THE MUNICIPALITY OF MAGNETAWAN

PLANNING REPORT

TO:	Erica Kelogg, Acting Deputy Clerk – Planning & Development Municipality of MagnetawanMunicipality of Magnetawan
FROM:	Jamie Robinson, BES, MCIP, RPP & Jonathan Pauk, MCIP, RPP MHBC Planning
DATE:	May 31, 2023
SUBJECT:	Consent Application – Parcel 23503 Section SS; Part Lot 9, Concession 1 Chapman Part 1, 42R10938, Henry Wiens Roll: 494401000105250

Recommendations

That prior to the consideration of the consent application by the Planning Board, a Lake Capacity Study be completed for the Subject Property. The addendum letter provided by Riverstone is not a Lake Capacity Study and did not consider the specifics of the Subject Property or recommend any mitigation measures as was included in the 2018 Lakeshore Capacity Assessment for the adjacent property to the west.

As a result, it is recommended that the application be deferred or denied.

Should the Planning Board approve the Consent application to create one (1) retained lot and one (1) new water access seasonal residential the following conditions of provisional consent should be included:

1. That the Applicant meet all financial requirements of the Municipality;

2. That a registrable description of the Severed Lot be submitted to the Municipality;

3. Confirmation from the North Bay Mattawa Conservation Authority (NBMCA) that the proposed Severed and Retained Lots can be adequately serviced by individual on-site septic systems and individual on-site water systems;

4. That a draft survey of the Severed Lot be provided to the Municipality for review and approval;

5. That the Applicant submit and obtain approval for a Zoning By-law Amendment to rezone the Severed Lot and Retained Lot to the Shoreline Residential Exception

Zone to bring the lots into compliance with the Zoning By-law, including the application of increased setbacks (50 metres) to from the “other wetland” located on the Severed Lot;

6. That cash-in-lieu of parkland be dedicated to the Municipality in the amount of 5% of the assessed value of land of the newly created lot or the entire lands, whichever is lesser; and,

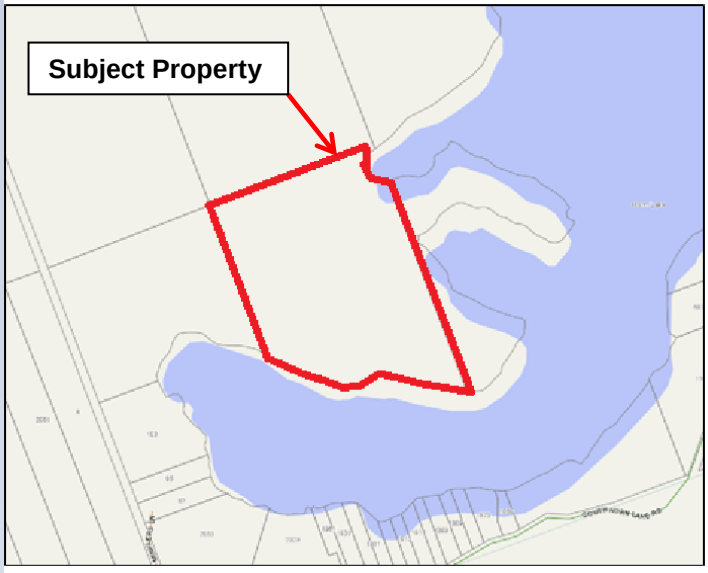
7. That the foregoing conditions be fulfilled within two years of the date of the notice of the decision of the Planning Board.

Proposal / Background

Marie Poirier (Marie Poirier Planning and Associates Inc.) has submitted a consent application on behalf of the property owner, 1671258 Ontario Inc. (Henry Wiens). The application proposes to create one new residential lot fronting onto Horn Lake. The proposed Severed and Retained lots are proposed to be accessed by a navigable waterway (there is no road access to either lot). As part of the application submission, the Applicant has provided confirmation of mainland docking, parking and garbage removal at Birch Crest Resort. A Planning Justification Report (Attachment 1) and a Planning Justification Addendum Letter (Attachment 2) were submitted by the Applicant.

The Subject Property is currently vacant. The proposed Retained and Severed lots are intended to be used for seasonal residential purposes. The location of the Subject Property is shown in Figure 1.

Figure 1: Subject Property



The Subject Property has a lot area of 20.7 hectares with approximately 478 metres of frontage on Horn Lake along the southern frontage and 105 metres on the northern

portion fronting onto a small bay of Horn Lake. The Subject Property is designated Shoreline, Rural and Environmental Protection in the Municipality's Official Plan and are zoned Rural (RU) and Environmental Protection (EP) the Municipality's Zoning By-law.

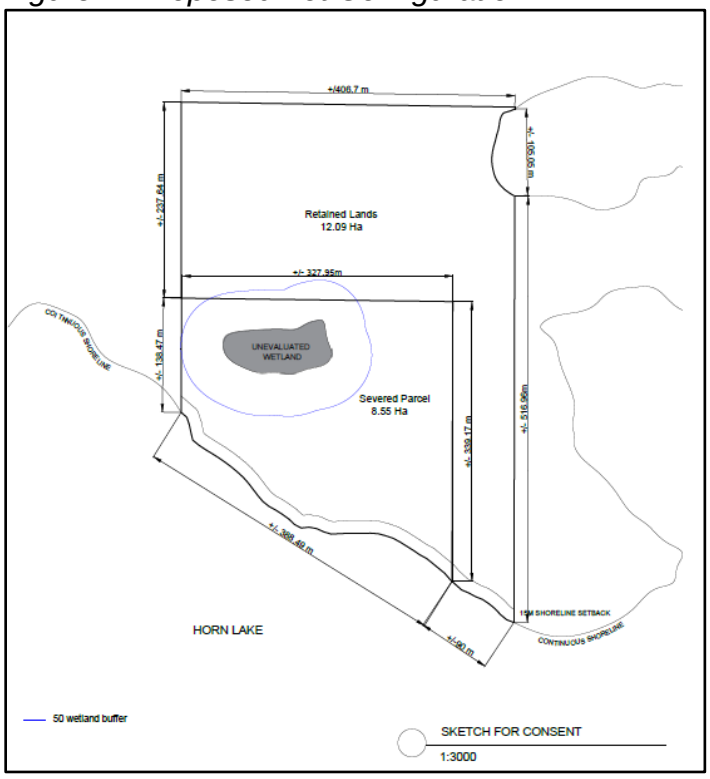
The proposal is to create one additional water access lot for a future seasonal residential dwelling fronting onto Horn Lake. Table 1 identifies the proposed lot frontage, lot area and proposed uses of the Severed and Retained Lots. These measurements are based on the drawing submitted with the Consent application.

Table 1: Proposal Summary

Lot	Area	Lot Frontage	Proposed Use
Retained Lot	12 hectares	+/- 90 metres (south) +/- 105 metres (north)	Future Shoreline Residential
Severed Lot	8.5 hectares	388 metres	Future Shoreline Residential

The proposed Severed and Retained Lots are currently vacant and are proposed to be developed with a future seasonal residential dwelling. The proposed Severed and Retained Lots are proposed to be accessed via navigable waterway (Horn Lake) and the Applicant has provided confirmation of mainland docking, parking and garbage removal at Birch Crest Resort (See Attachment 5). The proposed lot configuration shown in Figure 2.

Figure 2: Proposed Lot Configuration



Area Context

North: Crown Land
East: Shoreline Residential properties fronting onto Horn Lake
South: Horn Lake and Shoreline Residential properties fronting onto Horn Lake
West: Rural Residential properties fronting on to Minkler's Lane & South Horn Lake Road

Policy Analysis

Provincial Policy Statement

The Provincial Policy Statement (PPS) is a document that provides policy direction on matters of Provincial interest concerning land use planning. Ontario has a policy led planning system and the PPS sets the foundation for regulating the development and use of land in the Province. Policies are set out to provide for appropriate development while also protecting resources of provincial interest, public health and safety, and the quality of the natural and built environment. When making land use planning decisions, Planning Authorities must ensure that decisions are consistent with the PPS.

The Subject Property is located outside of the Magnetawan Village settlement area and is considered to be Rural Lands. The PPS, specifically Section 1.1.5.2, recognizes resource-based recreational uses, (including recreational dwellings) and residential development, including lot creation, which is locally appropriate, as permitted uses on rural lands. The consent application for a future seasonal residential dwelling is permitted.

Section 1.6.6.4 provides policies that apply to development on individual well and septic. It states that individual on-site sewage services and individual on-site water services may be used for a new development provided that site conditions are suitable for the long-term provision of such services with no negative impacts. Section 1.6.6.6 states that planning authorities may allow for lot creation, based on confirmation that adequate servicing can be accommodated.

The lots are proposed to be serviced by individual sewage and water services. Individual on-site sewage services are typical in the area and the proposed lots are anticipated to be of a sufficient size to accommodate on-site services. Should the application be approved, it is recommended that a condition of provisional consent require the North Bay Mattawa Conservation Authority (NBMCA) provide confirmation that a sewage system can be located on each lot. Individual on-site water services can be provided by drilled well or lake water.

Section 2 of the PPS contains policies that address the wise use and management of resources, including the protection of natural heritage features and functions. A portion of the Subject Property (on the proposed Retained Lot) is designated Environmental Protection which is understood to be an "other wetland" on Schedule B of the Official Plan. Development is not being proposed on either lot as part of the consent application.

Should the application be approved, a condition of provisional consent has been included to require that the Applicant submit a Zoning By-law Amendment to bring the Severed and Retained lots into compliance with the Zoning By-law and establish setbacks from the "other wetland". The proposed Severed Lot will be required to meet setback requirements as provided in the Municipality's Official Plan for adjacent lands (50 metres from the "other wetland").

Section 2.2 contains policies that require the quality and quantity of water to be protected, improved or restored. The Applicant submitted an addendum letter by Riverstone Environmental to a previous Lakeshore Capacity and Fish Habitat Assessment for Horn Lake that was prepared in 2018 for 4 (four) new lots at the adjacent property (Attachment 4). The 2018 Assessment concluded that the Lake was not at capacity and could accommodate the additional development. The addendum letter for this consent application concluded that the creation of one additional lot would not result in Horn Lake being at capacity.

The 2018 Lakeshore Capacity and Fish Habitat Assessment for Horn Lake recommended site specific mitigation measures in addition to the measures already required in the Municipality's Official Plan. The addendum letter prepared by Riverstone does not include any mitigation measures for the Subject Property and assumes that no additional development has occurred on Horn Lake that would bring the Lake to capacity.

We do not believe that the material provided by Riverstone is sufficient to address the Official Plan requirement for a Lake Capacity Assessment. A Lake Capacity Assessment for the Subject Property should be prepared and it is expected that such an assessment would include mitigation measures similar to those recommended in the Hutchison Report that can be implemented on the Subject Property. Should a Lake Capacity Assessment be prepared for the Subject Property and conclude there is capacity on Horn Lake and provide mitigation measures development of the proposed consent application could be consistent with Section 2.2 of the PPS.

Section 3.1 provides policies pertaining to natural hazards, including flooding. Based on the size of the proposed Severed and Retained Lots, it appears that a suitable building envelope location exists above the applicable flood elevation.

Subject to the Applicant fulfilling the conditions of consent, the proposed application is considered to be consistent with the PPS.

Municipality of Magnetawan Official Plan

Schedule A (Land Use Map) to the Official Plan identifies the Subject Property as being designated Rural, Shoreline and Environmental Protection as shown in Figure 3.

Figure 3: Excerpt from Official Plan – Schedule A

Based on Schedule B (Natural Heritage Features) of the Official Plan, there is an area mapped as Environmental Protection in the central portion of the Subject Property that appears to recognize an unevaluated wetland area.

Section 4.3 of the Official Plan includes surface water quality policies, and specifically speaks to lot creation policies for lakes that are at or near capacity whereby lot creation is not permitted with exception of certain circumstances. It is understood that if a Lake Capacity Study is completed and concludes that the lake is not at capacity the policies for lot creation on at/near capacity lakes in Section 4.3 do not apply. Accordingly, the Applicant is required to complete a Lake Capacity Study specific to the Subject Property to consider lot creation on the Subject Property.

Section 4.4 of the Official Plan states that new development or site alteration shall have no negative impact on the natural features or ecological functions of significant habitat of endangered or threatened species, other significant wildlife habitat, fish habitat, a provincially significant wetland or other significant natural heritage feature or functions.

Should the application be approved, a condition of provisional consent should be included to require that the Applicant submit a Zoning By-law Amendment to rezone the Subject Property to ensure the proposed lots comply with the minimum lot area, frontage and setbacks in the Zoning By-law.

Section 4.10 establishes what is deemed to be adjacent lands to natural heritage features. For “other wetlands” adjacent lands are identified as being lands within 50 metres. If future development is proposed within 50 metres of the “other wetland” an EIS would be required

to confirm no negative impact on the feature or its function. Should the application be approved subject to the recommended conditions, the rezoning of the Severed Lot will ensure that no future development will occur within 50 metres of the “other wetland.”

Section 5.4.1 of the Official Plan establishes permitted uses and detached dwellings are a permitted use in the Shoreline designation. It is understood that future development on the Severed and Retained lots is for seasonal residential purposes and accordingly would conform to Section 5.4.1 of the Official Plan.

Section 5.4.2 of the Official Plan states that Horn Lake has been identified as a lake trout lake that is at capacity. In order to evaluate the capacity issue, a Lakeshore Capacity and Fish Habitat Impact Assessment for Horn Lake was prepared by Hutchison Environmental Sciences Ltd. dated May 1, 2018 (See Attachment 3). The Lakeshore Capacity and Fish Habitat Impact Assessment was prepared in support of a consent application for 4 (four) lots at the abutting property to the west. The Assessment concluded that Horn Lake is not over capacity in terms of total phosphorus, recreational capacity or average Mean Volume-Weighted Hypolimnetic Dissolved Oxygen (MVWHDO) concentrations. The 2018 Lakeshore Capacity and Fish Habitat Assessment for Horn Lake recommended site specific mitigation measures in addition to the measures already required in the Municipality’s Official Plan.

The addendum letter prepared by Riverstone does not include any mitigation measures for the Subject Property and assumes that no additional development has occurred on Horn Lake to put the lake at capacity since the preparation of the 2018 report. Further consideration needs to be had for the site specific nature of the Subject Property. A Lake Capacity Assessment for the Subject Property should be prepared with mitigation measures that can be implemented on the Subject Property.

Section 5.4.2 of the Official Plan includes the development standard policies. New lots should have a minimum lot size of 1.0 hectare and minimum lot frontage of 90 metres. The proposed Severed and Retained lots exceed these minimum lot standards. In addition, lot lines should follow existing features and terrain and should be configured so that conflicts between abutting properties will be avoided. The proposed lots would appear to conform to Section 5.4.2.

Section 5.4.8, states that new development in the Shoreline Area should be directed to lands that are physically suitable for development in their natural state in an effort to maintain the area’s unique character. The implementing Zoning By-law for future development will address the location of the buildings through appropriate setbacks.

Section 7.1.1 of the Official Plan contains criteria that are applicable to consent applications. Table 2 below summarizes the consent policies.

Table 2: Official Plan Section 7.7.1 Summary

Policy 7.7.1 Severance Criteria	**Does the Application Conform?**
a) A registered plan of subdivision is not necessary for the orderly development of the lands.	A Plan of Subdivision is required where 3 or more lots are proposed. The proposed application is for 1 Retained Lot and 1 Severed lot. Therefore, a Plan of Subdivision is not required.
b) The lot size and setback requirements will satisfy specific requirements of this Plan and meet the implementing zoning by-law requirements.	Section 5.4.2 of the Official Plan requires a minimum lot area of 1 hectare for new residential lots. The proposed Severed (8.5 ha) and Retained Lots (12 ha) lots exceed this requirement. The subject property is Zoned Rural (RU).The minimum required lot area for the Rural Zone is 10 hectares. The proposed Severed Lot does not comply with the minimum lot area standard. Nor does the Retained Lot comply with the minimum required lot frontage of 134 metres, whereas 90 metres is proposed. In order to ensure Zoning By-law compliance, it is a recommended condition of consent that the proposed Severed and Retained Lots be rezoned to an appropriate Zone to ensure compliance with the Municipality's Zoning By-law and the intended use of the proposed lots.
c) The proposed lot must front on a publicly maintained road or, within the Shoreline designation, between existing lots on an existing private road with a registered right-of-way to a municipally maintained road or be a condominium unit, which may be created on private roads having access to a municipal year round road.	The Subject Property is located within the Shoreline Designation. See item g) of this Table. The lots are proposed on the basis of water access.
d) Lots for hunt camps, fishing camps, wilderness tourist camps or similar uses may be permitted on unmaintained municipal road allowances or on private right of ways to publicly maintained roads provided that the appropriate agreements are in place to ensure that the Municipality has no liability with respect to the use of these roads.	This policy is not applicable as the proposed lots are not for hunt camps, fish camps etc.

e) The lot must have road access in a location where traffic hazards such as obstructions to sight lines, curves or grades are avoided;	See item g) of this Table. The lots are proposed on the basis of water access.
f) The lot size, soil and drainage conditions must allow for an adequate building site and to allow for the provision of an adequate means of sewage disposal and water supply, which meets the requirements of the Building Code, the lot must have safe access and a building site that is outside of any flood plain or other hazard land.	The proposed Retained and Severed Lots are anticipated to be of sufficient size to accommodate a building site and individual on-site sewage and water services. Approval from the North Bay Mattawa Conservation Authority (NBMCA) is required to confirm that the Retained and Severed lots can be adequately serviced by on-site septic systems. The lots can be serviced with drilled wells, or lake water.
g) Notwithstanding subsection c), lots created for seasonal or recreational purposes may be permitted where the access to the lot is by a navigable waterbody provided that Council is satisfied that there are sufficient facilities for mainland parking and docking.	Access for the proposed lots are proposed to be accessed via a navigable waterway. It is noted that lot creation in the Shoreline designation is permitted based on water access. As part of the application submission, the Applicant has provided confirmation that mainland parking and docking is available at the Birch Crest Resort. See Attachment 5.
h) Any lot for permanent residential use shall be located on a year round maintained municipal road or Provincial highway.	The proposed lots represent seasonal residential uses and are not for permanent residential uses.
i) In the Rural designation, new lots created by consent shall be limited to the following: i. The Township will permit the creation of up to eight new lots per year. The new lots must comply with the regulations as set out in the implementing Zoning By-law. ii. two lots per original hundred acre lot; iii. one lot for each 50 acre parcel which existed as of the date of approval of this Plan; and iv. infilling between existing residences within 300 metres of each other on the same side of a municipal road or Provincial highway	The Subject Property is designated Rural and Shoreline. For the purposes of this report, we have focused our review in the context of the Shoreline designation policy given the location of the subject property and frontage onto Horn Lake.
j) The creation of any lot will not have the effect of preventing access to or land locking any other parcel of land.	Access to the Severed and Retained lots is by a navigable waterway (Horn Lake). The

	Severed and Retained lots will not prevent access to, or land lock, any other parcel of land.
k) Any severance proposal on land adjacent to livestock operations shall meet the Minimum Distance Separation Formula I in accordance with the MDS Guidelines and shall demonstrate that the proposed water supply has not been contaminated from agricultural purposes.	The subject lands are not adjacent to livestock operations. MDS calculations are not required for the consent application.

The new lots are being proposed on the basis of water access, in accordance with Section 7.7.1 g) of the Official Plan as referenced in Table 2. The application form in indicates that the applicant intends to obtain mainland parking and boat docking at Birch Crest Resort. In addition, the applicant has provided confirmation from Birch Crest Resort.

Municipality of Magnetawan Zoning By-law

The Subject Property is zoned Rural (RU) and Environmental Protection (EP) in the Municipality's Zoning By-law. A detached dwelling is a permitted use in the Rural (RU) Zone.

Table 3 provides a summary of the proposed lots in relation to the minimum requirements for the Rural (RU) Zone.

Table 3: Zone Standards

Zoning By-law Requirements		**Lot Configuration**	
	Rural (RU) Zone	**Proposed Retained Lot**	**Proposed Severed Lot**
Minimum Lot Area	**10 Hectares**	12 Hectares	8.5 Hectares
Minimum Lot Frontage	**134 Metres**	+/- 90 Metres	~388 Metres

The proposed lot configuration does not comply with the minimum lot standards for the Rural (RU) Zone. As mentioned, a condition of consent has been recommended to require the Applicant obtain approval for a Zoning By-law Amendment to rezone the proposed Severed and Retained Lots to bring them into compliance with the Zoning By-law.

The Shoreline Residential Zone identifies that detached dwellings are a permitted use and the minimum lot requirements are 1 hectare with 90 metres of frontage. The Shoreline Residential Zone is an appropriate zone for the intended seasonal residential dwellings on the proposed lots. A condition of provisional consent will need to be the zoning of the lots to the Shoreline Residential Zone. Future development on the proposed lots will be required to comply to the requirements in the Municipality's Zoning By-law.

Summary

Based on a review of the Application and subject to satisfaction of all of the recommended conditions identified in this Report, the proposed Consent application to permit the creation of one new shoreline lot, based on water access, would be consistent with the Provincial Policy Statement and would conform to the policies of the Municipality of Magnetawan Official Plan.

It is our opinion, the Consent Application should be deferred or denied on the basis that a Lake Capacity Assessment has not been completed and is required. Should the Planning Board decide to provisionally approve the application, the recommended conditions of provisional consent should be applied.

Respectively submitted,

Jonathan Pauk HBASc., MSc. MCIP, RPP
Planning Consultant
MHBC Planning

Jamie Robinson, BES, MCIP, RPP
Planning Consultant
MHBC Planning

Attachment 1: Planning Justification Report prepared by Marie Poirier Planning & Associates Inc.

Attachment 2: Update to Application and Planning Justification Report prepared by Marie Poirier Planning & Associates Inc. dated March 8, 2023

Attachment 3: Lakeshore Capacity Assessment prepared by Hutchison (2018)

Attachment 4: Lake Capacity Review prepared by Riverstone Environmental dated November 3, 2022

Attachment 5: Confirmation of Mainland Parking and Docking

Attachments

Attachment **1**

MARIE POIRIER
PLANNING & ASSOCIATES INC.

Planning Report

Prepared For:

1671258 Ontario Inc. (Henry Wiens)
Parcel 23503 Section SS; Part Lot 9 Concession 1
Chapman Part 1, 42R10938
Municipality of Magnetawan

Planning Justification Report

Parcel 23503 Section SS; Part Lot 9 Concession 1 Chapman Part 1, 42R10938; Magnetawan

Pursuant to Section 34 of the Planning Act

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PURPOSE AND NATURE OF THE APPLICATION

The purpose of this consent application is to create one new lot and one retained from the subject parent lot fronting on Horn Lake. A sketch for consent purposes is provided in Schedule A of this report (Figure 1). Through a comprehensive policy review, Marie Poirier Planning and Associates has determined that the proposal demonstrates appropriate development and planning for the subject lands. The firm is herewith submitting an application for consent, following the pre-consultation notes provide by the municipality's consulting planner and discussions with municipal staff.

Horn Lake is recognized as an "at-capacity" lake in the municipality's official plan; however a lake capacity was undertaken by Hutchinson Environmental Sciences Ltd. in 2018 concluding that the lake is not at capacity (Schedule B). This report is further discussed in the body of the report as supporting justification. This application has been amended since the initial proposal to ensure compliance with the Official Plan where it is permitted to create one (1) new lot and one (1) retained through the consent process, rather than the initial five lots proposed. The creation of one large lot will ensure the development on this property maintains the integrity of the area.

The proposed access for this subject property is by way of the waterbody Horn Lake. In correspondence with Birch Crest Resort, there is parking and dock space available for the proposed severed and retained lots.

PROPERTY DESCRIPTION

Legal

The property is legally described as Parcel 23503 Section SS, Part Lot 9 Concession 1 Chapman Part 1, 42R10938, Magnetawan.

Physical

The property is approximately 20.72 Ha in area and has two point of frontage on horn Lake, +/- 1653 ft. (+/-503 m) on the southern portion and +/- 379.94 ft. (115.8 m) at the northeast corner. The subject property is vacant. The proposed new lot is to be created on the southern portion of the property.

Natural

The property remains in its natural state and is well vegetated with varying topography, being consistent with the nature of Magnetawan. There are no steep slopes identified on the subject property and the slope is gentle as the land approaches the shoreline. The proposed lot will maintain the vegetation buffers as required along the shoreline, as the property enjoys a large frontage. A sketch of the proposed can be found on the following page, as Figure 1 as well as attached hereto in Appendix I. Photos are provided in Schedule C.

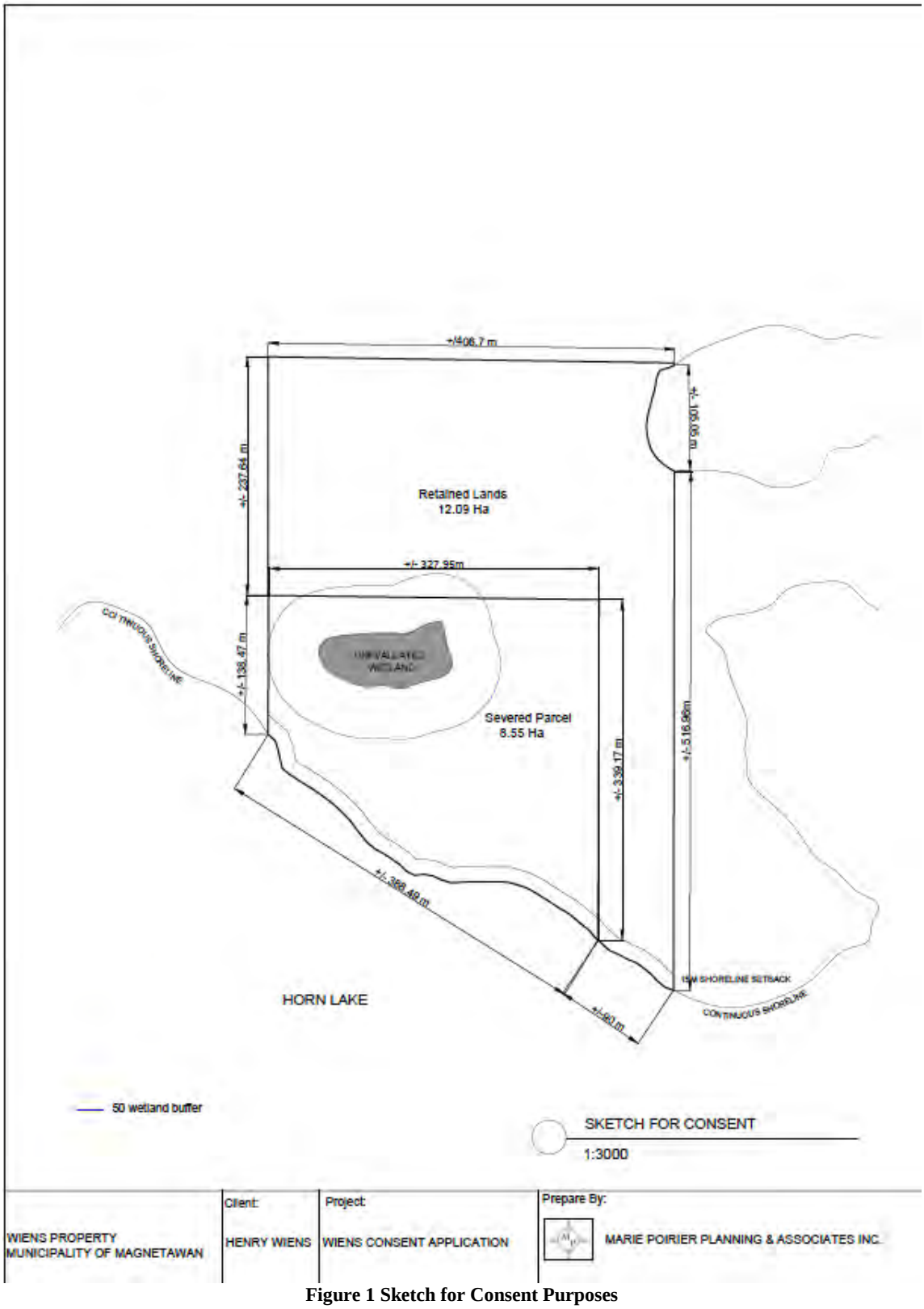


Figure 1 Sketch for Consent Purposes

PLANNING ANALYSIS

The Planning Act and Provincial Policy Statement

The Planning Act sections 1, 3 and 6 Subdivision of Land. Under part six particular attentions was given to section 53 Consents and 54 Delegation of authority to give consents. The application has considered all matters of provincial interest, to which it does not offend any of these policies. The proposed is also consistent with the Provincial Policy Statement (PPS), which is reviewed and analyzed in detail below.

The subject property is recognized as both Rural and Shoreline in the Municipality of Magnetawan, with a small portion Environmental Protection as provided in Schedule A of the Official Plan. During review of the Provincial Policy Statement, special attention was given to Section 2.1 Natural Heritage and 2.2 Water.

The natural heritage mapping system created by the Ministry of Natural Resources and Forestry was reviewed in conjunction with the Municipal Schedules as they pertain to the natural features identified. The mapping identifies an "unevaluated wetland" on the subject property; the mapping does not identify any fish habitat.

Section 2.1 states that natural heritage features should be protected for the long term ecological function of the land. The subject property resides in Ecoregion 5E, where the policy below is particularly relevant to the application, given the wetland identified on the parent lot.

2.1.4 Development and site alteration shall not be permitted in:
a) significant wetlands in Ecoregions 5E, 6E and 7E1; and
b) significant coastal wetlands.

There is no development proposed in the identified wetland on the subject property, the proposed lot creation has respect for this natural heritage feature and all construction will respect the required setbacks of the natural heritage feature. The definition of significant as defined in the PPS and relates to wetlands is described below.

Significant: means

a) in regard to wetlands, coastal wetlands and areas of natural and scientific interest, an area identified as provincially significant by the Ontario Ministry of Natural Resources and Forestry using evaluation procedures established by the Province, as amended from time to time.

The wetland on the subject property is identified as an "Unevaluated Wetland" and is not recognized to be Provincially Significant. There are also "Woodlands" identified on the subject property, to which section **2.1.5** states that Development and site alteration shall not be permitted in significant woodlands in "Ecoregions 6E and 7E" the subject property is located in Ecoregion 5E and therefore not deemed a significant woodland area.

Policy section **2.2** pertains to water and is particularly relevant as the proposed lots front onto Horn Lake. In policy **2.2.1** and most important to the proposed development is that the quality of water is to be protected, improved, or restored by minimizing potential negative impacts, evaluating and preparing for climate change, ensuring environmental lake capacity is considered. Future development on the proposed lots will be required to meet setback requirements As provided in the Magnetawan Official Plan and Zoning Bylaw while also maintaining the required vegetation buffer, protecting the quality of the shoreline. The proposed lots have sufficient development area to ensure all required setbacks are met.

Based on the above, it is the opinion of the firm that the proposed development does not offend any matters of Provincial interest and as such is consistent with the Provincial Policy Statement.

