Plan Review and Regulation Policies

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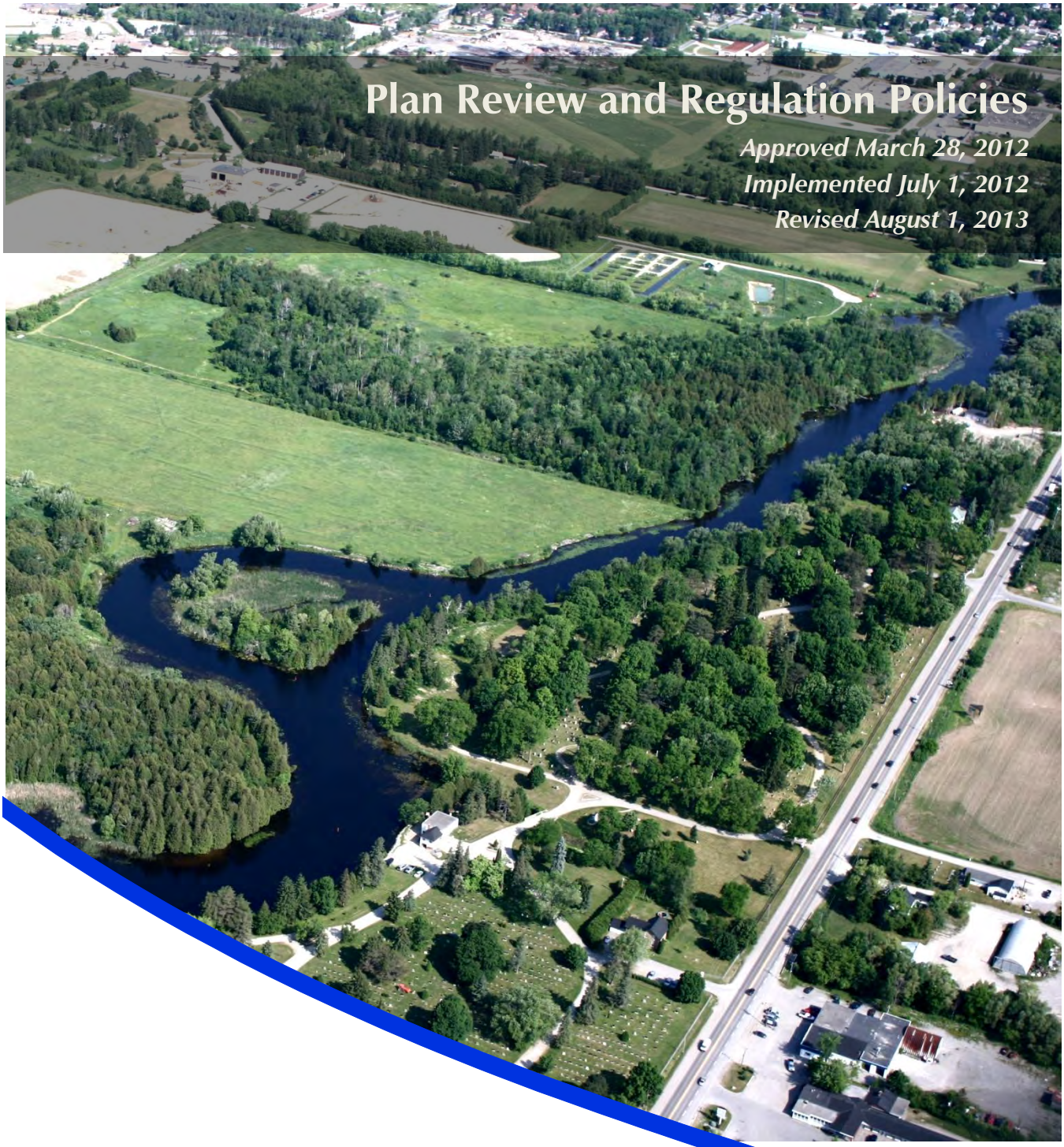

KAWARTHA CONSERVATION

Executive Summary

Kawartha Region Conservation Authority (KRCA) is committed to articulating its program and policy interests and working collaboratively with partners and clients. Having watershed plan review and regulation policies in place that are reflective of current provincial legislation and planning policy, easy to understand, reasonable and defensible offers a vital foundation for protecting public safety and property along with the features and functions of the KRCA watershed. These policies contribute to sound and responsible development and the promotion of safe, sustainable communities.

This Plan Review and Regulation Policy manual replaces the "Watershed Management Policies" approved by KRCA in November 2002. This new manual summarizes the scope of KRCA's planning mandate, advisory and regulatory responsibilities and requirements. It is expected that this manual will be used by KRCA staff; municipal planning, building department, public works, engineering, and community services staff; developers and their agents; and, private landowners who may be seeking approval from the Conservation Authority (CA) under the Conservation Authorities Act (CA Act) or seeking approvals from municipalities under the Planning Act. For this reason, every effort has been made to create a document that is easy to understand and easy to use.

This manual provides information and guidance and has been developed to:

- Articulate KRCA roles and activities by describing KRCA's local resource management program priorities, its delegated responsibilities applied in representing the Provincial Interest on matters related to the natural hazards component of the Provincial Policy Statement (PPS), its contractual role in the provision of land use planning advice to participating watershed municipalities, and its regulatory authority under the CA Act;

- Consolidate all regulatory and watershed plan review policies of KRCA in one place to offer an up-to-date and complete set of policies and provide KRCA staff with a single document against which to review CA Act permit applications provide plan review services to its municipal partners; and,

- Provide watershed municipalities, applicants and their agents, private landowners and special interest groups with a clear understanding of KRCA's role, mandate and responsibilities regarding CA Act permit applications and in the review of and commenting on municipal planning applications.

Purpose and Layout of the Manual

PURPOSE OF THE MANUAL

The primary purpose of this Plan Review and Regulation Policies manual is to update, consolidate and clearly articulate the policies that guide KRCA staff when providing planning advice to participating watershed municipalities and when evaluating applications for permission under the CA Act Section 28 Regulation administered by KRCA (O. Reg. 182/06).

The previous KRCA Watershed Management Policies manual dated back to 2002. Since that time there have been a considerable number of changes in policy and legislation.

In 2006, CAs across Ontario began implementing Section 28 Regulations in accordance with Ontario Regulation 97/04 of the CA Act, which requires CAs to regulate proposed development in areas related to and prone to water-related hazards, such as floodplains, wetlands, shorelines of inland lakes and the Great-Lakes-St. Lawrence River System, and hazardous lands, for impacts to the control of flooding, erosion, dynamic beaches, pollution or conservation of land. CAs also must regulate proposed activities that may alter or interfere in any way with a watercourse or wetland.

In addition, there have been major changes to Ontario's land use planning system with the introduction of numerous new statutes, policies and plans which influence and in cases such as the Provincial Policy Statement (PPS), provide the overarching policy framework for KRCA's plan review advice to watershed municipalities. These include:

- Oak Ridges Moraine Conservation Act (2001) & Oak Ridges Moraine Conservation Plan (2002)
- Species at Risk Act (2002)
- Strong Communities legislation (2004)
- Provincial Policy Statement (2005)
- Greenbelt Act (2005) & Greenbelt Plan (2005)
- Changes to the Municipal Act (2006)
- Clean Water Act (2006)
- Growth Plan for the Greater Golden Horseshoe (2006)
- Endangered Species Act (2007)
- Brownfields legislation (2007)
- Lake Simcoe Protection Act (2008) & Lake Simcoe Protection Plan (2009)
- Green Energy and Green Economy Act (2009)

Municipalities have been busy bringing Official Plans into conformity with provincial objectives and, at the same time, new provincial technical guidelines (e.g., Natural Heritage Reference Manual, 2nd Edition, 2010, and Natural Hazard Technical Guides, 2002) have emerged on an array of topics.

As well, Parks Canada (PC) formally adopted its Policies for In-water and Shoreline Work and Related Activities in 2007 for use along the Trent-Severn Waterway (TSW); KRCA shares regulatory responsibilities with PC over development and activities along the shorelines of the TSW lakes and connecting rivers.

Having a complete set of plan review and regulation polices that reflect current provincial legislation in one place is important – for KRCA staff, landowners, and other partners – because it allows everyone to understand what is expected and what is required when planning applications are being considered for approval by municipalities and permit applications are considered for approval by KRCA under the CA Act.

This manual outlines KRCA's plan review and regulation policy platform. It articulates the approach KRCA will use to review and evaluate planning applications submitted for municipal approval under the Planning Act, and it defines the parameters and criteria against which KRCA administers its regulatory responsibilities under Ontario Regulation 182/06.

This manual will serve many uses and many users. It will:

- Provide guidance and direction to KRCA staff who will receive, review and evaluate planning applications against the policies contained herein to provide advice to municipal approval authorities;

- Provide guidance and direction to KRCA staff who will receive, review and evaluate applications for approval under Ontario Regulation 182/06 against the policies contained herein to render a decision;

- Provide clear direction to municipalities (both local and regional) on land use planning as per the CA delegated role in representing the provincial interest with respect to ensuring conformity to the natural hazard policies (Section 3.1) of the PPS;

- Instill confidence among the Ministry of Natural Resources (MNR) (the oversight agency for all CAs) and provincial and federal partners (i.e., Ministry of Municipal Affairs and Housing (MMAH), Ministry of the Environment (MOE), Ministry of Agriculture, Food and Rural Affairs (OMAFRA), PC, Fisheries and Oceans Canada (DFO), etc.) that matters of stated provincial interest have been accurately interpreted and are being applied appropriately;

- Assist other agencies in understanding the jurisdiction and policies of KRCA in relation to the administration of their own approval processes;

- Provide guidance to municipalities (both local and regional) on land use planning with respect to the protection of natural heritage features and water resources as per the terms of municipal service agreement(s) and local resource management program(s);

- Provide guidance to landowners and the development community (applicants and their agents) who will utilize the plan review policies contained herein to assist in their preparation of development proposals for consultation, review and municipal approval under the Planning Act; and,

- Provide guidance and direction to landowners and the development community (applicants and their agents) who will use the regulation policies contained herein to assist in their preparation of development and/or activity proposals for consultation, review and KRCA approval under Ontario Regulation 182/06.

HOW TO READ THIS MANUAL

The content of this manual has been divided into the following chapters:

Chapter 1 Introduction

Provides an overview of the legislative framework that determines KRCA's planning and regulatory role and responsibility. It also provides a summary of the role of CAs generally and describes the guidelines and policies that KRCA staff rely on to make regulatory decisions and planning recommendations.

Chapter 2 Approach to Watershed Management

Provides context for local resource management programs and services. It outlines the vision and mandate of KRCA and the key principles that guide its watershed planning and management activities. Here, KRCA's watershed management platform is organized into four key areas: watershed planning; healthy, sustainable communities; resource use and management; and, natural hazards.

Chapter 3 Land Use Planning Policies

Outlines the policies that KRCA uses when providing plan review comments and advice to watershed municipalities and other approval authorities. ***This chapter is to be read using the Planning Act definitions of "development" and "wetland" (see Appendix A) and in terms of flooding and erosion hazards, in the context of river or stream valleys as detailed in the MNR's Natural Hazard Technical Guides, 2002.***

Chapter 4 Regulation Policies

Outlines the policies that KRCA staff will rely on when considering *development* and activity proposals for approval under Ontario Regulation 182/06. ***This chapter is to be read using the Conservation Authorities Act (CA Act) definitions of "development" and "wetland" (see Appendix A) and in terms of flooding and erosion hazards in the context of river or stream valleys as detailed in Ontario Regulation 182/06.***

Notes to remember when reading through the manual:

1. ***Important information has been placed in bold and italics.***
2. **KRCA policies are shown in bold in a grey shaded text box.**
3. *KRCA principles are shown in italics in an unshaded text box.*
4. Terms with definitions have been italicized and provided in Appendix A.
5. A list of common acronyms is provided in Appendix B.
6. Tables for conversion from metric to imperial are provided in Appendix C.
7. The use of "may be permitted" in policies of Chapter 4 should be interpreted as "under normal circumstances, permission will be granted".

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ROLE AND MANDATE OF KRCA

Chapter 1: Introduction

1.1 HISTORY OF CONSERVATION AUTHORITIES

Conservation Authorities (CAs) have a long and important history in Ontario. The Conservation Authorities Act (CA Act), administered by the Ministry of Natural Resources (MNR), was created in 1946 in response to concerns about erosion, flooding and drought, recognizing that these and other natural resource initiatives were best managed on a *watershed* basis. The Act was initiated in response to prevailing concerns about poor land, water and forestry practices that had taken place in the 1930s and 1940s. Organizations dedicated to conservation and wise resource use were becoming collectively concerned with drought, extensive soil loss, deforestation, and flooding and called for a more enlightened and integrated approach to resource management using natural *watershed* boundaries. While the responsibility for natural resource management lay with the province, the scale of erosion and water concerns was such that it required a new and different approach. When a number of municipal councils agreed to become involved, it led to the passage of the CA Act in 1946. The CA Act provided the legislative framework for collaborative action by the Province and *watershed* municipalities paving the way for a number of eventual legislative amendments by the Province.

After severe economic and human losses associated with Hurricane Hazel (1954), changes were made to the CA Act in 1956 to empower CAs to make regulations to prohibit filling in *floodplain*s. These regulations were broadened in 1960 to prohibit or regulate the placing or dumping of *fill* in defined areas where, in the opinion of the CA, the control of flooding, *pollution* or the *conservation of land* may be affected. In 1968, amendments to the CA Act further extended the regulations to prohibit or regulate construction and alteration to waterways. The CA Act was amended in 1998 as part of the Red Tape Reduction Act (Bill 25) to ensure that regulations under the Act were consistent across the province and complementary to provincial policies. Revisions were made to Section 28 which led to the "Content of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses" Regulation (O. Reg. 97/04), which determines the scope and content of individual Section 28 regulations and replaces the previous "Fill, Construction and Alterations to Waterways" Regulation. While some CAs had been regulating activities in *wetland*s, shorelines and inter-connecting channels for years, the amendments required all CAs to regulate activities on Great Lakes shorelines, interconnecting channels, inland *lake*s and *wetland*s in addition to the areas and features each CA had historically regulated.

In 2006, pursuant to Section 28 of the CA Act, under Ontario Regulation 97/04, each CA developed individual "Development, Interference and Alteration" Regulations approved by the Minister of Natural Resources that identify and regulate certain *development* activities in and adjacent to *watercourse*s (including *valleyland*s), *wetland*s, shorelines of inland *lake*s and *hazardous lands* and activities that may cause the straightening, changing, diverting or interfering in any way with the existing channel of a *river*, *creek*, *stream*, *watercourse* or for changing or interfering in any way with a *wetland*. In general, permissions (permits) may be granted with or without conditions for *development*. Permits are issued where, in the opinion of the CA, the control of flooding, erosion, dynamic beaches, *pollution* or the *conservation of land* will not be affected by the *development* or for activities that may cause the straightening, changing, diverting or interfering in any way with the existing channel of a *river*, *creek*, *stream*, *watercourse* or for changing or interfering in any way with a *wetland*.

1.2 ROLE AND MANDATE OF CONSERVATION AUTHORITIES

CAs are corporate bodies created through legislation by the Province at the request of two or more municipalities in accordance with the requirements of the CA Act. They are established by Cabinet through an Order-In-Council which defines the *watershed* boundaries over which they have jurisdiction to carry out program activities. Each CA is governed by the CA Act and by a Board of Directors whose members are appointed by participating municipalities within a common *watershed* within the CA jurisdiction.

Section 20 of the CA Act sets out the objects of a CA which are to establish and undertake, in the area over which it has jurisdiction, a program designed to further the conservation, restoration and management of natural resources other than gas, oil, coal and minerals. Section 21 of the CA Act outlines the powers of CAs such as the power to establish *watershed*-based resource programs, enter into agreements with municipalities and other agencies, and charge fees for services.

The fundamental provincial role for all CAs focuses on water-related natural hazard prevention and management and includes flood and erosion control. As part of the resource management program implemented by CAs on behalf of the Province related to natural hazard management, CAs regulate *development* and activities in areas related to or prone to water-related hazards through individual Section 28 regulations.

Ontario's 36 CAs perform a number of roles and activities that include the following:

CAs as Regulatory Authorities – Under Section 28 of the CA Act, CAs may make regulations. Presently, each CA administers an individual regulation, applicable to the area under its jurisdiction. These regulations require CAs to prohibit, restrict, or permit *development* in and adjacent to *river* or *stream valleys*, *wetlands*, shorelines of inland *lakes* and the Great Lakes-St. Lawrence River System and *hazardous lands* for affects to the control of flooding, erosion, dynamic beaches, *pollution* and the *conservation of land*, or for changing or interfering with the existing channel of a *watercourse* or interfering with a *wetland*. The regulations were developed in conformity with Ontario Regulation 97/04 governing their respective content and were subject to the approval of the Minister of Natural Resources.

CAs have Delegated Responsibilities – CAs have been delegated the responsibility by the Minister of Natural Resources to represent the provincial interests in plan review regarding natural hazards encompassed by Section 3.1 of the Provincial Policy Statement (PPS) as outlined in a Memorandum of Understanding (MOU) between Conservation Ontario (CO), the MNR and the Ministry of Municipal Affairs and Housing (MMAH). This delegated responsibility requires CAs to review and provide comments on municipal land use policies and planning documents (Official Plans, Secondary Plans and comprehensive Zoning By-laws) and applications submitted pursuant to the Planning Act for conformity to the natural hazard policies (S. 3.1) of the PPS as part of the Provincial One-Window Plan Review Service.

CAs as Resource Management Agencies – In accordance with Sections 20 and 21 of the CA Act, CAs are local *watershed*-based natural resource management agencies that develop programs that reflect local resource management needs within their jurisdiction. Such programs and/or policies are approved by the CA Board of Directors and may be funded from a variety of sources including municipal levies, fees for services, provincial and/or federal grants and self-generated revenue.

CAs as 'Public Commenting Bodies' – Pursuant to the Planning Act, CAs are to be notified of municipal policy documents and planning and *development* applications. CAs may provide comment to a municipality or planning authority on these documents and applications in relation to their respective Board approved resource management program policies.

CAs are also identified as commenting bodies under other Acts (i.e., Clean Water Act (CWA), Drainage Act, Environmental Assessment Act (EA Act), etc.) and Provincial Plans as outlined in Appendix E of this manual.

CAs as Service Providers – Individual CAs may enter into agreements with provincial and federal ministries and with municipalities to undertake specific responsibilities with respect to the review and approval of *development* activities (e.g., Fisheries Act Section 35 review; septic tank approvals under the Ontario Building Code). CAs may also perform a technical advisory role to municipalities, as determined under the terms of a service agreement with participating municipalities. This may include, but is not limited to matters related to the assessment or analysis of environmental impacts, *watershed* science and technical expertise associated with activities near or in the vicinity of *natural heritage features*, such as *wetlands*, *river* and *stream valleys*, *fish habitat*, significant woodlands, etc., hydrology, hydrogeology and storm water studies, and in some cases, septic system reviews. CAs work in collaboration with the local MNR district office when providing comments related to the protection of *natural heritage features*.

CAs as Landowners – CAs may become involved in the planning and *development* process either as an adjacent landowner or as a proponent/applicant. Planning Service Agreements with municipalities have anticipated that, as CAs are also landowners, this may lead to a conflict with the CA technical advisory role to municipalities. This potential conflict of interest is addressed by establishing a mechanism for either party to identify a conflict and implement an alternative review mechanism as necessary.

1.3 LEGISLATIVE FRAMEWORK

1.3.1 CONSERVATION AUTHORITIES ACT

Administered by the Ministry of Natural Resources (MNR)
The CA Act sets out the scope of activities for all CAs across Ontario. The Act (Section 20) allows all CAs to design a program(s), subject to provincial and municipal direction, to further the conservation, restoration and management of natural resources that fall within the boundaries of a specific *watershed* jurisdiction of a CA. It defines the objects of a CA as follows:

Section 20: *The objects of an authority are to establish and undertake, in the areas over which it has jurisdiction, a program designed to further the conservation, restoration, development and management of natural resources other than gas, oil, coal and minerals.*

The scope of activities available to CAs to accomplish their mandate is outlined under Section 21 of the Act and includes such things as carrying out studies, entering into agreements with other levels of government, charging fees for services, and acquiring land for conservation purposes.

Section 21: For the purposes of accomplishing its objects, an authority has power,

a. *to study and investigate the watershed and to determine a program whereby the natural resources of the watershed may be conserved, restored, developed and managed;*
b. *for any purpose necessary to any project under consideration or undertaken by the authority, to enter into and upon any land and survey and take levels of it and make such borings or sink such trial pits as the authority considers necessary;*
c. *to acquire by purchase, lease or otherwise and to expropriate any land that it may require, and, subject to subsection (2), to sell, lease or otherwise dispose of land so acquired;*
d. *despite subsection (2), to lease for a term of five years or less land acquired by the authority;*
e. *to purchase or acquire any personal property that it may require and sell of otherwise deal therewith;*
f. *to enter into agreements for the purchase of materials, employment or labour and other purposes as may be necessary for the due carrying out of any project;*
g. *to enter into agreements with owners of private lands to facilitate the due carrying out of any projects;*
h. *to determine the proportion of total benefit afforded to all the participating municipalities that is afforded to each of them;*
i. *to erect works and structures and create reservoirs by the construction of dams or otherwise;*
j. *to control the flow of surface waters in order to prevent floods or pollution or to reduce the adverse effects thereof;*
k. *to alter the course of any river, canal, brook, stream or watercourse, and divert or alter, as well temporarily or permanently, the course of any river, stream, road, street or way, or raise or sink its level in order to carry it over or under, on the level of or by the side of any work built or to be built by the authority, and to divert or alter the position of any water-pipe, gas-pipe, sewer, drain or any telegraph, telephone of electric wire or pole;*
l. *to use lands that are owner or controlled by the authority for purposes, not inconsistent with its objects, as it considers proper;*
m. *to use lands owned or controlled by the authority for park or other recreational purposes, and to erect, or permit to be erected, buildings, boots and facilities for such purposes and to make charges for admission thereto and the use thereof;*
m.1 *to charge fees for service approved by the Minister;*
n. *to collaborate and enter into agreements with ministries and agencies of government, municipal councils and local boards and other organizations;*
o. *to plant and produce trees on Crown lands with the consent of the Minister, and on other lands with the consent of the owner, for any purpose;*
p. *to cause research to be done;*
q. *generally to do all such acts as are necessary for the due carrying out of any project.*

In addition, the Act bestows regulatory responsibilities on CAs under Section 28 of the Act.

Section 28:

(1) Subject to the approval of the Minister, an authority may make regulations applicable in the area under its jurisdiction,

a. *Restricting and regulating the use of water in or from rivers, streams, inland lakes, ponds, wetlands and natural or artificially constructed depressions in rivers or streams;* [No regulation currently exists to give effect to this clause]

b. *Prohibiting, regulating or requiring the permission of the authority for straightening, changing, diverting or interfering in any way with the existing channel of a river,* creek*, stream or watercourse, or for changing or interfering in any way with a wetland;*
c. *Prohibiting or regulating or requiring the permission of the Authority for development if, in the opinion of the Authority, the control of flooding, erosion, dynamic beaches or pollution or the conservation of land may be affected by development.*
d. *Providing for the appointment of officers to enforce any regulation made under this section or Section 29;*
e. *Providing for the appointment of persons to act as officers with all the powers and duties of officers to enforce any regulation made under this section.*

KRCA administers Ontario Regulation 182/06 which requires KRCA to regulate development within or adjacent to river or stream valleys, wetlands and hazardous lands for impacts to the control of flooding, erosion, pollution or the conservation of land, and activities that may cause the straightening, changing, diverting or interfering in any way with the existing channel of a river, creek, stream or watercourse or for interfering in any way with a wetland.

1.3.2 PLANNING ACT

Administered by the Ministry of Municipal Affairs and Housing (MMAH)
The Planning Act is the primary piece of legislation that governs provincial and municipal regulation of land use. The Planning Act sets out the requirements that municipalities must meet in carrying out their planning responsibilities and defines, through the issuance of a PPS, matters of provincial interest.

