RIVER CONSERVATION AUTHORITY

Karen M. Winfield

Karen Winfield
Land Use Regulations Officer

Encl. - Appendix A (Drinking Water Source Protection Information applicable to 58 & 60 Hog Back Close, Municipality of Middlesex Centre (Delaware))

Appendix A – Drinking Water Source Protection Information applicable to 58 & 60 Hog Back Close, Municipality of Middlesex Centre (Delaware)

DRINKING WATER SOURCE PROTECTION

The *Clean Water Act* (CWA), 2006 is intended to protect existing and future sources of drinking water. The Act is part of the Ontario government's commitment to implement the recommendations of the Walkerton Inquiry as well as protecting and enhancing human health and the environment. The CWA sets out a framework for source protection planning on a watershed basis with Source Protection Areas established based on the watershed boundaries of Ontario's 36 Conservation Authorities. The Upper Thames River, Lower Thames Valley and St. Clair Region Conservation Authorities have entered into a partnership for The Thames-Sydenham Source Protection Region. Drinking Water Source Protection represents the first barrier for protecting drinking water including surface and ground water from becoming contaminated or overused thereby ensuring a sufficient, clean, safe supply now and for the future.

Assessment Reports:

The Thames-Sydenham Source Protection Region has prepared *Assessment Reports* which contain detailed scientific information that:

- identifies vulnerable areas associated with drinking water systems;
- assesses the level of vulnerability in these areas; and
- identifies activities within those vulnerable areas which pose threats to the drinking water systems, and assess the risk due to those threats.

The Assessment Report for the Upper Thames watershed delineates three types of vulnerable areas: Wellhead Protection Areas, Highly Vulnerable Aquifers and Significant Groundwater Recharge Areas. We wish to advise that the subject property contains areas identified as being a Highly Vulnerable Aquifer and Significant Groundwater Recharge Area.

Mapping which shows these areas is available at:

Highly Vulnerable Aquifers:
http://www.sourcewaterprotection.on.ca/downloads/assessment_reports/UTRCA/Appendices/A1-Maps/Map4-3-2_Highly%20Vulnerable%20Aquifers.pdf

Significant Groundwater Recharge Areas
http://www.sourcewaterprotection.on.ca/downloads/assessment_reports/UTRCA/Appendices/A1-Maps/Map4-2-2%20SGRA%20Vulnerability.pdf

Source Protection Plans:

Using the information in the Assessment Report, a Source Protection Plan is being developed for the Upper Thames watershed. It is anticipated that this Plan will consist of a range of policies that together, will reduce the risks posed by the identified water quality and quantity threats in the vulnerable areas. These policies will include a range of voluntary and regulated approaches to manage or prohibit activities which pose a threat to drinking water. Activities that can lead to; low, medium and significant threats have been identified in Appendix 10 of the Upper Thames River Source Protection Area Assessment Report, dated August 12, 2011. Available at:

http://www.sourcewaterprotection.on.ca/downloads/assessment_reports/UTRCA/Appendices/A10-Threats%20and%20Risk%20Assessment.pdf

AREA OF VULNERABILITY	VULNERABILITY SCORE	THREATS & CIRCUMSTANCES
Highly Vulnerable Aquifer (HVA)	6	Moderate & Low threats
Significant Groundwater Recharge Area (SGRA)	6	Moderate & Low threats
Wellhead Protection Area (WHPA)	n/a	n/a

NOTE: Certain Activities on this property may be considered *Moderate or Low* threats to drinking water.

As indicated, the *Source Protection Plan* is currently being developed and as such, the UTRCA cannot speculate what the *Plan* might dictate for such areas. Under the CWA, the Source Protection Committee has the authority to include policies in the *Source Protection Plan* that may prohibit or restrict activities identified as posing a *significant threat* to municipal drinking water supplies. Municipalities may also have or be developing policies that apply to vulnerable areas when reviewing development applications. Proponents considering land use changes, site alteration or construction in these areas need to be aware of this possibility.

Appendix B: Site Photographs

Photograph 1: View of the existing residence at 58 Hog Back Close, Delaware, Ontario. The foreground shows a portion of the extensive manicured lawn and gardens with the background showing the woodlands, at the rear of the residence.

Photograph 2: View of the east side of existing residence at 58 Hog Back Close. The foreground shows the driveway and extensive gardens and planted trees while the background showing the woodlands, at the rear of the residence.

Photograph 3: View of the rear of the existing residence on Lot 58 looking toward Hog Back Close, with driveway, manicured lawn, flower beds, and planted conifers evident.

Photograph 4: View of the rear of the existing residence on Lot 58. This view shows the flower beds at the base of the residence, the manicured lawn, planted tree, and gardens that exist at the edge of the woodlands.

Photograph 5: Side view of edge of the existing residence on Lot 58, with the manicured lawn, flower beds, and planted conifers evident at the front of the house, on the east side.

Photograph 6: View of edge of the existing residence on Lot 58 and a portion of the manicured lawn, flower beds, planted conifers, and driveway the east side.

Photograph 7: View of edge of the existing residence on Lot 58 and a portion of the manicured lawn, flower beds, and woodlands on the west side of the lot.

Photograph 8: View of edge of the existing residence on Lot 58 and a portion of the manicured lawn, flower beds, and woodlands on the west side of the lot. The lawn, flower beds, and woodlands of a portion of Lot 60 are evident in the centre and the left side of the photograph.

Photograph 9: View of edge of the manicured lawn of Lot 60 where it meets Hog Back Close. The manicured lawn ends at the property line, and the woody vegetation in the background of the picture is located on the adjacent property. However, the inner portion of Lot 60 includes the woodlands shown in Photograph 5. Thus, a rectangle of lawn, gardens, and planted trees exists on Lot 60 before it meets the woodland.

Photograph 10: View of manicured lawn of Lot 60 where it meets Hog Back Close. The gardens and planted conifers of Lot 58 are evident on the far left of the photograph.

Photograph 11: View of gardens with planted large-tooth aspen, and other deciduous and coniferous trees on north side of Lot 60. These gardens in the foreground are populated with greenhouse plants and also include a life-size chess set (black and white chess pieces on left side of photograph) and chairs. The woodlands are evident in the background of the garden.

Photograph 12: Closer view with the gardens and planted large-tooth aspen of the north portion of Lot 60 at the ecotone with the woodlands. These gardens in the foreground are populated by greenhouse plants with dark wood mulch while the woodlands are populated by native and non-native plants on native soils.

Photograph 13: Closer view with the gardens and planted large-tooth aspen of the north portion of Lot 60 at the ecotone with the woodlands. This view shows how the gardens and a shed extend in to the upper edge of the woodlands, at the top of the slope. In the background, this view shows the inner woodlands are essentially not disturbed by this land development.

Photograph 14: View of the top of slope adjacent to Lot 60, with the gardens in the foreground. The woodland in the background shows mature and immature trees, with examples of coppice growth forms. Based on the size of the trees and growth forms, it is probable that intensive forestry was completed on the slope approximately 60 – 100 years ago.

Photograph 15: View of the initial portion of the slope at Lot 60. The woodland shows mature and immature trees. It is noteworthy that wildlife browse was interpreted to be minimal.

Photograph 16: View of the wooded slope at 60 Hog Back Close. This portion of the woodland includes mature and immature trees, with additional examples of coppice growth forms. The woodland features along the slope are similar for 58 and 60 Hog Back Close, and again suggests limited disturbance associated with the existing land development.

Photograph 17: Another view of the woodland slope adjacent to Lot 60.

Photograph 18: View of the base of the slope and valley, with a tributary of Dingman Creek in background. This portion of the woodland valley also includes mature and immature trees, with examples of coppice growth forms. The channel for Dingman Creek was well defined.

Photograph 19: Another view of the tributary of Dingman Creek, in the valley downslope from Lot 60. This habitat included poorly drained soils and was dominated by Skunk cabbage (visible in the foreground, adjacent to the creek).

Photograph 20: View of approximately the same valley habitat as shown in Photograph 19 approximately three weeks later during an evening amphibian survey. This area adjacent to the creek was dominated by skunk cabbage, included moist and poorly drained soils, and was associated with a large population of frogs and toads.

Appendix C:
Example of Scientific Literature Relevant to this Study

CONSERVATION ISSUES

External Characteristics of Old Trees in the Eastern Deciduous Forest

Neil Pederson[1]

Department of Biological Sciences
Eastern Kentucky University
521 Lancaster Ave.
Richmond, KY 40475

[1] Corresponding author:
adk@ldeo.columbia.edu

[2] Current address:
Tree Ring Lab, Lamont-Doherty Earth Observatory of Columbia University
P.O. Box 1000, 61 Route 9W
Palisades, NY 10964

Natural Areas Journal 30:396–407

ABSTRACT: Because old trees contain centuries of environmental history, investigators are increasingly turning to dendrochronology to create context for current environmental change. While a suite of characteristics to identify old trees has been developed, most of these characteristics are for conifers or trees growing in low-density forests. Given that the diverse Eastern Deciduous Forest (EDF) is dominated by a species-rich, angiosperm-dominated woody flora, old-growth forests are scarce in the EDF, and research permits in natural areas often limit the number of trees that can be sampled, having a suite of characteristics that identify old trees for a wider range of species increases the likelihood of efficiently creating longer depths of ecological history. The common indicators of old (> 250 year old) EDF angiosperms are presented to aid in the recovery and preservation of these living sources of information. Six common external characteristics of old angiosperm trees include: (1) smooth or "balding" bark; (2) low stem taper; (3) high stem sinuosity; (4) crowns comprised of few, large-diameter, twisting limbs; (5) low crown volume; and (6) a low ratio of leaf area to trunk volume. The existence of old trees in the landscape can also be related to life-history traits or land-use histories. Both professionals and lay folk can be trained to identify these traits and environmental conditions. While these characteristics and settings generally signal the potential for old trees, there is no guarantee that they represent old ages. However, these characteristics should aid in the discovery of old trees throughout the EDF.

