CONSERVATION SUDBURY
DETERMINATION OF REGULATION LIMITS REFERENCE MANUAL
PREAMBLE TO 2021 RELEASE

Under *Ontario Regulation 156/06 Nickel District Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* (O. Reg. 156/06), made pursuant to the *Conservation Authorities Act* R.S.O. 1990, Conservation Sudbury regulates "development" (as defined within the Act) in areas within or adjacent to the following features:

- At the shoreline of inland lakes:
  - Flood hazards,
  - Erosion hazards,
  - Dynamic beach hazards, and
  - At the shoreline of Wanapitei Lake (classified as large inland lake), wave uprush or other water related hazards.
- Along riverine systems:
  - Flood hazards, and
  - Erosion hazards.
- Wetlands, and the area of interference to a wetland (distance as defined by wetland size), and
- Hazardous lands (unstable soils).

The above regulated features and the regulatory authority of Conservation Sudbury are defined in O. Reg. 156/06. These definitions supersede any definitions and descriptions provided in the attached reference manual.

To coincide with the release of the most current Regulation in 2006, Conservation Sudbury developed the following *Determination of Regulation Limits Reference Manual*. This document was developed to provide support in the interpretation of the Regulation and is intended as a high-level guideline to provide insight into the regulated features and respective limits. It should be noted that the regulated area includes the features themselves, plus an additional allowance of 15 meters (and up to 120 meters for wetlands).

It is important to be aware that features are regulated as they appear on the landscape. The published Regulated Areas Mapping Tool (available on the Conservation Sudbury website) shows the extent of the mapped regulated area and is based on the best available information and most recent studies available for any given feature and location. This mapping should be used as a high-level screening tool.

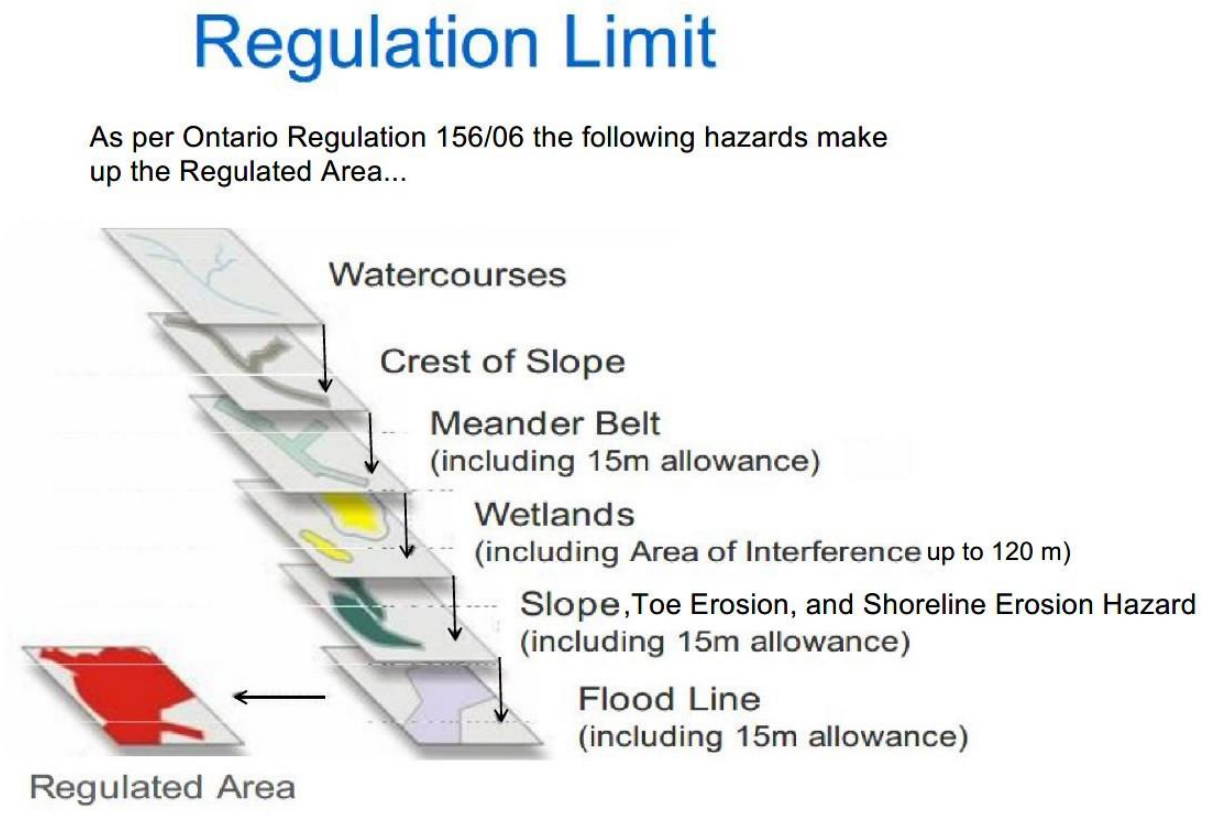
It is the proponent's responsibility to identify all regulated features within and adjacent to their proposed development area. If there are known or suspected regulated features on the property, the location and nature of such features must be included in all submissions to Conservation Sudbury. In some cases, the proponent may need to engage a qualified professional to determine the presence, location and extent of regulated features. It is encouraged that Conservation Sudbury be contacted to provide support for this site-specific evaluation.

The guidance provided in the *Determination of Regulation Limits Reference Manual* is largely based on the Ministry of Natural Resources and Forestry (MNFR) Guidelines listed below:

- Hazardous Sites Technical Guide V 1.0, December 1996
- Technical Guide, River & Stream Systems: Flooding Hazard Limit, 2002
- Technical Guide for Large Inland Lakes, 1996
- Technical Guide: River & Stream Systems: Erosion Hazard Limit, 2002

Applications for development within regulated areas will be reviewed against guidance outlined in the MNRF technical documents, and proponents preparing applications for development should refer to these technical guidelines. In the case of discrepancy between the *Determination of Regulation Limits Reference Manual* and the MNRF documents, the MNRF documents will prevail.

It should be noted that a new Regulation is anticipated within the coming year to replace the current O.Reg. 156/06. Any changes introduced in this Regulation may modify the interpretation of each hazard and the identification of the hazard limits.