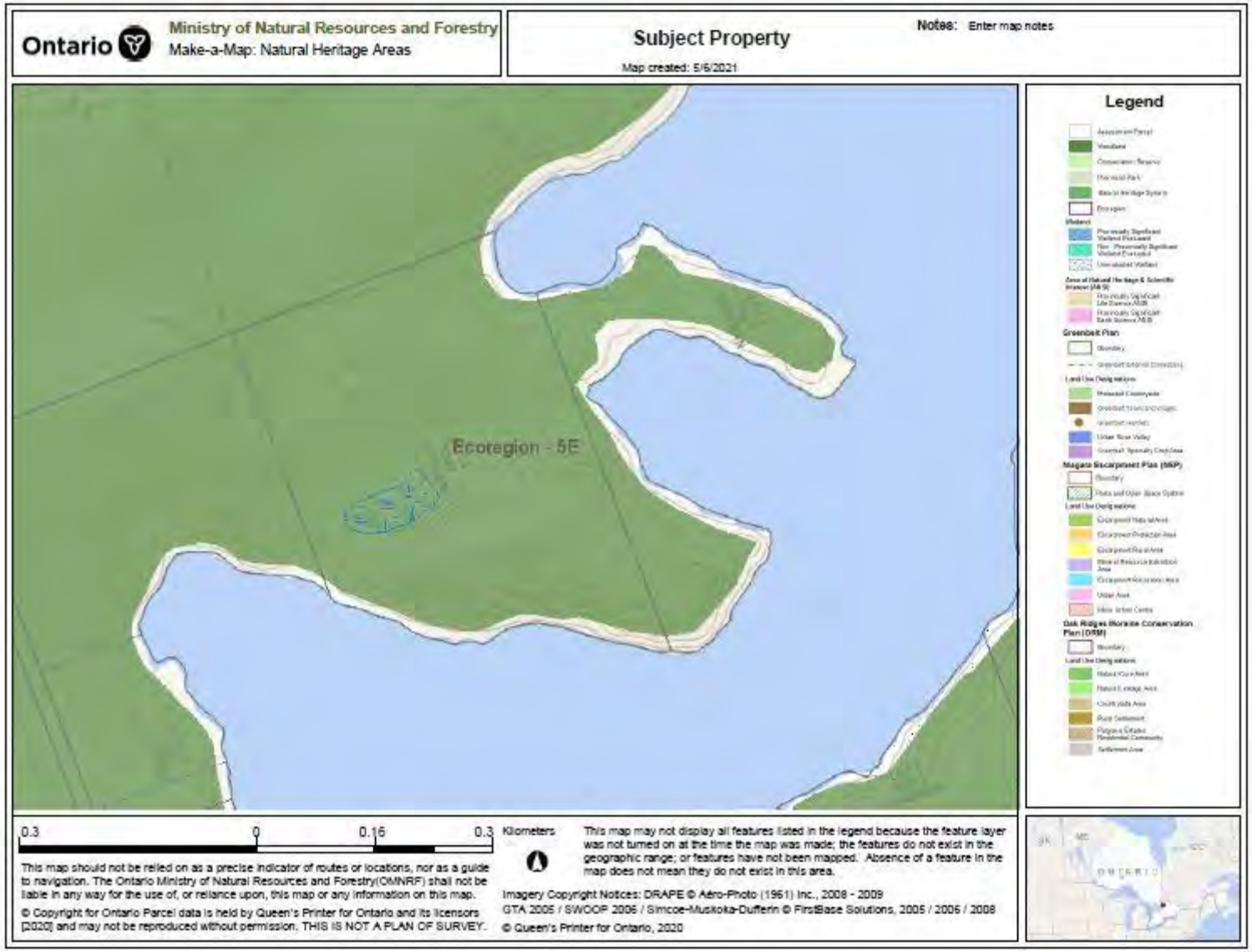


Figure 2 MNRF Natural Heritage Mapping

Municipality of Magnetawan Official Plan

The subject lands are located within the shoreline designation of the Municipality of Magnetawan official plan 'Schedule A' Land Use, attached hereto in Schedule D. The parent lot holds two frontages on Horn Lake, where the retained land will maintain frontage on both locations, and the severed lot will have frontage on the south (Figure 1). Additionally recognized is the EP designation comprising a small portion of the property, being the area recognized as "other wetland" (Figure 2) in Schedule B. The Municipality of Magnetawan Official Plan was reviewed in its entirety, with the following policies being most relevant to the proposed development.

Section 4.4 Natural Heritage and Resource Management

New development or alterations shall have no negative impact on the natural features or ecological functions of significant habitat of endangered or threatened species, other significant wildlife habitat, fish habitat, a provincially significant wetland or other significant natural heritage feature or function. Where development is proposed within or adjacent to these areas, the approval authority shall require the submission of an Environmental Impact Assessment.

As mentioned previously the wetland on the subject property is not identified as a "Provincially Significant Wetland" and therefore in this regard does not require an Environmental Impact Assessment. All development proposed on the resulting lots will maintain the required 50m setback.

The policy *Section 4.5 Wetlands* only pertains to the wetlands as recognized as significant and therefore is not applicable to the wetland on the subject property.

Section 4.10 Adjacent Lands

Adjacent lands are the lands adjacent to a natural heritage feature within which potential impacts of a development proposal must be considered. For the purposes of this Official Plan, adjacent lands are defined as all lands within:

- *120 metres of the boundary of a Provincially Significant Wetland or unclassified wetland in excess of 0.8 ha; ·*
- *50 metres of the boundary of other wetlands; ·*
- *30 metres of any watercourse; ·*
- *50 metres from the boundary of a Provincially or Regionally Significant Area of Natural and Scientific Interest; ·*
- *120 metres from a significant habitat of an endangered or threatened species;*
- *120 metres from the boundary of a significant fish habitat area; and ·*
- *120 metres from the boundary of a significant wildlife habitat.*

The natural heritage feature identified on the subject lands is and "other wetlands". This section defined adjacent lands to be within 50 metres from the boundary of other wetlands.

The site plan sketch submitted in conjunction with this application depicts the 50m boundary from the edge of the wetland, as scaled to that which is shown on schedule B of the Official Plan. The subject application will ensure that no future development will occur within 50 m of the other wetland. A small portion of this lane is within the 50m boundary, however all other land remains in its natural state.

The importance of the cultural landscape is discussed in section 4.13 of the official plan, whereby this includes the natural and man-made features that define the character of the municipality. All proposed future development will respect the natural heritage, specifically as it relates to shoreline development and vegetation retention. The proposed lot sizes and frontages ensure that the shoreline characteristics will prevail over any built form proposed in the future.

Section 4.15 of the Official Plan pertains to servicing requirements for new development. The proposed lot creation has sufficient building area to ensure septic and water capacity for each lot. Considering the significant size the severed and retained lots, there is no concern for the ability to construct a septic system.

The subject lands are identified as "Shoreline" under Schedule A and are therefore subject to the policies in section 5.4 of the Official Plan.

5.4.1 Permitted Uses

Permitted uses in areas designated Shoreline on Schedule 'A' shall include detached dwellings, commercial tourist resorts with associated commercial uses, lodges, motels, hotels, marinas, and recreational activities.

The intended use of the proposed lot creation is for the development of single detached dwellings as permitted above.

5.4.2 Development Standards

Unless otherwise specified, new lots should be no smaller than 1.0 ha (2.5 acres) in area with 90 metres (300 feet) of water frontage. Larger lots may be required in areas where environmental or physical constraints exist on the lands and on narrow channels (less than120 metres (400 ft.)) or small water bodies less than 40 ha (100 acres), in deer wintering or in or adjacent to sensitive fish habitat. Lot lines should follow existing features and terrain and should be configured so that conflicts between abutting properties will be avoided.

Both the severed and retained lot exceeds the required area and frontage for a new lot. There is no fish habitat identified on the shoreline of the subject lands.

Horn Lake has been identified as a lake trout lake that is at capacity. New development including additional lot creation or redevelopment of existing developed lots that would result in more intensive use, shall generally not be permitted except as provided for in Section 4.3.

The property fronts on Horn Lake, and the municipality designates this lake to be at capacity. However, the lot to the west of the property was recently severed to create 4 new lots, where the applicant provided a Lake Shore Capacity study prepared by Hutchinson environmental Sciences Ltd. This study concluded that Horn Lake is **not at capacity** and water quality and Lake Trout Habitat in Horn Lake appear to be healthy. Additionally, the study concluded that the Fish Habitat located on the shoreline of the property to the west of the subject lands is not critical or sensitive to development of docks. The study is attached hereto in Appendix II for reference.

In accordance with section 5.4.6 no back lot development is proposed.

Section 7.1 Severances

Applications for land division through the consent process shall only be considered if the proposal is minor in nature, does not result in unnecessary expansion of the present level of municipal services, is in compliance with the Objectives and General Development policies of this Plan and the applicable Land Use policies for the designation in which the land is located.

The proposed application is minor in nature, does not impact municipal services, and is in compliance with the application land use policies as related to the Shoreline designation.

7.1.1 Criteria

Every severance application received by Council for the purpose of creating a new lot shall meet the following criteria:

a) *a registered plan of subdivision is not necessary for the orderly development of the lands;*

We are of the professional opinion that a registered plan of subdivision is not necessary for the orderly development of the land to create one severed and one retained lot. The access to these lots will be by way Horn Lake water access, the adjacent lands and each lot will be serviced privately.

b) *the lot size and setback requirements will satisfy specific requirements of this Plan and meet the implementing zoning by-law requirements;*

The proposed lots meet the required area and frontage as described, and provide sufficient development envelopes for all future development to meet required lot standards.

c) *the proposed lot must front on a publicly maintained road or, within the Shoreline designation, between existing lots on an existing private road with a registered right-of-way to a municipally maintained road or be a condominium unit, which may be created on private roads having access to a municipal year round road;*

Similar to the lots approved on the adjacent property to the west, the proposed development will be accessed by way of Horn Lake, through water access and is further discussed below.

d) *lots for hunt camps, fishing camps, wilderness tourist camps or similar uses may be permitted on unmaintained municipal road allowances or on private right of ways to publicly maintained roads provided that the appropriate agreements are in place to ensure that the Municipality has no liability with respect to the use of these roads;*

These lots are to be used for the purposes of seasonal recreational shoreline development.

e) *the lot must have road access in a location where traffic hazards such as obstructions to sight lines, curves or grades are avoided;*

The lots do not have any traffic hazard concerns, as they will be accessed by water. The creation of one new lot and one retained, will not impact the traffic.

f) *the lot size, soil and drainage conditions must allow for an adequate building site and to allow for the provision of an adequate means of sewage disposal and water supply, which meets the requirements of the Building Code, the lot must have safe access and a building site that is outside of any flood plain or other hazard land;*

The lots have adequate building sites with the capacity to develop the shoreline with suitable sewage disposal and water supply meeting all building code requirements. There are no flood plains or hazard lands identified, and all setbacks from the unevaluated wetland will be met.

g) *notwithstanding subsection c), lots created for seasonal or recreational purposes may be permitted where the access to the lot is by a navigable waterbody provided that Council is satisfied that there are sufficient facilities for mainland parking and docking;*

The subject lot is proposed to be accessed by way of the navigable waterbody, Horn Lake. It has been established through correspondence with Birch Crest Resort that there are docking and parking facilities available to accommodate the severed and retained lots.

h) *any lot for permanent residential use shall be located on a year round maintained municipal road or Provincial highway;*

The purpose of creating these lots is for seasonal residential use, not permanent, and therefore do not require to be accessed from a year round maintained road.

i) *in the Rural designation, new lots created by consent shall be limited to the following:*
   a. *The Township will permit the creation of up to eight new lots per year. The new lots must comply with the regulations as set out in the implementing Zoning By-law*
   b. *Two lots per original hundred acre lot;*
   c. *one lot for each 50 acre parcel which existed as of the date of approval of this Plan; and*
   d. *infilling between existing residences within 300 metres of each other on the same side of a municipal road or Provincial highway.*

The subject lands are not located within the rural designation and therefore this policy section does not apply.

i) the creation of any lot will not have the effect of preventing access to or land locking any other parcel of land.

The creation of these lots does not prevent access to or land-lock any other parcels of land.

j) any severance proposal on land adjacent to livestock operations shall meet the Minimum Distance Separation Formula I in accordance with the MDS Guidelines and shall demonstrate that the proposed water supply has not been contaminated from agricultural purposes.

The proposed is not within any land uses that would trigger the MDS guidelines.

7.2 Subdivisions and condominiums

7.2.1 Where three or more lots are to be created from a single parcel of land existing as of the date of adoption of this Plan, a plan of subdivision or vacant land condominium shall generally be required. Exceptions to this policy may be considered where there are no residual lands resulting from the development and there is no need to extend municipal services including roads.

The proposed development does not have any residual lands resulting from the development and there is no need to extend municipal services. The access to the property will be addressed through establishing mainland docking and parking a Birch Crest Resort, located on the easterly shoreline of the Horn Lake. Therefore, it is not necessary for the proposed application to be processed through plan of subdivision, and is appropriate to proceed through the consent process. The proposal is to create one new lot and one retained, and therefore an application via the consent process is the most appropriate.

Overall, the proposed application does not offend any policies as described in the Municipality of Magnetawan Official Plan, and exceeds the lot area and sizes are required in the Shoreline designation. The “other” wetland identified is not deemed to be provincially significant and all future structures will maintain the required 50m setback. It is our professional opinion that the proposed lot configuration is consistent with and conforms to the general intent and purpose of the Municipality of Magnetawan Official Plan.

Municipality of Magnetawan Zoning Bylaw No. 2001-26

The subject property is Zoned Shoreline Residential with a small portion zoned EP, being consistent with the official plan designation in the location of the “Other” wetland as identified.

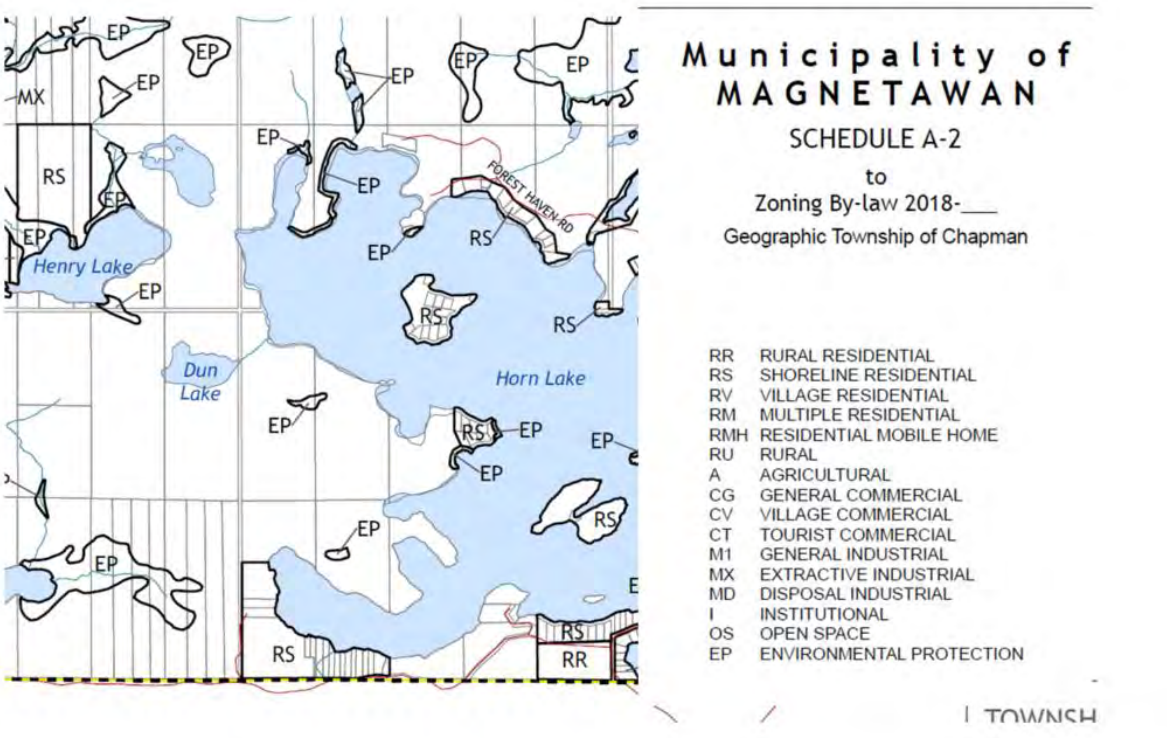


Figure 3 Municipality of Magnetawan Zoning Bylaw Schedule A

The regulations for a Shoreline Residential Zone (RS) are described in Section 4.2 of the Zoning Bylaw. The permitted uses include, detached dwellings, home occupation, and a bed a breakfast establishment. In accordance with the permitted uses, the intention of this severance is to create one lot for the purpose of sale and establishing a shoreline development on the retained lot.

Section 4.2.2 describes the lot regulations for the permitted uses on the land, which are as follows:

i) Minimum Lot Area - 1.0 ha
ii) Minimum Lot Frontage - 90 m
iii) Minimum Front Yard - 15 m
iv) Minimum Interior Side Yard - 3.5 m
v) Minimum Exterior Side Yard - 7.5 m
vi) Minimum Rear Yard - 10.0 m
vii) Maximum Lot Coverage - 15%
viii) Maximum Building Height - 10.7 m
ix) Minimum Ground Floor Area - 65.0 m2
x) Minimum Natural Vegetation Area or Landscaped Open Space - 70% of front yard.

The proposed severed lot will have a total area of 8.55 Ha with +/- 388.49 m of frontage on Horn Lake and the retained has an area of 12.09 Ha with +/- 105.05 m of frontage to the north and +/- 88.98 m of frontage to the south. Any future development on the subject lands will comply with

the above regulations. There is sufficient area provided on the proposed severed and retained lots to maintain the required setbacks, lot coverage and natural vegetation area.

Also relevant is the Environmental Protection Zone that is located on the subject lands. The relevant regulations are described in Section 4.16, whereby the permitted uses are, conservation, resource management activities and passive public parks.

4.16.2 Regulations for Permitted Uses

No buildings or structures including accessory buildings or structures with the exception of pump houses and buildings and structures for flood and erosion control are permitted in the Environmental Protection (EP) Zone.

The sketch provided in Appendix A of this report shows the approximate location of the wetland and the 50m setback as required in the Official Plan. The buildable area on both Lots 1 and 2 have been scaled and ensure that there is sufficient area to develop will still respecting the setbacks required. In saying that, all future development will be located outside the EP zone, within the building area provided.

In conclusion, all proposed lots comply with the lot area and frontages as required in the Shoreline Residential Zone, and provide sufficient building envelops to ensure setback from the wetland and development outside the EP zone. The intention for the lot creation is to permit season residential dwellings as permitted in the zone, where all future development is to comply with the zoning provisions as outlined.

JUSTIFICATION

In terms of justification for the proposed consent application we offer the following:

- The lots meet and exceed the area and frontages required in the zoning bylaw under the waterfront residential zone.

- The Unevaluated “Other” Wetland on the subject property is not deemed significant, and the setback requirements will be respected.

- The capacity of the lake was evaluated for a consent application on the adjacent lands, where it was concluded that the lake is not at capacity for development.

- The creation of one new lot is supported in the Official Plan, whereby an application for consent is deemed to be the appropriate planning process.

- Access will be by way of the navigable waterbody recognized as Horn Lake, as mainland docking and parking facilities are available at Birch Crest Resort.

- There will be no construction within 50m of the “Other Wetland”.

SUMMARY AND CONCLUSION

Based on the above analysis, of the Planning Act, the Provincial Policy Statement, the Official Plan, and the Zoning By-law it is our opinion that the proposed application for consent to create one new lot and one retained conforms to the general intent of the Municipality of Magnetawan Official Plan, complies with the Zoning Bylaw and represents good planning. The "other wetland" identified on the subject lands will be protected through the setback requirement as outlined in the official plan.

This application does not offend policy or regulation at the Provincial or local level. It satisfies and fulfills all policy and regulatory requirements and will establish a means of access to the subject lands. The intention of creating these lots is for the enjoyment of a shoreline residential property in conformity of the Official Plan and Zoning bylaw. With regard to the policy analysis and justification provided, we respectfully request approval to create one new lot and one retained lot from the subject parent lot.

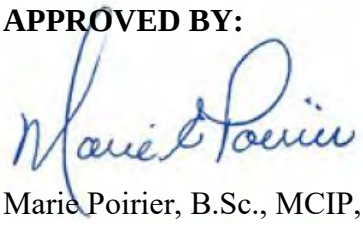
RESPECTFULLY SUBMITTED

MARIE POIRIER PLANNING AND ASSOCIATES INC

PREPARED BY:

Stephanie Sharp, BE.S Planner for Marie Poirier Planning & Associates Inc.

APPROVED BY:

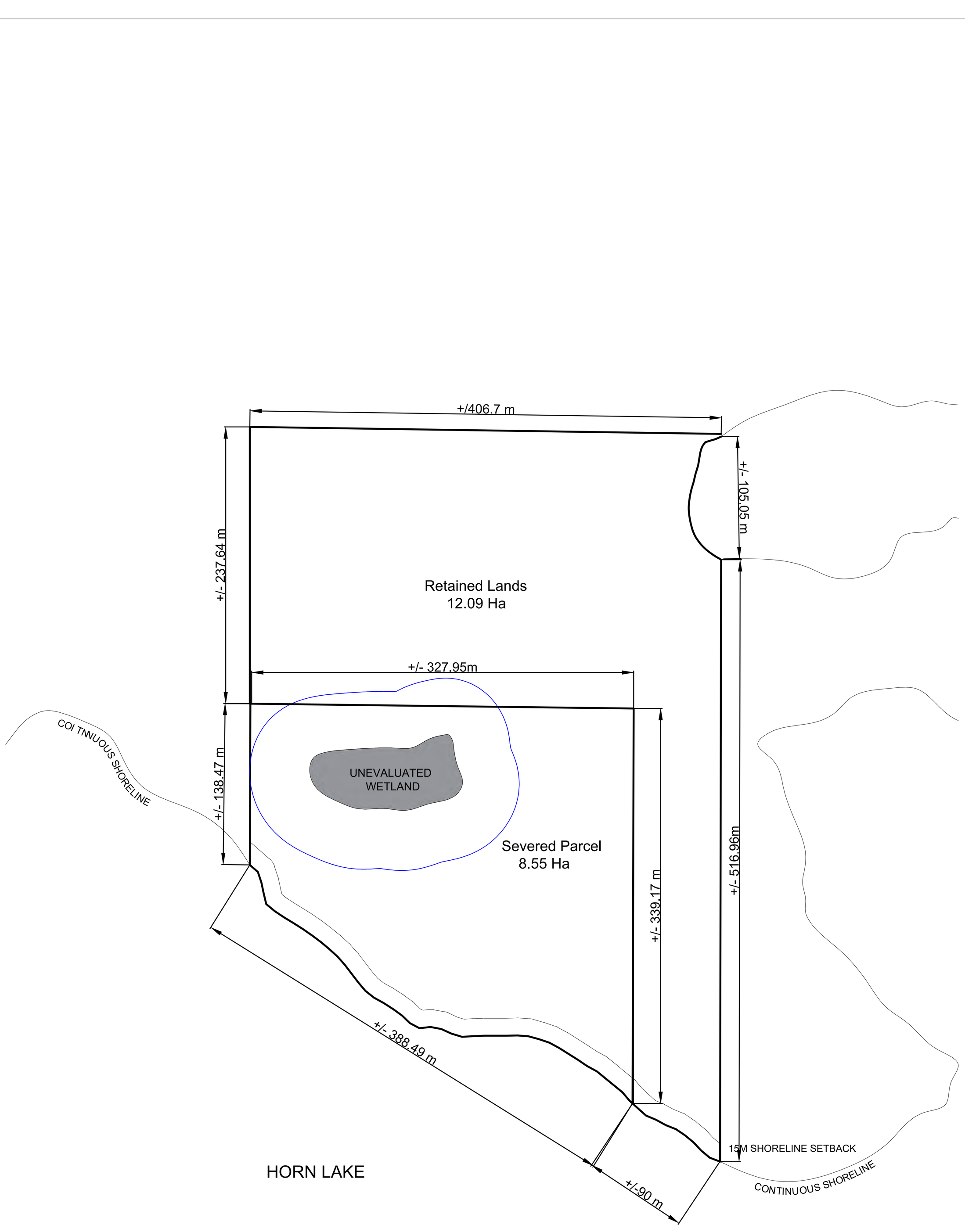


Marie Poirier, B.Sc., MCIP, RPP, Principa

LIST OF ATTACHMENTS

- Schedule A – Sketch for Consent Purposes
- Schedule B – Lake Capacity Assessment, Hutchinson Environmental Sciences Ltd.
- Schedule C – Photos
- Schedule D – Official Plan Schedules

Schedule A: Sketch for Consent Purposes



SKETCH FOR CONSENT

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WIENS PROPERTY MUNICIPALITY OF MAGNETAWAN	Client: HENRY WIENS	Project: WIENS CONSENT APPLICATION	Prepare By: MARIE POIRIER PLANNING & ASSOCIATES INC.

Schedule B: Lake Capacity Assessement, Hutchinson Environmental
Prepared for the neighbouring property & shared by the Municipality

Hutchinson

Environmental Sciences Ltd.

Lakeshore Capacity and Fish Habitat Impact Assessment for Horn Lake

Prepared for: Mr. Chris Noll
Job #: J170058

May 1, 2018

1-5 Chancery Lane, Bracebridge, ON P1L 2E3 | 705-645-0021

Hutchinson
Environmental Sciences Ltd.

1-5 Chancery Lane, Bracebridge, ON P1L 2E3 | 705-645-0021

May 1, 2018

HESL Job #: J170058

Mr. Chris Noll
125 Bermondsey Road
Toronto, ON M4A 1X3

Dear Mr. Noll:

Re: Lakeshore Capacity and Fish Habitat Impact Assessment for Horn Lake

Hutchinson Environmental Sciences Ltd. was retained to complete a Lakeshore Capacity Assessment and Fish Habitat Impact Assessment as part of a proposed land severance application on Horn Lake, in the Municipality of Magnetawan, Ontario.

Horn Lake is not over capacity in terms of total phosphorus, recreational capacity or average Mean Volume-Weighted Hypolimnetic Dissolved Oxygen (MVWHDO) concentrations. Modelled total phosphorus (TP) results indicate that the model does not properly represent existing conditions and capacity remains for additional development in relation to the interim Provincial Water Quality Objective guidelines of 10 µg/L or to Background + 50% if a 72% sewage-related total phosphorus retention coefficient is applied to existing development. With sewage treatment using Waterloo Biofilter Systems with EC-P units, the proposed development of 4 lots is modelled to potentially increase TP by <0.01 µg/L and decrease MVWHDO by <0.01 mg/L, increases which are well below regulatory guidelines and are immeasurable through standard laboratory procedures.

Most of the fish habitat fronting the subject property is not critical or sensitive to development of docks. We identified a groundwater seepage area that drains into nursery habitat and potential spawning habitat for some residential species, so this area was afforded a 10m buffer from shoreline structures and development should take place outside of this area.

Sincerely,

per Hutchinson Environmental Sciences Ltd.

Brent Parsons, M.Sc.
Senior Aquatic Scientist
brent.parsons@environmentalsciences.ca

Signatures

Report prepared by:

Brent Parsons, M.Sc.
Senior Aquatic Scientist

Report reviewed by:

Neil Hutchinson, Ph.D.
Principal Scientist

Executive Summary

Hutchinson Environmental Sciences Ltd. (HESL) was retained to complete a Lakeshore Capacity Assessment and Fish Habitat Impact Assessment as part of a proposed land severance application on Horn Lake, in the Municipality of Magnetawan, Ontario. The subject property (Part of Lot 10, Concession 1) is located at the south end of the lake (Figure 1) and the development proposal is to sever the property to create four lots.

Horn Lake supports Lake Trout (*Salvelinus namaycush*), is listed as a natural Lake Trout lake by the Ontario Ministry of Natural Resources and Forestry (MNRF 2015) and is listed as at "capacity" in the Municipality of Magnetawan's Official Plan.

The Lakeshore Capacity Model was not able to predict TP concentrations to within 20% of the measured value and so does not accurately reflect existing conditions. MOE (2010) recommends use of the interim PWQO of 10 µg/L of TP as an upper limit to protect against algal blooms instead of "Background + 50%". In this case, the modelled values of 3.68 µg/L to 3.94 µg/L (depending on % of TP retention and inclusion of vacant lots of record) are well below 10 ug/L and Horn Lake is not considered over capacity for TP.

Although Horn Lake is well below the Interim PWQO of 10 ug/L we do not recommend that 10 ug/L serve as a management limit. Instead, we refined the model to bring the management goals closer in line to the preferred objective of Background + 50%, which corresponds to a lower and more protective TP concentration of 4.51 µg/L. We utilized a scientifically-defensible sewage-related TP retention coefficient of 72% in the model for existing development to better align the model with existing conditions instead of utilizing the 10 µg/L of TP guideline, and the results indicate that capacity does exist on Horn Lake for the 4 proposed lots following this methodology. With sewage treatment using Waterloo Biofilter Systems with EC-P units, the proposed development of 4 lots is modelled to potentially increase TP by <0.01 µg/L and decrease MVWHDO by <0.01 mg/L, increases which are well below regulatory guidelines and are immeasurable through standard laboratory procedures.

Most of the fish habitat fronting the subject property is not critical or sensitive to development of docks. We identified a groundwater seepage area that drains into a nursery habitat and potential spawning habitat for some residential species, so this area was afforded a 10m buffer from the development of shoreline structures. A number of mitigation measures were also recommended in Section 5.3 that will protect fish habitat and ensure that the development follows municipal and federal regulations related to fish habitat.

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1. Introduction

Hutchinson Environmental Sciences Ltd. (HESL) was retained to complete a Lakeshore Capacity Assessment and Fish Habitat Impact Assessment as part of a proposed land severance application on Horn Lake, in the Municipality of Magnetawan, Ontario. The subject property (Part of Lot 10, Concession 1) is located at the south end of the lake (Figure 1) and the development proposal is to sever the property to create four lots. The exact orientation of each lot has yet to be determined so the Fish Habitat Impact Assessment focused on identifying opportunities and constraints to shoreline development across the entire subject property.

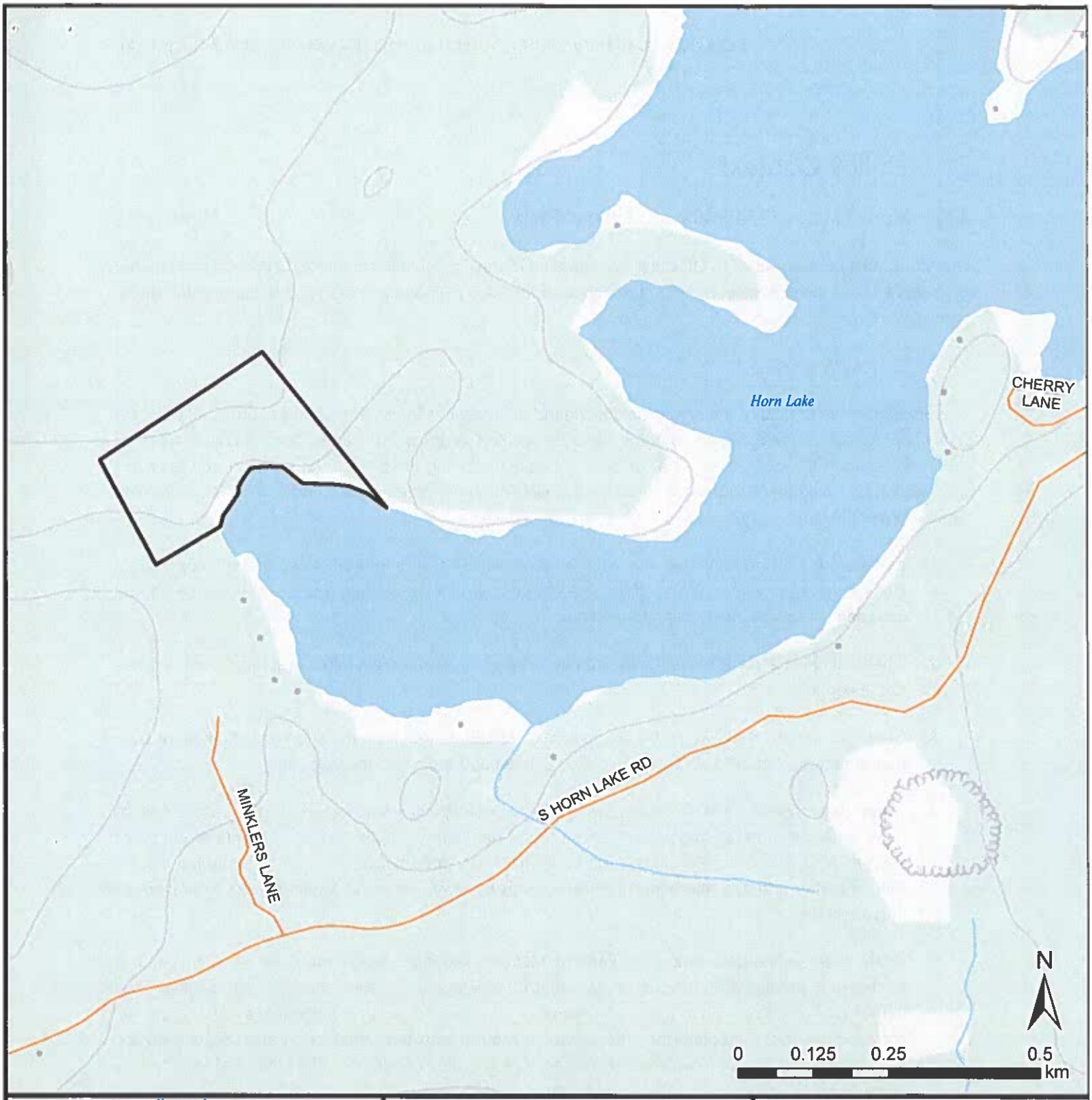
Horn Lake supports Lake Trout (*Salvelinus namaycush*), and is listed as a natural Lake Trout lake by the Ontario Ministry of Natural Resources and Forestry ((MNRF) 2015). Lake Trout have stringent habitat requirements including cold-water temperatures and high dissolved oxygen concentrations, and various policies have been adopted to protect this sensitive habitat. Waterfront development and the potential influx of sewage-related phosphorus to an adjacent waterbody has been identified as a stressor on Lake Trout habitat because increased phosphorus concentrations can lead to decreased dissolved oxygen concentrations.