Index terms: angiosperm trees, Eastern Deciduous Forest, forest history, old-growth forests, tree-ring analysis

INTRODUCTION

As investigators try to understand the long-term context of recent environmental change, many are turning to tree-ring analysis as a tool for understanding the range of variation in climatic and disturbance history. Old trees are vital to the revelation of environmental history because of their capacity to store information in their annual growth rings, morphology, wounds, and scars (Douglass 1920; Sheppard and Cook 1988; Fritts and Swetnam 1989). Old trees are also of great cultural value because of their aesthetic and spiritual qualities (Leverett 1996; Perlman 1996). Because of the limited area of old-growth forest in the eastern United States (Davis 1996), limited number of exceptionally old trees within an old-growth forest, and limits routinely placed on sampling trees in natural areas, the ability to readily identify old trees increases the likelihood of creating longer, well-replicated reconstructions of environmental history. Eastern North America is a highly fragmented region that is continuing to undergo rapid change under the threat of invasive species and pests, urban development, and climate change. In fact, recent land-use analysis suggests that forest loss has resumed after decades of forest recovery (Drummond and Loveland 2010). Therefore, identification of old trees should help preserve these rare, living, and culturally-valuable individuals.

Past work has identified a suite of external characteristics that can be used to readily identify older trees across a range of genera. These external features include spiral grain in a tree's trunk, thin or balding bark, loss of apical dominance, crown dieback, and crowns with a few, large limbs, among others (Swetnam and Brown 1992; Stahle and Chaney 1994; Kaufmann 1996; Stahle 1996; Huckaby et al. 2003). Most of these diagnostic features were identified from conifers or trees growing in relatively low-density forests. Given that there are more than 300 tree species in the dense Eastern Deciduous Forest (EDF), of which at least 75% percent are angiosperms (Burns and Honkala 1990; U.S. Department of Agriculture, Forest Service 2009), there is a need to discover and describe external characteristics of potentially old trees in this biome.

The primary purpose of this paper is to describe the common external indicators of trees > 250-years old in closed-canopied forests typical of the EDF and to hypothesize on the potential mechanisms of these features. Observations described here expand on previously-described traits for *Quercus* subgenera *Leucobalanus* (see Stahle and Chaney 1994; Stahle 1996) with the inclusion of additional characteristics and observations of other *Quercus* species and other genera, including *Acer, Betula, Carya, Liriodendron, Magnolia,* and *Nyssa.* Admittedly, many of the characteristics

Attachment #16

UPPER THAMES RIVER
CONSERVATION AUTHORITY

"Inspiring a Healthy Environment"

The Thames
A Canadian
Heritage River

December 16, 2014

Jason Dieleman - (via e-mail: [redacted])

[redacted]

Dear Mr. Dieleman:

Re: UTRCA Application #143/14
Proposed House and Driveway Construction and Septic Installation
60 Hogback Close
Municipality of Middlesex Centre (Delaware)

The Upper Thames River Conservation Authority (UTRCA) acknowledges receipt of an application form, project drawings and permit fee in support of the above-noted work. It is our understanding the work will involve the construction of a new single family residence and driveway and the installation of an associated septic system at the above noted property. We have reviewed the information submitted, concluding that requirements for approval have been addressed. Consequently, we are prepared to approve Application #143/14, subject to the following terms and conditions:

1. Work must proceed as per plans submitted to the UTRCA:

   - *E-mail (dated December 8, 2014) and attached site specific project info (Wastewater Treatment System – 60 Hog Back Close, Delaware design drawing Sheet No. 1 (Project No. 1412-03), prepared by A.W. Bos of BOS Engineering & Environmental Services Inc. (dated stamped December 8, 2014)) received by the UTRCA from Jason Dieleman.*
   - *E-mail (dated December 2, 2014) and attached site specific project info (Dieleman Residence, Lot 60, Hog Back Close, County of Middlesex, Ontario, design drawings Sheets 1-5 of 5, (Job No. 9180) dated November 13, 2014, prepared by Orchard Design Studio Incorporated), received by the UTRCA from Jason Dieleman.*
   - *Copy of letter to Mr. Jason Dieleman (dated August 26, 2014) from Art W. Bos of BOS Engineering & Environmental Service Inc. Re: Residential Wastewater Treatment System Assessment – 60 Hog Back Close (Delaware) Middlesex Centre.*
   - *E-mail (dated September 9, 2013) and attached site specific project information, received by the UTRCA from Dean Fitzgerald of exp Services Inc.*
   - *Copy of letter with attached Site Plan and Cross Section A-A (all dated July 12, 2013) to Bob and Carla Kelly from Craig Swinson and Rebecca Walker of exp Services Inc. Re: Response to UTRCA Technical Review email, sent July 10, 2013, Slope Stability Assessment, 60 Hog Back Close, Delaware, Ontario (KCH00212307-GE).*

- *Environmental Impact Study, 60 Hog Back Close, Delaware, ON NOL 1E0 (Project Number: KCH-00212307-GE), dated July 2013, prepared by Annette Mahar, David Praskey and Dean Fitzgerald of exp Services Inc.*
- *Slope Stability Assessment, Proposed Development, 60 Hog Back Close, Delaware, Ontario, KCH00212307-GE (dated June 6, 2013), prepared by C.D. Swinson and Rebecca Walker of exp Services Inc.*

2. Work must proceed in full accordance with the terms and conditions listed on the attached permit.
3. Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.
4. Any revisions to the approved drawings must be forwarded to the UTRCA for review and approval.
5. Any project drawing revisions required as a result of review by the Municipality of Middlesex Centre must be forwarded to the UTRCA for review and approval.
6. The UTRCA will require a set of final "as-built" drawings, stamped by a qualified professional, once prepared.
7. The UTRCA must be notified regarding project commencement and completion dates.
8. All project works must conform to the recommendations and mitigations measures outlined in the Slope Stability Assessment report (KCH00212307-GE) prepared by Exp Services Inc., dated June 6, 2013.
9. Erosion and sediment control measures must be properly installed prior to work commencing and must remain in proper working condition until such time that all disturbed soils are fully stabilized.
10. All sediment and erosion control measures shall be inspected daily/regularly (including prior to and immediately following runoff events) to ensure that they are functioning properly and are maintained and/or upgraded as required.
11. If the sediment and erosion control measures are not functioning properly, no further work should occur until the sediment and/or erosion problem is addressed. In the case that the sediment and erosion controls do not serve their intended purpose and/or function at an acceptable level, it is the proponent's responsibility to correct and/or implement the necessary measures to achieve an acceptable level of performance.
12. No fill, removed and/or imported as part of the work, will be placed or stockpiled slope-side (north) of the erosion hazard limit identified on the submitted site plans.
13. No site grading is to occur slope-side (north) of the erosion hazard limit identified on the submitted site plans.
14. Given the Natural Heritage designation of the forested areas on the subject property, the Tree Commissioner for the County of Middlesex should be consulted prior to removal of any trees associated with the works.
15. Any work beyond the scope of what has been presented to the UTRCA must be submitted for review and approval prior to work commencing or continuing.
16. All work must be completed within one year of the approval date or a request for extension must be received in writing no later than December 16, 2015.

Please note: We are also providing Drinking Water Source Protection information for all projects occurring in areas identified as vulnerable. To that end, please review the attached Drinking Water Source Protection information (Appendix A).

A copy of the UTRCA permit is attached. If you have any questions regarding this information, please contact the undersigned.

Yours truly,
UPPER THAMES RIVER CONSERVATION AUTHORITY

Karen M. Winfield

Karen Winfield
Land Use Regulations Officer

Encl. - UTRCA Section 28 Permit #143-14
- Appendix A (Drinking Water Source Protection Information applicable to 58 & 60 Hog Back Close, Municipality of Middlesex Centre (Delaware))

c.c. – Arnie Marsman, Municipality of Middlesex Centre – (via e-mail: marsmana@middlesexcentre.on.ca)

Appendix A – Drinking Water Source Protection Information applicable to 58 & 60 Hog Back Close, Municipality of Middlesex Centre (Delaware)

DRINKING WATER SOURCE PROTECTION

The *Clean Water Act* (CWA), 2006 is intended to protect existing and future sources of drinking water. The Act is part of the Ontario government's commitment to implement the recommendations of the Walkerton Inquiry as well as protecting and enhancing human health and the environment. The CWA sets out a framework for source protection planning on a watershed basis with Source Protection Areas established based on the watershed boundaries of Ontario's 36 Conservation Authorities. The Upper Thames River, Lower Thames Valley and St. Clair Region Conservation Authorities have entered into a partnership for The Thames-Sydenham Source Protection Region. Drinking Water Source Protection represents the first barrier for protecting drinking water including surface and ground water from becoming contaminated or overused thereby ensuring a sufficient, clean, safe supply now and for the future.

Assessment Reports:

The Thames-Sydenham Source Protection Region has prepared *Assessment Reports* which contain detailed scientific information that:

- identifies vulnerable areas associated with drinking water systems;
- assesses the level of vulnerability in these areas; and
- identifies activities within those vulnerable areas which pose threats to the drinking water systems, and assess the risk due to those threats.

The Assessment Report for the Upper Thames watershed delineates three types of vulnerable areas: Wellhead Protection Areas, Highly Vulnerable Aquifers and Significant Groundwater Recharge Areas. We wish to advise that the subject property contains areas identified as being a Highly Vulnerable Aquifer and Significant Groundwater Recharge Area.

Mapping which shows these areas is available at:

Highly Vulnerable Aquifers:
http://www.sourcewaterprotection.on.ca/downloads/assessment_reports/UTRCA/Appendices/A1-Maps/Map4-3-2_Highly%20Vulnerable%20Aquifers.pdf

Significant Groundwater Recharge Areas
http://www.sourcewaterprotection.on.ca/downloads/assessment_reports/UTRCA/Appendices/A1-Maps/Map4-2-2%20SGRA%20Vulnerability.pdf

Source Protection Plans:

Using the information in the *Assessment Report*, a *Proposed Source Protection Plan* has been developed for the Upper Thames watershed. The *Proposed Source Protection Plan*, along with any written comments, have now been submitted to the Province for approval by the Minister of the Environment. The *Proposed Source Protection Plan is available at:*

http://www.sourcewaterprotection.on.ca/sp_planning_protectionplan.html

The *Proposed Plan* consists of a range of policies that together, will reduce the risks posed by the identified water quality and quantity threats in the vulnerable areas. These proposed policies include a range of voluntary and regulated approaches to manage or prohibit activities which pose a threat to drinking water. Activities that can lead to; low, medium and significant threats have been identified in

Appendix 10 of the *Upper Thames River Source Protection Area Assessment Report*, dated August 12, 2011. Available at:

http://www.sourcewaterprotection.on.ca/downloads/assessment_reports/UTRCA/Appendices/A10-Threats%20and%20Risk%20Assessment.pdf

AREA OF VULNERABILITY	VULNERABILITY SCORE	THREATS & CIRCUMSTANCES
Highly Vulnerable Aquifer (HVA)	6	Moderate & Low threats
Significant Groundwater Recharge Area (SGRA)	6	Moderate & Low threats
Wellhead Protection Area (WHPA)	n/a	n/a

NOTE: Certain Activities on this property may be considered *Moderate or Low* threats to drinking water.