NICKEL DISTRICT CONSERVATION AUTHORITY

Reference Manual

DETERMINATION OF REGULATION LIMITS

January 2006

Nickel District Conservation Authority

Determination of Regulation Limits

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1.0 INTRODUCTION

The Nickel District Conservation Authority (NDCA) is currently developing a new Regulation for the hazardous lands, river and stream valleys, the Wanapitei Lake shoreline, smaller inland lakes, wetlands, watercourses and other areas as approved by the Minister of Natural Resources, within the Authority's jurisdiction. The other areas include an Area of Interference around wetlands. This new Regulation is being developed in conformity with Ontario Regulation 97/04 — Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation (Generic Regulation) made under Section 28(6) of the Conservation Authorities Act and will ultimately form part of the NDCA — Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. This will replace the Authority's existing Fill, Construction and Alteration to Waterways Regulation (Ontario Regulation 161/90). These Terms of Reference are consistent with the *Guidelines for Developing Regulation Schedules,* (Conservation Ontario, 2003).

These Terms of Reference and the text of the new Regulation are the first step and will be followed by the development of the maps referenced in section 12 of the new Regulation. It is through the guidance of these documents that the mapping procedures will be developed and the new maps created. The new Regulation is to be implemented by May 1, 2006. As the maps are completed, they will be appended to the new Regulation. These maps will progress as funds are made available. In the interim screening maps will be developed that allow the staff of the NDCA and the public to determine whether or not it is likely that a permit will be required for any proposed works. The text of the regulation will always prevail over the screening maps and ultimately over the new Regulation maps. The screening maps are a means for quickly identifying the need for permission, however, it will be necessary to refer to more detailed maps and/or to conduct a site-by-site analysis of the property in question before processing an application.

1.1 TIMELINE

The *Conservation Authorities Act,* (R.S.O. 1990), states that the Conservation Authority must have maps available for public review filed at the head office of the Authority. These maps ultimately must show all requisite hazards, however in the interim, a set of lesser quality screening maps may be used to show the location of the regulated lands. A jurisdiction map, along with a screening map(s), the text of the new Regulation and this Reference Manual will be completed in time to meet the May 1, 2006 deadline.

The 1:70,000 screening map will be based on the 1:20,000 Ontario Base Maps (OBMs) data for the NDCA's jurisdiction. The digital 1:20,000 OBM maps will be used as the base for the new Regulation maps and as the requisite hazards are identified for each section they will be added to the base data, creating a more

detailed map. The regulation lines (flood lines) from the existing.1:2,000 and 1:2,400 scale flood plain maps have been digitized and added to the base maps and screening map(s). It is proposed that new and revised hazards will be defined and digitized from 1:2000 scale mapping or detailed studies and added to the base data. The focus will be on the areas within the urban growth areas of the City of Greater Sudbury with the text of the Regulation taking precedence elsewhere. This is due to the prevalence of data that exists for these areas and also due to the increased amount of development pressure that is currently being experienced there. Once all of the hazards are identified and mapped within the urban areas of the City of Greater Sudbury, the focus will shift to the outlying areas within the city limits then to the unorganized areas where less data exists.

The 1:70,000 screening map for the public information meetings will be replaced with a set of 1:20,000 screening maps for office use. Where 1:2000 base maps exist this data will be used as part of the screening process, will be referenced on the screening map and used to upgrade and/or replace the corresponding area of the screening map. Support documentation which can be converted to GIS format such as ortho-imagery, aerial photographs and property detail from reliable sources will be added as layers.

In some instances, requisite hazard features may not be identified on the OBM maps. The maps are based on the best information available, and in Northern Ontario, there is an abundance of rural land, some of which is very remote. This makes it extremely difficult to identify all features throughout the NDCA jurisdiction. However, the creation of a digital geo-spatial database for this area facilitates the addition of new or updated data as it becomes available. This data can then generally be quickly subjected to the procedures set out for identifying hazards under Regulation 97/04 and maps can easily be generated from this new data. The most difficult and time consuming part of developing the new Regulation maps is the digitizing and geo-referencing of pre-existing analog data.

2.0 GENERAL OBJECTIVES

The NDCA has formulated a set of primary objectives, which will form the foundation for the decision-making process required in the development of the Generic Regulation. These objectives will guide the Authority's regulation of hazardous lands, river and stream valleys, shorelines, wetlands, watercourses and other areas. These objectives include, but are not necessarily limited to, an Authority regulation program designed to:

- prevent loss of life,
- minimize property damage and social disruption,
- reduce public and private expenditure for emergency operation, evacuation and restoration,
- minimize the hazards and unnecessary development of riverine floodplains and flood and erosion susceptible shoreline areas which in future years may require expensive protection measures,
- regulate works and development which, singularly or collectively, may reduce riverine channel capacities to pass flood flows resulting in increased flood levels, and creating potential danger to upstream and downstream landowners,
- control filling and/or draining of natural storage areas such as wetlands,
- encourage the conservation of land through the control of construction and placement of fill on existing or potentially unstable valley slopes or shoreline bluffs,
- reduce soit erosion and sedimentation from development activity,
- control pollution or other degradation of existing and potential groundwater aquifer(s) and aquifer recharge areas, created by fill activities, and,
- control water pollution, sedimentation, and potential nuisances due to floating objects and debris.

3.0 NDCA WATERSHED

The NDCA jurisdiction (Figure 3.1) is comprised of part of each of the following member municipalities in addition to a number of unorganized townships:

