



Environmental Impact Study

1391 Crystal Lake Road,
Municipality of Trent Lakes

Daniel and Erica Baker

December 07, 2021

➔ **The Power of Commitment**



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Executive summary

GHD Limited (GHD) was retained by the landowners to complete a scoped Environmental Impact Study (EIS) for a building envelope on a vacant lot of record for the subject property at 1391 Crystal Lake Road, Municipality of Trent Lakes. The proposed building envelope included a dwelling, septic, garage and boathouse to be located. The Municipality of Trent Lakes requires an EIS as part of the building permit. The proximity of the subject property to fish habitat and woodland triggered the requirement for an EIS.

GHD biologists conducted a site visit on June 24th, 2021 to complete the following assessments: one breeding bird survey, Ecological Land Classification (ELC), document vegetation, search for Species at Risk (SAR) and their habitats, confirm Significant Wildlife Habitat, and conduct shoreline visual aquatic habitat assessments and surface water quality sampling. After compiling the data collected, GHD identified one federally and provincially significant species (eastern wood-pewee). No other federal, provincial, or regionally significant plant or wildlife species were identified on the site at the time of assessment. Additionally, no sensitive vegetation communities were found in the study area. Potential habitat was identified for three other provincially and federally significant species.

Significant Wildlife Habitat (SWH) specifically woodland area, sensitive bird breeding habitat, Special Concern and Rare Wildlife Species were confirmed on the subject property, along with the potential for turtle wintering habitat. The subject property fronts onto Crystal Lake shoreline, which is classified as a Cold Water Lake Trout Lake.

The building envelope will occur on the south side of the property, adjacent to Crystal Lake Road. Tree removal will be required outside of 15 meter buffer associated with the waterbody. The building envelope will include a 2000 sq. ft bungalow with walkout basement, 3-car garage and septic. The client wishes to propose a floating dock and boathouse which would be located within the 15 m buffer. It should be noted that additional permitting requirements are required for any near or in-water works, refer to Section 7 for mitigation measures and recommendations.

Based on our analysis, no negative impacts are anticipated to the functions of identified natural heritage features provided the client follows the recommendations outlined in Sections 5 and 7 of this report. GHD's recommendations have been made to address potential impacts to natural heritage features and/or their functions.

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- Appendix B Bird Status Report - Comprehensive
- Appendix C Fish Species List for Crystal Lake

1. Introduction

1.1 Background

GHD Limited has been retained to complete a scoped Environmental Impact Study for a proposed building envelope on a vacant lot located at 1391 Crystal Lake Road in the Municipality of Trent Lakes. The property is located on the shore of Crystal Lake surrounded by woodlands. An access laneway is currently situated on the property. Due to the presence of woodlands and sensitive fish and fish habitat along the shoreline, the Municipality of Trent Lakes requires an EIS prior to the approval of a building envelope.

1.2 Location and Study Area

The property is located at 1391 Crystal Lake Road in the Municipality of Trent Lakes, County of Peterborough. The property is irregular in shape fronting on to Crystal Lake (north). The surrounding area contains seasonal and permanent dwellings with lake frontage on Crystal Lake. To the south of the lake is a large block of woodland.

1.3 Scope and limitations

This report has been prepared by GHD for the landowners Erica and Daniel Baker and may only be used and relied on by Erica and Daniel Baker for the purpose agreed between GHD and Erica and Daniel Baker as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Erica and Daniel Baker arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.4 Study Rationale

This section identifies federal, provincial and other regulatory legislation, policies, official plans (OPs) and official plan amendments that are applicable and relevant to the study area and the immediate vicinity. This includes policies that triggered the study. These documents may identify Species at risk, natural features and habitats or other features relevant to this study.

The Municipality of Trent Lakes, Zoning By-Law Policy, Section 4.30 Setbacks From Water Bodies, Watercourses and Wetlands apply to the subject property. Specifically;

Section 4.30.1 General Setback Provisions

Except as otherwise specifically provided for herein, no new building or structure, or new sewage system leaching bed, shall be erected within 30.0 metres (98.4 feet) of a normal high water mark of any water body and/or watercourse. This setback distance shall be applied horizontally from the high water mark.

Section 4.30.2 Exception to the General Setback

This provision shall not apply to marinas, docks, patios, and other marine facilities, including boathouses and pumphouses.

The Municipality of Trent Lakes, Galway-Cavendish-Harvey Official Plan Policy Sections 5.1.10.1 (natural features-fish habitat, woodlands), 5.1.10.3 (EIS contents), 5.1.10.8 (coldwater lake trout lakes) and 5.1.10.11 Water Setbacks and require the completion of an EIS.

Section 5.1.10.8 Coldwater Lake Trout Lakes

Highly sensitive lake trout lakes and moderately sensitive lake trout lakes are identified on Schedules “B1”, “B2”, and “B3” of this Plan.

The following policies shall apply to these lakes:

a) *Highly Sensitive Lake Trout Lakes*

*Beaver Lake, Pencil Lake, Fortescue Lake, **Crystal Lake**, Cavendish Lake, Concession Lake, Salmon Lake, and Bottle Lake within the Township of Galway-Cavendish and Harvey have been designated as highly sensitive or “at capacity” Lake Trout Lakes.*

vi) *Existing lot of record (existing at the date of approval of this Official Plan) may be issued a building permit for uses permitted by the Zoning By-law. The greatest development setback achievable shall be provided for existing lots of record on highly sensitive lake trout lakes in order to minimize negative impacts on water quality. At a minimum, a 30-metre development setback with maintenance of the natural vegetative cover should be provided.*

Section 5.1.10.11 Water Setbacks

New development shall be set back sufficiently from any water body or watercourse to promote the protection of water quality and natural stream and valley lands.

Shoreline development inclusive of sewage system leaching beds shall be set back from the high water mark of water bodies and watercourses to encourage minimal adverse impacts on both the shoreline and water body/watercourse.

For the purpose of this Plan and the implementing Zoning By-law, all new development on a lot shall be set back a minimum of 30 metres from the established high water mark of water bodies and watercourses.

Notwithstanding anything in this section to the contrary, structures such as septic tanks, pump houses, boat houses, docks, open decks and stairs shall be a permitted use and may encroach into the 30-metre setback without a minor variance provided that the property owner can demonstrate to the Township’s satisfaction and, if appropriate, the authority having jurisdiction over the waterway, that it does not negatively affect the waterfront environment. If addressed in the Zoning By-law, applicable standards must be met (i.e., deck width, area, etc.).

The property is located on the south shore of Crystal Lake Road. From our preliminary review of existing mapping, previous projects on this lake and the Municipality’s Official Plan schedules, the following natural features may be located on or within 120 metres of the property: Crystal Lake shoreline-coldwater lake, Fish habitat, Potential habitat for Species At Risk and Significant Wildlife Habitat.

1.5 Other Resources Referenced

Prior to field surveys, background information for the study area and surrounding lands from a variety of sources was reviewed to provide context for the setting and sensitivity of the site. Background information sources included:

1.5.1 Data Sources

- Aerial imagery
- MNRF Land Information Ontario (LIO) database mapping and Natural Heritage Information Centre (NHIC) Make-a-map tool (2021)
- Ontario Breeding Bird Atlas data (Bird Studies Canada, (BSC) 2001-2005 field data)
- Ontario Ministry of Natural Resources Fish-On Line, Fish Species List (OMNRF, 2019)
- Ontario Ministry of Natural Resources, Aquatic Resource Area, Fish Species List (OMNR, 2019)
- Department of Fisheries and Oceans (DFO) Aquatic Species at Risk Mapping (DFO, 2019)

1.5.2 Literature and Resources

- Natural Heritage Reference Manual (MNRF, 2010)
- Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E. Peterborough, 38pp. (OMNRF, 2015)

1.6 Description of Development

The proposed project is for a building envelope which would include a 2000 sq. ft. dwelling with septic and driveway with an attached 3 car garage. A floating dock and access ramp along the shoreline is also proposed.