Ontario's Lakeshore Capacity Model (MOE 2010) was developed to determine suitable development capacity on lakes through an assessment of phosphorus and the associated modelling procedure of Molot et al (1992) for dissolved oxygen concentrations, and in the case of Horn Lake, it has been determined that the lake is over capacity in terms of Provincial guidelines (Meridian Planning Consultants Inc. 2012). For recreational lakes on the Precambrian Shield, phosphorus and dissolved oxygen concentrations are the parameters of concern for water quality. The revised Provincial Water Quality Objective (PWQO) for inland lakes on the Precambrian Shield (MOE 2010) allows for a 50% increase in phosphorus concentration from development over levels that would occur in the absence of any development on the lake (i.e., "Background" + 50%) to a maximum concentration of 20 µg/L. The dissolved oxygen guideline for protection of lake trout habitat is 7 mg/L of Mean End-of-Summer Volume-Weighted Hypolimnetic Dissolved Oxygen (MVWHDO).

The Province of Ontario recommends the use of the Lakeshore Capacity Model to determine the interim PWQO for phosphorus and the amount of shoreline development that can occur to maintain phosphorus levels within the phosphorus threshold (MOE 2010). The LCM is a steady-state mass balance model that estimates hydrologic and phosphorus loading from natural (watershed runoff and atmospheric deposition) and human (septic systems and land disturbance) sources and links them together considering lake dynamics to predict total phosphorus concentrations in lakes. Dissolved oxygen is modelled on the basis of lake morphometry and total phosphorus concentrations using the techniques described in Molot et al. (1992) and Clark et al. (2002)

Fish habitat impact assessments are commonly completed in support of waterfront development applications to ensure that impacts to fish habitat are minimized to suitable levels in terms of relevant policies such as the federal Fisheries Act. Habitat is characterized, compared to habitat requirements of resident fish species, and suitable locations for the establishment of shoreline structures, such as boathouses and docks, are determined. Selection of appropriate locations and implementation of mitigation measures to minimize impacts typically results in regulatory approval.

The following assessments were completed to verify whether or not Horn Lake is currently over threshold for additional development, determine suitable locations for the establishment of shoreline structures, and to identify mitigation measures that would minimize any associated impacts to acceptable levels as described by relevant policy.



Legend

- Rivers
- Roads
- Subject Property
- Lakes

Project Lead: Brent Parsons
Prepared by: Kris Hadley
Data Source: HESL,Ontario Land, ESRI
Coordinate System: NAD 1983 UTM Zone 17N

Figure 1:
Study Area

Project: Lakeshore Capacity and Fish Habitat Impact Assessment for Horn Lake

Project #: J170058

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Environmental Sciences Ltd.

2. Policy Context

2.1 Municipality of Magnetawan Official Plan

The Municipality of Magnetawan Official Plan (Meridian Planning Consultants Inc. 2012) contains a number of relevant policies which helped define the scope of this study. These policies include those listed under sections 4.3, 4.4 and 5.4.2.

4.3 Surface Water Quality

Preservation of water quality is a significant consideration in reviewing any development proposal adjacent to a watercourse or lake. Septic systems shall be located at least 30 metres from a watercourse or waterbody, and in the case of lakes at or near capacity, including Horn Lake, lot creation and land use changes which would result in a more intensive use will not be permitted except under one of the following special circumstances:

1) to separate existing habitable dwellings, each of which is on a lot that is capable of supporting a class 4 sewage system, provided that the land use would not change and there would be not net increase in phosphorus loading to the lake;

2) where all new tile fields would be located such that they would drain into a drainage basin which is not at capacity;

3) where all new tile fields would be set back at least 300 metres from the shoreline of lakes, or such that drainage from the tile fields would flow at least 300 metres to the lake; and

4) where the proposed site can meet the additional site-specific soils criteria in the Lake Capacity Assessment Handbook and where certain municipal planning tools and agreements are in place such as a Development Permit System under the Planning Act, and/or site plan control under the Planning Act, and site alteration and tree-cutting by-laws under the Municipal Act to implement those criteria.

5) There is an additional criterion accepted by MOE for situations where there are deep soils native to the site (undisturbed and over 3m depth), meeting a specific chemical composition and hydrologic condition. This approach requires site-specific soils investigations by a qualified professional and, if meeting the criteria, would require long-term monitoring and use of planning tools that would ensure long-term maintenance of specified conditions. The MNR and MOE will be consulted if this criterion is considered for Horn Lake.

As a condition of development approval, a natural shoreline vegetation buffer shall be preserved within at least 20 metres of all watercourses and waterbodies wherever possible except for the removal of hazardous trees and a narrow area to allow a pathway to the shoreline. Council may require a wider buffer depending on site-specific conditions and the sensitivity of the adjacent natural heritage features.

Where development would result in a significant increase in storm water run-off, the Municipality shall require the proponent to complete storm water management works that will ensure that off-site surface water quality and quantity is not adversely impacted by the development. Direct outfalls to surface waters should be avoided and wherever possible developments shall utilize infiltration as a method for storm water management.

4.4 Natural Heritage and Resource Management

New development or alterations shall have no negative impact on the natural features or ecological functions of significant habitat of endangered or threatened species, other significant wildlife habitat, fish habitat, a provincially significant wetland or other significant natural heritage feature or function.

5.4.2 Development Standards

Horn Lake has been identified as a lake trout lake that is at capacity. New development including additional lot creation or redevelopment of existing developed lots that would result in more intensive use, shall generally not be permitted except as provided for in Section 4.3 (see above).

The at "capacity" status of Horn Lake in the Magnetawan OP was determined based on an old assessment of optimal Lake Trout habitat in the early 1990s (Sein, R. (MOECC) "Re: Horn Lake" Message to B. Parsons. January 15, 2018. Email). The approach has changed considerably over the last 30 years and is now based on a MVWHDO of 7 mg/L. MOECC has not, however, provided an updated assessment of capacity for Horn Lake on the basis of the newer MVWHDO criterion.

2.2 Fisheries Act

Regulation of fish habitat is carried out under the federal Fisheries Act enforced by Fisheries and Oceans Canada (DFO, Government of Canada, 2015). Section 35(1) of the Act states: "No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery." Furthermore the definition of "serious harm" is "the death of fish, or a permanent alteration to, or destruction of fish habitat", while fish habitat is defined as "spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes."

Fisheries and Oceans Canada now has a self-assessment process that includes criteria for no DFO review (i.e. if the required footprint of a dock or boat house is less than 20 m^2) and measures to avoid causing harm, both of which are addressed later in the report.

3. Site Description

Horn Lake is a 472 ha lake located on the Precambrian Shield, approximately 10 km east of the Town of Magnetawan (Figure 1). It has a watershed area of 1922 ha, a mean depth of 11.3 m and a maximum depth of 34.7 m (MNR 2010). Shoreline development around the lake consists of 32 year-round residences, 1 resort, 1 mobile home park with 29 trailers, and 138 seasonal properties in both the Municipality of

Magnetawan and Ryerson Township. The subject property proposed development site is in the southwestern portion of the lake.

4. Lakeshore Capacity Assessment

4.1 Input Data

The Lakeshore Capacity Assessment used the assumptions and recommended coefficients and constants provided by the MOE (MOE 2010), and data gathered from assessment of satellite imagery, the MNRF's Flow Assessment Tool and Lake Fact Sheet, the Ministry of Environment and Climate Change's (MOECC) Lake Partner Program and Runoff Lookup Database, and water quality sampling as listed in Table 1. Water quality sampling locations are presented on Figure 2. Sampling locations utilized by HESL staff overlapped those used by MNRF during dissolved oxygen sampling and those used by the Lake Partner Program for sampling of total phosphorus.

Table 1. Information on the data used in the Lakeshore Capacity Assessment.

Type of Data	Inputs	Source
Physical	Lake area and depth	Lake Fact Sheet (MNR 2010)
	Catchment and wetland area	Ontario Flow Assessment Tool (MNRF 2017)
Development	Lots and occupancies	Municipality of Magnetawan, Ryerson Township and satellite imagery
Water chemistry	Total phosphorus	Field sampling by HESL staff
		MOECC Lake Partner Program
	Dissolved oxygen	MNRF
		Field sampling by HESL staff
Hydrological	Annual runoff	MOECC Runoff Lookup Database

Legend

- Rivers
- Roads
- Subject Property
- Lakes
- Sampling Locations

Project Lead: Brent Parsons
Prepared by: Kris Hadley
Data Source: HESL,Ontario Land, ESRI
Coordinate System: NAD 1983 UTM Zone 17N

Figure 2:
Water Sampling Locations

Project: Lakeshore Capacity and Fish Habitat Impact Assessment for Horn Lake

Project #: J170058

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4.2 Measured Total Phosphorus Data

Measured Total Phosphorus (TP) data were compared with modelled TP results to determine the ability of the Lakeshore Capacity Model to accurately estimate TP concentrations. The Province recommends that differences between measured and modelled results be less than 20% to confidently use the model to assess capacity (MOE 2010).

Phosphorus samples have been collected from a central part of Horn Lake since 1994 as part of MOECC's Lake Partner Program (Figure 2). Our assessment focused on data from 2003 onwards because of improvements in collection methodologies since that time such as field filtering and sampling directly into glass tubes that are later used during laboratory analysis (Clark et al. 2010). Total phosphorus sampling is often best completed during spring turnover when the water column is mixed to assess whole lake conditions for studies of lake capacity. Spring overturn phosphorus data were collected in Horn Lake from 2002 to 2016 following improved sampling methodology through the MOECC's Lake Partner program but 2002 data (average = 10.6 µg/L) was not included as it was more than 2.5 standard deviations outside of the mean value of 5 µg/L and the highest average value recorded since that time was 5.3 µg/L in 2007. The average spring overturn phosphorus concentration in Horn Lake between 2003 and 2016 was 4.62 +/- 0.7 µg/L (Table 2).

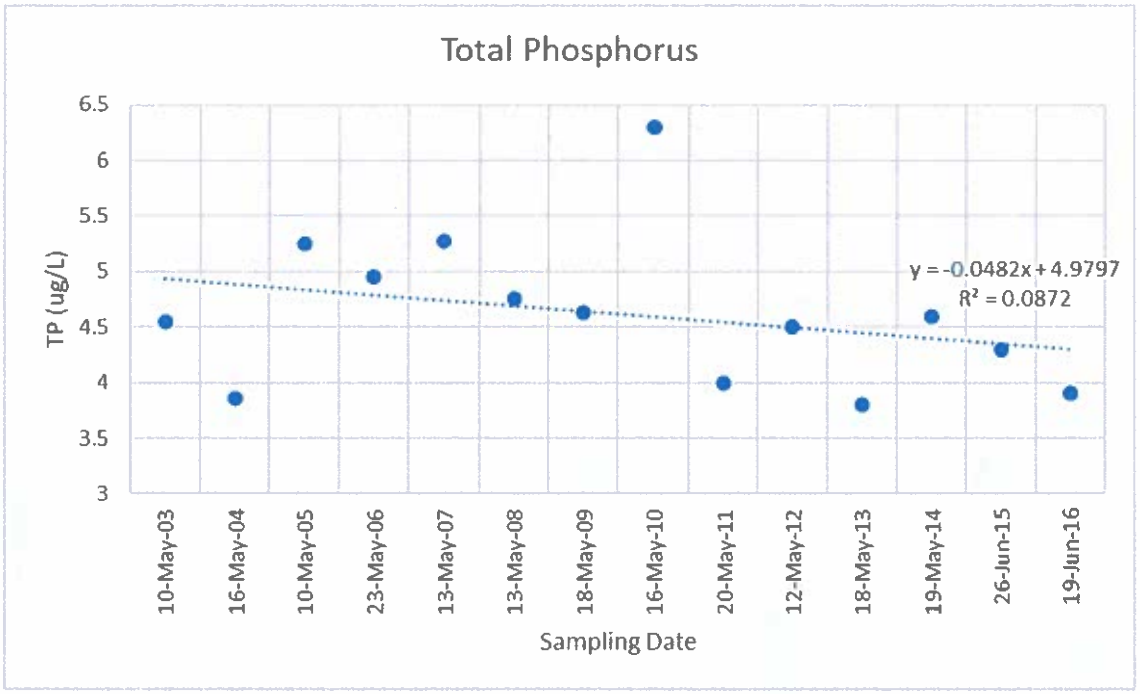
TP results were also plotted over time on Figure 3 to determine if any trends stand-out. Phosphorus concentrations declined between 2003 and 2016 ($y = -0.0482x + 4.9797$; $R^2 = 0.0872$), with a magnitude of change of 0.075 µg/L per year but the trend is not significant ($p = 0.11$).

Table 2. Phosphorus measurements from Horn Lake 2003-2016 (all samples collected from station 2015 in mid lake, deep spot through MOECC's Lake Partner Program).

Date	Phosphorus Concentration (µg/L)	Average Annual Phosphorus Concentration (µg/L)
May 10, 2003	4.2	4.6
	4.9	
May 16, 2004	3.8	3.9
	3.9	
May 10, 2005	4.9	5.3
	5.6	
May 23, 2006	5.3	5.0
	4.6	
May 13, 2007	5.8	5.3
	4.8	

May 13, 2008	5.3	4.8
	4.3	
May 18, 2009	4.5	4.6
	4.7	
May 16, 2010	6.8	6.3
	5.8	
May 20, 2011	4.0	4.0
	4.0	
May 12, 2012	4.4	4.5
	4.6	
May 18, 2013	3.8	3.8
	3.8	
May 19, 2014	4.4	4.6
	4.8	
June 26, 2015	4.0	4.3
	4.6	
June 19, 2016	3.8	3.9
	4.0	
Average		4.62

Figure 3. MOE Lake Partner Program Total Phosphorus Results Over Time



4.3 Measured Mean Volume Weighted Hypolimnetic Dissolved Oxygen

Dissolved oxygen was measured by MNRF throughout the water column in Horn Lake in 1999, 2000, 2001, 2003, 2004, 2006, 2007, 2009 and 2013, and by HESL in 2017 in Basin 1 and 2 (Figure 2). We noted two issues with MNRF data after review.

- MOE (2010) policy dictates that sampling is completed between August 15 and September 15 to capture the time of year when oxygen stress in the hypolimnion is the greatest. It should be noted that data collected by MNRF was outside of this range in 2001, 2009 and 2013, which could potentially misrepresent long-term average conditions.
- The hypolimnion must be determined to calculate MVWHDO. The hypolimnion is the bottom section of a stratified lake and the upper boundary of the hypolimnion is determined based on a temperature gradient between two depth strata that is <1°C/m (Wetzel 2001). MNRF routinely selected the bottom layer of the temperature gradient as the upper limit of the hypolimnion when in fact, the upper layer boundary of this temperature gradient should be used, so that the layer in which temperature first declines <1°C is included in the hypolimnetic volume. We therefore corrected the MVWHDO values to account for inclusion of the entire hypolimnion.

Original and corrected MVWHDO are presented in Table 3, while dissolved oxygen/temperature profiles from HESL sampling on August 18, 2017 are presented in Figures 4 and 5. Corrected MVWHDO concentrations ranged from 6.43 mg/L to 9.61 mg/L, with the four lowest concentrations measured following September 15th (September 18, 2001 = 6.94 mg/L (Basin 1), 7.08 mg/L (Basin 2), September 17, 2009 = 6.71 mg/L (Basin 1), 6.43 (Basin 2)). MVWHDO concentrations were similar in Basin 1 (7.97 mg/L) and 2

(7.70 mg/L). HESL recorded higher MVWHDO (Basin 1 = 8.94 mg/L; Basin 2 = 8.98 mg/L) in 2017 and, as can be seen in Figures 4 and 5, dissolved oxygen remained >4 mg/L near bottom.

Table 3. MVWHDO Results as part of MNRF and HESL Sampling

Source	Date	Basin	MVWHDO (mg/L)	
			Original	Corrected
MNRF	August 31, 1999	1	7.79	9.07
	August 31, 2000	1	7.35	7.69
	August 31, 2000	2	7.40	7.66
	September 18, 2001	1	6.41	6.94
	September 18, 2001	2	6.72	7.08
	September 3, 2003	1	7.41	7.78
	September 3, 2003	2	7.63	8.00
	September 14, 2004	1	8.72	9.61
	September 14, 2004	2	8.05	8.36
	September 14, 2006	1	7.57	7.70
	September 14, 2006	2	7.36	7.58
	September 14, 2007	1	7.50	7.81
	September 14, 2007	2	8.32	8.68
	September 17, 2009	1	6.64	6.71
	September 17, 2009	2	6.37	6.43
	September 23, 2013	1	8.15	8.38
	September 23, 2013	2	7.78	7.83
HESL	August 18, 2017	1	8.94	

	August 18, 2017	2	8.98	
Average (all years)			7.48	7.84
Average (data collected between August 15th and September 15th)			7.73	8.18
Average (Basin 1)			7.50	7.97
Average (Basin 2)			7.45	7.70

Figure 4. Dissolved oxygen and water temperature profile at Basin 1.

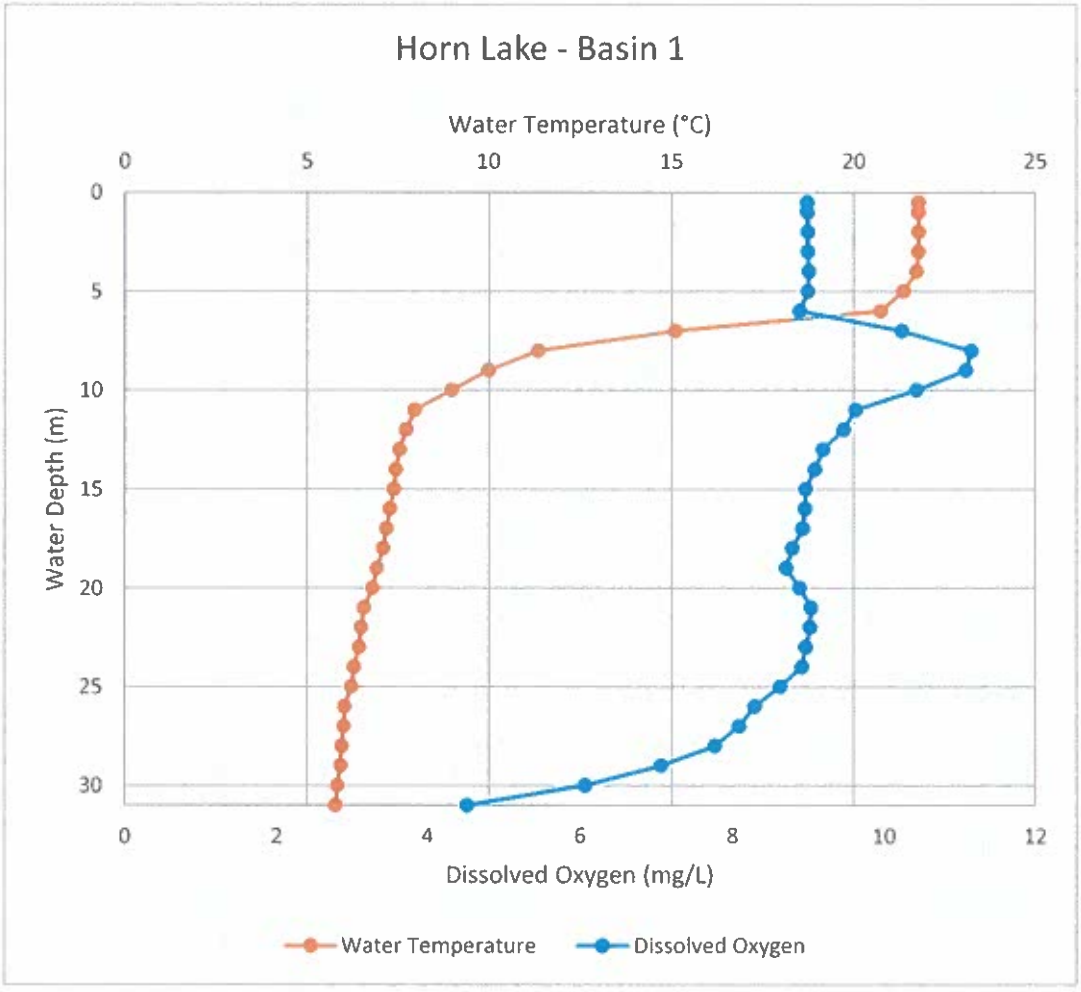
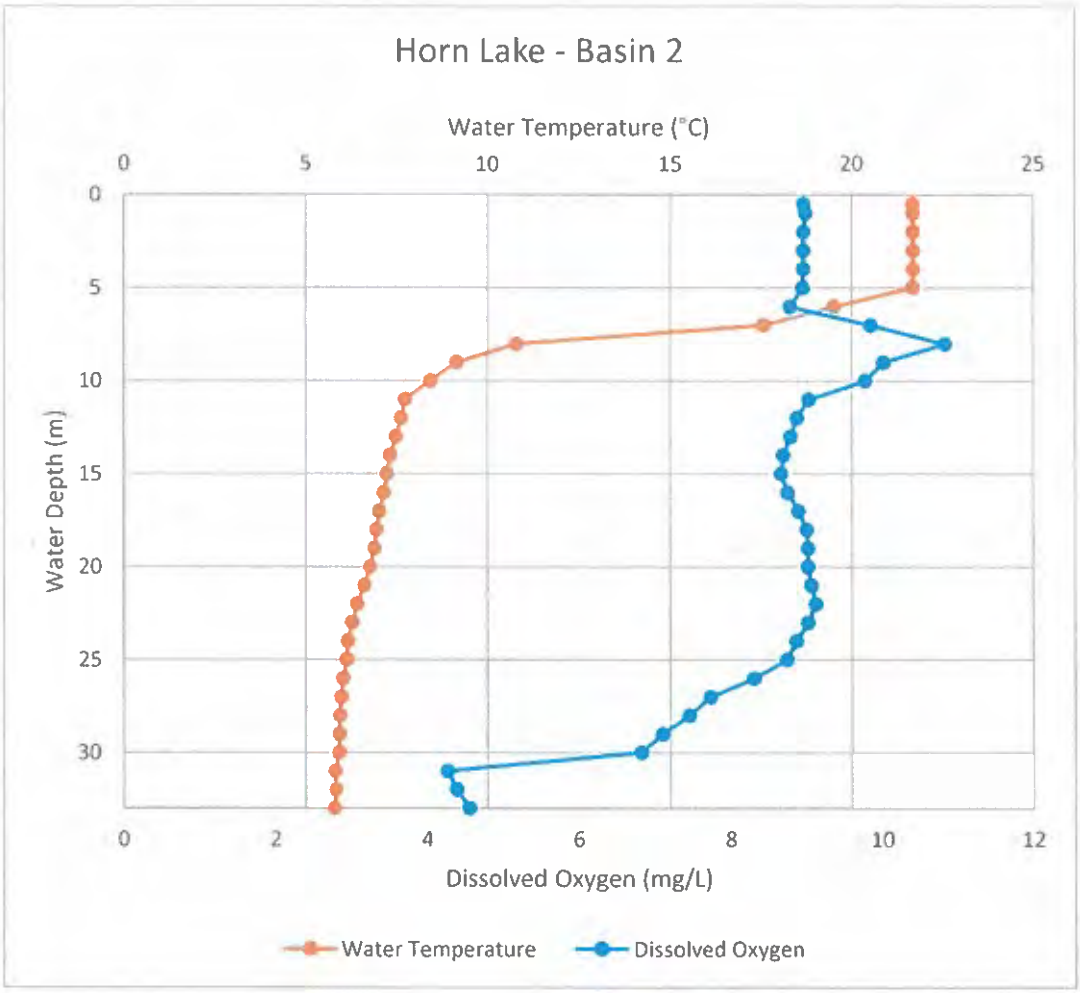


Figure 5. Dissolved oxygen and water temperature profile at Basin 2.



These analyses clearly show that Horn Lake is not at "capacity" in terms of oxygenated hypolimnetic Lake Trout habitat, as average MWWHDO concentrations collected by HESL and by MNRF exceeded 7 mg/L whether corrected or uncorrected.

4.4 Modelling Approach

Horn Lake was modelled using the Lakeshore Capacity Model following the Province's guidance in the Lakeshore Capacity Assessment Handbook (MOE 2010). Input parameters and calculation results used to model TP concentrations in Horn Lake are provided in Appendix A. Detailed methods and assumptions of the model are provided in MOE (2010). The following provides a description and brief rationale for the selection of various coefficients and assumptions used in the modelling of Horn Lake:

- The lake and catchment area of Horn Lake are 472 ha and 1922 ha, respectively.
- TP loading from land area in the Horn Lake watershed was determined using the following equation because % wetland in the catchment was greater than 3.5% and cleared or pastured land was less than 15%:
    - TP (kg/yr) = catchment area (km^2) * (0.47 * % wetland area +3.82)
- A TP loading rate of 0.167 kg/ha/yr was used to calculate TP loads to the surface of the lake from atmospheric deposition.
- Mean annual runoff value from 0.527 m/yr was determined from the runoff look up table provided by the MOECC and used to calculate water loads from the lake basin.
- TP loads from septic systems located within 300 m of the shoreline of the lake were calculated assuming a loading rate of 0.66 kg/capita/yr for each septic system. For existing conditions, a septic usage rate of 0.69 capita yrs/yr for seasonal residences was used.
- All lots included an overland runoff load of 0.04 kg of TP/lot/yr.
- For full build-out of the 4 proposed lots, TP loads were conservatively calculated assuming an extended seasonal usage rate of 1.27 capita years/yr[1].
- A settling velocity of 12.4 m/yr was used to indicate that oxic conditions are present in the hypolimnion of Horn Lake in accordance with dissolved oxygen measurements.

4.5 Capacity Assessment

4.5.1 Total Phosphorus

4.5.1.1 Existing Conditions

The modelled spring-overturn mean TP concentration under existing conditions was 5.73 µg/L; 24% above the measured value of 4.62 µg/L, indicating that the Lakeshore Capacity Model overestimates TP concentration and that the error exceeds the Provincial guidance of acceptable accuracy of +/- 20%. Provincial guidance (MOE 2010) recommends using the interim PWQO of 10 µg/L for TP as a water quality objective where the model is inaccurate.

A high level of protection against aesthetic deterioration will be provided by a total phosphorus concentration for the ice-free period of 10 µg/L or less. This should apply to all lakes naturally below this value (MOE 2010).

[1] *Usage rates of existing lots were provided by the Municipality of Magnetawan and Ryerson Township. An extended seasonal usage rate for the proposed lots was applied as part of a conservative assessment.*

This results in an additional 378 extended seasonal residences before ice-free TP concentrations are modelled to be greater than 10 µg/L. We therefore adjusted the Lakeshore Capacity Model inputs and assumptions to better reflect actual conditions to produce a better fit with measured values and allow use of the more conservative criterion. The model assumes that all sewage-related phosphorus is transported to the lake and it is most likely this assumption that caused the model to overestimate TP concentrations in Horn Lake.

Research over the past 20 years has consistently shown that septic system phosphorus is immobilized in PreCambrian Shield soils. Mechanistic evidence (Stumm and Morgan, 1970; Jenkins et al., 1971; Isenbeck-Schroter et al., 1993) and direct observations made in septic systems (Willman et al., 1981; Zanini et al., 1997; Robertson et al., 1998; Robertson, 2003) all show strong adsorption of phosphate on charged soil surfaces and mineralization of phosphate with iron (Fe) and aluminum (Al) in soil. The mineralization reactions, in particular, appear to be favoured in acidic and mineral rich groundwater in Precambrian Shield settings (Robertson et al., 1998; Robertson, 2003), such that over 90% of septic phosphorus may be immobilized. The mineralization reactions appear to be permanent (Isenbeck-Schroter et al., 1993). Recent studies conclude that most septic phosphorus may be stable within 0.5 m – 1m of the tile drains in a septic field (Robertson et al., 1998, Robertson, 2003, Robertson 2012).

Trophic status modelling also supports the mechanistic and geochemical evidence. Dillon et al. (1994) reported that only 28% of the potential loading of phosphorus from septic systems around Harp Lake, Muskoka, could be accounted for in the measured phosphorus budget of the lake. The authors attributed the variance between measured and modelled estimates of phosphorus to retention of septic phosphorus in tills that were found in the catchment of Harp Lake, within the geological classifications of Ground Moraine over bedrock, Glaciolacustrine Delta and Outwash Plain (Mollard et al. 1980, Gartner Lee Ltd. 2005).

Hutchinson (2002) recommended that the TP contribution from sewage septic systems be reduced by 74%[2] for lakes with suitable soils in their catchments. Bedrock with undifferentiated igneous and metamorphic rock, exposed at surface or covered by a discontinuous, thin layer of drift is predominant in the Horn Lake catchment (Ontario Geological Survey 2000). These geological formations typically result in acidic soils that are known to retain TP, such as those noted by Robertson (2012) and Hutchinson (2002). We therefore applied a 72% retention coefficient to existing development to determine if this improved the model response.

The modelled spring-overturn ice-free mean TP concentration under existing conditions with 72% retention of sewage related TP was 4.28 µg/L; 7% different than the measured value of 4.62 µg/L, indicating that the Lakeshore Capacity Model does accurately model concentrations in Horn Lake within acceptable limits (i.e. 20%) when a science-based retention coefficient is implemented to account for attenuation of phosphorus from existing development by soils in the catchment (Table 4).

The Lakeshore Capacity Model includes an equation to determine spring overturn TP based on ice-free concentrations as follows:

[2] *The Hutchinson (2002) citation represents an error – Dillon et al (1994) reported that 28% of septic phosphorus was accounted for in the lake budget (=72% retention) and not 26% (74% retention).*

Spring-overturn TP = (ice-free TP – (-0.563)/0.992

The interim PWQO of Background + 50% to protect against nuisance algal blooms (Table 4; MOE (2010)) was calculated based on the modelled background ice-free mean TP concentration for Horn Lake (3.00 µg/L). The revised PWQO derived from background plus 50% was 4.51 µg/L. Modelled ice-free TP concentrations were 3.68 µg/L, indicating that Horn Lake is currently 0.83 µg/L under capacity in terms of the interim PWQO, or is currently at Background + 23%.

Table 4. Modelled and measured spring overturn TP concentrations for Horn Lake.

Scenario	TP
Modelled Background Total Phosphorus (µg/L) - Ice-Free Conditions	3.00
Revised PWQO of Background + 50% (µg/L) - Ice-Free Conditions	4.51
Existing Modelled Total Phosphorus (µg/L) - Ice Free Conditions - Spring Overturn	3.68 4.28
Existing Measured Total Phosphorus (µg/L) - Spring Overturn	4.62
% difference between modelled and measured:	*-7%*

Horn Lake is currently under capacity for development in terms of TP following existing Provincial guidance. Previous modelling conducted in the early 1990s is what is reflected in the Magnetawan OP policies but this pre-dated the Province's recommended approach for both TP and MVWHDO as described in the Lakeshore Capacity Handbook (Sein, R. (MOECC) Re: Horn Lake. January 15, 2018. Email) and so the previous assessment is no longer valid.

Although Horn Lake has additional capacity we have recommended a number of mitigation measures as described in Section 4.6 as precautionary measures since a) the LCM did not accurately predict existing conditions and b) to protect sensitive Lake Trout habitat. The assessment of Future Conditions in the following section includes implementation of one recommended, optional mitigation measure - septic systems designed to retain sewage-related TP, since the amount of retention helps inform future modelled TP and MVWHDO concentrations.