Under the CWA, the Source Protection Committee has the authority to include policies in the *Proposed Source Protection Plan* that may prohibit or restrict activities identified as posing a *significant threat* to drinking water. Municipalities may also have or be developing policies that apply to vulnerable areas when reviewing development applications. Proponents considering land use changes, site alteration or construction in these areas need to be aware of this possibility.

Provincial Policy Statement (PPS, 2005):
Section 2.2.1 requires that:

"Planning authorities shall protect, improve or restore the quality and quantity of water by: d) implementing necessary restrictions on development and site alteration to:

1. *protect all municipal drinking water supplies and designated vulnerable areas; and*
2. *protect, improve or restore vulnerable surface and ground water features, and their hydrological functions*"

Section 2.2.2 requires that:

"*Development and site alteration shall be restricted in or near sensitive surface water features and sensitive ground water features such that these features and their related hydrologic functions will be protected, improved or restored*".

Municipalities must be consistent with the Provincial Policy Statement when making decisions on land use planning and development.

THAMES RIVER
ERVATION AUTHORITY

Application For Development, Interference with Wetlands and Alterations to Shorelines and Watercourses

Thames River Conservation Authority
24 Clarke Road London, Ontario N5V 5B9
Tel. (519) 451-2800 Fax (519) 451-1188

Conservation Authorities Act - Ontario Regulation 157/06, under O.reg. 97/04

Application # 143/14

Name of Landowner: Jason Dieleman Tel. Home: [redacted]
Address: [redacted] Postal Code: N0L 1E0 Tel. Business: [redacted]
Location of Project: 60 Hogback Close, Delaware, ON Middlesex
Street and Number, or Lot(s) and Concession Number/ 911 Address Municipality

DESCRIPTION OF PROJECT

General description of project: New House Construction

All applications must be accompanied by a detailed site plan, providing information on the following:

1. general location of property in relation to roads
2. location and dimensions of all existing structures on the property
3. location of any watercourse, wetland or steep slope on or near the subject property
4. intended location of all proposed work, including construction, filling/grading/excavation, wetland interference or watercourse alteration
5. location of septic system, if applicable and other property utilities, wells, etc.
6. cross-section of proposed work, showing existing and final grades and structure openings

Works including floodproofing of structures must be accompanied by detailed drawings, prepared by qualified professional engineers, with proper dates and stamps appearing on all plans. If filling is proposed, details on the type, area and volume of fill must be provided to the UTRCA, with existing and proposed grades clearly presented on plans.

UNLESS OTHERWISE REQUESTED, THE CONSERVATION AUTHORITY ONLY REQUIRES ONE COPY OF ALL PROJECT DRAWINGS. MULTI-PAGED ENGINEERING DRAWINGS MUST BE FOLDED OR REPRODUCED ON 11 x 17" SHEETS.

Dates of Commencement and Completion of Project: March 2015 to September 2015
If other approvals required for this project please indicate

- [ ] Federal - Fisheries Act
- [ ] Province - MNR Work Permit
- [X] Municipal - Building Permit
- [ ] Other
- [ ] Permit to Take Water
- [ ] Zoning
- [ ] Severance
- [ ] OPA

Name of Applicant if different than Landowner:
Mailing Address if different than above:
Postal Code: Phone Number: Email Address:

Applicant's Signature:
Application Date Month: DEC Day: 02 Year: 2014
Agent for Applicant (if different from above):
Mailing Address:
Postal Code: Phone Number: Email Address:

For UTRCA Completion Only

Application fee: $750.00 Date received: Dec. 5/2014 Received by: K. Winfield

Regulatory floodline elevation: _____ Typical ground elevation: _____

Other pertinent comments _____

Project-specific requirements (refer to page 2 for general conditions) Refer to UTRCA Letter of Approval (dated December 16, 2014)

Approved by: K. M. Winfield Date approved: December 16, 2014

Site inspection: Date: _____ By: _____

TERMS AND CONDITIONS

The Owner and Applicant, by acceptance of and in consideration of the issuance of this permit, agree to the following terms and conditions:

1. Permission granted by the Upper Thames River Conservation Authority cannot be transferred without prior written approval from the Upper Thames River Conservation Authority.

2. Approvals may be required from other agencies prior to undertaking the work proposed. The Upper Thames River Conservation Authority does not exempt the Applicant from complying with any or all other approvals, laws, statutes, or regulations.

3. The Upper Thames River Conservation Authority may at any time withdraw any permission given if, in the opinion of the Conservation Authority, the representations contained in the application for permission are not carried out or the conditions/requirements of the permit are not complied with.

4. Authorized representatives of the Upper Thames River Conservation Authority may at any time enter onto the lands that are described herein, in order to make any surveys, examinations, investigations or inspections that are required for the purpose of insuring that the work(s) authorized by this permit are being carried out according to the terms of this permit.

5. The Owner and Applicant agree:

- To indemnify and save harmless the Upper Thames River Conservation Authority and its officers, employees, or agents from and against all dam age, loss, costs, claims, demands, actions and proceedings, arising out of or resulting from any act or omission of the Owner and/or Applicant or any of his agents, employees or contractors relating to any of the particulars, terms or conditions of this permit;

- That this permit shall not release the Applicant from any legal liability or obligation and remains in force subject to all limitations, requirements and liabilities imposed by law;

- That all complaints arising from the execution of the works authorized under this permit shall be reported immediately by the Applicant to the Up per Thames River Conservation Authority. The Applicant shall indicate any action that has been taken, or is planned to be taken, with regard to each complaint.

6. The project shall be carried out in full accordance with the plans submitted in support of the application.

7. The Applicant agrees to install and maintain all sedimentation controls until all disturbed areas have been stabilized.

8. All disturbed areas shall be seeded, sodded, or stabilized in some other manner acceptable to the Conservation Authority as soon as possible, and prior to the expiry of this permit.

9. The Applicant agrees to maintain all existing drainage patterns, and not to obstruct external drainage from other adjacent private lands.

NOTE: The information on this form is being collected for the purpose of administering a regulation made pursuant to Section 28, Conservation Authorities Act, R.S.O. 1990, Chapter 27. This application and supporting documents and any other documentation received relating to this application, may be released, in whole or in part, to other persons in accordance with the Municipal Freedom of Information and Protection of Privacy Act, R.S.O. 1990c. M.56, as amended

Attachment #17

Photos of Slope Failure on Adjacent Property Parcel

17a

17b

17c

17d

RegulationsInquiry - Notice of Violation - 60 Hog Back Close, Delaware, ON, Middlesex Centre

Attachment #18a

From: Cari Ramsey
To: [redacted]
Date: 11/05/2023 2:03 PM
Subject: Notice of Violation - 60 Hog Back Close, Delaware, ON, Middlesex Centre
CC: marsmana@middlesexcentre.on.ca
BC: RegulationsInquiry
Attachments: 60 Hog Back Close.pdf; Violation - 60 Hog Back Close, Delaware, ON, Middlesex Centre.pdf

Hi Jason;

Attached is the notice of violation we discussed on the phone yesterday. I have also attached the regulation mapping for the property. The erosion hazard on this map is estimated and would have been more accurately delineated as part of the Slope Stability Assessment.

If you have any questions please feel free to contact me.

Thanks!
Cari

Cari Ramsey
Land Use Regulations Officer
UTRCA
1424 Clarke Side Road
London, ON
N5V 5B9
(519)451-2800 ext. 289
ramseyc@thamesriver.on.ca

Attachment #18b

UPPER THAMES RI

The Thames
A Canadian
Heritage River

"Inspiring a Healthy Environment"

May 11, 2023

Jason Dieleman (via [redacted]
60 Hog Back Close
Delaware, ON N0L 1E0

Dear Mr. Dieleman:

Re: **NOTICE OF VIOLATION**
Unauthorized Development, Unauthorized Fill Placement and Unauthorized Site Alteration Within a Regulated Erosion (Slope) Hazard and Stream Valley and Within the Area of Interference of a Wetland
60 Hog Back Close
Delaware, ON
Municipality of Middlesex Centre

Upper Thames River Conservation Authority (UTRCA) staff have noted unauthorized development, fill placement and site alteration – specifically the construction of a new patio, firepit, armour stone walls and stairs and other general hardscaping - within Conservation Authority Regulated Hazard Lands on the above noted property. A map is attached showing the approximate location of UTRCA Regulated Areas on the subject lot. We note the entire property is regulated by the Conservation Authority due to the presence of: a) riverine flood and erosion hazard land and stream valley associated with an unnamed tributary to Dingman Creek; b) wetland; and, c) the Area of Interference surrounding the wetland features.

The UTRCA regulates site alteration, construction and development activity within the Regulation Limit shown on the attached mapping. As you were already aware, written pre-approval (in the form of a *Conservation Authorities Act* [Section 28] permit) is required prior to undertaking any development, filling, excavation, site grading/alteration within the regulated area. Back in 2013 technical reports were submitted to our office to support the construction of a new house, driveway and septic system. The reports were necessary to identify a suitable building envelope that would be safely located outside the hazard lands. As per the Slope Stability Assessment Report (prepared by exp Services, dated June 6, 2013, Project No: KCH-00212307-GE) and any submitted addendums/technical updates, the (EIS) Environmental Impact Study (prepared by exp Services, dated July 2013, Project No: KCH-00212307-GE), and UTRCA permit #143/14, issued December 16, 2014, no development was to occur within the delineated erosion hazard nor beyond the delineated setback limit. The UTRCA has no record of having received any application for approval or having issued a permit for this activity, pursuant to Section 28 of the *Conservation Authorities Act*. This is a violation of Ontario Regulation 157/06, pursuant to Ontario Regulation 97/04.

The Slope Stability Report and the EIS report both included requirements and mitigation measures that were to be adhered to – including requirements with regards to development setbacks from the top-of-bank and requirements regarding the retention and/or planting of vegetation. These unauthorized works are not in keeping with the requirements of these reports nor are they in keeping with the previous permit. We note there has already been a recent slope failure on an adjacent property. It is important to maintain the integrity and stability of banks to prevent additional failures.