1.6.1 Scope of Report

The scope of work for the project includes the following:

- Description of current and proposed land uses
- Ecological Land Classification (ELC) of all vegetation communities
- Mapping of lake shore and setbacks
- Determination of fish habitat and setbacks
- General wildlife notes
- Species At Risk (SAR) presence and habitat assessment, including habitat of endangered and threatened species
- Analysis of possible impacts of development on the natural features and ecological functions of all significant features identified, including the shoreline
- Mitigation recommendations
- Figure illustrating lot layout that respects all significant natural features and buffers/setbacks per EIS recommendations
- Providing rationale for shoreline setback less than typical 30m distance.

This report will only deal with the suitability of the site from a biological perspective and the constraints due to the presence of the key natural heritage features. Any other approvals or constraints due to zoning, flood and fill regulations, health regulations, archaeology, slope stability studies, minimum distance separation or other approvals for the municipality and other agencies are the responsibility of the owner.

2. Study Methods

2.1 General Approach

Our approach to preparation of the EIS will consist of three phases.

In the first phase available information background information on the site including recent aerial photography, key natural features and GIS mapping was compiled and reviewed.

The second phase consisted of site visits by our terrestrial/wetland and fisheries biologists to collect site-specific information and confirm data obtained from background and literature reviews. On site surveys included Ecological Land Classification (ELC) mapping, vegetation community boundaries, wildlife corridors and linkages and presence of significant species including Species at Risk, aquatic habitat assessments and surface water quality sampling.

The final phase consisted of preparing an EIS report based upon both the literature review and field surveys completed according to applicable legislation and policies (as outlined in Section 1.3). The EIS report is designed to identify natural heritage features, assess their functions, and provide recommendations to mitigate any potential predicted impacts from the proposed development.

2.2 Study Site Methodology

2.2.1 Physical Site Characteristics

Site characteristics were assessed during field visits. This assessment included general documentation of existing disturbances, current property use, age of vegetation cover, topography and natural features.

2.2.2 Biophysical Inventory

2.2.2.1 Vegetation

ELC Survey Method

All vegetation encountered in the study was inventoried during the site visits. Delineation and classification of the vegetation community types was based on the Ecological Land Classification for Southern Ontario (Lee et al., 1998). General notes on disturbance, topography, soil types, soil moisture and state of each community were also compiled. All vegetation communities in the study area were included.

Rare, significant or uncommon species were searched for. Species significance or rarity on a national, provincial, regional or local level was based on published literature and standard status lists. These included SARA (2021), COSEWIC (2019), SARO (2018), Riley (1989) and Oldham (1999).

2.2.2.2 Birds

Breeding Bird Surveys

One breeding bird surveys was conducted during the breeding season (April 15-August 15). It was conducted following the protocols of the Ontario Breeding Bird Atlas point count (Cadman and Kopysh, 2001) in the early morning under acceptable weather parameters. Only one breeding bird survey was completed due to the small size of the property and the extensive background information collected on birds in the area. All birds seen or heard within the ten-minute station period were documented and breeding evidence codes reported. Searches for stick nests (woodland hawks and owls) and cavity trees were also conducted. The survey station was located on Crystal Lake Road at the current access road on the south-west corner of the property. The location of the survey stations is shown on Figure 1. Area searches continued the entire time the biologists were on site.

Area Searches

All birds detected while on-site during all field surveys were recorded along with a breeding evidence code if known. The search area for these surveys included all of the vegetation communities in the study area.

2.2.2.3 Other Wildlife

While surveyors were on site conducting surveys of vegetation communities (e.g., surveys of vegetation communities) observations of any wildlife encountered on site were recorded (including mammals, amphibians and reptiles). Documentation included notes about the species detected, their location and the type of encounter (i.e., direct sightings and indirect evidence such as calls, tracks, scat, burrows, dens, trails and browse). Targeted amphibian surveys using Marsh Monitoring Program protocols were not conducted.

2.2.2.4 Fish and Aquatic Habitat

Aquatic Habitat Assessment

Aquatic habitat assessment were conducted using standardized provincial aquatic protocols (OSAP, MTO). Aquatic habitat was quantified and characterized based on local substrate composition, vegetation, flow influence and condition, sediment transport, cover, channel morphology, groundwater indicators, riparian habitat, barrier presence and form, land use and landscape influences, human modifications and unique features. Shoreline assessments were completed visually by walking shoreline within the subject property.

Surface water quality was collected by GHD biologists. Measured parameters included dissolved oxygen (mg/L), conductivity (us/cm), total dissolved solids (mg/L) and water temperature (°C) using a handheld YSI Pro2030 System. The pH was recorded with a handheld waterproof pH meter and turbidity was recorded with a handheld LaMotte2020.

The Canadian Water Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment, 2002) and the Provincial Water Quality Objectives (PWQO) were used to interpret water quality data (Energy, 1994).

Fish Community

Due to the presence of existing fish community data for Crystal Lake, GHD did not conduct fish community sampling in the shoreline habitat. A fish species list was obtained from the Ontario Ministry of Natural Resources and Forestry (OMNR, 2019; OMNRF, 2019)

To ensure the project meets provincial and federal species at risk legislation, a full review of the current Ontario Endangered Species Act (ESA) and Canadian Species at Risk Act (SARA) was completed. The background literature review included Department of Fisheries and Oceans (DFO) Species at Risk maps to identify the presence of any endangered and/or threatened species and critical habitat on a federal level. The OMNRF-NHIC database was reviewed to identify the potential presence of endangered and/or threatened species which would receive individual protection (Section 9, ESA) or receive general habitat protection (Section 10, ESA) on a provincial level.

2.2.2.5 Significant Wildlife Habitat (SWH)

Prior to site visits, a candidate list of SWH features were determined based on the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E, 2015. During site visits, GHD biologists looked for evidence of those candidate significant wildlife habitat features (i.e., to determine presence/absence). Upon compiling field data, further consideration was given to which candidate SWHs could be confirmed as present on the property.



ELC TYPES - 1ST APPROXIMATION

Ecological Land Classification for Southern Ontario: First Approximation and Its Application. 1998.

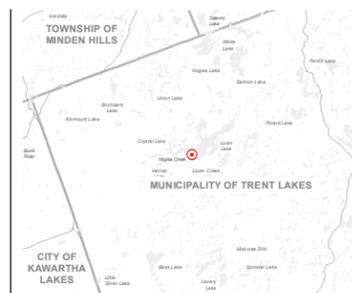
ELC CODE	ECOSITE-VEGETATION TYPE DESCRIPTION
FOD5-8	Dry-Fresh Sugar Maple-White Ash Deciduous Forest

LEGEND

- Property Limit
- Parcel Fabric
- BBS - Breeding Bird Survey
- SFQ - Surface Water Quality Survey
- HZ - Aquatic Habitat Zone
- Proposed Development Envelope
- 15 m Shoreline Setback

CITATIONS

- ▶ Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray, 1998. Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.
- ▶ Imagery: © County of Peterborough, 2018.

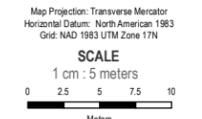


REVISION & WORK HISTORY

REV	BY	DATE	DESCRIPTION	REQUEST
0	W.P.	2012-12-18	Initial map creation.	C.E.



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 1391 Crystal Lake Road
 Municipality of Trent Lakes
 County of Peterborough
 Kawartha Region Conservation Authority

ENVIRONMENTAL IMPACT STUDY
**NATURAL FEATURES, VEGETATION
 COMMUNITIES, SURVEYS &
 CONSTRAINTS**

Project No. 11226761
 Revision No.
 Date 10/15/2021

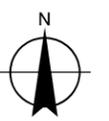


FIGURE 1

3. Survey Results

The following section presents GHD site-specific survey data only. Supporting information, the background review and other sources of information will be presented and discussed in Section 4.0 – Discussion and Analysis.

3.1 Physical Site Characteristics

Typical of this region of the province the site was heavily forested. Fronting onto Crystal Lake the property sloped towards the lake. The forests were mature deciduous, contiguous with larger forested blocks further south. The property was vacant with an existing access road.

