

Tree Preservation Plan - 189 Lake Drive

**Report prepared for:
Mr. Doug Adams**

Report prepared by:

A handwritten signature in black ink, appearing to read "Neil Morris", is positioned above a horizontal line.

**Neil Morris, Consulting Ecologist
Report Reference # 17-02.1**

17 March 2017

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Background	1
1.2	Objectives and Scope of Work	1
2.0	Method of Site Assessment.....	3
2.1	Delineation of Zone of Impact.....	3
2.2	Characterization of Existing Tree Cover	3
2.3	Assessment of Impacts.....	4
2.4	Development of Mitigation Measures	5
3.0	EXISTING SITE CONDITIONS	6
3.1	Physical Characteristics	6
3.1.1	Topography	6
3.1.2	Soils.....	6
3.1.3	Hydrology	6
3.2	Ecological Characteristics.....	7
3.2.1	Regional Ecology.....	7
3.2.2	Property Forest Cover	7
3.2.3	Tree Species Characteristics	8
3.2.4	Tree Species Distribution.....	9
4.0	ASSESSMENT OF IMPACT.....	12
4.1	Property Preparation Phase	12
4.1.1	Geotechnical Study	12
4.1.2	Access Road.....	13
4.1.3	Servicing	14
4.2	Lot Development Phase	14
5.0	CONCLUSIONS AND RECOMMENDATIONS	16
5.1	Summary of Existing Conditions.....	16
5.2	Summary of Identified Impacts	16
5.2.1	Spatial Extent.....	17
5.2.2	Ecological Significance	17
5.2.3	View-scape.....	18
5.3	Available Mitigation Measures.....	18
5.3.1	Rationale and Objectives	18
5.3.2	Tree Retention.....	19
5.3.3	Tree Protection.....	20
5.3.4	Tree Planting.....	20
5.4	Lake Drive Recommendations.....	21
5.4.1	Property Preparation Phase	21
5.4.2	Lot Development Phase	22
5.4.3	Species-at-Risk Management.....	24
5.4.4	Hazard Management	24
5.4.5	Lot-specific TPP	25
6.0	REFERENCES	26

LIST OF TABLES

Table 1: Summary of Tree Species within Development Area

Table 2: Tree Species Distribution

Table 3: Summary of Impacts

LIST OF APPENDICES

Appendix A – Site Plan (C.C. Tatham)

Appendix B – Grading Plan (C.C. Tatham)

Acronyms and Abbreviations

DBH	Diameter (of a tree) at breast height
EAB	Emerald Ash Borer
ELC	Ecological Land Classification
GSCA	Grey Sauble Conservation Authority
SAR	Species at Risk
TPP	Tree Preservation Plan
TPZ	Tree Protection Zone
ZOI	Zone of Impact

1.0 INTRODUCTION

1.1 Background

This report is submitted in support of a pending development application for a property along the shoreline of Georgian Bay within the Town of the Blue Mountains. The property address is 189 Lake Drive, and is legally known as Part Lots 37 Concession 11, Plan 931. The property is referred to hereafter as "the Lake Drive Property", or simply "the Property".

The Lake Drive Property is 2.34 ha in area, and over 90% of this area is occupied by natural forest cover at present. This wooded area is part of a narrow block of Significant Woodland that measures just less than 35 ha and borders the shore of Georgian Bay. This block of Significant Woodland and the Property itself are situated within an area that has been subject to development for residential and recreational use.

At present, there is a single residence established at the east end of the Property. The Property owner is currently seeking final approval of a plan which will see the creation of four additional residential lots to the west of the existing residence. This portion of the Property is almost entirely wooded at present.

The proposed development will necessitate some removal of trees within the portion of the Property proposed for development. Existing trees immediately adjacent to the areas of development could also be subject to indirect impacts both during and after construction. To help manage and mitigate potential impacts, and to ensure the long-term presence of tree cover in and around the development, this Tree Preservation Plan (TPP) has been developed.

1.2 Objectives and Scope of Work

This TPP is intended to meet three primary objectives, as follows:

- to document the nature of existing forest cover within and immediately adjacent to the Property,
- to provide an analysis of the potential impacts of the proposed development on existing woody vegetation, and
- to identify measures that will mitigate potential impacts and optimize the long-term presence of trees following development of the Property.

This TPP is intended to inform the application and approval process, and also to inform and guide future residential development plans for the individual lots at the Lake Drive Property.

The scope and content of this TPP have been developed to be consistent with available guidance (e.g. the Niagara Escarpment Commission's draft guidance for tree preservation (NEC, 2011)). Scope and content also reflect TPPs recently completed and implemented elsewhere in Grey County (e.g. Morris, 2011, 2012, 2015)

There are several broad tasks that have been undertaken in the preparation of this TPP, as follows;

- On-site surveillance of the general characteristics of the Property, with emphasis on the nature of existing forest cover (species composition, density, general health, size class distribution, extent of crown cover),
- Surveillance to determine the presence of any Species at Risk (tree species),
- Identification of tree-related hazard or liability issues (e.g. standing dead trees, trees in decline, etc.),
- Analysis of the potential impacts of development on the existing tree cover, and
- Development of recommendations regarding protection and mitigation measures specific to the Property.

2.0 Method of Site Assessment

2.1 Delineation of Zone of Impact

The initial step in the TPP was to establish the Zone of Impact (ZOI) for the Lake Drive Property. In general, a ZOI encompasses those areas within which development is proposed and damage or loss of trees may occur. The inclusion of all areas designated for development allows for consideration of any direct loss or damage of trees within those areas. Existing trees within the ZOI are directly subject to damage or removal to facilitate development. The ZOI also considers trees within a limited area (i.e., within 10-m) immediately outside the designated development area that are potentially at risk of damage through indirect effects.

For this TPP, the ZOI encompasses four of the five residential lots planned for the Property (see Site Plan in Appendix A). The majority of the area within Lot 1 is excluded from the ZOI because the existing residence is to remain in place and no site alteration is proposed for Lot 1 in the current Site Plan. The ZOI encompasses the full area of each of Lots 2-5, including the anticipated Lot set-backs. For the initial assessment of potential impacts to trees, the TPP simply assumes that all trees within the proposed Lot boundaries may be subject to direct impacts. The implications of Lot set-backs are to be considered as part of Lot-specific TPPs to be prepared prior to eventual grading and development of individual lots (see Section 5.4.5).

The ZOI also encompasses the proposed common element road that will traverse the full width of the Property, and servicing infrastructure that will be routed along this roadway. The proposed road is bordered entirely to the north by the residential lots, and this adjacent area is already encompassed in the ZOI. The ZOI further includes a 10-m band adjacent to south side of the road, as part of Block 1. A 10-m band within Lot 1 along the boundary with Lot 2 is also included in the ZOI.

The total area of the ZOI is approximately 1,400 m² (1.4 ha), which is about 60% of the full area of the Property.

2.2 Characterization of Existing Tree Cover

The characterization of the ZOI with respect to existing tree cover provides a basis for assessment of the possible impacts to those trees. For this TPP, the characterization of tree cover has been facilitated in part by information obtained through an Environmental Review recently prepared for the Lake Drive Property (Morris, 2016). For that review, on-site surveillance was conducted at the Property on 14 April and 27 June 2016. Further surveillance of the Lake Drive Property was conducted on 21 February 2017 specifically for the purpose of this TPP.

Focused site-specific monitoring has been conducted to evaluate and describe:

- Physiography and hydrology,
- Forest cover characteristics (age, canopy status, species distribution),
- General floral and faunal species presence, and
- Possible presence of Species at Risk (i.e., Butternut, Red Mulberry).

In addition, a formal Butternut health assessment was completed on 28 June 2016 by a designated Butternut Health Assessor (BHA).

The determination of existing conditions within the Property considers a few key physical and ecological characteristics. The general approach is consistent in concept and technical methods to the Ecological Land Classification (ELC) procedure documented by Lee et al. (1998). Specific forest characteristics observed and recorded include absolute and relative tree cover, relative abundance of each tree species within each stratum, and general ranges of diameter at breast height (DBH) of each tree species present. The presence (if any) of tree-related hazards (e.g. standing dead trees, trees in significant decline) were also noted during the ground-level surveillance.

2.3 Assessment of Impacts

The assessment serves to identify potential damage or loss of the existing woody vegetation throughout the entire ZOI. Consideration is given to both direct and indirect impacts, and also acute and chronic impacts.

The assessment addresses two distinct phases of the overall development process. The first phase is the initial establishment of the new lots and associated infrastructure (access road, servicing). For the purpose of this TPP, this is referred to as the "Property Preparation" phase. This phase encompasses larger-scale activities that are effectively the subject of consideration in the current planning application (i.e., geotechnical studies, overall lot grading plan, lot and building envelope configuration, design and installation of common element infrastructure). These activities will be undertaken collectively on behalf of a single proponent (the current owner of the Property) and are expected to be completed within a calendar year.