4.5.1.2 Future Conditions

Many sewage systems have been shown to mitigate phosphorus loads to lakes. These include: the use of phosphorus retaining "B" horizon soils rich in aluminum and iron in septic bed construction, the Ecoflo + DpEC Self-Cleaning Phosphorus Removal Unit, and the Waterloo Biofilter EC-P unit. MOECC have recognized the phosphorus removal capabilities of Waterloo Biofilter System and Ecoflo Biofilter and note that each system should be able to reliably and consistently reduce 88% of sewage related phosphorus before the effluent enters the leaching field (Castro 2015), with further retention likely in the leaching field. The use of phosphorus retaining "B" horizon soils is well documented in the works of Robertson et al. (1998)

and was tested as part of an OMB decision for Kushog Lake and shown to be effective (letter: Castro to Newhook, Oct. 29. 2013).

Altered TP concentrations in Horn Lake associated with the proposed development of 4 extended seasonal lots plus the vacant lots of record were assessed using the Lakeshore Capacity Model under three scenarios of varying TP retention: 0% TP retention, 72% TP retention (as described above) and 88% TP retention (via mitigation technologies) for the additional lots. The build-out of the 4-proposed extended seasonal residences resulted in ice-free TP concentrations ranging from 3.68 µg/L to 3.74 µg/L, depending on the level of TP retention (Table 5). These concentrations represent an increase of <0.01 µg/L to 0.08 µg/ from existing modelled concentrations. Build-out of the proposed 4 lots as well as the vacant lots of record resulted in TP concentrations of 3.75 µg/L to 3.94 µg/L or increases of 0.06 µg/L to 0.26 µg/L from modelled existing conditions. All future predicted concentrations are below the interim PWQO of 4.51 µg/L.

Table 5. Future modelled TP concentrations.

Scenario	TP (µg/L)		
	0% retention	72% retention	88% retention
With build-out of 4 additional extended seasonal residences (µg/L)	3.74	3.70	3.68
With build-out of 4 additional extended seasonal residences and 16 vacant lots of record as extended seasonal residences (µg/L)	3.94	3.76	3.75

4.5.1.3 TP Loads

Phosphorus loads under existing and build-out scenarios were calculated to be less than 26% over the background loads (Table 6) further supporting the conclusion that Horn Lake is under capacity for shoreline development in terms of phosphorus levels.

Table 6. Summary of TP loads to Horn Lake.

Scenario	Horn Lake
Background TP load (kg/yr)	204.3
Existing TP load with 72% retention of sewage-related TP (kg/yr)	250.5
% Increase over Background:	*22.5%*
With build-out of 4 additional extended seasonal residences and 72% retention of sewage-related TP (kg/yr)	251.6
% Increase over Background:	*23.1%*

With build-out of 4 additional extended seasonal residences and 16 vacant lots of record as extended seasonal residences and 72% retention of sewage-related TP (kg/yr)	256.0
% Increase over Background:	*25.3%*

4.5.2 Dissolved Oxygen

MVWHDO can be predicted for individual lakes based on spring overturn TP concentrations following the methods of Molot et al. (1992) and Clark et al. (2002). MNRF used contour volumes from two distinct basins when calculating MVWHDO. We utilized contour volumes from Basin 2 when predicting changes to MVWHDO concentrations since that basin is located closer to the subject property and the terrain indicates that drainage flows roughly towards that area.

Predicted MVWHDO concentrations ranged from 8.02 mg/L to 8.03 mg/L for build-out of the 4 proposed lots, representing a maximum decrease of 0.012 mg/L from the existing modelled concentration of 8.03 mg/L from Basin 2. Predicted MVWHDO concentrations ranged from 7.98 mg/L to 8.02 mg/L for build-out of the 4 proposed lots and 16 vacant lots of record, representing a maximum decrease of 0.055 mg/L from the existing modelled concentration.

Table 7. Modelled spring overturn TP and resulting MVWHDO concentrations.

Scenario	Spring Overturn TP (µg/L)			MVWHDO (mg/L)		
Modelled existing conditions	4.28			8.03		
TP Retention	0% Retention	74% Retention	88% Retention	0% Retention	74% Retention	88% Retention
With build-out of 4 additional extended seasonal residences (kg/yr)	4.34	4.30	4.28	8.02	8.03	8.03
With build-out of 4 additional extended seasonal residences and 16 vacant lots of record as extended seasonal residences (kg/yr)	4.54	4.36	4.35	7.98	8.02	8.02

Modelled existing MVWHDO concentrations (8.03 mg/L) are higher than the majority of average measured values presented in Table 3 but the same magnitude of predicted change can be applied to measured MVWHDO concentrations in Basin 2. Full build-out of the 4 proposed lots and 16 vacant lots of record with 0% retention of septic-related TP resulted in a 0.04 mg/L change (8.02 mg/L → 7.98 mg/L) in modelled MVWHDO concentrations. The uncorrected measured MVWHDO concentration of 7.45 mg/L in Basin 2 would therefore be modelled to decrease to 7.41 mg/L under that conservative scenario; all other measured values would be even greater than the guidance value MVWHDO of 7 mg/L.

4.5.3 Recreational Carrying Capacity

Recreational Carrying Capacity is another component of lake management that is used in some jurisdictions (i.e. Seguin Township) to manage development to control overcrowding. A development density of 1 lot/1.62 ha of lake surface area is used in Seguin Township as a "filter" for "crowding" or social density to reflect recreational use of lake surface areas, an approach which was upheld in an OMB decision of December 22, 2016. This filter equates to a Recreational Carrying Capacity of 291 lots for Horn Lake which is much higher than the 222 seasonal, permanent, resort units, mobile trailer lots and vacant lots of record (Section 3). The proposed addition of 4 lots development would therefore not result in over-crowding based on this metric.

4.6 Mitigation Measures

Horn Lake is not at capacity but a variety of mitigation measures should still be utilized during waterfront development to minimize short and long-term impacts associated with water quality as a precautionary measure since the LCM did not accurately predict existing conditions and to protect sensitive Lake Trout habitat. Mitigation measures #1 - #3 are already required through the Municipality of Magnetawan Official Plan and we recommend two additional approaches.

1. Septic systems shall be located at least 30 metres from a watercourse or waterbody.

2. As a condition of development approval, a natural shoreline vegetation buffer shall be preserved within at least 20 metres of all watercourses and waterbodies wherever possible except for the removal of hazardous trees and a narrow area to allow a pathway to the shoreline.

3. Where development would result in a significant increase in storm water run-off, the Municipality shall require the proponent to complete storm water management works that will ensure that off-site surface water quality and quantity is not adversely impacted by the development. Direct outfalls to surface waters should be avoided and wherever possible developments shall utilize infiltration as a method for storm water management.

    - We recommend discharging of roof leaders, use of soak away pits and other measures to promote infiltration. Other specific design options for consideration include: grassed and vegetated swales, filter strips, roof leaders and French drains which have all proven to be effective at mitigating impacts associated with stormwater.

4. We recommend implementation of an Erosion and Sediment Control plan during construction, which should (CISEC Canada 2012):

- Utilize a multi-barrier approach;
- Retain existing vegetation;
- Minimize land disturbance area;
- Slow down and retain runoff to promote settling;
- Divert runoff from problem areas;
- Minimize slope length and gradient of disturbed areas;
- Maintain overland sheet flows and avid concentrate flows; and
- Store/stockpile soil away from watercourses, drainage features, and tops of steep slopes.

5. Utilize Waterloo Biofilter Systems with EC-P units to minimize sewage related-TP.

Additional information regarding waterfront development Best Management Practices can be found in "Protect Your Waterfront Investment" (Muskoka Watershed Council; Appendix B).

4.7 Discussion

MNRF has a criterion of 7 mg/L of MVWHDO for the protection of Lake Trout habitat. The Province recommends that generally there will be no new development within 300 metres of Lake Trout lakes where MVWHDO has been measured to be at or below 7 mg/L. This recommendation also applies to lakes where modelling has determined that development would reduce MVWDHO to 7 mg/L or less. Although MVWDO concentrations less than 7 mg/L were recorded on September 18, 2001 and September 17, 2009, both of those dates lie outside of the MOECC-determined sampling window of August 15th to September 15th. Average MVWHDO concentrations were greater than 7 mg/L in both basins and the focus should be on the long-term average values because of issues related to inter-annual variability, including equipment and user error, in accordance with MOE (2010):

"When attempting to characterize lakes in this manner, it is preferable to use average profiles which are derived from several years of data to offset the effects of inter-annual variation. This approach will allow the description of average conditions in a lake's hypolimnion at the end of summer and compare between-lake differences under similar conditions."

The Lakeshore Capacity Model was not able to predict TP concentrations to within 20% of the measured value and so does not accurately reflect existing conditions. MOE (2010) recommends use of the interim PWQO of 10 µg/L of TP as an upper limit to protect against algal blooms instead of "Background + 50%". In this case, the modelled values of 3.68 µg/L to 3.94 µg/L (depending on % of TP retention and inclusion of vacant lots of record) are well below 10 ug/L and Horn Lake is not considered over capacity for TP.

Although Horn Lake is well below the Interim PWQO of 10 ug/L we do not recommend that 10 ug/L serve as a management limit. Instead, we refined the model to bring the management goals closer in line to the

preferred objective of Background + 50%. We utilized a scientifically-defensible sewage-related TP retention coefficient of 72% in the model for existing development to better align the model with existing conditions instead of utilizing the 10 µg/L of TP guideline, and the results indicate that capacity does exist on Horn Lake for the 4 proposed lots following this methodology. The proposed development of the 4 lots is modelled to increase TP by <0.01 µg/L and decrease MVWHDO by <0.01 mg/L with implementation of Waterloo Biofilter Systems with a EC-P units, both of which result in concentrations well below regulatory guidelines and are immeasurable through standard laboratory procedures. Mitigation measures listed in 4.6 further ensure that impacts to water quality will be minimized to acceptable levels in accordance with relevant municipal and provincial policy.

5. Fish Habitat Impact Assessment

MNRF fish habitat mapping did not indicate Type 1 habitat fronting the subject property but a Fish Habitat Impact Assessment (FHIA) was completed because such mapping is not always accurate as it was based on air photo interpretation. Documentation and an understanding of site-specific conditions allowed for the development of recommendations that will ensure shoreline development will adhere to policies outlined in the Municipality of Magnetawan Official Plan and the Fisheries Act.

Fish habitat was characterized in the littoral environment and compared to the habitat requirements of various resident fish species to classify the environment in terms of functionality (e.g. spawning) and resiliency per MNRF guidelines. The assessment was completed based on the proposed development of docks, the characterization of fish habitat features and functions, and the incorporation of a number of short and long-term mitigation measures.

The assessment of the subject properties' littoral and riparian environments was completed through a review of background material and a field investigation undertaken on August 18, 2017.

5.1 Background Review

A fish species list for Horn Lake and MNRF fish habitat mapping were reviewed to determine the perceived habitat value of the nearshore environment of the study area (MNR 2010).

5.1.1 Fish Habitat Mapping

The MNRF has developed three categories or habitat types to standardize the assessment of fish habitat (MNR 1994). Below is a summary of the characteristics of each habitat type and its sensitivities.

Type 1 Habitat

Habitats are rare or highly sensitive to the potential impacts of development or limit fish productivity either directly or indirectly in a specified water body or portion of a water body. Where these habitats are limiting, productivity would be expected to diminish if they are harmed.

Type 2 Habitat

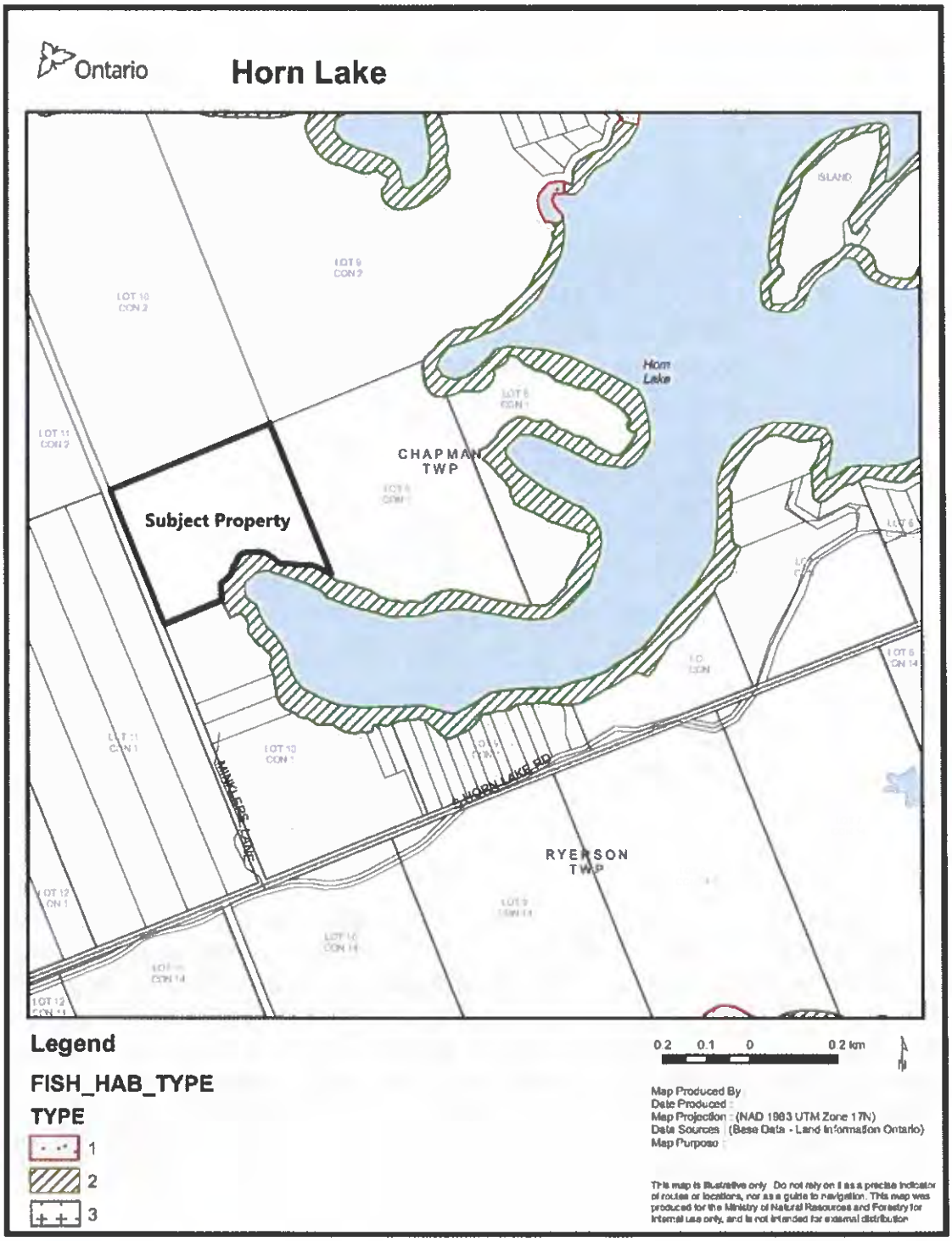
Habitats that are moderately sensitive to the potential impacts of development and although important to fish populations, do not limit the productivity of fish either directly or indirectly. These habitats are usually abundant and another habitat component is the limiting factor in fish production.

Type 3 Habitat

Habitats that are marginal or highly degraded, and currently do not contribute directly to fish productivity, based on fish community management objectives. Type 3 habitats can often be improved significantly, thereby providing a net gain of productive capacity.

Fish habitat classified in front of the subject property was entirely Type 2 (Figure 6).

Figure 6. MNRF Fish Habitat Mapping



5.1.2 Fish Species List

MNRF has recorded 13 fish species in Horn Lake, including the following game fish species: Lake Trout, Smallmouth Bass (*Micropterus dolomieu*), Walleye (*Sander vitreus*), Yellow Perch (*Perca flavescens*), Rainbow Trout (*Oncorhynchus mykiss*), and Brook Trout (*Salvelinus fontinalis*; Table 8). The lake was stocked for Lake Trout and Brook Trout between 1945 and 2000 (MNR 2010).

Table 8. Fish species in Horn Lake.

Common Name	Scientific Name
Brown Bullhead	*Ameiurus nebulosus*
Burbot	*Lota lota*
Creek Chub	*Semotilus atromaculatus*
Lake Trout	*Salvelinus namycush*
Lake Whitefish	*Coregonus clupeaformis*
Rainbow Smelt	*Osmerus mordax*
Rainbow Trout	*Oncorhynchus mykiss*
Rock Bass	*Ambloplites rupestris*
Smallmouth Bass	*Micropterus dolomieu*
Brook Trout	*Salvelinus fontinalis*
Walleye	*Sander vitreus*
White Sucker	*Catostomus commersonii*
Yellow Perch	*Perca flavescens*

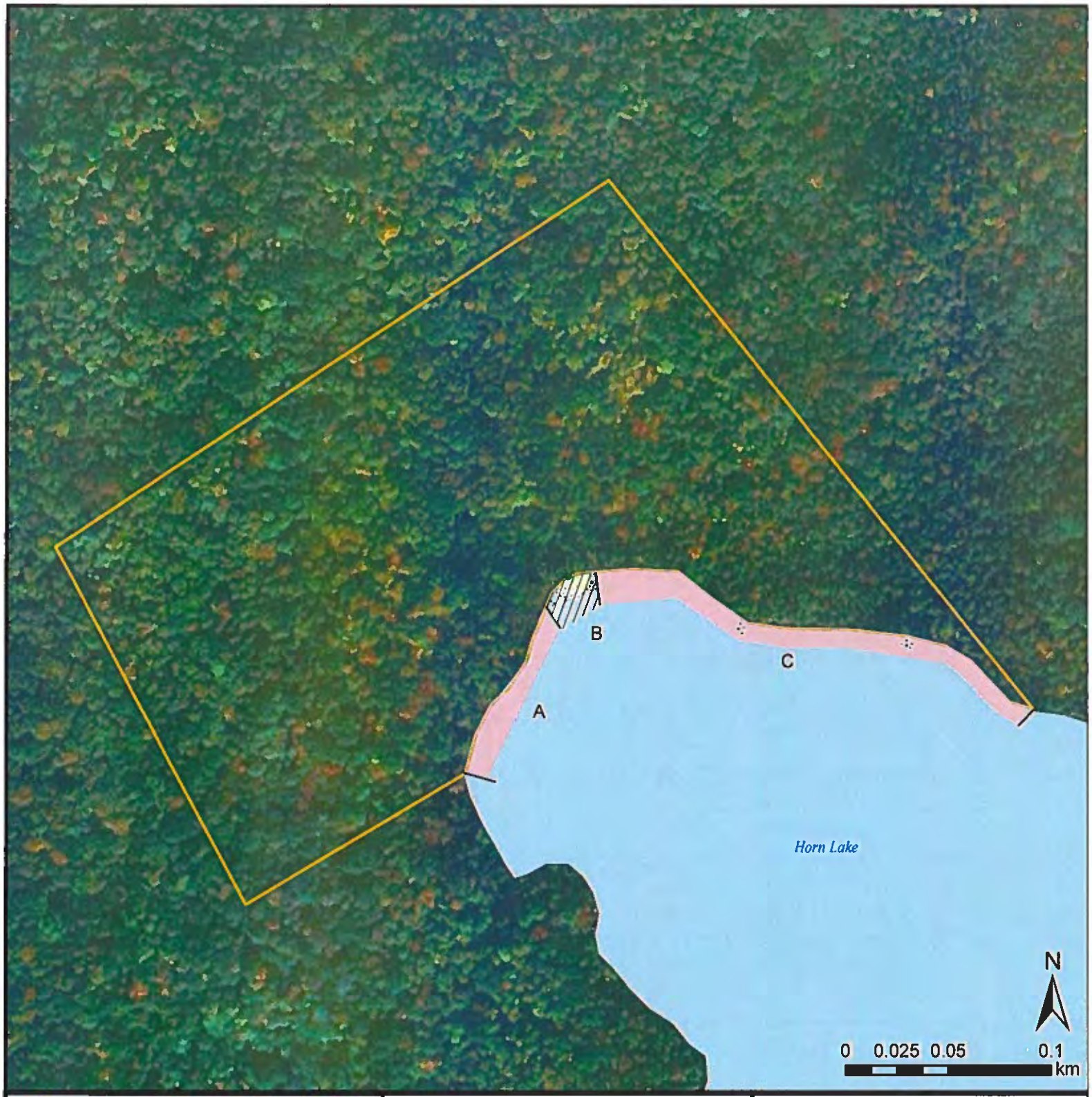
5.2 Existing Conditions

The nearshore environment fronting the subject property was relatively heterogeneous but can be best broken into three study areas with similar aquatic habitat features for descriptive purposes (Figure 7). Study Area A stretches from the western boundary of the subject property, approximately 110 m to the northeast before transitioning into Study Area B (Photograph 1). Riparian slopes were approximately 10% throughout Study Area A. In-water slopes were also relatively steep, ranging from 2:1 (2 m water depth 1 m offshore) to 3:1. Woody debris was abundant in the littoral environment, aquatic vegetation was sparse, and substrates were dominated by periphyton-covered large cobbles and boulders. Riparian vegetation includes mixed forest which overhung most of the nearshore environment, and the understory consisted of Sweet Gale (*Myrica gale*), Blue Flag Iris (*Iris versicolor*), Bracken Fern (*Pteridium aquilinum*), Sensitive Fern (*Onoclea sensibilis*), and Grass (*Poaceae spp.*).

Study Area B was a more depository area with shallower 4:1 in-water slopes and a variety of substrates, including: organic debris, sand, periphyton-covered boulders and some gravel. Patches of the following aquatic vegetation species were noted in the area: Pipewort (*Eriocaulon aquaticum*), Broad Leaf Arrowhead

(*Sagittaria latifolia*), and Pondweed (*Potamoegeton spp.*, Figure 6). Woody debris was also abundant in the study area. A small, seepage area was observed in the middle of the study area and cold-water temperatures indicated that it was of groundwater origin. The riparian environment in Study Area B contained similar vegetation as Study Area A and similar slopes, apart from a flatter transition from the shore.

Study Area C encompassed the eastern half of the subject property. The area contained steep in-water slopes (2:1), lots of woody debris, and sparse accumulations of Milfoil (*Myriophyllum spp.*) and Pipewort. Periphyton-covered large cobbles, boulders and exposed bedrock were dominant throughout the littoral environment. The riparian environment was similar to Study Area 1 in terms of vegetation and slope.



Legend

- Study Areas
- Mixed Substrates
- Groundwater Seepage
- Aquatic Vegetation
- Subject Property
- Cobbles/Boulders
- Lakes

Project Lead: Brent Parsons
Prepared by: Kris Hadley
Data Source: HESL,Ontario Land, ESRI
Coordinate System: NAD 1983 UTM Zone 17N

Figure 7:
Fish Habitat Features

Project: Lakeshore Capacity and Fish Habitat Impact Assessment for Horn Lake

Project #: J170058

Hutchinson
Environmental Sciences Ltd.

Photographs 1 and 2. A view of the nearshore environment fronting the western portion of the subject property, highlighting Study Area A (above) and Study Area B (below).

Photographs 3 and 4. A view of the heterogeneous shoreline fronting the eastern portion of the subject property (above), and periphyton covered rocks (below), which were abundant throughout the littoral environment.

5.2.1 Assessment of Fish Habitat

The assessment of fish habitat was completed by comparing site-specific features to the requirements of resident fish species so that critical habitats such as nursery or spawning habitats could be defined. Study Area B contains mixed substrates and vegetation that could provide spawning opportunities for Rock Bass, Smallmouth Bass, Yellow Perch and Brook Trout. The area also provides nursery habitat for various species because of cover provided by aquatic vegetation and woody debris, and the presence of the groundwater seepage area which provides a continuous influx of oxygen and nutrients to the area.

Study Areas A and C provide potential spawning opportunities for Lake Whitefish but the areas are not suitable for Lake Trout spawning. Lake Trout typically seek out clean, wave-swept cobble substrates where ample dissolved oxygen allows their eggs to develop in the interstitial spaces between the cobble (Fitzsimons 1994). Ubiquitous periphyton on the angular cobble and boulders has the potential to impact dissolved oxygen concentrations through photosynthesis, respiration and decomposition, and the location of the subject property on the western side of Horn Lake within a secluded embayment, limits the wave action (as seen by the accumulation of woody debris).

Table 9. Resident Fish Species that could use the Study Areas for Spawning Purposes.

Species	Tolerance[1]	Spawning Habitat	Study Area
Lake Whitefish	Intolerant	Rocky shoals, boulders, rubble and cobble	A and C
Rock Bass	Intermediate	Rocky or vegetated shallows of lakes	B
Smallmouth Bass	Intermediate	Rocky and sandy areas or lakes	B
Yellow Perch	Intermediate	Rooted vegetation, sand or gravel	B
Brook Trout	Intolerant	Groundwater upwellings, rocky substrates	B

Note : [1]Tolerances from Eakins (2015).

The majority of the littoral environment represents Type 2 habitat as it does not limit the productivity of resident fish species and is not sensitive to impacts generally associated with the development of docks. The groundwater seepage area and adjacent accumulation of macrophytes and woody debris represents a unique combination of fish habitat features in the study area, is appropriately classified as Type 1 habitat, and should be avoided to protect nursery habitat and spawning habitat for select resident fish species.

5.3 Mitigation Measures

The incorporation of appropriate mitigation measures will minimize impacts to fish habitat to acceptable levels in accordance with policies in the Fisheries Act and the Municipality of Magnetawan Official Plan.

The majority of the following mitigation recommendations were gathered from the "Measures to Avoid Causing Harm to Fish and Fish Habitat" (Fisheries and Oceans Canada 2015) and should be implemented:

- Avoid construction of shoreline structures on or within 10m of the groundwater seepage area identified on Figure 6. A 10 m buffer is sufficient to protect the functionality of the seepage area from adjacent development of docks or boardwalks since 10 m is a suitable base buffer width for water quality, screening of human disturbance and core habitat protection (Beacon Environmental Ltd. 2012).

- Implement a timing window of March 15th to July 15th and October 15th to May 31st to protect spring and fall spawning species, that is dock construction should be completed outside of that timing window (July 16th to October 14th).

- Utilize a dock design that has a small footprint on the lakebed such as a floating, cantilever or a pole supported dock. If a larger footprint is used (i.e. cribs) then the cribs should be constructed in an open- faced manner and filled with large rocks to provide accessible crevices for fish and other small organisms. Cribs should be spaced (2 m) and located at least 2 m from the high-water mark to allow nearshore water to circulate.

- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. For dock construction this includes:

    - Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.

- Clearing of riparian vegetation should be kept to a minimum.

- Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.

- Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.

- Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.

- If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.

- Remove all construction materials from site upon project completion.

- Ensure that all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows.

5.4 Discussion

The impact assessment was guided by the Fisheries Act and relevant Municipality of Magnetawan Official Plan policies, and completed based on the sensitivity of the fish habitat and implementation of various mitigation measures. In terms of the Fisheries Act, if a dock is constructed with a footprint of less than 20m^2 on the lake bed, no review is required by Fisheries and Oceans Canada, but if a footprint is larger than 20m^2 it is necessary to complete a self-assessment using information that is provided in this report.

Incorporation of the mitigation measures listed in Section 5.3 will provide assurance that fish habitat will be protected during the construction of docks on the subject property and the project will be in compliance with the Fisheries Act due to the self-assessment process described here-in.

The FHIA also addresses all requirements of an Environmental Impact Assessment as defined by the Municipality of Magnetawan Official Plan by ensuring that new developments shall have no negative impact on fish habitat (Policy 4.4).

6. Conclusions

6.1 Lakeshore Capacity Assessment

Horn Lake is not over capacity in terms of total phosphorus, recreational capacity or average MVWHDO concentrations. Modelled TP results indicate that the model does not properly represent existing conditions and capacity remains for additional development in relation to the interim PWQO guidelines of 10 µg/L or to Background + 50% if a 72% sewage-related TP retention coefficient is applied to existing development. Additionally, McIntyre (2006) noted that Lake Trout abundance slightly improved between 1998 and 2005, TP declined between 2003 and 2016, and there have been no algal blooms reported to the North Bay Parry Sound District Health Unit (Environmental Health Program, personal communication, January 4, 2017), so water quality and Lake Trout habitat appear healthy in Horn Lake.

The proposed development of the 4 lots is modelled to increase TP by <0.01 µg/L and decrease MVWHDO by <0.01 mg/L with implementation of Waterloo Biofilter Systems with EC-P units, both of which remain well below regulatory guidelines and are immeasurable through standard laboratory or field procedures. Mitigation measures listed in 4.6 further ensure that impacts to water quality will be minimized to acceptable levels in accordance with relevant municipal and provincial policy.

6.2 Fish Habitat Impact Assessment

Most of the fish habitat fronting the subject property is not critical or sensitive to development of docks. We identified a groundwater seepage area that drains into a nursery habitat and potential spawning habitat for some residential species, so this area was afforded a 10 m buffer and development should take place outside of this area. A number of mitigation measures were also recommended in Section 5.3 that will

protect fish habitat and ensure that the development follows municipal and federal regulations related to fish habitat.

7. References

Beacon Environmental Ltd. 2012. Ecological Buffer Guideline Review. Prepared for Credit Valley Conservation.

Castro, V. 2015. Lakeshore Capacity Assessment for White Lake – Revised. Letter.

Castro, V. 2013. Branson/Sanderson Severance, South Kushog Lake, Township of Algonquin Highlands. Letter.

Clark, B.J., Paterson, A.M., Jeziorski, A., and S. Kelsey. 2010. Assessing variability in total phosphorus measurements in Ontario lakes. Lake and Reservoir Management. 26: 53-72.

CISEC Canada. 2012. Certified Inspector of Sediment and Erosion Control Training Manual. 2012 Revised Edition V4 – Canada.

Dillon, P.J., W.A. Scheider, R.A. Reid and D.S. Jeffries. 1994. . Lakeshore Capacity Study : Part 1 – Test of effects of shoreline development on the trophic status of lakes. Lake and Reserv. Manage. 8 : 121 – 129.

Eakins, R. 2015. Ontario Freshwater Fishes Life History Database. http://ontariofishes.ca/fish_list.php

Fisheries and Oceans Canada. 2015. Measures to avoid causing harm to fish and fish habitat including aquatic species at risk. http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html

Fitzsimons, J.D. 1994. An Evaluation of Lake Trout Spawning Habitat Characteristics and Methods for Their Detection. Fisheries and Oceans Canada. Canadian Technical Report of Fisheries and Aquatic Sciences No. 1962.

Gartner Lee Ltd. 2005. Recreational Water Quality Management in Muskoka. Prepared for The Department of Planning and Economic Development, District Municipality of Muskoka. June 2005. 145pp.

Government of Canada. 2015. Fisheries Act.

Hutchinson, N.J., 2002:
Limnology, plumbing and planning: Evaluation of nutrient-based limits to shoreline development in Precambrian Shield watersheds. In: R.L. France (ed). Handbook of Water Sensitive Planning and Design, CRC Press, London. Pp. 647-680.

Isenbeck-Schroter, M., U. Doring, A. Moller, J. Schroter and G. Matthe. 1993. Experimental approach and simulation of the retention processes limiting orthophosphate transport in groundwater. J. Contam. Hydrol. 14 : 143-161.

Jenkins, D., J.F. Ferguson and A.B. Menar. 1971. Chemical processes for phosphate removal. Water Research 5 : 369 - 389.

McIntyre, E. 2006. Sollman Lake – Chapman Twp. 2005 Spring Littoral Index Netting (SLIN) Survey Report. 14 p.

Meridian Planning Consultants Inc. 2012. Official Plan for the Municipality of Magnetawan.

Ministry of Natural Resources. 1994. Fish Habitat Protection Guidelines for Developing Areas.

Ministry of Natural Resources and Forestry. 2010. Lake Fact Sheet – Sollman Lake (Horn Lake).

Ministry of Natural Resources and Forestry. 2015. Inland Ontario Lakes Designated for Lake Trout Management. Fisheries Section, Species Conservation Policy Branch.

Ministry of Natural Resources and Forestry. 2017. Ontario Flow Assessment Tool. http://www.gisapplication.lrc.gov.on.ca/OFAT/Index.html?site=OFAT&viewer=OFAT&locale=en-US

Ministry of Environment. 2010. Lakeshore Capacity Assessment Handbook. Protecting Water Quality in Inland Lakes on Ontario's Precambrian Shield. Queen's Printer for Ontario. PIBS 7642e

Mollard, D.G. 1980. Southern Ontario Engineering Geology Terrain Study. Database Map, Muskoka Area. Parry Sound and Muskoka District, Ontario Ministry of Natural Resources. Ontario Geological Survey Open File Report 5323.