As per our phone call on May 10, 2023, the UTRCA will require you either:

1) **Apply for a *Conservation Authorities Act* [Section 28] *Development, Interference With Wetlands and Alterations to Shorelines and Watercourses* permit to keep the unauthorized development works.** Included with your submission must be a site plan and a favourable geotechnical opinion letter (prepared by a qualified professional) confirming that the unauthorized works will not negatively impact the existing single family residence on site nor the short term or long term stability of the slope (on the subject property and any adjacent lands owned by others).

   Please note that even if the geotechnical assessment comes back favourably, the development would still not meet provincial nor UTRCA policies and therefore would require the application to go for a hearing with our Hearing Committee as it cannot be approved at a staff level. While staff cannot pre-suppose the decision of the Hearings Committee, as the works at the top-of-bank of a steep slope and erosion hazard would neither meet provincial nor UTRCA policy, the staff recommendation at the hearing would be for denial. We caution that there is a chance the works may not ultimately be approved in which case we would be asking for removal of all structures and restoration of the slope;

   OR

   2) **Remove the unauthorized works and restore the slope to pre-construction conditions or better.** Prior to undertaking any removal/restoration the UTRCA will require a geotechnical opinion letter and associated plans (prepared by a qualified professional) detailing how the development can be removed safely and how the site and slope would be restored to ensure its short term and long term stability and that it will not negatively impact the existing residence and any adjacent lands owned by others. Restoration of the slope would also have to be in keeping with the requirements and mitigation measures identified in the previously submitted EIS.

Please feel free to have your engineer contact us if there are any questions regarding our requirements.

Failure to either: 1) apply for a permit to keep the unauthorized works in a timely manner; OR, 2) remove the works and restore the slope under the guidance of a qualified professional and to the satisfaction of the Conservation Authority in a timely manner will result in the Conservation Authority evaluating its options, including the possibility of legal action.

Thank you for your anticipated cooperation in this matter.

Sincerely,
UPPER THAMES RIVER CONSERVATION AUTHORITY
Cari Ramsey
Land Use Regulations Officer

Encl. - UTRCA Regulation Limit mapping for 60 Hogs Back Close, Municipality of Middlesex Centre

c.c. – Arnie Marsman, Municipality of Middlesex Centre – (via e-mail: marsmana@middlesexcentre.on.ca)

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 Watershed (2017 LiDAR)
- Assessment Parcel (MPAC)
- Watercourse (UTRCA)
  - Open
  - Tiled
- Flooding Hazard Limit
- Erosion Hazard Limit
- Regulation Limit 2021

Attachment #18c

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.

The UTRCA disclaims explicitly any warranty, representation or guarantee as to the content, sequence, accuracy, timeliness, fitness for a particular purpose, merchantability or completeness of any of the data depicted and provided herein.

The UTRCA assumes no liability for any errors, omissions or inaccuracies in the information provided herein and further assumes no liability for any decisions made or actions taken or not taken by any person in reliance upon the information and data furnished hereunder.

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.

UPPER THAMES RIVER CONSERVATION AUTHORITY

Notes:
60 Hog Back Close, Delaware

Created By: cr May 11, 2023

* 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.

0 30 60 120
metres
1:1,500

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Attachment #19

UPPER THAMES RIVER
CONSERVATION AUTHORITY

Application For Development, Interference with Wetlands and Alterations to Shorelines and Watercourses

Upper Thames River Conservation Authority
1424 Clarke Road London, Ontario N5V 5B9
Tel. (519) 451-2800 Fax (519) 451-1188

Conservation Authorities Act - Ontario Regulation 157/06, under O.reg. 97/04

Application # #108-23

Name of Landowner: _____ Tel. Home: [redacted]
Address: [redacted] Postal Code: [redacted] Tel. Business: _____
Location of Project: 60 Hog Back Close, Delaware Middlesex
Street and Number, or Lot(s) and Concession Number/ 911 Address Municipality

DESCRIPTION OF PROJECT

General description of project: Approval of the installation of flag stone / Armour stone fire pit sitting area.

All applications must be accompanied by a detailed site plan, providing information on the following:

1. general location of property in relation to roads
2. location and dimensions of all existing structures on the property
3. location of any watercourse, wetland or steep slope on or near the subject property
4. intended location of all proposed work, including construction, filling/grading/excavation, wetland interference or watercourse alteration
5. location of septic system, if applicable and other property utilities, wells, etc.
6. cross-section of proposed work, showing existing and final grades and structure openings

Works including floodproofing of structures must be accompanied by detailed drawings, prepared by qualified professional engineers, with proper dates and stamps appearing on all plans. If filling is proposed, details on the type, area and volume of fill must be provided to the UTRCA, with existing and proposed grades clearly presented on plans.

UNLESS OTHERWISE REQUESTED, THE CONSERVATION AUTHORITY ONLY REQUIRES ONE COPY OF ALL PROJECT DRAWINGS.
MULTI-PAGED ENGINEERING DRAWINGS MUST BE FOLDED OR REPRODUCED ON 11 x 17" SHEETS.

Dates of Commencement and Completion of Project: _____ to _____
If other approvals required for this project please indicate

- ☐ Federal - Fisheries Act
- ☐ Other _____
- ☐ Province - MNR Work Permit
- ☐ Permit to Take Water
- ☐ Municipal - Building Permit
- ☐ Zoning ☐ Severance ☐ OPA ☐

Name of Applicant if different than Landowner: _____
Mailing Address if different than above: _____
Postal Code: _____ Phone Number: _____ Email Address: _____

Applicant's Signature: *Jason Dieleman*
Application Date Month: June Day: 5 Year: 2023
Agent for Applicant (if different from above): _____
Mailing Address: _____
Postal Code: _____ Phone Number: _____ Email Address: _____

For UTRCA Completion Only

Application fee:_____ Date received:_____ Received by:_____

Regulatory floodline elevation:_____ Typical ground elevation:_____

Other pertinent comments_____

Project-specific requirements (refer to page 2 for general conditions) _____

_____

_____

Approved by:_____ Date approved:_____

Site inspection: Date:_____ By:_____

TERMS AND CONDITIONS

The Owner and Applicant, by acceptance of and in consideration of the issuance of this permit, agree to the following terms and conditions:

1. Permission granted by the Upper Thames River Conservation Authority cannot be transferred without prior written approval from the Upper Thames River Conservation Authority.

2. Approvals may be required from other agencies prior to undertaking the work proposed. The Upper Thames River Conservation Authority does not exempt the Applicant from complying with any or all other approvals, laws, statutes, or regulations.

3. The Upper Thames River Conservation Authority may at any time withdraw any permission given if, in the opinion of the Conservation Authority, the representations contained in the application for permission are not carried out or the conditions/requirements of the permit are not complied with.

4. Authorized representatives of the Upper Thames River Conservation Authority may at any time enter onto the lands that are described herein, in order to make any surveys, examinations, investigations or inspections that are required for the purpose of insuring that the work(s) authorized by this permit are being carried out according to the terms of this permit.

5. The Owner and Applicant agree:

- To indemnify and save harmless the Upper Thames River Conservation Authority and its officers, employees, or agents from and against all dam age, loss, costs, claims, demands, actions and proceedings, arising out of or resulting from any act or omission of the Owner and/or Applicant or any of his agents, employees or contractors relating to any of the particulars, terms or conditions of this permit;

- That this permit shall not release the Applicant from any legal liability or obligation and remains in force subject to all limitations, requirements and liabilities imposed by law;

- That all complaints arising from the execution of the works authorized under this permit shall be reported immediately by the Applicant to the Up per Thames River Conservation Authority. The Applicant shall indicate any action that has been taken, or is planned to be taken, with regard to each complaint.

6. The project shall be carried out in full accordance with the plans submitted in support of the application.

7. The Applicant agrees to install and maintain all sedimentation controls until all disturbed areas have been stabilized.

8. All disturbed areas shall be seeded, sodded, or stabilized in some other manner acceptable to the Conservation Authority as soon as possible, and prior to the expiry of this permit.

9. The Applicant agrees to maintain all existing drainage patterns, and not to obstruct external drainage from other adjacent private lands.

NOTE: The information on this form is being collected for the purpose of administering a regulation made pursuant to Section 28, Conservation Authorities Act, R.S.O. 1990, Chapter 27. This application and supporting documents and any other documentation received relating to this application, may be released, in whole or in part, to other persons in accordance with the Municipal Freedom of Information and Protection of Privacy Act, R.S.O. 1990c. M.56, as amended

Attachment #20

EXP Services Inc.
15701 Robin's Hill Road
London, ON N5V 0A5
Telephone: (519) 963-3000
Facsimile: (519) 963-1152

June 2nd, 2023 LON-23006304-A0

Mr. Jason Dieleman
60 Hog Back Close,
Delaware, Ontario
N0L 1E0

Attention: Mr. Dieleman

Geotechnical Comments Regarding the Existing Rear-Yard Hardscaping
60 Hog Back Close, Deleware, Ontario

As requested, this letter provides geotechnical comments regarding the hardscaping features impact on the slope stability at 60 Hog Back Close in Delaware, Ontario. The hardscape features consist of a firepit, flagstones, retaining structure, amour stone walls, and stairs located near the crest of the slope. It is understood that the hardscaping features were constructed within the previously established Erosion Hazard Limit (Development Setback) without the approval of the Upper Thames Conservation Authority (UTRCA).

This letter should be read in conjunction with the EXP Slope Assessment Report date June 2013.

Background

EXP previously completed a Slope Assessment report dated June 2013 for the Site. At the time of the report, a residence was proposed at the Site and an Erosion Hazard Limit (Development Setback) was established from the top of the slope in accordance with Ministry of Natural Resources (MNR) Technical Guide. The slope assessment consisted of the advancement of one borehole near the slope and a topographic survey of the property.

Since the issuance of the report, the dwelling has been constructed in accordance with the setbacks outlined in the report and was approved by the UTRCA. Additional hardscaping was constructed near the crest of the slope in the rear-yard of the property which is located within the previously established erosion hazard limits (development setback) and approval of the hardscaping was not obtained from the UTRCA prior to construction.