The second phase encompasses activities that will be undertaken by eventual owners of each of the individual lots (i.e., residential construction, landscaping). This is referred to herein as the "Lot Development" phase. This phase will commence some time following completion of the Property Preparation phase, but the timing of the activities within any given Lot is largely dependent on the intentions of Lot purchasers.

The extent and significance of potential impacts are subject to a qualitative evaluation that considers both ecological and aesthetic functions of trees within the Property. For each identified component of the development, the evaluation takes into account the nature of the impacted trees, their location within the Property, and the total number or area of trees that would likely be impacted. The given impact is simply rated as *low*, *medium* or *high* to give a sense of its relative importance and need for mitigation.

2.4 Development of Mitigation Measures

Recommendations for mitigation measures have been developed for each of the development phases defined herein, and for the specific undertakings in those phases.

The recommendations are made mainly on the basis of two main factors;

1. the specifications of current development plans (grading requirements, building envelope configuration, road dimensions, etc.), and
2. the species, size and abundance of trees in the specific areas of impact.

Recommendations are provided for either the retention of existing trees or planting of new trees, as appropriate for each specific circumstance. For all trees anticipated to be present in the long-term, either retained or planted, recommendations are also provided for the protection of those trees.

3.0 EXISTING SITE CONDITIONS

3.1 Physical Characteristics

Certain physical characteristics are important determinants of the long term fate of existing tree cover, both with and without development. These characteristics are also important to consider in any plans for tree protection or replacement.

3.1.1 Topography

The Property occupies an area of relatively steep relief on the shore of Lora Bay (Georgian Bay). Elevation rises from ~180 meters above sea level (masl) near water's edge to ~205 masl at the southern boundary of the Property. This equates to ~25% average slope over the ~100 m width of the Property. Slope is variable over the width of the Property, with a relatively high gradient encountered both north and south of the existing laneway that traverses the Property.

There are also small ridges that yield smaller scale topographical variability along the long axis of the Property. The relief associated with these ridges is typically 1-2 m. The presence of these ridges and adjacent troughs, and the overall north-south slope of the Property, are key determinants of site hydrology. This in turn has an influence on the nature of existing tree cover.

3.1.2 Soils

The Grey County Soil Survey identifies soils within and around the Lake Drive Property as Vincent Silt Clay Loam. These finer textured limestone till soils are described as having good drainage and are typically gullied. Soil profiles completed during the 2016 Environmental Review reveal a relatively high silt and fine sand content on elevated ridges and greater clay content in depressions. In certain depressions, the soil profile is reflective of the regular flow of surface runoff and/or shallow groundwater seepage towards the bay. Soils in these depressions tended to be less oxidized and had higher content of silt and clay.

3.1.3 Hydrology

The general direction of natural drainage in the area surrounding the Lake Drive Property is from southwest to northeast (i.e., towards Georgian Bay). At a finer scale, natural drainage may be channeled to some extent by small ridges and gullies formed primarily on the slope faces within the Property.

3.2 Ecological Characteristics

Terminology and classifications from the Southern Ontario Ecological Land Classification (ELC) manual (Lee et al., 1998) are applied in the characterization of the woody vegetation communities currently found in and around the development area proposed for the Lake Drive Property. A description of the regional ecology is provided for context.

3.2.1 Regional Ecology

The Lake Drive Property is situated within the Mixedwood Plains *Ecozone*, and more specifically it is within the Manitoulin – Lake Simcoe *Ecoregion*, equivalent to Site Region 6E under Provincial classification. In this region, the climax vegetation is characterized by mixed hardwoods, including Sugar Maple, American Beech, Eastern Hemlock, Red Oak, and Basswood. Pioneer species include White Pine, White Birch, and Trembling Aspen. Moist sites are characterized by Yellow Birch, White Elm, and Red Maple, with Black Ash and Eastern White Cedar typically occupying depressions.

3.2.2 Property Forest Cover

The Lake Drive Property is occupied largely by a mix of deciduous and coniferous forest. Deciduous trees dominate the upper emergent canopy, consisting mainly of Aspen (Trembling, Large-toothed) and Ash (Red, White, Black), with Birch (White and Yellow), American Basswood and Sugar Maple also sporadically present. Coniferous trees are a minor component of the upper canopy, and tend to be found in clusters, more so on lower portions of slopes and on flats, especially on the lower half of the Property. Eastern White Cedar is the most abundant conifer, and Balsam fir is also relatively abundant. A few specimens of Eastern Hemlock are also present, mostly on the western part of the Property.

In following the ELC, system (Lee et al., 1998) the forest encountered within and around the Lake Drive Property would be described as Fresh-Moist White Cedar Mixed Forest (FOM7) community type.

The Property has been subject to anthropogenic disturbance and clearing in the past, as evidenced by a few large, well-aged stumps, and also by the general nature of tree cover that is currently present. The trees encountered in and around the Property are relatively young and mostly either early-succession and mid-succession species. It is estimated that less than 10% of all trees exceed 30 cm diameter at breast height (DBH), with most being <20 cm DBH. Only a few scattered specimens of Aspen, Ash and Cedar exhibit a DBH >40 cm. The largest tree encountered in the ZOI is a specimen of Trembling Aspen measuring 55 cm DBH. This is a relatively fast growing and early-succession tree species, and specimens of this size are likely still relatively young.

The species composition and stand characteristics of the forest cover are subject to variability over a fairly small spatial scale. Topography is a primary determinant of the species composition of woody cover. Eastern White Cedar tend to be concentrated on the lower portion of the Property between the beach area and the relatively steep slope down from the laneway. Certain species tend to be more abundant in proximity to low areas where seepage tends to be encountered. This includes Black Ash and Balsam Fir. Willows, Alders and a few other woody species are encountered only in relatively close proximity to the beach.

The forest cover creates a canopy that varies in the degree of closure, with an overall average for the Property estimated to be about 60-70% closed. The sub-canopy is generally thin, consisting mostly of cedar and younger specimens of common deciduous trees (Ash, Birch and Aspen). Most of the sub-canopy trees are <15 cm DBH. The under-storey is also relatively thin, composed mostly of saplings of the mature tree species present (primarily ash) and typical shrubs of deciduous forest (e.g. Round-leaf Dogwood, Alternate-leaved Dogwood).

3.2.3 Tree Species Characteristics

A summary of the tree species found within and around the Lake Drive Property is provided in Table 1. There are additional woody species present within the Property that have been excluded from Table 1. These are species that are either very few in number, are non-native, occur primarily in shrub form, and/or are not within the ZOI. This includes the following;

- domestic apple - two specimens of domestic apple, in significant decline, in Lots 2 and 3,
- non-native honeysuckle - a few specimens confined to the area bordering the beach,
- non-native high-bush cranberry - a few specimens confined to the area bordering the beach,
- non-native shrub alder - small clusters confined to the area bordering the beach, and
- shrub willows - scattered specimens confined to the area bordering the beach.

Aside from the noted exclusions, there are 26 species of tree that have been recorded within the Lake Drive Property, specifically within the ZOI. All but four of the 26 species are deciduous. Five of the identified species are deemed to have relatively high tolerance to wet conditions. These water-tolerant species (Black Ash, Red Ash, Eastern White Cedar, White Elm, and Mountain Maple) are generally associated with low and relatively wet areas within the Property. White Cedar, which is tolerant of a range of soil moisture regimes, is the only one of these species that is widely distributed

throughout the Property. The existing forest cover also includes a limited presence of non-native tree/shrub species, including European Buckthorn and White Mulberry.

The following are the broad characteristics of tree species that dominate the existing canopy and represent the very large majority of existing forest cover within the Lake Drive Property:

- Aspen (Trembling and Large-toothed): Pioneer species, intolerant of shade and excessive soil saturation, with shallow, wide-spreading root systems.
- Eastern White Cedar: A conifer with a narrow conical crown. Relatively tolerant of wet conditions, with variable root systems. Commonly associated with a variety of deciduous trees (birch, ash, silver maple).
- Balsam Fir: A medium-sized conifer that is a late succession or climax species. It is a major element of Canada's boreal forest, but also commonly found in mixed stands, particularly with Aspens, Cedar and Birch. Very tolerant of shade and a wide variety of soil conditions.
- White Birch: Typically 20 to 25 m tall at maturity. Root system is shallow and wide-spreading. Not very tolerant of wet conditions or shade. A pioneer species, tending to have a limited life span in settings other than boreal forests.
- Ash (Red and White): Root systems variable, but often shallow. Typically achieve a height of ~ 20 m at maturity. Early-succession species that generally do poorly in competition with other trees. Long-term viability now significantly threatened due to continuing spread of Emerald Ash Borer (EAB) in Ontario.