Molot, L.A., Dillon, P.J., Clark, B.J., and B.P. Neary. 1992. Predicting End-of-Summer Oxygen Profiles in Stratified Lakes. Canadian Journal of Fisheries and Aquatic Sciences. 49: 2363-2372.

Ontario Geological Survey. 2000. Quartenary Geology, Seamless Coverage of the Province of Ontario, Data Set 14 – Revised.

Robertson, W.D., S.L. Schiff and C.J. Ptacek. 1998. Review of phosphate mobility and persistence in 10 septic system plumes. Ground Water 36 : 1000-1010.

Robertson, W.D., 2003:
Enhanced attenuation of septic system phosphate in noncalcareous sediments. Groundwater 41: 48 – 56.

Robertson, W.D., 2008:
Irreversible phosphorus sorption in septic system plumes? Groundwater 46: 51- 60.

Robertson, W.D. 2012. Phosphorus Retention in a 20-Year-Old Septic System Filter Bed. Journal of Environmental Quality.

Wetzel, R.G. 2001. Limnology – Lake and River Ecosystems, Third Edition.

Willman, B.P., G.W. Petersen and D.D. Fritton.. 1981. Renovation of septic tank effluent in sand-clay mixtures. J. Environ. Qual. 10 : 439- 444.

Appendix A. Lakeshore Capacity Model

Lakeshore Capacity Model

Horn Lake

Anthropogenic Supply

Shoreline Development Type	Number	Usage (capita years/yr)	
Permanent	32	2.56	
Extended Seasonal		1.27	
Seasonal	138	0.69	
Resort	7	1.18	
Trailer Parks	29	0.69	
Youth Camps	0	0.125	kg/capita/yr
Campgrounds/Tent trailers/RV parks	0	0.37	
Vacant Lots of Record	16	1.27	
		206	
Retention by soil (Rs) (0-1)	0.72		

Catchment

Lake Area (Ao)	471.8	ha	Upstream Lakes
Catchment Area (Ad)	1922.3	ha	
Wetland	5.8	%	
Cleared	0.0	%	

Hydrological Flow

Mean annual runoff	0.527	m/yr
Lake outflow discharge (Q)	12616927	m3/yr
Areal water loading rate (qs)	2.67	m/yr
Inflow 1		m3/yr
Inflow 2		m3/yr
Inflow 3		m3/yr

Natural Loading

Atmospheric Load	78.79	250.46	
Runoff Load	125.47	kg/yr	

Upstream Loading

Background Upstream Load 1		kg/yr	
Background Upstream Load 2		kg/yr	
Background Upstream Load 3		kg/yr	
Current Total Upstream Load 1		kg/yr	142.3
Current Total Upstream Load 2		kg/yr	0.696524719
Current Total Upstream Load 3		kg/yr	
Future Upstream Load 1		kg/yr	
Future Upstream Load 2		kg/yr	
Future Upstream Load 3		kg/yr	

Anthropogenic Loading

Current Anthropogenic Load	46.20	kg/yr
Future Anthropogenic Load	46.20	kg/yr

Areal Load Rate

Current Total Areal Loading Rate (L_T)	53.09	mg/m2/yr
Future Total Areal Loading Rate (L_{FT})	53.09	mg/m2/yr

Sedimentation

Is the lake anoxic?	n	
Settling velocity (v)	12.4	m/yr
In lake retention (Rp)	0.82	

Monitoring Data

Years of spring TP data	17	
Average Measured TPso	4.62	µg/L
Measured vs. Predicted TPso	-7 4	%
Is the model applicable?	y	
Over or under predicted?	under	

Modeling Results

TPlake	3.68	µg/L
TPout	3.52	µg/L
TPso	4.28	µg/L
TPfuture	3.68	µg/L

Phosphorus Thresholds

TPbk	3.00	µg/L
TPbk+40	4.21	µg/L
TPbk+50	4.51	µg/L
TPbk+60	4.81	µg/L

*if TPbk+40% < TPlake < TPbk+60% cell is orange

*if TPlake > TPbk+60% cell is red

No. of allowable residences to reach capacity:

# Permanent OR	32
# Extended seasonal OR	64
# Seasonal cottages OR	116

Loads

Natural Load w/no developmer	204.26	kg/yr
Background + 50% Load	306.39	kg/yr
Current Load	250.46	kg/yr
Future Load	250.46	kg/yr

Outflow Loads

Background Outflow Load	36.24	kg/yr
Current Outflow Load	44.43	kg/yr
Future Outflow Load	44.43	kg/yr

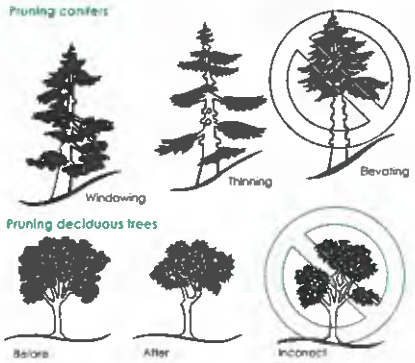
Appendix B. Protect Your Waterfront Investment, Muskoka Watershed Council, Best Practices Series

Your shoreline insurance policy

Before you cut down trees or remove understory vegetation, think about how it will affect your investment.

1) *PLAN FOR NATURAL SUCCESSION* - young plants tend to be more resilient and will grow into your future trees so leave a healthy mix of young and old trees.

2) *PLAN YOUR VIEWS* - with proper pruning, you can obtain good views of the water while maintaining your shoreline buffer and your privacy. Improper pruning can weaken trees. If you are in any doubt, hire a tree specialist to prune and protect your investment.



3) *PROTECT YOUR SOIL* - native grasses and groundcover can be established in less shaded or more active areas to further enhance your buffer zone, reduce runoff and immobilize pollutants.

4) *INVEST IN YOUR PROPERTY* - manures, compost and fertilizers, should only be applied carefully or by qualified individuals and used only as a last resort to maintain optimum plant health.

Without a buffer zone, nutrients and toxic chemicals can be carried into your lake and contribute to water quality issues such as algae blooms. This decrease in water quality can reduce the value of your property by as much as 8.5%!

Where to find more information

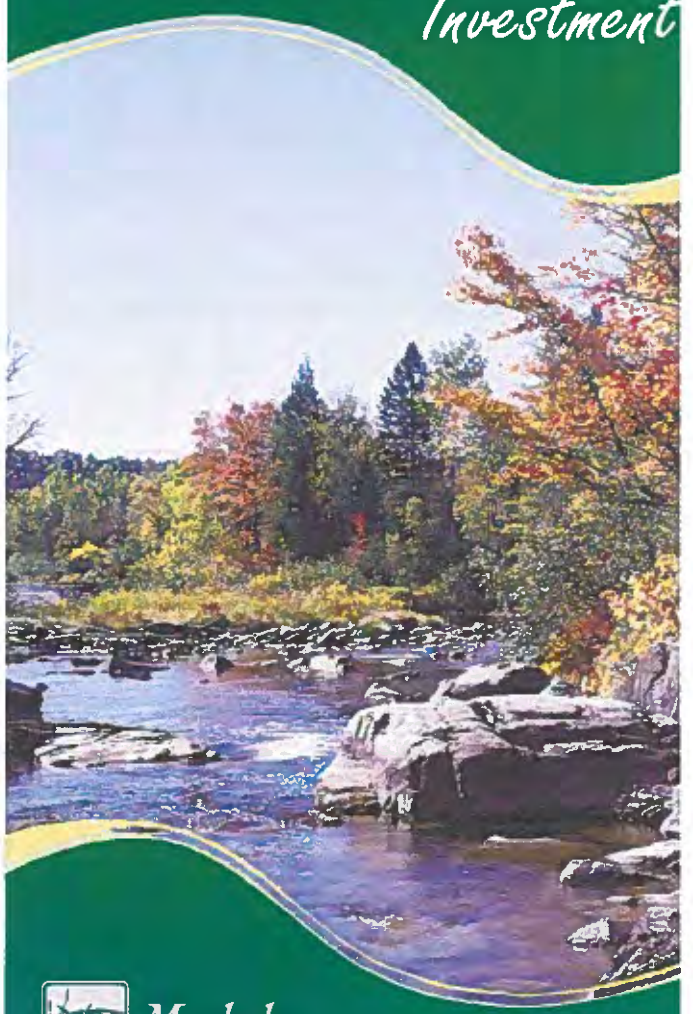
- Muskoka Watershed Council
  www.muskokaheritage.org/mwc
- District Municipality of Muskoka
  www.muskoka.on.ca
- Parry Sound-Muskoka Stewardship Network
  www.ontariostewardship.org/councils/parrysound-muskoka
- Muskoka Water Web
  www.muskokawaterweb.ca
- Ontario Professional Forester's Association
  www.opfa.ca
- Ontario Ministry of Agriculture and Food
  www.omafra.gov.on.ca
- Ontario Ministry of Environment
  www.ene.gov.on.ca/environment
- Ontario Ministry of Natural Resources
  www.mnr.gov.on.ca
- *On the Living Edge*: Your Handbook for Waterfront Living published by the Living By Water Project. Available from the Muskoka Heritage Foundation at (705) 645-7393.

Muskoka Watershed Council
11-B Taylor Road, Box 482
Bracebridge, ON P1L 1T8

Phone: (705) 645-7393 Fax: (705) 645-7888
Email: watershed@muskokaheritage.org

Brought to you by:

Protect your Waterfront Investment



Muskoka
WATERSHED COUNCIL

Best Practices Series

Help your investment grow!

Reduced water clarity can result in an 8.5% decrease in your property value!

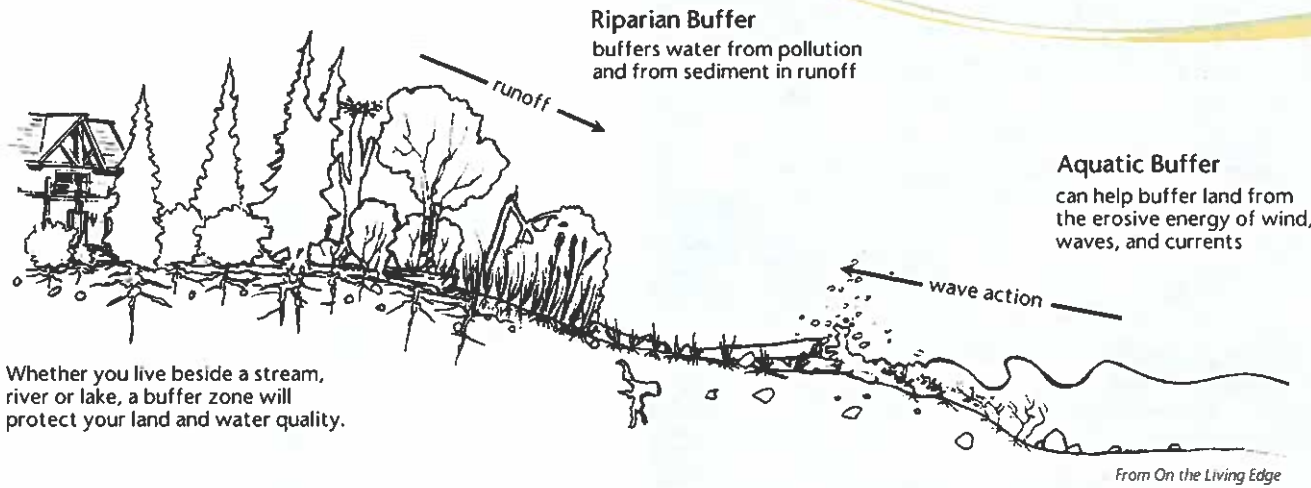
Studies demonstrate that property values decrease as water quality declines. The single most important thing you can do to protect the value of your waterfront investment is to maintain the water quality in your lake.

The natural vegetation on your property, especially that located along your shoreline, is an excellent and low cost way to maintain the quality of your water and protect your land from erosion. Think of the natural vegetation on your property as a free shoreline insurance policy.

Protect your investment

- Maintain or re-establish a shoreline buffer using species native to Muskoka.
- Get to know your property. Look at the vegetation on your property and make note of what species are present and in what numbers.
- Inspect the shoreline buffer area in all four seasons and take notes to compare one season to the next. Certified foresters, horticulturalists, and/or arborists can help you in this process.
- Use this information to gauge the health of your shoreline and plan accordingly.
- Have many different native plant species on your property with varied ages. By doing so, you can account for any unforeseen disturbances, such as wind or ice storms, and/or environmental changes that may occur in the future.

Your buffer zone



Whether you live beside a stream, river or lake, a buffer zone will protect your land and water quality.

From On the Living Edge

Your buffer zone is an area of natural vegetation, including fallen trees, branches and washed up logs, and natural rocks or pebbles, that runs along the length of your shoreline. It includes the areas upland of the high water mark (your riparian buffer) as well as the area below the high water mark, right down into the water (your aquatic buffer).

Ideally, a buffer zone contains vegetation that would normally grow in Muskoka. These native species might include trees, shrubs, wildflowers, grasses and native aquatic plants.

When a shoreline is cleared, the buffer area has the potential to become an erosion zone. Alterations to shorelines can also result in:

- silted up spawning beds
- pollution from runoff
- increased flooding

Your buffer zone is in a constant state of change.

Dead, dying, diseased, and dangerous material can be removed in order to improve the health, safety and aesthetics of your property.

Common shoreline species in Muskoka:
TREES: White cedar, White pine, Hemlock
SHRUBS: Red-osier dogwood, Meadowsweet
WILDFLOWERS: Cardinal flower, Blue flag iris
AQUATIC PLANTS: Pickerelweed, Coontail

Whether you are planning a major construction project or just maintaining what you have, it is important to:

- *MINIMIZE* the types and amount of traffic your buffer area receives. Simple foot traffic can drive oxygen out of the soil and allow for water runoff.
- *MAINTAIN* natural forest floor coverings and keep natural areas as large as possible.
- *INCORPORATE* a woodchip-style mulch approximately 2-4" thick in high traffic areas to condense traffic flow and minimize damage.
- *LEAVE* some dead or dying material on your property, if it isn't a hazard, to enhance wildlife habitat.
- *CHECK* with local authorities before removing vegetation from your property so you don't contravene any laws.

Schedule C: Photos

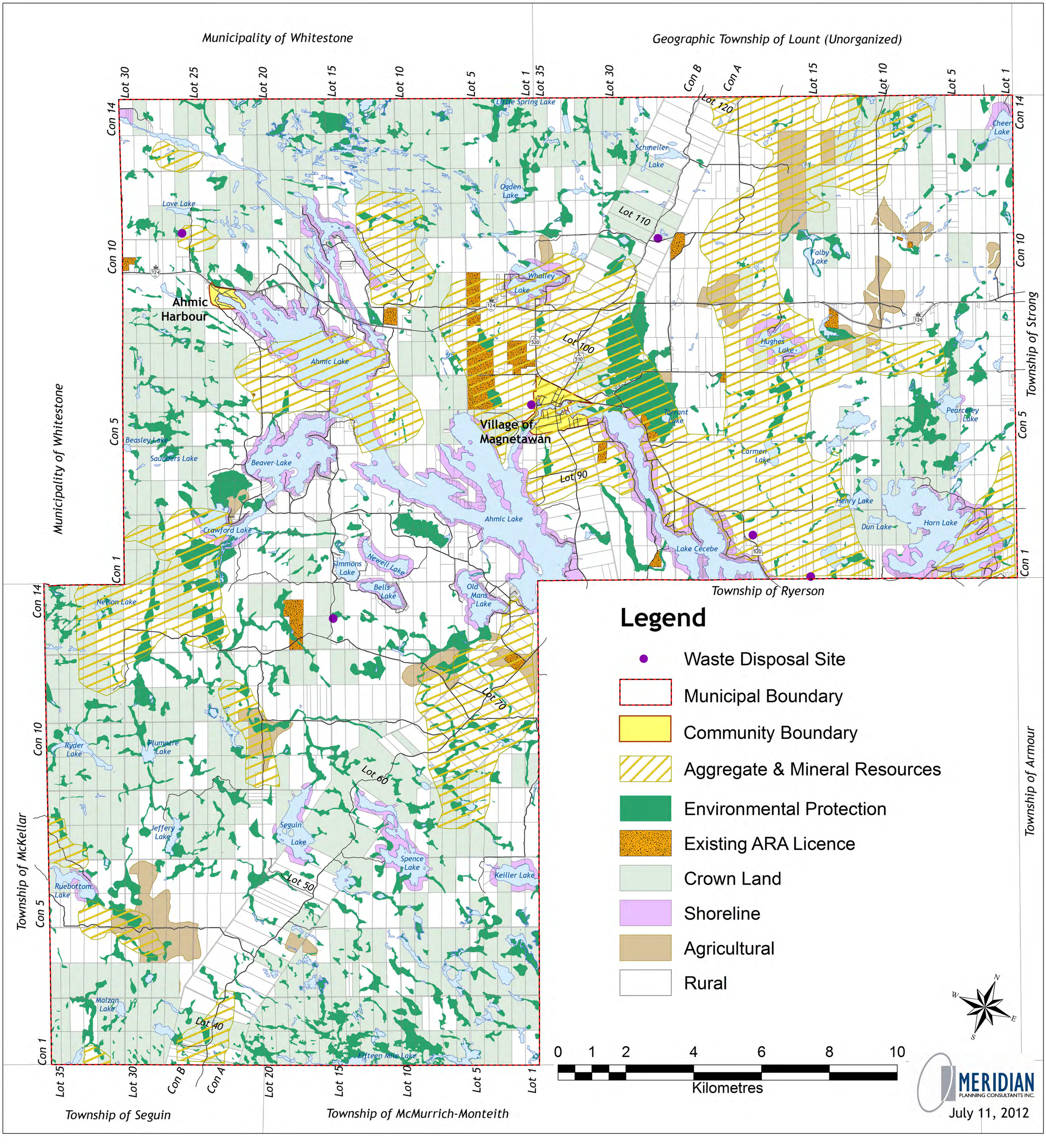
Photos

Schedule D: Official Plan Schedule

Municipality of Magnetawan

Official Plan

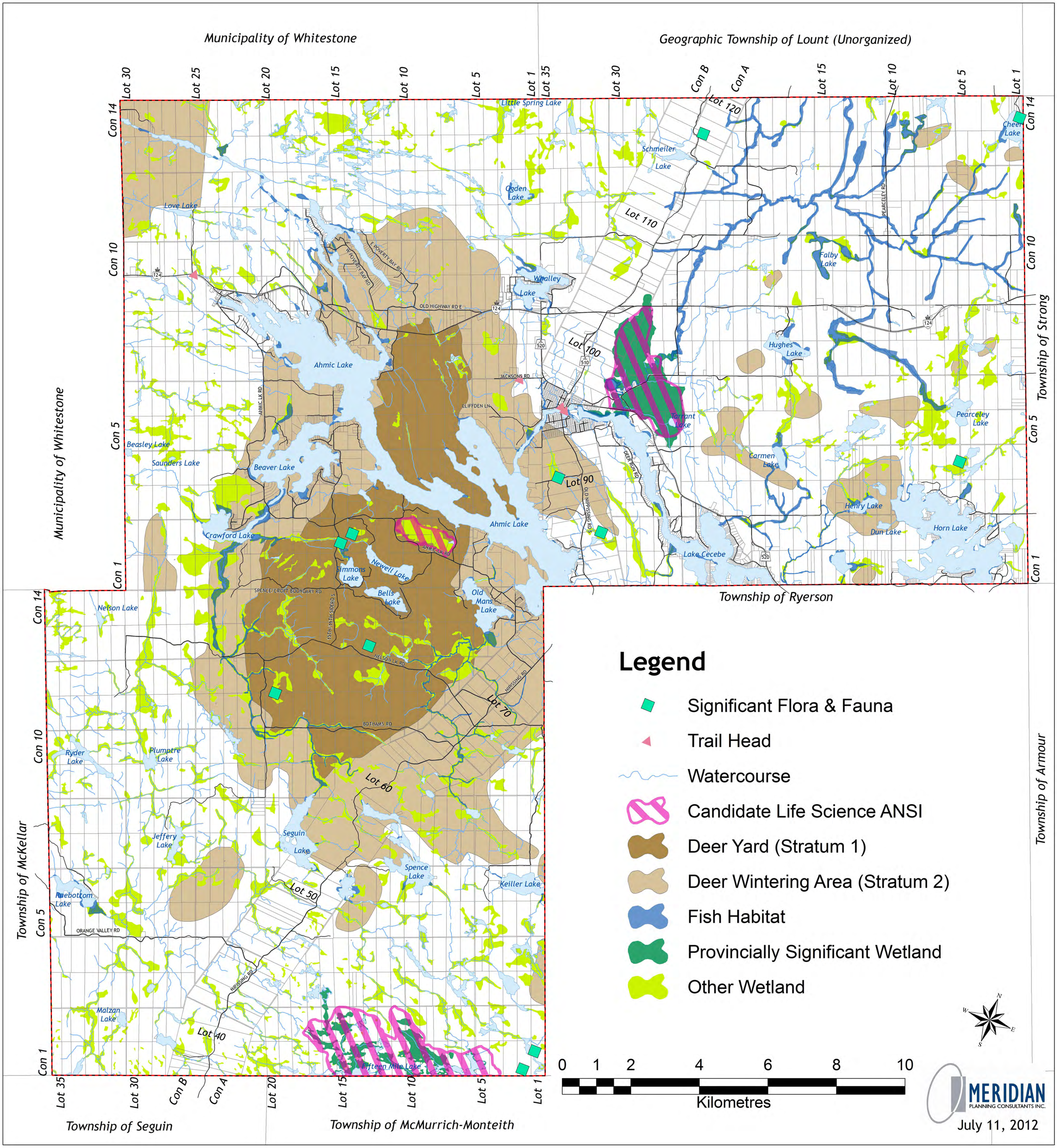
SCHEDULE A
Land Use



Municipality of Magnetawan

Official Plan

SCHEDULE B
Environmental Features



Legend

- Significant Flora & Fauna
- Trail Head
- Watercourse
- Candidate Life Science ANSI
- Deer Yard (Stratum 1)
- Deer Wintering Area (Stratum 2)
- Fish Habitat
- Provincially Significant Wetland
- Other Wetland

0 1 2 4 6 8 10

Kilometres

MERIDIAN PLANNING CONSULTANTS INC.

July 11, 2012

Attachment **2**

MARIE POIRIER PLANNING
& ASSOCIATES INC.

Marie E. Poirier, B.Sc., MCIP, RPP
44-A King William Street, Huntsville, ON P1H 1G3
Phone: 705-789-9860 E-mail: marie@mpplanning.com

March 8, 2023

Municipality of Magnetawan
PO Box 70
4304 Highway 520
Magnetawan, ON POA 1P0

Attention: Erica Kellogg
Acting Deputy Clerk
Planning & Development

Dear Ms Kellogg:

RE: Application for Consent (Wiens)
Part Lot 9 Concession 1, Township of Magnetewan
Horn Lake
Update to Application and Planning Justification Report

As result of your review of the above referenced application and supporting documentation, we were asked to provide additional and updated information to address conformity with the Official Plan. In that regard we offer the following.

Conformity Respecting "At Capacity" Lakes Policy

The Magnetewan Official Plan designates Horn Lake as being "at capacity" for additional lot creation. It has always been our position based on the Lake Capacity study that was completed by Hutchison and accepted by the Township for the adjoining property that this Lake in fact isd NOT at capacity. In support of our position we engaged Riverstone Environmental another well reputed firm to review the data and provide us with an opinion is the regard. We asked

Riverstone to look at a worst case scenario base on the creation of four lots adjacent to the subject property, when in fact the Wiens application is for only one (1) new lot.

Riverstone has determined in agreement with Hutchison, that Horn Lake is NOT at capacity and that the creation of one new lot is appropriate. Specifically, they conclude:

The proposed consent application for the Wiens property, can be evaluated through the results of the Hutchinson capacity assessment for the neighbouring property, where new four (4) lots were proposed. The capacity model calculations showed that Horn Lake is not at capacity, when compared to a more stringent capacity threshold (background + 50%). The addition of four (4) new lots will change total phosphorus or dissolved oxygen concentrations in such a small amount that it will not be measurable. Similarly, the addition of 0ne (1) new lot as proposed for the Wiens property, will not have any impact on water quality and will not extend Horn Lake beyond capacity as noted by the model calculations of Hutchinson. As a result, the application for consent can be considered by the Township.

The complete Riverstone report is attached to this correspondence.

On that basis we opine that that the application conforms with the Official Plan as Horn Lake is not an "at capacity" lake.

Conformity Respecting "Water Access" Policies

The applicant has secured through pre-payment, mainland docking, parking and garbage removal at Birch Crest Resort. Verification has been sent to you and your planning consultants under separate cover. Therefore, "conformity with the Official Plan policies for "water access" only lots has been achieved.

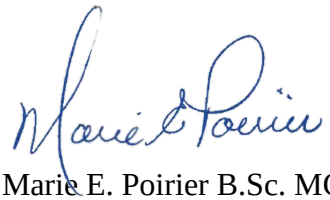
Official Plan Designation and Zoning By-law Zone

Recent correspondence from your consultants on your behalf asked us to confirm the Official Plan Land Use Designation and Zone for the subject property. We remain committed to our position that the Official Plan designation is "Shoreline".

With respect to the Zone as per the Zoning By-law, there does not appear to be a zone category abbreviation directly on top of the subject property as per the Schedule. On that basis we considered the property for the purpose of the application to be zoned RR as this is the abbreviation assigned to the surrounding properties. Should you interpret the subject property to be in the R or any other zone please advise, If this is the case, we would suggest that a re-zoning be a condition of approval of the consent.

I trust you now have sufficient supporting opinion and technical material to process the application and we respectfully request that the application be brought forward to the next available Planning Bord meeting. Thank you.

Yours truly,
MARIE POIRIER PLANNING & ASSOCIATES INC



Marie E. Poirier B.Sc. MCIP RPP

Attachment **3**

Hutchinson

Environmental Sciences Ltd.

Lakeshore Capacity and Fish Habitat Impact Assessment for Horn Lake

Prepared for: Mr. Chris Noll
Job #: J170058

May 1, 2018

1-5 Chancery Lane, Bracebridge, ON P1L 2E3 │ 705-645-0021

Hutchinson
Environmental Sciences Ltd.

1-5 Chancery Lane, Bracebridge, ON P1L 2E3 | 705-645-0021

May 1, 2018 HESL Job #: J170058

Mr. Chris Noll
125 Bermondsey Road
Toronto, ON M4A 1X3

Dear Mr. Noll:

Re: Lakeshore Capacity and Fish Habitat Impact Assessment for Horn Lake

Hutchinson Environmental Sciences Ltd. was retained to complete a Lakeshore Capacity Assessment and Fish Habitat Impact Assessment as part of a proposed land severance application on Horn Lake, in the Municipality of Magnetawan, Ontario.

Horn Lake is not over capacity in terms of total phosphorus, recreational capacity or average Mean Volume-Weighted Hypolimnetic Dissolved Oxygen (MVWHDO) concentrations. Modelled total phosphorus (TP) results indicate that the model does not properly represent existing conditions and capacity remains for additional development in relation to the interim Provincial Water Quality Objective guidelines of 10 µg/L or to Background + 50% if a 72% sewage-related total phosphorus retention coefficient is applied to existing development. With sewage treatment using Waterloo Biofilter Systems with EC-P units, the proposed development of 4 lots is modelled to potentially increase TP by <0.01 µg/L and decrease MVWHDO by <0.01 mg/L, increases which are well below regulatory guidelines and are immeasurable through standard laboratory procedures.

Most of the fish habitat fronting the subject property is not critical or sensitive to development of docks. We identified a groundwater seepage area that drains into nursery habitat and potential spawning habitat for some residential species, so this area was afforded a 10m buffer from shoreline structures and development should take place outside of this area.

Sincerely,

per Hutchinson Environmental Sciences Ltd.

Brent Parsons, M.Sc.
Senior Aquatic Scientist
brent.parsons@environmentalsciences.ca

Signatures

Report prepared by:

Brent Parsons, M.Sc.
Senior Aquatic Scientist

Report reviewed by:

Neil Hutchinson, Ph.D.
Principal Scientist

Executive Summary

Hutchinson Environmental Sciences Ltd. (HESL) was retained to complete a Lakeshore Capacity Assessment and Fish Habitat Impact Assessment as part of a proposed land severance application on Horn Lake, in the Municipality of Magnetawan, Ontario. The subject property (Part of Lot 10, Concession 1) is located at the south end of the lake (Figure 1) and the development proposal is to sever the property to create four lots.

Horn Lake supports Lake Trout (*Salvelinus namaycush*), is listed as a natural Lake Trout lake by the Ontario Ministry of Natural Resources and Forestry (MNRF 2015) and is listed as at "capacity" in the Municipality of Magnetawan's Official Plan.

The Lakeshore Capacity Model was not able to predict TP concentrations to within 20% of the measured value and so does not accurately reflect existing conditions. MOE (2010) recommends use of the interim PWQO of 10 µg/L of TP as an upper limit to protect against algal blooms instead of "Background + 50%". In this case, the modelled values of 3.68 µg/L to 3.94 µg/L (depending on % of TP retention and inclusion of vacant lots of record) are well below 10 ug/L and Horn Lake is not considered over capacity for TP.

Although Horn Lake is well below the Interim PWQO of 10 ug/L we do not recommend that 10 ug/L serve as a management limit. Instead, we refined the model to bring the management goals closer in line to the preferred objective of Background + 50%, which corresponds to a lower and more protective TP concentration of 4.51 µg/L. We utilized a scientifically-defensible sewage-related TP retention coefficient of 72% in the model for existing development to better align the model with existing conditions instead of utilizing the 10 µg/L of TP guideline, and the results indicate that capacity does exist on Horn Lake for the 4 proposed lots following this methodology. With sewage treatment using Waterloo Biofilter Systems with EC-P units, the proposed development of 4 lots is modelled to potentially increase TP by <0.01 µg/L and decrease MVWHDO by <0.01 mg/L, increases which are well below regulatory guidelines and are immeasurable through standard laboratory procedures.

Most of the fish habitat fronting the subject property is not critical or sensitive to development of docks. We identified a groundwater seepage area that drains into a nursery habitat and potential spawning habitat for some residential species, so this area was afforded a 10m buffer from the development of shoreline structures. A number of mitigation measures were also recommended in Section 5.3 that will protect fish habitat and ensure that the development follows municipal and federal regulations related to fish habitat.

Table of Contents

List of Figures

List of Tables

1. Introduction

Hutchinson Environmental Sciences Ltd. (HESL) was retained to complete a Lakeshore Capacity Assessment and Fish Habitat Impact Assessment as part of a proposed land severance application on Horn Lake, in the Municipality of Magnetawan, Ontario. The subject property (Part of Lot 10, Concession 1) is located at the south end of the lake (Figure 1) and the development proposal is to sever the property to create four lots. The exact orientation of each lot has yet to be determined so the Fish Habitat Impact Assessment focused on identifying opportunities and constraints to shoreline development across the entire subject property.