Based on information provided by the client and observations made by EXP personnel, the hardscaping consists of a firepit/patio area with armour stone walls, flagstone and a small retaining structure on the slope. The grade of the firepit area has been excavated down and the armour stone wall in this area is a maximum heigh of approximately 0.6 m. The flagstone in the firepit area is approximately 75 mm thick. The retaining structure is located on the slope, approximately 2.7 m from the crest of the slope and is approximately 0.4 m in height was observed to retain cobbles and granular materials. It is constructed of a steel grate and T-posts that have been embedded in the soil. Some armour stone blocks were also observed to be placed on the retained soil on the slope. Photos of the hardscaping are attached for reference.

Based on information from the client, the existing hardscaping features have been in place for approximately eight years.

It should be noted that EXP was not present during the construction of the rear-yard hardscaping, however, a Site visit was completed by EXP personnel on May 24, 2023, to observe the current slope condition and the completed hardscaping at the top of the slope.

Site Reconnaissance

A site reconnaissance survey was carried out on May 24, 2023. The purpose of the site visit was to examine the current conditions of the site slope and determine if there was any visible impact of the hardscape features on the slope stability. The survey included detailed observations such as slope vegetation, seepage and any localized or global failure.

During the recent site reconnaissance, a rating chart was completed at one location (Cross Section A- A') throughout the existing slope profile. The rating chart scored a value of 30 which is the same score that was recorded in 2013. No significant changes of slope condition were observed relative to the conditions in 2013. No localized failures or signs of distress (tension cracks) were observed in the area of the hardscape features. Photos of the current slope condition are attached for reference.

It should be noted that drainage pipes were observed to outlet on the slope in photos provided by the client prior to the site reconnaissance. Since that time, the client has extended the drainage pipes to extend beyond the toe of the slope at the recommendation of EXP and this was confirmed during the site visit on May 24, 2023.

Slope Stability Analyses

In addition to the Site Reconnaissance, a slope stability analysis was completed to assess the impacts of the hardscape features on the slope stability.

The stability of the current slope condition including the impact of the hardscape features was investigated for a number of different Factors of Safety (FOS). The analyses were undertaken by computer methods utilizing the Slope/W computer program for the select slope profile.

Soil strength parameters used in the analyses were consistent with the soil parameters established in the previous slope assessment and are provided below.

Table 1 – Soil Parameters

Soil Type	Density	Cohesion	Angle of Internal Friction
Sand	20.5 kN/m^3	0 kPa	34^o
Silt Till	20.0 kN/m^3	5 kPa	28^o

Minimum factors of safety are provided in the report “Geotechnical Principles for Stable Slopes” prepared for the Ministry of Natural Resources, for infrastructure and public use (Section 4.3.3.1 in the MNR Technical Guide).

The following table from the MNR Technical Guide provides guidance on how to select a minimum factor of safety based on the intended land use above or below the slope. The hardscape features can be considered as Light Land Use. In order to determine a stable slope, a minimum factor of safety of 1.20 was used during the computerized analyses for long term stable slope analyses in the area of the hardscape features.

Table 2 – Design Minimum Factor of Safety

	LAND-USES	FACTOR OF SAFETY
A	**PASSIVE**; no buildings near slope; farm field, bush, forest, timberland, woods, wasteland, badlands, tundra	1.10
B	**LIGHT**; no habitable structures near slope; recreational parks, golf courses, buried small utilities, tile beds, barns, garages, swimming pools, sheds, satellite dishes, dog houses	1.20 to 1.30
C	**ACTIVE**; habitable or occupied structures near slope; residential, commercial, and industrial buildings, retaining walls, storage/warehousing of non-hazardous substances	1.30 to 1.50
D	**INFRASTRUCTURE and PUBLIC USE**; public use structures or buildings (i.e., hospitals, schools, stadiums), cemeteries, bridges, high voltage power transmission lines, towers, storage/warehousing of hazardous materials, waste management areas	1.40 to 1.50

Table obtained from page 60 of MNR Technical Guide – River and Stream Systems: Erosion Hazard Limit

One cross section was assessed in the area of the existing hardscape features, which is the same as the cross section provided in the 2013 slope assessment. The grading change and loading associated with the amour stone walls and retaining wall were considered in the analyses and the results are compared to the conditions prior to the hardscaping. Because of the near surface soil conditions (sand), slope observations, and inclusion of the drainage tiles in the hardscape features, no significant change in the water table is anticipated from the hardscape features. The slope stability analysis results are provided in the table below.

Table 3 - Summary of Pertinent Slope Stability Analyses

Cross-Section Condition	Description of Failure Mode	Computed Factor of Safety
Slope Section, A-A'	Original Slope Condition Minimum FOS	1.25
Slope Section, A-A'	Current Slope Condition – Shallow Failure	1.23
Slope Section, A-A'	Current Slope Condition – Moderate Failure	1.24
Slope Section, A-A'	Current Slope Condition – Deep Failure	1.25
Slope Section, A-A'	Current Slope Condition – No Retaining Structure	1.25

The results indicate that the influence from the hardscaping have a marginal influence on the stability of the slope. Based on the observations made on during the Site visit and results of the stability analyses, there is no significant impact on the long-term slope stability due to the hardscaping located at the top of the slope. It should be noted that if the retaining structure on the slope were to be removed, the minimum factor of safety is the same as the original slope condition, prior to the addition of the hardscape features.

It should be noted that the theoretical calculations for FOS are conservative. Based on the site reconnaissance conducted by EXP, it was observed that the slopes at the site are covered by occasional mature trees and shrubs. The trees were generally in an upright state. The deep roots of mature trees assist to reinforce and to enhance the stabilization of slopes.

Geotechnical Comments

Based on the Site Reconnaissance completed on May 24, 2023, no significant changes to the slope were observed relative to the slope conditions in 2013. No failures or signs of distress were observed on the slope or in the area of the hardscaping features. Drainage pipes were observed to extend from the hardscape features to the top of the slope and no seepage along the slope was observed.

An updated Factor of Safety slope stability analysis was completed utilizing Slope/W software for the previously reviewed slope profile. The effects of the completed hardscaping at the top of the slope, such as, armour stone wall, retaining wall and regrading were modelled in the analyses. The results indicate that there is no significant impact on the slope stability due to the anticipated minor loads induced from the completed hardscaping and grading at the top of the slope.

It should be noted that no details regarding the depth of the supports for the non-engineered retaining structure on the slope were known at the time of the report (see photos). From a geotechnical standpoint, the long-term integrity/stability of this structure is difficult to quantify. However, failure of this structure is not anticipated to significantly affect the global stability of the slope and is anticipated to be localized to that structure only.

From a geotechnical standpoint, no significant impact on the long-term slope stability, relative to the original slope conditions, are anticipated due to the armour stone, retaining structure and regrading. The final approval and permission to allow building components over the table land is subject to the review by UTRCA and local building official.

A regular maintenance program should be implemented such as tree/slope vegetation preservation, grading and drainage control to maintain slope conditions. If any changes in the slope condition are observed, EXP should be contacted immediately.

General Comments

We trust the above is satisfactory for your present requirement. Should you have any questions regarding this matter, please don't hesitate to contact our office.

Yours very truly,

EXP Services Inc.

Mark Bertens, P. Eng.
Geotechnical Services

Craig Swinson, P. Eng.
Geotechnical Services

Attachments: Site Photos
Current Slope Stability Analyses
Limitations and Use of Report

Distribution: Mr. Jason Dieleman [redacted]

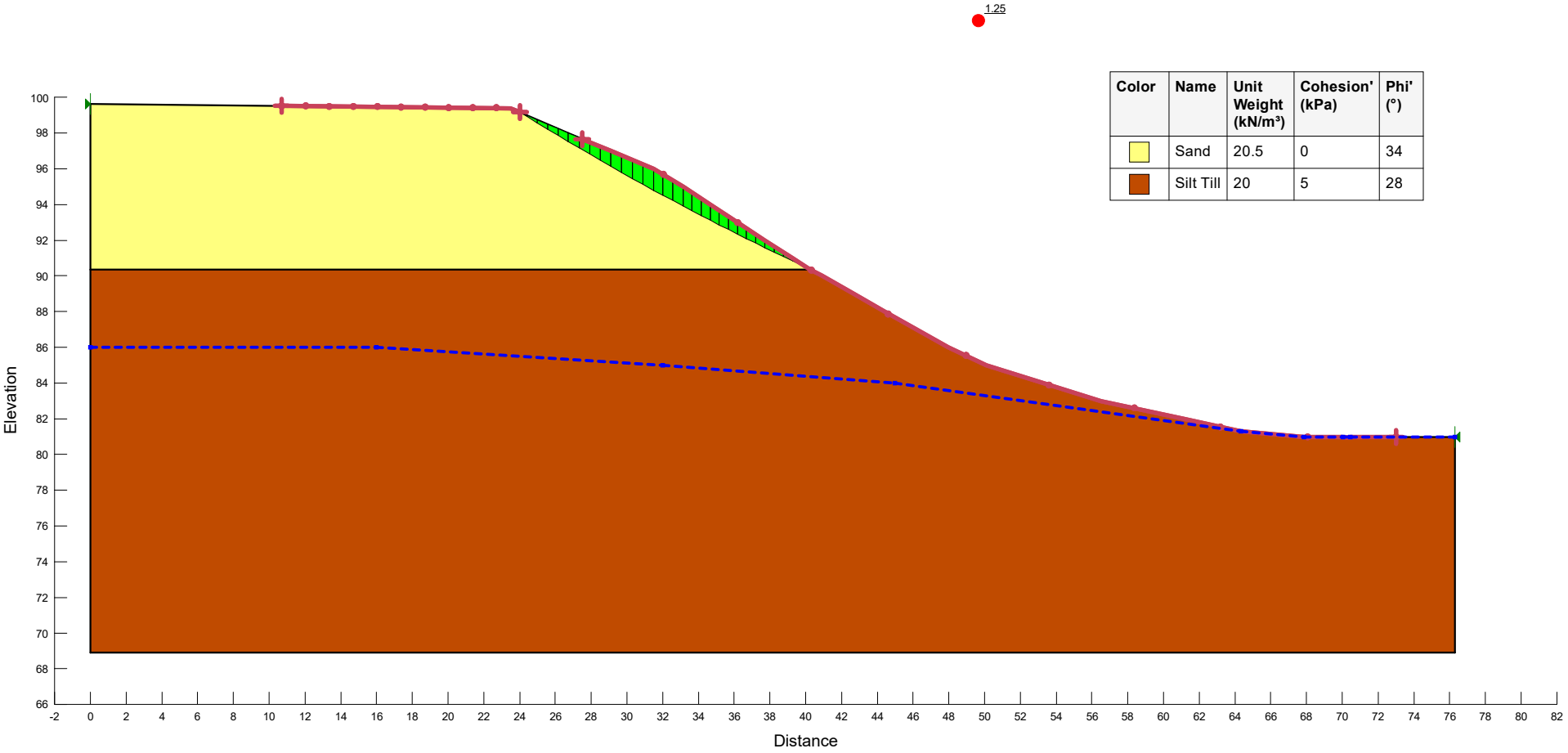
Site Photos

EXP Services Inc.
Client: Jason Dieleman.
60 Hog Back Close, Delaware, ON
Project Number: LON-23006304-A0
Date: Janu 2nd, 2023