3.2.4 Tree Species Distribution

Within the Lake Drive Property, the forest cover is relatively uniform but there is still some degree of spatial variability in the relative abundance and size of the various tree species. A summary of tree species distribution throughout the ZOI is provided in Table 2.

Lot 1

Lot 1 has been previously cleared for the purpose of establishing a single family residence. In its present state, Lot 1 is about 50% wooded. Woody vegetation is confined almost exclusively to the east and west perimeters of the Lot. On the west side, this is continuous with forest cover occupying the undeveloped area that will become Lots 2 through 5. A few specimens of Eastern White Cedar are present in the open yard adjacent to existing dwelling.

The upper canopy in the wooded portions of Lot 1 is a mix of Ash and Birch, with scattered Aspen also present. The large majority of trees are <30 cm DBH. As elsewhere within the Property, the sub-canopy is dominated by Cedar, with younger specimens of Ash and Aspen also present. Clusters of Balsam Fir are also mixed in with the Cedars,

slightly more so than elsewhere on the Property. Almost all sub-canopy trees are <30 cm DBH, with the majority <15 cm DBH.

Lot 2

Birch and Aspen (Large-toothed and Trembling) dominate the upper canopy in Lot 2. A few specimens of these trees are >30 cm DBH, but almost all are <40 cm DBH. A single Aspen specimen in the northeast corner of the Lot measures 53 cm DBH, making it one of the largest trees on the Property. Eastern White Cedar is the most common tree in sub-canopy, with a few scattered Balsam Fir also present. Less than 10% of these sub-canopy trees exceed 30 cm DBH, and most are <15 cm DBH.

Lot 3

In Lot 3, Ash and Birch are the dominant emergent trees in the upper canopy. A few Basswood are also present. About 20% of these upper canopy trees are > 30 cm DBH. The canopy is slightly more dense than elsewhere in the Property, estimated as being about 80% closed. The larger deciduous trees are more prevalent in the upper half of the lot, closer to the laneway.

Cedars dominate the sub-canopy with Balsam Fir also present in significant number (more so than all other Lots, except Lot 1). Less than 10% of these trees exceed 30 cm DBH. Cedar become more prevalent in the lower half of the Lot, and also smaller, with ~5% exceeding 30 cm DBH. The large majority are <15 cm DBH.

Lot 3 contains one small Butternut specimen (<5 cm DBH), located in the lower half of the lot, outside the building envelope.

Lot 3 also contains 13 specimens of relatively young Mulberry. A few measure 15-20 cm DBH, but most are <10 cm DBH. One of these specimens was identified by GSCA during the dormant period as a possible specimen of Red Mulberry (*Endangered*). Closer examination during the non-dormant period, as part of the 2016 Environmental Review, has revealed all Mulberry specimens within the Lot 3 to be non-native White Mulberry. Mulberry specimens have not been found elsewhere on the Property.

Lot 4

The general pattern of tree distribution in Lot 4 is similar to Lot 3, with large deciduous trees being more prevalent in the upper half, and smaller conifers (especially Cedar) being more abundant in the lower half of the Lot. Aspens dominate the upper deciduous canopy, with Birch also present. The canopy in this lot is less continuous than other lots, with an estimated cover of about 55-60%. About 25-30% of the canopy trees are >30 cm DBH.

Cedar and also Birch dominate the sub-canopy. Aspen are also present in this layer on the lower half of the Lot. Less than 10% of these trees exceed 30 cm DBH, and the majority are <15 cm DBH.

Lot 5

The upper canopy in Lot 5 is dominated by Aspen, but Ash and Birch are also present. About 20% of these trees are <30 cm DBH, with a few specimens of Aspen approaching 45 cm DBH. Canopy cover is relatively patchy in Lot 5, with total cover estimated at about 50-55%. The larger deciduous trees are more prevalent on the upper half of the Lot (i.e., within the proposed building envelope).

Cedar dominates the sub-canopy, and accounts for 40-50% of the total cover within the Lot. Cedars are more abundant on the lower half of property, and only about 5% of trees in this part of the Lot are >30 cm DBH, and most are <15 cm DBH.

Block 1

The upper canopy in Block 1 is dominated by Trembling Aspen, with Ash and Birch also contributing meaningfully to this layer. Scattered specimens of Basswood, Ironwood and Sugar Maple are also present in the deciduous canopy. Cedar dominates the sub-canopy, and is most concentrated on the lower half of the slope near the laneway. Cedar account for about ~40-50% of the woody cover within the Block. Scattered Balsam Fir are also present in the sub-canopy. The large majority of trees in Block 1 are small or medium sized (i.e., <30 cm DBH). About 10-15% of the Aspen and Ash and about 20% of Cedar are >30 cm DBH. Only a few specimens of trees measure 40 to 50 cm DBH.

Access Road

The proposed route for the access road follows an existing trail that is already cleared of trees. There is tree cover to the sides of the existing trail, consisting of a species mix that is consistent with the larger block of forest cover that is bisected by the trail. Many of the trees on the immediate perimeter of the trail are recently established and are relatively small (<10 cm DBH). The common deciduous trees (primarily Ash and Aspen) are early-succession species that have started to encroach on the existing trail since it was originally cleared. There are few conifers present, almost all being Eastern White Cedar.

A narrow portion of the access road route overlaps with more mature forest cover to the north and south of the existing trail. This forest cover is a continuum of that occurring on the adjacent areas (i.e., Block 1, and the upper portions of Lots 2 - 5). It includes a mix of mature deciduous trees (Ash, Aspen, Basswood, Birch) as well as a sub-canopy of Cedar and some Balsam Fir. Along the north edge of the access road corridor, there are also two Butternut trees. One Butternut (22 cm DBH) is located immediately adjacent to Lot 2, and the second specimen (25 cm DBH) is located adjacent to Lot 1 close to the boundary with Lot 2.

4.0 ASSESSMENT OF IMPACT

The eventual development of the Lake Drive Property will have some adverse impacts on existing woody vegetation. Impacts may be direct or indirect, and acute or chronic. Impacts may occur due to:

- Removal of trees within developed areas for purposes of grading, or construction of buildings and infrastructure (e.g. roadways, service corridors, driveways),
- Accidental contact and damage of trees (inside or immediately adjacent to developed areas) during the operation of construction machinery within developed areas,
- Damage to root systems of trees (inside or immediately adjacent to developed areas) during excavation within the area,
- Impairment to root function of trees (inside or immediately adjacent to developed areas) as a result of compaction or excessive depth of added overburden,
- Impairment to root function of trees (inside or immediately adjacent to developed areas) as a result of altered runoff patterns due to alterations (grading, ditching) within the area of development, and
- Impairment of root function of trees (inside or immediately adjacent to developed areas) as a result of placement of permanent impermeable surface in the developed area.

The assessment of potential impacts on existing woody vegetation within the Lake Drive Property considers all of the potential impacts identified above for each Phase and distinct component of the proposed development. A summary of potential impacts to trees within the Lake Drive Property is provided in Table 3.

4.1 Property Preparation Phase

4.1.1 Geotechnical Study

As a requirement of the approval process, geotechnical investigations have been conducted at the Lake Drive Property. The completion of these studies has required clearance of routes of access through the Property for relatively large machinery. These routes measure approximately 5 m in width, and all trees within these routes have been cleared. The total area that has been cleared in association with the geotechnical survey is conservatively estimated to be in the range of 500 to 700 m².

In addition to the direct loss of trees due to clearance, root systems of immediately adjacent trees have been exposed and/or damaged in some locations where the path of

travel was cut through raised areas. Trees with significant root damage are not expected to survive long-term. This does include some trees that are within proposed building envelopes, and thus may ultimately be removed during the Lot Development Phase.

The passage of machinery may have also resulted in some degree of soil compaction over the root zone of trees adjacent to the path of travel. Because machinery traffic was not repetitive, the degree of compaction is not expected to be severe, and the likelihood of notable effects on trees is considered to be low.

Summary of Impacts:

- Unavoidable direct loss of trees within an area of $<1,000 \text{ m}^2$, including some specimens $>30 \text{ cm DBH}$.
- Possible impacts on root systems of some trees adjacent to cut areas, possibly leading to eventual loss of a limited number of trees.

4.1.2 Access Road

The proposed allowance for the common element access road has a full width of about 9 m, including paved travel surface, gravel shoulders, roundings, and a small gap to a retaining wall that will be installed along the southern perimeter of the road corridor. The total length of the road is about 240 m, and thus the total area allocated to the road is in the order of $2,300 \text{ m}^2$, including the turn around area near the western terminus of the road (approximately 50 m^2). The construction of the road will necessitate the removal of all trees within this area. As noted in Section 3.2.4, the proposed access road route is currently occupied by a wide trail that is already devoid of trees. Of the total area allocated to the access road, at least half is currently devoid of trees. The total area of existing tree cover that will be cleared is estimated to be about $1,000 \text{ m}^2$.