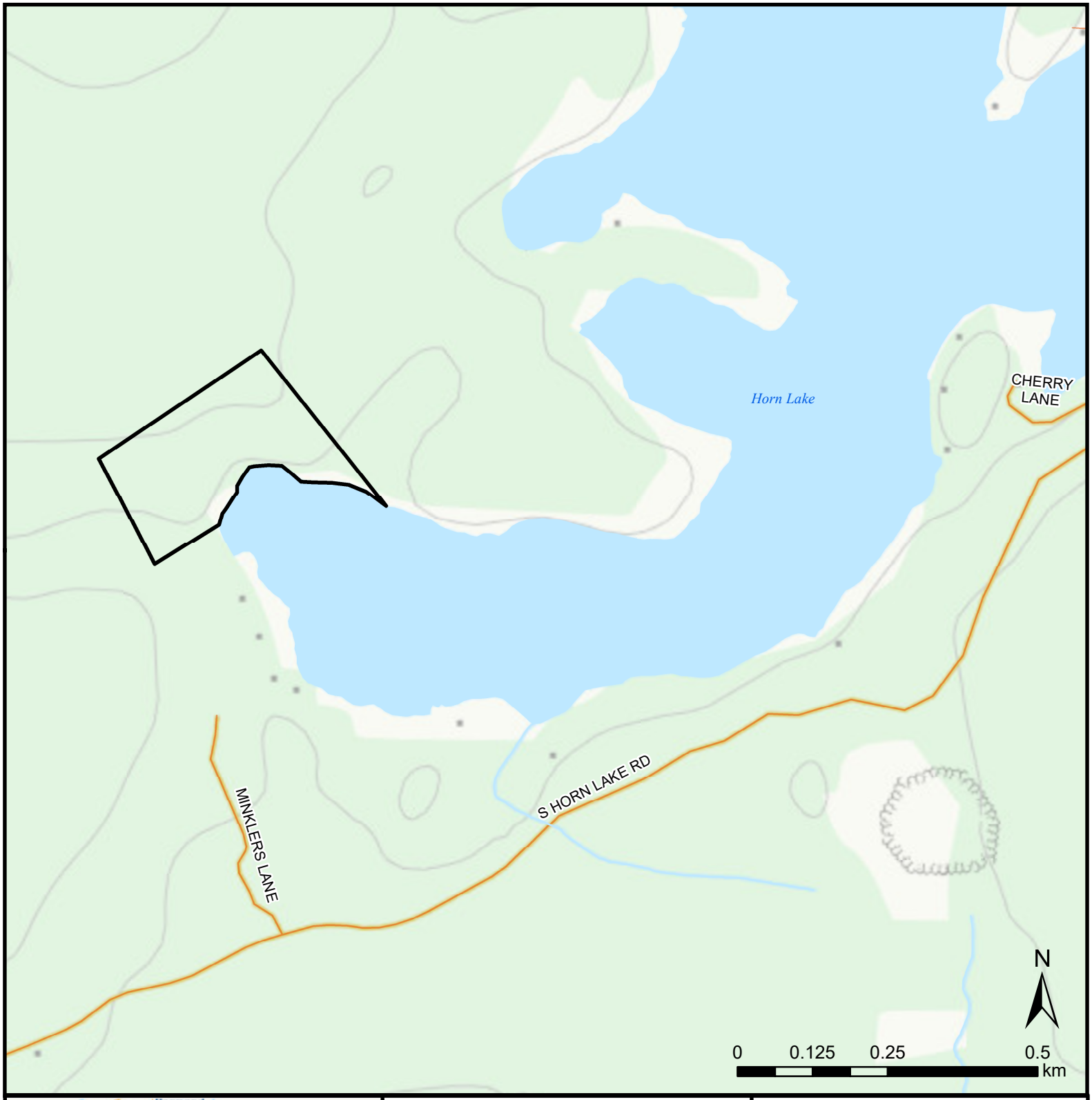
Horn Lake supports Lake Trout (*Salvelinus namaycush*), and is listed as a natural Lake Trout lake by the Ontario Ministry of Natural Resources and Forestry ((MNRF) 2015). Lake Trout have stringent habitat requirements including cold-water temperatures and high dissolved oxygen concentrations, and various policies have been adopted to protect this sensitive habitat. Waterfront development and the potential influx of sewage-related phosphorus to an adjacent waterbody has been identified as a stressor on Lake Trout habitat because increased phosphorus concentrations can lead to decreased dissolved oxygen concentrations.

Ontario's Lakeshore Capacity Model (MOE 2010) was developed to determine suitable development capacity on lakes through an assessment of phosphorus and the associated modelling procedure of Molot et al (1992) for dissolved oxygen concentrations, and in the case of Horn Lake, it has been determined that the lake is over capacity in terms of Provincial guidelines (Meridian Planning Consultants Inc. 2012). For recreational lakes on the Precambrian Shield, phosphorus and dissolved oxygen concentrations are the parameters of concern for water quality. The revised Provincial Water Quality Objective (PWQO) for inland lakes on the Precambrian Shield (MOE 2010) allows for a 50% increase in phosphorus concentration from development over levels that would occur in the absence of any development on the lake (i.e., "Background" + 50%) to a maximum concentration of 20 μg/L. The dissolved oxygen guideline for protection of lake trout habitat is 7 mg/L of Mean End-of-Summer Volume-Weighted Hypolimnetic Dissolved Oxygen (MVWHDO).

The Province of Ontario recommends the use of the Lakeshore Capacity Model to determine the interim PWQO for phosphorus and the amount of shoreline development that can occur to maintain phosphorus levels within the phosphorus threshold (MOE 2010). The LCM is a steady-state mass balance model that estimates hydrologic and phosphorus loading from natural (watershed runoff and atmospheric deposition) and human (septic systems and land disturbance) sources and links them together considering lake dynamics to predict total phosphorus concentrations in lakes. Dissolved oxygen is modelled on the basis of lake morphometry and total phosphorus concentrations using the techniques described in Molot et al. (1992) and Clark et al. (2002)

Fish habitat impact assessments are commonly completed in support of waterfront development applications to ensure that impacts to fish habitat are minimized to suitable levels in terms of relevant policies such as the federal Fisheries Act. Habitat is characterized, compared to habitat requirements of resident fish species, and suitable locations for the establishment of shoreline structures, such as boathouses and docks, are determined. Selection of appropriate locations and implementation of mitigation measures to minimize impacts typically results in regulatory approval.

The following assessments were completed to verify whether or not Horn Lake is currently over threshold for additional development, determine suitable locations for the establishment of shoreline structures, and to identify mitigation measures that would minimize any associated impacts to acceptable levels as described by relevant policy.



Legend

- Rivers
- Roads
- Subject Property
- Lakes

Project Lead: Brent Parsons
Prepared by: Kris Hadley
Data Source: HESL,Ontario Land, ESRI
Coordinate System: NAD 1983 UTM Zone 17N

Figure 1:
Study Area

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2. Policy Context

2.1 Municipality of Magnetawan Official Plan

The Municipality of Magnetawan Official Plan (Meridian Planning Consultants Inc. 2012) contains a number of relevant policies which helped define the scope of this study. These policies include those listed under sections 4.3, 4.4 and 5.4.2.

4.3 Surface Water Quality

Preservation of water quality is a significant consideration in reviewing any development proposal adjacent to a watercourse or lake. Septic systems shall be located at least 30 metres from a watercourse or waterbody, and in the case of lakes at or near capacity, including Horn Lake, lot creation and land use changes which would result in a more intensive use will not be permitted except under one of the following special circumstances:

1) to separate existing habitable dwellings, each of which is on a lot that is capable of supporting a class 4 sewage system, provided that the land use would not change and there would be not net increase in phosphorus loading to the lake;

2) where all new tile fields would be located such that they would drain into a drainage basin which is not at capacity;

3) where all new tile fields would be set back at least 300 metres from the shoreline of lakes, or such that drainage from the tile fields would flow at least 300 metres to the lake; and

4) where the proposed site can meet the additional site-specific soils criteria in the Lake Capacity Assessment Handbook and where certain municipal planning tools and agreements are in place such as a Development Permit System under the Planning Act, and/or site plan control under the Planning Act, and site alteration and tree-cutting by-laws under the Municipal Act to implement those criteria.

5) There is an additional criterion accepted by MOE for situations where there are deep soils native to the site (undisturbed and over 3m depth), meeting a specific chemical composition and hydrologic condition. This approach requires site-specific soils investigations by a qualified professional and, if meeting the criteria, would require long-term monitoring and use of planning tools that would ensure long-term maintenance of specified conditions. The MNR and MOE will be consulted if this criterion is considered for Horn Lake.

As a condition of development approval, a natural shoreline vegetation buffer shall be preserved within at least 20 metres of all watercourses and waterbodies wherever possible except for the removal of hazardous trees and a narrow area to allow a pathway to the shoreline. Council may require a wider buffer depending on site-specific conditions and the sensitivity of the adjacent natural heritage features.

Where development would result in a significant increase in storm water run-off, the Municipality shall require the proponent to complete storm water management works that will ensure that off-site surface water quality and quantity is not adversely impacted by the development. Direct outfalls to surface waters should be avoided and wherever possible developments shall utilize infiltration as a method for storm water management.

4.4 Natural Heritage and Resource Management

New development or alterations shall have no negative impact on the natural features or ecological functions of significant habitat of endangered or threatened species, other significant wildlife habitat, fish habitat, a provincially significant wetland or other significant natural heritage feature or function.

5.4.2 Development Standards

Horn Lake has been identified as a lake trout lake that is at capacity. New development including additional lot creation or redevelopment of existing developed lots that would result in more intensive use, shall generally not be permitted except as provided for in Section 4.3 (see above).

The at "capacity" status of Horn Lake in the Magnetawan OP was determined based on an old assessment of optimal Lake Trout habitat in the early 1990s (Sein, R. (MOECC) "Re: Horn Lake" Message to B. Parsons. January 15, 2018. Email). The approach has changed considerably over the last 30 years and is now based on a MVWHDO of 7 mg/L. MOECC has not, however, provided an updated assessment of capacity for Horn Lake on the basis of the newer MVWHDO criterion.

2.2 Fisheries Act

Regulation of fish habitat is carried out under the federal Fisheries Act enforced by Fisheries and Oceans Canada (DFO, Government of Canada, 2015). Section 35(1) of the Act states: "No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery." Furthermore the definition of "serious harm" is "the death of fish, or a permanent alteration to, or destruction of fish habitat", while fish habitat is defined as "spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes."

Fisheries and Oceans Canada now has a self-assessment process that includes criteria for no DFO review (i.e. if the required footprint of a dock or boat house is less than 20 m^2) and measures to avoid causing harm, both of which are addressed later in the report.

3. Site Description

Horn Lake is a 472 ha lake located on the Precambrian Shield, approximately 10 km east of the Town of Magnetawan (Figure 1). It has a watershed area of 1922 ha, a mean depth of 11.3 m and a maximum depth of 34.7 m (MNR 2010). Shoreline development around the lake consists of 32 year-round residences, 1 resort, 1 mobile home park with 29 trailers, and 138 seasonal properties in both the Municipality of

Magnetawan and Ryerson Township. The subject property proposed development site is in the southwestern portion of the lake.

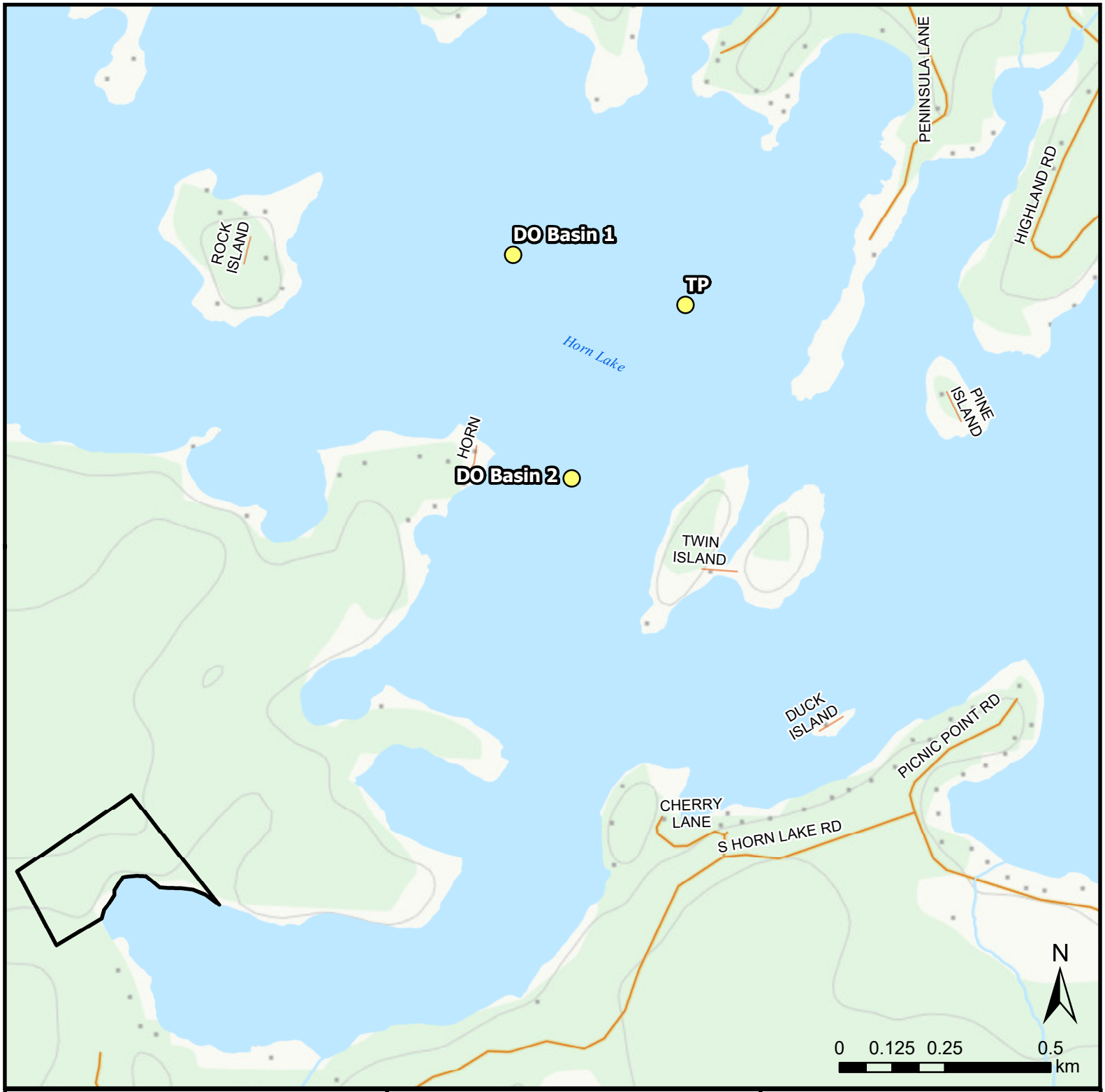
4. Lakeshore Capacity Assessment

4.1 Input Data

The Lakeshore Capacity Assessment used the assumptions and recommended coefficients and constants provided by the MOE (MOE 2010), and data gathered from assessment of satellite imagery, the MNRF's Flow Assessment Tool and Lake Fact Sheet, the Ministry of Environment and Climate Change's (MOECC) Lake Partner Program and Runoff Lookup Database, and water quality sampling as listed in Table 1. Water quality sampling locations are presented on Figure 2. Sampling locations utilized by HESL staff overlapped those used by MNRF during dissolved oxygen sampling and those used by the Lake Partner Program for sampling of total phosphorus.

Table 1. Information on the data used in the Lakeshore Capacity Assessment.

Type of Data	Inputs	Source
Physical	Lake area and depth	Lake Fact Sheet (MNR 2010)
	Catchment and wetland area	Ontario Flow Assessment Tool (MNRF 2017)
Development	Lots and occupancies	Municipality of Magnetawan, Ryerson Township and satellite imagery
Water chemistry	Total phosphorus	Field sampling by HESL staff
		MOECC Lake Partner Program
	Dissolved oxygen	MNRF
		Field sampling by HESL staff
Hydrological	Annual runoff	MOECC Runoff Lookup Database



Legend

- Rivers
- Roads
- Subject Property
- Lakes
- Sampling Locations

Project Lead: Brent Parsons
Prepared by: Kris Hadley
Data Source: HESL,Ontario Land, ESRI
Coordinate System: NAD 1983 UTM Zone 17N

Figure 2:
Water Sampling Locations

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4.2 Measured Total Phosphorus Data

Measured Total Phosphorus (TP) data were compared with modelled TP results to determine the ability of the Lakeshore Capacity Model to accurately estimate TP concentrations. The Province recommends that differences between measured and modelled results be less than 20% to confidently use the model to assess capacity (MOE 2010).

Phosphorus samples have been collected from a central part of Horn Lake since 1994 as part of MOECC's Lake Partner Program (Figure 2). Our assessment focused on data from 2003 onwards because of improvements in collection methodologies since that time such as field filtering and sampling directly into glass tubes that are later used during laboratory analysis (Clark et al. 2010). Total phosphorus sampling is often best completed during spring turnover when the water column is mixed to assess whole lake conditions for studies of lake capacity. Spring overturn phosphorus data were collected in Horn Lake from 2002 to 2016 following improved sampling methodology through the MOECC's Lake Partner program but 2002 data (average = 10.6 µg/L) was not included as it was more than 2.5 standard deviations outside of the mean value of 5 µg/L and the highest average value recorded since that time was 5.3 µg/L in 2007. The average spring overturn phosphorus concentration in Horn Lake between 2003 and 2016 was 4.62 +/- 0.7 µg/L (Table 2).

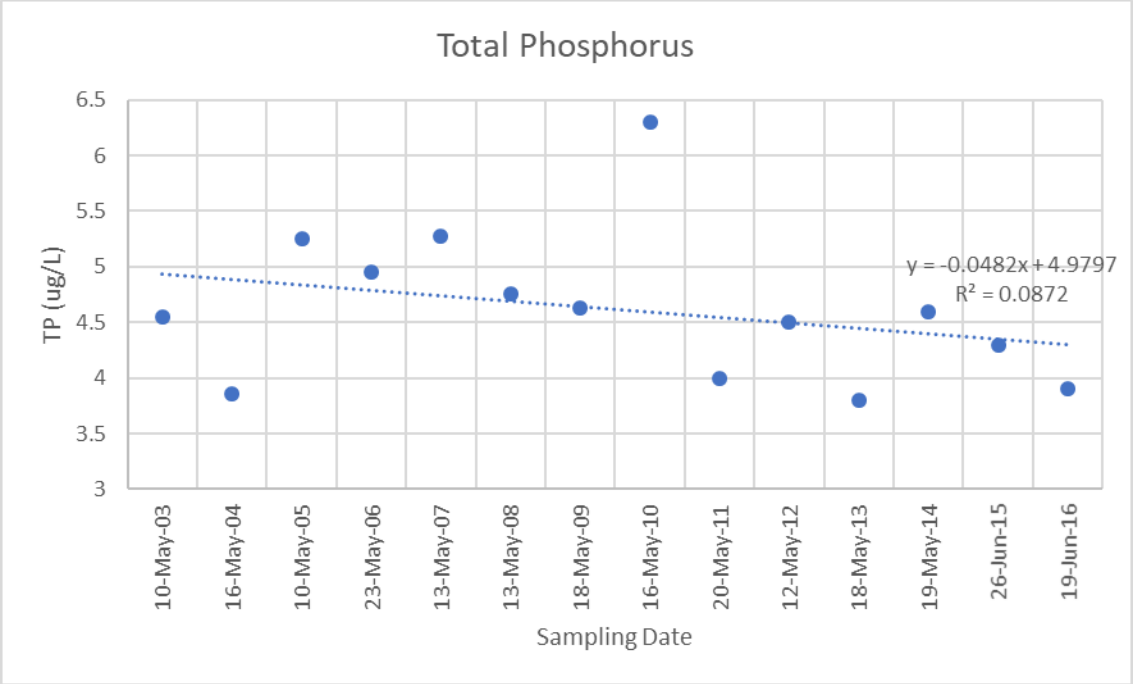
TP results were also plotted over time on Figure 3 to determine if any trends stand-out. Phosphorus concentrations declined between 2003 and 2016 ($y = -0.0482x + 4.9797$; $R^2 = 0.0872$), with a magnitude of change of 0.075 µg/L per year but the trend is not significant ($p = 0.11$).

Table 2. Phosphorus measurements from Horn Lake 2003-2016 (all samples collected from station 2015 in mid lake, deep spot through MOECC's Lake Partner Program).

Date	Phosphorus Concentration (µg/L)	Average Annual Phosphorus Concentration (µg/L)
May 10, 2003	4.2	4.6
	4.9	
May 16, 2004	3.8	3.9
	3.9	
May 10, 2005	4.9	5.3
	5.6	
May 23, 2006	5.3	5.0
	4.6	
May 13, 2007	5.8	5.3
	4.8	

May 13, 2008	5.3	4.8
	4.3	
May 18, 2009	4.5	4.6
	4.7	
May 16, 2010	6.8	6.3
	5.8	
May 20, 2011	4.0	4.0
	4.0	
May 12, 2012	4.4	4.5
	4.6	
May 18, 2013	3.8	3.8
	3.8	
May 19, 2014	4.4	4.6
	4.8	
June 26, 2015	4.0	4.3
	4.6	
June 19, 2016	3.8	3.9
	4.0	
Average		4.62

Figure 3. MOE Lake Partner Program Total Phosphorus Results Over Time



4.3 Measured Mean Volume Weighted Hypolimnetic Dissolved Oxygen

Dissolved oxygen was measured by MNRF throughout the water column in Horn Lake in 1999, 2000, 2001, 2003, 2004, 2006, 2007, 2009 and 2013, and by HESL in 2017 in Basin 1 and 2 (Figure 2). We noted two issues with MNRF data after review.

- MOE (2010) policy dictates that sampling is completed between August 15 and September 15 to capture the time of year when oxygen stress in the hypolimnion is the greatest. It should be noted that data collected by MNRF was outside of this range in 2001, 2009 and 2013, which could potentially misrepresent long-term average conditions.
- The hypolimnion must be determined to calculate MVWHDO. The hypolimnion is the bottom section of a stratified lake and the upper boundary of the hypolimnion is determined based on a temperature gradient between two depth strata that is <1°C/m (Wetzel 2001). MNRF routinely selected the bottom layer of the temperature gradient as the upper limit of the hypolimnion when in fact, the upper layer boundary of this temperature gradient should be used, so that the layer in which temperature first declines <1°C is included in the hypolimnetic volume. We therefore corrected the MVWHDO values to account for inclusion of the entire hypolimnion.

Original and corrected MVWHDO are presented in Table 3, while dissolved oxygen/temperature profiles from HESL sampling on August 18, 2017 are presented in Figures 4 and 5. Corrected MVWHDO concentrations ranged from 6.43 mg/L to 9.61 mg/L, with the four lowest concentrations measured following September 15th (September 18, 2001 = 6.94 mg/L (Basin 1), 7.08 mg/L (Basin 2), September 17, 2009 = 6.71 mg/L (Basin 1), 6.43 (Basin 2)). MVWHDO concentrations were similar in Basin 1 (7.97 mg/L) and 2

(7.70 mg/L). HESL recorded higher MVWHDO (Basin 1 = 8.94 mg/L; Basin 2 = 8.98 mg/L) in 2017 and, as can be seen in Figures 4 and 5, dissolved oxygen remained >4 mg/L near bottom.

Table 3. MVWHDO Results as part of MNRF and HESL Sampling

Source	Date	Basin	MVWHDO (mg/L)	
			Original	Corrected
MNRF	August 31, 1999	1	7.79	9.07
	August 31, 2000	1	7.35	7.69
	August 31, 2000	2	7.40	7.66
	September 18, 2001	1	6.41	6.94
	September 18, 2001	2	6.72	7.08
	September 3, 2003	1	7.41	7.78
	September 3, 2003	2	7.63	8.00
	September 14, 2004	1	8.72	9.61
	September 14, 2004	2	8.05	8.36
	September 14, 2006	1	7.57	7.70
	September 14, 2006	2	7.36	7.58
	September 14, 2007	1	7.50	7.81
	September 14, 2007	2	8.32	8.68
	September 17, 2009	1	6.64	6.71
	September 17, 2009	2	6.37	6.43
	September 23, 2013	1	8.15	8.38
	September 23, 2013	2	7.78	7.83
HESL	August 18, 2017	1	8.94	

	August 18, 2017	2	8.98	
Average (all years)			7.48	7.84
Average (data collected between August 15th and September 15th)			7.73	8.18
Average (Basin 1)			7.50	7.97
Average (Basin 2)			7.45	7.70

Figure 4. Dissolved oxygen and water temperature profile at Basin 1.

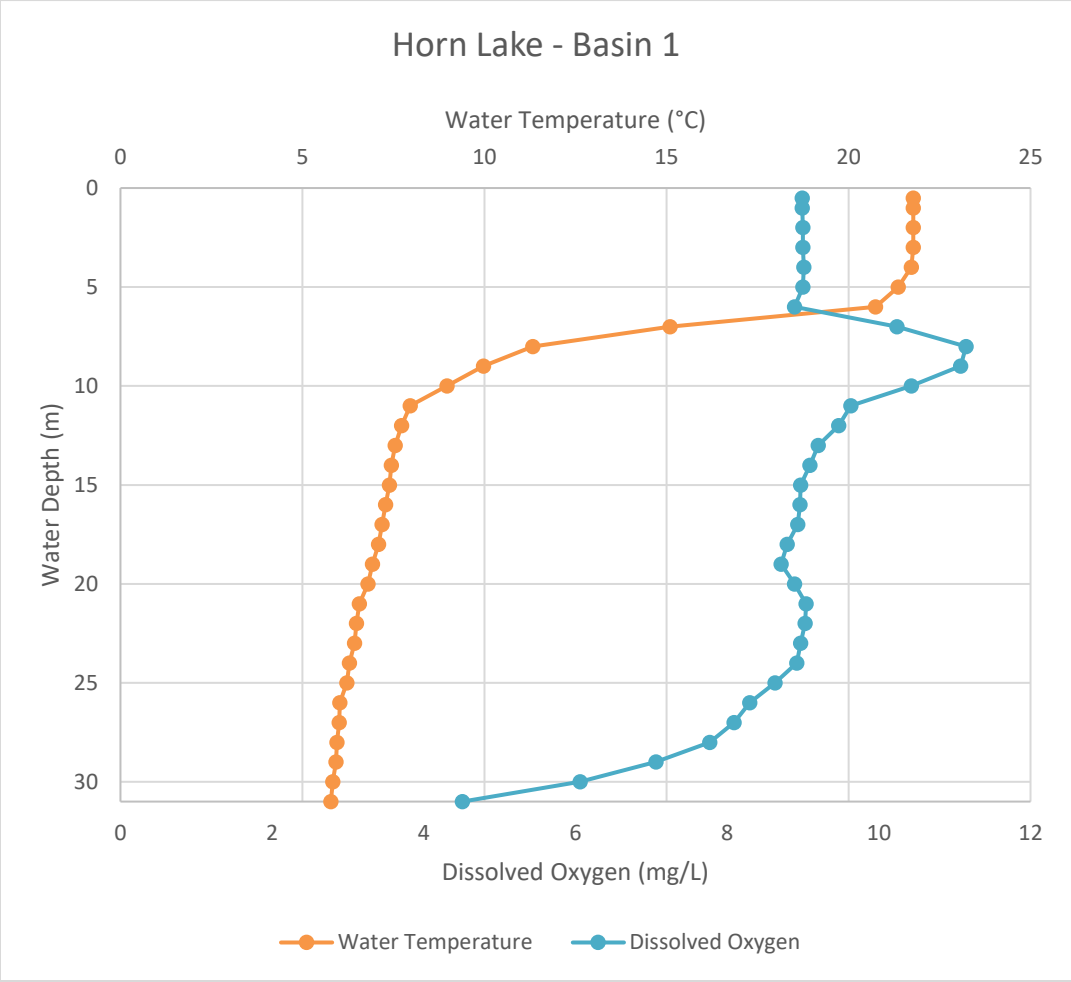
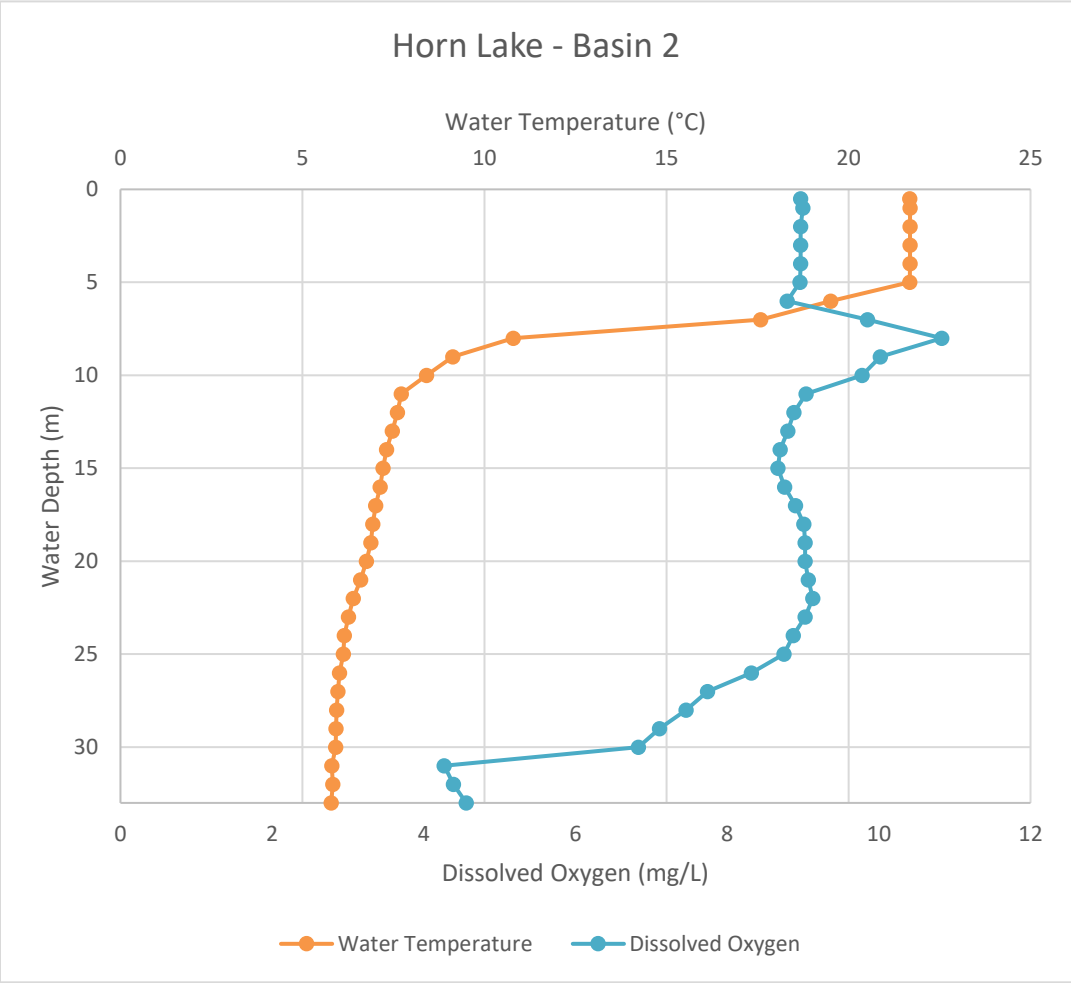


Figure 5. Dissolved oxygen and water temperature profile at Basin 2.



These analyses clearly show that Horn Lake is not at "capacity" in terms of oxygenated hypolimnetic Lake Trout habitat, as average MVWHDO concentrations collected by HESL and by MNRF exceeded 7 mg/L whether corrected or uncorrected.

4.4 Modelling Approach

Horn Lake was modelled using the Lakeshore Capacity Model following the Province's guidance in the Lakeshore Capacity Assessment Handbook (MOE 2010). Input parameters and calculation results used to model TP concentrations in Horn Lake are provided in Appendix A. Detailed methods and assumptions of the model are provided in MOE (2010). The following provides a description and brief rationale for the selection of various coefficients and assumptions used in the modelling of Horn Lake:

- The lake and catchment area of Horn Lake are 472 ha and 1922 ha, respectively.
- TP loading from land area in the Horn Lake watershed was determined using the following equation because % wetland in the catchment was greater than 3.5% and cleared or pastured land was less than 15%:
    - TP (kg/yr) = catchment area (km^2) * (0.47 * % wetland area +3.82)
- A TP loading rate of 0.167 kg/ha/yr was used to calculate TP loads to the surface of the lake from atmospheric deposition.
- Mean annual runoff value from 0.527 m/yr was determined from the runoff look up table provided by the MOECC and used to calculate water loads from the lake basin.
- TP loads from septic systems located within 300 m of the shoreline of the lake were calculated assuming a loading rate of 0.66 kg/capita/yr for each septic system. For existing conditions, a septic usage rate of 0.69 capita yrs/yr for seasonal residences was used.
- All lots included an overland runoff load of 0.04 kg of TP/lot/yr.
- For full build-out of the 4 proposed lots, TP loads were conservatively calculated assuming an extended seasonal usage rate of 1.27 capita years/yr[1].
- A settling velocity of 12.4 m/yr was used to indicate that oxic conditions are present in the hypolimnion of Horn Lake in accordance with dissolved oxygen measurements.