Section 3(1) of the Planning Act provides for the issuance of policy statements on matters relating to municipal planning that are of provincial interest (e.g., PPS). Through the Minister of Natural Resources' delegation letter (April 1995) and accompanying MOU between CO, MNR and MMAH, the 'provincial interest' has been delegated to CAs to ensure that municipal planning documents and decisions on *development* applications made pursuant to the Planning Act conform with the natural hazard policies (S. 3.1) of the PPS. The MOU clarifies the role of CAs under the One-Window Planning System.

Natural hazards outlined in the PPS include:

- *Flooding hazards*;
- *Erosion hazards*;
- Dynamic beach hazards; and,
- *Hazardous sites* (unstable soil or unstable bedrock).

In keeping with Section 3(5) and 3(6) of the Planning Act, decisions of Municipal Council, Local Boards, Planning Boards, Ministers of the Crown, Agencies, Boards and Commissions in respect of any Authority decision that affects a planning matter shall be consistent with provincial policy statements in effect and further, decisions shall conform to established provincial plans (i.e., Greenbelt Plan, Growth Plan for the Greater Golden Horseshoe, Oak Ridges Moraine Conservation Plan, etc.).

Further, Section 26 of the Planning Act requires municipalities to review Official Plans every five years to ensure that Municipal Official Plans conform to provincial plans and reflect established provincial policy and are consistent with provincial policy statements issued under Section 3(1).

1.3.3 FEDERAL FISHERIES ACT

Administered by Fisheries and Oceans Canada (DFO)
The Fisheries Act is a federal statute that was established to manage and protect Canada's fisheries resources including fish and *fish habitat*. It applies to all fishing zones, territorial seas and inland waters of Canada. It provides for regulations governing the use of fisheries resources (fishing seasons, quotas, gear, etc.) and provides for protection of *fish habitat*. Section 35 of the Act prohibits individual persons from engaging in activities that would result in a Harmful Alteration, Disruption or Destruction (HADD) of *fish habitat*. It is important to note that only the federal government can authorize a HADD.

CAs have individual agreements with DFO to review proposed works for the potential to result in a HADD of *fish habitat*, pursuant to Section 35 of the Fisheries Act. There are three different levels of agreement:

> **Level 1 screening** – CA conducts the initial review of the project to identify any impacts to fish and *fish habitat* and if potential impacts are found, the project is forwarded to the local DFO district office for further review.
>
> **Level 2 screening and mitigation planning** – in addition to the responsibilities assigned in level 1, the CA determines how the proponent can mitigate any potential impacts to fish and *fish habitat* and if mitigation is not possible, the project is forwarded to the local DFO district office for further review.
>
> **Level 3 full mitigation and compensation planning** – in addition to all of the above, the CA works with the proponent and DFO to prepare a *fish habitat* compensation plan and the project is then forwarded to the local DFO office for authorization under the Fisheries Act.

Applications requiring HADD authorization are referred by the CA to DFO for final approval. Along the Trent-Severn Waterway, Parks Canada (PC) is responsible for Section 35 Fisheries Act reviews under a separate agreement with DFO.

1.3.4 CLEAN WATER ACT

Administered by the Ministry of the Environment (MOE)
Ontario's CWA helps protect drinking water from source to tap through a risk assessment approach that prevents contaminants from entering sources of drinking water – *lake*s, *river*s and *aquifer*s. The Act requires local communities, through local source water protection committees, to assess existing and potential threats to water and develop science-based action plans. It also introduces the Ontario Drinking Water Stewardship Program (ODWSP) which offers financial assistance to farmers, landowners, and small or medium businesses for activities that reduce threats to local drinking water courses.

CAs have a role in the MOE led provincial initiative under the CWA, 2006, in exercising and performing the powers and duties of a Source Protection Authority for a Source Protection Area established by CWA regulation. In their capacity as Source Protection Authorities under the CWA, they have leadership role in the development of Source Protection Plans. The Plans will identify the threats to natural water supplies and contain the policies required to protect them. CAs will also be responsible for number of tasks related to the development of the Plans including:

- Collecting, analyzing and compiling technical and scientific information and data (*watershed* characterizations, water budgets);
- Providing local engagement, consultation, information management and communications;
- Providing a support role to Source Protection Committees, including funding support; and,
- Coordinating technical work with municipalities and others.

Once a Source Protection Plan has been approved by the Minister of the Environment, Municipalities are required to bring their Official Plans and Zoning By-laws into conformity with the policies contained in the Plan.

1.3.5 ENVIRONMENTAL ASSESSMENT ACT

Administered by the Ministry of the Environment (MOE)
The purpose of the Ontario Environmental Assessment Act (EA Act) is the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management of the environment. CAs review and comment on Class and Individual Environmental Assessments that occur within their jurisdiction under the EA Act. CAs bring local environmental and *watershed* knowledge into the review and assessment process.

It is a requirement for proponents to identify and consult with government agencies, including CAs, if the proposed project may have an impact on an item related to the CA's areas of interest (e.g., regulatory authority or as service providers). The Minister of the Environment is the approval authority for decisions under the EA Act.

CAs as landowners may also be the proponent under the EA Act for proposed projects that may occur on CA lands. The Class Environmental Assessment for Remedial Flood and Erosion Control Projects establishes a planning and approval process for a variety of remedial flood and erosion control projects that may be carried out by CAs. This Class Environmental Assessment sets out procedures and environmental planning principles for CAs to follow to plan, design, evaluate, implement and monitor remedial flood and erosion control projects so that environmental effects are considered as required under the EA Act. Approval of this Class Environmental Assessment allows CAs to undertake these projects without applying for formal approval under the EA Act, on the condition that the planning and design process outlined in the Class Environmental Assessment is followed and that all other necessary federal and provincial approvals are obtained.

1.3.6 AGGREGATE RESOURCES ACT

Administered by the Ministry of Natural Resources (MNR)
The purposes of the Aggregate Resources Act (AR Act) are to provide for the management of the aggregate resources of Ontario; to control and regulate aggregate operations on Crown and private lands; to require the rehabilitation of land from which aggregate has been excavated; and, to minimize adverse impacts on the environment due to aggregate operations.

Under Section 28(11) of the CA Act, areas licensed for aggregate extraction under the AR Act are exempt from CA permitting activities. However, CAs may bring local environmental and *watershed* knowledge into the application review process. CAs are afforded an opportunity to review and provide comments to MNR during the application review and consultation process either directly or by contract through their *watershed* municipalities. MNR is the approval authority for license applications submitted pursuant to the AR Act, whereas municipalities are the approval authorities with respect to applications submitted pursuant to the Planning Act.

As with other applications submitted pursuant to the Planning Act, CAs may review Official Plan amendments, zoning by-law amendments and other applications for proposed new or expanded aggregate operations submitted pursuant to the Planning Act, and provide comments to participating *watershed* municipalities making decisions on Planning Act applications.

1.3.7 DRAINAGE ACT

Administered by the Ministry of Agriculture, Food and Rural Affairs (OMAFRA)
The Drainage Act defines the terms by which a drainage project may be initiated and prescribes the various stages of the procedure (i.e., engineer's report, consultation, appeals, construction) that must be followed by municipalities in the development of this municipal drainage infrastructure. The local municipality is also responsible for the maintenance, repair and management of the drainage systems that are developed through this procedure.

The Act defines a process whereby property owners can petition their local municipality to develop communal solutions to solve drainage problems. Using the procedures in the Act, the construction of a "municipal drain" – a communal drainage system designed to accommodate water flowing from the properties located within the *watershed* can be accommodated. The Act defines "drainage works" as:

> *a drain constructed by any means, including the improving of a natural watercourse, and includes works necessary to regulate the water table or water level within or on any lands or to regulate the level of the waters of a drain, reservoir, lake or pond, and includes a dam, embankment, wall, protective works or any combination thereof*

Once constructed under the authority of a by-law, a municipal drain becomes part of the municipality's infrastructure. The local municipality is responsible for repairing and maintaining the municipal drain in accordance with the associated engineers report. In certain circumstances, the municipality can be held liable for damages for not maintaining these drains.

CAs are involved with drainage matters in three ways:

1) Since 1949, drainage petitions for new drains and improvements to existing drains are circulated to CAs for comment as required under the Drainage Act S. 4 and S. 78 respectively. CAs may request an environmental appraisal for new drainage works. Once an engineer's report has been drafted for the proposed drainage works, the Drainage Act provides CAs with a right to appeal the proposed project to the Drainage Tribunal.

2) CAs under agreement with DFO undertake Fisheries Act Section 35 authorization reviews under a drainage class system. While CAs do not give final approval on authorization requests, they review applications and form recommendations that are forwarded to DFO for approval decisions.

3) As municipal drains meet the definition of a *watercourse* under Section 28 of the CA Act, CA permissions (permits) may be required for new drainage works and drain improvements, maintenance and repair activities.

1.3.8 ONTARIO WATER RESOURCES ACT

Administered by the Ministry of the Environment (MOE)
The Ontario Water Resources Act (OWRA) provides for the conservation, protection and management of Ontario's waters and for their efficient and sustainable use. Under the OWRA, Certificates of Approval are required for stormwater management infrastructure from MOE as the approval authority. CAs often undertake a public commenting role on Certificates of Approval.

Furthermore, water takings in Ontario are governed by Section 34 of the OWRA and the Water Taking and Transfer Regulation (O. Reg. 387/04). Section 34 of the OWRA requires anyone taking more than a total of 50,000 litres of water in a day from a *lake*, *stream*, *river* or groundwater source, with some exceptions, to obtain a Permit to Take Water (PTTW). A PTTW is not required for water taken for emergency fire fighting, watering of livestock, private domestic use, or water takings that require 50,000 litres or less in a day. PTTW applications are posted on the Environmental Bill of Rights Registry. MOE may circulate notice of the posting to CAs.

1.3.9 GREEN ENERGY ACT AND RENEWABLE ENERGY APPROVALS (O. REG. 359/09)

Administered by the Ministry of Energy and Infrastructure (MEI) and the Ministry of the Environment (MOE)
The Green Energy Act (or Green Energy and Green Economy Act, GEA) provides for green infrastructure such as wind power, solar power, etc.

Under the GEA, there are provisions for completing a records review and for consultation on significant natural features including water resources. The CA Act Section 28 regulation applies to *development* related to renewable energy projects and, further, prevents CAs from refusing to grant permission or to attach conditions on *development* unless necessary to prevent or mitigate impacts to the control of flooding, erosion, dynamic beaches or *pollution*.

Ontario Regulation 359/09 requires proponents to undertake a natural heritage assessment and a water assessment which includes a requirement to undertake a records review including the review of those records maintained by CAs.

1.3.10 OTHER LEGISLATION

There may be authorizations, permits or approvals required from other agencies under other federal and provincial legislation, the mandates of which are different from that of the CA Act and administered separately by the agency responsible.

> ***Applicants are responsible for obtaining all necessary approvals and for taking steps necessary to secure such approvals.***
>
> ***Securing approval under Section 28 of the CA Act does not imply that additional approvals will be forthcoming from other agencies or municipalities.***

In this regard, applicants or their agents should also be aware of the pieces of federal and provincial legislation found in Appendix H – Other Legislation.

1.4 ROLE AND MANDATE OF KRCA

KRCA is governed by a nine-member Board of Directors and by the CA Act and its regulations. KRCA is accountable for the management of natural hazards in its *watershed* jurisdiction, specifically, the delivery of the following provincial programs:

- Flood and erosion control operations
- Flood forecasting and warning
- Ice management
- Hazard information derived from studies for hazard prevention through municipal plan input (PPS Natural Hazards Policies – Section 3.1)
- Regulate *development* and activities in relation to specific natural hazards.

Furthermore, KRCA is accountable and has responsibility for developing a program that contributes to the conservation, restoration, and management of the natural resources in its *watershed* jurisdiction.1

In line with the CA roles and activities outlined in Section 1.2 of this manual, KRCA performs a number of specific roles across the *watershed*:

1. REGULATORY AUTHORITY

KRCA is the approval authority for *development* and/or activity applications submitted for approval under the "Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses" (O. Reg. 182/06 under the CA Act) within the authority's jurisdiction. Applications may be denied or granted approval in the form of a permission (permit) with or without conditions.

KRCA administers Ontario Regulation 182/06 throughout its jurisdiction.

2. DELEGATED RESPONSIBILITIES IN PLAN REVIEW WITH RESPECT TO NATURAL HAZARDS

KRCA has delegated responsibility to review and comment on planning issues for conformity to Section 3.1 natural hazard policies contained in the PPS. The technical basis for this commenting role is MNR's Natural Hazard Technical Guides.

3. RESOURCE MANAGEMENT AGENCY

KRCA is a local *watershed*-based natural resource management agency that has and is committed to developing various programs reflecting local resource management needs within KRCA's jurisdiction.

4. PUBLIC COMMENTING BODY

Pursuant to the Planning Act, *watershed* municipalities are required to provide KRCA notice on municipal policy documents and planning and *development* applications. KRCA may comment on these documents and applications to the municipality or planning approval authority as per their Board approved policies as local resource management agencies.

[1] KRCA does not have authority to manage oil, gas, coal or mineral resources, as stipulated by the Conservation Authorities Act.

KRCA also has a role as a public commenting body under other Acts (i.e., CWA, Drainage Act, EA Act, etc.) and Provincial Plans as outlined in Appendix E of this manual.

5. SERVICE PROVIDER

KRCA provides technical advisory services and planning advice to municipalities in keeping with the service level agreements that are in place with the City of Kawartha Lakes and the Regional Municipality of Durham.

> ***KRCA has 3 Partnership Memoranda presently in place: two with the City of Kawartha Lakes, and a third Partnership Memorandum with the Regional Municipality of Durham that specify the role and the responsibilities of KRCA and the municipality in the provision of environmental planning services.***

Like other CAs across Ontario, KRCA has entered into a formal MOU with DFO to review applications in light of their impact on *fish habitat*. Under the federal Fisheries Act, there are prescribed requirements that include no net loss of *fish habitat* and CAs play an important role in assessing the impact of *development* applications and site alteration proposals in this regard. The MOU specifies the role of KRCA in the review process and the conditions under which applications are forwarded directly to DFO for review (e.g., where the impact on identified *fish habitat* cannot be effectively *mitigate*d). It is important to recognize that PC takes over this responsibility for Trent-Severn Waterway *lake*s and connecting *river*s under a separate agreement with DFO.

> ***KRCA has a Level 3 Service Agreement with DFO. Under a Level 3 Agreement with DFO, KRCA also provides technical review in accordance with a risk management framework under Section 35 (1) of the Fisheries Act to determine whether or not a project may potentially create a HADD and provides input about how damaging impacts can be avoided or reduced. If the impacts of the project cannot be avoided or reduced, KRCA reviews compensation plans for the loss of fish habitat as a result of any proposed works. Any work resulting in a HADD must be approved by the Minister of Fisheries and Oceans.***

6. LANDOWNER

KRCA owns four properties (Conservation Areas) and manages two others within its jurisdiction for which we undertake a number of programs.

1.4.1 RELATIONSHIP TO OTHER AGENCIES AND GOVERNMENTS

The *development* approval process in Ontario is complex. There are many agencies at the federal, provincial and municipal level that have an interest in, and a responsibility for, the review and approval of planning and *development* applications. In addition to the local municipal planning authority, depending on the scope and location of the application, it can be quite complex involving a number of provincial and federal agencies. However, the authority prescribed to each Ministry/Agency is founded in legislation. Some of these legislative requirements and responsibilities have been articulated in Section 1.3. The inter-relationships between various Ministries and agencies are frequently prescribed in formal Memorandums of Agreement (MOA) or MOUs. There are MOUs in place at the federal level and also at the provincial level that articulate the relative role and responsibilities of various agencies.

As identified in this chapter, KRCA has entered into a formal MOU with DFO and service agreements (Partnership Memoranda) with participating *watershed* municipalities (i.e., the City of Kawartha Lakes and the Regional Municipality of Durham), and as part of the Provincial One-Window Plan Review Service, KRCA has been delegated the responsibility from the Minister of Natural Resources to represent the

'provincial interest' in planning matters for conformity to the natural hazard policies (S. 3.1) of the PPS (as per the Conservation Ontario/ Ministry of Natural Resources / Ministry of Municipal Affairs and Housing Memorandum of Understanding).

PARKS CANADA (PC) – TRENT-SEVERN WATERWAY (TSW):

KRCA enjoys a unique relationship with PC through the latter agency's management of the TSW. PC manages *lake* levels to minimize flooding and provide adequate water depth for boating and related recreational activities. *Lake* levels are regulated on the four locks and water control structures that exist within the KRCA *watershed* - See Figure 3: Trent Severn Waterway in Appendix D - Mapping. PC exercises its permitting authority on Federal lands below the "Upper Controlled Navigation Limit" while KRCA applies its regulatory jurisdiction on private or Crown lands (typically, above the "Upper Controlled Navigation Limit"). PC, other government agencies and CAs along the Trent-Severn Waterway are working collaboratively to develop a more consistent and coordinated approach to the review and approval of *development* activities in near shore areas of the TSW.

Note: For lands abutting the Trent-Severn Waterway, applicants are advised to check with PC regarding permit requirements under its applicable legislation.

FIRST NATIONS:

KRCA is aware of the unique relationship that has been promoted by the Province of Ontario and the fact that First Nations are a separate level of government. As well, KRCA is aware that the land is the basis of traditional First Nations culture and knowledge. KRCA will seek and support a positive relationship with First Nations, in particular, with the Mississaugas of Scugog Island.

1.4.2 THE PLANNING ACT AND THE CA ACT SECTION 28 REGULATION

It is important to understand the difference between regulatory approvals issued by KRCA under Section 28 of the CA Act and approvals that are issued by municipalities and other planning authorities under the Planning Act. The principle of *development* is established through the Planning Act approval process. The Act establishes where and what types of *development* should occur in a municipality. Concerns regarding the principle of *development* are conveyed to the municipality during the preparation of municipal land use policies and planning documents (Official Plans, Secondary Plans and comprehensive Zoning By-laws) or during the Planning Act approval process and are not normally addressed through the CA permitting process. The CA permitting process pursuant to Section 28 of the CA Act is site specific, by individual application for a technical decision on a proposed *development* or activity. Technical considerations relate to public safety, natural hazard prevention and management.

Note: Applicants who are contemplating development in the watershed are advised to check with the local and/or regional municipality to determine the requirements contained in Official Plans, Secondary Plans and Zoning By-laws and the latest requirements prescribed under the PPS and related planning initiatives prior to any consultation with KRCA. In addition, applicants are also advised to contact the Municipal Building Official or By-law Enforcement Officer with any questions pertaining to enforcement or the application of applicable law.

Municipal Pre-consultation:
As a matter of policy, CAs are strongly encouraged to participate in pre-consultation meetings with applicants, municipalities and other agencies to help identify concerns and provide information with respect to approval requirements as early as possible in the application process. Pre-consultation provides an opportunity for CAs to identify concerns related to their delegated plan review responsibilities with respect to natural hazards (Section 3.1 of the PPS), regulatory responsibilities under the CA Act, and comment/provide advice and information on items identified in municipal service agreement(s), where applicable, and local resource management program(s). Technical service agreements between municipalities and individual CAs may formalize arrangements for CA involvement in pre-consultation. As coordinated by the municipality or planning approval authority, depending on the scope of the project, pre-consultation could include staff from the following parties: CAs, the municipality (planning and engineering staff or others as appropriate), the applicant, consultants, developer (owner) and may be supplemented by staff from provincial ministries, PC, and other government agencies. Currently, KRCA is actively involved in the pre-consultation process with the City of Kawartha Lakes and the Regional Municipality of Durham (Township of Scugog and Municipality of Clarington).

1.4.3 KEY ELEMENTS IN ADMINISTRATION OF ROLES

Delegated Authority	*KRCA will operate in accordance with the provisions of the Conservation Ontario/ Ministry of Natural Resources/ Ministry of Municipal Affairs and Housing Memorandum of Understanding when carrying out its plan input and review responsibilities.*
Planning Act Priority	*KRCA recognizes that the Planning Act provides the framework for the development of municipal policy documents which establish the* ***'principle of development'.*** *Any concerns regarding the establishment of the principle of development will be conveyed to the municipality/planning approval authority during the Planning Act approvals process and not addressed through the Conservation Authority permitting process. (Planning Act approvals are to be secured first; permit approvals follow).*
Partnership	*KRCA will promote a* ***collaborative team approach*** *with member municipalities and will participate in pre-consultation meetings arranged by member municipalities.*
Process Fairness	*KRCA will ensure that applicants are treated respectfully through decision making processes that are both fair and easy to understand. This reinforces that we will address requirements that are in effect at the time of submission. In the event that historical planning approval decisions were made in the absence of current technical information which could preclude development under the Conservation Authorities Act, KRCA will work diligently with the applicant and municipality to arrive at an agreed-upon solution, taking into account the impact on the control of flooding, erosion, pollution and/or the conservation of land as well as any interference with the watercourses or wetlands.*
Service Excellence	*KRCA is* ***committed to service excellence*** *and to providing timely, transparent and professional services to all.*

CHAPTER 2: WATERSHED MANAGEMENT

WATERSHED FEATURES AND FUNCTIONS

VISION, GOALS AND OBJECTIVES

GUIDING PRINCIPLES

APPROACH TO WATERSHED MANAGEMENT

AREAS OF INTEREST

Chapter 2: KRCA'S Approach to Watershed Management

2.1 WATERSHED FEATURES AND FUNCTIONS

The Kawartha Region Conservation Authority (KRCA) *watershed* covers 2,563 square kilometres and includes portions of the Region of Durham (Township of Scugog, Township of Brock and Municipality of Clarington), the City of Kawartha Lakes and Peterborough County (Township of Galway-Cavendish and Harvey, and the Township of Cavan-Monaghan). It is a diverse landscape, reflective of its early settlement and economic origins. It is a landscape that provides evidence of 200 years of settlement evolution. The name "Kawartha" is a First Nation term meaning "land of shining waters", clearly descriptive of the many *lake*s and *river*s that dot the landscape. The *lake*s and *river*s support a thriving recreational and tourist-based economy. The *watershed* drains the Nogies Creek, Emily Creek, Pigeon River, East Cross Creek, Nonquon River, Mariposa Brook and the Scugog River as well as the Balsam, Cameron, Sturgeon, Scugog and Pigeon Lake drainage system.

Offering unique opportunities for agriculture, recreation and tourism, the KRCA *watershed* (made up of twelve sub-*watersheds*) provide a diversity of *ecosystem* functions including critical habitat for flora and fauna, natural storage and regulation of surface and groundwater, maintenance of biodiversity and purification of water and air as well as climate moderation and stabilization.

The *watershed* is naturally divided into two physically distinct areas by geological features: the Precambrian Shield in the north and the Paleozoic limestone plateau in the south. The Precambrian Shield features faults, dips and complex folds that originated during a mountain building phase about 550 million years ago. The Precambrian bedrock disappears from view in the south and is overlain by younger sedimentary rocks that were deposited by a large ocean that existed during the Ordovician period about 480-460 Million years ago. The boundary between these two different bedrock formations is generally marked by the northern shorelines of the Kawartha Lakes. The current landscape owes its character to glacial activity that occurred during the Pleistocene epoch; this glacial activity shaped a highly variable landscape. Massive ice sheets that covered the area and the melt waters of retreating glaciers shaped many of the present surface features found within the *watershed*. The recession of the most recent Wisconsin glaciation, particularly the recession of the Lake Simcoe ice lobe, greatly affected the landscape in this area, leaving behind moraines, eskers, drumlins and other glacial features.