Trees currently standing immediately within this route are relatively small and consist largely of common early-succession species (mainly Ash, some Aspen, a few Elm). On the northern perimeter of the proposed route for the road, there is a greater presence of more mature trees, dominated by deciduous species (mainly Aspens and Ash). This also includes two mature Butternut trees adjacent to the front of Lots 1 and 2.

The south edge of the road allowance borders the area of Block 1, which is entirely treed. A mix of coniferous and deciduous trees occupies the full face of the slope that descends through Block 1. At the lower edge of the slope, in proximity to the road, trees tend to be relatively small and dominated by Cedar and either Ash or Aspen. The road will be separated from the treed area to the south by a retaining wall, averaging about 1 m in height but exceeding 2 m over short stretches. The retaining wall will be supported by helical piles so disturbance behind the wall should be limited. Piles will be embedded to a depth of up to 5 m.

Trees on either side of the corridor are also subject to impacts associated with grading and construction within the road corridor. These impacts could occur due to accidental contact and damage of above-ground portions of trees (trunks, branches) by swinging booms or buckets, or through interference of root systems due to heavy machinery passage (i.e., through compaction). Trees and shrubs immediately adjacent to the south edge of the road may also experience some damage to root systems during the installation of the pilings for the retaining wall.

The trees at the southern margin of the access road route are relatively small trees, but the species present tend to have root systems that are shallow and spread laterally (see Table 1). Trees within a few meters of the retaining wall may be subject to root system damage or impairment that leads to a decline in tree health, and possible loss of some trees. Longer term, the retaining wall may act as a barrier to growth of root systems of adjacent trees. These factors could lead to significant decline in any trees in close proximity to the wall (i.e., within 2-3 meters).

The area adjacent to the northern perimeter of the road corridor and the front lot lines of Lots 2-5 will be subject to grading, and trees in this location will likely be removed. This loss of trees is discussed in Section 4.2 as an aspect of the Lot Development Phase.

Summary of Impacts:

- Unavoidable direct loss of trees within an area of ~1,000 m², with most trees being <30cm DBH.
- Possible impacts on root systems of some trees adjacent to roadway due to road-bed preparation and the installation of the retaining wall (approximately 500 m² of affected area).

4.1.3 Servicing

The servicing corridor (electrical, communications, water, sewage) is to be installed on the south side of the access road corridor, inside of the retaining wall. The installation and long-term presence of servicing will not result in any additional disturbance to trees beyond that potentially associated with the road corridor itself. There is no expected increase in the likelihood or degree of impacts on nearby trees.

4.2 Lot Development Phase

The Site Plan (Appendix A) identifies 5 Lots, ranging in size from approximately 0.15 to 0.25 ha. Each of the lots will be developed individually as freehold condominiums. Lot 1 is currently occupied by an existing residence which is to remain in place, and thus no construction activity is proposed for this lot. The total area of Lots 2-5, where construction activity is proposed, is approximately 0.85 ha (8,500 m²).

Standard lot setbacks will apply for side-of-lot (2 m) and front-of-lot (7.5 m), with potential adjustment to 4 m for the front set-back. The depth of lot ranges from 10 to 17 m for Lots 2 through 5, in keeping with the Draft Plan (42T-91009) of subdivision for the Property. This is less than half the total depth of each of the lots. The defined building envelopes of Lots 2-5 range in size from about 650 to 1,070 m², with a combined total area of about 0.35 ha, or 15% of the total area of the Property.

The topography of the Property necessitates significant fill and grading to accommodate eventual residential development. As per the current Lot Grading Plan (see Appendix B), fill and grading activity will extend throughout the building envelope of each lot, with grading taper extending beyond the rear set-back line. To accommodate lot grading, it is highly likely that all trees within the graded area will be removed. This includes a mix of deciduous (*i.e.*, Aspen, Ash, Basswood, Birch) and coniferous (Cedar and Fir) trees, with 10-20% having a DBH of 30 cm or more.

In the 10-m beyond the back lot lines of Lots 2-5 (part of the ZOI), and in Lot 1 within 10 m of Lot 2, the tree cover is primarily a mix of Cedar, Fir and early-succession deciduous tree species (Ash, Aspen). The trees in this area are relatively small compared to trees on the upper portion of each lot. Grading and construction activity may directly impact some of these trees as a result of accidental contact of trunks or branches with booms, buckets or other moving parts of construction machinery. There may also be indirect impacts associated with soil compaction or fill placement over the root zone trees within or near the limit of grading. In the worst-case scenario, all trees within this part of the ZOI would be lost due to direct or indirect impacts. The total area of this part of the ZOI is approximately 2,500 m².

Summary of Impacts:

- unavoidable direct loss of trees within an area of at least 3,500 m², with 10-15% of trees being >30cm DBH,
- possible direct or indirect impacts on relatively small trees adjacent to rear of building envelope due to grading activity, total area of ~2,500 m².

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Existing Conditions

The Property has been subject to anthropogenic disturbance and clearing in the past, and the trees encountered in and around the Property are relatively young and mostly either early-succession and mid-succession species. The Lake Drive Property exhibits notable slopes and scattered depressions and gullies. Variability in topography and soil moisture results in some variability in the size and distribution of tree species. A total of 26 tree species have been identified as present within the Zone of Impact (ZOI), including 5 species that tend to have an affinity for relatively wet conditions. Less than 10% (estimate) of all trees exceed 30 cm diameter at breast height (DBH). Only a few scattered specimens of Aspen, Ash and Cedar are >40 cm DBH. The canopy is dominated by a few deciduous tree species (Aspen, Ash, Birch, Basswood) but Eastern White Cedar is the most abundant tree species, mainly in the sub-canopy.

Because of the relatively young age of trees, the prevalence of trees in poor health that is often associated with later stages of maturity is quite low. Still, scattered specimens of Elm, Ash and Birch were exhibiting some signs of early decline. Many of the early-succession species do not have long life spans, and their viability following proposed development may not be protracted. Due to pending exposure to Emerald Ash Borer (EAB), this is most likely the case for any Ash specimens (Red, White or Black) that are commonly encountered within the Property.

Overall, the tree cover currently present within the Lake Drive Property consists largely of relatively young specimens of common species. The presence of species of high ecological significance or conservation concern within the ZOI is limited to three specimens of Butternut, which are listed as *Endangered* both Federally and Provincially. The wooded cover within the Property still supports various general ecological functions, including habitat connectivity with the larger band of woodlands that extends through the Property in both directions along the perimeter of Georgian Bay.

5.2 Summary of Identified Impacts

Potential impacts to trees in the ZOI defined for the Lake Drive Property have been identified both within and immediately outside the 4 proposed lots. These impacts are summarized in Table 3, which presents qualitative rankings of the relative extent and potential significance of impacts of each the main activities of both the Property Preparation and Lot Development Phases. In regard to significance, the assessment discriminates between two distinct endpoints; 1) ecology, and 2) view-scape.

5.2.1 Spatial Extent

Overall, the total forested area that is subject to full clearing is approximately 0.55 ha, which includes the entirety of the building envelopes of Lots 2-5, the full road corridor, the space between the road corridor and the lots, and the area already cleared for the purpose of a geotechnical study. There is an additional 0.35 ha of treed land where removal is not planned but where trees may be damaged or even lost, primarily as a result of accidental contact or impairment of root systems through compaction. The total affected area of approximately 0.9 ha represents about 38% of the entire Property.

The Block along the south end of the Property is 0.82 ha (~35% of the Property) and will be retained under natural forested condition. Some tree cover will also be retained along the shore front of each of Lots 2 through 5. The total area of retained tree cover will depend in part on the individual Lot plans. With the general recommendations proposed herein for individual lot development (see Section 5.4.2), this area is expected to be in the order of 0.15 ha. Combined with the ~0.1 ha of tree cover standing in Lot 1, the minimum area of retained tree cover is projected to be about 1.07 ha in total (~46% of Property).

5.2.2 Ecological Significance

The recent Environmental Review (Morris, 2016) concludes that the forest cover within the Lake Drive Property does serve as habitat for common birds and mammals, and also provides a linkage function within the larger block of surrounding woodland. Overall, the potential ecological function and value of the existing forest cover within the Property is relatively limited. As a result, the potential ecological significance of tree loss or damage within the Lake Drive Property is itself limited.

In general, larger trees are considered to have greater ecological value, both in their own right and in the various functions they may serve (e.g. wildlife habitat, hydrological function). The interpretation of ecological significance presented in Table 3 is based in part on this notion, and the fact that the abundance of larger trees (i.e., >30 cm DBH) is relatively low throughout the Property.