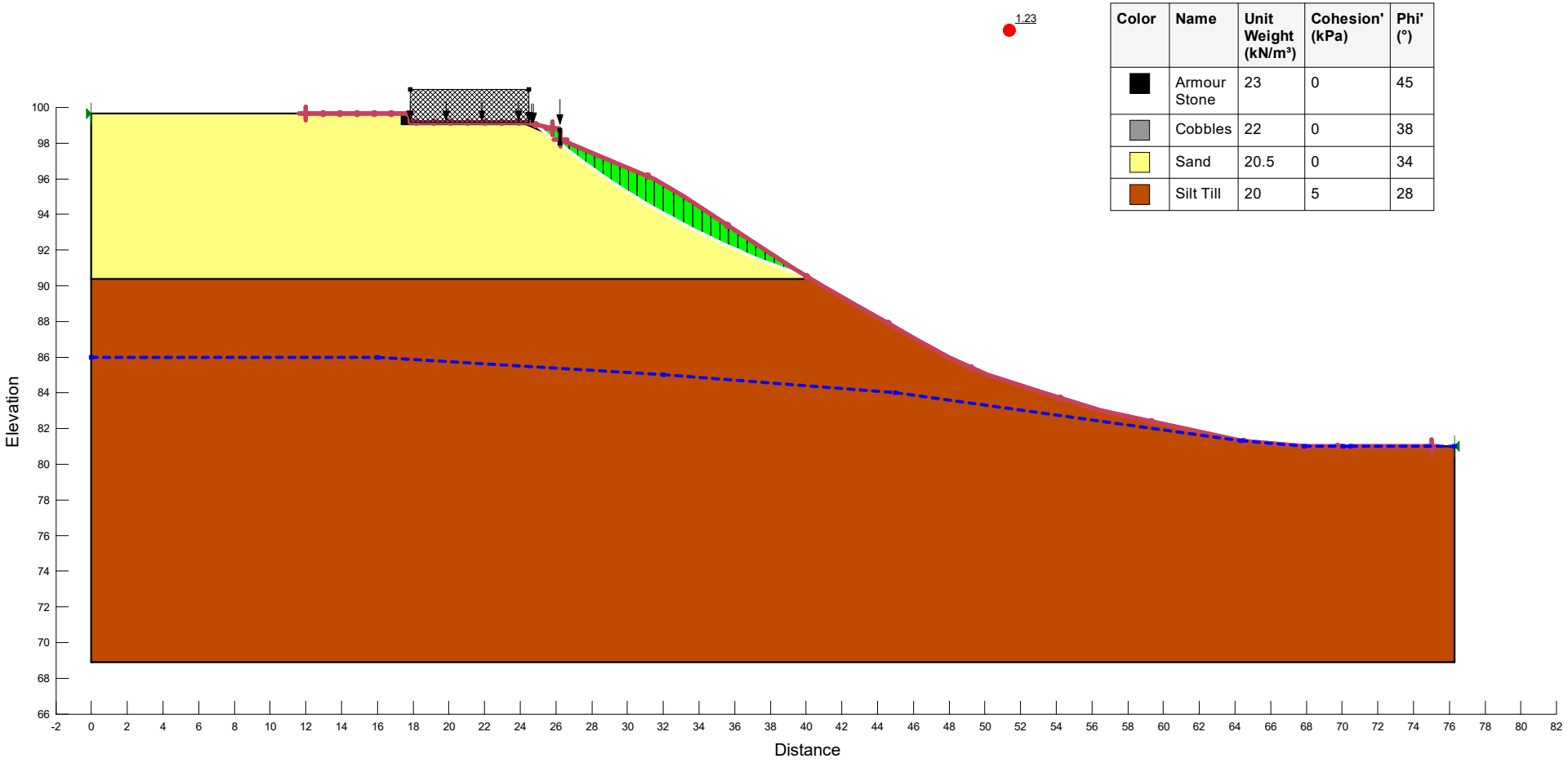
EXP Services Inc.
Client: Jason Dieleman.
60 Hog Back Close, Delaware, ON
Project Number: LON-23006304-A0
Date: Janu 2nd, 2023