The *watershed* is characterized by the Oak Ridges Moraine in the south; a unique landform feature that stretches from Orangeville in the north-west to Trenton in the east, and the Canadian Shield in the north. Between these physiographic regions are: the Peterborough Drumlin Fields, with characteristic rolling, drumlinized terrain; the Schomberg Clay Plains; and, the Dummer Moraine. The Carden Plain is located to the north of the Peterborough Drumlin Fields, covering a significant portion of the area covered under the extended planning agreement with the City of Kawartha Lakes. The Oak Ridges Moraine is one of the key landforms in the *watershed*, supporting many of the best groundwater-fed *headwaters* systems in the southern portion of our *watershed*. The Oak Ridges Moraine is classified as an interlobate moraine in which sediments were deposited between two ice sheets about 12,000 years ago. The moraine is composed of differing till deposits that vary in silt, sand, and clay content (primarily sand and gravel, which contribute to its groundwater significance). To the north of the Oak Ridges Moraine is the Peterborough drumlin field, composed of elongate, low-lying hills generally oriented from northeast to southwest. They are composed of highly calcareous glacial till that consist of sands and gravels. The Schomberg Clay Plain is a relatively flat,

dish-shaped area, bound by the Peterborough Drumlin Fields to the west, north and east, and by the Oak Ridges Moraine to the south, that was created by the deposition of clay and silt sediments of the glacial Lake Schomberg. The majority of the clay and silt deposits measure an average depth of five metres in thickness. The Carden Plain is located between Lake Simcoe and Balsam Lake north of the Peterborough Drumlin Field. The Carden Plain supports an alvar community, which is characterized by an open habitat environment situated on a limestone plain with a thin layer of soil. The landscape is distinctly unique and supports many rare plants and animals. The Dummer Moraine occupies an area to the south of the Precambrian Shield and north of the Peterborough Drumlin field in our watershed, and is characterized by a limestone plain mostly overlain with shallow, stony overburden (see Figure 4: Physiographic Regions in Appendix D – Mapping).

There are reports of *karst*-like topography in the *watershed* in the interface between the Precambrian bedrock and the Paleozoic limestone. *Karst* terrain can generally be found within the Nogies Creek and Four Mile Lake *watershed*s and surrounding the community of Bobcaygeon. *Karst* is a unique landscape where the water dissolving properties dissolve the underlying carbonate bedrock (usually limestone, dolomite, or marble) resulting in unusual surface and subsurface features ranging from sinkholes, vertical shafts, disappearing *stream*s, and springs, to complex underground drainage systems.

*River*s generally run north to the Kawartha Lakes which then drain east to the Trent River and eventually south to the Lake Ontario basin where the mouth of the Trent River meets the Bay of Quinte. The *watershed* receives significant amounts of water from the Burnt River and the Gull River which flow south from the Precambrian Shield, feeding into Cameron and Balsam Lakes respectively. The *watershed* boundary terminates at the mouth of these rivers in the northwest portion of our *watershed*. On the east, the *watershed* runs along the middle of Pigeon Lake, where the *watershed* borders the Otonabee Region Conservation Authority (ORCA) jurisdiction, and to the west of Big Island. The *watershed* consists of five *lake* systems (Balsam Lake, Cameron Lake, Lake Scugog, Sturgeon Lake and Pigeon Lake) and six major *river* systems which can be further subdivided into smaller *watershed* areas (i.e., sub*watershed*s). These major systems include the Nonquon River, East Cross Creek and Pigeon River flowing from the Oak Ridges Moraine, Mariposa Brook, Emily Creek originating in the Peterborough Drumlin Field and Nogies Creek flowing from the Canadian Shield (see Figure 5: Subwatershed Areas in Appendix D – Mapping).

This is a region with a long and significant history. Inhabited by several First Nations who used the land for subsistence farming and as territorial hunting grounds, the *watershed* drew fur traders and later European settlers who cultivated the land for agriculture and the forests for timber. Land was cleared, trees were felled and crops were planted. Gristmills and timber mills followed and early patterns of settlement were established as a result of these initial ties to the land and to the resources of the area. The construction of the Trent-Severn Waterway at Bobcaygeon in 1833 introduced navigation and the control of water levels that dramatically altered the region's natural, social, and economic environment.

Today, population in the *watershed* is concentrated primarily in Lindsay (in the middle of the *watershed*) and Port Perry (on the western shore of Lake Scugog) in Scugog Township, in Bobcaygeon, Fenelon Falls and, to a lesser degree, Omemee in the City of Kawartha Lakes. Currently, it is estimated that only 5% of the *watershed* is urbanized with just over 68,000 permanent residents and 19,500 seasonal residents calling the *watershed* home (Statistics Canada, 2007 - 2006 Community Profiles, 2006 Census). Growth is anticipated in Port Perry, Lindsay, Bobcaygeon and Fenelon Falls and there is mounting evidence to suggest that change is coming to the *watershed*. The conversion of seasonal cottages to year-round use, the addition of new retirees to local communities, *development* along *lake* shorelines and an increased interest in smaller *settlement area*s such as Caesarea and Blackstock suggest that pressure on the resource base will continue, albeit in different ways in the future.

At this time, the *watershed* is predominantly rural, with agricultural uses, recreation and tourism activities playing a dominant role on the landscape.

Agricultural uses are particularly prominent across the *watershed*. Currently, it is estimated that agricultural activities occur on approximately 50% of the *watershed* land base. Agriculture is particularly important in sustaining rural communities in the *watershed* because of the very large capital investment and significant direct and indirect economic impacts (employment, expenditures, etc.). Today, with the increased demand on food and crops for biofuels, there is a growing pressure to increase agricultural production. Smaller farms are being replaced by larger operations.

The presence of the *lake*s, the Trent-Severn Waterway and numerous inland *river* systems offer an abundance of recreational amenities and, as a result, the City of Kawartha Lakes and Peterborough Country remain important recreational centres in the province. Today, the main water bodies comprising the Trent-Severn Waterway and the smaller feeder *lake*s form a highly regulated system and an important navigational link between Lake Ontario and Georgian Bay that contributes significantly to recreational and tourism values in the Kawartha region.

Given the general consensus that the state of human health is directly connected to the health of our *ecosystem*, undertaking activities to effectively manage the natural resources and ecological systems that are within the jurisdiction of KRCA will produce multiple benefits. KRCA works with landowners, stakeholder organizations and all levels of government to enhance *watershed* health by coordinating and implementing a variety of programs and services designed to:

- Enhance water quality;
- Maintain reliable water supply;
- Reduce flood damages;
- Protect natural areas and biodiversity;
- Facilitate sustainable *development*;
- Provide environmental education; and,
- Provide environmentally responsible outdoor recreational opportunities.

KRCA owns 809 hectares of natural area lands within its *watershed* jurisdiction, including *valleyland*s, *headwater* tributaries, provincially significant *wetland*s, rare habitats and forests. KRCA manages another 444 hectares including the Fleetwood Creek Natural Area and the Tuckerman property (adjacent to the Windy Ridge Conservation Area) on behalf of Ontario Heritage Trust, as well as Dewey's Island, in cooperation with the Nature Conservancy of Canada, which protects a provincially significant *wetland*.

Conservation areas in the *watershed* include:

- Pigeon River Headwaters Conservation Area;
- Windy Ridge Conservation Area;
- Ken Reid Conservation Area;
- East Cross Forest; and,
- Fleetwood Creek Natural Area.

These conservation lands are examples of areas that are used primarily for conservation purposes and are protected for their ecological value. In addition, the *watershed* is home to numerous municipal parks and three Provincial Parks – Balsam Lake, Indian Point and Emily Provincial Park. Balsam Lake is comprised of 448 hectares and is located on the western shore of Balsam Lake's North Bay. Indian Point Provincial Park consists of a 947 hectare peninsula parcel in the north end of Balsam Lake, with Emily Provincial Park occupying an 83 hectare site on the eastern bank of Pigeon River, just upstream of Pigeon Lake. There are some crown land holdings in the *watershed*, including portions of Galway-Cavendish and Harvey, lands at the tip of Scugog Island, the Nonquon River *wetland*s and an area bordering the Ken Reid Conservation Area. The City of Kawartha Lakes manages the Emily Creek and Manvers forest tracts in the *watershed* for timber resources. In addition, there are several properties that are owned and operated by non-government agencies including the Nature Conservancy of Canada, Ontario Heritage Foundation and Ducks Unlimited. Some of these properties, though owned by Non-Governmental Organizations (NGOs) are managed by KRCA.

2.2 VISION AND MANDATE

KRCA's *watershed* management programs and services are based on the six KRCA roles outlined in Chapter 1 and in line with KRCA's Strategic Plan and the vision established by KRCA:

Vision:

Abundant, clean water within a healthy landscape.

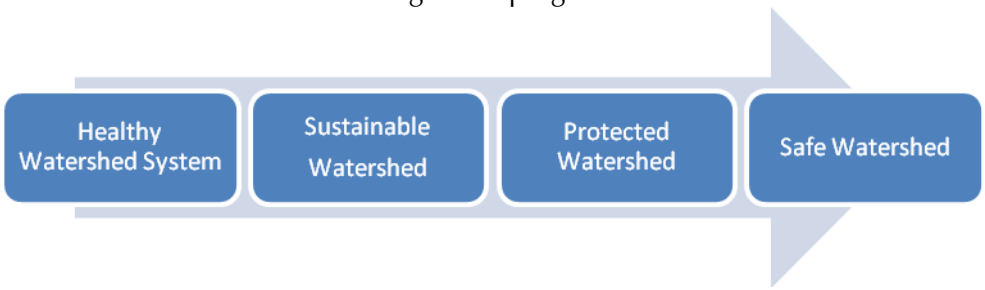
In keeping with KRCA's corporate vision, the following mandate statement provides context for the local resource management work of KRCA:

Mandate:

Help ensure the conservation, restoration and responsible management of water, land and natural habitats through programs and services that balance human, environmental and economic needs.

2.3 GUIDING PRINCIPLES

In the context of the vision, goals and objectives, the following principles will guide the work that KRCA undertakes in its *watershed* management programs and services:



HEALTHY WATERSHED SYSTEM

The Foundation	*An ecological approach to the use of land and water is fundamental to a healthy watershed and should be the foundation for planning within the KRCA watershed.*
Linkages	*Recognize the link between human health and environmental health.*
Watershed-Scale	*Maintain a watershed-scale perspective and consider the implications of cumulative actions on the watershed as a whole.*

SUSTAINABLE WATERSHED

Balanced	*Recognize that healthy communities require a sustainable balance between economic, social and environmental priorities, interest and uses. Embrace the concept of no net loss of environmental features and their functions.*
Look to the Future	*KRCA will consider future impacts of climate change on water and other natural resources in assessing the impacts of development and activities.* *Recognizes that planning establishes the decision making framework and to this end, KRCA recognizes the importance of establishing program priorities through policy setting and direction.* *Make decisions and take action based on accumulated knowledge, skills and experience. Further, KRCA will continually work to improve the knowledge base across the watershed and how it functions.* *Promote opportunities for ecosystem restoration.*

PROTECTED WATERSHED

Collaboration	*Adhere to the premise that protection and restoration of watershed health is a broadly shared responsibility. Watershed management efforts are achieved by working collaboratively with partners and landowners. KRCA will strive to achieve relational excellence by strengthening existing partnerships and building new alliances.* *Success is dependent on a team approach both within KRCA and with clients and partners. KRCA objectives can only be achieved fully through collaboration, partnership, innovation and learning.*
Integration	*KRCA will work in collaboration with landowners, stakeholders and municipal, provincial and federal partners to share the best available information and science.*
Implementation	*Pursue practical approaches to the management of water, other natural resources and natural heritage based on the application of sound science, creativity, innovation and partnership.*
Knowledge	*KRCA is committed to learning from and informing watershed residents, member municipalities, partners and clients about the value of the watershed, its features and functions. At the same time, KRCA invites the opportunity to learn about the interests of the watershed community to help integrate the practical implementation of our programs and services.*

SAFE WATERSHED

Monitoring	*Commit to ongoing monitoring, evaluation and assessment of watershed conditions to promote continuous improvement in policy and procedures.* *Commit to monitoring compliance to ensure that permitted works are carried out in keeping with prescribed conditions.*
Caution	*Adopt a precautionary approach. Take a preventive, proactive and integrative approach to watershed management based on adaptive management principles. Where there is uncertainty, risk or irreversibility, KRCA will exercise caution and err on the side of environmental protection and public safety.*

2.4 KRCA'S APPROACH TO WATERSHED MANAGEMENT

As identified in Chapter 1 of this manual, KRCA is a local *watershed* management agency that provides services and programs to further the conservation, restoration and responsible management of natural resources in partnership with landowners, governments, and other organizations. KRCA implements an integrated, systems approach to *watershed* management, balancing human, environmental and economic needs and recognizing the dynamic interplay between *ecosystem* functions and human activities.

2.4.1 A NATURAL SYSTEMS APPROACH

A natural heritage system includes all of the hydrologic and ecological 'systems' that make up the natural features and areas of the *watershed*. These can include *valleylands*, areas of natural and scientific interest (ANSIs), woodland, *wildlife habitat*, *wetlands* and *watercourses*, to name a few. In addition to this, the Provincial Policy Statement (PPS) offers additional direction by suggesting that natural heritage systems:

> *"can include lands that have been restored and areas with the potential to be restored to a natural state." (Provincial Policy Statement, MMAH, 2005)*

Based on the PPS, natural features and areas that comprise the natural heritage system may also include those elements that are in need of restoration that act to improve connectivity between and among adjacent natural features and areas. The emphasis is on system integrity and the importance of a holistic or systems-based approach. Linkages are a key element of the natural heritage system as there is a natural movement pattern of plants and animals that is necessary for biodiversity conservation and long term sustainability. This may become increasingly important as our climate changes. A systems approach considers features and functions and is premised on a precautionary approach that considers the needs of more demanding species from a landscape perspective.

KRCA encourages a natural heritage systems approach to *watershed* management based on the understanding that individual natural features and functions have strong ecological linkages with one another. Traditional conservation approaches have focused on protecting individual natural features and areas and as a result, failed to adequately protect the ecological integrity of the *watershed* as a whole. A natural heritage systems approach is premised on the commonly held belief that protecting and/or restoring features alone is not sufficient to maintain critical ecosystem functions. In addition, a natural heritage systems approach to *watershed* planning upholds the PPS, which states:

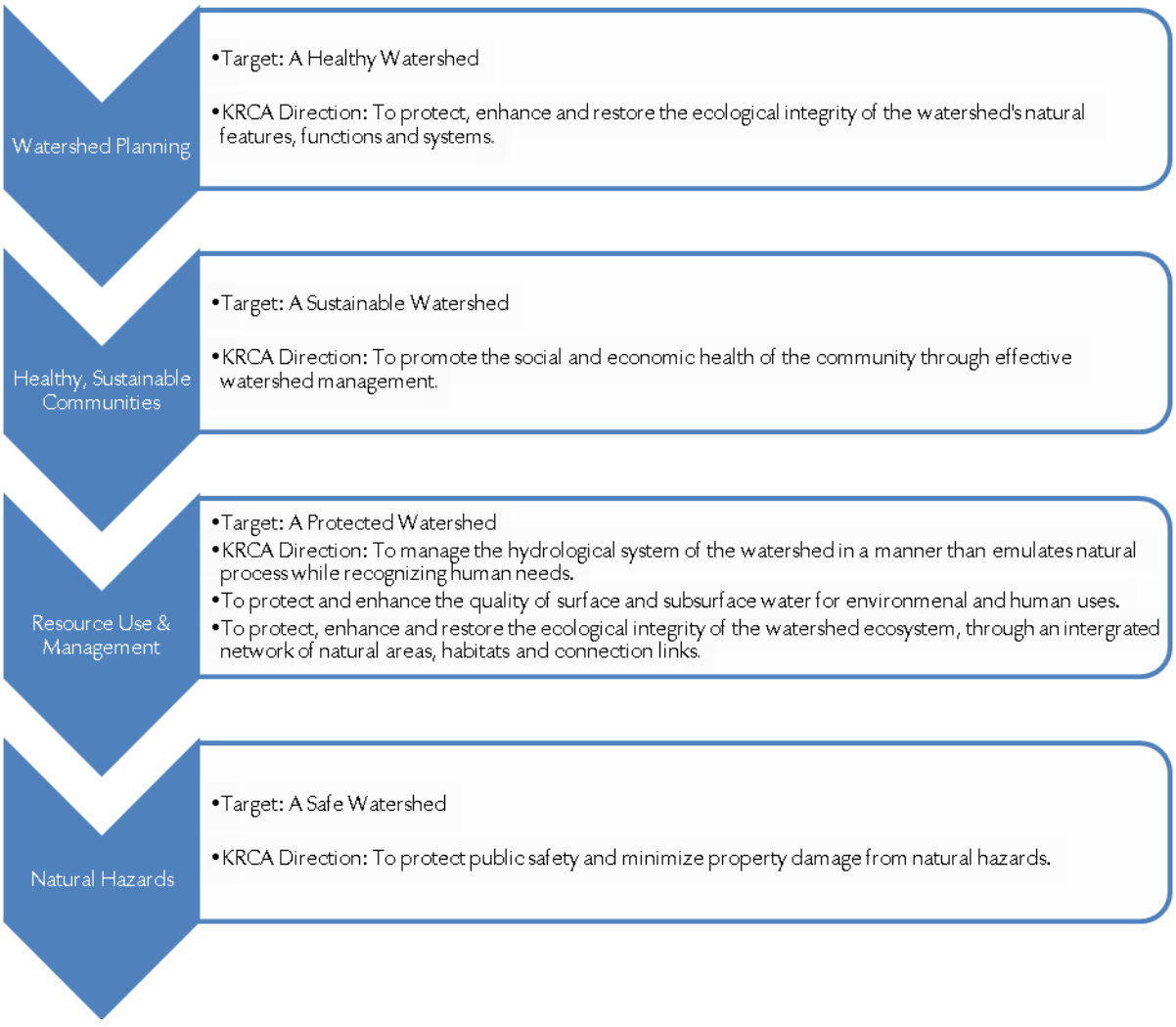
> *"the diversity and connectivity of the natural features in an area, and the long-term ecological function and diversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and groundwater features." (Provincial Policy Statement, MMAH, 2005)*

Within KRCA's jurisdiction, there are many species dependent on multiple habitats for completion of their life cycles. Maintaining features diversity, the integration of land and water related function and the restoration of natural linkages is critical to *watershed* resiliency against such forces as climate change and to ensure long-term *ecosystem* health. The natural heritage systems approach also realizes the important ecological and hydrological linkages that extend beyond property, planning area and political boundaries.

At the present time natural heritage systems are in place on only a relatively small portion of the KRCA *watershed* i.e., the Oak Ridges Moraine. Presently, however, a community effort of partner organizations including KRCA, the Ministry of Natural Resources (MNR), City of Kawartha Lakes and the County of Peterborough are developing a natural heritage system project for the Kawartha Lakes that would encompass KRCA's and ORCA's *watershed*s and build on existing natural heritage systems. Given the level of interest locally in the development of natural heritage systems, it is our expectation there will be a completed natural heritage system identified for the KRCA *watershed* in the near future.

2.4.2 AREAS OF INTEREST

KRCA has a number of areas of interest relating to its *watershed* management programs and services that help to provide higher level objectives supporting its role and activities in plan review and permitting. These areas of interest are directly reflective of KRCA's vision and mandate (as described previously), tie into KRCA's natural heritage systems outlook, and can be broadly categorized into four thematic areas:



2.4.2.1 WATERSHED PLANNING

TARGET: A Healthy Watershed

A *watershed* is an integrated system of human and natural processes that must be managed in a holistic and balanced way to achieve 'whole' *ecosystem* sustainability. KRCA advocates for a comprehensive and integrated approach to *watershed* planning and to managing natural hazards and natural resources, features, areas and systems that is consistent with the PPS.

Watershed planning helps to inform direction for land use activities and stewardship efforts. It is based on the biophysical characteristics of a particular study area, on a *watershed* wide level. *Watershed* planning relies on the hydrologic cycle as the main pathway that integrates physical, chemical and biological processes. As mentioned in the previous Chapter, using the *watershed* as the ecologically meaningful scale for planning has proven to be the most effective method to manage the features and functions that are within the KRCA *watershed* and is consistent with the PPS which states that:

> *"planning authorities shall protect, improve or restore the quality and quantity of water by using the watershed as the ecologically meaningful scale for planning." (Provincial Policy Statement, Ministry of Municipal Affairs and Housing (MMAH), 2005)*

Watershed plans include all of the lands drained by a major *river* and its tributaries and in some cases, can transcend administrative and political boundaries. Generally, a *watershed* plan is a document that describes a series of science-based actions needed to achieve sustainable *development* while protecting, restoring or enhancing *ecosystem* functions within a *watershed*. This can include protection of *natural heritage features* and natural hazards as well as strategies for effective water management, which may in turn serve to inform land use planning policies in local municipal Official Plan.

Sub*watershed* studies focus on a smaller geographical area (i.e., include all of the lands that fall within one tributary of a *watershed*) and have a narrower scope than *watershed* plans. They generally make science-based recommendations in three key areas: natural heritage protection and natural hazard management, servicing and stormwater management, and implementation and ongoing monitoring.

In 2010, KRCA, in collaboration with municipalities, federal and provincial agencies and other stakeholders completed the Lake Scugog Environmental Management Plan, a basin plan that encompassed all *watersheds* flowing into Lake Scugog. In 2011, KRCA initiated the development of similar *lake* management plans for the other inland *lakes* within the City of Kawartha Lakes. Also in 2011, KRCA in partnership with the Regional Municipality of Durham will complete the development of *watershed* plans for four *watersheds* originating on the Oak Ridges Moraine.

Guiding Principles:

- *KRCA will undertake the development of lake management plans, watershed and subwatershed plans for areas within their jurisdiction.*
- *KRCA will promote a holistic, integrated ecological approach to watershed planning in order to recognize the connectivity of issues and the importance of taking a systems approach and will encourage others to do the same.*
- *KRCA will encourage and support efficient land use and development patterns that are consistent with recommendations identified in watershed planning initiatives.*

2.4.2.2 HEALTHY, SUSTAINABLE COMMUNITIES

TARGET: A Sustainable Watershed

KRCA supports sustainable community *development* that is premised on sustainable community design and growth management. KRCA considers future impacts of climate change on water and other natural resources and looks to the best available science and information to support its *watershed* management programs and services. KRCA promotes opportunities for sustainable management practices and design when reviewing municipal policy documents, planning applications and applications submitted pursuant to Ontario Regulation 182/06, which may involve the review of stormwater management and servicing strategies as well as the design and implementation of infrastructure. In addition to its regulatory function and plan review function, KRCA provides technical advisory services to planning authorities that promote sustainable water management and public infrastructure planning.

KRCA promotes shoreline naturalization, *ecosystem* restoration, and public environmental awareness through stewardship programs, and education and outreach efforts to help guide sustainable living in the *watershed* and enhance, improve or restore features and functions.

Guiding Principles:

- *KRCA will recommend the use of sustainable management practices including the application of such principles as smart growth, low impact development and green technologies as embodied in the Growth Plan and the Provincial Policy Statement.*
- *KRCA will recommend that community development consider existing natural features and encourage decisions to be made that maintain, restore or enhance ecological and hydrological functions.*

2.4.2.3 RESOURCE USE AND MANAGEMENT

TARGET: A Protected Watershed

In line with the KRCA's *watershed* management initiatives (programs and services to further the conservation, restoration and responsible management of natural resources), KRCA supports the sustainable management and wise use of the resources within the *watershed* through its role as a local resource management agency and service provider to participating *watershed* municipalities. *Valleylands*, woodlands, *wetlands*, *watercourses*, *wildlife habitat*, *fish habitat* and life science areas of natural and scientific interest (ANSI) are among those natural features and areas that are considered for conservation. Many of these features and areas share a symbiotic relationship and the impact on one feature is likely to have an ensuing impact on others. There is, in addition, the potential that *development* proposals on *adjacent lands* could have an adverse impact on natural features and areas, which may, in turn, affect the ecological sustainability of the area. The concept of maintaining and/or enhancing *buffers* between areas proposed for *development* and natural features and areas is a concept that is well understood and one that has broad acceptance. Among other means of conserving, restoring and managing natural resources, KRCA recognizes the importance of conservation *buffers*. *Buffer* zones help to stabilize *stream* banks and prevent erosion. They assist in trapping waterborne contaminants that can pollute *watercourses* and they provide important habitat areas for critical species of fish and wildlife.

Generally, *buffers* are needed to address:

- Access and maintenance issues;
- Attenuation of pollutants;
- Maintenance of existing *ecological functions* and *hydrologic functions*;
- External and unpredicted factors;
- Areas of future potential enhancements; and/or,
- Wildlife corridors.

Guiding Principles:

- *KRCA will promote the conservation and wise use of resources in the watershed.*
- *KRCA will encourage and support land use and development patterns including intensification and redevelopment that support the protection, restoration and enhancement of the watershed features and functions.*
- *KRCA will encourage resource related decisions that are guided by comprehensive environmental studies based on natural boundaries and a watershed scale.*
- *KRCA will recommend updates to comprehensive environmental studies to reflect advancements in science and information.*
- *KRCA will work with clients and partners to recognize and encourage the sustainable use and management of natural resources as a shared responsibility.*

2.4.2.4 NATURAL HAZARDS

TARGET: A Safe Watershed

As defined under the Conservation Authorities Act (CA Act), *hazardous land* means lands that could be unsafe for *development* due to naturally occurring processes associated with flooding, erosion, dynamic beaches or unstable soil or bedrock. Whereas, under the PPS, there is a distinction between hazards related to flooding, erosion, dynamic beaches and hazards related to unstable soils or unstable bedrock: *hazardous lands* means property or lands that could be unsafe for development due to naturally occurring processes (flooding, erosion, dynamic beach hazards) and *hazardous sites* means property or lands that could be unsafe for *development* and site alteration due to naturally occurring hazards (may include unstable soils or unstable bedrock). Under its provincially delegated responsibility and its local resource management programs, KRCA undertakes the following:

- Prevent new *development* from locating in areas where there is a potential for loss of life and/or property damage from natural hazards;
- Protect existing *development* from natural hazards by implementing structural and non-structural *mitigation* measures including the acquisition of lands that are subject to known natural hazards;
- Emergency Preparedness through flood forecasting and early warning systems; and,
- Coordinate between natural hazards management and planning and *development*-related activities to ensure that decision makers have the necessary information they need and are well informed of any potential for a natural hazard.

- ***Eliminating natural hazards completely is not possible and, as a consequence, the approach taken is to manage the risk. The Province establishes minimum standards for acceptable levels of risk to the general public.***

Guiding Principles:

- *KRCA will help to prevent, eliminate or minimize risks to life and property caused by natural hazards through implementation of provincial programs.*
- *KRCA will work to ensure development does not create new hazards or exacerbate existing hazardous conditions.*
- *KRCA will promote land use policies and development practices that prevent, eliminate or minimize the risks to life and property caused by flooding, erosion, unstable soils or unstable bedrock.*

CHAPTER 3: LAND USE PLANNING POLICIES

PLAN INPUT AND REVIEW OVERVIEW

GENERAL APPROACH

KRCA ADVISORY SERVICES – GENERAL POLICIES

RESOURCE USE AND MANAGEMENT – SPECIFIC POLICIES

NATURAL HAZARDS – SPECIFIC POLICIES

Chapter 3: Land Use Planning Policies

3.1 LAND USE PLANNING OVERVIEW

The policies contained in this Chapter provide further guidance for Kawartha Region Conservation Authority's (KRCA) land use planning function. Applicants are directed to consult with member municipalities as there will be specific planning policies and requirements that will be articulated through Official Plans, Secondary Plans and Zoning By-laws. The intent of this manual is not to replicate current municipal policies, but to clearly identify KRCA's specific planning recommendations.

Consideration for the natural environment is an important part of land use planning and, as such, KRCA provides planning and technical advice to assist municipalities in fulfilling their responsibilities associated with natural heritage, water resources and hazard management. These responsibilities emphasize the importance of coordinating planning decisions and regulatory requirements.

As outlined in Chapter 1, KRCA provides planning and technical advice to municipalities from several perspectives:

- Through provincially delegated responsibility to ensure conformity with the natural hazard policies (S. 3.1) of the Provincial Policy Statement (PPS);
- As a *watershed*-based resource management agency;
- Through the provision of technical advisory services;
- Through its regulatory responsibility (discussed in more detail in the Chapter that follows); and,
- As a land manager and landowner in very site specific circumstances.

The PPS provides the key context and important policy framework against which KRCA carries out its environmental planning responsibilities and mandate. It is against the backdrop of the PPS that KRCA carries forward its planning mandate. KRCA's planning comments also reflect KRCA's broad goals and objectives for managing the natural resources of the *watershed*.

Specifically, KRCA provides input to the municipal land use planning process and reviews *development* applications submitted pursuant to the Planning Act to ensure that municipal policy and planning documents as well as *development* decisions are consistent with the natural hazards policies of the PPS and, where requested (as in the case of service level agreements), provides advice with respect to *natural heritage features* and water resources. In carrying out these responsibilities, KRCA considers environmental protection, social impacts, including human health and public safety, as well as economic implications. KRCA also considers natural heritage systems, connectivity and linkages. *Natural heritage features*[2] include *wetlands*, significant woodlands, significant *valleylands*, *fish habitat*, significant habitat of *endangered* and *threatened species*, *significant wildlife habitat*, and significant Areas of Natural and Scientific Interest (ANSIs). Natural hazard features include lands susceptible to flooding or erosion (*hazardous lands*) and unstable soils or bedrock (*hazardous sites*). KRCA also has management responsibility to protect significant or vulnerable surface and ground water features and their *hydrologic functions*, significant *aquifer* discharge and recharge areas. This Chapter outlines the policies of KRCA with respect to these environmental topics of interest.

[2] Conservation Authorities are not responsible for the determination of the significance of natural heritage features recognized under the PPS, nor are they responsible for the approval of the boundaries of natural heritage features recognized by the province.

In keeping with the provisions of the Planning Act, KRCA has the ability to appeal all or part of a decision of the approval authority to the Ontario Municipal Board (OMB). At the same time, however, it is recognized that there may be historical planning approval decisions that were made in the absence of current technical information that could now preclude *development* under the CA Act requirements. Wherever possible, if an issue remains unresolved, KRCA will work with the proponent and the municipality to pursue a resolution.

3.2 GENERAL APPROACH

Planning is a dynamic process as areas of specific interest and their contexts are subject to change over time. One of the areas of specific interest that is evolving is the development of natural heritage systems as an integral component of land use planning. The PPS provides policy direction on planning for a connected natural landscape that will support biodiversity, be ecologically functional and recognize linkages between and among natural heritage and water resource features. Furthermore, several provincial level land use plans (i.e., the Greenbelt Plan, Oak Ridges Moraine Conservation Plan (ORMCP), Lake Simcoe Protection Plan (LSPP), etc.) have integrated natural heritage systems.

KRCA is committed to delivering top quality service to clients and working in partnership with member municipalities to ensure that decisions are based on the best available science. As new information and knowledge becomes available, it is expected that these policies will be revised accordingly. In keeping with this commitment to continuous improvement, KRCA will adhere to the following principles:

- *Conduct its planning responsibilities on a watershed basis, recognizing the value of a holistic, integrated and ecological approach to planning and the important connectivity that exists between components of the natural environment.*
- *Make recommendations that are consistent with KRCA's vision, goal and objectives when reviewing proposals for development.*
- *Work with its municipal partners to include natural heritage features and systems, natural hazard areas and sensitive or vulnerable surface and ground water features within Official Plan and Zoning By-laws to ensure no new development occurs that would be contrary to provincial or KRCA policy.*
- *Have regard for all applicable provincial and federal legislation, including but not limited to, the Oak Ridges Moraine Conservation Plan, the Greenbelt Act and Plan, the Green Energy and Green Economy Act, the federal Fisheries Act, the Lake Simcoe Protection Act and Plan, and the Historic Canals Regulations when reviewing proposals under the Planning Act.*
- *Be consistent with the Provincial Policy Statement and have regard for all upper and lower tier Official Plans, Secondary Plans, Zoning By-laws and other applicable policies.*
- *Make recommendations to planning authorities and agencies that are in alignment with existing legislation, policy and guidelines approved by all three levels of government and in keeping with approved studies.*
- *Provide up-to-date technical advice on conservation matters.*
- *Consider both the site specific and cumulative impacts of development proposals in the context of broader watershed targets and objectives.*
- *Collaborate with other approval agencies in the review of development applications. Work to harmonize the approval process and promote a streamlined review and approval process.*

In addition to the Conservation Authorities Act (CA Act) and the Planning Act, *development* proposals may be subject to the legislative requirements of an array of statutes as identified in Chapter 1 and Appendix H – Other Legislation (i.e., ORMCP, Greenbelt Plan, LSPP, etc.). As such, in accordance with service level agreements (see below) KRCA may provide planning and technical advice to municipalities on conformity of planning and *development* activities with other pieces of legislation, where applicable.

> ***In the case of the KRCA watershed, there are a number of critical pieces of legislation that may impact planning and development activities. Here, because the watershed contains portions of the Oak Ridges Moraine, Greenbelt, and Lake Simcoe Watershed, provisions of the ORMCP, Greenbelt Plan and LSPP will apply within the relevant legislative boundary. See Figure D-1: Legislative Boundaries in Appendix D – Mapping.***

Partnership Memoranda

KRCA provides technical advisory services and planning advice to municipalities in keeping with service level agreements (Partnership Memoranda) in place with the City of Kawartha Lakes and the Regional Municipality of Durham. These Partnership Memoranda specify the role and the responsibilities of KRCA and the municipality on the provision of environmental advisory services on land use planning matters.

It is important to note that one of the service level agreements in place with the City of Kawartha Lakes governs KRCA's technical advisory services for that portion of the City of Kawartha Lakes that falls outside of KRCA jurisdiction (see Figure 1 in Appendix D – Mapping for extended planning area). In this way, KRCA provides technical advisory services for that portion of the City of Kawartha Lakes that lies within the *watershed* boundary as well as that portion of the City of Kawartha Lakes that lies beyond the boundary of the KRCA *watershed* north of the jurisdiction of Lake Simcoe Region Conservation Authority (LSRCA).

KRCA provides planning advisory services on a cost-recovery basis in accordance with a KRCA Board approved fee schedule, in the following key areas:

- Natural hazard planning (flooding, erosion, unstable soils or bedrock);
- Natural heritage and water resource planning (*wetland*s, significant woodlands, *fish habitat*, significant *valleyland*s, significant habitat of *endangered* and t*hreatened species*, *significant wildlife habitat*, significant ANSIs, vulnerable surface and ground water, sensitive surface water features and sensitive ground water features and their *hydrologic function*s); and,
- Adequacy of stormwater management plans from the perspective of KRCA.

KRCA is receptive to entering into other agreements with partner agencies and other *watershed* municipalities where efforts would improve and streamline service delivery.

Pre-consultations

Proponents are encouraged to take advantage of opportunities afforded by municipalities for pre-consultation – that is, the review and preliminary discussion of a *development* application as provided for under the Planning Act prior to submitting the application. Pre-consultation meetings offer an opportunity for applicants and their agents to meet with municipal staff and affected Agency staff (including KRCA) to review a proposal and to identify studies, information requirements and additional approvals that may be required. At this time, pre-consultation opportunities are offered by a number of municipalities in the KRCA *watershed* including: the City of Kawartha Lakes, Municipality of Clarington, Regional Municipality of Durham, and the Township of Scugog.

3.2.1 PLANNING ACT – APPLICATION TYPES

The municipal plan input and review program of KRCA involves the review of municipal policy and planning documents as well as site-specific planning applications submitted for approval under the Planning Act.

Planning related documents and applications circulated to KRCA for review and comment typically include:

- Official Plans and Official Plan Amendments
- Secondary Plans
- Zoning By-laws and Zoning By-law Amendments
- Plans of Subdivision
- Plans of Condominium
- Consents (severances and lot line adjustments)
- Minor Variances; and
- Site Plans.

Official Plans and Official Plan Amendments:
An Official Plan is a document adopted by a Municipal Council and approved either by the Minister of Municipal Affairs and Housing, a delegated authority such as a regional government, or the OMB. Official Plans while general in nature contain objectives and policies to guide *development* in a municipality while, at the same time, addressing social, environmental, and economic conditions.

Under the provisions of the Planning Act, Council must provide the agencies it considers having an interest adequate information on the Official Plan and an opportunity to submit comments. The same provisions apply to Official Plan Amendments.

The Planning Act also stipulates notice provisions and requires the municipality to hold at least one public meeting to consider input from members of the public. Before an Official Plan or Amendment is approved, it is usually circulated to agencies like KRCA for review.

Secondary Plans:
Secondary Plans relate to specific areas within a particular municipality, and are prepared in accordance with the applicable Official Plan. They provide a more detailed level of policy direction for land use and servicing.

Zoning By-laws and Zoning By-law Amendments:
Zoning by-laws are precise documents that are used by Council to implement Official Plan policies through the regulation of land use. Zoning By-laws, as the legal implementing tool, must conform to the Official Plan. While the Official Plan divides a municipality into land use designations, zoning by-law provisions establish site-specific requirements (such as *setback*s and density) that are identified and implemented on a site-specific basis. Given their specific nature, Zoning By-laws can directly complement the CA's regulations by prohibiting certain buildings or *structure*s on land with steep slopes and/or land that is subject to flooding.

Under the provisions of the Planning Act, landowners within 120 meters of a proposed amendment must be provided with written notice. Municipalities only provide notice to KRCA when, in their opinion, KRCA has an interest in the proposed by-law.

Draft Plans of Subdivision:
When land is being subdivided into multiple lots, a plan of subdivision is generally required. This plan must be submitted to the Minister of Municipal Affairs and Housing or a delegated authority for approval. The plan of subdivision is first submitted and circulated as a draft under the Planning Act.

As part of the approval process, municipalities may consult with commenting and approval agencies it feels have an interest in the proposed plan of subdivision. In the KRCA *watershed*, most draft plans of subdivision and plans of condominium are circulated by the *watershed* municipalities.

The Planning Act requires that, among other things, plans of subdivision be considered in light of the effect that *development* will have on matters of provincial interest (e.g., *floodplain* management, *wetland*s, etc.), the suitability of the land for which it is to be developed and the conservation of natural resources and flood control. Provisions under the Planning Act allow conditions of *development* to be imposed and it is through this mechanism that CAs like KRCA are able to identify matters of concern relating to its mandate.

Draft Plans of Condominium:
Condominiums are a form of subdivision in which title to a unit (e.g., individual apartment) is held by an individual. A share in the rest of the property is held commonly by all owners. Condominiums are regulated under the Condominium Act and the process for approval of a plan of condominium is markedly similar to that of a plan of subdivision. Draft plans of condominium are circulated to KRCA for review by *watershed* municipalities. Condominiums can involve new *development* or the transition of an existing rental property to condominium ownership. Condominiums units can also apply in principle to any type of residential building as well as to commercial and/or industrial areas.

Consents:
A consent (sometimes referred to as a severance) is the authorized separation of a piece of land into two or more adjoining properties. If several severances are intended on the same property, the planning authority may determine that a plan of subdivision may be required. Severance approval is generally delegated to a Committee of Council. Notice requirements pertaining to severances/consents are identified under the Planning Act.

Minor Variances:
A minor variance is generally considered a minor exception to the requirements of the Zoning By-law. Usually, minor variances apply to specific properties and in most cases, municipalities appoint a Committee of Adjustment to deal with minor variance applications as they relate to:

- Minor variances to certain types of by-laws;
- Minor variances to non-conforming uses; and/or,
- Minor variances to permit specific uses where a by-law defines them in specific terms.

The review of minor variance applications is an effective method by which KRCA can generally monitor and assess the impact of *development* activities on key policy and program interests.

Under the provision of the Planning Act, the Committee of Adjustment circulates notice of a hearing on an application to agencies that it considers have an interest. As a result, KRCA can request conditions be placed on the minor variance application and can identify the need for a permit under Ontario Regulation 182/06, where such requirements apply.

Site Plan Approval:
In general, site plan, variance and similar types of applications deal with existing *lots of record* and tend to be more detail design oriented. KRCA typically considers these applications in accordance with CA Act Section 28 permit requirements (see Chapter 4). Under the provisions of the Planning Act, municipalities are empowered to require landowners to enter into a *development* agreement to ensure site-specific requirements are met.

3.3 KRCA PLANNING ADVISORY SERVICES – GENERAL POLICIES

In carrying out its planning related responsibilities, KRCA will consider the following in making recommendations to *watershed* planning authorities:

- Policy conformity (i.e., conformity with PPS, provincial plans and KRCA policy, etc.);
- Potential impacts on *natural heritage features*, including their *ecological* and *hydrologic function*s;
- Potential impacts on natural hazards;
- Potential impacts to water resources, including surface and ground water features;
- Infrastructure, site servicing and grading;
- Stormwater management;
- Erosion and sediment control; and,
- Vegetation preservation and landscaping.

For the purposes of this Chapter, it is important to recognize that KRCA's comments regarding natural hazards encompassed by Section 3.1 of the PPS (i.e., floodways, hazardous lands, and hazardous sites) reflect KRCA's delegated responsibility to represent the 'provincial interest' in ensuring conformity with the natural hazards policies of the PPS (S. 3.1). As such, Policies contained in this Chapter relating to flooding hazards (for the KRCA watershed, all flooding hazards are considered floodways), erosion hazards, and unstable soils or unstable bedrock are directive as opposed to recommendations.

When reviewing applications submitted under the Planning Act, KRCA may recommend to the municipality that the following be submitted by the proponent or the proponent's agent:

- *Watershed* or Sub*watershed* Plan;
- Master Environmental Servicing Plan;
- Landscaping Plan;
- Vegetation Preservation Plan;
- *Watercourse* and/or *Valley* Wall Stabilization Plan;
- Geotechnical Analysis (soil and/or slope stability, *erosion hazard* analysis);
- *Environmental Impact Study*;
- Stormwater Management Plan;
- Erosion and Sediment Control Plan;
- *Floodplain* Study/Floodline Delineation (hydrologic and hydraulic analyses with detailed topographic mapping and modelling)
- Natural Channel Modification/Design Plan;
- Compliance Monitoring Plan;
- Water Budget, Hydrological and Hydro-Geological Studies; and/or,
- Any additional report or study required by KRCA to provide additional information relating to a specific concern.

Note: KRCA may recommend to a municipality that studies, reports or plans be peer-reviewed in cases where KRCA does not have appropriate in-house expertise to complete the review.

KRCA supports and encourages an *ecosystem* approach to land use planning. In general, *development* shall be directed away from the following natural hazard, *natural heritage* and water resource *features*:

- *Flooding hazards*;
- *Erosion hazards*;
- Areas of unstable soils or bedrock (*hazardous sites*);
- *Wetlands*;
- *Watercourses*/shorelines;
- Significant *valleylands*;
- Significant ANSIs;
- Significant woodlands;
- *Significant wildlife habitat*;
- Significant habitat of *endangered* or *threatened species*;
- *Fish habitat*;
- Sensitive and/or vulnerable surface water features; and,
- Sensitive and/or vulnerable ground water features.

Note: Features identified as "significant" are those recognized as such in accordance with the PPS.

Constraints Mapping

3.3(1) When *development* proposals involving site alteration are submitted, KRCA will require a site-specific evaluation that recognizes the existence of any of the above-noted natural hazard, *natural heritage* and/or water resource *features*. Typically, this evaluation will consist of an on-site constraint assessment with subsequent constraints mapping and is to be completed before any site alteration takes place.

Note: For the purposes of clarity, KRCA distinguishes between New Development and Expansion/Reconstruction/Relocation when dealing with development applications submitted pursuant to the Planning Act. The more stringent policies are generally applied to new development as KRCA recognizes that applications for expansions, reconstructions, or relocations are often related to an established use.

Note: KRCA's review of infrastructure, stormwater management, ponds and drains, parks, trails and recreational open spaces will be in accordance with KRCA's CA Act Section 28 permitting responsibilities if within a regulated area and subject to the policies contained within Chapter 4 as they are normally dealt with at a more detailed level of planning. In addition, KRCA will recommend that planning applications associated with these types of structures are consistent with all other policies contained in this manual.

3.3.1 OFFICIAL PLAN AND ZONING BY-LAW POLICIES

Official Plans and Zoning By-laws

3.3.1(1) **KRCA will only support the adoption of an Official Plan or the passing of a Zoning By-law when it reflects and references all identified hazards in accordance with the Provincial Policy Statement.**

3.3.1(2) **KRCA will only support the adoption of an Official Plan or the passing of a Zoning By-law when issues of *safe access/egress* have been appropriately addressed.**

3.3.1(3) **KRCA will recommend the inclusion of natural heritage systems that have been identified through comprehensive *watershed* or subwatershed plans or other publicly supported natural heritage planning initiatives in Official Plans and Zoning By-laws.**

3.3.1(4) **KRCA will strive to protect existing *wildlife habitat* by recommending to planning authorities that *significant wildlife habitat* be identified and placed in a protective designation/zoning in Official Plans/Zoning By-laws.**

3.3.1(5) **KRCA will strive to protect existing *valleyland*s by recommending to planning authorities that significant *valleyland*s be identified and placed in a protective designation/zoning in Official Plans/Zoning By-laws.**

3.3.1(6) **KRCA will strive to protect existing *wetland*s by recommending to planning authorities that all *wetland*s be identified and placed in a protective designation/zoning in Official Plans/Zoning By-laws.**

3.3.1(7) **KRCA will strive to protect *fish habitat* and watercourse functionality by recommending to planning authorities that water features and their associated *buffer*s (measured in accordance with Sections 3.4.6 and 3.4.8) be identified and placed in a protective designation/zoning in Official Plans/Zoning By-laws.**

3.3.1(8) **KRCA will recommend that sensitive groundwater features, where they have been identified, be included in Official Plans and Zoning By-laws and that necessary restrictions on *development* and site alteration be incorporated to protect, improve or restore sensitive groundwater features.**

3.3.1(9) **KRCA will require that lands susceptible to a *flooding hazard* be placed in a protective designation/zoning in Official Plans/Zoning By-laws to recognize the environmental hazard and that policies contained within these planning documents be in accordance with the requirements of the Provincial Policy Statement.**

3.3.1(10) **KRCA will require that policies pertaining to *hazardous lands* associated with erosion be in accordance with the requirements of the Provincial Policy Statement and included within Official Plans and Zoning By-laws.**

3.3.1(11) **KRCA will require that policies pertaining to *hazardous sites* associated with unstable soil or unstable bedrock be in accordance with the requirements of the Provincial Policy Statement and included within Official Plans and Zoning By-laws.**

3.3.2 LOT CREATION POLICIES

Under normal circumstances, KRCA will not recommend the creation of a lot(s) through plan of subdivision or consent that extends into defined areas of interest (i.e., natural hazard, *natural heritage* and water resource *features*) as referenced in Section 3.3 and listed in the following table, in consideration of the protection of *natural heritage* and *hydrologic features* and *functions* and long term management concerns related to risks to life and property associated with natural hazards.

Subdivisions and Consents

3.3.2(1) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that a lot(s) created through plan of subdivision or consent is set back a minimum of whichever is the greatest of the following (see Appendix C for *setback* reference). In the case of *fish habitat*, provincially significant *wetlands*, significant woodlands, significant v*alleylands*, significant areas of natural and scientific interest, and/or s*ignificant wildlife habitat* KRCA may recommend lot line *setbacks* other than those outlined below as determined based on the results of a satisfactory *Environmental Impact Study*, and consistent with provincial and municipal policy, provided that lot line(s) do not extend into the feature:**

Feature	Lot Line Setback
➢ *Confined Valley System*	6 metres from the limit of the stable *top of slope* or predicted long term stable slope (taking into account toe erosion allowance, where applicable).
➢ *Unconfined Valley System*s	6 metres from the maximum extent of the greater of the *flooding hazard* limit or the predicted *meander belt* width.
➢ *Floodplain*s	The limit of the *flooding hazard* based on the *100-year flood* or the Regional Storm (Timmins storm), whichever is greater.
➢ *Fish Habitat*	
Trent-Severn Waterway *lake*s and connecting *river*s	120 metres from the *Upper Controlled Navigation Limit*.
All other *lake*s	120 metres, OR 300 metres for *at capacity lake trout lake*s, from the *normal high-water mark*.
Meandering *stream*s with defined bed and banks	120 metres from the line that connects each outside curve/concave bank at bankfull stage.
Non-meandering *stream*s with defined bed and banks	120 metres from the *normal high-water mark*.

Intermittent *streams* and drainage features with no defined bed or banks, including *headwater* drainage features	**120 metres from the centre line of a channel or depression that concentrates flow.**
Wetland* supporting *fish habitat	**120 metres.**
➢ **Provincially Significant *Wetland*s***	**120 metres.**
➢ **Significant Woodlands**	**120 metres.**
➢ **Significant *Valleyland*s**	**120 metres.**
➢ **Significant Life Science Areas of Natural and Scientific Interest**	**120 metres.**
➢ **Significant Earth Science Areas of Natural and Scientific Interest**	**50 metres.**
➢ ***Significant Wildlife Habitat***	**120 metres from the limit of the habitat as identified through a technical evaluation completed in accordance with the Ministry of Natural Resources' Significant Wildlife Habitat Technical Guide (1999). KRCA will seek advice from the Ministry of Natural Resources with respect to the presence of known s*ignificant wildlife habitat*.**
➢ **Significant Habitat of *Threatened* or *Endangered Species***	**A distance to be determined through the completion of an *Environmental Impact Study***
➢ **Other Areas (sensitive groundwater recharge/discharge areas, wellhead protection areas, surface water intakes, vulnerable *aquifer*)**	**A distance to be determined through the completion of an *Environmental Impact Study* or other technical report**

***While not included in the Provincial Policy Statement, KRCA will recommend the following setbacks for non-provincially significant *wetland*s: 120 metres for *wetland*s >2 ha and 30 metres for *wetland*s <2 ha, unless otherwise determined based on the results of a satisfactory *Environmental Impact Study* consistent with provincial and municipal policy, provided that lot line(s) do not extend into the *wetland*.**

<u>Where lot creation adheres to provincially prescribed setbacks, KRCA will not recommend the submission of an *Environmental Impact Study*.</u>

3.3.2(2) **Notwithstanding Policy 3.3.2(1), KRCA will support the creation of a lot(s) set back a distance other than those identified in some circumstances where the creation of a new lot is for the purpose of flood and/or erosion *protection works* or for passive non-structural uses which do not affect flood flows.**

3.3.2(3) **Notwithstanding Policy 3.3.2(1), KRCA will support the creation of a lot(s) that is set back a distance other than those identified in the case of single severances and/or lot line adjustments where a suitable building envelope exists (including sufficient space to incorporate necessary infrastructure such as private septic systems, wells, driveway, and parking areas) outside of the applicable *setback* OR where a suitable building envelope**

	does not exist outside of the applicable *setback*, a distance other than those identified based on the results of a satisfactory *Environmental Impact Study*, provided that lot line(s) do not extend into the feature, where practical (e.g., in some cases, lot lines may need to extend into a feature in order to comply with applicable municipal zoning and/or designation requirements, or to accommodate a sensible lot configuration). In these circumstances, KRCA will recommend that the feature be zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature and/or hazard.
3.3.2(4)	**Notwithstanding Policy 3.3.2(1), KRCA will support the creation of a lot in the case of single severances and/or lot line adjustments within 120 metres of a non-provincially significant *wetland* greater than 2 ha in size or within 30 metres of a *wetland* less than 2 ha in size provided that a suitable building envelope exists (including sufficient space to incorporate necessary infrastructure such as private septic systems, wells, driveway, and parking areas) where *development* could satisfy the policies contained in Chapter 4. KRCA will recommend that the *wetland* be zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature.**
3.3.2(5)	**In addition to the above, within areas subject to the Greenbelt Plan, Oak Ridges Moraine Conservation Plan or the Lake Simcoe Protection Plan, KRCA will provide recommendations regarding lot(s) creation through plan of subdivision or consent that are consistent with the provisions of the applicable plan.**

In cases where orphaned properties (remnant parcels) are created as a result of setback requirements, KRCA's recommendation is that these properties be protected; that they either be retained by the owner, held in common ownership, or dedicated to a willing party (e.g., CA, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties. At a minimum, KRCA will recommend that they be zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature and/or hazard.

Site Access (Ingress/Egress)	
3.3.2(6)	**KRCA will only support the creation of a lot(s) when *safe access (ingress/egress)* can be achieved.**
3.3.2(7)	**KRCA will only support the creation of a lot(s) where new access (ingress/egress) is not required through *wetland*s.**

3.4 RESOURCE USE AND MANAGEMENT – SPECIFIC POLICIES

Across the KRCA *watershed*, there are a number of important physiographic, biological, ecological, geological, and/or hydrologic features. The following sections outline policies that KRCA follows when providing recommendations to municipalities for the protection of these *natural heritage* and water resource *features* and their functions.

Generally, the KRCA approach is to recommend that *development* be directed away from these features.

3.4.1 VALLEYLANDS

As the "backbone" of a *watershed*, *river* and *stream valleys* perform important *hydrologic* and *ecological functions* (such as providing diverse habitats). Typically, *valleylands* form an important component of natural heritage systems and their significance should be evaluated in accordance with standards established in the Ministry of Natural Resources' (MNR) Natural Heritage Reference Manual, 2nd Edition (2010). In the KRCA *watershed* at the present time, there are no known significant *valleylands* as defined under the PPS.

However, as the natural drainage systems for *watersheds*, *valleys* provide an appropriate context for evaluating water related resources. Aside from their natural heritage value, *valleys* are also extremely important to our social well being and cultural history. They enhance our quality of life and provide economic diversity and vitality through the resources they contain. Some of the cultural values of *valleylands* include:

- archaeological resources representative of indiginous cultures,
- a variety of recreational activities such as nature appreciation, hiking, fishing and hunting, swimming, boating, parks and golf courses,
- important economic resources such as aggregates, agriculture, and forestry, etc.

In fragmented landscapes, *valleylands* may represent the only natural areas remaining in a planning area and are often considered essential in defining the basis of a community. *Valleylands* are essential for establishing connectivity for natural heritage systems.

In order to protect the integrity of *valleylands* in the *watershed* and ensure their continuing functionality, KRCA will protect both *confined* and *unconfined valley systems*.

> ***It is important to recognize that hazardous lands may be associated with both confined and unconfined valley systems and as such, this section should be interpreted in conjunction with the Flooding Hazard policies outlined in Section 3.5.1 and the Erosion Hazards policies outlined in Section 3.5.2.***

New *Development* and/or Site Alteration

3.4.1(1) **For *development* proposals adjacent to *valleylands*, KRCA may recommend the submission of an *Environmental Impact Study* that provides an evaluation of *valleyland* significance.**

3.4.1(2) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that new *development* and/or site alteration not be permitted within significant**

	***valleyland*s or *adjacent lands* (i.e., within 120 metres) unless it has been demonstrated that there will be no negative impact on the *valleyland* or *adjacent land*s, or on their *ecological function*s. KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**
3.4.1(3)	**KRCA will recommend that a subdivision or condominium plan adjacent to significant *valleyland*s be required to include protection of the *valleyland* and applicable *setback* as per Policies 3.3.2(1) and 3.3.2(5). KRCA will recommend that protected lands either be retained by the owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature.**
3.4.1(4)	**Where there are additional requirements outlined in any *Watershed* Plan, Sub*watershed* Plan or Master Drainage Plan, KRCA will recommend that *development* adjacent to a *valleyland* conform to the provisions of that plan.**

Expansion/*Replacement*/Relocation	
3.4.1(5)	**KRCA will recommend approval of the expansion, *replacement*, or relocation of an existing building or *structure* within a significant *valleyland* or *adjacent lands* (i.e., within 120 metres) provided it has been demonstrated that there will be no negative impact on the *valleyland* or *adjacent lands*, or on their *ecological function*s. For building or *structure* relocations KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

Note: The exact limits of valleylands will be determined through site specific field investigations and technical reports (where required) in accordance with the Flooding Hazard policies outlined in Section 3.5.1 and the Erosion Hazards policies outlined in Section 3.5.2. These limits will be established and confirmed to the satisfaction of KRCA and the affected planning authority, as appropriate.

3.4.2 AREAS OF NATURAL AND SCIENTIFIC INTEREST - ANSI

Areas of natural and scientific interest (ANSIs) are those areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values worthy of protection, scientific study or education.

Life science ANSIs are significant representative segments of Ontario's biodiversity and natural landscapes, including specific types of forests, *valley*s, prairies, savannahs, alvars and *wetland*s, their native plants and animals, and their supporting environments. They contain relatively undisturbed vegetation and landforms, and their associated species and communities.

Earth science ANSIs are geological in nature, consist of some of the most significant representative samples of the bedrock, fossils and landforms in Ontario, and include examples of ongoing geological processes.

ANSIs play an important role in the protection of Ontario's natural heritage, since they best represent the full spectrum or biological communities, natural landforms and environments across Ontario.

New *Development* and/or Site Alteration

3.4.2(1) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that new *development* and/or site alteration not be permitted in significant areas of natural and scientific interest or *adjacent lands* (i.e., within 120 metres for life science and 50 metres for earth science) unless it has been demonstrated that there will be no negative impact on the area of natural and scientific interest or *adjacent lands*, or on their *ecological function*s; and, the *development*/site alteration proposal is consistent with the requirements in any approved plan for the area of natural and scientific interest. KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

3.4.2(2) **KRCA will recommend that a subdivision or condominium plan adjacent to significant areas of natural and scientific interest be required to include protection of the area of natural and scientific interest and applicable *setback* as determined in accordance with Policies 3.3.2(1) and 3.3.2(5). KRCA will recommend that protected lands either be retained by the owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature.**

Expansion/*Replacement*/Relocation

3.4.2(3) **KRCA will recommend approval of the expansion, *replacement*, or relocation of an existing building or *structure* within a significant area of natural and scientific interest or *adjacent lands* (i.e., within 120 metres for life science and 50 metres for earth science) provided it has been demonstrated that there will be no negative impact on the area of natural and scientific interest or *adjacent lands*, or on their *ecological function*s. For building or *structure* relocations, KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

Note: The exact limit of ANSIs are determined by the MNR.

3.4.3 WILDLIFE HABITAT

Wildlife habitat is often associated with other *natural heritage features* such as *wetlands*, *valleylands*, woodlands and ANSI's, and should be considered as integral components of any natural heritage system design. Designing a natural heritage system provides the opportunity to identify *significant wildlife habitat* proactively. To date, *significant wildlife habitat* has not been identified within the KRCA *watershed*; however, we anticipate that current initiatives to develop a natural heritage system for the *watershed* will identify *significant wildlife habitat*. In the absence of a natural heritage system, identification occurs on a case-by-case through an *Environmental Impact Study* or other technical evaluation (e.g., Natural Heritage Evaluation).

The MNR's Significant Wildlife Habitat Technical Guide (1999) describes four categories of *significant wildlife habitat*:

1. Habitats of seasonal concentrations of animals;
2. Rare vegetation communities or specialized habitat for wildlife;
3. Habitat of species of conservation concern; and,
4. Animal movement corridors.

The confirmation of significance of *wildlife habitat* should be determined in accordance with the MNR's Significant Wildlife Habitat Technical Guide (1999) and instigated when lands beyond the boundary of a *settlement area* are subject to one or more of the following triggers:

- Creation of more than three lots through either consent or plan of subdivision;
- Change in land use, not including the creation of a lot, that requires approval under the Planning Act;
- Shoreline consent along a large inland *lake*, small inland *lake* or large *river* (denoted on 1:50,000 National Topographic System maps as being two-lined) that is within 120 metres along the shoreline of an existing *lot of record* or a lot described in an application for subdivision or consent; and,
- Construction for recreational uses (e.g., golf courses, serviced playing fields, serviced campgrounds and ski hills) that require large-scale modification of terrain, vegetation or both.

Where any of the above-noted triggers exists, an Environmental Impact Study is necessary to evaluate the area with respect to the existence of significant wildlife habitat.

It is important to note that significant wildlife habitat must be formally identified by a municipality or by the Province in order to have status.

New *Development* and/or Site Alteration

3.4.3(1) **For *development* and/or site alteration proposals that involve the creation of more than three lots through either consent or plan of subdivision; a change in land use, not including the creation of a lot, that requires approval under the Planning Act; a shoreline consent along a large inland *lake*, small inland *lake* or large *river* (denoted on 1:50,000 National Topographic System maps as being two-lined) that is within 120 metres along the shoreline of an existing *lot of record* or a lot described in an application for subdivision or consent; and/or, the construction for recreational uses (e.g., golf courses, serviced playing fields, serviced campgrounds and ski hills) that require large-scale modification of terrain, vegetation or both, KRCA will recommend the submission of a technical evaluation of *wildlife habitat* significance completed in accordance with the Ministry of Natural Resources' Significant Wildlife Habitat Technical Guide (1999).**

3.4.3(2) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that new *development* and/or site alteration not be permitted in *significant wildlife habitat* or *adjacent lands* (i.e., within 120 metres from the limit of the habitat as identified through a technical evaluation completed in accordance with the Ministry of Natural Resources' Significant Wildlife Habitat Technical Guide, 1999) unless it has been demonstrated that there will be no negative impact on the *wildlife habitat* or *adjacent lands*, or on their *ecological functions*. KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

3.4.3(3) **KRCA will recommend that a subdivision or condominium plan adjacent to *significant wildlife habitat* be required to include protection of the habitat and applicable *setback* as determined in accordance with Policies 3.3.2(1) and 3.3.2(5). KRCA will recommend that protected lands either be retained by the owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature.**

Expansion/*Replacement*/Relocation

3.4.3(4) **KRCA will recommend approval of the expansion, *replacement*, or relocation of an existing building or *structure* within *significant wildlife habitat* or *adjacent lands* (i.e., within 120 metres from the limit of the habitat as identified through a technical evaluation completed in accordance with the Ministry of Natural Resources' Significant Wildlife Habitat Technical Guide (1999)) provided it has been demonstrated that there will be no negative impact on the *wildlife habitat* or *adjacent lands*, or on their *ecological functions*. For building or *structure* relocations, KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

3.4.4 HABITAT OF ENDANGERED AND THREATENED SPECIES

Significant habitat as it pertains to *endangered species* and *threatened species* is habitat that is approved by the MNR. There are two basic characteristics that the habitat must exhibit to meet the definition of significance:

1. Necessary for the maintenance, survival and/or recovery of naturally occurring or reintroduced populations; and,
2. Occupied or habitually occupied by the species during all of any part(s) of its life cycle.

Where the potential exists for significant *endangered* and *threatened species* habitat, proponents will be encouraged to contact MNR directly as early in the planning process as possible. MNR district offices can provide information and guidance for identifying *endangered* and *threatened species* and their habitats found within a municipal planning area or within a proposed *development* area.

Additional guidance on the identification and protection of significant habitat of endangered and threatened species can be found in MNR's Natural Heritage Reference Manual 2nd Edition (2010).

New *Development* and/or Site Alteration

3.4.4(1) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that new *development* and/or site alteration not be permitted in significant habitats of *endangered* and *threatened species*, except as may be permitted by the Ministry of Natural Resources.**

3.4.4(2) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that new *development* and/or site alteration not be permitted on *adjacent lands* (i.e., within 120 metres) of significant habitats of *endangered* and *threatened species* unless the *ecological function* of the *adjacent lands* has been evaluated and it has been**

demonstrated that there will be no negative impact on the natural features or their *ecological function*s. KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.

3.4.4(3) **KRCA will recommend that a subdivision or condominium plan adjacent to significant habitats of *endangered* and *threatened species* formally identified by the MNR be required to include protection of the habitat and applicable *setback* as determined in accordance with Policies 3.3.2(1) and 3.3.2(5). KRCA will recommend that protected lands either be retained by the owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature.**

Expansion/*Replacement*/Relocation

3.4.4(4) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that expansion, *replacement* or relocation of an existing building or *structure* not be permitted in significant habitats of *endangered* and *threatened species*, except as may be permitted by the Ministry of Natural Resources.**

3.4.4(5) **KRCA will recommend approval of the expansion, *replacement*, or relocation of an existing building or *structure* on *adjacent lands* (i.e., within 120 metres) of significant habitats of *endangered* and *threatened species* where the *ecological function* of the *adjacent lands* has been evaluated and it has been demonstrated that there will be no negative impact on the natural features or their *ecological function*s. For building or *structure* relocations, KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

3.4.5 WOODLANDS

Woodlands are an integral component of the natural heritage system. Woodlands are defined using the Ecological Land Classification System, and based on the presence of woody vegetation and soil composition.

Woodlands include treed areas that provide environmental and economic benefits to both the private landowner and the general public, such as erosion prevention, hydrological and nutrient cycling, provision of clean air and the long-term storage of carbon, provision of *wildlife habitat*, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. Woodlands include treed areas, woodlots or forested areas, and vary in their level of significance at the local, regional and provincial levels.

Significance in regard to woodlands means areas that are ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to their contribution to the broader landscape because of location, size or the amount of forest cover in the planning area; or economically important due to site quality, species composition or past management history.

KRCA will promote the maintenance of existing tree cover and vegetation associated with the control of flooding, erosion, pollution or the conservation of land.

It is important to recognize that significant woodlands must be formally identified by a municipality or by the province in order to have status.

New *Development* and/or Site Alteration

3.4.5(1) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that new *development* and/or site alteration not be permitted in significant woodlands south and east of the Canadian Shield or *adjacent lands* (i.e., within 120 metres) unless it has been demonstrated that there will be no negative impact on the woodland or *adjacent lands*, or on their *ecological function*s. KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

3.4.5(2) **KRCA will recommend that a subdivision or condominium plan adjacent to significant woodlands formally identified by a municipality or by the Province be required to include protection of the woodland and applicable *setback* as determined in accordance with Policies 3.3.2(1) and 3.3.2(5). KRCA will recommend that protected lands either be retained by the owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature.**

Expansion/*Replacement*/Relocation

3.4.5(3) **KRCA will recommend approval of the expansion, *replacement*, or relocation of an existing building or *structure* within a significant woodland south and east of the Canadian Shield or *adjacent lands* (i.e., within 120 metres) provided it has been demonstrated that there will be no negative impact on the woodland or *adjacent lands*, or on their *ecological function*s. For building or *structure* relocations, KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

3.4.6 FISH HABITAT

Fish habitat as defined in the Fisheries Act means spawning grounds and nursery, rearing, food supply, and migration areas on which *fish* depend directly or indirectly in order to carry out their life process. Maintaining healthy *fish* communities is important for the preservation of *fish* species biodiversity, supporting subsistence and sport fisheries as well as commercial and tourism-based industries, and protecting associated aquatic species, ecological processes and aesthetic and natural values. *Development* on sites adjacent to *fish habitat* can directly or indirectly result in negative impacts to the associated *fish* community, for example, through the runoff of sediments and nutrients and the removal of aquatic and/or terrestrial vegetation.

In accordance with the guidance provided in the MNR's Natural Heritage Reference Manual, 2nd Edition (2010), all water features – including permanent and intermittent *streams*, headwaters, seasonally flooded areas, wetlands, municipal or agricultural surface drains, lakes and ponds (except human-made off-stream ponds) are considered *fish habitat* by KRCA, unless it can be demonstrated (i.e., through site review or a report prepared by a qualified professional) that the feature does not constitute *fish habitat* pursuant to the Fisheries Act.

Water features generally support three major types of aquatic communities: coldwater, coolwater and warmwater communities. The community types reflect the thermal conditions of the waterbody and are often defined by either temperature or the composition of *fish* and invertebrate species present. It is important to identify the thermal regime of the water feature to help evaluate the sensitivity of the *fish* community to potential *development* and site alteration impacts. Coldwater and coolwater *streams* are particularly sensitive to land use impacts, which is due to the relatively narrow habitat requirements of resident fishes (e.g., requiring clean cold water, high levels of dissolved oxygen, etc.).

Restricted activity timing windows are a measure used to protect *fish* and *fish habitat* from *development* proposals in or around water. They are applied to protect fish from impacts of works or undertakings in and around water during spawning migrations and other critical life history stages. The MNR is responsible for setting timing window guidelines. The restricted activity timing windows are determined on a case-by-case basis in accordance with the following table, as amended from time to time following direction from the Province and/or local data:

MNR District	**Thermal Classification**		
	Warmwater	Coldwater	Warmwater Migratory
Aurora	April 1st – June 30th	September 15th – May 31st	March 1st – June 30th
Bancroft	April 1st – July 15th	October 1st – July 15th	N/A
Peterborough	April 1st – June 30th	October 1st – May 31st	N/A

Source: MNR district offices.

The thermal regime of the water feature not only affects the timing for which works in and around water may be restricted to protect the local *fish* population, but it also has a bearing on determining an appropriate *buffer* width for *development* and/or site alteration proposals adjacent to a water feature (see following subsection). Maintaining an appropriate shoreline *buffer* is another measure used to protect *fish* and *fish habitat* from *development* impacts. Typically, larger *buffer* widths are necessary along our most sensitive *fish habitats* (e.g., coldwater streams, Lake Trout Lakes, spawning habitats of important game fishes, etc.). The following table provides the minimum natural vegetated cover (i.e., *buffer* width) adjacent to *fish habitat* recommended by the MNR:

Habitat Type	**Buffer Width**
Warmwater	30 metres*
Coolwater	30 metres*
Coldwater, inland waterbodies on the Canadian Shield	30 metres

In cases where a site specific technical report (e.g., *Environmental Impact Study*) has evaluated the ecological function of the adjacent lands and has demonstrated that smaller buffer widths would be appropriate to ensure no negative impacts on the fish habitat, a minimum 15 metre buffer width for warmwater systems and a minimum 20 metre buffer width for coolwater systems may be acceptable.
Source: MNR's Natural Heritage Reference Manual, 2nd Edition, 2010

New *Development* and/or Site Alteration

3.4.6(1) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that new *development* and/or site alteration not be permitted in *fish habitat*, except as may be permitted by the Ministry of Natural Resources and/or Fisheries and Oceans Canada.**

3.4.6(2) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that new *development* and/or site alteration not be permitted on *adjacent lands* (i.e., within 120 metres OR 300 metres for *at capacity lake trout lakes*) of *fish habitat* unless the *ecological function* of the *adjacent lands* has been evaluated and it has been demonstrated that there will be no negative impact on the natural features or their *ecological functions*. KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

3.4.6(3) **KRCA will recommend that a subdivision or condominium plan adjacent to *fish habitat* be required to include protection of the habitat and applicable *setback* as determined in accordance with Policies 3.3.2(1) and 3.3.2(5). KRCA will recommend that protected lands either be retained by the owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature.**

Expansion/*Replacement*/Relocation

3.4.6(4) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that expansion, *replacement* or relocation of an existing building or *structure* not be permitted in *fish habitat*, except as may be permitted by the Ministry of Natural Resources and/or Fisheries and Oceans Canada.**

3.4.6(5) **KRCA will recommend approval of the expansion, *replacement*, or relocation of an existing building or *structure* on *adjacent lands* (i.e., within 120 metres OR 300 metres for *at capacity lake trout lakes*) of *fish habitat* where the *ecological function* of the *adjacent lands* has been evaluated and it has been demonstrated that there will be no negative impact on the natural features or their *ecological functions*. For building or *structure* relocations, KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

Note: The determination and limits of fish habitat will be determined through site-specific field investigations and technical reports where required, to the satisfaction of KRCA and affected planning authorities, as appropriate.

Fish Habitat Buffers

In addition to lot creation *setback*s where *fish habitat* is present, KRCA recognizes the importance of the maintenance, establishment and/or enhancement of *buffers* adjacent to water features supporting *fish habitat*. It is important to recognize the difference between lot creation *setback*s and *buffers* (also see Appendix A – Definitions). A *setback* is a defined physical separation that prohibits all *development* and/or site alteration and provides for protection against overall impacts. Typically, a *buffer* can vary in width depending on site circumstances and is generally applied to *mitigate* specific types of impacts (e.g., sedimentation and contamination). KRCA will recommend the application of *buffers* in accordance with the policies of relevant provincial plans (i.e., Greenbelt Plan, Oak Ridges Moraine Conservation Plan, Lake Simcoe Protection Plan) and guidance provided in the MNR's Natural Heritage Reference Manual, 2nd Edition (2010).

Buffers* for *Development* and/or Site Alteration – *Fish Habitat

3.4.6(6) **For all new *development on adjacent lands* (i.e., within 120 metres OR 300 metres for *at capacity lake trout lakes*) of *fish habitat*, KRCA will recommend the maintenance, establishment, and/or enhancement of a *buffer* strip running continuously along both sides of all water features supporting *fish habitat*, measured in accordance with Policies 3.4.6(10), 3.4.6(11), 3.4.6(12) and 3.4.6(13) below. KRCA will recommend approval of the interruption of this *buffer* to allow *watercourse* crossings, boathouses, recreational trails and paths, and infrastructure provided that they can satisfy the policies contained in Chapter 4.**

3.4.6(7) **Notwithstanding Policy 3.4.6(6), where new *development* on an existing *lot of record* is proposed and there is no feasible alternative site to locate the *development* that is outside of the applicable *buffer*, measured in accordance with Policies 3.4.6(10), 3.4.6(11), 3.4.6(12) and 3.4.6(13) below, KRCA will recommend maximum *buffers* given the site constraints be applied wherever possible and may recommend the submission of an *Environmental Impact Study* that:**

- **provides an evaluation of the potential impact on *fish* and *fish habitat*;**
- **provides mitigation measures, including such things as sediment and erosion control plans, plans to protect and sustain natural vegetation (e.g., Planting or Vegetation Plan, Vegetation Preservation Plan and/or a Tree Management Plan, etc.); and,**
- **demonstrates that the natural state of the water feature can be protected.**

3.4.6(8) **For expansion, *replacement,* or relocation of an existing building or *structure* on *adjacent lands* (i.e., within 120 metres OR 300 metres for *at capacity lake trout lakes*) of *fish habitat*, KRCA will recommend the maintenance, establishment, and/or enhancement of a *buffer* strip running continuously along both sides of all water features supporting *fish habitat*, measured in accordance with Policies 3.4.6(10), 3.4.6(11), 3.4.6(12) and 3.4.6(13) below OR where this is not feasible, that maximum *buffers* given the site constraints be applied wherever possible. For building or *structure* relocations, KRCA will recommend that the proponent minimize the building envelope and may recommend the submission of a proposal to enhance the *fish habitat buffer*.**

3.4.6(9) **KRCA will recommend that *fish habitat buffers* either be retained by an owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority,**

municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature.

3.4.6(10) **For *river*s, *creek*s and *stream*s, KRCA will recommend that the *buffer* strip is measured perpendicularly inland from the *river*, *creek*, or *stream* as follows:**

- **For *watercourse*s in the Oak Ridges Moraine, a minimum of 30 metres from the meander belt of the *watercourse*;**
- **For *watercourse*s in the Protected Countryside of the Greenbelt, a minimum of 30 metres from the outside boundary, notwithstanding provisions for e*xisting use*s in the Greenbelt Plan;**
- **For all other meandering *stream*s with defined bed and banks that support *fish habitat*, 30 metres from the line that connects each outside curve/concave bank at bankfull stage. Where it can be demonstrated through an *Environmental Impact Study* that there will be no negative impact on *fish habitat*, a 15 metre *buffer* in the case of warmwater systems and a 20 metre *buffer* in the case of coolwater systems would be acceptable;**
- **For all other non-meandering *stream*s with defined bed and banks that support *fish habitat*, 30 metres from the *normal high-water mark*. Where it can be demonstrated through an *Environmental Impact Study* that there will be no negative impact on *fish habitat*, a 15 metre *buffer* in the case of warmwater systems and a 20 metre *buffer* in the case of coolwater systems would be acceptable; or,**
- **For all other intermittent *stream*s and drainage features with no defined bed or banks that support *fish habitat*, including *headwater* drainage features, 30 metres from the centre line of a channel or depression that concentrates flow. Where it can be demonstrated through an *Environmental Impact Study* that there will be no negative impact on *fish habitat*, a 15 metre *buffer* in the case of warmwater systems and a 20 metre *buffer* in the case of coolwater systems would be acceptable.**

3.4.6(11) **For Trent-Severn Waterway *lake*s and connecting *river*s, KRCA will recommend a minimum 30 metre *buffer* strip measured perpendicularly inland from the *Upper Controlled Navigation Limit*, as established for the Trent-Severn Waterway by Parks Canada, and for all other *lake*s, a minimum 30 metre *buffer* strip measured perpendicularly inland from the *normal high-water mark*.**

3.4.6(12) **For *wetlands* and seasonally flooded areas that support *fish habitat*, KRCA will recommend a minimum 30 metre buffer strip measured perpendicularly inland from the edge of open water. Where it can be demonstrated through an *Environmental Impact Study* that there will be no negative impact on *fish habitat*, a 15 metre *buffer* in the case of warmwater systems and a 20 metre *buffer* in the case of coolwater systems would be acceptable.**

3.4.6(13) **Notwithstanding Policies 3.4.6(10), 3.4.6(11) and 3.4.6(12) above, greater *buffer* widths may be recommended for areas of sensitive soil conditions (e.g., high permeability, shallow depths, or extensive organics, etc.), areas subject to the recommendations of a *Watershed* Plan, Sub*watershed* Plan or *Lake* Management Plan, and/or, in the habitat of *endangered* or *threatened species*.**

3.4.7 WETLANDS

*Wetland*s are important natural features on the landscape, whether they are permanently or seasonally wet. *Wetland*s perform many important *ecological function*s. They moderate water flow by absorbing much of the surface water runoff from the land and then slowly releasing it. This helps to reduce flooding and to sustain *stream* flows during dry spells. Many *wetland* areas recharge groundwater by moving surface water into the groundwater system. As a result, they play an important role in protecting and improving water quality, provide for *fish* and *wildlife habitat* and offer a number of associated recreational opportunities. The lands that surround *wetland* areas are important in sustaining their vital *hydrologic* and *ecological function*s.

*Wetland*s are defined in the PPS as:

> *lands that are seasonally or permanently covered by shallow water as well as lands where the water table is close to or at the surface. In either case, the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic plants or water-tolerant plants. The four types of wetlands include swamps, marshes, bogs and fens.*

The PPS indicates that lands that are periodically soaked or *wetland*s being used for agricultural purposes which no longer exhibit *wetland* characteristics, are not considered to be *wetland*s for the purposes of this definition. The PPS contains policies around significant *wetland*s, which are considered to be those *wetland*s that have been evaluated by the MNR and designated as Provincially Significant based on evaluation procedures established by the Province.

In addition to PPS provisions with respect to *wetland*s, KRCA will consider the CA Act permitting requirements for interference in any way with a *wetland* when providing planning advice to municipalities. This is to ensure that regulatory requirements can be satisfied once a planning decision is made.

Under the CA Act Section 28 Regulation administered by KRCA (O. Reg. 182/06), a *wetland* includes:

> *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).*

It should be noted that, *wetland*s along the TSW that are under federal ownership (PC) are afforded protection in relation to in-water and shoreline works that could have an adverse impact.

> ***All wetlands and their associated adjacent lands or area of interference are regulated under KRCA's Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses – O. Reg. 182/06 (See Chapter 4).***

New *Development* and/or Site Alteration

3.4.7(1) **Further to Policy 3.3(1), for all new *development* proposals involving site alterations where a *wetland* is present on or adjacent to lands subject to the *development* proposal, KRCA may recommend an on-site *wetland* boundary delineation/staking. This boundary delineation shall be illustrated on a Reference Plan or Site Plan. In the case of provincially significant *wetlands*, where an approved Ministry of Natural Resources' boundary differs from that identified on-site, the proponent will be responsible for obtaining acceptance of the new provincially significant *wetland* boundary from the Ministry of Natural Resources.**

3.4.7(2) **For new *development* proposals adjacent to a an unevaluated *wetland*, KRCA may recommend the submission of an *Environmental Impact Study* that provides an evaluation of *wetland* significance in accordance with the Ontario Wetland Evaluation System.**

3.4.7(3) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that new *development* and/or site alteration not be permitted in provincially significant *wetland*s, except as may be permitted by the policies contained in Chapter 4.**

3.4.7(4) **KRCA will recommend that a subdivision or condominium plan adjacent to a provincially significant *wetland* include protection of the *wetland* and applicable *setback* as determined in accordance with Policies 3.3.2(1) and 3.3.2(5). KRCA will recommend that protected lands either be retained by the owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature.**

3.4.7(5) **KRCA will recommend that a subdivision or condominium plan adjacent to all other *wetland*s (i.e., non-Provincially Significant) include protection of the *wetland* and an appropriate *setback* determined through the submission of a satisfactory *Environmental Impact Study*. KRCA will recommend that protected lands either be retained by the owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature.**

Note: The determination and limits of a wetland will be determined through site-specific field investigations and technical reports where required, to the satisfaction of KRCA and affected planning authorities, as appropriate.

Adjacent Lands and Areas of Interference

The areas surrounding *wetland*s where *development* could interfere with the *hydrologic* and *ecological function*s of a *wetland* are referred to as "*adjacent lands*" (PPS). With respect to the CA Act, areas surrounding *wetland*s where *development* could interfere with the *hydrologic function* of a *wetland* are referred to as *"areas of interference"* (CA Act). According to the MNR's Natural Heritage Reference Manual 2nd Edition (2010), *adjacent lands* identified in the PPS include lands that are 120 metres from the boundaries of provincially significant *wetland*s. Under the CA Act Section 28 Regulation administered by KRCA (O. Reg. 182/06), *areas of interference* include lands that are 120 metres from the boundaries of all *wetland*s greater than or equal to 2 hectares (regardless of significance) and lands that are 30 metres from the boundaries of *wetland*s less than 2 hectares in size. In addition to PPS provisions with respect to *adjacent lands*, KRCA will consider the CA Act permitting requirements for *development* within *areas of interference* when providing planning advice to municipalities. This is to ensure that regulatory requirements can be satisfied once a planning decision is made.

New *Development* and/or Site Alteration

Within 120 metres of a Provincially Significant *Wetland*:

3.4.7(6) **In keeping with the provisions of the Provincial Policy Statement, KRCA will recommend that new *development* and/or site alteration not be permitted on *adjacent lands* (i.e., within 120 metres) of a provincially significant *wetland,* except as may be permitted by the policies contained in Chapter 4 and where the *ecological function* of the *adjacent lands* has been evaluated and it has been demonstrated that there will be no negative impact on the natural features or their *ecological function*s. KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

Within 120 metres of a *Wetland* Greater than 2 hectares other than a Provincially Significant *Wetland* or Within 30 metres of a *Wetland* Less than 2 hectares:

3.4.7(7) **In general, KRCA will recommend that new *development* and/or site alteration not be permitted within 120 metres of the boundary of a *wetland* greater than 2 hectares in size other than a provincially significant *wetland* or within 30 metres of the boundary of a *wetland* less than 2 hectares in size, except as may be permitted by the policies contained in Chapter 4.**

Expansion/*Replacement*/Relocation

Within 120 metres of a Provincially Significant Wetland:

3.4.7(8) **KRCA will recommend approval of the expansion, *replacement*, or relocation of an existing building or *structure* on *adjacent lands* (i.e., within 120 metres) of a provincially significant *wetland* subject to the policies contained in Chapter 4, and where the *ecological function* of the *adjacent lands* has been evaluated and it has been demonstrated that there will be no negative impact on the natural features or their *ecological function*s. For building or *structure* relocations, KRCA may recommend the submission of an *Environmental Impact Study* to demonstrate no negative impact.**

Within 120 metres of a *Wetland* Greater than 2 hectares other than a Provincially Significant *Wetland* or Within 30 metres of a *Wetland* Less than 2 hectares:

3.4.7(9) **KRCA will recommend approval of the expansion, *replacement*, or relocation of an existing building or *structure* within 120 metres of the boundary of a *wetland* greater than 2 hectares in size other than a provincially significant *wetland* or within 30 metres of the boundary of a *wetland* less than 2 hectares in size subject to the policies contained in Chapter 4.**

3.4.8 WATERCOURSES

*Watercourse*s are dynamic systems that include complex processes constantly undergoing change. A *watercourse* is any *river*, *creek*, *stream*, *lake* (in the case of the KRCA *watershed*), and/or municipal drain and is further defined in Appendix A – Definitions. The health of *watercourse*s is integral to the health of a *watershed* as they provide key *ecological function*s and *hydrologic function*s such as *fish habitat* (refer to Section 3.4.6) and habitat for wildlife, sediment and nutrient transport and deposition, transfer media for energy and organisms, source of water supply and important contributions to the hydrologic cycle.

The structure and functions of *watercourse*s are influenced by channel morphology, sediment characteristics and the nature of the *riparian vegetation*. Each of these aspects is interrelated and as a result, impacts on one are likely to impact others. Changes to channel morphology reduce the ability of the *watercourse* to process sediment causing erosion and changing the amount or size of bed load being moved. Loss of *riparian vegetation* results in more pollutants and run-off being transferred from the land to the water, impacting water quality and flooding downstream reaches. In addition, loss of *riparian vegetation* or change to sources of the water supply can have impacts to the thermal regime of the *watercourse*. These changes degrade near shore and aquatic habitat, and impair the *watercourse* for use by fish, wildlife, humans and other organisms.

KRCA will generally recommend that all watercourses and adjacent resource areas remain in their natural state.

***Development* and/or Site Alteration**

3.4.8(1) **KRCA will recommend that *development* and/or site alteration not be permitted within the existing channel of a *watercourse*, except in accordance with the policies in Chapter 4.**

3.4.8(2) **KRCA will recommend that proposals to realign or channelize portions of a natural *watercourse* to accommodate *development* not be permitted, except in accordance with the policies in Chapter 4.**

3.4.8(3) **With the exception of *watercourse* crossings discussed in Chapter 4, KRCA will recommend that spanning buildings or *structures* across *watercourses* not be permitted.**

3.4.8(4) **Where there are additional requirements outlined in any *Watershed* Plan, Sub*watershed* Plan or Master Drainage Plan, KRCA will recommend that *development* adjacent to *watercourses* conform to the provisions of that plan.**

Note: The determination and limits of a watercourse will be determined through site-specific field investigations and technical reports where required, to the satisfaction of KRCA and affected planning authorities, as appropriate.

Watercourse Buffers

Watercourse buffers are not only used to protect *fish habitat* (see Section 3.4.6), but also to provide quality control for runoff, promote infiltration, stabilize soil, and provide erosion protection. For *development* and/or site alteration proposals adjacent to a *watercourse* where it has been demonstrated (i.e., through site review or a report prepared by a qualified professional) that the *watercourse* does not constitute *fish habitat* pursuant to the Fisheries Act, the importance of maintaining *watercourse buffers* from a watercourse functionality (e.g., water quality control, water conveyance, etc.) perspective must still be recognized.

***Buffers* for *Development* and/or Site Alteration – Watercourse Functionality**

3.4.8(5) **For all *development* and/or site alteration proposals adjacent to a *watercourse* where it has been demonstrated through site review or appropriate technical reports (e.g., *Environmental Impact Study*) that the *watercourse* does not constitute *fish habitat* pursuant to the Fisheries Act, KRCA will recommend the maintenance, establishment, and/or enhancement of a *buffer* of an appropriate width (i.e., 5-15 metres) based on intended land use and site conditions as determined by KRCA staff in consultation with the applicant and guided by the *Best Management Practices 15: Buffer Strips* manual developed by OMAFRA, 2004 and/or in accordance with the results of the technical report.**

3.4.8(6) **Notwithstanding Policy 3.4.8(5), greater *buffer* widths may be recommended for areas subject to the recommendations of a *Watershed* Plan, Sub*watershed* Plan or *Lake* Management Plan, the provisions of a particular provincial plan (i.e., Greenbelt Plan, Oak Ridges Moraine Conservation Plan, Lake Simcoe Protection Plan) and/or, in the habitat of *endangered* or *threatened species*.**

3.4.8(7) **KRCA will recommend approval of the interruption of a *buffer* to allow *watercourse* crossings, boathouses, recreational trails and paths, and infrastructure provided that they can satisfy the policies contained in Chapter 4.**

3.4.8(8) **KRCA will recommend that *watercourse buffers* either be retained by an owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the feature.**

3.4.9 SENSITIVE GROUNDWATER FEATURES

Section 2.2 of the PPS provides direction with respect to groundwater features. Specifically, Policy 2.2.2 states that *development* and site alteration shall be restricted in or near sensitive surface water features and sensitive ground water features such that these features and their related *hydrologic function*s will be protected, improved or restored.

***Development* and/or Site Alteration**

3.4.9(1) **KRCA will recommend that an *Environmental Impact Study* scoped to address potential *hydrologic*/hydrogeological impacts be completed for all *development* and/or site alteration proposals in or adjacent to sensitive groundwater features, including recharge/discharge areas and *aquifer*s that have been identified in a Municipal Official Plan, *Watershed* Plan, Sub*watershed* Plan and/or other Studies (such as the *Trent Assessment Report* developed under the Clean Water Act). In accordance with the provisions of the Provincial Policy Statement, the study shall demonstrate that these features and their related *hydrologic function*s will be protected, improved or restored.**

3.5 NATURAL HAZARDS – SPECIFIC POLICIES

There are a number of natural physical environmental processes that can produce unexpected events the outcome of which can be catastrophic and result in damage to property, injury to humans, and occasionally, loss of life. These processes are considered natural hazards. Across the *watershed*, they include *flooding hazard*s, *erosion hazard*s, and unstable soil or bedrock.

KRCA will recommend that a comprehensive approach to natural hazard management is followed considering risks to life and property, economic feasibility (i.e., cost benefit analysis), upstream and downstream impacts, social impacts and cumulative impacts, as well as the impact to natural features and areas. KRCA will take the position that *development* shall not take place within *flooding hazard*s or areas that would be rendered inaccessible to people and vehicles during events associated with *hazardous lands*, unless it has been demonstrated that the site has *safe access (ingress/egress)* appropriate for the nature of the *development* being proposed and the natural hazard. KRCA will make recommendations consistent with established provincial policy and articulated provincial standards when determining the limits and extent of *hazardous lands* and *hazardous sites*.

KRCA adheres to the following in carrying out its natural hazard management responsibilities:

- Proper natural hazard management requires that natural hazards (flooding, erosion, *karst* bedrock, organic soils) be simultaneously recognized and addressed in a manner that is integrated with land use planning and maintains environmental and *ecosystem* integrity.
- Effective *floodplain* management can only occur on a *watershed* and littoral reach basis with due consideration given to the effects of *development* and the associated environmental and *ecosystem* impacts.
- Local conditions must be taken into account in the planning and management of natural hazards.
- New *development* which is susceptible to natural hazards or which will cause or aggravate hazards to existing and approved land uses or which will cause adverse environmental impacts will not be supported unless the natural hazard and environmental impacts can be addressed.
- Natural hazard management should include where possible the early identification of hazards during land use planning initiatives and may require a coordinated effort on the part of municipalities, KRCA, MNR and the Ministry of Municipal Affairs and Housing (MMAH).

Because hazards have the potential to result in significant human consequences in terms of loss of life and property damage, it is imperative that municipal land use policies and planning documents (Official Plans, Secondary Plans and comprehensive Zoning By-laws) and *development* decisions take all necessary precautions to ensure community safety, being consistent with Section 3.1 of the PPS. KRCA will apprise MMAH of planning matters where there is inconsistency with respect to the application of Section 3.1 of the PPS to determine whether or not direct involvement by the province is required.

Prohibited Uses

3.5(1) Due to potential public safety concerns, the following uses are generally prohibited from occurring on lands susceptible to natural hazards:

- **an institutional use associated with hospitals, nursing homes, pre-school, school nurseries, day care and schools, where there is a threat to the safe evacuation of the sick, the elderly, persons with disabilities or the young during an emergency as a result of flooding, failure of floodproofing and/or *protection works*, and/or erosion;**
- **an essential emergency service such as that provided by fire, police and ambulance stations and electrical substations, which would be impaired during an emergency as result of flooding, failure of flood-proofing measures and/or *protection works*, and/or erosion; or,**
- **uses associated with the disposal, manufacture, treatment or storage of *hazardous substances.***

3.5.1 FLOODING HAZARDS

Flooding of *river* and *stream* systems typically occurs following a spring freshet and may occur as a result of extreme rainfall events. *River*s and *stream*s naturally accommodate flooding in their *valley*s. Historically, *development* occurred in *floodplain* areas because of the availability of water for power, transportation, energy, waste assimilation, domestic and industrial use, and for aesthetic reasons. *Floodplain development* is susceptible to flooding which can result in property damage and/or loss of life.

For the KRCA *watershed*, the *flooding hazard* limit (or *floodplain*) of *river* and *stream* systems is the area adjacent to the *watercourse* that would be inundated under a flood resulting from the rainfall experienced during the Timmins storm (1961) or the *100-year flood*, whichever is greater. It is generally applied to *watercourse*s which drain areas that are equal to or greater than 125 hectares. It is important to note that the standard for defining the *floodplain* along small *lakes* (all *lakes* within the KRCA *watershed*) is the same standard used for *river* and *stream* systems (i.e., flooding produced by the Timmins storm or the *100-year flood*, whichever is greater). Where the limit of a *flooding hazard* has not been determined through an engineering analysis, KRCA sets the flood elevation at one metre above the *normal high-water mark*.

KRCA applies a one-zone concept to *floodplain* management based on the *regulatory flood* standard, in accordance with provincial standards. In a one-zone concept, the entire area within the *flooding hazard* limit (i.e., the *floodplain*) is considered to be one management unit; it is referred to as the *floodway* (see Figure 3A below). The one zone concept is the most restrictive but also the most effective way to manage flood hazards from a risk management perspective. There are alternative *floodplain* management concepts, see Appendix K – Floodplain Management (Two-Zone Concept and Special Policy Areas) for more detail. Currently, there are no Two-Zone or Special Policy Areas within the *watershed*. Application of the two-zone concept may be appropriate in some areas. If a Two-Zone concept is approved within the *watershed*, policies will need to be developed to address *floodplain* management on a reach-by-reach basis. KRCA is of the opinion that there are no situations in the *watershed* that would meet the Special Policy Area criteria.

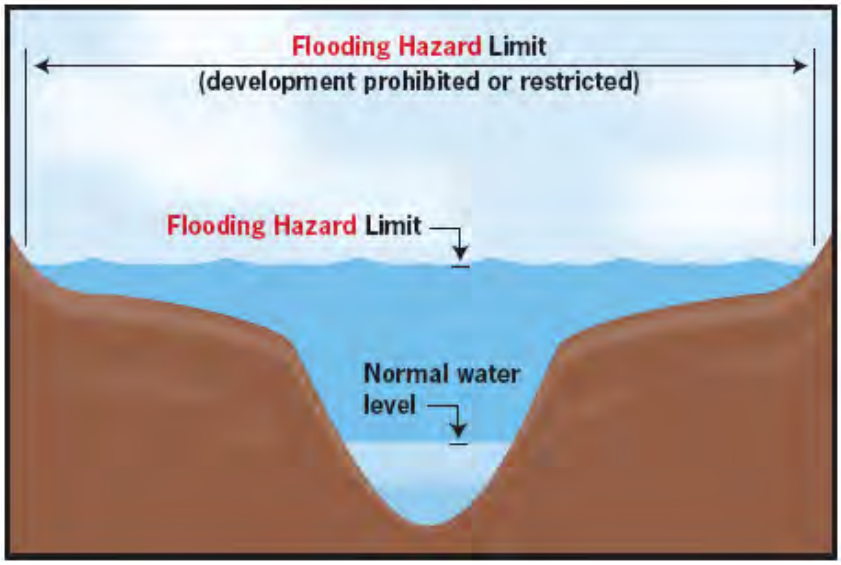


Figure 3A : One-Zone Floodplain Concept (Technical Guide – River & Stream Systems: Flooding Hazard Limit, MNR, 2002)

Where a proposal involves a building, structure or ancillary uses that abut the limit of the flooding hazard or encroach into the floodplain, the proposal will be considered to be flood susceptible and the floodplain policies will apply. (Ancillary uses can include such things as driveways, parking lots and/or septic systems.)

New *Development* and/or Site Alteration

3.5.1(1) **KRCA will not support new *development* and/or site alteration within a *floodplain* regardless of whether the area of inundation contains high points of land not subject to flooding.**

3.5.1(2) **Notwithstanding Policy 3.5.1(1), KRCA will support *development* and/or site alteration within a *floodplain* subject to the policies contained in Chapter 4, where the *development* and/or site alteration is limited to uses which by their nature must locate within the *floodplain*, including: flood and/or erosion control works; passive non-structural uses which do not affect flood flows; minor additions; and/or, boathouses.**

3.5.1(3) **KRCA will not support new *development* and/or site alteration within areas that would be rendered inaccessible to people and vehicles during times of *flooding hazards* unless it has been demonstrated that the site has safe access appropriate for the nature of the development and the natural hazard.**

3.5.1(4) **When *development* is proposed within or adjacent to a *river* or *stream valley* where the *watercourse* drains an area equal to or greater than 125 hectares and the *floodplain* limits for the *watercourse* are not available, the KRCA will require that the applicant (or agent) provide appropriate technical report(s) identifying the *floodplain* limits on the subject lands prepared by a *qualified professional* in accordance with the criteria set out in the Ministry of Natural Resources' Technical Guide – River & Stream Systems: Flooding Hazard Limit (2002). The *floodplain* limit is to be based on the greater of the flood produced by the greater of the Timmins storm or the *100-year flood*.**

3.5.1(5) **KRCA will require that a subdivision or condominium plan adjacent to a *floodplain* include protection of the *floodplain* and for *unconfined valley system*s, the applicable *setback* as determined in accordance with Policy 3.3.2(1). KRCA will recommend that these lands either be retained by the owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the hazard.**

Expansion/*Replacement*/Relocation

3.5.1(6) **The expansion, *replacement*, or relocation of an existing building or *structure* within a *floodplain* will be supported by KRCA provided that the expansion, *replacement* or relocation conforms to the policies contained in Chapter 4.**

3.5.2 EROSION HAZARDS

River and *stream* systems (including all *watercourse*s, *river*s, *stream*s and small inland *lake*s) are by nature dynamic, constantly changing landforms mainly due to erosive forces or flowing water and the relative stability of surrounding slopes. The degree and frequency with which the morphological or physical change will occur in these systems depends on the interaction of a number of interrelated factors including hydraulic flow, channel configuration, sediment load in the system, and the stability of the banks, bed and adjacent slopes. The constant shaping and re-shaping of *river* and *stream* systems by the physical processes associated with flooding, erosion and slope instability result in the creation of hazardous conditions that pose a threat to human lives and property.

Erosion and slope stability are two different processes which are often associated together and can pose a threat to life and property through the loss of land due to human or naturally occurring processes. Erosion is the continued loss of earth material (i.e., soil or sediment) over time as a result of the influence of water or wind action. The erosion process affects the soil surface at the particle level, by gradually dislodging and removing (transporting) the soil particles from the parent mass. Slope stability, usually described in terms of the potential for slope failure, refers to a mass movement of earth material, or soil, sliding down a bank or slope face as a result of a single event in time. Slope movement or instability can occur in many ways but is generally the result of:

- Changes in slope configurations, such as steepness or inclination;
- Increases in loading on or near the slope, such as *structures* or filling;
- Changes in ground water conditions or drainage of the soil (i.e., heavy rainfall or spring melt, drainage blocked by filling, or broken watermains);
- Loss of vegetation cover and root systems; and/or,
- Erosion of the toe slope.

The *erosion hazard* associated with *river* and *stream* systems is that area of a *river* or *stream* bank and lands adjacent to *watercourse*s where erosion is actively occurring and/or where *development* could create slope stability issues. The *erosion hazard* component of the actual *river* and *stream* system is intended to address both erosion potential of the actual *river* and *stream* bank as well as erosion or potential slope stability issues related to *valley* walls.

Slopes steeper than 3:1 (horizontal:vertical) with a height of at least 2 metres are generally considered potentially unstable. Slopes in sandy soil areas may be unstable if the slope is steeper than 5:1 (horizontal:vertical).

The application of the *erosion hazard* limit will depend on whether the *watercourse* flows through a well defined *valley* system and is confined within a *valley* corridor or whether it flows through landscapes that are relatively flat, and is not confined or bounded by *valley* walls. In accordance with provincial guidelines, KRCA considers two basic types of *river* and *stream* systems when determining the extent of an *erosion hazard*:

- *Confined systems*
- *Unconfined systems*

The extent of the hazard varies based on the characteristics of the bedrock and soils which comprise the *valley* slope, degree to which the *valley* slope is stable or unstable, and whether or not the *valley* slope is subject to active erosion.

Confined river or stream systems are ones in which the physical presence of a *valley* corridor containing a *river* or *stream* channel (which may or may not contain flowing water) is visibly evident – that is, the *valley* walls are clearly definable from the surrounding landscape, either by field investigations, aerial photography or map interpretation. The location of the *river* or *stream* channel may be at the base of the *valley* slope, in close proximity to the *valley* slope (i.e., within 15 metres) or removed from the *valley* slope (i.e., a distance greater than 15 metres). The *river* or *stream* channels can contain either perennial (i.e., year round) or ephemeral (i.e., seasonal or intermittent) flow and may range in channel configuration from seepage and natural springs to detectable channels.

The *erosion hazard limit* in *confined systems* is defined by a toe erosion allowance, plus a stable slope allowance, plus an *erosion access allowance*. For more detailed information, see Section 1) of Appendix J – Identifying Erosion Hazard Limits.

Unconfined river or stream systems are ones in which the *river* or *stream* is present but there is no identifiable *valley* slope or bank that can be detected from the surrounding landscape, either by field investigations, aerial photography or map interpretation. Generally, these features are found in flatter or gently rolling landscapes and may be located within the *headwater* areas of drainage basins. The *river* or *stream* channels can contain either perennial (i.e., year round) or ephemeral (i.e., seasonal or intermittent) flow and may range in channel configuration from seepage and natural springs to detectable channels.

The *erosion hazard* limit in *unconfined systems* is defined by the *flooding hazard* limit or *meander belt allowance*, plus an *erosion access allowance*. For more detailed information, see Section 1) of Appendix J – Identifying Erosion Hazard Limits.

Note: Geotechnical studies, as required by KRCA, must provide an analysis based on the natural state of the slope and be completed in accordance with the criteria set out in the MNR's Technical Guide – River & Stream Systems: Erosion Hazard Limit (2002), see Section 1) of Appendix J – Identifying Erosion Hazard Limits.

New *Development* and/or Site Alteration

3.5.2(1) **KRCA will not support new *development* and/or site alteration on lands susceptible to an *erosion hazard*, except as may be permitted by the policies contained in Chapter 4.**

3.5.2(2) **KRCA will not support new *development* and/or site alteration within areas that would be rendered inaccessible to people and vehicles during times of *erosion hazards* unless it has been demonstrated that the site has safe access appropriate for the nature of the *development* and the natural hazard.**

3.5.2(3) **In cases where new *development* is proposed within or adjacent to a *river* or *stream valley,* KRCA will require that the applicant (or agent) provide appropriate technical report(s) (i.e., topographic survey, stream bank erosion analysis, and/or geotechnical investigation) identifying the extent of the *erosion hazard* limit on the subject lands prepared by a *qualified professional* in accordance with the criteria set out in the Ministry of Natural Resources' Technical Guide - River & Stream Systems: Erosion Hazard Limit (2002) to the satisfaction of KRCA.**

3.5.2(4) **KRCA will require that a subdivision or condominium plan adjacent to an *erosion hazard* include protection of the entire *erosion hazard* limit determined in accordance with the criteria set out in the Ministry of Natural Resources' Technical Guide - River & Stream Systems: Erosion Hazard Limit (2002)(see Policy 3.5.2(3)). KRCA will recommend that these lands either be retained by the owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the hazard.**

Expansion/*Replacement*/Relocation

3.5.2(5) **The expansion, *replacement* or relocation of an existing building or *structure* within or adjacent to an unstable slope and/or *erosion hazard* will be supported by KRCA provided that the *reconstruction* or relocation conforms to the policies contained within Chapter 4.**

3.5.3 HAZARDOUS LAND ASSOCIATED WITH UNSTABLE SOIL OR UNSTABLE BEDROCK

As identified previously, *hazardous land* means land that could be unsafe for *development* and site alteration because of naturally occurring processes associated with flooding, erosion, dynamic beaches or unstable soil or unstable bedrock. This section applies where an activity is within unstable soil or unstable bedrock. Otherwise refer to the appropriate section(s) for other *hazardous land*, such as *flooding* or *erosion hazards*.

Hazardous land associated with unstable soil or unstable bedrock includes, but is not limited to, sensitive marine clays, organic soils and *karst* topography. Within the *watershed*, organic soils and *karst*-like topography can be found. Organic soils are normally formed by the decomposition of vegetative and other organic materials. A soil is organic when the percentage weight loss of the soil, when heated, is five to eighty percent - peat soils are the most common type of organic soil in Ontario. *Karst* topography may be present in limestone or dolomite bedrock, and are extremely variable in nature – there are areas of *karst* topography within KRCA jurisdiction.

Due to the specific nature of organic soils and *karst* topography it is difficult to accurately identify the location and extent of the hazard without undertaking site-specific technical reports. In this regard, the potential for catastrophic failures in some areas of unstable soil and unstable bedrock require site-specific studies to determine their characteristics and therefore the appropriate limits of the hazard.

Note: The determination and limits of hazardous land associated with unstable soil or unstable bedrock will be determined through site-specific field investigations and technical reports where required, to the satisfaction of KRCA and the affected planning authority, as appropriate.

New *Development* and/or Site Alteration

3.5.3(1) **KRCA will not support new *development* and/or site alteration on *hazardous land* associated with unstable soil or unstable bedrock, except as may be permitted by the policies contained in Chapter 4.**

3.5.3(2) **KRCA will require that a subdivision or condominium plan adjacent to *hazardous land* associated with unstable soil or unstable bedrock include protection of the *hazardous land*, as determined through a geotechnical study prepared, signed and stamped by a qualified Geotechnical Engineer. KRCA will recommend that these lands either be retained by the owner, held in common ownership, dedicated to a willing party (e.g., Conservation Authority, municipality, land trust organization, etc.) on a case-by-case basis depending on the interest of the respective parties, or at a minimum, zoned appropriately (e.g., Environmental Protection, Hazard Land, Open Space) to protect the hazard.**

Expansion/*Replacement*/Relocation

3.5.3(3) **The expansion, *replacement*, or relocation of an existing building or *structure* within or adjacent to *hazardous lands* associated with unstable soils or bedrock will be supported provided that the expansion, *reconstruction*, or relocation conforms to the policies contained in Chapter 4.**

CHAPTER 4: REGULATION POLICIES

BACKGROUND AND OVERVIEW

AUTHORITY OF THE REGULATION

GENERAL POLICIES

RIVER OR STREAM VALLEYS

HAZARDOUS LANDS

FLOODING HAZARDS, EROSION HAZARDS, UNSTABLE SOIL OR BEDROCK

WETLANDS AND AREAS OF INTERFERENCE

STRAIGHTENING, CHANGING, DIVERTING, OR INTERFERING WITH THE EXISTING CHANNEL OF A RIVER, CREEK STREAM OR WATERCOURSE

Chapter 4: Regulation Policies

4.1 BACKGROUND AND OVERVIEW

The policies contained in this Chapter apply specifically to Kawartha Region Conservation Authority's (KRCA) regulatory role under Section 28 of the Conservation Authorities Act (CA Act). These policies must be considered in their entirety, since KRCA is required to regulate development that may affect the control of flooding, erosion, pollution or conservation of land, and activities that may change or interfere with the existing channel of a watercourse or with a wetland, either singly or in combination.

In 1956, the Province amended the CA Act to empower Conservation Authorities (CAs) to make regulations to prohibit filling in *floodplains*. These powers were broadened in 1960 to prohibit or regulate the placing or dumping of *fill* in defined areas where, in the opinion of the CA, the control of flooding, *pollution* or the *conservation of land* may be affected. In 1968, an amendment to the CA Act further extended the power of CAs to prohibit or control construction and alteration to waterways, in addition to filling.

In 1998, the CA Act was changed as part of the Red Tape Reduction Act (Bill 25) to ensure that regulations under the Act were consistent across the province and complementary with provincial policies. To better reflect provincial direction and to strengthen protection of public safety and the environment, the CA Act was modified to enable CAs to enact the Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation (O. Reg. 97/04) to replace the Fill, Construction and Alteration to Waterways Regulation (O. Reg. 33/94).

Ontario Regulation 97/04 requires CAs to regulate development in areas where flooding, erosion, dynamic beaches[3], pollution or the conservation of land may be affected by development. The purpose of this regulation is to prevent the creation of new hazards or the exacerbation of existing hazards.

The primary objectives of the regulation are to:

- Prevent loss of life as a result of *flooding* or *erosion hazards*, or unstable soil or bedrock; and,
- Minimize property damage and social disruption resulting from *flooding* or *erosion hazards*, or unstable soil or bedrock.

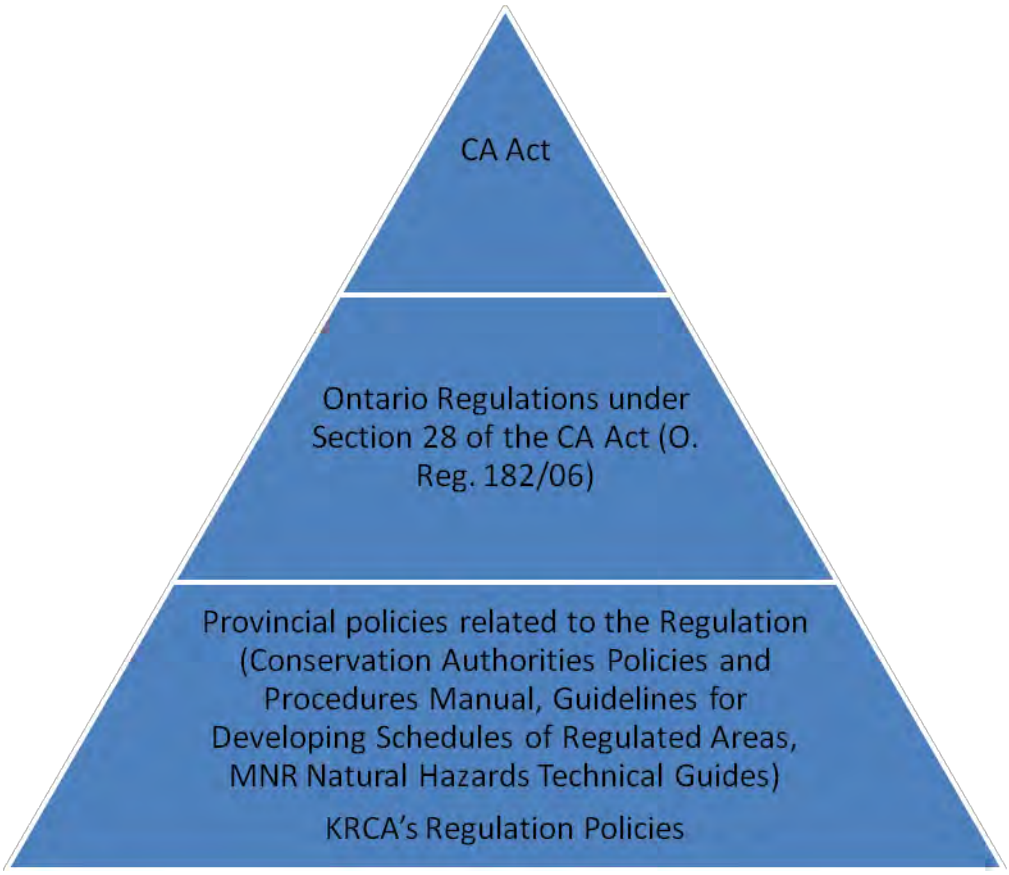
In order to achieve these objectives, CAs take into consideration:

- Minimizing public and private expenditure for emergency operations, evacuations, disaster relief and restoration;
- Preventing hazardous *development* within *floodplains*, erosion areas, and unstable soil and bedrock which may in future require substantive *mitigation* measures;
- Ensuring *development* does not increase risks to upstream and downstream landowners;
- Preventing filling in and/or draining of natural storage areas and *development* that may impact the *stage-storage discharge relationship* of a *floodplain*, increase flood elevations and/or decrease slope stability;
- Preventing interference with the *hydrologic function* of *wetlands*; and,
- Preventing *pollution* and other degradation of *rivers* and other water bodies.

[3] Note: KRCA does not have any known dynamic beach hazards within its watershed.

The Minister of Natural Resources approved Ontario Regulation 182/06 on May 4th, 2006 for KRCA, consistent with the Cabinet-approved Ontario Regulation 97/04. This regulation is titled the Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation (hereafter referred to as the Regulation).

Permission from KRCA is required for proposed *development* in water-related hazard areas such as *river* or *stream valleys* (including *lake* shorelines), *wetlands*, or other *hazardous lands;* alterations to the existing channel of a *river*, *creek*, *stream* or *watercourse*; or interference with a *wetland*. The purpose of the Regulation is to guide *development*, ensuring that people are protected from risk and that properties are protected against *flooding* and *erosion hazards*, and unstable soil or bedrock. The following schematic illustrates the legislative context within which these policies fit:



KRCA is committed to providing a timely, objective, impartial, consistent and comprehensive review of all permit applications submitted for approval under the CA Act Section 28 regulation (O. Reg. 182/06). Although permit applications are not reviewed pursuant to the Planning Act, where possible, KRCA will endeavour to apply the regulation in a manner consistent with the Provincial Policy Statement made under the authority of Section 3 of the Planning Act.

4.2 AUTHORITY OF THE REGULATION

The Regulation provides KRCA with specific authority to:

a) Prohibit, regulate or require permission for straightening, changing, diverting or interfering in any way with the existing channel of a *river*, *creek*, *stream*, or *watercourse*; or changing or interfering with a *wetland*; and,
b) Prohibit, regulate or require permission for *development* if the control of flooding, erosion, dynamic beaches, *pollution* or the *conservation of land* may be affected by the *development*.

Conservation of land is broadly interpreted to mean the protection, preservation, management or restoration of lands within the watershed ecosystem. Note: Renewable energy projects that have been approved pursuant to an application made under the Green Energy Act (GEA) are not required to demonstrate that there will be no impact on the conservation of land.

Pollution, as defined in the CA Act, means any deleterious physical substance or other contaminant that has the potential to be generated by development in an area to which the regulation applies.

The Regulation does not:

- Limit the use of water for domestic or livestock purposes;
- Interfere with the rights or powers conferred upon a municipality in respect of the use of water for municipal purposes;
- Interfere with any rights or powers of any board or commission that is performing its functions for or on behalf of the Government of Ontario;
- Interfere with any rights or powers under the Electricity Act or the Public Utilities Act; or,
- Apply to activities approved under the Aggregate Resources Act (AR Act).

4.2.1 AREAS SUBJECT TO THE REGULATION

In accordance with Ontario Regulation 182/06, KRCA has regulated areas within its jurisdiction as follows:

River or Stream Valleys:

- This component of the Regulation applies to *development* within *river* or *stream valley*s that have depressional features associated with a *river* or *stream*, whether or not they contain a *watercourse*, the limits of which are determined in accordance with the following rules:
    - where the *river* or *stream valley* is apparent (*confined*) and has stable slopes, the *valley* extends to the stable top of bank plus 15 metres to a similar point on the opposite side,
    - where the *river* or *stream valley* is apparent (*confined*)and has unstable slopes, the *valley* extends from the predicted long term stable slope projected from the existing stable slope or if the *toe of slope* is unstable, from the predicted location of the *toe of slope* as a results of stream erosion over a projected 100 year period, plus 15 metres (including 6 metre *erosion access allowance*), to a similar point on the opposite side of the valley,
    - where the *river* or *stream valley* is not apparent (*unconfined*), the *valley* extends the greater of:
        - the distance from a point outside of the edge of the maximum extent of the *floodplain* under the applicable flood event standard, plus 15 metres (including 6 metre *erosion access allowance*), to a similar point on the opposite side of the valley, and

- the distance from the predicted *meander belt* of a *watercourse*, expanded as required to convey the flood flows under the applicable flood event standard, plus 15 metres (including 6 metre *erosion access allowance*), to a similar point on the opposite side of the *valley*.

- *Lake*s in the KRCA *watershed* are regulated as *river* or *stream valley*s. The above-noted regulatory limits are thus applied to *development* along *lake*s.
- *Development* within a *river* or *stream valley* would be assessed with respect to its effect on the control of flooding, erosion, dynamic beaches, *pollution* or the *conservation of land*.

Wetlands (including swamps, marshes, fens and bogs):

- This component of the Regulation applies to *development* within a *wetland* or interference in any way with a *wetland*.
- As defined under Section 28 of the CA Act, "a *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)."
- *Development* within a *wetland* would be assessed with respect to its effect on the control of flooding, erosion, dynamic beaches, *pollution* or the *conservation of land*.

Other Areas where Development could Interfere with the Hydrologic Function of a Wetland (Areas of Interference):

- This component of the Regulation applies to *development* on lands within 120 metres of all provincially significant *wetlands* and *wetlands* greater than 2 hectares in size, and lands within 30 metres of *wetlands* less than 2 hectares in size.
- In some circumstances, *development* could interfere with the *hydrologic function* of a *wetland* beyond the distances described above and would be subject to this component of the Regulation.
- *Development* within an *area of interference* would be assessed with respect to interference with the *hydrologic function* of the *wetland* AND its effect on the control of flooding, erosion, dynamic beaches, *pollution* or the *conservation of land*.

Hazardous Lands:

- This component of the Regulation applies to *development* within *hazardous lands* as defined under Section 28 of the CA Act as land that could be unsafe for *development* due to naturally occurring processes associated with flooding, erosion, dynamic beaches, or unstable soil or bedrock.
- Unstable soil and bedrock include, but are not limited to, sensitive marine clays, organic soils, and *karst* topography. Sensitive marine clays are not identified within the *watershed*, while *karst* topography and organic soils are. Organic soils are normally formed by the decomposition of vegetative and other organic materials. A soil is organic when the percentage weight loss of the soil when heated is 5-80% - peat soils are the most common type of organic soil in Ontario. *Karst* topography may be present in limestone or dolomite bedrock and are extremely variable in nature.

- *Development* within *hazardous lands* would be assessed with respect to its effect on the control of flooding, erosion, dynamic beaches, *pollution* or the *conservation of land*.

Rivers, Creeks, Streams or Watercourses:

- This component of the Regulation applies to the straightening, changing, diverting, or interfering in any way with the existing channel of a *watercourse*. All *rivers*, *streams*, *creeks*, municipal drains, and in some instances agricultural drainage ditches and roadside ditches where they meet the definition of a *watercourse* under the CA Act, are regulated as *watercourses*.
- Similarly, this component of the Regulation applies to alterations to *lake* shorelines (i.e., straightening, changing, diverting, or interfering in any way).
- This component of the Regulation does not apply to *dug-out* or *isolated ponds* located outside of any *wetland* or *area of interference* with a *wetland*, *river* or *stream valley*, *hazardous land* associated with unstable soil or bedrock, and/or the applicable regulated allowance.

The Regulation Limit

The approximate extent of *regulated areas* associated with *hazardous lands*, *wetlands*, *areas of interference* with *wetlands*, *watercourses*, and *river* or *stream valleys* is identified by a Regulation limit. Throughout the *watershed*, the Regulation limit has been mapped by KRCA in accordance with guidelines from the Ministry of Natural Resources (MNR) and Conservation Ontario (CO).

> ***However, it is very important to recognize that this Regulation limit is merely an approximation that is based on the best available information and that, in case of a conflict, the written description of those areas in Section 2(1) of Ontario Regulation 182/06 shall prevail over the Regulation limit illustrated on the maps. In most cases, the exact limits of hazardous lands have not been mapped.***

The KRCA Regulation limit mapping is available on-line at http://camaps.ca/ and available in hard copy at the Kawartha Conservation Administrative Centre. Municipal planning officials and building inspectors have also been provided with the mapping.

4.2.2 REGULATED ACTIVITIES

The Regulation gives KRCA the authority to prohibit or regulate *development* in areas described above within its jurisdiction (the *watershed*).