The presence of three specimens of Butternut at the Property is recognized as an important factor from a conservation perspective. While the loss of Butternuts within the Lake Drive Property is subject to MNRF permitting and ultimately a compensatory planting program, this loss is rated as having inherently high ecological significance.

Other than the loss of Butternut specimens, the ecological significance is rated as *low* or *medium*. The *medium* significance is driven primarily by the relative spatial extent of tree loss, rather than inherent ecological value of the trees in question.

Aside from other factors, loss or damage of trees is deemed to be less ecologically significant for trees that are early-succession in nature (Birch, Aspen) or which are likely to be subject to hastened decline (e.g. Elm affected by Dutch Elm disease, Ash affected

by EAB). This is simply due to the fact that these trees are not expected to have prolonged presence, even in absence of development. Throughout the Property, early-succession species, including three Ash species, are a significant component of the existing tree cover.

5.2.3 View-scape

In addition to ecological function, the value of tree cover is in part determined by its role in the public view-scape. The presence of trees in the view-scape is valued by the public and agencies representing the public. Conversely, the loss of trees in the view-scape is considered detrimental.

The significance of tree loss or damage in this context is dependent on the number or area of impacted trees, and also the placement of those trees in the landscape relative to public vistas. In the case of the Lake Drive Property, the public view of the new residential lots will be highly limited. From the south, potential views of the Lots from the adjacent golf course are largely precluded owing to the fact that the lots are situated behind a slope that will remain treed. View of the front of lots will be confined almost entirely to the lot owners traveling the access road. There may be limited view of the rear of these lots by boaters traveling by on the adjacent bay, who are not expected to be numerous.

Overall, the view-scape significance of the anticipated loss or damage of trees within the Lake Drive Property is deemed to be low. The possible view-scape implications from the vantage point of passing boaters have been conservatively judged as *medium* significance.

5.3 Available Mitigation Measures

5.3.1 Rationale and Objectives

The meaningful presence of trees within the development area of the Lake Drive Property may serve a number of beneficial purposes, including:

- Enhanced appearance of the residential lots,
- Benefits to residential function (e.g. summer shading, winter wind break),
- Wildlife benefits (nesting and foraging of small mammals and birds),
- Buffering of adjacent natural areas, and
- Screening to minimize visual impacts.

Lot and infrastructure development can be planned to optimize the post-development presence of trees and associated benefits. The post-development presence of trees can generally be achieved through three primary means: 1) targeted retention, 2) protection of existing trees, or 3) through tree plantings.

5.3.2 Tree Retention

As a general guiding principle, all phases of development should be planned and implemented to avoid direct loss of trees, to the extent feasible. In cases where there is uncertainty in the feasibility of tree retention, or where there are options as to which trees should be targeted for retention (e.g. selection of driveway locations), decisions should give consideration to the likelihood of long term viability and value of the trees in question. As a general rule, retention of larger (>30 cm DBH) specimens is generally the preferable option, where feasible.

Trees that are prioritized for retention (or planting) should be native and representative of the regional ecosystem and the local natural areas. Trees that exhibit nuisance characteristics (e.g. thorns, heavy debris dropping) are less desirable for residential settings. For screening function, trees that are long-lived and native, relatively tall at maturity, and that exhibit robust crowning are recommended. For the Lake Drive Property, the highest priority species for retention include Basswood, Sugar maple, and Ironwood, but these species are not abundant or widely distributed. Eastern White Cedars are recommended for retention where feasible to add a coniferous element to the long-term tree assemblage. Birch and Aspen are not expected to have the same longevity, and their typical crown form tends not to be as optimal for screening purposes. These species would be of lower priority. All ash species are deemed to be low priority, owing to the high likelihood of severe impacts due to EAB. Elm are also a relatively low priority. Balsam Fir could be retained, but preferably within stands of trees because this species is prone to being uprooted when growing open to winds.

Mature trees at the front of any of the proposed lots are considered to be a relatively high priority for retention. At present, all lots have some presence of mature specimens of desirable trees along lot frontage. If possible, these trees should be identified as a high priority for retention when lots are eventually developed. Priority should also be placed on retention of large trees or clusters of trees along the rear of each lot, bordering the water front, for view-scape purposes.

In the determination of the feasibility to retain any given trees, it is important to ensure that the post-development conditions will be conducive to the long-term survival of those trees. There are several conditions that are unfavourable to long term viability of most trees, and which should generally be avoided. This includes:

- the presence of impermeable surface over a significant portion of the root zone of a tree,
- the regular occurrence of vehicular travel over the root zone,
- the presence of in-ground barriers (e.g. building foundations, retaining walls, in-ground pools) in close proximity to a tree (i.e., within dripline), and
- the anticipated casting of significant shade (from buildings or other retained trees), especially in regard to shade-intolerant tree species (e.g. Birch, Fir).

Any trees that are currently in a notable state of decline should be excluded from retention objectives.

5.3.3 Tree Protection

For those trees that are targeted for retention within construction zones or building envelopes, or trees just outside of these areas but still potentially subject to harm, there are several general practices which protect retained trees and facilitate post-development survival. These include:

- Placement of protective wrap or fencing (hoarding) around individual trees, or along perimeter of woody vegetation units,
- Establishing limits on the depth of excavation or grading within prescribed distance of the tree(s),
- Avoidance of passage of construction vehicles over the root zone of the tree(s), especially during conditions which are conducive to compaction,
- Establishing exclusion areas for temporary placement and storage of stripped overburden during site preparation, and
- Developing residential design to minimize the installation of impermeable surface (e.g. fully paved patios, driveways, walkways) within and around the root zone.

5.3.4 Tree Planting

Where construction requirements preclude the retention of desirable trees, or where existing trees are of low desirability for retention, planting of trees following construction is the most effective method of meeting objectives pertaining to the long-term presence of trees.

For purposes of visual screening, plantings should have a minimum caliper size of 50 mm (5 cm) if deciduous, and a minimum height of 180 cm if coniferous. Plantings should consist of native species effectively adapted to site conditions. The preferred candidate species described for retention (Section 5.3.2) should be first considerations for plantings. Additional species can be included in landscape plans, but should not constitute the majority of plantings and should be predominantly native species. Non-native walnuts (e.g. Japanese walnut) and non-native mulberry (e.g. White Mulberry) should be fully prohibited to mitigate the possible impacts of hybridization with native Red Mulberry and Butternut, both being *Endangered* species reported as present in the area around the south shore area of Georgian Bay.

Plantings should be undertaken with the over-arching objective of creating an assemblage of trees within the Property that resembles the natural presence of trees in existence prior

to development activities. For the Lake Drive Property, this is generally a fairly even mix of deciduous species and conifers, especially Eastern White Cedar.

5.4 Lake Drive Recommendations

The recommendations herein are provided to optimize the post-development presence of trees, with the broader intention of maintaining or enhancing the natural environment, and the cultural and ecological functions of that environment. They are provided primarily as guiding principles, along with more specific measures where such a determination is appropriate. They are made in deference to any engineering requirements that might preclude or limit them.

For all phases and activities, there are four basic recommendations that apply:

1. Retain trees to the extent possible, with highest priority on larger (>30 cm DBH) native trees,
2. Implement measures to reduce indirect impacts of those retained trees and increase the likelihood of long-term survival (see Section 5.3.2),
3. Implement measures to protect trees that are outside of the active construction areas, and
4. Where retention of desired trees is not possible, conduct post-development planting to re-establish the function of those trees that were removed (see Section 5.3.4)

In a general sense, the priority to implement these recommendations should be based on the likelihood and potential significance of the impacts. The recommendations provided below are based in part on the likelihood and significance of the impacts (see Table 3). It should be noted that the assigned ratings of likelihood and significance are intended to rate the various potential impacts relative to each other, not in an absolute sense. This serves simply to gain a sense of priority for any mitigation measures.

5.4.1 Property Preparation Phase

Retention

The construction of the proposed residential access road will necessitate removal of most or all woody vegetation within the proposed road corridor (see Site Plan - Appendix A). The majority of the trees within the corridor are of low priority for retention.

If there are specimens of relatively high priority trees in any portions of the perimeter of the road corridor where retention is feasible, especially in the area in front of the proposed new lots, the general guidance for retention in Section 5.3.2 should be applied.

Protection

Measures should be implemented to minimize the potential for impacts on trees adjacent to the road corridor.

Individual trees or areas of woody cover adjacent to the road construction area should be protected following the general principles described in Section 5.3.3. This includes installation of heavy duty fencing at the outer limit of disturbance prior to construction onset to prevent tree contact/damage, and avoidance of work with heavy machinery during and following significant precipitation events. Protection measures are not needed for trees that are in obvious decline or areas that must be cleared for other purposes (e.g. for eventual lot grading).

Replanting

Replanting within the road corridor will be largely precluded by installation of a permanent road surface.

The area immediately to the south of the retaining wall will likely experience some loss of trees as a direct or indirect result of the wall's installation. This zone may provide opportunities for replanting, depending on engineering requirements for this space. If tree planting is feasible in open areas immediately upslope of the retaining wall, small species (e.g. Dogwoods, Serviceberries) or species with non-spreading root systems should be considered. Eastern White Cedar should be included in the mix to ensure representative conifer presence, and also owing to the relatively resilient rooting habits of this species. If boulevard plantings are feasible on the north side of the road corridor, a similar species mix is recommended. Basswood, Black Cherry and Sugar Maple could also be considered, depending on anticipated proximity to eventual residential buildings.

The area that has been cleared for the geotechnical study should be targeted for replanting. The area north of the extent of grading should be replanted as soon as practical following completion of site alteration undertaken during the Property Preparation Phase. The planting mix should generally reflect the existing tree cover surrounding the cleared areas, but should exclude any Ash species owing to EAB implications. Replanting of within areas still subject to future site alteration (i.e., within the building envelopes and grading area) should occur as part of the Lot Development Phase once residential site alteration is complete.

5.4.2 Lot Development Phase

Retention

Within all new lots, there are scattered trees with DBH > 30 cm, more towards the front of the lots and often within the building envelopes. The eventual grading of these lots is likely to necessitate the removal of most or all of these trees, as will the subsequent

installation of residential structures. Some trees at the lower end of the grading taper could be retained, through targeted adjustment of the grading limit (as permitted by engineering requirements), or possibly through the creation of tree wells.

There may be limited opportunities for tree retention on the perimeters of the building envelopes. Tree retention could be feasible under certain conditions, including:

- depth of fill is minimal (i.e., less than 0.3 m), or tree wells can be established,
- trees are located away from paved surfaces or in-ground structures,
- trees are not in areas that have been subject to compaction, and
- trees are NOT of species with inherent limitations on long-term viability (i.e., Ash, early-succession species approaching late-life decline).

Given the proposed placement and dimensions of the building envelopes, the anticipated dimensions of future buildings, and the general nature of trees within the proposed lots, there is a very low likelihood that meaningful tree retention can be achieved within or immediately adjacent to the building envelopes. Long-term tree presence will likely be achieved primarily through post-development planting.

Protection

Implementation of measures to protect against impacts outside of the building envelope and grading area are warranted.

In addition to physical protection measures, the establishment of a Tree Protection Zone (TPZ) along the northern perimeter of each lot is recommended. The TPZ will be an area where tree removal will be subject to constraints, but not entirely prohibited. Removal of trees would be permissible for the purpose of addressing hazard trees (including Ash infected with EAB), creating access paths to the shore area, and creating view windows. To optimize the aesthetic and ecological function of the TPZ, a default width of 10-m is recommended.

Additional measures recommended with respect to enhancing the likelihood for the long-term presence of trees is to adopt practices that minimize the potential for soil compaction. This will reduce the potential for conditions prohibitive to root system establishment when trees are eventually planted along the lot frontages.

Planting

TPP efforts for these lots should focus on post-construction planting efforts, following the principles briefly described in Section 5.3.4.

Additional Measures

More detailed lot-specific TPPs are recommended in advance of site alteration and construction within Lots 2 to 5. See Section 5.4.5 for more detailed recommendations.

5.4.3 Species-at-Risk Management

As noted, a total of three Butternuts (*Juglans cinerea*) have been found within the proposed Lots. Butternuts are classed as *Endangered* and are designated as a Species at Risk (SAR), both federally and provincially. Butternut impacts will occur during both Phases of the proposed Lake Drive development project.

A formal Butternut health assessment has been completed by a designated Butternut Health Assessor (BHA). A BHA report has been submitted and accepted by the Ministry of Natural Resources and Forestry (MNR). These Butternut are considered to be Category 2 for regulatory purposes. Accordingly, they have been formally registered with the MNR, and a compensatory planting program will be implemented in accordance with MNR requirements. The small Butternut in Lot 3 is outside the building envelope, and the lot-specific TPP should address the possibility of retaining or transplanting this tree.

Red Mulberry (*Morus rubra*) are an Endangered species that has been reported in a few locations in general proximity to the Property (e.g. Craigleith). On inspection, a number of mulberry specimens found on the Property have been determined to be non-native White Mulberry (*Morus alba*), which is not of any conservation concern. The presence of White Mulberry is actually considered to be a potential threat to populations of native Red Mulberry due to hybridization that readily occurs between the two species. For this reason, long-term management recommendations for the Property include the removal of non-native mulberries (see Section 5.3.4).

5.4.4 Hazard Management

In regard to woody vegetation, the presence of standing dead trees or old large trees with dead or dying limbs could pose a potential hazard when in proximity to residential areas. At present, there are no trees within the Property that are categorized as old and large, and there were only a few standing specimens that were currently dead or exhibiting extensive signs of poor health or decline. Of the few elm occurring on the Property, most were showing signs of decline due to Dutch Elm Disease. A number of Birch also appeared to be entering a state of decline, likely owing to the presence of nearby larger trees that have now placed the Birch in considerable shade.

There were also a few recently fallen specimens of both Ash and Aspen. These trees were among the larger trees on the Property and appeared to be in good health. These

trees had become uprooted, which could in part be a result of their positioning on a slope face or in areas of wet soil.

Any Ash on or near the Property will be susceptible to eventual exposure to EAB, likely to occur within the next few years. A number of the larger Ash on the Property occur in the upper slope where building envelopes are proposed. These trees may pose a hazard to people and property when the Lots are eventually developed, and may need to be proactively managed as a hazard. Some of these trees are behind the lots and part of an extended area that is expected to remain forested after development. Ash that are located outside of the building envelopes may serve some wildlife habitat function if retained, even if they succumb to EAB. Limbing and topping of these trees may remove the hazard while retaining the habitat function.

Of the trees that could be considered as a potential hazard, some may be removed as a result of activities of the Property Preparation Phase. There will still be some potential for trees to be present in the Lot Development Phase that may pose a hazard. These trees will require assessment and management at that time if they are potentially retainable.

5.4.5 Lot-specific TPP

More detailed lot-specific TPPs are recommended in advance of site alteration and construction within Lots 2 to 5. Those TPPs should reflect to basic recommendations identified throughout Section 5.4, and should be prepared in coordination with owners, architects, engineers and/or contractors as part of the construction permitting process. Among other things, the lot-specific TPP should serve the following purposes:

- identification of retainable tree specimens within each lot,
- determination of possible modifications to the grading taper,
- determination of possible modifications to the site design (e.g. driveway location),
- determination of TPZ characteristics (width/length, species composition, location of view windows, etc),
- identification of tree-related hazards and determination of proactive management needs, if any are required, and
- determination of core aspects of the post-construction planting plan.

6.0 REFERENCES

- Hosie, R.C. 1979. Native Trees of Canada. Eight Edition. Fitzhenry and Whiteside, Don Mills, Ontario.
- Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.
- Morris, N. 2011. Tree Preservation Plan – Georgian Woodlands: Phase IV – Stage 1. Nov. 2011. Ref. # 11-06.1
- Morris, N. 2012. Tree Preservation Plan – Georgian Woodlands: Phase IV – Stage 2. Oct. 2012. Ref. # 12-01.1
- Morris, N. 2015. Tree Preservation Plan – Havens Property. July 2015. Ref. # 15-06.1
- Morris, N. 2016. Environmental Review - 189 Lake Drive. July 2016. Ref. # 16-08.1
- Niagara Escarpment Commission (NEC). 2011. Draft NEC Guideline for the Preparation of Woody Vegetation Inventory, Impact Assessment, and Preservation Plans. 27 January 2011.
- .

TABLES

Table 1: Summary of Tree Species - Lake Drive Property

Species	Characterisitics ¹			Distribution Notes
	Height (m)	Crown Morphology	Root System	
Alternate-leaved Dogwood (<i>Cornus alternifolia</i>)	5 - 7	spreading	branched, spreading	scattered under-story tree throughout property
Balsam Fir (<i>Abies balsamia</i>)	15 - 20	narrow, pyramidal	shallow	common in sub-canopy, prevalent below slopes
Balsam Poplar (<i>Populus balsamifera</i>)	20 - 25	narrow, open	shallow	isolated specimens, mainly near beach
Basswood (<i>Tilia americana</i>)	20	rounded	deep, spreading	scattered canopy species, more at top of slopes
Black Ash (<i>Fraxinus nigra</i>)	15 - 20	narrow, open	shallow, spreading	not abundant, mostly in/near wet areas
Black Cherry (<i>Prunus serotina</i>)	20	narrow, rounded	deep (tap root)	very few specimens, upper slopes
Butternut (<i>Juglans cinerea</i>)	15 - 20	large, spreading	deep, spreading	3 specimens identified - Lots 1, 2 and 3.
Eastern Cottonwood (<i>Populus deltoides</i>)	25 - 30	small, rounded	shallow, spreading	scattered mature specimens near beach front
Eastern Hemlock (<i>Tsuga canadensis</i>)	20	pyramidal	shallow, spreading	a few specimens in Lots 4 and 5 and Block 1
Eastern White Cedar (<i>Thuja occidentalis</i>)	15 - 20	conical, narrow	variable	most abundant species, mostly sub-canopy
European Buckthorn (<i>Rhmanus cathartica</i>)	3 - 5	rounded, narrow	shallow, spreading	scattered presence, mostly in Lots 1 and 2
Hawthorn (<i>Crataegus</i> sp.)	<10	wide-spreading	shallow	uncommon, isolated occurrences in open areas
Ironwood (<i>Ostrya virginiana</i>)	10 - 15	wide-spreading	spreading	not common, mainly in Block 1 and Lot 5
Large-tooth Aspen (<i>Populus grandidentata</i>)	15 - 20	oval, uneven	shallow, spreading	significant canopy tree, more so below slopes
Mountain Maple (<i>Acer spicatum</i>)	3 - 5	round, uneven	very shallow	a few under-story specimens, near wetter areas
Red Ash (<i>Fraxinus pennsylvanica</i>)	10 - 15	narrow, ascending	shallow, spreading	scattered specimens, mostly top of slopes
Round-leaf Dogwood (<i>Cornus rugosa</i>)	<5	spreading	branched, spreading	relatively common throughout understory
Serviceberry (<i>Amelanchier</i> sp.)	<10	narrow	shallow	a few clustered specimens in Lots 2 and 3
Sugar Maple (<i>Acer saccharum</i>)	25 - 30	narrow, rounded	deep, branched	not widespread, mostly upper slopes
Trembling Aspen (<i>Populus tremuloides</i>)	15 - 20	short, rounded	shallow, wide-spread	significant canopy presence, some >50 cm DBH
White Ash (<i>Fraxinus americana</i>)	20	broad	deep or shallow	common canopy species, mostly upper slope
White Birch (<i>Betula papyrifera</i>)	20 - 25	narrow, oval	shallow, spreading	scattered clusters throughout property
White Elm (<i>Ulmus americana</i>)	20 - 25	spreading	shallow, spreading	scattered, not common, late maturity
White Mulberry (<i>Morus alba</i>)	20 - 25	dense, rounded	shallow, spreading	13 specimens total, young, all in Lot 3
White Spruce (<i>Picea glauca</i>)	20 - 25	conical, narrow	shallow, spreading	isolated, not large, mostly below slopes
Yellow Birch (<i>Betula alleghaniensis</i>)	20 - 25	long, spreading	deep, spreading	scattered mature specimens, some in decline

1 - Typical characteristics of mature trees under good growing conditions. Taken from Hosie (1979).

Table 2: Summary of Existing Woody Vegetation Cover

Lot #	Area ² (m ²)		Woody Species Composition ²		# Trees >30 cm DBH
	Total Lot	Building Envelope	Canopy	Sub-canopy	
1	2400	560	ash=birch>aspen	cedar>fir>ash	>10%
2	1590	650	birch>ash>cedar	cedar>>ash>fir	10%
3	1990	900	ash>birch>cedar	cedar>fir>ash	10%
4	2370	1070	aspen>birch>ash	cedar>>ash>fir	15%
5	2590	920	aspen>ash>cedar	cedar>>ash>fir	15%

1 - as per Site Plan, rounded to nearest 10m²

2 - relative abundance as per standard ELC notation (Lee *et al.*, 1998)

Table 3: Summary of Potential Impacts on Trees

Development Component	Affected Forest Area	Zone	General Nature of Impact	Relative Extent	Relative Significance	
					Ecological	View
Geotechnical Study	<1,000 m ² (<500 m ²) ¹	Within path of travel	Removal/damage of smaller ² trees Removal/damage of larger ³ trees	Medium Low	Low Low	Low Low
		Adjacent to path of travel	Indirect impacts ⁴ on smaller trees Indirect impacts on larger trees	Low Low	Low Low	Low Low
Road Corridor and Servicing	~1,000 m ²	Within corridor	Removal/damage of smaller trees Removal/damage of larger trees	High Low	Low Low	Low Low
	<500 m ²	Immediately south of corridor	Indirect impacts on smaller trees Indirect impacts on larger trees	Low Low	Low Medium	Low Low
Lot Grading and Residential Construction	~3,500 m ² ,	Within building envelope	Removal/damage of smaller trees Removal/damage of larger trees	High Medium	Medium Medium	Low Medium
	~500 m ²	Outside front lot line	Removal/damage of smaller trees Removal/damage of larger trees	Medium Medium	Low High ⁵	Low Low
	~2,000 m ²	Outside rear or side lot lines	Direct or indirect impacts on small trees Direct/indirect impacts on larger trees	Medium Low	Low High ⁶	Low Low

1 - more than half this area lies within areas proposed for grading and construction

2 - trees with DBH of <30 cm

3 - trees with DBH of >30 cm

4 - mainly damage or impairment of root systems due to compaction, excess overburden, or damage through excavation

5 - includes loss of two mature Butternut trees (Endangered) - MNRF permission and compensation planting required

6 - includes loss of one immature Butternut tree (Endangered) - MNRF permission and compensation planting required

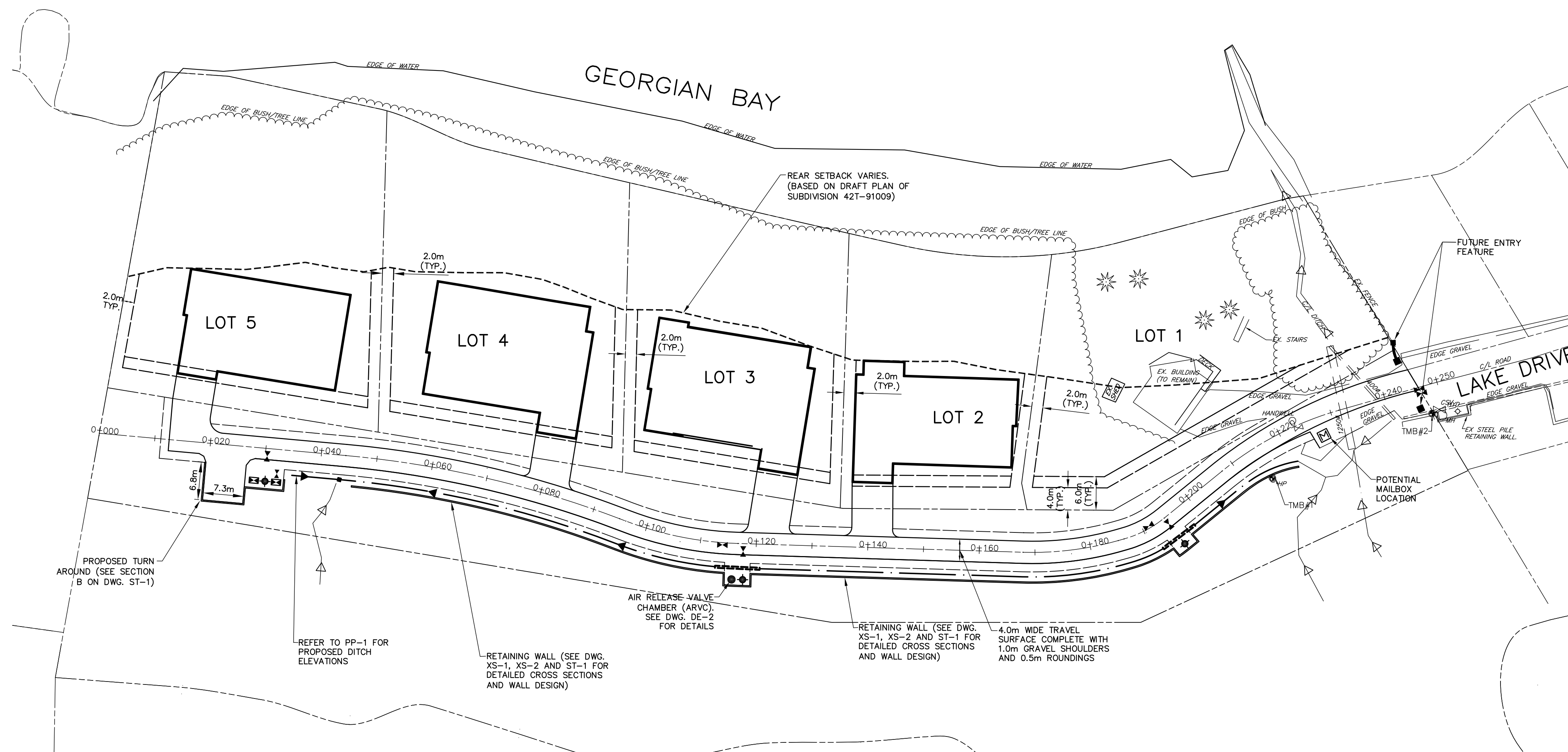
APPENDICES

Appendix A – Site Plan (C.C. Tatham)