3.2 Biological Inventories

3.2.1 Vegetation

3.2.1.1 Level of Effort

The vegetation communities were delineated within the study area by GHD biologists according to methodologies outlined in Section 2.2.2.1. A summary of the level of effort and environmental conditions have been provided in Table 1.

Table 1 *Vegetation Surveys - Level of Effort*

Survey Date	Survey Type	Weather	Start Time	Effort (person hrs.)
June 24, 2021	Ecological Land Classification (ELC)	20°C, Cloud cover 20%, Beaufort Wind Scale 1, no precipitation	8:30 AM	1.55

3.2.1.2 ELC Code Descriptions

One vegetation community was identified within the study area. The community is described below and illustrated on Figure 1.

A total of 61 plant species were identified during field surveys. The dominant species in each community are described below and a complete plant list is found in Appendix A.

Community 1 Dry-Fresh Sugar Maple-White Ash Deciduous Forest Type (ELC Code: FOD5-8)

Community 1 made up the entire property, extending south off the property as well. The dominant species was sugar maple (*Acer saccharum*) with white ash (*Fraxinus americana*) and white birch (*Betula papyrifera*) moderately dominant in the canopy. Several species of shrubs were identified in the understory and included red-osier dogwood (*Cornus sericea*), round-leaved dogwood (*Cornus rugosa*) and purple-flowering raspberry (*Rubus odoratus*). A variety of herbaceous plants were identified in the groundcover and included crown vetch (*Securigera varia*), oxeye daisy (*Leucanthemum vulgare*), western poison-ivy (*Toxicodendron rydbergii*), helleborine (*Epipactis helleborine*), Pennsylvania sedge (*Carex pensylvanica*) and bladder campion (*Silene vulgaris*).



Photo 1: Community 1 – Deciduous Forest (Photo Date: June 24, 2021)

3.2.2 Birds

3.2.2.1 Level of Effort

Surveys for breeding birds were conducted in the study area by GHD biologists according to the methodologies outlined in Section 2.2.2.2. A summary of the level of effort and environmental conditions at the time of survey have been provided in Table 2.

Table 2 Bird Surveys – Level of Effort

Survey Date	Survey Type	Weather	Start Time	Effort (Person hrs.)
June 24, 2021	Breeding Bird Surveys	20°C, Cloud cover 20%, Beaufort Wind Scale 1, no precipitation	8:30 am	0.25

3.2.2.2 Breeding Bird Survey

Fourteen (14) bird species were identified during one breeding bird survey conducted on June 24, 2021 (Appendix B). Species typical of this ecoregion identified during this survey included downy woodpecker (*Picoides pubescens*), Eastern phoebe (*Sayornis phoebe*), red-eyed vireo (*Vireo olivaceus*), blue jay (*Cyanocitta cristata*) and American crow (*Corvus brachyrhynchos*). A full list of all birds recorded on site can be found in Appendix B.

3.2.3 Other Wildlife

No other wildlife species, or any evidence of wildlife species was documented during field surveys.

3.2.4 Woodlands

One woodland community (Community 1) was identified on the property. This woodland was a small piece of a larger woodland extending south off the property. Community 1 is a mature deciduous forest.

3.2.5 Significant Wildlife Habitat

During our review of candidate significant wildlife habitat, the following were identified as potentially present on or adjacent to the site: Turtle Wintering Areas, Woodland area-sensitive bird breeding habitat, habitat for Special Concern and Rare Wildlife species.

3.2.6 Fish and Aquatic Habitat

3.2.6.1 Level of Effort

Surveys for fish and aquatic habitat were conducted in the study area by GHD biologists on June 24th 2021, along the shoreline of Crystal Lake (Figure 1). Surveys were conducted following the methodologies outlined in Section 2.2.2.4. A summary of the level of effort and environmental conditions at the time of assessment have been provided in Table 3.

Table 3 Fish and Aquatic Habitat Surveys – Level of Effort

Survey Date	Survey Type	Weather	Start Time	Effort (Person hrs.)
July 24 th 2021	Aquatic Habitat Assessment of Shoreline and Surface Water Quality Sampling	Sunny (55% cloud cover), BWS 00-2, no precipitation during surveys, air temperature 19.5°C and water temperature 20.1°C.	9am	1 (2x2 staff)
Note: BWS-Beaufort Wind Scale				

3.2.6.2 Aquatic Habitat

The subject property is located along the southern shoreline of Crystal Lake. The shoreline of Crystal Lake within the subject property measured approximately 30 m in length and was classified into a single habitat zone. The habitat zone extended approximately 10m north into the littoral zone. Habitat zones were determined and differentiated based on presence of barriers, substrate composition, channel morphology, riparian habitat, percent in-stream cover, hydrological connection and unique features. The habitat zone locations have been illustrated in Figure 1 and habitat characteristics have been summarized in Table 4.

During the time of the assessments, the bank had a steep slope towards the shoreline. The shoreline was slightly unstable except for small area on the eastern portion of the property (Photo 2). The in-water substrate was dominated by gravel, sand, cobble mixture with depths that ranged from 0.2m to 1m. The in-water cover was low, the canopy cover was also considered low. The overhead cover along the shoreline was moderate and contained trees and woody debris. There were no watercourse features located within the study area during the time of assessments. Refer to Section 3.2.1 Vegetation Communities for the riparian habitat details.



Photo 2: Habitat Zone 1, showing small, cleared shoreline area on the eastern portion of the property. Photo facing northeast (Photo Date: June 24th, 2021).



**Photo 3: Habitat Zone 1, showing lake and riparian habitat. Photo facing southwest
(Photo Date: June 24th, 2021).**

Table 4 Aquatic Habitat Observations

Habitat Zone	Substrate Composition	In-water Cover	Canopy Cover (%)	Overhead Cover	Water Depth Range (m)	Zone Length (m)
01	5% boulder 25% cobble 35% gravel 35% sand	5% large woody debris 10% small woody debris 2% boulders	0-24	40% trees 20% woody debris	0.2-11	30

Surface water quality was collected on the eastern portion of Habitat Zone 1 June 24th, 2021 approximately 0.11 m below the surface of the water (Figure 1). A summary of results and parameter details has been provided in Table 5.

Table 5 Surface Water Quality Results

Water Quality Parameters	Sample Number	Accepted Parameter Range
	01	
Date (dd/mm/yy)	2424/06/21	N/A
Time (hh:mm)	9:30	N/A
Weather conditions	Sunny (5% cloud cover), BWS 0-2, no precipitation during surveys.	N/A
Sample Depth (m)	0.10	N/A
Air Temperature (°C)	19.5	N/A
Water Temperature (°C)	20.1	N/A
Dissolved Oxygen (mg/L)	7.48	5-8*
Total Dissolved Solids (mg/L)	122.85	N/A
Conductivity (SPC-us/cm)	188.5	N/A
Salinity (ppt)	0.09	N/A
pH	8.28	8-10**
Turbidity (NTU)	0.7171	Normal**
Note: BWS=Beaufort wind scale (Government of Canada, 2017), N/A= not applicable and/or specific guidelines not available. *lowest acceptable range for warm water biota (Canadian Council of Ministers of the Environment, 2002), ** Provincial Water Quality Objectives (PWQO) (Energy, 1994).		

3.2.6.3 Fish Community

As previously mentioned in Section 2.2.2.4 Fish Community, surveys were not conducted by GHD biologist. Existing fish community data was obtained by the Ministry of Natural Resources and Forestry (MNRF), refer to Section 4.2.3 for more details.

4. Discussion and Analysis

4.1 Species and Communities

4.1.1 Vegetation

GHD biologists found no plant species that are classified as federally and/or provincially rare in the study area (SARA 2021; COSEWIC 2021; COSSARO 2021). Additionally, no regionally rare plant species (Cuddy, 1991) were detected on site.

None of the ecological communities (i.e., ELC ecosites or vegetation communities) found in the study are considered provincially rare (NHIC, 2021).