- City of Greater Sudbury
- Township of Nairn

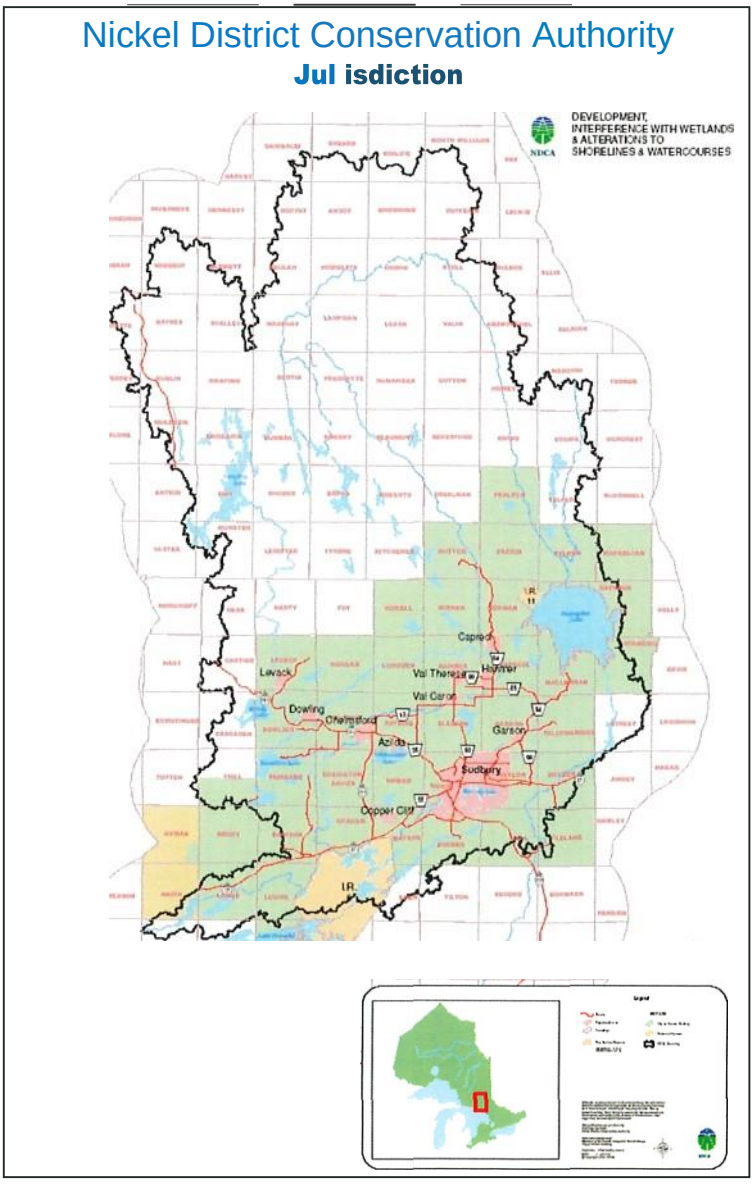

Figure 3.1 — NDCA Watershed

4.0 RIVERINE HAZARDS

Riverine Hazard Limits address the potential hazards resulting from the proximity of development to river and stream systems. These systems include all watercourses, rivers, streams and small inland lakes. Small inland lakes are those lakes that have a surface area of less than 100 square kilometres and have a measurable and predictable response to a single runoff event.

Potential hazards associated with rivers, streams and their valley lands include flooding, stream bank and valley erosion, and the erosion that can be attributed to meandering rivers or streams. The following sections outline the methods that will be implemented to create the boundaries of these hazardous lands.

River and stream valleys are the depressional features associated with a river or stream, whether or not they contain a watercourse, and the valleys can either be apparent as in confined riverine systems or not apparent as in unconfined riverine systems. The primary difference in the two systems is the presence of a valley wall at least 2 metres in height in confined systems. Both systems are subject to erosion and flooding hazards, but unconfined systems may also be subject to the possibility of the presence of a meander belt.

4.1 RIVERINE FLOODING HAZARD LIMIT

The Riverine Flooding Hazard Limit is based on the greater of The Timmins Flood Event Standard or The 100 Year Flood Event Standard (rainfall or snowmelt, or a combination of rainfall and snowmelt producing at any location in a river, creek, stream or watercourse, a peak flow that has a probability of occurrence of one percent during a given year).

Within the NDCA watershed, the floodplain for most sub-watersheds (less than 300 km^2) is calculated based on The Timmins Flood Event Standard as it produced the greater flows. The bulk of the floodplain mapping for the City of Greater Sudbury was completed in the 1977 to 1985 period.

Table 1 lists the watersheds within the Nickel District jurisdiction for which floodplain mapping has been produced and the standards for their respective floodlines. Floodlines from the various floodplain-mapping sources have been digitized for use in the determination of the Riverine Flooding Hazard Limit throughout the NDCA jurisdiction.

TABLE 1

Location	**Floodline Source**	Storm Standard
Junction Creek	1985 Floodplain Mapping Study Kilborn Ltd	Timmins/ 100 year
Whitson River	1988 Floodplain Mapping Study S.A Kirchhefer Ltd	Timmins/ 100 year
Onaping River	1982 Floodplain Mapping Study Dennis & McLaren	Timmins/ 100 year
Vermilion River (Upper)	1980 Floodplain Mapping Study, A P & D	100 year
Vermilion River (Lower)	1980 Floodplain Mapping Study, A P & D	100-Year
Meatbird Creek	1984 Floodplain Mapping Study S.A Kirchhefer Ltd	Timmins/ 100 year
Fairbanks Creek	1986Floodplain Mapping Study S.A Kirchhefer Ltd	Timmins
Coniston Creek	1983 Floodplain Mapping Study S.A Kirchhefer Ltd	Timmins/ 100 year
Wahnapitae River	1983 Floodplain Mapping Study S.A Kirchhefer Ltd	100-Year
Whitewater Lake	1978 Floodplain Mapping Study Crysler & Lathem	Timmins/ 100 year
Whitefish River	1983 Floodplain Mapping Study, Dillon	Timmins/ 100 year
Vermilion River — Capreol	1982 Floodplain Mapping Study, Dillon	Timmins/ 100 year
Moose Creek (Onaping)	1986 Floodplain Mapping Study S.A Kirchhefer Ltd	Timmins
Moose Creek (Wahnapitae)	1986 Floodplain Mapping Study S.A Kirchhefer Ltd	Timmins
Landry Creek	1983 Floodplain Mapping Study, Dillon	Timmins

In the urban areas of the City of Greater Sudbury, floodplain elevations were produced for most drainage areas greater than 125 hectares as part of the study areas where the base mapping was available and considered to have a high degree of accuracy (i.e. 1:2000 scale). Drainage areas smaller than 125 hectares were considered to be the responsibility of the municipality. Floodplain mapping has been completed for some areas that are outside the urban areas of the City of Greater Sudbury where flooding had been experienced or development pressures were present.

The floodplain is developed in accordance with established criteria (i.e. Federal-Provincial, Guidelines for developing schedules of regulated areas (Section 3),etc.). In a basic system, the floodplain is determined through a hydrologic simulation of the specified storm centred over the watershed being studied, and a hydraulic model that analyzes the effect of conveying the storm runoff through the watershed. The simulation takes into account various features of the watershed including soil type and degree of saturation, vegetation, grades and pre-existing land uses. The floodline is placed on either side of the existing channel, in the case of riverine systems, and indicates the area, which is to be protected by the regulation. Figures 4.1 and 4.2 display the application of the modelling in delineating the floodline.