Slope Stability Analyses

Original Slope - Minimum Factor of Safety

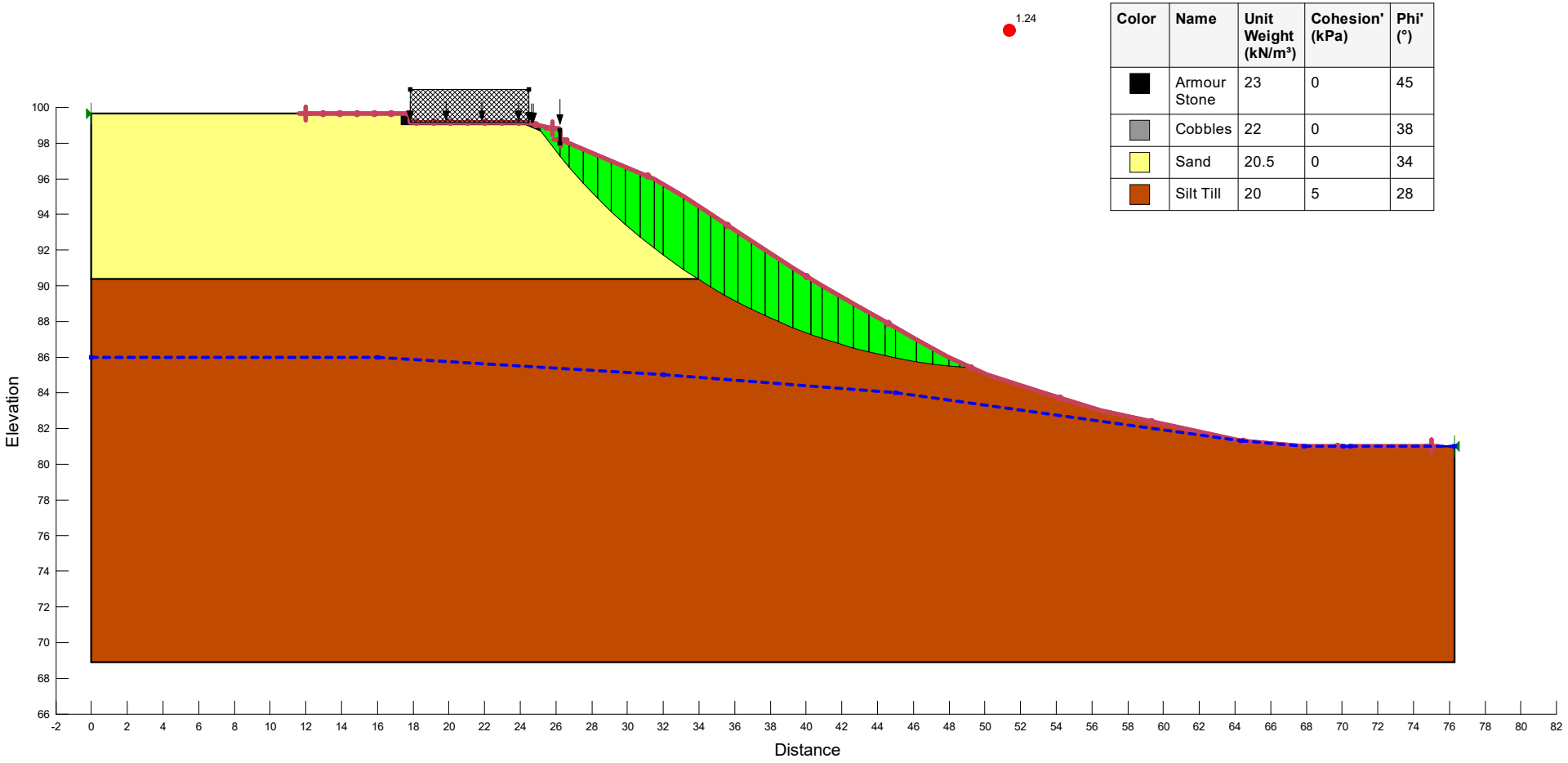


Current Slope - Shallow Failure

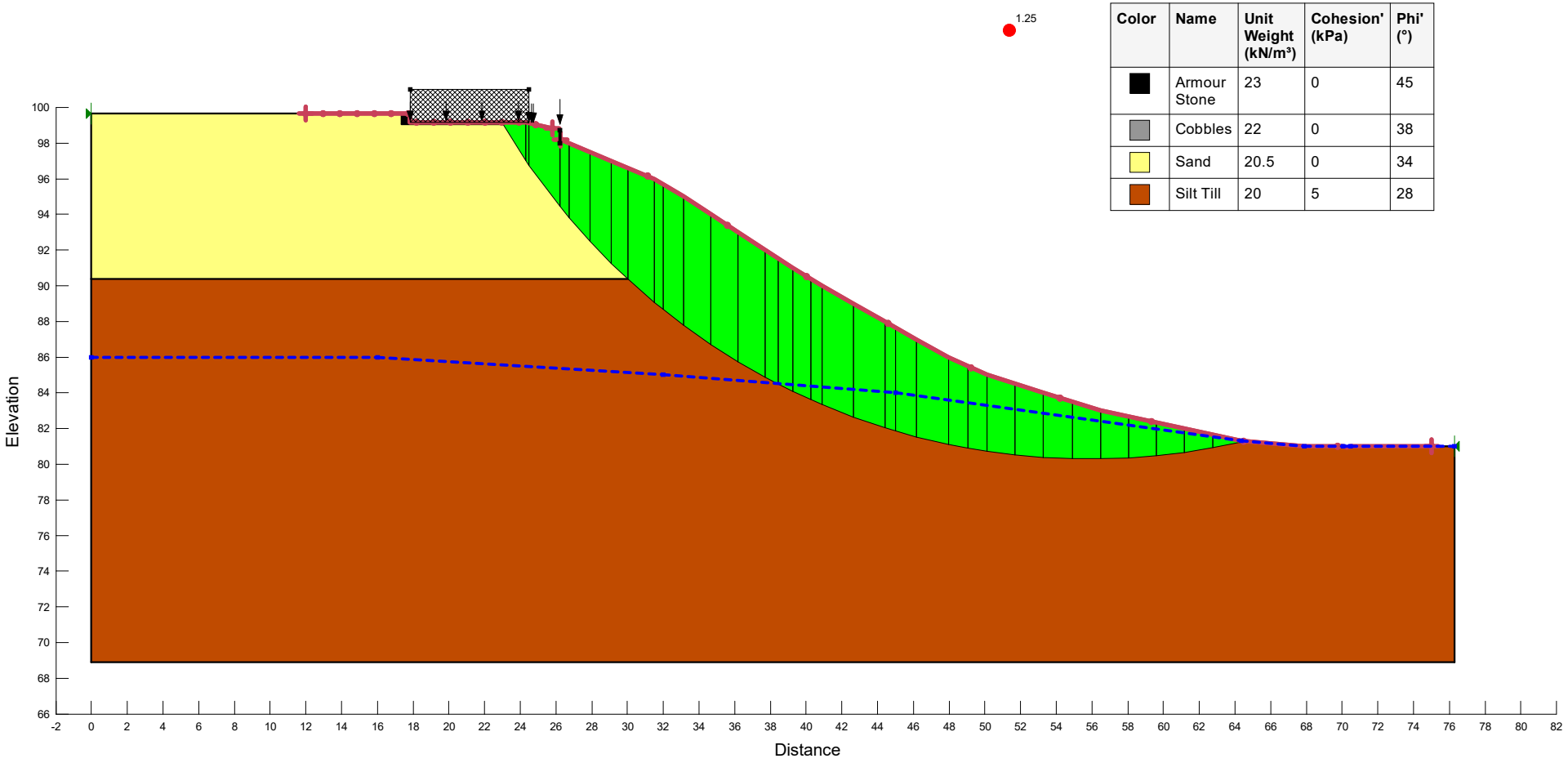


Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)
	Armour Stone	23	0	45
	Cobbles	22	0	38
	Sand	20.5	0	34
	Silt Till	20	5	28

Current Slope - Moderate Depth Failure

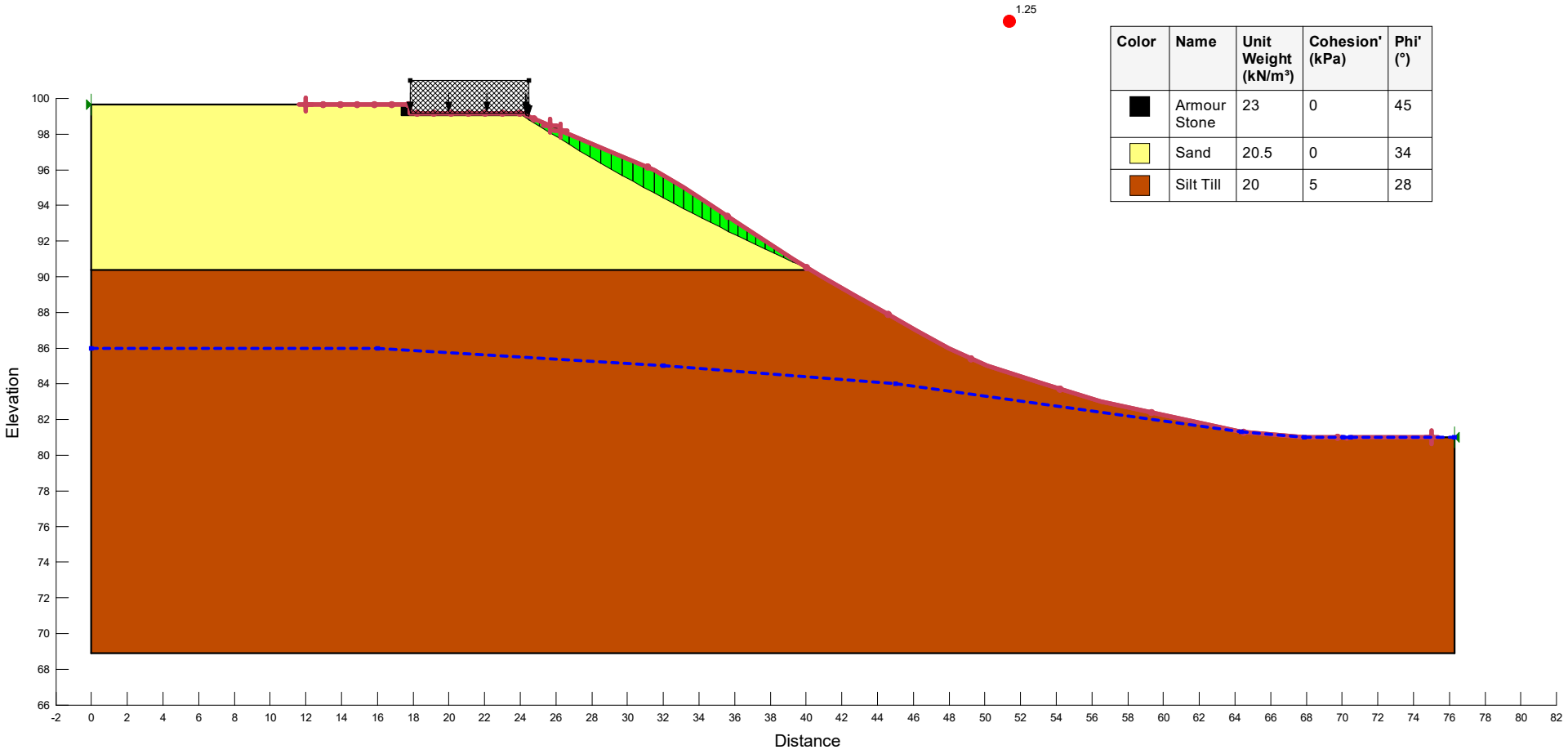


Current Slope - Deep Failure



Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)
	Armour Stone	23	0	45
	Cobbles	22	0	38
	Sand	20.5	0	34
	Silt Till	20	5	28

Current Slope - Retaining Structure Removed



Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)
	Armour Stone	23	0	45
	Sand	20.5	0	34
	Silt Till	20	5	28

Limitations and Use of Report

LIMITATIONS AND USE OF REPORT

BASIS OF REPORT

This report ("Report") is based on site conditions known or inferred by the geotechnical investigation undertaken as of the date of the Report. Should changes occur which potentially impact the geotechnical condition of the site, or if construction is implemented more than one year following the date of the Report, the recommendations of EXP may require re-evaluation.

The Report is provided solely for the guidance of design engineers and on the assumption that the design will be in accordance with applicable codes and standards. Any changes in the design features which potentially impact the geotechnical analyses or issues concerning the geotechnical aspects of applicable codes and standards will necessitate a review of the design by EXP. Additional field work and reporting may also be required.

Where applicable, recommended field services are the minimum necessary to ascertain that construction is being carried out in general conformity with building code guidelines, generally accepted practices and EXP's recommendations. Any reduction in the level of services recommended will result in EXP providing qualified opinions regarding the adequacy of the work. EXP can assist design professionals or contractors retained by the Client to review applicable plans, drawings, and specifications as they relate to the Report or to conduct field reviews during construction.

Contractors contemplating work on the site are responsible for conducting an independent investigation and interpretation of the borehole results contained in the Report. The number of boreholes necessary to determine the localized underground conditions as they impact construction costs, techniques, sequencing, equipment and scheduling may be greater than those carried out for the purpose of the Report.

Classification and identification of soils, rocks, geological units, contaminant materials, building envelopment assessments, and engineering estimates are based on investigations performed in accordance with the standard of care set out below and require the exercise of judgment. As a result, even comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations or building envelope descriptions involve an inherent risk that some conditions will not be detected. All documents or records summarizing investigations are based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated. Some conditions are subject to change over time. The Report presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, these should be disclosed to EXP to allow for additional or special investigations to be undertaken not otherwise within the scope of investigation conducted for the purpose of the Report.

RELIANCE ON INFORMATION PROVIDED

The evaluation and conclusions contained in the Report are based on conditions in evidence at the time of site inspections and information provided to EXP by the Client and others. The Report has been prepared for the specific site, development, building, design or building assessment objectives and purpose as communicated by the Client. EXP has relied in good faith upon such representations, information and instructions and accepts no responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of any misstatements, omissions, misrepresentation or fraudulent acts of persons providing information. Unless specifically stated otherwise, the applicability and reliability of the findings, recommendations, suggestions or opinions expressed in the Report are only valid to the extent that there has been no material alteration to or variation from any of the information provided to EXP.

STANDARD OF CARE

The Report has been prepared in a manner consistent with the degree of care and skill exercised by engineering consultants currently practicing under similar circumstances and locale. No other warranty, expressed or implied, is made. Unless specifically stated otherwise, the Report does not contain environmental consulting advice.

COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment form part of the Report. This material includes, but is not limited to, the terms of reference given to EXP by its client ("Client"), communications between EXP and the Client, other reports, proposals or documents prepared by EXP for the Client in connection with the site described in the Report. In order to properly understand the suggestions, recommendations and opinions expressed in the Report, reference must be made to the Report in its entirety. EXP is not responsible for use by any party of portions of the Report.

USE OF REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. No other party may use or rely upon the Report in whole or in part without the written consent of EXP. Any use of the Report, or any portion of the Report, by a third party are the sole responsibility of such third party. EXP is not responsible for damages suffered by any third party resulting from unauthorized use of the Report.

REPORT FORMAT

Where EXP has submitted both electronic file and a hard copy of the Report, or any document forming part of the Report, only the signed and sealed hard copy shall be the original documents for record and working purposes. In the event of a dispute or discrepancy, the hard copy shall govern. Electronic files transmitted by EXP have utilize specific software and hardware systems. EXP makes no representation about the compatibility of these files with the Client's current or future software and hardware systems. Regardless of format, the documents described herein are EXP's instruments of professional service and shall not be altered without the written consent of EXP.