4.1.2 Birds

One of the bird species detected during GHD's area search for breeding birds was considered significant at the national and provincial level, eastern wood-pewee (*Contopus virens*) (SARA 2021; COSEWIC 2020; COSSARO 2021).

Three species detected during field inventories are area sensitive as per MNRF Significant Wildlife Habitat Technical Guide (2015) definitions. These species were the yellow-bellied Sapsucker (*Sphyrapicus varius*), red-breasted nuthatch (*Sitta canadensis*), and ovenbird (*Seiurus aurocapillus*). All three species were identified in the woodlands on the subject property identified as Communities 1. Area-sensitive species are those that require a minimum area of suitable habitat to successfully breed.

Data from other sources has also been used to get a picture of avifauna that may be present on the site or in the neighbouring area during breeding season.

The Ontario Breeding Bird Atlas data for the 10 km x 10 km square that includes the property (17PK95) includes eleven (11) bird species that are provincially (COSSARO, 2018) or nationally (COSEWIC, 2019) significant: common nighthawk (*Chordeiles minor*), eastern whip-poor-will (*Antrostomus vociferus*), chimney swift (*Chaetura pelagica*), eastern wood-pewee (*Contopus virens*), bank swallow (*Riparia riparia*), barn swallow (*Hirundo rustica*), wood thrush (*Hylocichla mustelina*), golden-winged warbler (*Vermivora chrysoptera*), Canada warbler (*Cardellina canadensis*), bobolink (*Dolichonyx oryzivorus*), and eastern meadowlark (*Sturnella magna*). The eastern wood-pewee was identified during field studies and was found using the woodland and adjacent forests. Additionally, there is also potential for the wood thrush and Canada warbler to find suitable habitat on the property.

4.1.3 Other Wildlife

No other federal or provincial species at risk were recorded on the subject property during the site visit (SARA 2021; COSEWIC 2020; COSSARO, 2021). Our background review using the Ontario Natural Heritage Information Centre identified one significant species within the 1km by 1km square containing the study property, bandings turtle (*Emydoidea blandingii*).

4.2 Natural Features

4.2.1 Woodlands

Woodland covers the subject property (and most of the surrounding area). The Township, Municipality and/or County of Peterborough have not yet designated Significant Woodland, or even identified woodland areas at this time.

4.2.2 Significant Wildlife Habitat

Significant Wildlife Habitat often occurs within other natural heritage features and areas covered by Policy 2.1 of the Provincial Policy Statement (e.g., significant wetlands). Therefore, it has been suggested that identification and evaluation of significant wildlife habitat is best undertaken after other natural heritage features have been identified (Natural Heritage Reference Manual, 2010).

GHD biologists analyzed the information collected from the ecological communities on the subject property using the criteria for Significant Wildlife Habitat in Ecoregion 6E (2015) and identified three (3) potential candidate SWH on the property: Turtle Wintering Areas, Woodland Area-Sensitive Bird Breeding Habitat, and Special Concern and Rare Wildlife Species

Of these candidates, two were confirmed to be occurring on the property, Woodland Area-Sensitive Bird Breeding Habitat, and Special Concern and Rare Wildlife Species.

Woodland Area-Sensitive Bird Breeding Habitat was confirmed by the presence of three species of birds from this grouping. Yellow-bellied Sapsucker (*Sphyrapicus varius*), red-breasted nuthatch (*Sitta canadensis*), and ovenbird (*Seiurus aurocapillus*). The site meets this criterion when the presence of nesting or breeding pairs of three or more of the listed wildlife species are present. However it does not meet the patch size criteria that requires a contiguous woodland of greater than 30 ha and 200 m of interior habitat. The shoreline lots are separated by Crystal Lake Road with the large contiguous woodland on the south side of the road, where interior habitat would be found. The species found were likely on this site using the property as only a part of their territory.

The offshore waters may provide turtle overwintering habitat for any of the turtle species that are present in the area as water depth and substrate here provide ideal conditions.

Table 6 Significant Wildlife Habitat – Candidate and Confirmed

Wildlife Habitat	Wildlife Species	Candidate SWH and Habitat Criteria		Confirmed SWH and Defining Criteria	Candidate Habitat found within Study Area	Confirmed Habitat found within Study Area
		ELC Ecosite	Habitat Criteria			
<p>Woodland Area-Sensitive Bird Breeding Habitat</p> <p><i>Rationale:</i> Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest songbirds</p>	<p>Yellow-bellied sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren</p>	<p>FOC FOM FOD SWC SWM SWD</p>	<p>Typically, large mature (>50 yrs. old) forest stands or woodlots >30 ha. Interior forest habitat is at least 200m from forest edge habitat</p>	<p>Presences of nesting or breeding pairs of 3 or more of the listed wildlife species Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH</p>	<p>Community 1 FOD on site</p>	<p>Yes – Three area sensitive species (yellow-bellied sapsucker, Red-breasted nuthatch and Ovenbird) were observed on site.</p>
<p>Turtle Wintering Areas</p> <p><i>Rationale:</i> Generally, sites are the only known sites in the area. Sites with the highest number of individuals area most significant</p>	<p>Northern Map Turtle Snapping Turtle Midland Painted Turtle</p>	<p>MA, OA and SA, ELC Community Series; FEO and BOO Norther Map Turtle; Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.</p>	<p>For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. Over-wintering sites are permanent water bodies, large wetlands and bogs or fens with adequate Dissolved Oxygen. Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH.</p>	<p>Presence of 5 over-wintering Midland Painted Turtles is significant. One or more Norther Map Turtle or Snapping Turtle over-wintering within a wetland is significant. The mapped ELC ecosite area with the over-wintering turtles is the SWH. If the hibernation site is within a stream of river, the deep-water pool where the turtles are over-wintering is the SWH. Over-wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm sunny days during the fall (Sept. – Oct.) or spring (Mar. – May). Congregation of turtles is more common where wintering areas are limited and therefore significant.</p>	<p>Possible –Several species of turtles known to occur in area, with ideal offshore conditions.</p>	<p>Not confirmed.</p>
<p>Special Concern and Rare Wildlife Species:</p> <p><i>Rationale: These species are quite rare or have experienced significant population declines in Ontario</i></p>	<p>All Special Concern and Provincially rare (S1-S3, SH) plant and animal species. Lists of these species are tracked by the Natural Heritage Information Centre.</p>	<p>All plant and animal element occurrences (EO) within a 1 or 10km grid. Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy.</p>	<p>When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites Ixxviii Information Sources • Natural Heritage Information Centre (NHIC) will have Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website “Get Information” : http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas • Expert advice should be sought as many of the rare spp. have little information available about their requirements</p>	<p>Studies Confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat. • SWHMiST cxlix Index #37 provides development effects and mitigation measures</p>	<p>Community 1 FOD</p>	<p>Yes-the presence of one special concern species (eastern wood-pewee) observed on site. The property also contained suitable habitat for Wood thrush and Canada warbler, although not observed during field surveys.</p>

4.2.3 Fish and Aquatic Habitat

Aquatic Habitat

Crystal Lake provides direct and indirect fish habitat for a wide diversity of fish species within the lake. Specifically, it provides, food supply, cover, overwintering, spawning habitat, nursery habitat, hydrological and groundwater connections and nutrients. Fish habitat in Ontario is managed federally by the Minister of Fisheries and Oceans Canada and therefore, the Fisheries Act applies to Crystal Lake shoreline within the subject property. No critical habitat for Aquatic Species at Risk (DFO, 2019) was identified within the subject property.

The surface water quality parameters collected within the subject lands were within the acceptable range. The baseline data may be used for construction and post construction effectiveness monitoring if required.

Fish Community

Crystal Lake is composed of fish species that prefer cold, cool and warm water thermal regimes. Cumulatively, 9 fish species have been documented in the Lake and represent the following families: *Catostomidae*, *Centrarchidae*, *Cyprinidae*, *Ictaluridae*, *Percidae* and *Salmonidae*. The fish species are common and are widely distributed throughout southern Ontario (Appendix C).