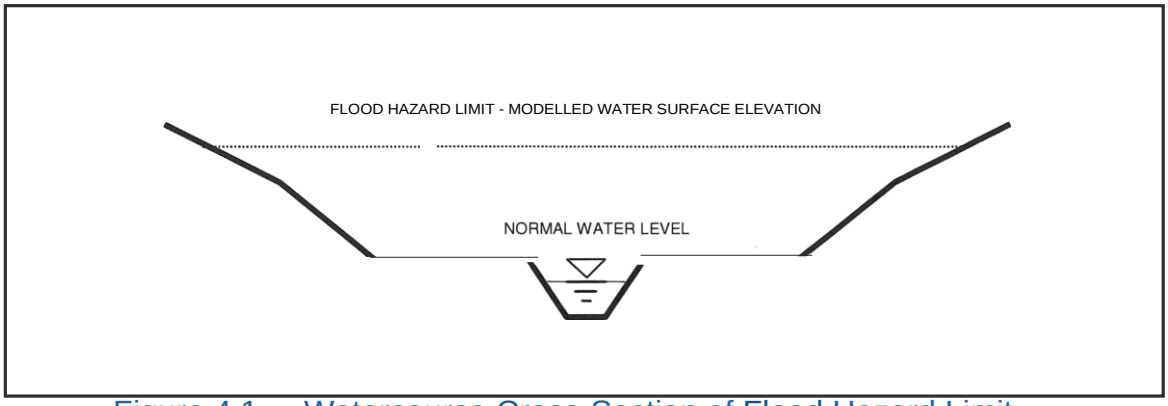

Figure 4.1 — Watercourse Cross-Section of Flood Hazard Limit

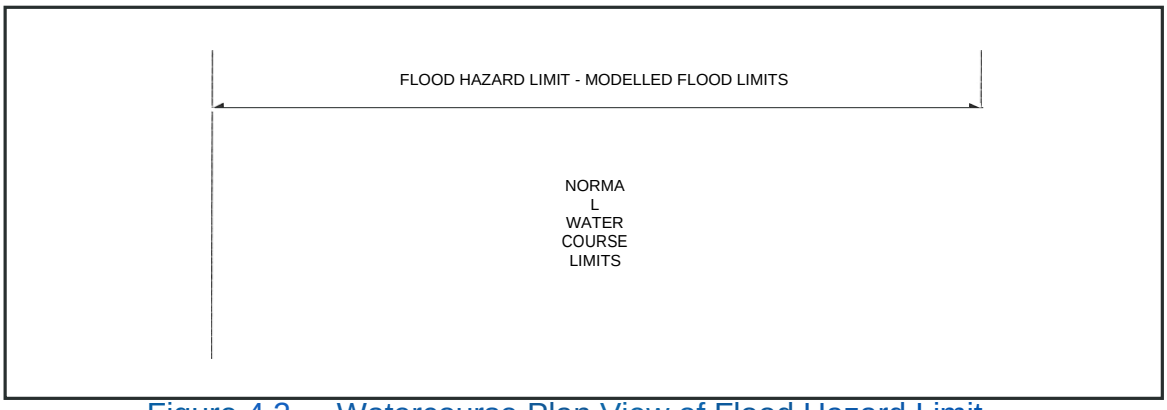

Figure 4.2 — Watercourse Plan View of Flood Hazard Limit

4.2 RIVERINE EROSION HAZARD LIMIT - CONFINED SYSTEMS

The Erosion Hazard Limit for a riverine system consists of the valley Top of Slope and where necessary, the Toe Erosion Allowance, and the Stable Slope Allowance for a confined riverine system. A confined system is identified by a

clearly visible valley (notable break in slope) shown on the mapping used within this project.

The following table details the number and scales of maps to be used to delineate the Erosion Hazard Limits for riverine systems.

Table 2: Base Mapping used for Riverine Erosion Hazard Limits

MUNICIPALITY	SCALE	NUMBER OF MAPS
Unorganized Townships	1:20,000 Ontario Base Maps	70
City of Greater Sudbury	1:20,000 Ontario Base Maps	49
City of Greater Sudbury	1:2,000 Base Maps	959

In addition, the 1":200' floodplain mapping for a portion of the Whitson River currently in use by NDCA will be used as a reference for areas where features are not fully evident.

The geo-referenced ortho photography (air photos — City of Greater Sudbury) will be used to check watercourse location and limits.

4.2.1 Valley Top of Slope — Confined Riverine Systems

The Valley Top of Slope is the break in slope point between the valley side slope and the tableland, and should be discernable from the contour line information.

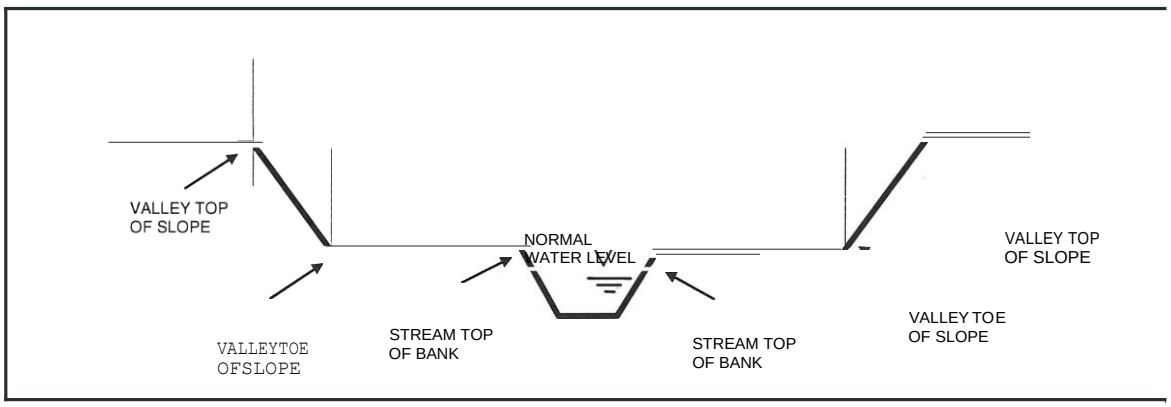

Figure 4.3 - Confined Riverine System Identifying Valley Top of Slope and Valley Toe of Slope

4.2.2 Stream Erosion — Confined Riverine Systems

Stream bank erosion is an important cause of valley slope instability and is ultimately responsible for the presence of a valley. Stream erosion directly at the toe of a valley slope can steepen and undercut the slope, leading to the eventual

failure of the bank. The *Toe Erosion Allowance* has been implemented to buffer development from the hazardous effects of toe erosion, and also to buffer the natural river processes from the influences of development. This allowance is based on a minimum distance of 15 metres between the edge of a river system, and the toe of its confining valley wall. Figures 4.4 and 4.5 show the application of the Toe Erosion Allowance.

Where specific study information or detailed air photo interpretation has taken place, the actual or calculated erosion rates will be used to predict the location of the stable toe-of-slope based on 100 years of this type of erosion. Where a study has been undertaken to determine the actual erosion rates, the location of the toe-of-slope in 100 years will be predicted. Where detailed aerial photography can be used to provide a measurement of erosion rates over a minimum of 25 years, the data will be used to determine an average annual erosion rate, which will then be extrapolated for the 100-year period to provide the Toe Erosion Allowance.

In the absence of this specific information, the Toe Erosion Allowance is based on a maximum of 15 metres, measured perpendicular from the edge of a river or stream bank. Where this distance projects into the existing toe-of-slope, the allowance is used to predict the future location of the stable toe-of-slope of the affected valley slope. The application of the Toe Erosion Allowance can be seen in Figures 4.4 and 4.5.

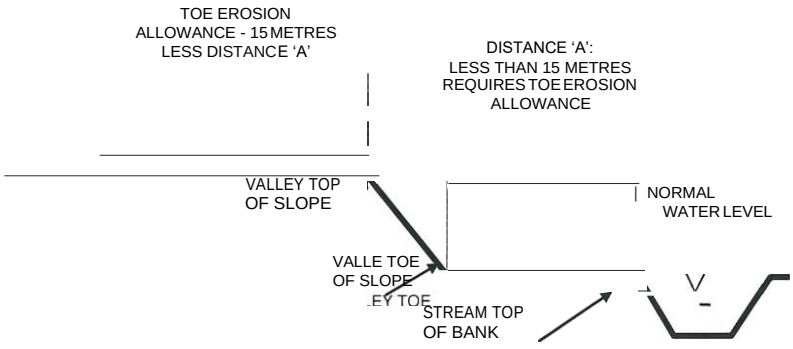

Figure 4.4: Watercourse Cross-Section with Toe Erosion Allowance

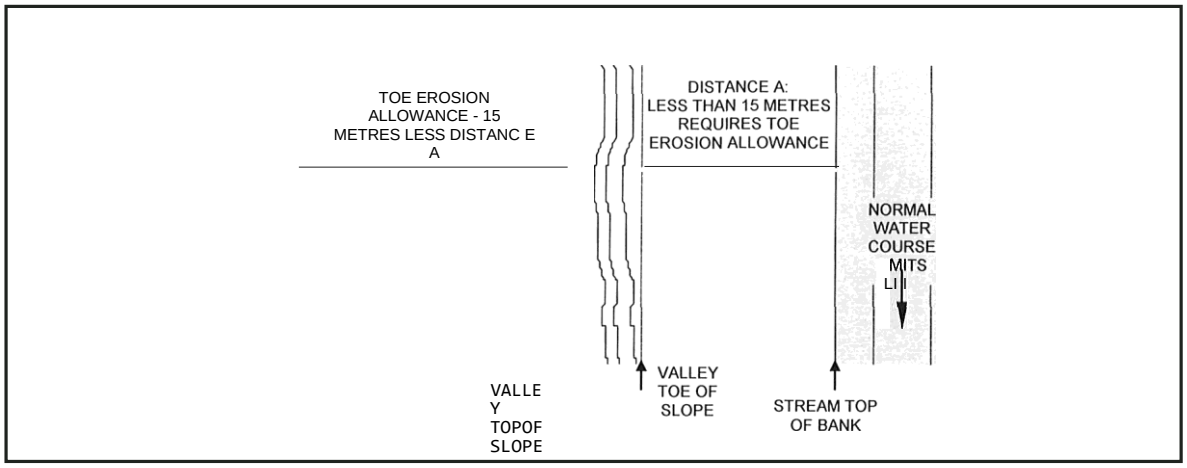

Figure 4.5: Plan View of Watercourse with Toe Erosion Allowance

4.2.3 Slope Stability — Confined Riverine Systems

Slopes are also naturally subject to movement and failure. The *Stable Slope Allowance* has been implemented to buffer development from the hazards of slope instability, and also to prevent the influence of development on the rate of slope movement. This allowance is based on an assumed stable slope gradient of 3 horizontal units to 1 vertical unit (3:1). For slopes at steeper gradients, the allowance is equal to the distance between the actual valley top of slope and the point at which a slope at a 3:1 gradient, rising from the same toe position, would intersect the ground surface. Figure 4.6 shows the application of the Stable Slope Allowance.

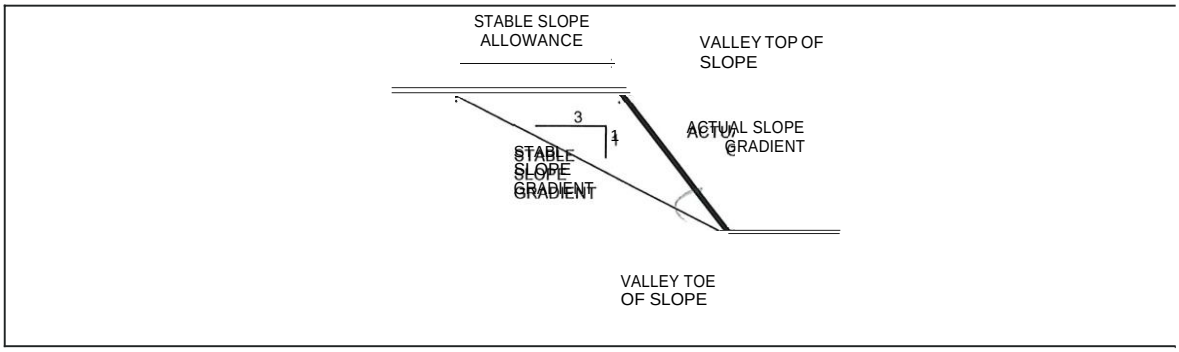

Figure 4.6: Stable Slope Allowance

4.3 RIVERINE EROSION HAZARD LIMIT - UNCONFINED SYSTEMS

The Erosion Hazard Limit for unconfined systems consists of the meander belt allowance. Unconfined systems occur where a watercourse is not contained within a clearly visible valley section.

4.3.1 Meander Belt — Unconfined Systems

In unconfined systems, the watercourse is not contained within a visible valley, and the flow of water is free to shift across the shallower land. Although toe erosion and slope stability are not deemed potential hazards, consideration for the meandering tendencies of the system must be provided. The *Meander Belt Allowance* provides a limit to development within the areas where the river system is likely to shift. This allowance is based on twenty (20) times the bankfull channel width, where the bankfull channel width is measured at the widest riffle section of the reach. A riffle is a section of shallow rapids where the water surface is broken by small waves. The meander belt is centred over a meander belt axis that connects the riffle sections of the stream.

The meander belt will be applied for many of the 1st and 2nd order streams in the watershed headwaters, where there is no apparent valley, streams are small, and sinuosity is low. In these situations, the stream width will be estimated as 1.5 metres, and the meander belt is created as an offset from the watercourse feature on the base map. This process eliminates the need to establish a meander belt axis, and provides a reasonable meander belt allowance.

Where on-line ponds are located in unconfined systems, the meander belt width is increased by the width of the open water in the pond.

Figure 4.7 shows a typical application of the Meander Belt Allowance.