Legal Notification

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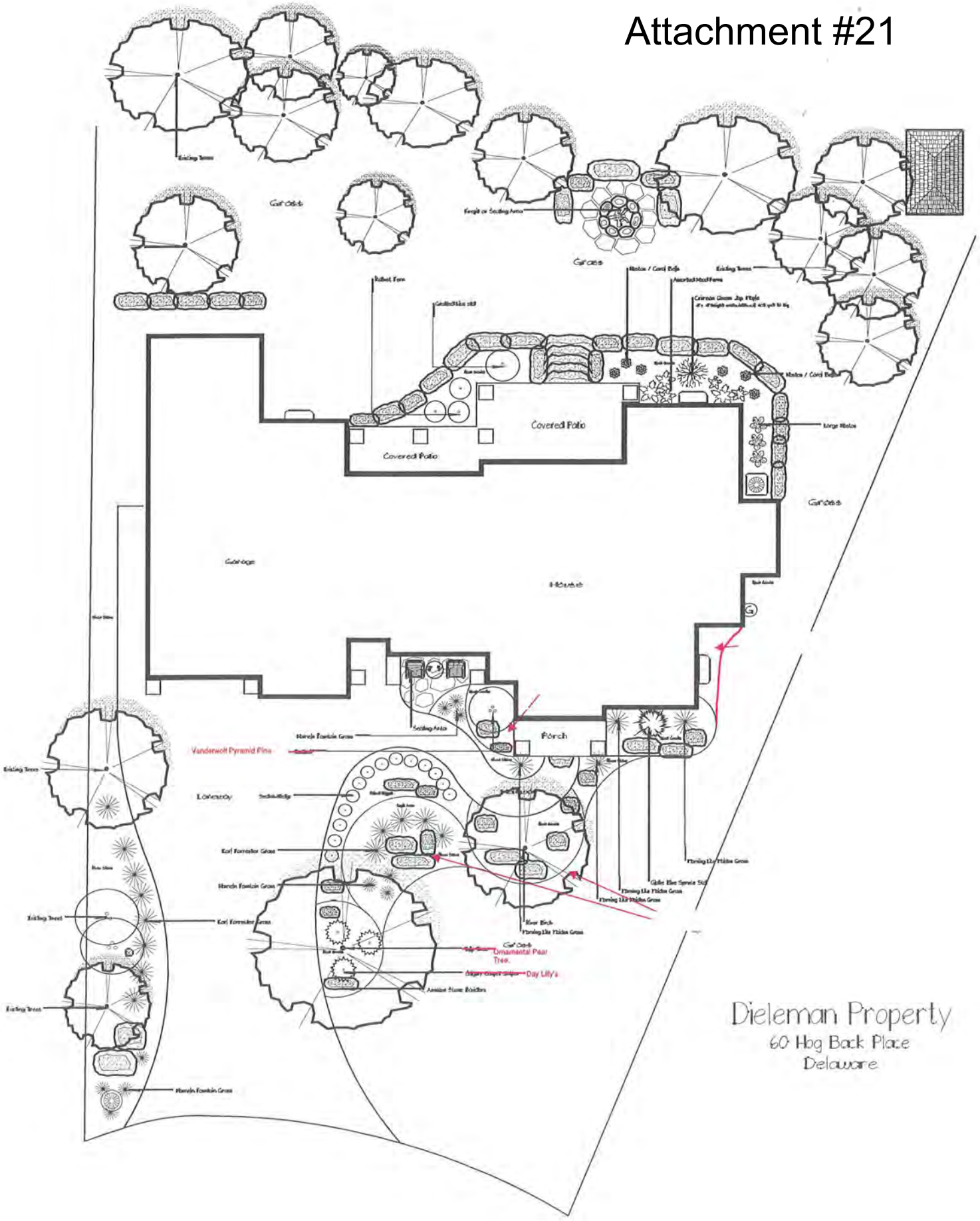
Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EXP Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

Attachment #21



Applicable Policy **Attachment #22**

*****Please Note:** the following information is taken from the *UTRCA Environmental Planning Policy Manual,* approved by the Board of Directors, June 28, 2006. While the following policies have been included with this report to assist with your review for this Hearing, we note policies in the manual are intricately interwoven and should always be read in their entirety. The *UTRCA Environmental Planning Policy Manual (2006)* is available on our website at:

http://thamesriver.on.ca/wp-content/uploads//PlanningRegulations/UTRCA-EnvironmentalPlanningPolicyManual-2006.pdf

or a hard-copy can be made available to you upon request. It is advised that you refer to all the policies contained within the manual as other policies, not listed below, may also be applicable.

4 SECTION 28 REVIEW & APPROVAL PROCESS

4.2.1 General Policies for Hazard Limit

1. *Development* and *site alteration* shall be directed away from *hazard lands* where there is an unacceptable risk to public health or safety or property damage and shall be directed to areas located outside of the defined limits of the hazard.

2. *Development* and *site alteration* may only be permitted in *hazard lands* provided that all of the following conditions can be implemented to the satisfaction of the Authority:

   ~~a) F*loodproofing* measures – n/a~~
   b) No new hazards will be created and existing hazards will not be aggravated.
   c) No adverse environmental impacts will result.
   ~~d) The *development* does not include institutional uses or essential emergency services or the disposal, manufacture, treatment or storage of *hazardous substances* – n/a~~

3. All *development* and *site alteration* proposed within the *Regulation Limit* shall require prior written approval from the Authority in accordance with Section 28 of the Conservation Authorities Act and be consistent with policies contained herein.

4. ~~Any *development* or *site alteration*, permitted in accordance with policies 4.2.1 (1., 2. and 3.), with the exception of watercourse alterations, will maintain a minimum setback of 30 metres from the bank of any coldwater/coolwater *watercourse* and warmwater sportfish *watercourse* and 15 metres from the bank of any warmwater baitfish *watercourse*. Exceptions may be considered on a site-specific basis in areas of existing development, where the works will not encroach into the setback any further than the existing building/structure and where no other alternative exists. Additional setbacks may be required as per other agency guidelines. – n/a~~

~~5. Fencing – n/a~~

6. Integration – While this section of the manual is devoted to policies associated with the review and approval of applications made to the UTRCA pursuant to Section 28 of the Conservation Authorities Act, it is imperative that staff integrate natural heritage policies, goals and objectives into the decision-making process. Similarly, staff must be familiar with and have full regard for other environmental legislation which may have a direct bearing on whether development, interference with *wetlands* and alterations to shorelines and *watercourses* may proceed.

4.2.3 Riverine Erosion Hazard Policies

1. *Fill* and grading and related *site alteration* activities shall not be permitted in erosion *hazard lands*, unless associated with measures prescribed and/or approved by a municipality or environmental agency specifically intended to remediate *erosion* concerns.

2. The Authority shall encourage the *conservation of land* through the control of construction and placement of *fill* on existing or potentially unstable slopes.

3. Any *development* or *site alteration* proposal which is in close proximity to an erosion hazard and located within the *Regulation Limit*, must be supported by a favourable geotechnical report and an *Environmental Impact Study* (*EIS*) prepared by a qualified professional, to the satisfaction of the UTRCA.

~~*4.* Any *development* or *site alteration* proposal which is in close proximity to a *meander belt* and that is located within the *Regulation Limit*, must be supported by a favourable geomorphological study and an *EIS*, prepared by a qualified professional, to the satisfaction of the UTRCA.~~

~~**5.** Existing structures – n/a~~

4.2.4 Wetland Policies

1. New *development* and *site alteration* is not permitted in wetlands. Some *restricted uses* may be permitted provided that they are supported by an EIS or an Environmental Assessment.

2. *Development* and *site alteration* within the *area of interference* of a *wetland* shall only be permitted by the Authority if the applicant can demonstrate that such activity will have no impact on the control of *flooding, erosion*, *pollution* or the *conservation of land.* This will involve a scoping process where the UTRCA and the proponent (with the help of a qualified professional as required) will assess a proposed undertaking, having regard for the sensitivity of the *wetland* features and functions, the extent of encroachment and impact of use. This initial assessment will assist with the formulation of the terms of reference for a *scoped EIS* or a *comprehensive EIS*.

3. The following policies shall apply to regulating *development* and *site alteration* on lands located within 120 metres of *Provincially Significant Wetlands* and *wetlands* greater than or equal to 2 hectares in size:

4.

A. WITHIN 30 METRES

a) Where buildings and structures already exist within 30 metres of a Provincially *Significant* Wetland and *wetlands* greater than or equal to 2 hectares in size, any reconstruction, alteration or additions may be permitted subject to the following:

i) No new septic systems permitted

ii) Existing septic systems may be replaced provided there are no feasible locations available outside of the 30 metre *area of interference* and it does not encroach any closer to the wetland than the existing system

iii) Reconstruction, alteration or addition does not encroach any closer to the wetland than the existing development at its closest point

iv) Even if the existing development is closer than 15 metres to the wetland, no new development is permitted within 15 metres of the wetland

v) A hydrologic study may be required to determine whether there would be a negative impact on the hydrologic functions of the wetland as a result of the proposed development

b) Where there is an existing lot of record and residential dwelling, in existence prior to the adoption of these policies and where no land exists outside of the 30 metre *area of interference*, pools, decks and non-habitable accessory structures may be permitted subject to:

i) No *development* or *site alteration*s permitted within 15 metres of the wetland

ii) A hydrologic study may be required to determine whether there would be a negative impact on the hydrological functions of the wetland as a result of the proposed *development* or *site alteration*.

c) Except as provided for in policies 4.2.4 (3.) A(a) and 4.2.4 (3.) A(b.), no new development or site alteration is permitted within 30 metres of a Provincially Significant Wetland or a wetland greater than or equal to 2 hectares in size.

B. BETWEEN 30 & 120 METRES – LETTER OF CLEARANCE

The following uses may be permitted and will only require a letter of clearance, if proposed within 30 to 120 metres from the limit of a Provincially *Significant* Wetland or a wetland greater than or equal to 2 hectares in size:

i) Single family residential dwelling
ii) Swimming pools, decks, non-habitable *accessory* structures
iii) Minor additions to existing residential and agricultural buildings/structures
iv) Residential septic systems

C. BETWEEN 30 & 120 METRES – PERMIT

Any uses, other than those outlined in Policy 4.2.4 B., proposed within 30 to 120 metres of a wetland will require a permit pursuant to Ontario Regulation 157/06 and will need to be supported by a hydrological assessment, prepared by a qualified professional, that identifies whether the proposed development or site alteration would cause a negative hydrologic impact on the wetland features/functions