The literature review found no provincially and/or nationally rare aquatic species documented within the study area (COSSARO, 2021; COSEWIC, 2021). The Crystal Lake fish species list was obtained from MNR (OMNRF, 2019; OMNRF, 2019) and has been provided in Appendix C.

5. Impact Assessment and Recommendations

The following section provides a description of the predicted impacts that may result from the proposed development (Table 7). It also identifies mitigation measures to be implemented to avoid and/or minimize adverse effects to the natural environment features within or near the project. A full list of mitigation measures has been provided in Section 7 of this report.

5.1 Species and Communities

5.1.1 Other Wildlife

The Blanding's turtle was identified as potentially being within the area, as indicated within the literature review. Blanding's turtles inhabit shallow water, in large wetlands and shallow lakes with lots of aquatic vegetation. Although no Blanding's turtles were observed during field surveys, there is potential for them to live in the adjacent waters of Crystal Lake. No impacts are anticipated on the habitat for Blanding's turtle. The building envelope is to be located primarily in forested area, with no wetlands adjacent, away from any corridors or breeding areas. Additionally, no obvious nesting sites or predated nests were observed along the shoreline. As the property faces north and has dense forest cover, there is no open sunny areas that would be suitable for turtles to nest. Turtle nests/eggs need open areas with hours of direct sunlight to hatch. GHD recommends that construction crews be aware of their potential presence and identification of the Blanding's turtle and proper mitigation measures are followed. Turtles will nest in disturbed soils, stockpiles and open sandy areas, particularly in the June breeding period. This can cause delays with construction if a nest is found. Silt fencing recommended for the site should be installed with no gaps and toed into the ground as per the standard practice to prevent turtle access. This is a form of restrictive or exclusion fencing.

5.2 Natural Features

5.2.1 Woodland

Woodland was identified on the property, however, as mentioned above in section 4.2.1 was not identified as Significant woodland. Although there is woodland on the property, it is amongst shoreline residential, seasonal and permanent homes and across the road from the more extensive woodlands. This small treed lot was on the edge of the larger woodland to the south and separated by a roadway. The removal of a portion of this lot (outside of the shoreline buffer) would not impact the overall woodland in the larger landscape. The proposed house footprint would be approximately 40ft by 50ft with a 3-car garage on the west side. Some clearing would be completed around the home as well, with a maximum of 883 m sq. of forested area to be removed. GHD recommends when possible that trees are incorporate into the landscaping around the home. The removal of a portion of this forest along Crystal Lake Road would not have a significant negative impact on the ecological features and functions of the overall forest. Due to the steep slopes, it is anticipated the house and parking would be close to the roadside, similar to the adjacent lots.

5.2.2 Significant Wildlife Habitat

Two types of Significant Wildlife Habitat were confirmed in the study area: habitat for special concern and rare wildlife species and woodland area sensitive bird breeding habitat. One additional type of candidate Significant Wildlife Habitat (turtle over wintering habitat) was identified as possible/probable in the study area but could not be confirmed based on GHD's survey efforts (See Table 6).

The proposed development envelope is located on the upper slope of the property. Some trees will be required to be removed to accommodate a building envelope which would include a dwelling, septic and garage. The eastern wood pee-wee was identified within the forest on the subject property with suitable habitat identified for the wood thrush and Canada warbler. The removal of an approximate building envelope footprint of 50ft by 40 ft of forest along the edge habitat will not significantly impact the bird species. Cottages line the shoreline in this area and the building envelope will retain trees when possible. Tree removal will be conducted outside of breeding bird season (April 15th-August 15th) to prevent direct harm to nesting birds and young.

The potential turtle overwintering habitat was identified in the lake adjacent to the property. The construction of a floating boathouse will not significantly impact overwintering turtles. No in water works will be completed during winter months, therefore, no disruption to any possible overwintering turtles is expected. In general, turtles will travel some distance from water to find suitable egg laying sites and it is recommended that extra vigilance be taken during their nesting season from May to September, particularly in the first 2 weeks of June. The installation of the silt fence will also act an exclusion fence for turtles that may be seeking disturbed sandy soils for nesting.

5.2.3 Fish and Aquatic Habitat

The proposed building envelope will avoid all in-water work. The typical shoreline setback is 30 m, however, this setback could not be achieved due to the small lot size. GHD is proposing a minimum building envelope setback of 15m naturally vegetated buffer from the high-water mark to minimize potential developmental impacts to the fish community and aquatic habitat. No new development shall occur within the naturally vegetative buffer expect for the proposed boathouse. Development includes vegetation removal or clearing, houses, pools, accessory buildings, septic, and utilities.

The purpose of the buffer (15m) is to prevent nutrients and sediment from entering the lake and altering the temperature and dissolved oxygen. Typically, this occurs from nutrient laden sediments from lawns and other surfaces affecting the water quality of the lake, increasing phosphorus levels that leads to increased aquatic vegetation growth, that in turn can change the lake environment, warming the lake and altering the thermal stratification in the lake and

the dissolved oxygen, affecting Lake Trout. In this case, the lot in question is located on a cold water lake and highly sensitive lake trout lake and buffers are an important component of healthy lake management.

Due to the constraints imposed by the small lot size, the options for a building envelope are restricted, however a 15 m setback and vegetated buffer will be established along shoreline to mitigate those potential impacts (refer to Section 7.5). The 15m vegetated buffer will be established from the highwater mark to protect Crystal Lake water quality and Lake Trout habitat.

As mentioned in Section 3.2.6 the shoreline was slightly unstable, GHD recommends that the access to the boathouse be a walking path on the east side of the property where there is evidence of a cleared area. This will reduce the amount of tree clearing within the 15m buffer. It is recommended that the 15 m buffer be mitigated for as outlined in Section 7.5 by riparian plantings to further protected the shoreline.

Recommendations have been provided in Section 7.0 for incorporation into the final site plan. The client will be responsible to obtain the appropriate permits for the boathouse from other applicable agencies. Specifically, the proposed floating dock must prevent the death of fish, maintain riparian vegetation, avoid any in-water works by using a floating dock design, maintain fish passage, ensure proper sediment control, and prevent the entry of deleterious substance to Crystal Lake. The final design of the boathouse shall be reviewed by a professional biologist.

A detailed sediment and erosion control plan must be prepared for all construction activities to ensure disturbed soils are not transported off-site into Crystal Lake negatively impacting aquatic life and fish habitat.

No significant impacts to fish or fish habitat are anticipated from the proposed development provided the 15 m setback from the shoreline is respected and the mitigation measures and recommendations are implemented as outlined in this report. To further protect the shoreline and to ensure the project complies with the PPS, Municipality of Trent Lakes and Fisheries Act, additional recommendations have been provided in Section 7.0. These recommendations should be incorporation into the project detailed design.

Table 7 Impact Assessment and Recommendation Summary

Feature or Function	Impact to Feature of Function	Mitigation	Residual Effect
Significant Wildlife Habitat – Special Concern and Rare Wildlife Species	Potential disturbance to eastern wood-pewee	See mitigation for eastern wood-pewee (Section 5.2.1)	None expected.
Significant Species-Endangered and Threatened Species	Potential disturbance to habitat for Blanding’s turtle	See mitigation for Blanding’s turtle (Section 5.1.1)	None expected
Woodland	Tree removal (maximum of 883m2)	Trees be incorporated into the landscaping of the home	Loss of a maximum of 883 m2) of forest
Fish and Aquatic Habitat <i>Crystal Lake Shoreline</i>	Potential for disturbed sediment to move offsite into Crystal Lake from future development.	No in-water or riparian work. Silt fencing installed around perimeter of development envelope and detailed SEC plan. Development must comply with DFO Measures to Protect Fish and Fish Habitat.	None expected.
	Potential disturbance from the creation of the proposed Floating Boathouse	Respect MNRF fish timing windows to protect fish. No in-water work between March 15 th and June 15 th and October 1 st to May 31 st to protect spring and fall spawning species that have been documented in Crystal Lake (Appendix C)	To be determined during the detail design phase of the project (boathouse dimension etc.).

Feature or Function	Impact to Feature of Function	Mitigation	Residual Effect
		<p>Silt fencing installed around perimeter of development envelope and detailed SEC plan.</p> <p>Development must comply with DFO Measures to Protect Fish and Fish Habitat</p> <p>Native shoreline plantings to enhance riparian habitat function and protect Crystal Lake surface water quality and lake trout habitat. Planting plan to be prepared during detailed design.</p>	

6. Policies and Legislative Compliance

The proposed development is not in compliance with applicable federal and provincial legislation and policies. Specifically, Section 5.1.10.8 Coldwater Lake Trout Lakes and 5.1.10.11 Water Setbacks of the municipality official plan. The typical shoreline setback is 30m, however this setback could not be achieved due to the small lot size, steep slopes and shallow depth of the lot. GHD is recommending a 15m vegetated buffer, if the recommendations and mitigations measures are implemented correctly, they will minimize potential developmental impacts to the fish community and aquatic habitat. Specifically to protect the lake trout and their habitat along the shoreline of the property.

GHD recommends riparian planting compensation for reduced setback to address surface water quality potential impacts and ultimately Lake Trout habitat impacts (Section 7.5).

The final design of the proposed boathouse should be reviewed by a professional biologist. No in-water work between March 15th and June 15th and October 1st to May 31st to protect spring and fall spawning species that have been documented in Crystal Lake.

Additionally, mitigation measures such as recommendations for vegetation clearing (outside of breeding bird timing window April 15th-August 15th) and proper installation of sediment fencing will protect the features and functions of the site in order to comply with all applicable legislation and policies. Furthermore, no Significant Wetlands, Woodlands, Valleylands or ANSI's were identified on or adjacent to the subject property.

7. Summary of Recommendations

7.1 General

1. No development within the 15m naturally vegetated shoreline buffer with the exception of the proposed floating boathouse.
2. Prior to any site preparation activities, erosion and sediment control measures should be installed around the perimeter of the construction envelope to ensure sediment laden runoff does not enter or interfere with adjacent waterbody. The silt fence should be inspected and maintained throughout the construction phase and remain in place until the soils are stabilized and re-vegetated. It will also act as a barrier to turtles.
3. Any tree clearing required for construction access prior to construction and tree clearing in general will be completed outside the Breeding Bird timing window of April 15th to August 15th.
4. Obtain relevant permits from appropriate agencies (i.e. Municipality, Ministry of Northern Development, Mines, Natural Resources and Forestry, Trent-Severn Waterway, Department of Fisheries and Oceans).
5. Create downspouts that spill out onto grassed or gravel surfaces off the roofs. This will convey the rainfall captured by the roof to the ground where it can infiltrate.
6. No in-water works with the exception of the proposed floating boathouse. Respect NDMNR in-water work timing windows.

7.2 Species at Risk

1. Ensure that on-site personnel are aware of Species at Risk that may be found in the study area and are able to recognize these species and their habitat(s).
2. Daily ongoing observation for SAR, and all wildlife more generally, will be undertaken during construction by all personnel on site.
3. In the active season for turtles (April 1-October 30) a thorough sweep shall be done of the area before beginning work to ensure no individuals are injured and/or killed.
4. Silt fencing installed must not have an open plastic mesh or netting as backing that could lead to entanglement of wildlife.
5. Extra vigilance be taken during their nesting season from May to September, particularly in the first 2 weeks of June for nesting turtles. The installation of the silt fence will also act as an exclusion fence for turtles that may be seeking disturbed sandy soils for nesting.

7.3 Sediment and Erosion Control

1. A heavy-duty reinforced silt fence will be installed and maintained along development envelope boundary. This line should be surveyed and staked in the field prior to any site preparation activities.
2. All sediment and erosion control products will be selected for the site based on the manufacturer's product specifications. Product installation and maintenance will follow the manufacturer's guidelines.
3. All sediment and erosion control measures shall be inspected daily during the construction phase and periodically afterwards to ensure they are functioning properly. The sediment and erosion control measures must be maintained and upgraded as required. Sediment fence shall be checked regularly to ensure they are maintained and working properly. Accumulated silt and debris will be removed from the fence and site after every precipitation event.
4. Construction will be undertaken during normal weather conditions, to the extent possible, and will avoid large precipitation events to minimize the risk of sedimentation off-site.

5. In the event that sediment and erosion control measures are not functioning, the construction supervisor shall order the work to be stopped. No further work shall be carried out until the construction methods and/or the sediment control plan is adjusted to address the sediment/erosion problem(s). Such occurrences should be documented by the site inspector and provided to a qualified biologist.

7.4 Fish Protection (DFO measures to protect fish and fish habitat)

1. No work in or near water with the exception of the proposed floating boathouse to avoid killing fish by means other than fishing.
2. Any new development (cottages/houses, septic, garage) locations will not exceed the 15 m shoreline buffer to protect the natural feature form and function.
3. The Project Manager/Contractor shall not allow any deleterious substances as defined in the Fisheries Act (such as silt), caused by the work, to enter or re-enter the watercourse.
4. No use of explosives in or near water.
5. Should work conditions change such that it is possible that fish or fish habitat may potentially be negatively impacted, all works shall cease until the problem has been corrected or authorization has been obtained from the appropriate authorities.
6. Maintain riparian vegetation.
7. Respect NDMNRF fish timing windows to protect fish. No in-water work between March 15th and June 15th and October 1st to May 31st to protect spring and fall spawning species that have been documented in Crystal Lake
8. No disturbance of bank material or building structures in the area than may result in erosion or scouring.
9. Always maintain fish passage.
10. Prevent soil compaction using mats and pads.
11. The Project Manager/Contractor shall not allow any deleterious substances as defined in the Canadian Fisheries Act (such as silt), caused by the work, to enter or re-enter the watercourse or lake. See Sediment and Erosion Control.
12. Final design of the proposed floating boathouse to be reviewed by a professional biologist and potentially the Department of Fisheries and Oceans (DFO) staff to ensure the design is in compliance with the Fisheries Act.

7.5 Riparian Habitat Enhancement

1. Shoreline buffers will be established along the shoreline of Crystal Lake within the subject property. The current vegetation will remain in place (i.e. no clearing or cutting of trees or shrubs, or mowing the lawn) and native vegetation (low shrub and wildflower mix) will be planted to enhance the shoreline riparian habitat. Access paths and walkways will be permitted to maintain water recreational use and access.
2. All planted shrubs will have a generous volume of mulch planted about the plant base to retain the surrounding soil moisture.
3. Native species recommended for the buffer vegetation enhancement may include: red-osier dogwood (*Cornus stolonifera*), shining willow (*Salix lucida*) and highbush cranberry (*Viburnum trilobum*). In addition, the shoreline mix 8250 (Ontario Seed Company (www.oscseeds.com)) is recommended for all disturbed areas near the top of shoreline buffer. Mix with sand at a 5:1 ration before spreading.
4. Plantings to be completed in the spring or fall when regular rainfall and cooler temperatures occur. However, if summer planting is required, shrubs and trees should be heavily mulched and watered with a hose to ensure they establish and survive the summer heat.

7.6 Operation of Machinery

1. No machinery shall enter the shoreline or watercourse.
2. All heavy equipment, machinery, and tools required for the work shall be regularly inspected, maintained and operated to avoid leakage of fuels and liquids and shall be stored in a manner that prevents any deleterious substance from entering the soil or nearby watercourses.
3. Vehicle and equipment refuelling and/or maintenance shall be conducted within a defined staging area 30 m from any waterbody. If 30 m is not achievable a portable spill containment berm may be used. Portable spill containment berms can be rented by companies such as Wise Environmental Solution Inc (W.I.S.E, 2017).
4. Any part of a vehicle and/or equipment entering the water will be free of fluid leaks and externally cleaned/degreased to prevent deleterious substances from entering the water.
5. Any stockpiled materials will be stored and stabilized away from the water above the high-water mark at a minimum of 30 m. Stockpiles will be enclosed by sediment fencing or installed down gradient for the purpose of preventing movement of sediment away from the stockpile.
6. An emergency spill kit shall be kept on site and employed immediately should a spill occur. In the case of a spill, the Ontario Spill Action Center shall be notified immediately at 1-800-268-6060. All provincial and federal regulations shall be adhered to.
7. Maintain an adequate supply of clean-up materials on-site. Construction crews will be fully trained in their use to ensure timely and effective responses to spill incidents.

7.7 Concrete Leachate

1. Concrete leachate is alkaline and highly toxic to fish and aquatic life. Measures will be taken to prevent any incidence of concrete or concrete leachate from entering any waterbody.
2. Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials (concrete) will **not** deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into any waterbody.
3. All concrete, sealants or other compounds used for this project shall be utilized according to the appropriate Product Technical Data Sheet, stating guidelines and methods for proper use, and provided by the manufacturer of the product.

8. Conclusion

GHD Limited has prepared this Environmental Impact Study report to address potential environmental issues associated with the proposed building envelope on vacant lot which would include a dwelling, septic, garage and boathouse.

Significant natural features identified in the study area included fish and fish habitat and significant wildlife habitat and habitat of species of Special Concern.

Maintaining the existing 15-meter buffer has been recommended from the high-water mark. Mitigation measures have been recommended for significant wildlife habitat, and species at risk, Coldwater lake, fish and fish habitat, specifically the protection of the Crystal Lake water quality and sensitive Lake Trout habitat.

Construction within the proposed development envelope will result in no significant negative impacts on the functions of identified natural features provided the recommendations outlined in Sections 5 and 7 are implemented. GHD's recommendations have been made to address potential impacts to natural features and/or their functions during the site preparation, construction and post construction period. Additional discussions with the Municipality of Trent Lakes need to occur so that appropriate permitting processes are followed. Additional permits will be required for all shoreline and in-water works associated with the boathouse.

9. References

- Bird Studies Canada. 2007. Atlas of the Breeding Birds of Ontario square summary information sheets. Accessed on the World Wide Web at: <https://www.birdsontario.org/atlas/datasummaries.jsp?lang=en>.
- Cadman, M. and N. Kopysh. 2001. Ontario Breeding Bird Atlas guide for participants. Environment Canada, Ontario Ministry of Natural Resources, Government of Ontario, Human Resources Development Canada. Guelph, 35pp.
- Canadian Council of Ministers of the Environment. (2002). Canadian water quality guidelines for the protection of aquatic life.
- COSEWIC. (2021). *Species at Risk Public Registry*. Retrieved from Government of Canada: http://www.registrelep-sararegistry.gc.ca/sar/index/default_e.cfm
- COSSARO. (2021). *Species at Risk in Ontario*. Retrieved from Government of Ontario: <https://www.ontario.ca/page/species-risk-ontario#section-2>
- DFO. (2017, 07 24). *Aquatic Species at Risk Maps*. Retrieved from Government of Canada-Fisheries and Oceans Canada: <http://www.dfo-mpo.gc.ca/species-especies/fpp-ppp/index-eng.htm>
- DFO. (2019, 08 23). *Aquatic Species at Risk Map*. Retrieved from Government of Canada, Fisheries and Oceans Canada: <https://www.dfo-mpo.gc.ca/species-especies/sara-lep/map-carte/index-eng.html>
- Energy, M. o. (1994). *Waste Managment Policies Guidelines Provincial Water Quality Objectives of the Ministry of Environment and Energy*. Ottawa: Queen's Printer for Ontario.
- OMNR. (2019). Aquatic Resource Area Survey. Peterborough, Ontario: Land Information, Ontario Ministry of Natural Resources. Ontario Ministry of Natural Resources.
- OMNRF. (2019). *Fish ON-Line*. Retrieved from Ontario Ministry of Natural Resources and Forestry: <https://www.gisapplication.lrc.gov.on.ca/FishONLine/Index.html?site=FishONLine&viewer=FishONLine&locale=e-US>
- W.I.S.E. (2017). *Wise Environmental Solutions Inc.* Retrieved from <http://wiseenv.com/>

Appendix A

Plant Distribution by Community

Appendix A Plant Distribution By Community

Families and genera for the plant species found in this appendix are listed in taxonomic order. The species are listed alphabetically within each genus.

Three standard reference works were used for the botanical nomenclature and taxonomy (Newmaster et. al., 1998; Gleason and Cronquist 1991; Voss 1980; 1985). Other published works for botanical names included; ferns (Cody and Britton 1989); grasses (Dore and McNeill 1980); orchids (Whiting and Catling 1986); shrubs (Soper and Heimbürger 1982) and trees (Farrar 1995).

Community 1

ComID: 5065

ELC Code: FOD5-8

Common Name	Scientific Name	Remarks
HORSETAIL FAMILY	EQUISETACEAE	
field horsetail	<i>Equisetum arvense</i>	
BRACKEN FERN FAMILY	DENNSTAEDTIACEAE	
eastern bracken fern	<i>Pteridium aquilinum</i>	
WOOD FERN FAMILY	DRYOPTERIDACEAE	
spinulose wood-fern	<i>Dryopteris carthusiana</i>	
marginal wood-fern	<i>Dryopteris marginalis</i>	
ostrich fern	<i>Matteuccia struthiopteris</i>	
PINE FAMILY	PINACEAE	
balsam fir	<i>Abies balsamea</i>	
eastern white pine	<i>Pinus strobus</i>	
eastern hemlock	<i>Tsuga canadensis</i>	
BUTTERCUP FAMILY	RANUNCULACEAE	
thimbleweed	<i>Anemone virginiana</i>	
tall buttercup	<i>Ranunculus acris</i>	
BEECH FAMILY	FAGACEAE	
American beech	<i>Fagus grandifolia</i>	
red oak	<i>Quercus rubra</i>	
BIRCH FAMILY	BETULACEAE	
white birch	<i>Betula papyrifera</i>	
ironwood	<i>Ostrya virginiana</i>	
PINK FAMILY	CARYOPHYLLACEAE	
bladder campion	<i>Silene vulgaris</i>	
common chickweed	<i>Stellaria media</i>	
ST. JOHN'S-WORT FAMILY	GUTTIFERAE	
common St. John's-wort	<i>Hypericum perforatum</i>	
LINDEN FAMILY	TILIACEAE	
American basswood	<i>Tilia americana</i>	

WILLOW FAMILY	SALICACEAE	
white poplar	<i>Populus alba</i>	
trembling aspen	<i>Populus tremuloides</i>	
WINTERGREEN FAMILY	PYROLACEAE	
shinleaf	<i>Pyrola elliptica</i>	
ROSE FAMILY	ROSACEAE	
common strawberry	<i>Fragaria virginiana</i>	
yellow avens	<i>Geum aleppicum</i>	
choke cherry	<i>Prunus virginiana</i>	
Alleghany blackberry	<i>Rubus allegheniensis</i>	
purple-flowering raspberry	<i>Rubus odoratus</i>	
PEA FAMILY	FABACEAE	
crown-vetch	<i>Coronilla varia</i>	
low hop clover	<i>Trifolium agrarium</i>	
white clover	<i>Trifolium repens</i>	
cow vetch	<i>Vicia cracca</i>	
DOGWOOD FAMILY	CORNACEAE	
round-leaved dogwood	<i>Cornus rugosa</i>	
red-osier dogwood	<i>Cornus stolonifera</i>	
MAPLE FAMILY	ACERACEAE	
sugar maple	<i>Acer saccharum ssp.saccharum</i>	
CASHEW FAMILY	ANACARDIACEAE	
climbing poison-ivy	<i>Rhus radicans ssp. Negundo</i>	
staghorn sumac	<i>Rhus typhina</i>	
DOGBANE FAMILY	APOCYNACEAE	
spreading dogbane	<i>Apocynum androsaemifolium</i>	
MINT FAMILY	LAMIACEAE	
wild basil	<i>Clinopodium vulgare</i>	
heal-all	<i>Prunella vulgaris ssp. Lanceolata</i>	
PLANTAIN FAMILY	PLANTAGINACEAE	
Rugel's plantain	<i>Plantago rugelii</i>	
OLIVE FAMILY	OLEACEAE	
white ash	<i>Fraxinus americana</i>	
FIGWORT FAMILY	SCROPHULARIACEAE	
common speedwell	<i>Veronica officinalis</i>	
ASTER FAMILY	ASTERACEAE	
ox-eye daisy	<i>Chrysanthemum leucanthemum</i>	
daisy fleabane	<i>Erigeron annuus</i>	
orange hawkweed	<i>Hieracium aurantiacum</i>	
field hawkweed	<i>Hieracium caepitosum ssp.caespitos</i>	
king devil hawkweed	<i>Hieracium x florbundum</i>	
white lettuce	<i>Prenanthes alba</i>	
spiny-leaved sow thistle	<i>Sonchus asper</i>	
heart-leaved aster	<i>Symphotrichum cordifolium</i>	
common dandelion	<i>Taraxacum officinale</i>	

SEDGE FAMILY	CYPERACEAE	
drooping wood sedge	<i>Carex arctata</i> Boott	
GRASS FAMILY	POACEAE	
poverty grass	<i>Aristida dichotoma</i>	
awnless brome grass	<i>Bromus inermis ssp.inermis</i>	
orchard grass	<i>Dactylis glomerata</i>	
red fescue	<i>Festuca rubra</i>	
white-grained mountain rice	<i>Oryzopsis asperifolia</i>	
LILY FAMILY	LILIACEAE	
lily-of-the-valley	<i>Convallaria majalis L.</i>	
tiger lily	<i>Lilium lancifolium</i>	
Canada mayflower	<i>Maianthemum canadense</i>	
hairy Solomon's seal	<i>Polygonatum pubescens</i>	
ORCHID FAMILY	ORCHIDACEAE	
helleborine	<i>Epipactis helleborine</i>	

Plant Species Per Community 61

Total Number of Plant Species 61

Appendix B

Bird Status Report - Comprehensive

APPENDIX C

Bird Status Report - Comprehensive

Bird species observed by GHD are listed in the order followed the American Ornithologists' Union (AOU) Check-list of North American birds (7th edition, 1999, 47th Supplement). Common and scientific nomenclature are based on those used by AOU. Breeding status and breeding evidence code are listed when observed. Any significant status for a species on national and provincial lists is displayed as well as those from relevant regional lists.

List Status :	END - endangered	A wildlife species facing imminent extirpation or extinction.
	END-R -endangered regulated	A wildlife species facing imminent extirpation or extinction in Ontario which has been regulated under Ontario's Endangered Species Act (ESA).
	THR - threatened	A wildlife species likely to become endangered if limiting factors are not reversed.
	SC - special concern	A wildlife species that may become threatened or an endangered species because of a combination of biological characteristics and identified threats.
	YES - Area Sensitive	A wildlife species that requires large areas of suitable habitat in order to sustain their population numbers.

*** Other status levels are not displayed**

List Sources:		
	COSEWIC	The Committee on the Status of Endangered Wildlife in Canada, May 2018.
	COSSARO	The Committee on the Status of Species at Risk in Ontario, June 2018.
	SARA	Species At Risk Act, Schedule 1, Government of Canada, 2018.
	Area Sensitive	Significant Wildlife Technical Guide, Appendix C, OMNR, Oct. 2000
	Region 6	Southern Ontario Wetland Evaluation Appendix 11B, Version 3.2, March 2013

Breeding Status:		
(Observed By NEA)	B	-species observed in breeding season in suitable habitat with some evidence of breeding (confirmed, probable or possible as per Ontario Breeding Bird Atlas, 2002).
	F	-species observed in breeding season but no evidence of breeding or suitable nest sites available on the study site (includes flyovers, migrants and foraging colonial breeders).
	M	-species observed outside of breeding season for that species and in area outside of the known breeding range for that species.

**Breeding Evidence Code:
(Observed By NEA)**

OBSERVED

X -species observed in its breeding season (no evidence of breeding).

POSSIBLE BREEDING

H -species observed in its breeding season in suitable nesting habitat

S -singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat

PROBABLE BREEDING

P -pair observed in their breeding season in suitable nesting habitat

T -permanent territory presumed through registration of territorial song on at least 2days,
a week or more apart, at the same place

D -courtship or display between a male and a female or 2 males, including courtship feeding or copulation

V -visiting probable nest site

A -agitated behaviour or anxiety calls of an adult

B -brood patch on adult female or cloacal protuberance on adult male

N -nest-building or excavation of nest hole

CONFIRMED BREEDING

DD -distraction display or injury feigning

NU -used nest or egg shell found (occupied or laid within the period of study)

FY -recently fledged young or downy young, including young incapable of sustained flight

AE -adults leaving or entering nest site in circumstances indicating occupied nest

FS -adult carrying fecal sac

CF -adult carrying food for young

NE -nest containing eggs

NY -nest with young seen or heard

SOURCE: Ontario Breeding Bird Atlas March 2001

AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code	COSEWIC	COSSARO	SARA	Area Sensitive	Region 6		
RTHU	Ruby-throated Hummingbird	<i>Archilochus colubris</i>	B	S				No			
YBSS	Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	B	S				Yes			
DOWO	Downy Woodpecker	<i>Picoides pubescens</i>	B	H				No			
EWPE	Eastern Wood-Pewee	<i>Contopus virens</i>	B	S	SC	SC	SC	No			
EAPH	Eastern Phoebe	<i>Sayornis phoebe</i>	B	S				No			
REVI	Red-eyed Vireo	<i>Vireo olivaceus</i>	B	None				No			
BLJA	Blue Jay	<i>Cyanocitta cristata</i>	B	H				No			
AMCR	American Crow	<i>Corvus brachyrhynchos</i>	B	H				No			
CORA	Common Raven	<i>Corvus corax</i>	B	H				No			
RBNU	Red-breasted Nuthatch	<i>Sitta canadensis</i>	B	H				Yes			
AMRO	American Robin	<i>Turdus migratorius</i>	B	S				No			
AMRE	American Redstart	<i>Setophaga ruticilla</i>	B	S				No			
OVEN	Ovenbird	<i>Seiurus aurocapillus</i>	B	S				Yes			
SOSP	Song Sparrow	<i>Melospiza melodia</i>	B	S				No			
TOTAL SPECIES OBSERVED:	14	BREEDING SPECIES OBSERVED:	14		1	1	1	3	0	0	0

Appendix C

Fish Species List for Crystal Lake

Appendix C Table 1.1 Fish Species List for Crystal Lake

Family	Common Name	Scientific Name	Thermal Regime	Spawning Season
<i>Catostomidae</i>	White Sucker	<i>Catostomus commersonii</i>	Coolwater	Spring (April-June)
<i>Centrarchidae</i>	Pumpkinseed	<i>Lepomis gibbosus</i>	Warmwater	Spring-summer (May-August)
	Smallmouth Bass	<i>Micropterus dolomieu</i>	Coolwater	Spring (May-June)
<i>Cyprinidae</i>	Spottail Shiner	<i>Notropis hudsonius</i>	Coolwater	Spring (May-June)
<i>Ictaluridae</i>	Brown Bullhead	<i>Ameiurus nebulosus</i>	Warmwater	Spring (May-June)
<i>Percidae</i>	Walleye	<i>Sander vitreus</i>	Coolwater	Spring (April-June)
	Yellow Perch	<i>Perca flavescens</i>	Coolwater	Spring (April-May)
<i>Salmonidae</i>	Lake Trout	<i>Salvelinus namaycush</i>	Coldwater	Fall (September-November)
	Lake Whitefish	<i>Coregonus clupeaformis</i>	Coldwater	Fall (October-December)

Note: Fish species listed under OMNR 2012 obtained from the Aquatic Resource Area Survey (OMNR, 2019). Fish species spawning season obtained from the *Ontario Freshwater Fishes Life History Database* (Eakins, Ontario Freshwater Fishes Life History Database, 2019) and Fish On-Line (OMNRF, 2019)