4.5 Capacity Assessment

4.5.1 Total Phosphorus

4.5.1.1 Existing Conditions

The modelled spring-overturn mean TP concentration under existing conditions was 5.73 μg/L; 24% above the measured value of 4.62 μg/L, indicating that the Lakeshore Capacity Model overestimates TP concentration and that the error exceeds the Provincial guidance of acceptable accuracy of +/- 20%. Provincial guidance (MOE 2010) recommends using the interim PWQO of 10 μg/L for TP as a water quality objective where the model is inaccurate.

A high level of protection against aesthetic deterioration will be provided by a total phosphorus concentration for the ice-free period of 10 μg/L or less. This should apply to all lakes naturally below this value (MOE 2010).

[1] *Usage rates of existing lots were provided by the Municipality of Magnetawan and Ryerson Township. An extended seasonal usage rate for the proposed lots was applied as part of a conservative assessment.*

This results in an additional 378 extended seasonal residences before ice-free TP concentrations are modelled to be greater than 10 µg/L. We therefore adjusted the Lakeshore Capacity Model inputs and assumptions to better reflect actual conditions to produce a better fit with measured values and allow use of the more conservative criterion. The model assumes that all sewage-related phosphorus is transported to the lake and it is most likely this assumption that caused the model to overestimate TP concentrations in Horn Lake.

Research over the past 20 years has consistently shown that septic system phosphorus is immobilized in PreCambrian Shield soils. Mechanistic evidence (Stumm and Morgan, 1970; Jenkins et al., 1971; Isenbeck-Schroter et al., 1993) and direct observations made in septic systems (Willman et al., 1981; Zanini et al., 1997; Robertson et al., 1998; Robertson, 2003) all show strong adsorption of phosphate on charged soil surfaces and mineralization of phosphate with iron (Fe) and aluminum (Al) in soil. The mineralization reactions, in particular, appear to be favoured in acidic and mineral rich groundwater in Precambrian Shield settings (Robertson et al., 1998; Robertson, 2003), such that over 90% of septic phosphorus may be immobilized. The mineralization reactions appear to be permanent (Isenbeck-Schroter et al., 1993). Recent studies conclude that most septic phosphorus may be stable within 0.5 m – 1m of the tile drains in a septic field (Robertson et al., 1998, Robertson, 2003, Robertson 2012).

Trophic status modelling also supports the mechanistic and geochemical evidence. Dillon et al. (1994) reported that only 28% of the potential loading of phosphorus from septic systems around Harp Lake, Muskoka, could be accounted for in the measured phosphorus budget of the lake. The authors attributed the variance between measured and modelled estimates of phosphorus to retention of septic phosphorus in tills that were found in the catchment of Harp Lake, within the geological classifications of Ground Moraine over bedrock, Glaciolacustrine Delta and Outwash Plain (Mollard et al. 1980, Gartner Lee Ltd. 2005).

Hutchinson (2002) recommended that the TP contribution from sewage septic systems be reduced by 74%[2] for lakes with suitable soils in their catchments. Bedrock with undifferentiated igneous and metamorphic rock, exposed at surface or covered by a discontinuous, thin layer of drift is predominant in the Horn Lake catchment (Ontario Geological Survey 2000). These geological formations typically result in acidic soils that are known to retain TP, such as those noted by Robertson (2012) and Hutchinson (2002). We therefore applied a 72% retention coefficient to existing development to determine if this improved the model response.

The modelled spring-overturn ice-free mean TP concentration under existing conditions with 72% retention of sewage related TP was 4.28 µg/L; 7% different than the measured value of 4.62 µg/L, indicating that the Lakeshore Capacity Model does accurately model concentrations in Horn Lake within acceptable limits (i.e. 20%) when a science-based retention coefficient is implemented to account for attenuation of phosphorus from existing development by soils in the catchment (Table 4).

The Lakeshore Capacity Model includes an equation to determine spring overturn TP based on ice-free concentrations as follows:

[2] *The Hutchinson (2002) citation represents an error – Dillon et al (1994) reported that 28% of septic phosphorus was accounted for in the lake budget (=72% retention) and not 26% (74% retention).*

Spring-overturn TP = (ice-free TP – (-0.563)/0.992

The interim PWQO of Background + 50% to protect against nuisance algal blooms (Table 4; MOE (2010)) was calculated based on the modelled background ice-free mean TP concentration for Horn Lake (3.00 μg/L). The revised PWQO derived from background plus 50% was 4.51 μg/L. Modelled ice-free TP concentrations were 3.68 μg/L, indicating that Horn Lake is currently 0.83 μg/L under capacity in terms of the interim PWQO, or is currently at Background + 23%.

Table 4. Modelled and measured spring overturn TP concentrations for Horn Lake.

Scenario	TP
Modelled Background Total Phosphorus (μg/L) - Ice-Free Conditions	3.00
Revised PWQO of Background + 50% (μg/L) - Ice-Free Conditions	4.51
Existing Modelled Total Phosphorus (μg/L) - Ice Free Conditions - Spring Overturn	3.68 4.28
Existing Measured Total Phosphorus (μg/L) - Spring Overturn	4.62
% difference between modelled and measured:	*-7%*

Horn Lake is currently under capacity for development in terms of TP following existing Provincial guidance. Previous modelling conducted in the early 1990s is what is reflected in the Magnetawan OP policies but this pre-dated the Province's recommended approach for both TP and MVWHDO as described in the Lakeshore Capacity Handbook (Sein, R. (MOECC) Re: Horn Lake. January 15, 2018. Email) and so the previous assessment is no longer valid.

Although Horn Lake has additional capacity we have recommended a number of mitigation measures as described in Section 4.6 as precautionary measures since a) the LCM did not accurately predict existing conditions and b) to protect sensitive Lake Trout habitat. The assessment of Future Conditions in the following section includes implementation of one recommended, optional mitigation measure - septic systems designed to retain sewage-related TP, since the amount of retention helps inform future modelled TP and MVWHDO concentrations.

4.5.1.2 Future Conditions

Many sewage systems have been shown to mitigate phosphorus loads to lakes. These include: the use of phosphorus retaining "B" horizon soils rich in aluminum and iron in septic bed construction, the Ecoflo + DpEC Self-Cleaning Phosphorus Removal Unit, and the Waterloo Biofilter EC-P unit. MOECC have recognized the phosphorus removal capabilities of Waterloo Biofilter System and Ecoflo Biofilter and note that each system should be able to reliably and consistently reduce 88% of sewage related phosphorus before the effluent enters the leaching field (Castro 2015), with further retention likely in the leaching field. The use of phosphorus retaining "B" horizon soils is well documented in the works of Robertson et al. (1998)

and was tested as part of an OMB decision for Kushog Lake and shown to be effective (letter: Castro to Newhook, Oct. 29. 2013).

Altered TP concentrations in Horn Lake associated with the proposed development of 4 extended seasonal lots plus the vacant lots of record were assessed using the Lakeshore Capacity Model under three scenarios of varying TP retention: 0% TP retention, 72% TP retention (as described above) and 88% TP retention (via mitigation technologies) for the additional lots. The build-out of the 4-proposed extended seasonal residences resulted in ice-free TP concentrations ranging from 3.68 µg/L to 3.74 µg/L, depending on the level of TP retention (Table 5). These concentrations represent an increase of <0.01 µg/L to 0.08 µg/ from existing modelled concentrations. Build-out of the proposed 4 lots as well as the vacant lots of record resulted in TP concentrations of 3.75 µg/L to 3.94 µg/L or increases of 0.06 µg/L to 0.26 µg/L from modelled existing conditions. All future predicted concentrations are below the interim PWQO of 4.51 µg/L.

Table 5. Future modelled TP concentrations.

Scenario	TP (µg/L)		
	0% retention	72% retention	88% retention
With build-out of 4 additional extended seasonal residences (µg/L)	3.74	3.70	3.68
With build-out of 4 additional extended seasonal residences and 16 vacant lots of record as extended seasonal residences (µg/L)	3.94	3.76	3.75

4.5.1.3 TP Loads

Phosphorus loads under existing and build-out scenarios were calculated to be less than 26% over the background loads (Table 6) further supporting the conclusion that Horn Lake is under capacity for shoreline development in terms of phosphorus levels.

Table 6. Summary of TP loads to Horn Lake.

Scenario	Horn Lake
Background TP load (kg/yr)	204.3
Existing TP load with 72% retention of sewage-related TP (kg/yr)	250.5
% Increase over Background:	*22.5%*
With build-out of 4 additional extended seasonal residences and 72% retention of sewage-related TP (kg/yr)	251.6
% Increase over Background:	*23.1%*

With build-out of 4 additional extended seasonal residences and 16 vacant lots of record as extended seasonal residences and 72% retention of sewage-related TP (kg/yr)	256.0
% Increase over Background:	*25.3%*

4.5.2 Dissolved Oxygen

MVWHDO can be predicted for individual lakes based on spring overturn TP concentrations following the methods of Molot et al. (1992) and Clark et al. (2002). MNRF used contour volumes from two distinct basins when calculating MVWHDO. We utilized contour volumes from Basin 2 when predicting changes to MVWHDO concentrations since that basin is located closer to the subject property and the terrain indicates that drainage flows roughly towards that area.

Predicted MVWHDO concentrations ranged from 8.02 mg/L to 8.03 mg/L for build-out of the 4 proposed lots, representing a maximum decrease of 0.012 mg/L from the existing modelled concentration of 8.03 mg/L from Basin 2. Predicted MVWHDO concentrations ranged from 7.98 mg/L to 8.02 mg/L for build-out of the 4 proposed lots and 16 vacant lots of record, representing a maximum decrease of 0.055 mg/L from the existing modelled concentration.

Table 7. Modelled spring overturn TP and resulting MVWHDO concentrations.

Scenario	Spring Overturn TP (µg/L)			MVWHDO (mg/L)		
Modelled existing conditions	4.28			8.03		
TP Retention	0% Retention	74% Retention	88% Retention	0% Retention	74% Retention	88% Retention
With build-out of 4 additional extended seasonal residences (kg/yr)	4.34	4.30	4.28	8.02	8.03	8.03
With build-out of 4 additional extended seasonal residences and 16 vacant lots of record as extended seasonal residences (kg/yr)	4.54	4.36	4.35	7.98	8.02	8.02

Modelled existing MVWHDO concentrations (8.03 mg/L) are higher than the majority of average measured values presented in Table 3 but the same magnitude of predicted change can be applied to measured MVWHDO concentrations in Basin 2. Full build-out of the 4 proposed lots and 16 vacant lots of record with 0% retention of septic-related TP resulted in a 0.04 mg/L change (8.02 mg/L → 7.98 mg/L) in modelled MVWHDO concentrations. The uncorrected measured MVWHDO concentration of 7.45 mg/L in Basin 2 would therefore be modelled to decrease to 7.41 mg/L under that conservative scenario; all other measured values would be even greater than the guidance value MVWHDO of 7 mg/L.

4.5.3 Recreational Carrying Capacity

Recreational Carrying Capacity is another component of lake management that is used in some jurisdictions (i.e. Seguin Township) to manage development to control overcrowding. A development density of 1 lot/1.62 ha of lake surface area is used in Seguin Township as a "filter" for "crowding" or social density to reflect recreational use of lake surface areas, an approach which was upheld in an OMB decision of December 22, 2016. This filter equates to a Recreational Carrying Capacity of 291 lots for Horn Lake which is much higher than the 222 seasonal, permanent, resort units, mobile trailer lots and vacant lots of record (Section 3). The proposed addition of 4 lots development would therefore not result in over-crowding based on this metric.

4.6 Mitigation Measures

Horn Lake is not at capacity but a variety of mitigation measures should still be utilized during waterfront development to minimize short and long-term impacts associated with water quality as a precautionary measure since the LCM did not accurately predict existing conditions and to protect sensitive Lake Trout habitat. Mitigation measures #1 - #3 are already required through the Municipality of Magnetawan Official Plan and we recommend two additional approaches.

1. Septic systems shall be located at least 30 metres from a watercourse or waterbody.

2. As a condition of development approval, a natural shoreline vegetation buffer shall be preserved within at least 20 metres of all watercourses and waterbodies wherever possible except for the removal of hazardous trees and a narrow area to allow a pathway to the shoreline.

3. Where development would result in a significant increase in storm water run-off, the Municipality shall require the proponent to complete storm water management works that will ensure that off-site surface water quality and quantity is not adversely impacted by the development. Direct outfalls to surface waters should be avoided and wherever possible developments shall utilize infiltration as a method for storm water management.

    - We recommend discharging of roof leaders, use of soak away pits and other measures to promote infiltration. Other specific design options for consideration include: grassed and vegetated swales, filter strips, roof leaders and French drains which have all proven to be effective at mitigating impacts associated with stormwater.

4. We recommend implementation of an Erosion and Sediment Control plan during construction, which should (CISEC Canada 2012):

- Utilize a multi-barrier approach;
- Retain existing vegetation;
- Minimize land disturbance area;
- Slow down and retain runoff to promote settling;
- Divert runoff from problem areas;
- Minimize slope length and gradient of disturbed areas;
- Maintain overland sheet flows and avid concentrate flows; and
- Store/stockpile soil away from watercourses, drainage features, and tops of steep slopes.

5. Utilize Waterloo Biofilter Systems with EC-P units to minimize sewage related-TP.

Additional information regarding waterfront development Best Management Practices can be found in "Protect Your Waterfront Investment" (Muskoka Watershed Council; Appendix B).

4.7 Discussion

MNRF has a criterion of 7 mg/L of MVWHDO for the protection of Lake Trout habitat. The Province recommends that generally there will be no new development within 300 metres of Lake Trout lakes where MVWHDO has been measured to be at or below 7 mg/L. This recommendation also applies to lakes where modelling has determined that development would reduce MVWDHO to 7 mg/L or less. Although MVWDO concentrations less than 7 mg/L were recorded on September 18, 2001 and September 17, 2009, both of those dates lie outside of the MOECC-determined sampling window of August 15th to September 15th. Average MVWHDO concentrations were greater than 7 mg/L in both basins and the focus should be on the long-term average values because of issues related to inter-annual variability, including equipment and user error, in accordance with MOE (2010):

"When attempting to characterize lakes in this manner, it is preferable to use average profiles which are derived from several years of data to offset the effects of inter-annual variation. This approach will allow the description of average conditions in a lake's hypolimnion at the end of summer and compare between-lake differences under similar conditions."

The Lakeshore Capacity Model was not able to predict TP concentrations to within 20% of the measured value and so does not accurately reflect existing conditions. MOE (2010) recommends use of the interim PWQO of 10 µg/L of TP as an upper limit to protect against algal blooms instead of "Background + 50%". In this case, the modelled values of 3.68 µg/L to 3.94 µg/L (depending on % of TP retention and inclusion of vacant lots of record) are well below 10 ug/L and Horn Lake is not considered over capacity for TP.

Although Horn Lake is well below the Interim PWQO of 10 ug/L we do not recommend that 10 ug/L serve as a management limit. Instead, we refined the model to bring the management goals closer in line to the

preferred objective of Background + 50%. We utilized a scientifically-defensible sewage-related TP retention coefficient of 72% in the model for existing development to better align the model with existing conditions instead of utilizing the 10 µg/L of TP guideline, and the results indicate that capacity does exist on Horn Lake for the 4 proposed lots following this methodology. The proposed development of the 4 lots is modelled to increase TP by <0.01 µg/L and decrease MVWHDO by <0.01 mg/L with implementation of Waterloo Biofilter Systems with a EC-P units, both of which result in concentrations well below regulatory guidelines and are immeasurable through standard laboratory procedures. Mitigation measures listed in 4.6 further ensure that impacts to water quality will be minimized to acceptable levels in accordance with relevant municipal and provincial policy.

5. Fish Habitat Impact Assessment

MNRF fish habitat mapping did not indicate Type 1 habitat fronting the subject property but a Fish Habitat Impact Assessment (FHIA) was completed because such mapping is not always accurate as it was based on air photo interpretation. Documentation and an understanding of site-specific conditions allowed for the development of recommendations that will ensure shoreline development will adhere to policies outlined in the Municipality of Magnetawan Official Plan and the Fisheries Act.

Fish habitat was characterized in the littoral environment and compared to the habitat requirements of various resident fish species to classify the environment in terms of functionality (e.g. spawning) and resiliency per MNRF guidelines. The assessment was completed based on the proposed development of docks, the characterization of fish habitat features and functions, and the incorporation of a number of short and long-term mitigation measures.

The assessment of the subject properties' littoral and riparian environments was completed through a review of background material and a field investigation undertaken on August 18, 2017.

5.1 Background Review

A fish species list for Horn Lake and MNRF fish habitat mapping were reviewed to determine the perceived habitat value of the nearshore environment of the study area (MNR 2010).

5.1.1 Fish Habitat Mapping

The MNRF has developed three categories or habitat types to standardize the assessment of fish habitat (MNR 1994). Below is a summary of the characteristics of each habitat type and its sensitivities.

Type 1 Habitat

Habitats are rare or highly sensitive to the potential impacts of development or limit fish productivity either directly or indirectly in a specified water body or portion of a water body. Where these habitats are limiting, productivity would be expected to diminish if they are harmed.

Type 2 Habitat

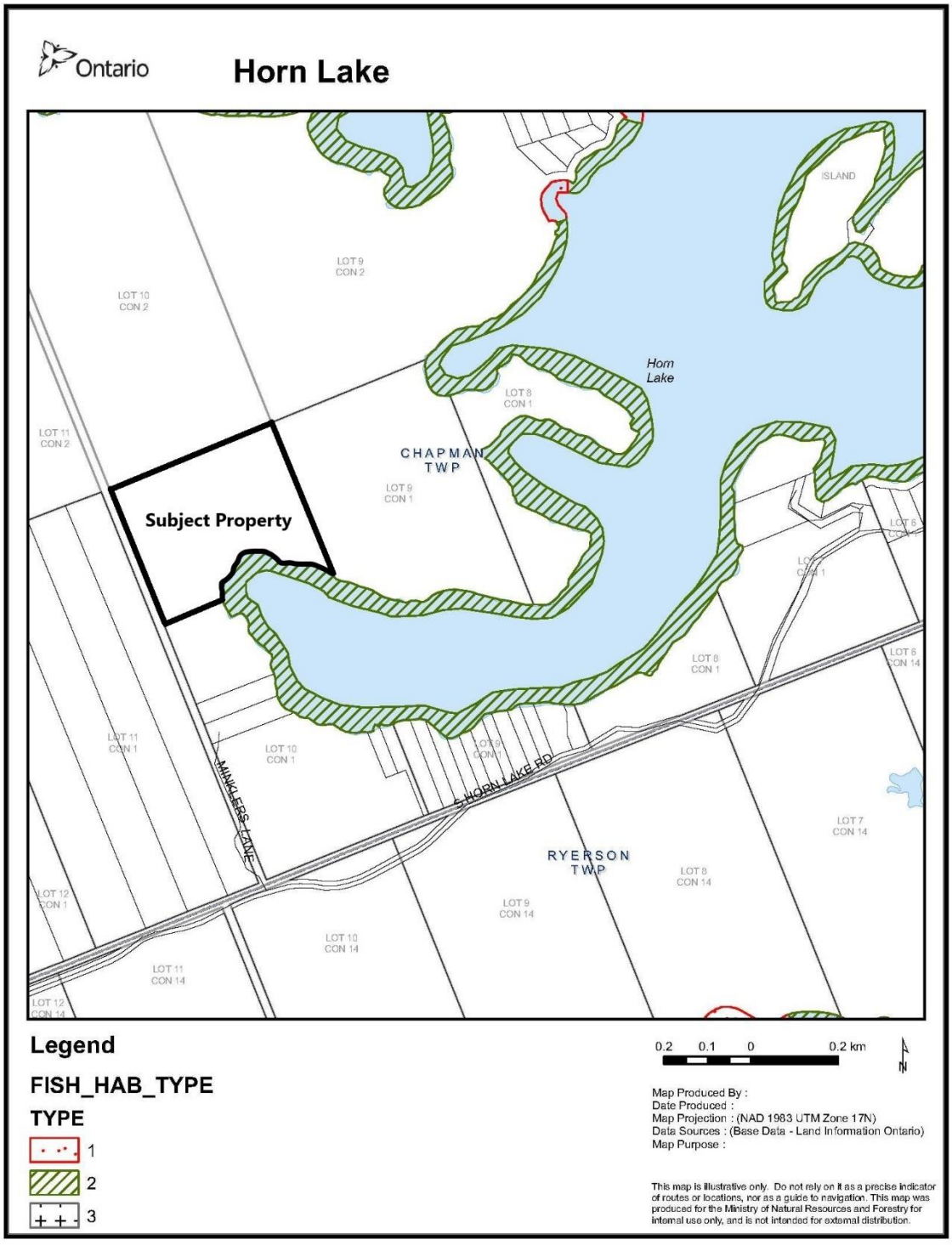
Habitats that are moderately sensitive to the potential impacts of development and although important to fish populations, do not limit the productivity of fish either directly or indirectly. These habitats are usually abundant and another habitat component is the limiting factor in fish production.

Type 3 Habitat

Habitats that are marginal or highly degraded, and currently do not contribute directly to fish productivity, based on fish community management objectives. Type 3 habitats can often be improved significantly, thereby providing a net gain of productive capacity.

Fish habitat classified in front of the subject property was entirely Type 2 (Figure 6).

Figure 6. MNRF Fish Habitat Mapping



5.1.2 Fish Species List

MNRF has recorded 13 fish species in Horn Lake, including the following game fish species: Lake Trout, Smallmouth Bass (*Micropterus dolomieu*), Walleye (*Sander vitreus*), Yellow Perch (*Perca flavescens*), Rainbow Trout (*Oncorhynchus mykiss*), and Brook Trout (*Salvelinus fontinalis*; Table 8). The lake was stocked for Lake Trout and Brook Trout between 1945 and 2000 (MNR 2010).

Table 8. Fish species in Horn Lake.

Common Name	Scientific Name
Brown Bullhead	*Ameiurus nebulosus*
Burbot	*Lota lota*
Creek Chub	*Semotilus atromaculatus*
Lake Trout	*Salvelinus namycush*
Lake Whitefish	*Coregonus clupeaformis*
Rainbow Smelt	*Osmerus mordax*
Rainbow Trout	*Oncorhynchus mykiss*
Rock Bass	*Ambloplites rupestris*
Smallmouth Bass	*Micropterus dolomieu*
Brook Trout	*Salvelinus fontinalis*
Walleye	*Sander vitreus*
White Sucker	*Catostomus commersonii*
Yellow Perch	*Perca flavescens*

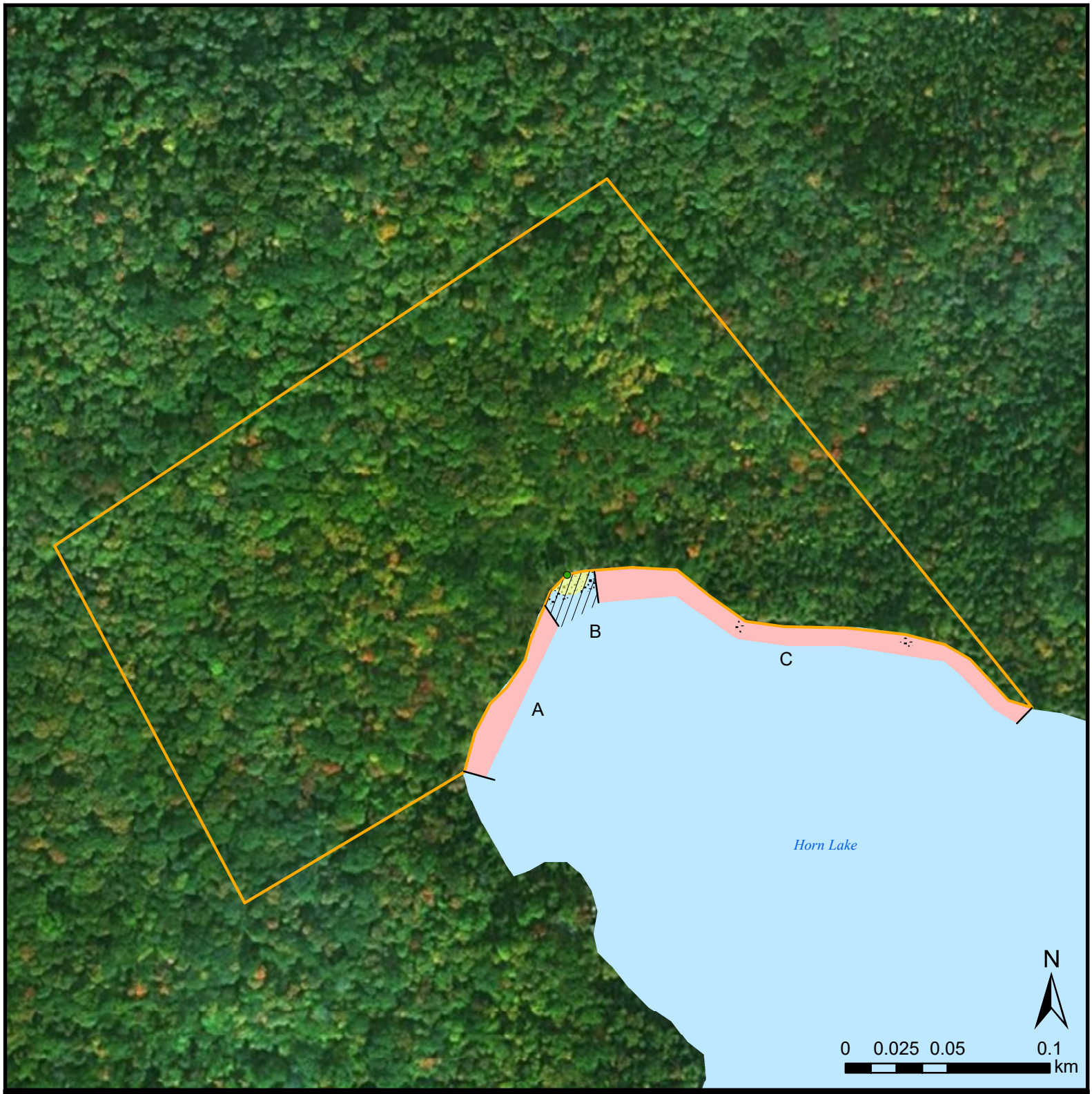
5.2 Existing Conditions

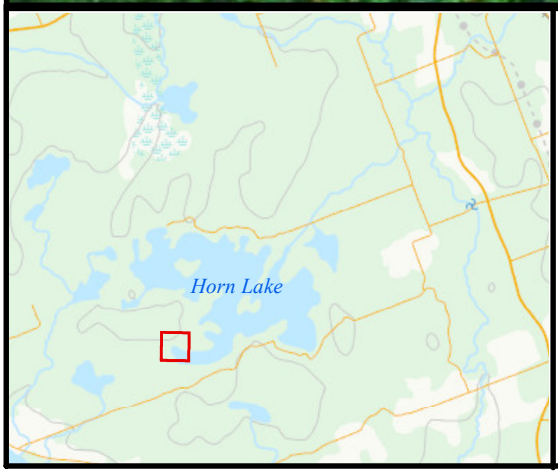
The nearshore environment fronting the subject property was relatively heterogeneous but can be best broken into three study areas with similar aquatic habitat features for descriptive purposes (Figure 7). Study Area A stretches from the western boundary of the subject property, approximately 110 m to the northeast before transitioning into Study Area B (Photograph 1). Riparian slopes were approximately 10% throughout Study Area A. In-water slopes were also relatively steep, ranging from 2:1 (2 m water depth 1 m offshore) to 3:1. Woody debris was abundant in the littoral environment, aquatic vegetation was sparse, and substrates were dominated by periphyton-covered large cobbles and boulders. Riparian vegetation includes mixed forest which overhung most of the nearshore environment, and the understory consisted of Sweet Gale (*Myrica gale*), Blue Flag Iris (*Iris versicolor*), Bracken Fern (*Pteridium aquilinum*), Sensitive Fern (*Onoclea sensibilis*), and Grass (*Poaceae spp*.).

Study Area B was a more depository area with shallower 4:1 in-water slopes and a variety of substrates, including: organic debris, sand, periphyton-covered boulders and some gravel. Patches of the following aquatic vegetation species were noted in the area: Pipewort (*Eriocaulon aquaticum*), Broad Leaf Arrowhead

(*Sagittaria latifolia*), and Pondweed (*Potamoegeton spp.*, Figure 6). Woody debris was also abundant in the study area. A small, seepage area was observed in the middle of the study area and cold-water temperatures indicated that it was of groundwater origin. The riparian environment in Study Area B contained similar vegetation as Study Area A and similar slopes, apart from a flatter transition from the shore.

Study Area C encompassed the eastern half of the subject property. The area contained steep in-water slopes (2:1), lots of woody debris, and sparse accumulations of Milfoil (*Myriophyllum spp.*) and Pipewort. Periphyton-covered large cobbles, boulders and exposed bedrock were dominant throughout the littoral environment. The riparian environment was similar to Study Area 1 in terms of vegetation and slope.





Legend

- Study Areas
- Mixed Substrates
- Groundwater Seepage
- Aquatic Vegetation
- Subject Property
- Cobbles/Boulders
- Lakes

Project Lead: Brent Parsons
Prepared by: Kris Hadley
Data Source: HESL,Ontario Land, ESRI
Coordinate System: NAD 1983 UTM Zone 17N

Figure 7:
Fish Habitat Features

Project: Lakeshore Capacity and Fish Habitat Impact Assessment for Horn Lake

Project #: J170058

Hutchinson
Environmental Sciences Ltd.

Photographs 1 and 2. A view of the nearshore environment fronting the western portion of the subject property, highlighting Study Area A (above) and Study Area B (below).

Photographs 3 and 4. A view of the heterogeneous shoreline fronting the eastern portion of the subject property (above), and periphyton covered rocks (below), which were abundant throughout the littoral environment.

5.2.1 Assessment of Fish Habitat

The assessment of fish habitat was completed by comparing site-specific features to the requirements of resident fish species so that critical habitats such as nursery or spawning habitats could be defined. Study Area B contains mixed substrates and vegetation that could provide spawning opportunities for Rock Bass, Smallmouth Bass, Yellow Perch and Brook Trout. The area also provides nursery habitat for various species because of cover provided by aquatic vegetation and woody debris, and the presence of the groundwater seepage area which provides a continuous influx of oxygen and nutrients to the area.

Study Areas A and C provide potential spawning opportunities for Lake Whitefish but the areas are not suitable for Lake Trout spawning. Lake Trout typically seek out clean, wave-swept cobble substrates where ample dissolved oxygen allows their eggs to develop in the interstitial spaces between the cobble (Fitzsimons 1994). Ubiquitous periphyton on the angular cobble and boulders has the potential to impact dissolved oxygen concentrations through photosynthesis, respiration and decomposition, and the location of the subject property on the western side of Horn Lake within a secluded embayment, limits the wave action (as seen by the accumulation of woody debris).

Table 9. Resident Fish Species that could use the Study Areas for Spawning Purposes.

Species	Tolerance[1]	Spawning Habitat	Study Area
Lake Whitefish	Intolerant	Rocky shoals, boulders, rubble and cobble	A and C
Rock Bass	Intermediate	Rocky or vegetated shallows of lakes	B
Smallmouth Bass	Intermediate	Rocky and sandy areas or lakes	B
Yellow Perch	Intermediate	Rooted vegetation, sand or gravel	B
Brook Trout	Intolerant	Groundwater upwellings, rocky substrates	B

Note : [1]Tolerances from Eakins (2015).

The majority of the littoral environment represents Type 2 habitat as it does not limit the productivity of resident fish species and is not sensitive to impacts generally associated with the development of docks. The groundwater seepage area and adjacent accumulation of macrophytes and woody debris represents a unique combination of fish habitat features in the study area, is appropriately classified as Type 1 habitat, and should be avoided to protect nursery habitat and spawning habitat for select resident fish species.

5.3 Mitigation Measures

The incorporation of appropriate mitigation measures will minimize impacts to fish habitat to acceptable levels in accordance with policies in the Fisheries Act and the Municipality of Magnetawan Official Plan.