1. TOPOGRAPHIC SURVEY COMPLETED BY C.C. TATHAM AND ASSOCIATES LTD. ON DECEMBER 10, 2015.
2. LEGAL BOUNDARY SURVEY PROVIDED BY HEWETT AND MILNE LTD. LAND SURVEYOR DATED AUGUST 31, 1990.
3. PROPOSED DRIVEWAY LOCATIONS AND HOUSE DIMENSIONS/CONFIGURATION CONCEPTUAL FOR DESIGN PURPOSES ONLY. FUTURE DRIVEWAY LOCATION AND HOUSE DIMENSIONS TO BE DETERMINED DURING INDIVIDUAL LOT GRADING PLAN DESIGN AND BE APPROVED AS PART OF THE INDIVIDUAL BUILDING PERMIT APPLICATION PROCESS.

SITE STATISTICS		
LOT #	LOT AREA(m ²)	BLDG AREA(m ²)
LOT 1	2,397.90	564.00
LOT 2	1,593.20	647.00
LOT 3	1,993.10	897.50
LOT 4	2,367.70	1,074.70
LOT 5	2,594.00	924.00
TOTAL (1-5)	10,945.90	4,107.20
ZONING INFORMATION (SHORELINE RESIDENTIAL_R3)		
SETBACKS		
FRONT	7.5m (PROPOSED TO BE REDUCED TO 4.0m)	
SIDE	2.0m	
REAR	BASED ON DRAFT PLAN OF SUBDIVISION 42T-91009	



C.C. TATHAM & ASSOCIATES LTD. CLAIMS COPYRIGHT
TO THIS DOCUMENT WHICH MAY NOT BE USED FOR
ANY PURPOSE OTHER THAN THAT PROVIDED IN THE
CONTRACT BETWEEN THE OWNER/CLIENT AND THE
ENGINEER WITHOUT THE EXPRESS CONSENT OF C.C.
TATHAM & ASSOCIATES LTD.

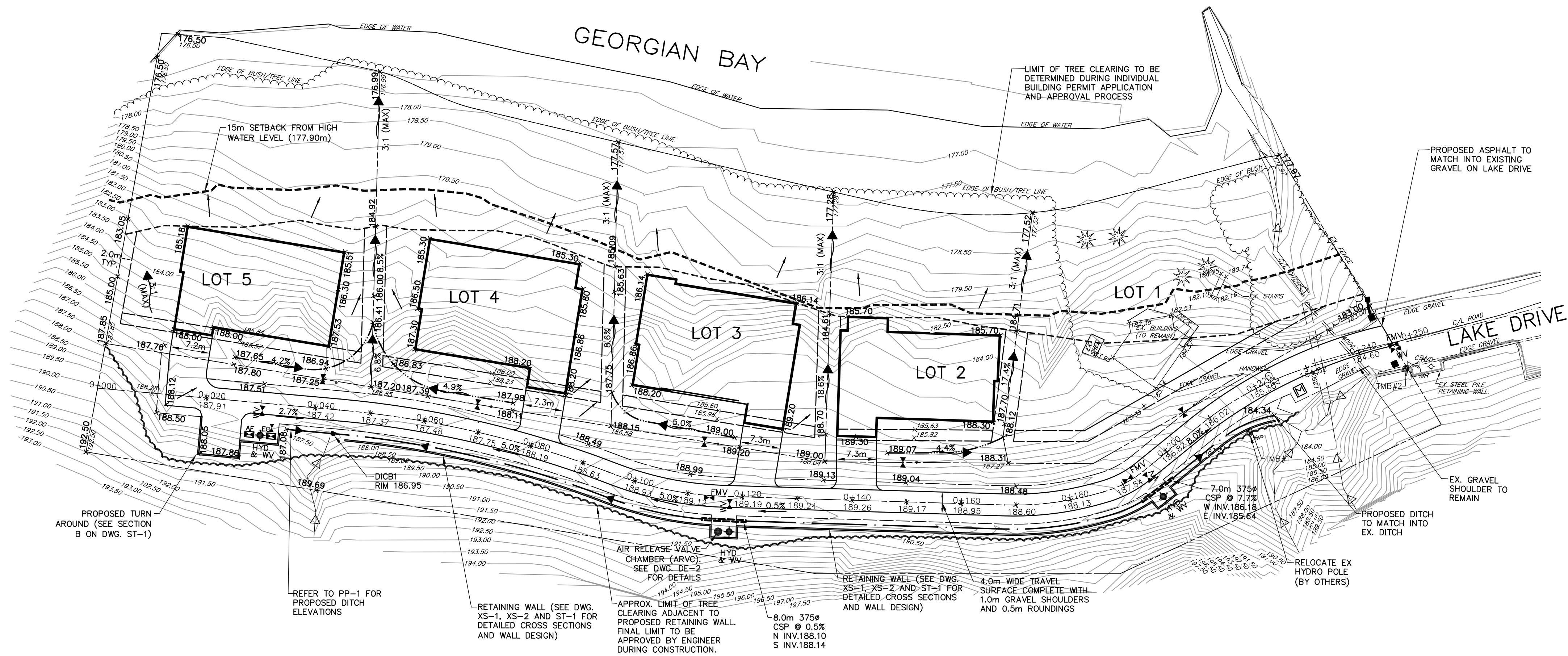
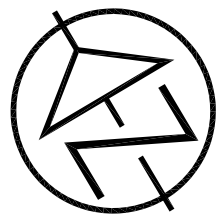
TBM 2 – ELEVATION 186.802m
NAIL AND WASHER IN LAST HYDRO POLE ON SOUTH
SIDE OF LAKE DRIVE

1.	FIRST ENGINEERING SUBMISSION	FEB.28/17	KRS
NO.	REVISIONS	DATE	INITIAL

SITE DEVELOPMENT PLAN

Appendix B – Grading Plan (C.C Tatham)

- NOTES:**
1. TOPOGRAPHIC SURVEY COMPLETED BY C.C. TATHAM AND ASSOCIATES LTD. ON DECEMBER 10, 2015.
 2. LEGAL BOUNDARY SURVEY PROVIDED BY HEWETT AND MILNE LTD. LAND SURVEYOR DATED AUGUST 31, 1990.
 3. PROPOSED DRIVEWAY LOCATIONS AND HOUSE DIMENSIONS/CONFIGURATION CONCEPTUAL FOR DESIGN PURPOSES ONLY. FINAL DRIVEWAY LOCATION AND HOUSE DIMENSION TO BE DETERMINED DURING INDIVIDUAL LOT GRADING PLAN DESIGN AND BE APPROVED AS PART OF THE INDIVIDUAL BUILDING PERMIT APPLICATION PROCESS.



CONTRACT DRAWINGS

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

C.C. TATHAM & ASSOCIATES LTD. CLAIMS COPYRIGHT TO THIS DOCUMENT WHICH MAY NOT BE USED FOR ANY PURPOSE OTHER THAN THAT PROVIDED IN THE CONTRACT BETWEEN THE OWNER/CLIENT AND THE ENGINEER WITHOUT THE EXPRESS CONSENT OF C.C. TATHAM & ASSOCIATES LTD.

TBM 1 – ELEVATION 185.020m
NAIL AND WASHER IN WEST FACE OF WOOD RETAINING WALL ON SOUTH SIDE OF LAKE DRIVE

TBM 2 – ELEVATION 186.802m
NAIL AND WASHER IN LAST HYDRO POLE ON SOUTH SIDE OF LAKE DRIVE

1.	FIRST ENGINEERING SUBMISSION	FEB.28/17	KRS	
NO.	REVISIONS	DATE	INITIAL	

APPROVED



ARTISAN ON LORA BAY
189 LAKE DRIVE
TOWN OF THE BLUE MOUNTAINS

OVERALL LOT GRADING PLAN



C.C. Tatham & Associates Ltd.
Consulting Engineers

Collingwood Bracebridge Orillia Barrie Ottawa

SCALE: 1:500

DESIGN: SBU/BSS

DRAWN: SBU/BSS

CHECKED: KRS

DATE: AUG./16

JOB NO. 115208

DWG. **LG-1**