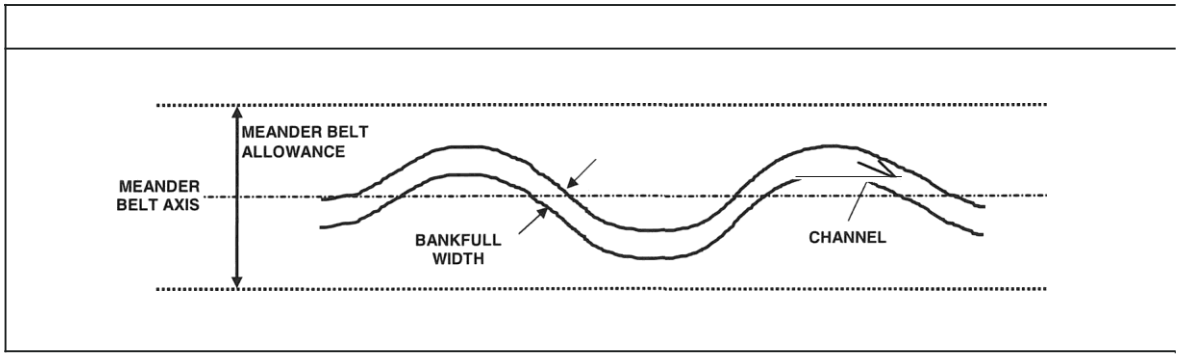

Figure 4.7: Erosion Hazard Limit (for an unconfined system)

4.4 RIVERINE HAZARD LIMIT

The Erosion Hazard Limit (developed for either an unconfined or confined system) and the Flood Hazard Limit are applied in combination to every riverine system in the watershed. The greatest extent of these two limits is the Riverine Hazard Limit.

5.0 SHORELINE HAZARDS

The coast or shoreline refers to the furthest landward limit bordering a large body of water. The NDCA watershed contains numerous small inland lakes, with a surface area less than 100 km^2, and Wanapitei Lake. With its surface area of more than 125 km^2 Wanapitei Lake is classified as a large inland lake. Operated within a 2.9 metre range, the lake level is controlled by OPG in accordance with a Licence of Occupation Agreement No. 6168, dated July 7, 1944 at a maximum 'flood allowance' elevation of 267.95 metres.

Potential hazards associated with the Wanapitei Lake shoreline include flooding (with allowances for wave uprush and other water related hazards) and bluff erosion. The Flooding and Erosion Hazard Limits for the shoreline of Wanapitei Lake will be established in order to regulate development in areas susceptible to periodic flooding and/or erosion concerns.

There are different methods of determining the shoreline hazards of small and large inland lakes. Small inland lakes are regulated in a similar manner to a river or stream valley. Large inland lakes, however, are regulated based on Section 5.0.

In all cases, the Shoreline Hazard Limit is taken to be the greater of the Flooding and Erosion Hazard Limits. This section briefly outlines the methods used to determine these Shoreline Flooding and Erosion Hazard Limits of Wanapitei Lake

5.1 SHORELINE F LOODING HAZARDS

The Flooding Hazard Limit of Wanapitei Lake includes the aggregate of the 'maximum flood allowance elevation' of 267.95 metres C.G.D. and the flood allowance for wave uprush and other water related hazards.

In areas susceptible to wave action, shoreline-flooding hazards extend landward beyond the 'maximum flood allowance elevation' of 267.95 metres to the limit of wave action. All shorelines of large inland lakes should be considered susceptible to wave action unless site-specific studies using accepted engineering principles demonstrate that wave action is not significant. Wave action includes wave uprush, which is the furthest distance inland that the waves will reach as the water runs up the shoreline face.

In the absence of site-specific studies, the wave uprush and other related hazards allowances are based on the default allowance of 15 metres each.

The flooding hazard limit will be mapped based on the 'maximum flood allowance elevation' of 267.95 metres plus a 30 metre wave uprush and other water related hazards allowance, as a line landward and roughly parallel to the shoreline. The application of the Flooding Hazard Limit is shown in Figure 5.1.

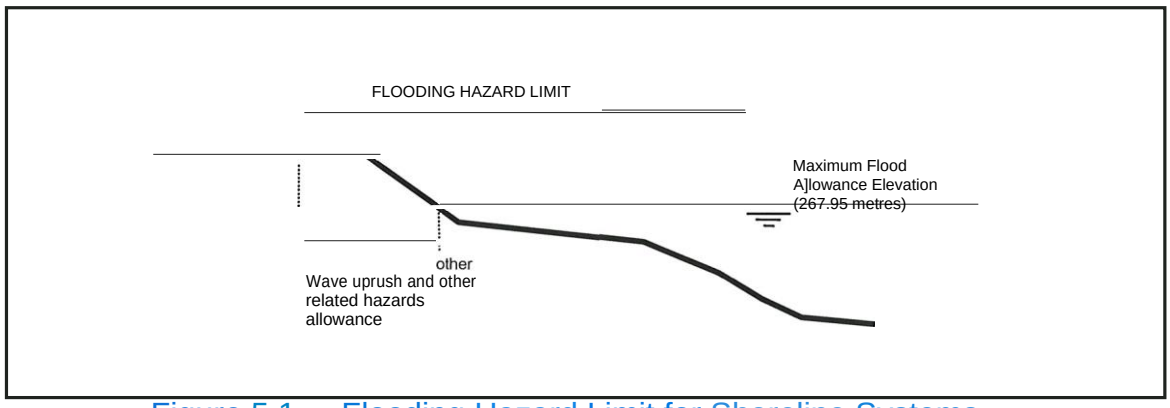

Figure 5.1 — Flooding Hazard Limit for Shoreline Systems

5.2 SHORELINE EROSION HAZARD

All shorelines, including bedrock shorelines, should be considered to be subject to erosion. This shoreline erosion is an important cause of slope instability, and is a potential hazard to waterfront development. Erosion in a shoreline environment results from both, the forces of nature acting on the shoreline and, the actions of humans. The Erosion Hazard Limit for shoreline systems is applied to buffer development from the hazardous effects of shoreline erosion, and also to buffer the natural coastal processes from the influences of development

5.2.1 Bluff Erosion

Shoreline bluff erosion is determined on the basis of an allowance for 100 years of toe of bluff erosion plus a 3 horizontal to 1 vertical (3:1) stable slope allowance.

The Erosion Hazard Limit for bluffs includes a setback distance for slope stability, based on an assumed stable slope gradient of 3 horizontal units to 1 vertical unit (3:1). For slopes at steeper gradients, the allowance is equal to the distance between the actual top of slope and the point at which a slope at a 3:1 gradient, rising from the same toe position would intersect the ground surface.

In the absence of site-specific studies, the shoreline bluff erosion is based on a default 100-year erosion allowance of 30 metres. This allowance is measured from the 100-year flood level (‘maximum flood allowance elevation’), together with the stable slope allowance of 3:1. The application of the Erosion Hazard Limit for shoreline bluffs is shown in Figure 5.2.

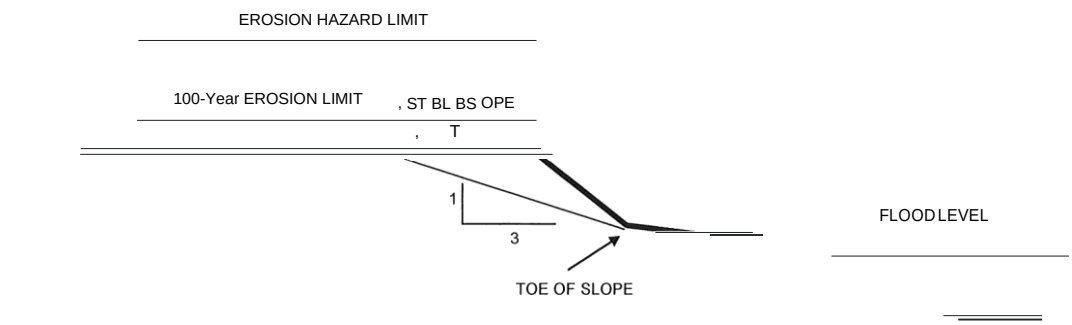

Figure 5.2 — Erosion Hazard Limit for Shoreline Bluffs

5.3 SHORELINE HAZARD LIMIT

The Erosion Hazard Limit and the Flood Hazard Limit are applied in combination to every shoreline system in the watershed. The greatest extent of these two limits is the Shoreline Hazard Limit

6.0 WETLANDS AND WETLAND COMPLEXES

6.1 WETLANDS

Wetlands play an important role in the hydrology of watersheds, and, therefore, are also important features in floodplain management. From a natural hazard perspective, wetlands retain surface water and may release stored water to streams over periods of time. The attenuation of drainage in wetlands is a function that will influence the shaping of stormwater flow and flooding.

Because of the role of wetlands in floodplain management, the intent of mapping and regulating these features is to prevent any negative impacts to natural flood conditions through the loss of wetlands.

It should be noted that compliance with this regulation does not exempt applicants from having regard for local by-laws, Municipal and Regional Office Plans, or the Provincial Policy Statements.

6.1.1 Wetland Mapping

Wetland mapping consists of evaluated and unevaluated wetlands.

For the evaluated wetland component, boundaries from OMNR Land Information Ontario (LIO) dataset will be utilized where they are available and where they are not, the NDCA will use OBM datasets or seek other sources of mapping. The age of wetland boundaries within the OMNR dataset is varied ranging from mid 1980's through to present. The evaluated wetlands from OMNR are “open files”, meaning that boundaries can be adjusted based on new information from time to time.

In keeping with the methodology adopted from ELC community series mapping, no wetland with an area of less the 0.5 ha would be included as part of the regulation mapping, except in special circumstances (i.e. <0.5 ha wetland in close proximity to larger wetland feature).

Wetland evaluations (MNR) and Authority resource information will be compiled to evaluated wetlands in the NDCA watershed. This baseline of wetland information will be examined to ensure candidate wetlands will conform to the Conservation Authorities Act definition of wetland. For the unevaluated wetlands in the NDCA jurisdiction, existing aerial photography will be examined and the boundaries of the wetlands will be digitized.

6.1.2 Wetland Complexes

For the purpose of the regulation, wetland complex boundaries are not used. Wetlands will be protected from indirect impacts through the establishment of an “other area" around all wetlands as described in section 7.2.

7.0 ALLOWANCES, OTHER AREAS AND REGULATION LIMITS

7.1 ALLOWANCES

The Generic Regulation describes the use of an allowance that may be applied to all riverine and shoreline Hazard Limits. The allowance is for the purpose of maintaining sufficient access for emergencies, maintenance, and construction activities. This allowance is analogous to a factor of safety, providing protection against unforeseen conditions that may adversely affect the land adjacent to a natural hazard area. A 15-metre allowance is applied to the Hazard Limit.

7.2 OTHER AREAS

Including wetlands within a regulation schedule assumes that wetland boundaries can be clearly encompassed within a static boundary. In reality, however, wetlands very rarely have such hard boundaries and are often in a constant state of flux. Wetland boundaries retreat or grow in response to variations in ground and surface water elevations or soil moisture content. Typically the edge of the wetland is a transitional boundary that may or may not fit the Conservation Authorities Act definition of a wetland, depending on when the site is examined, as there are seasonal and annual variations.

Wetlands can be affected by development where the development is outside of the wetland boundary but within the adjacent lands. The lands must be both adjacent to, and support the functions of, the wetland and are known as Areas of Interference. The width of an Area of Interference could be different for every application and therefore, requires site-by-site assessment. Through the Planning Act, Provincially Significant Wetlands (PSWs) are automatically afforded a 120-metre setback.

Upon completion of the identification of candidate wetlands for regulation (per section 6.0) an Area of Interference of 120 metres will be created around the PSWs and the wetlands greater than 2 hectares in size. The remaining wetlands, those not deemed Provincially Significant and smaller than 2 hectares in size, will be given an Area of Interference of 30 metres. An examination of soils mapping, wetland evaluations, groundwater information (studies, mapping and/or well records), vegetation (records and/or air photo interpretation) will be carried out to identify any key wetland supporting functions within this Area of Interference. The Areas of Interference will be included in the NDCA Regulation 97/04 under Section 4(1) (e), as an "Other Area". This will allow NDCA to review each application for development on land adjacent to wetlands through the permit process.

7.3 REGULATION LIMITS

The Regulation Limit is mapped as the greatest extent of the:

- Shoreline Hazard Limit, and
- Riverine Hazard Limit, and
- A 15 metre Allowance, and
- Wetland boundary, and
- Areas of Interference (30 or 120 metres) adjacent to all wetlands.

The greatest extent of all features identified above is the Regulation Limit provided on the NDCA Regulation Limit mapping.

8.0 DEFINITIONS

The following definitions are intended to provide a clearer understanding of the basis by which these terms of reference have been written. All definitions have been obtained through accepted sources, as outlined in Section 8.0 References.

Accepted engineering principles:

The current coastal, geotechnical, and hydraulic engineering principles, methods, and procedures that would be judged by a peer group of qualified engineers (by virtue of their training and experience) as being reasonable for the scale and type of project being considered, the sensitivity of the location, and the potential threats to life and property.

Access (Ingress/egress):

Standards and procedures currently applied in engineering practice associated with providing safe passage for vehicles and people to and from a shoreline or river-side property during an emergency situation as a result of flooding, other water related hazards, the failure of floodproofing and/or protection works, and/or erosion that have been reviewed and approved by the Conservation Authority and/or the Ministry of Natural Resources.

Bankfull discharge:

The formative flow of water that characterizes the morphology of a fluvial channel. In a single channel stream, “bankfull” is the discharge, which just fills the channel without flowing onto the floodplain.

Confined System:

A riverine system where the physical presence of a valley corridor containing the system is visibly discernible. Also “well-defined system".

Developments

Development means:

a) The construction, reconstruction, erection, or placing of a building or structure of any kind;
b) Any change to a building or structure that would have the effect of altering the use or potential use of the building or structure, increasing the size of the building or structure, or increasing the number of dwelling units in the building or structure;
c) Site grading; or
d) The temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere.

Dr ainage area.•

For a point, the area that contributes runoff to that point.

Any material used or capable of being used to raise, lower, or in any way affect the contours of the ground, whether on a permanent or temporary basis, and whether it originated on the site or elsewhere.

Hazardous land means land that could be unsafe for development because of naturally occurring processes associated with flooding, erosion, dynamic beaches, or unstable soil or bedrock.

Protection works:

Refers to structural or non-structural works, which are intended to appropriately address damages caused by flooding, erosion, and/or other water related hazards.

Slope crest:

The highest point on a slope at which the gradient becomes shallow enough to be used for access. Also 'top of slope'.

Slope £oe•

The lowest point on a slope, where the surface gradient changes from relatively shallow to relatively steep.

Unconfined system:

A river or stream system where there is no discernible valley slope or bank that can be detected from the surrounding landscape. Also "III-defined system".

Watercourse:

Watercourse means an identifiable depression in the ground in which a flow of water regularly or continuously occurs.

Wetland•

Wetland means land that

a) is seasonally or permanently covered by shallow water, or has a water table close to or at its surface;

b) directly contributes to the hydrological function of a watershed through connection with a surface watercourse;

c) has hydric soils, the formation of which has been caused by the presence of abundant water; and,

d) has vegetation dominated by hydrophytic plants or water tolerant plants, the dominance of which has been favoured by the presence of abundant water.

But does not include periodically soaked or wet land that is used for agricultural purposes and no longer exhibits a wetland characteristic referred to in clause c) or d)

9.0 REFERENCES

1. Conservation Authorities Act (Revised Statutes of Ontario, 1990, Chapter C.27, as amended, Queens Printer March 29, 1999).

2. Ontario Ministry of Natural Resources, Natural Hazards Training Manual, Provincial Policy Statement, Public Health and Safety Policies 3.1, Version 1.0, 1997.

3. Conservation Ontario, Guidelines for Developing Schedules of Regulated Areas, 2005

4. Ontario Regulation made under the Conservation Authorities Act, Content of Conservation Authority Regulations Under Subsection 28(1) Of The Act: Development, Interference With Wetlands And Alterations To Watercourses

Appendix A: Determination of Regulation Limits

Regulation Limits are the result of several components, each of which addresses a specific hazard. These include riverine flooding hazard limits, riverine erosion hazard limits, shoreline flooding limits, shoreline erosion limits, wetlands limits, allowances, and “other areas”. Each of these components are identified and defined individually. The final Regulation Limit for each system is taken as the greater of the applicable hazard limits. The following identifies the steps to be taken by NDCA staff to develop the regulation mapping:

1) Riverine Systems

Identify the valley Top-of-Slope with a GREEN line. The Top-of-Slope is the break in slope point between the valley side slope and the tableland, and should be discernable from the contour line information. In an agricultural area, the limit of tree line or fence lines is also indicators of the Top-of-Slope. Where a Top-of-Slope cannot be discerned (unconfined valley) proceed to step e).

Identify the valley Toe-of-Slope with an ORANGE line. The Toe-of-Slope is the break in slope point between the valley floor and the valley side slope, and should be discernable from the contour line information.

Identify portions of steep valley slope. A greater contour density can identify steep slopes. At these sites, calculate the slope from the Valley Toe-of-Slope to the Valley Top-of-Slope by measuring the horizontal distance, and calculating the difference between the Valley Toe-of-Slope elevation and the Valley Top-of-Slope elevation. If the ratio of horizontal distance: elevation difference is more steep than 3:1, multiply the elevation difference by 3, and identify a Stable Slope Allowance at this distance from the valley Toe-of-Slope with a RED line.

Identify portions of the valley system where the creek bank is close to the valley side slope (wherever the creek bank and the valley Toe-of-Slope are within 15 metres or less). At these sites, identify a Toe Erosion Allowance with a BLUE line, as the difference between 15 metres and the actual distance between the creek bank and the valley Toe-of-Slope. Apply this allowance beyond the valley Top- of-Bank. If a Stable Slope Allowance has already been calculated at the site, apply the Toe Erosion Allowance beyond the Stable Slope Allowance.

Where a valley Top-of-Slope cannot be discerned, the valley is considered Unconfined, and a Meander Belt is applied in place of

the features identified in steps a) through d). The meander belt is drawn as a PURPLE line. Calculate the meander belt width as 20 times the width of the bank full channel. Where the channel width cannot be measured or is not known, assume a minimum width of 1.5 metres. Although the meander belt should be centered on the meander axis, estimation can be made by setting the meander belt as an offset from the watercourse layer.

Select the Riverine Erosion Hazard Limit as the outer most line of all the combined features identified in items a) through e).

Add the Riverine Floodline Hazard Limit. This line has been developed from the floodplain mapping sources listed in Table 1 of this report. The floodline is coloured RED.

Select the Riverine Hazard Limit as the outer most line of the Erosion and Floodline Hazard Limits.

2) Wetland Systems

a. Add the wetland layers from Ministry of Natural Resources digital wetland layers and from NDCA ELC mapping queries. Map the Wetland Limit as the greater extent of the two data sources. (Note: the ELC queries will eliminate wetlands less than 0.5 hectares in size).

b. Apply an “Area of Interference" of 120 metres beyond the Wetland Limit of provincially significant wetlands and all other wetlands greater than 2 Ha.

c. Apply an “Area of Interference” of 30 metres beyond the Wetland Limit of all non-provincially significant wetlands that are less than 2 Ha.

3) Regulation Limit

Combine the Regulation Limit for Riverine and the “Other Area “Limit. The outermost limit of these features is the NDCA Regulation Limit. The Regulation Limit is the greatest extent of:

- Riverine Hazard Limit, and
- A 15 metre Allowance on all Riverine Hazards and
- Wetland boundary, and
- “Areas of Interference” within 120 or 30 metres of all wetlands

6) Base Mapping

The NDCA Regulation Limit is shown on 1:20,000 OBM. The mapping will be published at a scale of 1:20,000, and will include the Regulation Limit Line, roadway and watercourse labels, and a full legend. The mapping will be provided on individual sheets no larger than 610mm x 915mm '