The majority of the following mitigation recommendations were gathered from the "Measures to Avoid Causing Harm to Fish and Fish Habitat" (Fisheries and Oceans Canada 2015) and should be implemented:

- Avoid construction of shoreline structures on or within 10m of the groundwater seepage area identified on Figure 6. A 10 m buffer is sufficient to protect the functionality of the seepage area from adjacent development of docks or boardwalks since 10 m is a suitable base buffer width for water quality, screening of human disturbance and core habitat protection (Beacon Environmental Ltd. 2012).

- Implement a timing window of March 15th to July 15th and October 15th to May 31st to protect spring and fall spawning species, that is dock construction should be completed outside of that timing window (July 16th to October 14th).

- Utilize a dock design that has a small footprint on the lakebed such as a floating, cantilever or a pole supported dock. If a larger footprint is used (i.e. cribs) then the cribs should be constructed in an open- faced manner and filled with large rocks to provide accessible crevices for fish and other small organisms. Cribs should be spaced (2 m) and located at least 2 m from the high-water mark to allow nearshore water to circulate.

- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. For dock construction this includes:

    - Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.

- Clearing of riparian vegetation should be kept to a minimum.

- Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.

- Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.

- Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.

- If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.

- Remove all construction materials from site upon project completion.

- Ensure that all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows.

5.4 Discussion

The impact assessment was guided by the Fisheries Act and relevant Municipality of Magnetawan Official Plan policies, and completed based on the sensitivity of the fish habitat and implementation of various mitigation measures. In terms of the Fisheries Act, if a dock is constructed with a footprint of less than 20m^2 on the lake bed, no review is required by Fisheries and Oceans Canada, but if a footprint is larger than 20m^2 it is necessary to complete a self-assessment using information that is provided in this report.

Incorporation of the mitigation measures listed in Section 5.3 will provide assurance that fish habitat will be protected during the construction of docks on the subject property and the project will be in compliance with the Fisheries Act due to the self-assessment process described here-in.

The FHIA also addresses all requirements of an Environmental Impact Assessment as defined by the Municipality of Magnetawan Official Plan by ensuring that new developments shall have no negative impact on fish habitat (Policy 4.4).

6. Conclusions

6.1 Lakeshore Capacity Assessment

Horn Lake is not over capacity in terms of total phosphorus, recreational capacity or average MVWHDO concentrations. Modelled TP results indicate that the model does not properly represent existing conditions and capacity remains for additional development in relation to the interim PWQO guidelines of 10 µg/L or to Background + 50% if a 72% sewage-related TP retention coefficient is applied to existing development. Additionally, McIntyre (2006) noted that Lake Trout abundance slightly improved between 1998 and 2005, TP declined between 2003 and 2016, and there have been no algal blooms reported to the North Bay Parry Sound District Health Unit (Environmental Health Program, personal communication, January 4, 2017), so water quality and Lake Trout habitat appear healthy in Horn Lake.

The proposed development of the 4 lots is modelled to increase TP by <0.01 µg/L and decrease MVWHDO by <0.01 mg/L with implementation of Waterloo Biofilter Systems with EC-P units, both of which remain well below regulatory guidelines and are immeasurable through standard laboratory or field procedures. Mitigation measures listed in 4.6 further ensure that impacts to water quality will be minimized to acceptable levels in accordance with relevant municipal and provincial policy.

6.2 Fish Habitat Impact Assessment

Most of the fish habitat fronting the subject property is not critical or sensitive to development of docks. We identified a groundwater seepage area that drains into a nursery habitat and potential spawning habitat for some residential species, so this area was afforded a 10 m buffer and development should take place outside of this area. A number of mitigation measures were also recommended in Section 5.3 that will

protect fish habitat and ensure that the development follows municipal and federal regulations related to fish habitat.

7. References

Beacon Environmental Ltd. 2012. Ecological Buffer Guideline Review. Prepared for Credit Valley Conservation.

Castro, V. 2015. Lakeshore Capacity Assessment for White Lake – Revised. Letter.

Castro, V. 2013. Branson/Sanderson Severance, South Kushog Lake, Township of Algonquin Highlands. Letter.

Clark, B.J., Paterson, A.M., Jeziorski, A., and S. Kelsey. 2010. Assessing variability in total phosphorus measurements in Ontario lakes. Lake and Reservoir Management. 26: 53-72.

CISEC Canada. 2012. Certified Inspector of Sediment and Erosion Control Training Manual. 2012 Revised Edition V4 – Canada.

Dillon, P.J., W.A. Scheider, R.A. Reid and D.S. Jeffries. 1994. . Lakeshore Capacity Study : Part 1 – Test of effects of shoreline development on the trophic status of lakes. Lake and Reserv. Manage. 8 : 121 – 129.

Eakins, R. 2015. Ontario Freshwater Fishes Life History Database. http://ontariofishes.ca/fish_list.php

Fisheries and Oceans Canada. 2015. Measures to avoid causing harm to fish and fish habitat including aquatic species at risk. http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html

Fitzsimons, J.D. 1994. An Evaluation of Lake Trout Spawning Habitat Characteristics and Methods for Their Detection. Fisheries and Oceans Canada. Canadian Technical Report of Fisheries and Aquatic Sciences No. 1962.

Gartner Lee Ltd. 2005. Recreational Water Quality Management in Muskoka. Prepared for The Department of Planning and Economic Development, District Municipality of Muskoka. June 2005. 145pp.

Government of Canada. 2015. Fisheries Act.

Hutchinson, N.J., 2002:
Limnology, plumbing and planning: Evaluation of nutrient-based limits to shoreline development in Precambrian Shield watersheds. In: R.L. France (ed). Handbook of Water Sensitive Planning and Design, CRC Press, London. Pp. 647-680.

Isenbeck-Schroter, M., U. Doring, A. Moller, J. Schroter and G. Matthe. 1993. Experimental approach and simulation of the retention processes limiting orthophosphate transport in groundwater. J. Contam. Hydrol. 14 : 143-161.

Jenkins, D., J.F. Ferguson and A.B. Menar. 1971. Chemical processes for phosphate removal. Water Research 5 : 369 - 389.

McIntyre, E. 2006. Sollman Lake – Chapman Twp. 2005 Spring Littoral Index Netting (SLIN) Survey Report. 14 p.

Meridian Planning Consultants Inc. 2012. Official Plan for the Municipality of Magnetawan.

Ministry of Natural Resources. 1994. Fish Habitat Protection Guidelines for Developing Areas.

Ministry of Natural Resources and Forestry. 2010. Lake Fact Sheet – Sollman Lake (Horn Lake).

Ministry of Natural Resources and Forestry. 2015. Inland Ontario Lakes Designated for Lake Trout Management. Fisheries Section, Species Conservation Policy Branch.

Ministry of Natural Resources and Forestry. 2017. Ontario Flow Assessment Tool. http://www.gisapplication.lrc.gov.on.ca/OFAT/Index.html?site=OFAT&viewer=OFAT&locale=en-US

Ministry of Environment. 2010. Lakeshore Capacity Assessment Handbook. Protecting Water Quality in Inland Lakes on Ontario's Precambrian Shield. Queen's Printer for Ontario. PIBS 7642e

Mollard, D.G. 1980. Southern Ontario Engineering Geology Terrain Study. Database Map, Muskoka Area. Parry Sound and Muskoka District, Ontario Ministry of Natural Resources. Ontario Geological Survey Open File Report 5323.

Molot, L.A., Dillon, P.J., Clark, B.J., and B.P. Neary. 1992. Predicting End-of-Summer Oxygen Profiles in Stratified Lakes. Canadian Journal of Fisheries and Aquatic Sciences. 49: 2363-2372.

Ontario Geological Survey. 2000. Quartenary Geology, Seamless Coverage of the Province of Ontario, Data Set 14 – Revised.

Robertson, W.D., S.L. Schiff and C.J. Ptacek. 1998. Review of phosphate mobility and persistence in 10 septic system plumes. Ground Water 36 : 1000-1010.

Robertson, W.D., 2003:
Enhanced attenuation of septic system phosphate in noncalcareous sediments. Groundwater 41: 48 – 56.

Robertson, W.D., 2008:
Irreversible phosphorus sorption in septic system plumes? Groundwater 46: 51- 60.

Robertson, W.D. 2012. Phosphorus Retention in a 20-Year-Old Septic System Filter Bed. Journal of Environmental Quality.

Wetzel, R.G. 2001. Limnology – Lake and River Ecosystems, Third Edition.

Willman, B.P., G.W. Petersen and D.D. Fritton.. 1981. Renovation of septic tank effluent in sand-clay mixtures. J. Environ. Qual. 10 : 439- 444.

Appendix A. Lakeshore Capacity Model

Lakeshore Capacity Model

Horn Lake

Anthropogenic Supply			
Shoreline Development Type	Number	Usage (capita years/yr)	
Permanent	32	2.56	
Extended Seasonal		1.27	
Seasonal	138	0.69	
Resort	7	1.18	
Trailer Parks	29	0.69	
Youth Camps	0	0.125	kg/capita/yr
Campgrounds/Tent trailers/RV parks	0	0.37	
Vacant Lots of Record	16	1.27	
		206	
Retention by soil (Rs) (0-1)	0.72		

Catchment			**Upstream Lakes**
Lake Area (Ao)	471.8	ha	
Catchment Area (Ad)	1922.3	ha	
Wetland	5.8	%	
Cleared	0.0	%	

Hydrological Flow		
Mean annual runoff	0.527	m/yr
Lake outflow discharge (Q)	12616907	m3/yr
Areal water loading rate (qs)	2.67	m/yr
Inflow 1		m3/yr
Inflow 2		m3/yr
Inflow 3		m3/yr

Natural Loading		
Atmospheric Load	78.79	250.46
Runoff Load	125.47	kg/yr

Upstream Loading		
Background Upstream Load 1		kg/yr
Background Upstream Load 2		kg/yr
Background Upstream Load 3		kg/yr
Current Total Upstream Load 1		kg/yr 142.3
Current Total Upstream Load 2		kg/yr 0.696524719
Current Total Upstream Load 3		kg/yr
Future Upstream Load 1		kg/yr
Future Upstream Load 2		kg/yr
Future Upstream Load 3		kg/yr

Anthropogenic Loading		
Current Anthropogenic Load	46.20	kg/yr
Future Anthropogenic Load	46.20	kg/yr

Areal Load Rate		
Current Total Areal Loading Rate (L_T)	53.09	mg/m2/yr
Future Total Areal Loading Rate (L_{FT})	53.09	mg/m2/yr

Sedimentation		
Is the lake anoxic?	n	
Settling velocity (v)	12.4	m/yr
In lake retention (Rp)	0.82	

Monitoring Data		
Years of spring TP data	17	
Average Measured TPso	4.62	µg/L
Measured vs. Predicted TPso	-7.4	%
Is the model applicable?	y	
Over or under predicted?	under	

Modeling Results		
TPlake	3.68	µg/L
TPout	3.52	µg/L
TPso	4.28	µg/L
TPfuture	3.68	µg/L

Phosphorus Thresholds		
TPbk	3.00	µg/L
TPbk+40	4.21	µg/L
TPbk+50	4.51	µg/L
TPbk+60	4.81	µg/L

*if TPbk+40% < TPlake < TPbk+60% cell is orange

*if TPlake > TPbk+60% cell is red

No. of allowable residences to reach capacity:	
# Permanent OR	32
# Extended seasonal OR	64
# Seasonal cottages OR	116

Loads		
Natural Load w/no developmer	204.26	kg/yr
Background + 50% Load	306.39	kg/yr
Current Load	250.46	kg/yr
Future Load	250.46	kg/yr

Outflow Loads		
Background Outflow Load	36.24	kg/yr
Current Outflow Load	44.43	kg/yr
Future Outflow Load	44.43	kg/yr

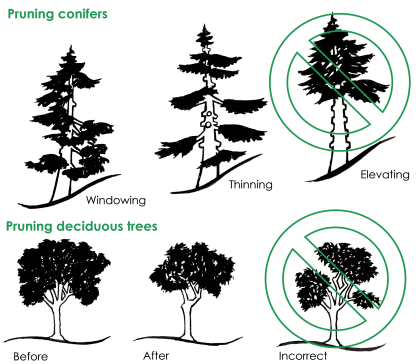
Appendix B. Protect Your Waterfront Investment, Muskoka Watershed Council, Best Practices Series

Your shoreline insurance policy

Before you cut down trees or remove understory vegetation, think about how it will affect your investment.

1) *PLAN FOR NATURAL SUCCESSION* - young plants tend to be more resilient and will grow into your future trees so leave a healthy mix of young and old trees.

2) *PLAN YOUR VIEWS* - with proper pruning, you can obtain good views of the water while maintaining your shoreline buffer and your privacy. Improper pruning can weaken trees. If you are in any doubt, hire a tree specialist to prune and protect your investment.



3) *PROTECT YOUR SOIL* - native grasses and groundcover can be established in less shaded or more active areas to further enhance your buffer zone, reduce runoff and immobilize pollutants.

4) *INVEST IN YOUR PROPERTY* - manures, compost and fertilizers, should only be applied carefully or by qualified individuals and used only as a last resort to maintain optimum plant health.

Without a buffer zone, nutrients and toxic chemicals can be carried into your lake and contribute to water quality issues such as algae blooms. This decrease in water quality can reduce the value of your property by as much as 8.5%!

Where to find more information

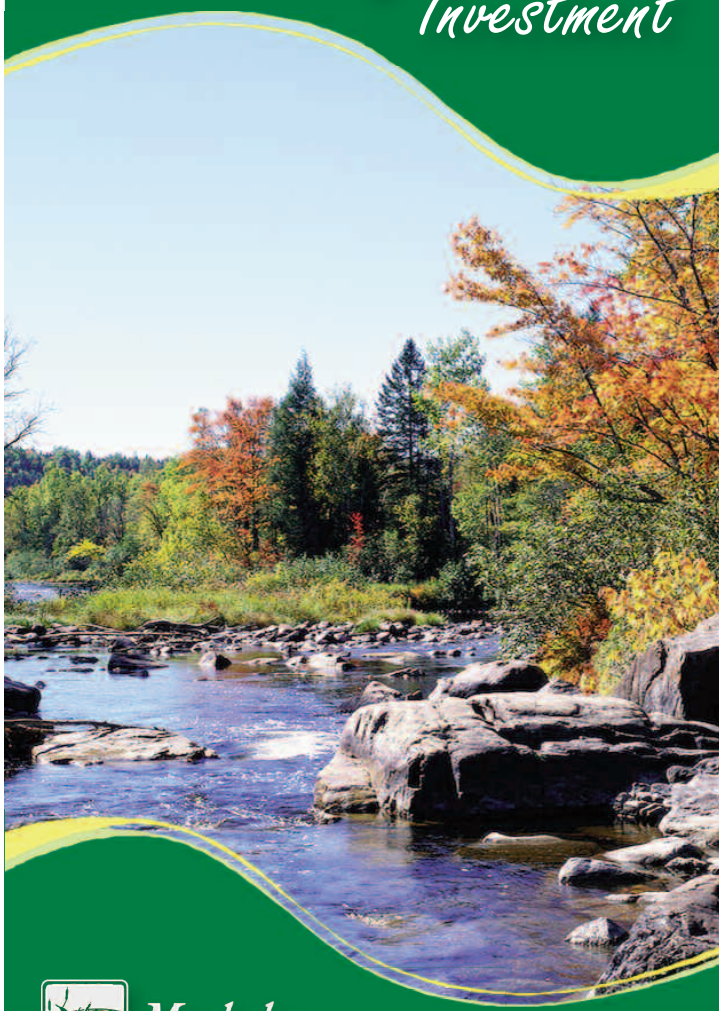
- Muskoka Watershed Council
  www.muskokaheritage.org/mwc
- District Municipality of Muskoka
  www.muskoka.on.ca
- Parry Sound-Muskoka Stewardship Network
  www.ontariostewardship.org/councils/parrysound-muskoka
- Muskoka Water Web
  www.muskokawaterweb.ca
- Ontario Professional Forester's Association
  www.opfa.ca
- Ontario Ministry of Agriculture and Food
  www.omafra.gov.on.ca
- Ontario Ministry of Environment
  www.ene.gov.on.ca/environment
- Ontario Ministry of Natural Resources
  www.mnr.gov.on.ca
- *On the Living Edge*: Your Handbook for Waterfront Living published by the Living By Water Project. Available from the Muskoka Heritage Foundation at (705) 645-7393.

Muskoka Watershed Council
11-B Taylor Road, Box 482
Bracebridge, ON P1L 1T8

Phone: (705) 645-7393 Fax: (705) 645-7888
Email: watershed@muskokaheritage.org

Brought to you by:

Protect your Waterfront Investment



Muskoka
WATERSHED COUNCIL

Best Practices Series

Help your investment grow!

Reduced water clarity can result in an 8.5% decrease in your property value!

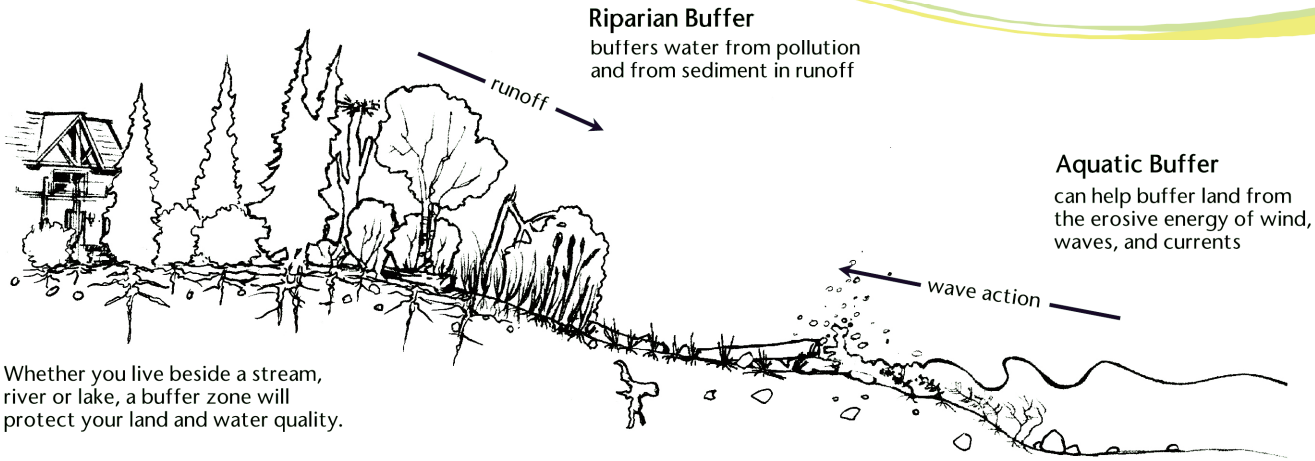
Studies demonstrate that property values decrease as water quality declines. The single most important thing you can do to protect the value of your waterfront investment is to maintain the water quality in your lake.

The natural vegetation on your property, especially that located along your shoreline, is an excellent and low cost way to maintain the quality of your water and protect your land from erosion. Think of the natural vegetation on your property as a free shoreline insurance policy.

Protect your investment

- Maintain or re-establish a shoreline buffer using species native to Muskoka.
- Get to know your property. Look at the vegetation on your property and make note of what species are present and in what numbers.
- Inspect the shoreline buffer area in all four seasons and take notes to compare one season to the next. Certified foresters, horticulturalists, and/or arborists can help you in this process.
- Use this information to gauge the health of your shoreline and plan accordingly.
- Have many different native plant species on your property with varied ages. By doing so, you can account for any unforeseen disturbances, such as wind or ice storms, and/or environmental changes that may occur in the future.

Your buffer zone



Whether you live beside a stream, river or lake, a buffer zone will protect your land and water quality.

From On the Living Edge

Your buffer zone is an area of natural vegetation, including fallen trees, branches and washed up logs, and natural rocks or pebbles, that runs along the length of your shoreline. It includes the areas upland of the high water mark (your riparian buffer) as well as the area below the high water mark, right down into the water (your aquatic buffer).

Ideally, a buffer zone contains vegetation that would normally grow in Muskoka. These native species might include trees, shrubs, wildflowers, grasses and native aquatic plants.

When a shoreline is cleared, the buffer area has the potential to become an erosion zone. Alterations to shorelines can also result in:

- silted up spawning beds
- pollution from runoff
- increased flooding

Your buffer zone is in a constant state of change.

Dead, dying, diseased, and dangerous material can be removed in order to improve the health, safety and aesthetics of your property.

Common shoreline species in Muskoka:
TREES: White cedar, White pine, Hemlock
SHRUBS: Red-osier dogwood, Meadowsweet
WILDFLOWERS: Cardinal flower, Blue flag iris
AQUATIC PLANTS: Pickerelweed, Coontail

Whether you are planning a major construction project or just maintaining what you have, it is important to:

- *MINIMIZE* the types and amount of traffic your buffer area receives. Simple foot traffic can drive oxygen out of the soil and allow for water runoff.
- *MAINTAIN* natural forest floor coverings and keep natural areas as large as possible.
- *INCORPORATE* a woodchip-style mulch approximately 2-4" thick in high traffic areas to condense traffic flow and minimize damage.
- *LEAVE* some dead or dying material on your property, if it isn't a hazard, to enhance wildlife habitat.
- *CHECK* with local authorities before removing vegetation from your property so you don't contravene any laws.

Attachment **4**

RIVERSTONE
ENVIRONMENTAL SOLUTIONS INC.

November 3, 2022
RS#222-245

Henry Wiens
c/o Marie Poirier
Marie Poirier Planning Associates Ltd.
44A King William Street
Huntsville ON
P1H 1G3

Via email: marie@mpplanning.com

***SUBJECT*: Lake Capacity Review - Wiens Property, Horn Lake Municipality of Magnetawan**

Dear Marie:

Based on our recent discussions, RiverStone Environmental Solutions Inc. (hereafter RiverStone), has completed a review of lake capacity implications for the Wiens consent application on Horn Lake. The Wiens property is legally described as part of Lot 10, Concession 1 (**Figure 1**), in the Municipality of Magnetawan (hereafter 'subject property'), with a focus on reviewing a potential severance application as it relates to the capacity for further development, including lot creation, on Horn Lake.

Lake Capacity – Dissolved Oxygen/Total Phosphorus

The subject property is located on the southwest shoreline of Horn Lake, which is a cold-water Lake Trout lake. A lake can be classified by the province as "at capacity" based on low dissolved oxygen concentrations or high total phosphorus concentrations.

Lake Trout (*Salvelinus namaycush*) are a sensitive cold water fish species that require high levels of dissolved oxygen in order to maintain healthy populations. The province has established a threshold of 7 mg/L of dissolved oxygen (mean volume-weighted hypolimnetic dissolved oxygen, MVWHDO) which allows Lake Trout to complete all life functions effectively. If during monitoring a lake is found to have less than 7 mg/L, the lake is deemed to be at capacity, and lot creation will not be approved, except under very specific circumstances outlined in the Lakeshore Capacity Assessment Handbook (MNRF 2014).

Elevated concentrations of Total Phosphorus are also a determinant of lake capacity. The Provincial threshold is based on the background concentration within a lake. This is calculated using the Provincial Lake Capacity model. The threshold is based on the background concentration of phosphorus prior to development, plus an additional 50%. If a lake is modeled using its current development level to be above 50% over background, then the lake would be deemed to be at capacity for further development, unless under specific circumstances.

Lake Capacity Assessment

Horn Lake has not been deemed to be at capacity for either dissolved oxygen or total phosphorus, because the lake had never been assessed through the Provincial Lake Capacity Model.

In May of 2018 Hutchinson Environmental Sciences Ltd. (hereafter Hutchinson) completed a Lake Capacity and Fish Habitat Assessment for Horn Lake, related to a development proposal for the property immediately to the west of the Wiens Property. Hutchinson determined that the Lakeshore Capacity Model was not able to accurately predict Total Phosphorus (TP) concentrations to within 20% of the measured value, which indicates that the Lakeshore Capacity Model does not accurately reflect existing conditions in Horn Lake. As dictated by the Ministry of Environment, Conservation and Parks (MECP), in cases where ethe model does not work, the interim PWQO of 10 µg/L is intended to be used as a measure of capacity for Horn Lake. It was further recommended that the municipality use the Background + 50% threshold as a more conservative management objective. For Horn Lake, the Background + 50% concentration was calculated by Hutchinson to be 4.51 ug/L.

Application of Lake Capacity to Current Application

The results of the Hutchinson study showed that the expected Total Phosphorus concentration in Horn Lake is between 3.68 µg/L and 3.94 µg/L (depending on values used in the model calculations). Hutchinson then used the model to predict how total phosphorus and dissolved oxygen concentrations would change if the proposal of four (4) additional lots were to be approved. The results suggest that the total phosphorus concentration would increase by <0.01 µg/L and the dissolved oxygen concentration would be reduced by <0.01 µg/L. When compared to the guideline of 10 µg/L from the Province for total phosphorus, or the recommended threshold of 4.51 µg/L (background + 50%), Horn Lake can accept the additional development without approaching capacity.

The results of the Hutchinson study for the adjacent property apply to the Wiens property as well. The modeled total phosphorus and dissolved oxygen concentrations expected following development of the four (4) new adjacent lots do not place the lake near capacity. If we assume that no other lots have been created on Horn Lake Since that time, and we conservatively assume that the additional lot being proposed for the Wiens Property changes the total phosphorus and dissolved oxygen concentrations as predicted for the adjacent four (4) lots, the lake will remain well under capacity and there should be no measurable changes in water quality as noted in the Hutchinson report.

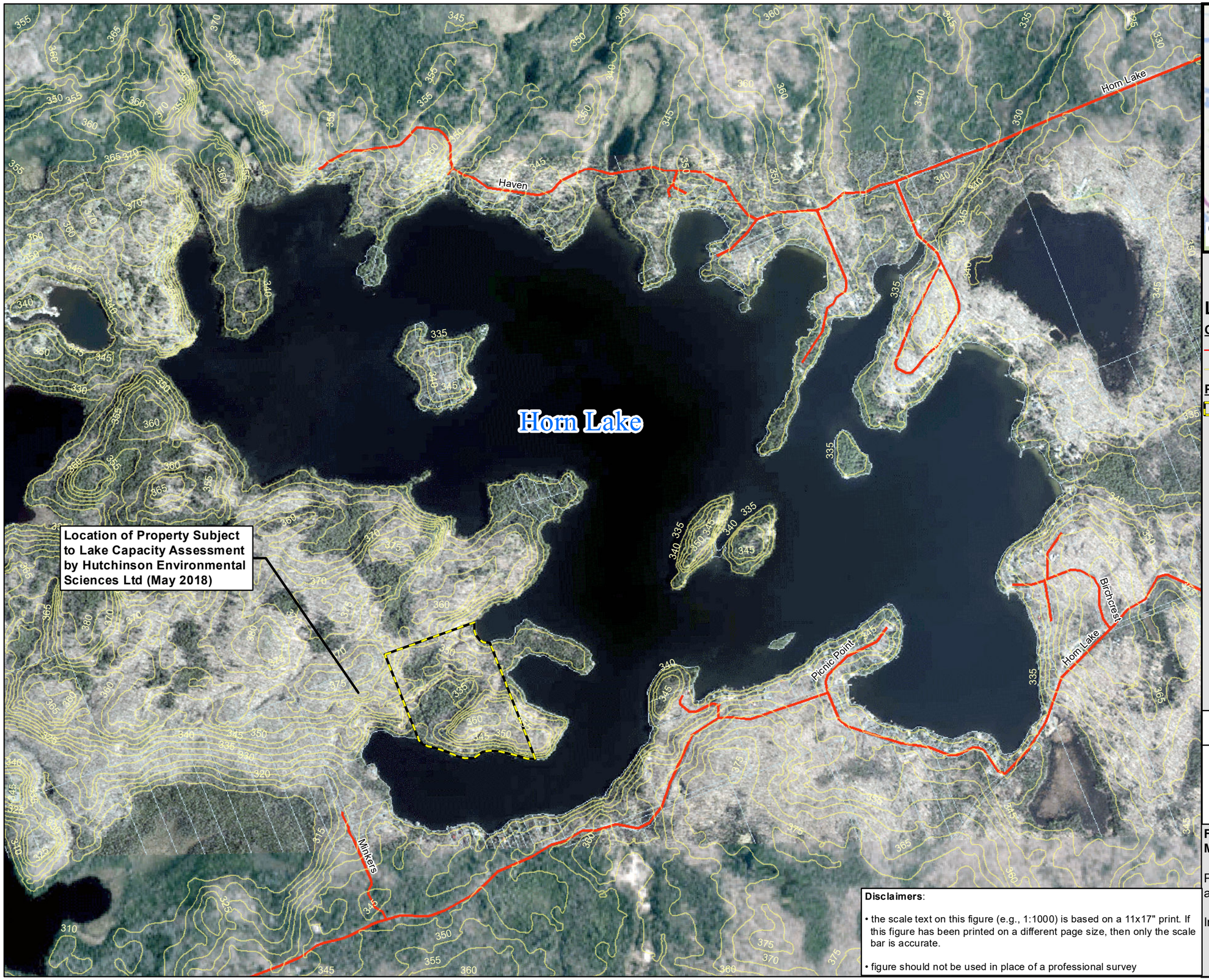
Summary

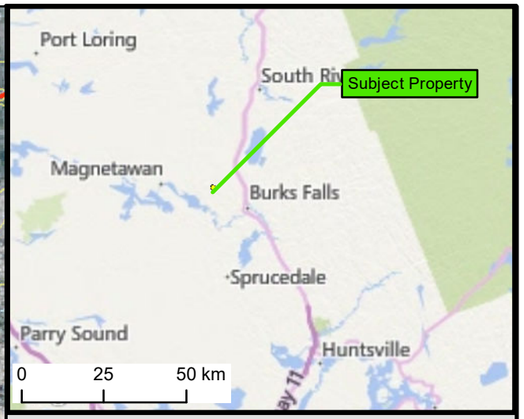
The proposed consent application for the Wiens property, can be evaluated through the results of the Hutchinson capacity assessment for the neighbouring property, where new four (4) lots were proposed. The capacity model calculations showed that Horn Lake is not at capacity, when compared to a more stringent capacity threshold (background + 50%). The addition of four (4) new lots will change total phosphorus or dissolved oxygen concentrations in such a small amount that it will not be measurable. Similarly, the addition of 0ne (1) new lot as proposed for the Wiens property, will not have any impact on water quality and will not extend Horn Lake beyond capacity as noted by the model calculations of Hutchinson. As a result, the application for consent can be considered by the Township.

RiverStone Environmental Solutions Inc.

Al Shaw, M.Sc.
Senior Ecologist / Principal

Terin Robinson, M.Sc.,
Aquatic Ecologist





N

Legend

Ontario Base Mapping (OBM)

- Roads
- 5 m Contours

Planning Boundaries

- Subject Property

Orthorectified aerial photo - spring 2018

Scale	RS Project No.	Date Last Updated	By
1:15,000	2022-245	Oct 12, 2022	AS

0 225 450 Metres

RIVERSTONE

Figure 1. Location of Subject Property, Horn Lake, Municipality of Magnetawan

Prepared for: Henry Wiens c/o Marie Poirier Planning and Associates

Inset: Generalized Location of Subject Property

Disclaimers:

- the scale text on this figure (e.g., 1:1000) is based on a 11x17" print. If this figure has been printed on a different page size, then only the scale bar is accurate.
- figure should not be used in place of a professional survey

Attachment **5**

From: Marie Poirier
To: Jonathan Pauk; ekellogg@magnetawan.com >> Erica Kellogg
Cc: marie@mpplanning.com
Subject: Consent Application Wiens Horn Lake
Date: March-07-23 1:39:25 PM

Hello everyone

Here is the receipt for the water access

Marie

-------- Forwarded Message --------
Subject: Fwd:
Date: Tue, 22 Nov 2022 12:29:29 -0500
From: Henry Wiens <wienshenry111@gmail.com>
To: Marie Poirier <marie@mpplanning.com>

---------- Forwarded message ---------
From: **Beverley Stewart** <485@birchcrestresort.com>
Date: Tue, 22 Nov 2022 at 11:08
Subject: Re:
To: Henry Wiens <wienshenry111@gmail.com>

This email is to confirm the payment for services at birch Crest Resort for parking ,docking for one boat and valet garbage services for the next 12 months. The fee of [redacted] has been applied to your Visa card as requested. Look forward to meeting you in the spring .
Thanks Dave & Bev Stewart

On Thu, Nov 17, 2022 at 6:43 PM Henry Wiens <wienshenry111@gmail.com> wrote: