

**PREPARATION OF
NATURAL HERITAGE EVALUATIONS FOR ALL
KEY NATURAL HERITAGE FEATURES
ON THE OAK RIDGES MORaine
(FINAL DRAFT)**

TABLE OF CONTENTS

Section	Page
1.0 Purpose	3
2.0 Background	3
3.0 Assessing the Need for a Natural Heritage Evaluations	5
3.1 STEP ONE: Initial Assessment Based on the Collection of Background Information	6
3.2 STEP TWO: Determine Overlap with any Known KNHF	6
3.3 STEP THREE: Determine the Presence of Candidate Significant Wildlife Habitat using Ecological Land Classification (ELC)	7
3.4 STEP FOUR: Requirements for a Detailed Natural Heritage Evaluation	8
4.0 Development of a Detailed Natural Heritage Evaluation	9
4.1 Initial Assessment Evaluation	10
4.2 Scoping	11
4.3 Evaluation of the Application	11
a) Assessing Potential Impacts	
b) Identification of Mitigation Techniques	
c) Identification of Monitoring Needs	
4.4 Review of Natural Heritage Evaluation by Municipal Planning Authority	14
4.5 Final Decision	14

Appendix 1, Table A: Key Natural Heritage Features, Hydrologically Sensitive Features and Areas of Natural and Scientific Interest: Minimum Areas of Influence and Minimum Vegetation Protection Zones	16
Appendix 2, Table A: Suggested Scoping Elements for Specific KNHFs and their Related Functions	17
Appendix 3, Table A: Potential Development Impacts and Mitigation Measures	19

OAK RIDGES MORaine TECHNICAL PAPER	MNR T.P. 8
SUBJECT: Natural Heritage Evaluations for all Key Natural Heritage Features on the Oak Ridges Moraine	Feb, 2004 Final Draft

1. Purpose:

To provide guidance for assessing the impact of development and site alteration on Key Natural Heritage Features, and demonstrating how the requirements of section 23 of the Oak Ridges Moraine Conservation Plan (ORMCP) can be met.

2. Background:

The ORMCP provides land-use and resource management planning direction on how to protect the ecological and hydrological features and functions on the Oak Ridges Moraine (ORM).

Protecting and managing the health, diversity, size and connectivity of Key Natural Heritage Features is critical to the ecological and hydrological integrity of the ORM.

Section 22(1) of ORMCP identifies Key Natural Heritage Features as:

- 1) *Wetlands.*
- 2) *Significant portions of the habitat of endangered, rare and threatened species.*
- 3) *Fish habitat.*
- 4) *Areas of natural and scientific interest (life science).*
- 5) *Significant valleylands.*
- 6) *Significant woodlands.*
- 7) *Significant wildlife habitat.*
- 8) *Sand barrens, savannahs and tallgrass prairies.*

The Table in the Plan identifies Key Natural Heritage Features, Hydrologically Sensitive Features and Areas of Natural and Science Interest (Earth Science) including their associated Minimum Areas of Influence and Minimum Vegetation Protection Zones. The Table in the Plan is provided in Appendix 1, Table A of this Technical Paper.

Section 22(3) of ORMCP states that:

“An application for development or site alteration with respect to land within the minimum area of influence that relates to a key natural heritage feature, but outside the key natural heritage feature itself and the related minimum vegetation protection zone, shall be accompanied by a natural heritage evaluation under section 23.”

Section 23(1) of the ORMCP states that:

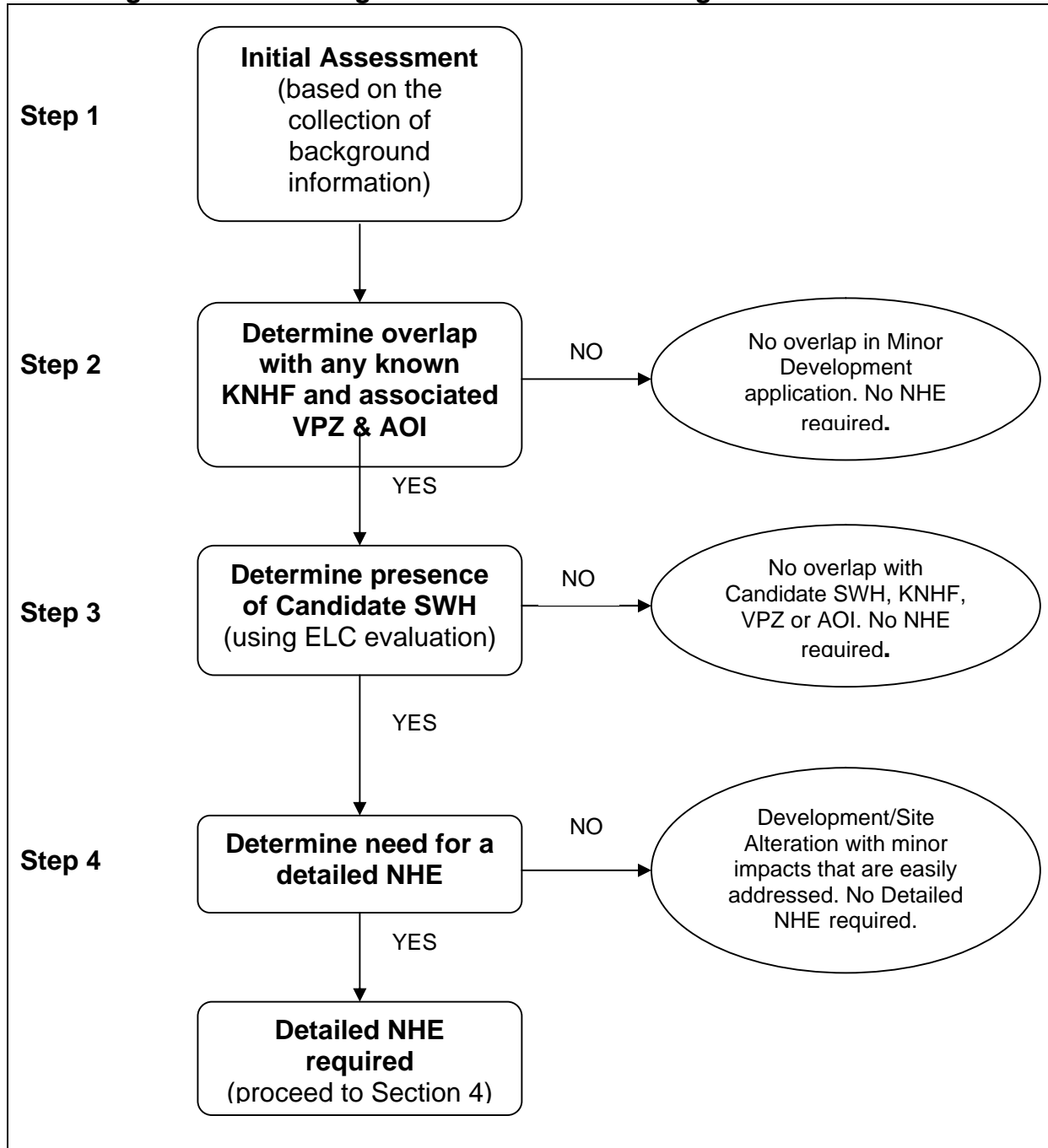
“A natural heritage evaluation shall,

- a) demonstrate that the development or site alteration applied for will have no adverse effects on the key natural heritage feature or on the related ecological functions;*
- b) identify planning, design and construction practices that will maintain and, where possible, improve or restore the health, diversity and size of the key natural heritage feature and its connectivity with other key natural heritage features;*
- c) in the case of an application relating to land in a Natural Core Area, Natural Linkage Area or Countryside Area, demonstrate how connectivity within and between key natural heritage features will be maintained and, where possible, improved or restored before, during and after construction;*
- d) if the Table to this Part specifies the dimensions of a minimum vegetation protection zone, determine whether it is sufficient, and if it is not sufficient, specify the dimensions of the required minimum vegetation protection zone and provide for the maintenance and, where possible, improvement or restoration of natural self-sustaining vegetation within it;*
- e) if the Table to this Part does not specify the dimensions of a minimum vegetation protection zone, determine whether one is required, and if one is required, specify the dimensions of the required minimum vegetation protection zone and provide for the maintenance and, where possible, improvement or restoration of natural self-sustaining vegetation within it; and*
- f) in the case of a key natural heritage feature that is fish habitat, ensure compliance with the requirements of the Department of Fisheries and Oceans (Canada).”*

3.0 Assessing the Need for a Natural Heritage Evaluation:

This section provides a 4-step process for assessing the need for a Natural Heritage Evaluation (NHE) as part of an application for development or site alteration (Figure 1).

Figure 1 – Assessing Need for a Natural Heritage Evaluation



3.1 STEP ONE: Initial Assessment Based on the Collection of Background Information

For all development and site alteration applications, it is recommended that the proponent provide the following information:

- an outline of the development or site alteration proposal;
- assessment of existing site conditions;
- assessment of policy direction and other legislative requirements;
- supporting background information for the study area. This information may be found in municipal studies, watershed plans, Environmental Assessment studies, environment impact studies, etc.;
- topographic mapping at 1:5,000 scale with 2m contour intervals where available (or 1:10,000 scale with 5m contour intervals), on which is delineated, the boundaries of the lands subject to the Planning Application, plus the adjacent lands within 120m of the application site;
- overlay mapping of land use designations with the mapping above; and
- overlay mapping of all known (i.e. previously mapped / identified) Key Natural Heritage Features (KNHF) and Hydrologically Sensitive Features (HSF) including their associated Minimum Vegetation Protection Zones (VPZ) and Areas of Influence (AOI) with the mapping above. The Identification of Key Natural Heritage Features on the Oak Ridges Moraine (MNR Technical Paper 1-03) provides definition and technical criteria for the identification of KNHF.

3.2 STEP TWO: Determine Overlap with any known KNHF

Based on the information collected in Step 1, determine whether there are any known KNHFs on-site, and whether the application for development or site alteration overlaps with the AOI of any known KNHF either on site or on adjacent lands. Based on this review, determine which of the following scenarios the application would fall into:

3.2(a) Minor Development* or Site Alteration Applications Without Overlap Between the Application and any known KNHF, VPZ and AOI

If an application for Minor Development or Site Alteration is located entirely outside of any known KNHF, and their associated VPZ and AOI, a Natural Heritage Evaluation is not required. The approval authority can proceed without further regard to the requirements of section (23) of the ORMCP.

3.2(b) Minor Development* or Site Alteration Applications With Overlap Between the Application and any known KNHF, VPZ and AOI

If an application for Minor Development or Site Alteration overlaps with the area of influence of one or more known KNHFs, then the proponent should proceed to **Step Three** for the preparation of the Ecological Land Classification (ELC) evaluation of vegetation communities. The ELC evaluation will be utilized for the determination of the presence of Candidate Significant Wildlife Habitat (SWH).

3.2(c) Major Development, Mineral Aggregate Operations or Wayside Pit Applications

All applications for Major Development Applications, Mineral Aggregate Operations or Wayside Pits require an ELC evaluation of the vegetation communities regardless of whether there is an overlap with a KNHF, or its associated VPZ and AOI. The proponent should proceed to **Step Three**. The ELC evaluation will be utilized for the determination of the presence of Candidate SWH.

3.3 STEP THREE: Determine the Presence of Candidate Significant Wildlife Habitat using Ecological Land Classification

This step requires the applicant to complete an Ecological Land Classification (ELC) evaluation of vegetation communities and the identification of Candidate SWH located on or adjacent to the subject lands.

The determination of the presence of Candidate SWH will require the identification and delineation of ELC Ecosites, in accordance with the ELC, within the lands subject to the application, and to the finest level practical on the adjacent lands 120m beyond (this can be accomplished with sufficient accuracy to the Community Series using mapping and remote sensing imagery).

Currently there is very little mapping of wildlife habitat in southern Ontario on private land. The Significant Wildlife Habitat Technical Paper on the Oak Ridges Moraine (MNR Technical Paper 2-03) outlines a process for the determination of Candidate and Confirmed SWH.

* Minor Development shall mean “*any development other than development defined in the ORMCP as Major Development or Mineral Aggregate Operation or Wayside Pit.*”

In addition, an ELC evaluation may assist with providing a determination of the Significant Portions of the Habitat of Endangered Rare, and Threatened Species, identification of wetlands and woodlands, and with the preparation of a detailed NHE.

Based on the ELC evaluation and the guidance provided in MNR Technical Paper 2-03, determine which of the following scenarios applies to the application.

3.3(a) No Candidate Significant Wildlife Habitat is identified within the Study Area

If upon the completion of the ELC evaluation and the determination of the presence of Candidate SWH, there is no overlap between the subject property and with a Candidate SWH or any other KNHFs, then no further evaluation per section 23 (1) of the ORMCP is required.

3.3(b) Candidate Significant Wildlife Habitat or KNHF and associated VPZ and AOI identified within the Study Area

If upon the completion of the ELC evaluation it is determined that:

- there is a Candidate or Confirmed SWH and/or its associated VPZ and AOI on site; and /or
- there are additional KNHFs and their associated VPZ and AOI on site.

The proponent is required to proceed to Step Four.

3.4 STEP FOUR: Requirements for a Detailed Natural Heritage Evaluation

Based on the information collected in Step 3 and the nature of the development or site alteration application, the approval authority will determine which of the following scenarios are applicable:

3.4(a) Development Applications with Predictable Impacts

An approval authority may determine that the application has predictable, low level effects on a KNHF and its VPZ.

In these situations, the approval authority may determine that the KNHF can be protected through the identification of straightforward planning, design, and construction criteria, and therefore a detailed NHE is not

required. The approval authority may also use their discretion to determine if further studies are required.

It may be necessary for the applicant and approval authority to agree to specific plans, designs, and construction measures such as delineation of a building envelope and the identification and acceptance of on-site erosion and sediment controls.

Because of their size and potential for impacts, the majority of Major Development applications should be considered to have significant or unpredictable impacts that would be best addressed through a detailed NHE as described in section 3.4(b). In rare circumstances, where the area of development or site alteration is not located immediately adjacent to the Key Natural Heritage Feature and the impacts can be easily mitigated, the approval authority may waive or scope the requirements of a detailed NHE. Even in these situations however the approval authority should require the proponent to provide a full accounting of how these impacts will be mitigated.

3.4(b) Development Applications and Mineral Aggregates Operations and Wayside Pits Applications with the Potential for Significant or Unpredictable Impacts

Where the approval authority determines that:

- additional information is required to understand the nature, location, functions and sensitivity of a KNHF and its associated VPZ, or
- additional information is required to understand the nature and severity of the impacts of the proposed development or site alteration, or
- requires a detailed review and description of potential mitigation measures to protect the KNHF.

The proponent will then be required to undertake a detailed Natural Heritage Evaluation described in section 4 of this Technical Paper.

4.0 Development of a Detailed Natural Heritage Evaluation

A NHE must meet all the criteria outlined in section 23 of the ORMCP.

A Natural Heritage Evaluation should include:

- current / existing attributes and site conditions;
- assessment of the need for additional site studies / investigations to confirm the nature or location of KNHFs located on the lands

subject to the application, (or within 240, for the purposes of connectivity) before the planning / site alteration application can be assessed;

- sufficient information to determine the potential impact of the proposed development or site alteration occurring on or within 120 metres of a KNHF;
- sufficient information to determine whether defined Minimum Vegetation Protection Zones for KNHFs and Hydrologically Significant Features (HSFs) are adequate;
- the presence / identification of Rare, Threatened and Endangered species, their habitat and VPZ (MNR Technical Paper 6-03);
- the need to maintain connectivity between KNHFs, Core and Linkage areas may need to be addressed (MNR Technical Paper 3-03);
- sufficient information to establish a suitable minimum VPZ for an ANSI or SWH;
- sufficient information to determine the nature or adequacy of the proposed mitigation measures in ensuring no adverse effect on KNHFs; and
- sufficient information on the adequacy of proposed monitoring techniques.

The MNR Natural Heritage Reference Manual (1999) provides additional detail on the preparation of Natural Heritage Evaluations.

Components of a Detailed Natural Heritage Evaluation for KNHFs

In the development of a detailed Natural Heritage Evaluation for KNHFs, a proponent should include the following components in assessing the impacts of the proposal.

- 4.1 Initial Assessment Evaluation
- 4.2 Scoping
- 4.3 Evaluation of the Application
 - (a) Assessing potential impacts
 - (b) Identification of mitigation techniques
 - (c) Identification of monitoring needs
- 4.4 Review of NHE by municipal planning authority
- 4.5 Final decision

4.1 Initial Assessment Evaluation

An Initial Assessment Evaluation should include:

- identification of existing conditions including current land use;

- an outline of the development or site alteration proposal;
- assessment of policy direction and other legislative requirements; and
- supporting background information for the study area. This information may be found in municipal studies, watershed plans, Environmental Assessment studies, environment impact studies, etc.

4.2 Scoping

Scoping should include:

- identification of KNHFs and functions that maybe affected by development or site alteration;
- identification of ecological linkages, natural processes and study area boundaries;
- determination of timing and scope of studies required;
- determination of information needs and availability of information;
- determination of the nature and extent of additional information or studies that may be needed;
- determination of additional inventory work;
- application of the connectivity test as outlined in section 20 of the ORMCP (MNR Technical Paper 3-03) that is a separate evaluation procedure which can be included herein when a NHE is required; and
- identification of unknown Rare, Threatened and Endangered species (MNR Technical Paper 6-03).

The proponent should meet with the appropriate municipal planning authorities to confirm the elements that need to be included in the detailed NHE for each KNHF (Note: this may have already occurred during the gathering of background information).

Appendix 2, Table A provides suggested scoping elements for KNHF and their related functions.

For scoping elements specific to Significant Wildlife Habitat, please refer to MNR Technical Paper 2-03 and contact the MNR for Significant Wildlife Habitat Decision Support System (DSS) information. Information in the DSS outlines the habitat needs of species or groups requiring similar wildlife habitat features. The DSS is intended to be used to by planners as a guide to help understand the functions of the habitat, potential impacts, and strategies for mitigation.

4.3 Conducting the Evaluation

a) Assessing Potential Impacts

The detailed evaluation should examine the effect of the proposed development and site alteration on the size, diversity, health, connectivity, functionality and resilience of the KNHF.

The assessment should examine potential adverse effects generated before, during, and after construction.

Although the assessments of impacts should be quantitative, there are some situations where this is not possible. Impacts may be direct and measurable (eg. removal of vegetation cover) or indirect (eg. increased use by people, impacts of light glare). All impacts should be duly assessed.

At a minimum, the following should be considered in assessing potential impacts:

- the spatial extent, magnitude, frequency and duration of the impacts;
- the extent and degree to which adjacent lands will be affected;
- whether the impacts are likely to result in cumulative impacts;
- potential impacts on specific features and their functions; and
- immediate and long-term impacts upon connectivity.

(Note: data amassed during collection of background information and during evaluation of Candidate SWH may assist with detailed NHE.)

For development impacts specific to SWH, please refer to MNR Technical Paper 2-03 and contact the MNR for Significant Wildlife Habitat Decision Support System (DSS) information;

For all other KNHFs, please see Appendix 3, Table A: Potential Development Impacts and Mitigation Measures.

b) Identification of Mitigation Techniques

A detailed NHE for a KNHF should identify mitigation techniques designed to maintain the health, form and function for which the KNHF was identified.

Mitigation involves implementing measures to avoid or reduce adverse effects on the KNHF. The implementation of mitigation measures is the responsibility of the proponent.

Mitigation techniques should be effective. Ideally, they should be low maintenance without any undue, long-term maintenance expense.

In accordance with the requirements of the ORMCP, mitigation techniques must ensure that:

- the KNHF and any related minimum vegetation protection zone is maintained or restored to a natural vegetative state except for uses permitted in section 20 and 22(2) of the ORMCP.
- size, diversity, and health of the KNHF is maintained.
- connectivity is maintained (please see MNR Technical Paper 3-03) .

For mitigation techniques specific to Significant Wildlife Habitat, please refer to MNR Technical Paper 2-03 and contact MNR for Significant Wildlife Habitat Decision Support System (DSS) information.

For all other KNHFs, please see Appendix 3, Table A: Potential Development Impacts and Mitigation Measures

c) Identification of Monitoring Needs

It is recommended that the municipal planning authority identify monitoring needs to be considered as part of the planning authority's decision. There are two types of monitoring – compliance monitoring and effectiveness monitoring.

It is recommended that Monitoring Programs be established as a condition of approval. This provides planning authorities with an opportunity to review monitoring results before proceeding with subsequent phases of a development, in accordance with appropriate conditions of approval.

Examples of such conditions could include:

- adoption of planning and/or regulatory instruments such as zoning, site plans or development agreements; and
- completion of certain structural works in accordance with accepted standards.

Planning authorities may undertake compliance monitoring to ensure that the proponent has implemented mitigation measures identified in the impact assessment and that the measures are performing as predicted. Monitoring may be undertaken before, during and after construction or site alteration.

The purpose of effectiveness monitoring is to determine the adequacy of the mitigation measures identified in the impact assessment, relative to avoiding adverse effects. Such monitoring may be appropriate where:

- there is uncertainty as to the effectiveness of established mitigation measures to avoid adverse effects; and
- new and untested mitigation measures are used.

4.4 Review of NHE by Municipal Planning Authority

The applicant will be expected to submit the NHE (as a portion of a complete application) to the appropriate municipal planning authority for review and approval.

The planning authority reviews the evaluation to determine if it is acceptable. In terms of this review, the planning authority may request that further information is provided or alternative mitigation and monitoring measures be considered. Other agencies may be consulted regarding technical aspects or the planning authority may have the NHE peer reviewed. The MNR may be consulted to address questions of a general technical nature or to confirm any changes or adjustments to the status or boundaries of ANSIs, wetlands (evaluated under the Ontario Wetland Evaluation System), or significant habitat of Rare, Threatened and Endangered species. Public input to the document may also be integrated into the process.

4.5 Final Decision

In making its decision, the municipal planning authority will consider the results of the review along with other planning related matters. The planning authority's decision can be contingent on the revision of the development proposal and/or the attachment of conditions. For example, approval may be contingent upon the implementation of specific mitigation and/or monitoring measures. Alternatively, approval may be granted only after more extensive revisions to the planning application.

Ultimately, it will be the responsibility of the approval authority to ensure that the proposal and its related conditions meet the requirements of the ORMCP and are reasonable and possible to implement.

Several types of decisions may be made:

- approval of the development application in accordance with section 23(1) ORMCP;
- revisions to the proposed development to avoid impacts that the planning authority deems unacceptable;
- Attach conditions of approval to address agreed upon issues in more detail or to address new issues raised during the assessment process; or
- no approval, in situations where the tests of the ORMCP cannot be met.

Questions an approval authority should consider in reviewing a Natural Heritage Evaluation for KNHF on the ORM.

1. Will the development result in adverse effects on a KNHF?
2. Will the development result in adverse effects on the ecological functions of a KNHF?
3. Has the NHE identified planning, design and construction practices that will maintain and, where possible, improve or restore the health, diversity and size of the Key Natural Heritage Feature and its connectivity with other KNHFs?
4. Does the NHE, in the case of an application relating to land in a Natural Core Area, Natural Linkage Area or Countryside Area, demonstrate how connectivity within and between KNHFs will be maintained and, where possible, improved or restored before, during and after construction?
5. Has the NHE determined that the dimensions of a Minimum Vegetation Protection Zone are sufficient, and if not sufficient, has it specified the dimensions of the required Minimum Vegetation Protection Zone and provided for the maintenance and, where possible, improvement or restoration of natural self-sustaining vegetation within it?
6. Has the NHE addressed the requirement to: determine dimensions of a Minimum Vegetation Protection Zone where none are provided within the Table of the Plan; determine whether one is required, and if one is required, specify the dimensions of the Required Minimum Vegetation

Protection Zone and provide for the maintenance and, where possible, improvement or restoration of natural self-sustaining vegetation within it?

Appendix 1, Table A
Key Natural Heritage Features, Hydrologically Sensitive Features and Areas of Natural and Scientific Interest: Minimum Areas of Influence and Minimum Vegetation Protection Zones ORMCP.

Item	Feature	Minimum Area of Influence ORMCP	Minimum Vegetation Protection Zone ORMCP [21, 23, 26 (4), 30 (12)]
1.	Wetlands	All lands within 120 metres of any part of feature	All lands within 30 metres of any part of feature, subject to clause 23 (d) if a natural heritage evaluation is required
2.	Significant portions of the habitat of endangered, rare and threatened species	All lands within 120 metres of any part of feature	As determined by a natural heritage evaluation carried out under section 23
3.	Fish habitat	All lands within 120 metres of any part of feature	All lands within 30 metres of any part of feature, subject to clause 23 (1) (d) if a natural heritage evaluation is required
4.	Areas of natural and scientific interest (life science)	All lands within 120 metres of any part of feature	As determined by a natural heritage evaluation carried out under section 23
5.	Areas of natural and scientific interest (earth science)	All lands within 50 metres of any part of feature	As determined by an earth science heritage evaluation carried under section 30 (12)
6.	Significant valleylands	All lands within 120 metres of stable top of bank	All lands within 30 metres of stable top of bank, subject to clause 23 (1) (d) if a natural heritage evaluation is required
7.	Significant woodlands	All lands within 120 metres any part of feature	All lands within 30 metres of the base of outermost tree trunks within the woodland, subject to clause 23 (1) (d) if a natural heritage evaluation is required
8.	Significant wildlife habitat	All lands within 120 metres of any part of feature	As determined by a natural heritage evaluation carried out under section 23
9.	Sand barrens, savannahs and tallgrass prairies	All lands within 120 metres of any part of feature	All lands within 30 metres of any part of feature, subject to clause 23 (1) (d) if a natural heritage evaluation is required
10.	Kettle lakes	All lands within 120 metres of the surface catchment area	All lands within the surface catchment area or within 30 metres of any part of feature whichever is greater, subject to clause 26 (4) (c) if a hydrological evaluation is required
11.	Permanent and intermittent streams	All lands within 120 metres of meander belt	All lands within 30 metres of meander belt, subject to clause 26 (4) (c) and sub-section 26 (5) if a hydrological evaluation is required
12.	Seepage areas and springs	All lands within 120 metres of any part of feature	All lands within 30 metres of any part of feature, subject to clause 26 (4) (c) and subsection 26 (5) if a hydrological evaluation is required

Appendix 2, Table A
Suggested Scoping Elements for Specific KNHFs and their Related Functions

Feature	Scoping Elements
For all KNHFs	<ul style="list-style-type: none"> • Identification and more detailed mapping of boundaries and Minimum Vegetation Protection Zones (with the exception of ANSIs) • More detailed investigation and mapping of features for which the Feature has been identified • More detailed investigation of functions for which the Feature has been identified • More detailed investigation and mapping of ecological linkages, both form and function, including studies relating to their potential disruption • Studies of disruption to movement patterns (where applicable), key life cycle patterns, adjacency effects and how these may effect features for which the area has been identified • An inventory of flora and fauna species conducted to identify occurrences of Rare, Threatened, and Endangered species • Determination of the nature and extent of additional information or studies that may be needed
Wetlands	<p><u>Features</u></p> <ul style="list-style-type: none"> • water cover, or proximity to the water table; hydric soils and hydrophytic or water tolerant vegetation communities; other features for which the MNR has identified it <p><u>Functions</u></p> <ul style="list-style-type: none"> • primary production; watershed protection; preservation of bio-diversity; maintenance of three dimensional vegetation systems; maintenance of conditions essential for symbiosis; natural cycles (carbon, nitrogen, water); provision of species to support food chains; wildlife habitat
Fish Habitat	<p><u>Features</u></p> <ul style="list-style-type: none"> • all lands and waters within the meander belt of a permanent or intermittent stream, and kettle lakes <p><u>Functions</u></p> <ul style="list-style-type: none"> • 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
ANSI's (Life Science)	<ul style="list-style-type: none"> • Evaluation protocols for individual ANSIs must be obtained from the MNR, including elements requiring scoping (i.e. those features and functions for which the ANSI has been identified by the MNR)
Significant Woodlands	<p><u>Features</u></p> <ul style="list-style-type: none"> • the aerial extent of the woodland (irrespective of ownership); woodland configuration and contiguity, proximity to other

	<p>habitat types, interior vs. edge habitat, diversity including community types, species composition, age class, uncommon characteristics with respect to composition, cover type, quality, age and age structures as well as older woodlands (>100yrs.)</p> <p><u>Functions</u></p> <ul style="list-style-type: none"> • presence of sensitive wildlife species, woodland impact upon water quantity and quality, uptake of toxins and excess nutrients, protection of groundwater recharge areas, degree of riparian cover, nutrient cycling / food webs, potential impact upon drainage to and from the woodland, wildlife habitat
Sand Barrens, Tallgrass Prairies and Savannahs	<p><u>Features</u></p> <ul style="list-style-type: none"> • plant communities including percent tree vs. herbaceous cover, plant species listings, soil types and depths, moisture regime, nitrogen levels, faunal species <p><u>Functions</u></p> <ul style="list-style-type: none"> • presence of sensitive wildlife species, nutrient cycling / food webs, potential impact of drainage to and from the feature, bio-mass production, wildlife habitat
Significant Valleylands	<p><u>Features</u></p> <ul style="list-style-type: none"> • top of bank to top of bank, or other boundary limits such as area of land within the floodplain; land within the meander belt or land within the highest general level of seasonal inundation; conveyance of and provision for short-term storage of storm and melt waters; springs; seepage areas; fish and wildlife habitat; slopes; natural vegetation to top of bank <p><u>Functions</u></p> <ul style="list-style-type: none"> • flow and groundwater recharge and/or discharge; floodplain inundation; meandering of a watercourse; use as a wildlife corridor
Significant Wildlife Habitat	<p>Boundary Determination (please see Technical paper 2-02 as well as information in the Appendices)</p> <p><u>Features / Functions</u></p> <ul style="list-style-type: none"> • More detailed investigation of the location and numbers of wildlife species that occupy a Confirmed SWH • Where the study requires confirmation of the presence or absence of certain species, breeding activity, seasonal concentration, the proponent should confirm the timing, frequency and nature of the field work • The information provided in Appendices, section 5 of MNR Technical Paper 2-03, will provide additional guidance with respect to identifying and developing more specific studies for Confirmed SWH
Habitat of Rare, Threatened, Endangered Species	<p><u>Features / Functions</u></p> <ul style="list-style-type: none"> • To be determined by the specific requirements of the species being examined.

**Appendix 3, Table A: Potential Development Impacts and Mitigation Measures
(Attachment C.3, Natural Heritage Reference Manual, OMNR, 1999)**

Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
SITE PREPARATION AND SERVICING			
<p>1. Vegetation Removal</p> <p>A) <u>Shoreline/Riparian Areas</u></p> <ul style="list-style-type: none"> • Clearing • Grubbing 	<ol style="list-style-type: none"> 1. Loss of shade may result in increased water temperatures 2. Reduced inputs of leaves, twigs, and insects to water bodies 3. Reduced bank stability and ability to trap sediment from upland areas; increased erosion, sedimentation and turbidity 4. Reduced stability of sensitive landforms; increased erosion of landforms 5. Loss or disturbance of riparian wildlife species 	<ol style="list-style-type: none"> 1. Water temperatures may exceed tolerance of cold and cool water fish species; changes in fish species composition and abundance 2. Reduced food supply for aquatic life (including fish) 3. Decreased photosynthesis, loss of productivity, loss of fish habitat (eg. spawning areas), loss of food organisms, avoidance of areas by fish; changes in fish species composition and abundance 4. Loss of all or part of earth science feature, valleyland, etc. 5. Reduced cover and food supply for species such as otter, mink, beaver and wintering deer; loss of habitat for species requiring both aquatic and terrestrial areas; interruption of riparian corridors 	<ol style="list-style-type: none"> 1. Maintain as much riparian vegetation as possible to maximize shading <ul style="list-style-type: none"> • plant appropriate species 2. Maintain as much riparian vegetation as possible to provide a food supply 3. Maintain riparian vegetation; develop and implement an erosion and sediment control plan before removing vegetation; stabilize banks where necessary 4. Avoid vegetation removal on sensitive landforms 5. Maintain riparian vegetation and adjacent forests where they exist <ul style="list-style-type: none"> • rehabilitation/restoration • maintain important wildlife areas (eg. cover, nesting habitat, movement corridors)

Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
SITE PREPARATION AND SERVICING			
B) <u>Upland Areas</u> <ul style="list-style-type: none"> • Clearing • Grubbing 	<ol style="list-style-type: none"> 1. Increased erosion, sedimentation and turbidity and decrease in shade, cover and diversity of vegetation 2. Loss of vegetation and wildlife habitat or loss of significant portions of habitat 	<ol style="list-style-type: none"> 1. Decreased photosynthesis, loss of productivity, loss of fish habitat, loss of food organisms, avoidance by fish; changes in fish species compositions and abundance; smothering upland and wetland vegetation 2. Direct habitat loss (eg. winter cover, nesting trees or important food sources); reduction in habitat below a critical level (eg. woodland habitat for forest interior birds) habitat fragmentation <ul style="list-style-type: none"> • Greater exposure of wildlife to predation and parasitism • Site may be more vulnerable to invasion by non-native species • decreased biodiversity 	<ol style="list-style-type: none"> 1. Maintain vegetative buffers; develop and implement an erosion and sediment control plan before removing vegetation 2. Identify and avoid/protect critical components of wildlife habitat (eg. winter cover, hibernation sites, migration staging areas, nesting trees) Design the development to minimize loss of vegetation <ul style="list-style-type: none"> •Revegetate after development with native species •Encourage cluster development to avoid housing adjacent to significant natural features •Avoid fragmenting forests, and severing linkages; consider restoration and planting projects

Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
SITE PREPARATION AND SERVICING			
B) <u>Upland Areas</u> <ul style="list-style-type: none"> • Clearing • Grubing (CONTINUED)	3. Loss of linkages and corridors for animal movement 4. Disturbance of wildlife species 5. Loss of rare plant species and communities 6. Reduced stability of landforms composed of unconsolidated material (esker, moraine, dune, etc.)	3. Isolation of species, loss of genetic and biodiversity 4. Noise due to clearing activities may disturb concentrations of wildlife (deer yards, colonially-nesting birds) or those sensitive to human disturbance 5. Loss of species and biodiversity 6. Reduced integrity of landform and loss of significance or loss of Earth Science ANSI	3. Leave a buffer around habitats of significant species; identify important animal movement corridors; avoid eliminating corridors 4. Time activities to avoid wildlife disturbance, leave a buffer area around sensitive species 5. Avoid disturbing habitats of rare plant species and communities and establish appropriate buffers 6. Minimize vegetation removal on slopes; no roads or skidder tracks; no aggregate pits

Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
SITE PREPARATION AND SERVICING			
2. Grading	<ol style="list-style-type: none"> 1. Increased erosion, sedimentation and turbidity; increased inputs of nutrients and contaminants to water bodies and wetlands 2. Changes in natural drainage, including elimination of streams, increased or decreased surface runoff; increased or decreased streamflows 3. Changes in soil moisture and species composition of vegetation 4. Disturbance of wildlife, particularly sensitive species 	<ol style="list-style-type: none"> 1. Decreased photosynthesis, loss of productivity, loss of fish habitat, loss of food organisms, avoidance by fish, lethal or sub-lethal toxic effects on aquatic life; changes in fish species composition and abundance; changes in wetland plant communities 2. Loss of fish habitat (eg. water, spawning areas), loss of food organisms; changes in fish species composition and abundance; changes in wetland plant communities, channel erosion, change in geomorphology 3. Loss of important wildlife species or habitat 4. Reduced number of species or reduced abundance of a species 	<ol style="list-style-type: none"> 1. Maintain vegetative buffers; develop and implement an erosion and sediment control plan; control access and movement of equipment; time activities to avoid sensitive periods of habitat use (eg. spawning); schedule to minimize area and duration of soil exposure 2. Minimize changes in land contours and natural drainage; maintain streams (permanent and intermittent) and timing and quantity of flows 3. Minimize vegetation removal and changes in land contours and natural drainage 4. Identify sensitive species prior to the work, design grading to avoid disturbance of sensitive species; conduct work at a time that is least disturbing to

	5. Alteration or destruction of landforms composed of unconsolidated materials (eg. kames, eskers, sand dunes)	5. Loss of earth science ANSI, valleyland, etc.	sensitive species 5. Avoid grading of areas containing significant landform features
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Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
SITE PREPARATION AND SERVICING			
2. Aggregate Extraction	<ol style="list-style-type: none"> 1. Alteration or destruction of landforms 2. Increased erosion, sedimentation and turbidity; increased inputs of nutrients and contaminants to water bodies and wetlands 3. Changes in natural drainage, including altered surface runoff; altered stream-flows 4. Changes in soil moisture and species composition of vegetation 5. Disturbance of wildlife, particularly sensitive species 	<ol style="list-style-type: none"> 1. Alteration to subsurface flow regime 2. Decreased photosynthesis, loss of productivity, loss of fish habitat, loss of food organisms, avoidance by fish, lethal or sub-lethal toxic effects on aquatic life; changes in fish species compositions and abundance; changes in wetland plant communities 3. Loss of fish habitat (eg. water, spawning areas), loss of food organisms; changes in fish species composition and abundance; changes in wetland plant communities, channel erosion, change in geomorphology 4. Loss of important wildlife species or habitat 5. Reduced number of species or reduced abundance of a 	<ol style="list-style-type: none"> 1. Minimize extraction in sensitive head water areas 2. Maintain vegetative buffers; develop and implement an erosion and sediment control plan; control access and movement of equipment; time activities to avoid sensitive periods of habitat use (eg. spawning); schedule to minimize area and duration of soil exposure 3. Minimize changes in land contours and natural drainage; maintain streams (permanent and intermittent) and timing and quantity of flows 4. Minimize vegetation removal and changes in land contours and natural drainage 5. Identify sensitive species prior to the work, design work to

		species	avoid disturbance of sensitive species; conduct work at a time that is least disturbing to sensitive species
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Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
SITE PREPARATION AND SERVICING			
4. Installation of Services and Utilities (eg. water sewers, hydro, storm water management facilities)	<ol style="list-style-type: none"> 1. Increased erosion, sedimentation, turbidity; increased inputs of nutrients and contaminants to water bodies 2. Disturbance of wildlife, particularly sensitive species 3. Alteration of identified, significant rock types, fossil assemblages or landforms by tunnelling or blasting 4. Hydrological changes (eg. changes in water levels as a result of re-routed water flow) 5. Fragmentation of natural areas 	<ol style="list-style-type: none"> 1. Decreased photosynthesis, loss of productivity, loss of fish habitat, loss of food organisms, avoidance by fish; changes in fish species composition and abundance 2. Reduced abundance of species 3. Loss of significant earth science values 4. Changes in vegetative communities and fish and wildlife assemblages; reduction in groundwater recharge 5. Corridors through wetlands 	<ol style="list-style-type: none"> 1. Maintain vegetative buffers; develop and implement an erosion and sediment control plan; time activities to avoid sensitive periods of habitat use; re-establish vegetation as soon as possible 2. Identify sensitive species prior to the work, conduct work at a time that is least disturbing to sensitive species 3. Identify and avoid significant earth science features when planning and installing services; minimize the amount of disturbance 4. Conduct appropriate studies to determine how to maintain existing hydrological regime; design underground facilities to minimize impacts on groundwater flows (seepage collars, orientation and depth of trenches, etc.) 5. Avoid forest fragmentation; if

		fragment habitat; reduce or eliminate forest-interior species; increased nest predation and parasitism; introduction of non-native species	services must go through forests, route the corridor through edges instead of the interior
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Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
CONSTRUCTION			
2. Building Construction	<ol style="list-style-type: none"> 1. Increased erosion, sedimentation and turbidity; increased inputs of nutrients to water bodies and wetlands 2. Water contamination by oils, gasoline, grease and other materials 3. Increase in impervious surfaces; increased surface runoff, reduced infiltration and groundwater discharge; reduced stream base-flows and upwelling; loss of vegetation resulting in increased water temperatures 4. Loss of vegetation 	<ol style="list-style-type: none"> 1. Decreased photosynthesis, changes in productivity, loss of fish habitat, loss of food organisms, avoidance by fish; changes in fish species composition and abundance; loss of stream channel stability; changes in plant communities 2. Lethal or sub-lethal toxic effects on aquatic life and vegetation 3. Loss of fish habitat (eg. water, spawning areas for brook trout); changes in fish species composition and abundance; changes in wetland vegetation communities; drying of wetlands 4. Loss or fragmentation of wildlife habitat; loss of biodiversity 	<ol style="list-style-type: none"> 1. Maintain vegetative buffers; control erosion, sedimentation and nutrient inputs through use of Best Management Practices (BMPs) 2. Control water contamination through BMPs 3. Maintain or provide vegetative buffers; control quantity and quality of storm water discharge using BMP's 4. Maintain a buffer between buildings and significant wildlife habitats; cluster housing as much as possible to avoid habitat fragmentation; ensure a threshold level of habitat is maintained for sensitive wildlife

	<ol style="list-style-type: none"> 5. Disturbance of wildlife 6. Loss of wildlife (eg. mortality due to collisions with buildings) 	<ol style="list-style-type: none"> 5. Introduction of non-native species of plants and wildlife; increased predation and parasitism on native wildlife 6. Avoidance of the area by wildlife species 	<p>species (eg. forest interior species)</p> <ol style="list-style-type: none"> 5. Ensure that important animal movement corridors are not lost; develop alternate corridors, cover etc., where possible 6. Identify species sensitive to disturbance and time construction to avoid period of habitat use <ul style="list-style-type: none"> • appropriate building design to prevent / minimize mortality
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Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
CONSTRUCTION			
2. Water Crossings (roads)	<ol style="list-style-type: none"> 1. Realignment of stream channel; changes in water velocity 2. Increased erosion, sedimentation and turbidity 3. Loss of riparian vegetation 4. Impediment of lateral flows in wetlands 	<ol style="list-style-type: none"> 1. Barrier to fish movement may be created; may create downstream erosion or sediment deposition; separation of stream from floodplain 2. Decreased photosynthesis, changes in productivity, loss of fish habitat, loss of food organisms, avoidance by fish; changes in fish species composition and abundance; changes in wetland vegetation 3. Loss of habitat for certain wildlife species (eg. loons, ducks, reptiles and amphibians); water temperature may exceed tolerance of cold and cool water fish species 4. Significant alterations in wetland vegetation communities; potential change of wetland type; changes in wildlife populations 	<ol style="list-style-type: none"> 1. Maintain existing stream channel; use bridges to span stream; time construction to avoid sensitive periods of habitat use (eg. spawning) 2. Minimize width of right-of-way; develop and implement an erosion and sediment control plan 3. Minimize width of right-of-way; time construction to avoid sensitive periods of habitat use (eg. nesting, spawning); replant vegetation 4. Install adequate culverts and gravel base to maintain flow of surface water and shallow groundwater

	5. Attraction of nesting turtles and other wildlife to roadsides and roads	5. Mortality due to road-kill	5. Build roadside wings to keep turtles off roads; build underpasses with funnel fencing to direct turtles and other wildlife to develop alternate egg laying sites
	6. Pollutants from road	6. Heavy metals, oils and grease from vehicles	6. Collect and treat road runoff in storm water management facilities

Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
CONSTRUCTION			
1. Paving	<ol style="list-style-type: none"> 1. Increase in impervious surfaces; increased surface runoff and stream peak flows; reduced infiltration, base-flows and upwellings 2. Increased erosion, sedimentation and turbidity from increased peak flows; increased inputs of nutrients and contaminants to water bodies and wetlands 3. Increased water temperatures 4. Loss of wildlife habitat 5. Barrier to wildlife movement 	<ol style="list-style-type: none"> 1. Loss of fish habitat (eg. water upwelling/ spawning areas for brook trout); changes in fish species composition and abundance; changes in wetland vegetation communities 2. Loss of fish habitat; lethal or sub-lethal toxic effects on aquatic life; changes in wetland vegetation communities and productivity 3. Loss of cold and cool water fish species, where water temperatures exceed their tolerances 4. Same as for vegetation removal and construction of buildings (wildlife habitat) 5. Some small mammals may not 	<ol style="list-style-type: none"> 1. Minimize area of paved surfaces; design roads without curbs, gutters and sidewalks to promote infiltration; maintain or provide vegetative buffers; control quantity and quality of storm water using BMP's 4. Same as for vegetation removal and construction of buildings (wildlife habitat) 5. Extend bridges beyond

	6. Wildlife mortality on roads	cross paved surfaces 6. Paved surfaces which intersect movement corridors can cause high mortality	watercourse shorelines to allow wildlife passage 6. Avoid intersecting wildlife migration routes wherever possible; funnel wildlife through culverts
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Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
ACTIVITIES ASSOCIATED WITH DEVELOPMENT			
1. Groundwater taking	1. Reduced groundwater discharge; reduced stream base-flows and upwelling; increased water temperature	1. Loss of fish habitat (eg. water, spawning areas for brook trout); changes in fish species composition and abundance; changes in wetland hydrology and vegetation communities 2. Loss of moisture-sensitive vegetation communities and species which depend on them	1. Control rate and timing of water pumping; control lawn watering; pump from deep wells to infiltration galleries adjacent to water bodies or wetlands
2. Use of septic systems	1. Increased inputs of nutrients and contaminants to water bodies and wetlands; increased algal growth, reduced oxygen levels 2. Faulty systems may adversely affect vegetation	1. Loss of fish habitat (eg. reduced oxygen in deep portions of lake trout lakes); lethal or sub-lethal toxic effects on aquatic life; changes in fish species composition and abundance; changes in wetland vegetation communities and productivity; loss of waterfowl species 2. Loss of vegetation can destabilize vegetation or landforms	1. Make alternative servicing arrangements or use alternative nutrient removal technologies approved by Ministry of the Environment 2. Avoid installing system near sensitive vegetation or landforms

Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
ACTIVITIES ASSOCIATED WITH DEVELOPMENT			
3. Human occupation	<ol style="list-style-type: none"> 1. Increased inputs of nutrients and contaminants to water bodies and wetlands from use of fertilizers, pesticides, etc. 2. Trampling of vegetation and soil compaction' increased erosion sedimentation and turbidity 3. Removal of vegetation; changes in vegetation structure and composition 4. Increased predation on wildlife by pets; introduction of non-native plants (eg. purple loosestrife); invasion by predators, parasites and competitive species 	<ol style="list-style-type: none"> 1. Increased productivity, increased algal growth, reduced oxygen levels; lethal or sub-lethal toxic effects on aquatic life and wildlife species 2. Loss of fish habitat and food organisms; changes in fish species composition and abundance 3. Loss of wildlife habitat; reduced number of wildlife; loss of species, reduced biodiversity 4. Reduced numbers of wildlife; loss of species; reduced biodiversity and wildlife reproductive success 	<ol style="list-style-type: none"> 1. Avoid use of fertilizers and other chemicals in shoreline or riparian areas; maintain or provide vegetative buffers 2. Minimize erosion by using gravel, stones or wood on paths; fencing or other deterrents to humans 3. Cluster housing so people are concentrated and less habitat is disturbed 4. Public education / awareness may help over the long term

Development Activity	Potential Physical Impacts	Potential Impacts on Functions and Features	Examples of Some Possible Mitigation and Avoidance Techniques
ACTIVITIES ASSOCIATED WITH DEVELOPMENT			
4. Recreation (eg. walking, swimming, boating, fishing, hunting and use of all terrain vehicles)	<ol style="list-style-type: none"> 1. Increase in shoreline alterations (eg. dredging, docks, beach creation) to support recreational use; 	<ol style="list-style-type: none"> 1. Changes in productivity, loss of fish habitat (eg. nursery and food organisms) by shoreline alterations and covering 	<ol style="list-style-type: none"> 1. Choose designs (eg. floating docks) and materials which will minimize impacts

	<p>removal of aquatic vegetation, logs etc.; increased erosion, sedimentation and turbidity</p> <ol style="list-style-type: none"> 2. Trampling of vegetation, damage to root mat, soil disturbance; introduction of invasive, non-native plant species 3. Disturbance of wildlife species, especially during critical periods 4. Attraction of some wildlife species (eg. bird feeding) 5. Reduced opportunities for hunting and trapping in developed areas; increase in deer-vehicle accidents 6. Increased harvest of fish 7. Trampling of sensitive life science or earth science features (eg. sand dunes) 8. Access to sensitive sites (fossil and mineral localities) 	<p>substrate; changes in fish species composition and abundance</p> <ol style="list-style-type: none"> 2. Loss of wildlife habitat 3. Loss of wildlife species and reduced numbers of wildlife 4. Increased numbers of some species; increase in nuisance species (eg. squirrels) 5. Increase in nuisance species (eg. racoons, deer) 6. Reduced numbers of fish 7. Loss of all or part of sensitive feature or area 8. Site stress from vandalism; loss of integrity 	<ol style="list-style-type: none"> 2. Develop trails for walking and trail bikes that direct people away from sensitive habitats 3. Restrict some areas for ATV's; education 4. Educate the public about attracting nuisance species 5. Educate the public about attracting nuisance species 6. Comply with fishing regulations; exercise stewardship 7. Locate development away from sensitive feature or area 8. Route recreation away from feature
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