> ***For the purposes of the Regulation, KRCA uses the definition of development as defined by the CA Act. Under the CA Act, development means:***
>
> - ***the construction, reconstruction, erection or placing of a building or structure of any kind;***
> - ***any change to a building or structure that would have the effect of altering the use or potential use of the building or structure;***
> - ***any change to a building or structure that would increase its size or structure or increase the number of dwelling units in the building or structure;***
> - ***site grading; or,***
> - ***the temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere.***

The Regulation also gives KRCA authority to regulate activities which would result in:

- the straightening, changing, diverting or interfering in any way with the existing channel of a *river*, *creek*, *stream*, or *watercourse*; or
- changing or interfering in any way with a *wetland*.

Note: Activities that would not meet the definition of development under CA Act include – non-structural activities associated with existing agricultural use (e.g., cropping, pasturing, tilling, fence row clearing, stone pile removal, etc.), other non-structural uses that would not result in alterations to the existing grade (e.g., gardens, nurseries, timber harvesting, etc.), maintenance and upkeep of existing buildings or structures (e.g., window repair, siding, etc.), installation of utility connections (e.g., telephone, cable, fiberoptics, gas lines), well installation and fence installation. However, if these activities would result in the straightening, changing, diversion or interference in any way with the existing channel of a watercourse, or the changing or interference in any way with a wetland, they would be subject to Ontario Regulation 182/06 and require written permission from KRCA.

Note: Agricultural field tile drainage would not meet the definition of development under the CA Act and would not normally result in interference with a wetland or watercourse. In some cases, ditching or pumping may be required as part of the field tile drainage project or outlet. Where the field drainage project would convey water in a manner inconsistent with the natural drainage grade, a CA Act approval may be required. In this case, the tile drainage proposal would be subject to Policy 4.6.2.1(4) for interference with a wetland. Where the realignment of a watercourse is required to facilitate the installation of field tile drainage, a CA Act approval would be required. In this case, the realignment would be subject to Policy 4.7.2.4(1) for interference with a watercourse.

Note: Tile drain outlets installed along the bank of a watercourse would not require a CA Act approval as they are not considered to be activities that would straighten, change, divert or interfere with the existing channel of a watercourse provided they are installed in accordance with the following best management practices:

- ***maintain sediment and erosion control measures during installation;***
- ***minimize vegetation disturbance;***
- ***carry out work during dry or low-water periods;***
- ***set outlet back from the bank, where feasible; and,***
- ***incorporate permanent erosion protection.***

Note: It is KRCA's opinion that the installation or maintenance of ponds for the sole purpose of watering livestock would not be subject to Ontario Regulation 182/06 in accordance with Section 28(10)(a) of the CA Act.

Activities Subject to Streamlined Review and Approval Process

4.2.2(1) **Permission may be granted by KRCA through a streamlined process for regulated *development* and activities including, but not limited to, the following minor/routine works:**

- **Construction of non-habitable *accessory buildings or structures* that are less than 10 metres^2 in size, located outside of any *wetland*;**
- **Installation of swimming pools, located outside of any *wetland* and/or *flooding hazard*;**
- **Construction of unenclosed decks, patios, and single residential docks;**
- **Roadside ditch* maintenance;**
- **Routine maintenance and/or repair of public infrastructure (e.g., roads, sewers, flood and/or erosion control works, water supply, etc.) and private infrastructure (e.g., roads, gas and electrical transmission pipelines/corridors, etc.);**
- **Culvert replacements of the same length and diameter;**
- **Fill placement, excavation and/or grade modifications with volume not exceeding 20 metres^3 outside of any *wetland* or *watercourse;* and,**
- **Maintenance of existing *dug-out* or *isolated ponds* that would not result in an enlargement of the pond in area or volume beyond what was previously constructed.**

Provided appropriate mitigation measures are implemented, it is KRCA's opinion that the control of flooding, erosion, *pollution* or the *conservation of land* would not be affected by these *development* and activities and any interference with a *watercourse* or *wetland* would be *negligible*. These mitigation measures will be included in the written permission.

*** In some instances, roadside ditches do not convey water regularly or continuously and therefore are not considered to be *watercourses* under the Conservation Authorities Act. In these instances, their maintenance would not be subject to Ontario Regulation 182/06 and would not require written permission from KRCA.**

<u>Applicants will be required to submit a completed permit application form in conjunction with a site plan in order to obtain a Permit.</u>

4.2.2(2) **Permission may be granted by KRCA via a Standard Compliance Requirements (SCR) authorization for Municipal drain maintenance and/or repair activities subject to the process contained within the Drainage Act and Conservation Authorities Act Protocol and, for drain cleanouts within a *wetland*, the additional *wetland*-specific mitigation measures outlined below:**

- **no work within the *wetland* is to occur between April 1st – July 31st;**
- **all equipment used for the cleanout is to be cleaned in accordance with the procedures identified in the Clean Equipment Protocol for Industry (http://www.ontarioinvasiveplants.ca/files/CleanEquipmentProtocol_Summary_Mar152013_D2.pdf) prior to entering the site;**
- **prior to April 1st of the following calendar year, all spoil material (dredgeate) is to be removed from the *wetland* at the upstream entrance of the drain into the *wetland* for a distance of 30 metres and/or at the downstream exit of the drain from the *wetland* for a distance of 15 metres OR acceptable distances as determined by KRCA staff in consultation with the Municipality based on site conditions/constraints; and,**

- **all other spoil material (dredgeate) is to be spread evenly adjacent to the drain in a manner that minimizes fill in the *wetland*, as well as disturbance into the *wetland* away from the drain, and seeded with native herbaceous material consistent with local flora.**

Applicable SCR authorization forms are contained within the Protocol (see Appendix R).

4.2.2(3) Permission (i.e., an Emergency Works permit) will be granted by KRCA through a streamlined process for *emergency works* to repair infrastructure within a *regulated area* that is at immediate risk of failure or other public safety concerns provided that KRCA is notified prior to conducting remediation works and given the opportunity to review, provide technical guidance related to the control of flooding, erosion, *pollution* and/or the *conservation of land*, and supervise if necessary.

Note: Any in-water works contained in the list above may be subject to review under the Federal Fisheries Act.

Note: For Municipal drain maintenance and/or repair activities, KRCA will work in accordance with the Drainage Act and Conservation Authorities Act Protocol (Appendix R).

4.2.3 APPROVAL PROCESS

Development within a *regulated area* (as defined in Section 2(1) of Ontario Regulation 182/06 and described above), interference with *wetland*s or alterations to *river*, *creek*, *stream* or *watercourse* channels requires permission from KRCA. Each application will be evaluated on its own merits, on a case-by-case basis, consistent with the policies outlined in this Chapter, which are based on and/or interpreted to be consistent with provincial legislation, regulations and policy.

Applicants who are contemplating *development* (other than activities identified in Policy 4.2.2(1) – see paragraph below for streamlined review and approval process) are encouraged to view the Regulation limit mapping to see if their property lies within an area covered by the Regulation limit (note: mapping is only an approximation of the extent of *regulated areas* throughout the *watershed* – see Section 4.1.1 for more detail). Applicants are encouraged to contact KRCA for confirmation prior to the commencement of any on-site work. If it is determined that the property is located within an area covered by the Regulation limit mapping, a permit may or may not be required. In some cases, a site visit to be conducted by KRCA staff, or a topographic survey or other technical document (e.g., *wetland* boundary delineation) to be provided by the applicant, will be required to determine if a permit is required for the proposed works. Applicants should submit an Information Request application with the required fee to KRCA to determine if any of the proposed works are to be located within a *regulated area*. An Information Request form can be obtained from the Kawartha Conservation Administrative Centre, from the KRCA website (www.kawarthaconservation.com), or via facsimile or mail.

With respect to the streamlined review and approval process, applicants who are contemplating any of the permitted activities outlined in Policy 4.2.2(1) are encouraged to view the Regulation limit mapping and contact KRCA to confirm 1) if their property falls within a *regulated area* and 2) whether or not their proposal conforms Policy 4.2.2(1) prior to the commencement of any on-site works. If it is determined that the property is located within a *regulated area* and that their proposal conforms to Policy 4.2.2(1), applicants will be required to submit a completed permit application form and all of the applicable standard application criteria listed in Part A of the application, with the exception of multiple (i.e., three) copies of plans/drawings – only one copy of a site plan clearly illustrating the location and details of the proposed activity is required.

A permit application form can be obtained from the Kawartha Conservation Administrative Centre, from the KRCA website, or via facsimile or mail. KRCA is committed to providing a permit for these activities within 15 days from the date of application submission to promote a streamlined review and approval process for activities which, in the opinion of KRCA, will not impact the control of flooding, erosion, *pollution* or the *conservation of land*.

For Municipal drain maintenance and/or repair activities where the maintenance can satisfy the conditions of the applicable SCR authorization and wetland-specific mitigation measures, where applicable, municipalities will be required to submit a complete notification form (attached to the Drainage Act and Conservation Authorities Act Protocol in Appendix R). If deemed to meet the tests and intent of the protocol, KRCA will endeavor to provide a signed SCR authorization to the municipality within 15 working days of receipt of a complete notification form.

Furthermore, as per Policy 4.2.2(3), municipalities and other agencies conducting *emergency works* within a *regulated area* must notify KRCA prior to conducting remediation works and provide opportunity for KRCA to review, provide technical guidance related to the control of flooding, erosion, *pollution* and/or the *conservation of land*, and supervise if necessary in order to obtain an Emergency Works permit. KRCA is committed to providing written permission for *emergency works* within 24 hours of notification.

In 2010, MNR approved the "Policies and Procedures for Conservation Authority Plan Review and Permitting Activities", a new chapter of the Conservation Authorities Policies and Procedures Manual. This chapter provides a consistent approach to the permitting function undertaken by CAs under Section 28 of the CA Act. The following outlines best practice recommendations of the chapter, and KRCA's approach in adhering to these recommendations when processing permit applications.

Pre-consultation

The "Policies and Procedures for Conservation Authority Plan Review and Permitting Activities" chapter encourages pre-consultation to provide clarity and direction, to facilitate receipt of complete applications and to streamline the CA Act S. 28 permitting review and decision making process. To meet these objectives, depending on the scale and scope of a project, pre-consultation may include staff from the following parties: the CA, the municipality (such as planning and engineering staff), the applicant, consultants, the developer and owner, and may be supplemented by staff from provincial ministries, Parks Canada (PC) and any other appropriate government agencies; and may occur concurrently with Planning Act (municipal) pre-consultation.

If it has been determined that a permit is required, applicants are encouraged to engage in pre-consultation with KRCA prior to the submission of a permit application, to provide an opportunity for KRCA staff and applicants to determine complete application requirements (see following section) for specific projects. KRCA will engage in pre-consultation in a timely manner so as not to delay the proponent's ability to submit an application. The pre-consultation schedule and details can be found on the KRCA website.

In order to determine complete application requirements, applicants should submit in writing adequate information for pre-consultation, such as property information (lot number, concession number, township, etc.), a concept plan of the proposed *development* which shows the property limit (legal survey, where available), and a description of what is being proposed (i.e., what is being planned and when the work will take place). A permit application form can be obtained during pre-consultation, or as noted above, from the Kawartha Conservation Administrative Centre, from the KRCA website, or via facsimile or mail.

Permit application fees vary depending on the nature of the application and are updated periodically. During pre-consultation, KRCA staff can advise of the permit fee(s) that apply.

Complete Application

Requirements for complete applications can be found in Appendix P – Complete Application Checklist and on the KRCA website. Standard (base) application requirements are identified in the first section of the checklist and are applicable to all submissions with or without pre-consultation. KRCA will identify and confirm complete application requirements for specific projects, in writing, within 21 days of the pre-consultation meeting (i.e., provide the applicant with a complete application checklist identifying the specific requirements for their proposal). However, substantial changes to a proposal or a site visit after pre-consultation may warrant further pre-consultation and/or necessitate changes to the complete application requirements.

Within 21 days of the receipt of a permit application, KRCA will notify applicants, in writing, as to whether the application has been deemed complete or not. If a permission (permit) application is deemed incomplete, KRCA will provide the applicant with direction as to the missing and needed information when notifying the applicant that the application has been deemed incomplete. If not satisfied with the decision on whether an application is deemed complete, the applicant can request an administrative review by the Chief Administrative Officer (CAO) and then, if not satisfied, by the KRCA Board of Directors. This review will be limited to a complete application policy review and will not include a review of the technical merits of the application.

During the review of a 'complete application', KRCA may request additional information if the CA deems a permission (permit) application does not contain sufficient technical analysis. Delays in timelines for decision making may occur due to KRCA's request for additional information to address errors or gaps in information submitted for review. Thus, an application can be put "on hold" or returned to the applicant pending the receipt of further information. If necessary, this could be confirmed between both parties as an "Agreement to Defer Decision".

From the date of written confirmation of a complete application, the "Policies and Procedures for Conservation Authority Plan Review and Permitting Activities" chapter recommends that CAs are to make a decision (i.e., approve or refer to a Hearing (see following section)) with respect to a permit application within 30 days for a minor application and 90 days for a major application. Major applications may include those that: are highly complex, requiring full technical review, and need to be supported by comprehensive analysis; or, do not conform to existing CA Board-approved Section 28 policies.

KRCA is committed to working within the above-noted timelines. If a decision has not been rendered by KRCA within the appropriate recommended timeframe (i.e., 30 days for minor applications / 90 days for major applications) the applicant can submit a request for administrative review by the CAO and then if not satisfied, by the KRCA Board of Directors.

Subsequent to receipt of a complete application, delays in timelines for decision making on a permit application may occur due to KRCA's request for additional information to address errors or gaps in technical information submitted for review if the KRCA deems a permit application does not contain sufficient technical analysis. Through an "Agreement to Defer Decision" between the applicant and the CA, applications can be put "on hold" or returned to the applicant pending the receipt of further information to avoid premature refusals of permit applications due to inadequate information.

The maximum period of validity of a permit is 5 years. Once issued, by regulation, a permit shall not be extended. If the works covered by the application are not completed within the legislated timeframe, the applicant must reapply and delays in approval may result. Typically, the policies in place at the time of the re-application will apply.

Please note that in addition to a permit under KRCA regulations, other permissions may be required from other federal, provincial or municipal bodies.

Hearing of the Authority Board

As per subsection 28(12) of the CA Act, permission required under Ontario Regulation 182/06 shall not be refused or granted subject to conditions unless the person requesting the permission has been given the opportunity to require a hearing before the KRCA Hearing Board. If the decision is "referred to a Hearing of the Authority Board" the KRCA Administrative By-Law #3, prepared in accordance with MNR/CO Hearings Guidelines (approved 2005), will be followed. This By-Law – Hearing Procedures is available on the KRCA website or in hard copy at the Kawartha Conservation Administrative Centre.

As per the guidelines and subsections 28 (12), 28 (13), 28 (14) and 28 (15) of the CA Act:

After holding a hearing, KRCA shall refuse the permission, grant the permission with condition, or grant the permission without conditions. If KRCA refuses permission or grants permission subject to conditions, KRCA shall give the person who requested permission written reasons for the decision.

A person who has been refused permission or who objects to conditions imposed on a permission may, within 30 days of receiving the written reasons, appeal in writing to the Minister of Natural Resources. It is important to note that only the applicant can appeal. The Office of the Mining and Lands Commissioner (OMLC) has been delegated the authority, duties and powers of the Minister of Natural Resources under the Ministry of Natural Resources Act (O. Reg. 571/00) to hear appeals from the decisions of CAs made under CA Act Section 28 regarding a refusal to grant permission or with respect to conditions imposed on a permission granted by the CA. The Mining and Lands Commissioner (MLC) may refuse the permission, or grant the permission, with or without conditions.

The applicant has an additional recourse to appeal to the Divisional Court, a Branch of the Superior Court of Justice under the Mining Act if they do not agree with a legal or procedural aspect of the MLC hearing. It is important to note that only the applicant can appeal.

Agricultural Advisory Panel

In addition to the approval process outlined above, an Agricultural Advisory Panel (AAP) will be established to provide advice to KRCA management on the implementation of permitting policies in relation to particular agricultural-related permit applications. It is anticipated that the committee will be comprised of agricultural representatives and KRCA staff. The AAP Terms of Reference can be found in Appendix G – Agricultural Advisory Panel Terms of Reference.

4.2.4 VIOLATIONS AND COMPLIANCE WITH APPROVED PERMITS

Violations of Ontario Regulation 182/06 occur as a result of *development,* interference or alteration activities occurring within a *regulated area* in one of two ways:

- without written permission from KRCA; or,
- the *development*, interference and/or alteration activity has taken place contrary to the terms and/or conditions stipulated in a permit issued by KRCA.

The landowner and/or individuals involved may be unaware that permission is required from KRCA. However, this does not absolve the landowner and/or individuals involved from obtaining permission. Permits may be revoked if conditions of a permit are not adhered to.

KRCA has legal authority to investigate an activity to determine whether or not a contravention of Ontario Regulation 182/06 has taken place pursuant to Section 28 (20) of the CA Act. Specific powers of entry are discussed more fully in Appendix I – Violations.

If convicted, the person(s) committing the offence may be subject to a fine of not more than $10,000 or to a term of imprisonment of not more than three months (Conservation Authorities Act, R.S.O. 1990, c. 27, s. 28, ss. 16). In addition, if convicted, the *development*/interference may be required to be removed at the expense of the landowner. The landowner may also be required to rehabilitate the impacted area in a manner prescribed by the courts (Conservation Authorities Act, R.S.O. 1990, c. 27, s. 28, ss. 17).

Further information about the procedures associated with violations is described in Appendix I – Violations.

4.3 GENERAL POLICIES

KRCA will be guided by the following general administrative guidance with respect to the implementation of its regulatory responsibilities:

Development, interference and/or alteration activities shall not be undertaken in a regulated area without written permission from KRCA.

Where a regulated area pertains to more than one water-related hazard (e.g., lands susceptible to flooding that are part of a wetland), policies will be applied jointly, and where applicable, the more restrictive policies will apply.

In general, policies regarding fill placement, excavation and/or grade modifications must be read in the context of the appropriate policy category (e.g., New Residential Development policies for dwelling (including excavation and foundation backfill) vs. Fill Placement, Excavation and/or Grade Modifications policies for septic installations).

Technical studies and/or assessments, site plans and/or other plans submitted as part of an application for permission to undertake development, interference and/or alteration in a regulated area must be completed by a qualified professional to the satisfaction of KRCA in conformity with the most current provincial technical guidelines or guidelines accepted by KRCA through a Board Resolution.

Note: Information regarding technical standards and guidelines is contained within the Appendices.

Within areas defined by the regulation (i.e., *regulated areas*), including *river* or *stream valleys* and an allowance, *wetlands* or other areas where *development* could interfere with the *hydrologic function* of a *wetland* (*areas of interference*), *watercourses*, or *hazardous lands*, the following general policies will apply:

General Policies

4.3(1) ***Development*, interference and/or alteration will not be permitted within a *regulated area*, except in accordance with the policies contained in this Chapter.**

4.3(2) **Notwithstanding Policy 4.3(1), the KRCA Board of Directors may grant permission for *development*, interference and/or alteration where the applicant provides evidence acceptable to the Board of Directors that documents that the *development* and/or activity will have no adverse effect on the control of flooding, erosion, *pollution* or the *conservation of land* with respect to *river* or *stream valleys, hazardous land, wetlands* and *areas of interference,* or will not result in an unacceptable interference with a *watercourse* or *wetland*.**

4.3(3) **Large-scale fill operations associated with infrastructure projects, agricultural, commercial, industrial, or multiple residential *development* permitted in accordance with the policies contained in this Chapter would be subject to the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

4.3(4) **In addition to specific conditions outlined throughout this Chapter, d*evelopment*, interference and/or alteration within a *regulated area* may be permitted only where:**

- **risk to public safety is not increased;**
- **susceptibility to natural hazards is not increased nor new hazards created (e.g., there will be no impacts on adjacent properties with respect to natural hazards);**
- ***pollution*, sedimentation and erosion during construction and post construction is minimized using *best management practices* including site, landscape, infrastructure and/or facility design, construction controls, and appropriate remedial measures;**
- **access for emergency works and maintenance of flood or erosion control works is available;**
- **proposed *development* is constructed, repaired and/or maintained in accordance with *accepted engineering principles* and approved engineering standards or to the satisfaction of KRCA, whichever is applicable based on the structural scale and scope, and purpose of the project;**
- **there are no *adverse hydraulic* or *fluvial* effects on *rivers*, *creeks*, *streams*, or *watercourses*;**
- **there are no adverse effects on the *hydrologic function* of *wetlands*; and,**
- **the control of flooding, erosion, *pollution* and/or the *conservation of land* is not adversely affected during and post *development*.**

Renewable energy projects that have been approved pursuant to an application made under the Green Energy Act are not required to demonstrate that the *conservation of land* is not adversely affected.

Prohibited Uses

4.3(5) **Notwithstanding the General Policies referenced above, in accordance with Section 3.1 of the Provincial Policy Statement, *development* will not be permitted within *hazardous lands* as defined in the Conservation Authorities Act, where the use is:**

- **an institutional use associated with hospitals, nursing homes, pre-school, school nurseries, day care and schools, where there is a threat to the safe evacuation of the sick, the elderly, persons with disabilities or the young during an emergency as a result of flooding, failure of floodproofing and/or *protection works*, and/or erosion;**
- **an essential emergency service such as that provided by fire, police and ambulance stations and electrical substations, which would be impaired during an emergency as result of flooding, failure of flood-proofing measures and/or *protection works*, and/or erosion; or,**
- **uses associated with the disposal, manufacture, treatment or storage of *hazardous substances*.**

Activities in *regulated area*s that are carried out by other provincial ministries or the federal government do not require a permit. Activities conducted on provincial crown land by third-party proponents in a *regulated area* may require a permit, unless acting as an agent of the Crown.

Works for which permission is required under the Regulation may also be subject to other legislation, policies and standards that are administered by other agencies and municipalities, such as the Planning Act, Public Lands Act, Nutrient Management Act, Drainage Act, Environmental Assessment Act (EA Act) or the federal Fisheries Act, etc. (see Appendix H – Other Legislation). It is the responsibility of the applicant (or applicant's agent) to ensure that all necessary approvals are obtained prior to undertaking any works for which a permit under this Regulation has been obtained.

4.4 RIVER OR STREAM VALLEYS

4.4.1 DEFINITION AND CONTEXT

Maintaining the natural state of *valley* systems is important to ensure the continued functionality of their physical processes (i.e., flow dynamics) and to prevent property damage and/or loss of life resulting from hazards associated with erosion, slope instability and flooding. *River* and *stream* systems are shaped and re-shaped by the natural processes of erosion, slope stability and flooding. Erosion and slope stability are two natural processes that are quite different in nature yet often linked together. Erosion is essentially the continual loss of earth material (i.e., soil or sediment) over time as a result of the influence of water or wind. Slope instability, usually described in terms of potential for slope failure, refers to mass movement of earth material, or soil, sliding down a bank or slope face as a result of a single event in time. The degree and frequency with which the physical change will occur in these systems depends on the interaction of a number of interrelated factors including hydraulic flow, channel configuration, sediment load in the system, storage and recharge functions, and the stability of banks, bed and adjacent slopes. The constant shaping and re-shaping of *river* and *stream* systems by the physical processes results in hazardous conditions (e.g., e*rosion hazard*s and *flooding hazard*s) which can pose a risk to life and cause property damage.

River and *stream* systems (including *lake* systems in the KRCA *watershed*) can exhibit erosion potential of the actual *river* and *stream* bank, or shoreline in the case of *lakes*, as well as potential slope instability issues related to *valley* walls. Slopes steeper than 3:1 (horizontal:vertical) with a height greater than 2 metres are generally considered potentially unstable. Slopes in sandy soil areas may be unstable if the slope is steeper than 5:1 (horizontal:vertical). *Erosion hazard*s and slope instability pose a threat to life and property through the loss of land due to human or natural processes.

Flooding of *river*, *stream* or *lake* systems typically occurs following the spring freshet and may occur again as a result of extreme rainfall events. These water features naturally accommodate flooding within their *valley*s. Historically, *development* occurred in *floodplain* areas because of the availability of water for power, transportation, energy, waste assimilation, and domestic and industrial consumption. However, *floodplain development* is susceptible to flooding which can result in property damage and/or loss of life.

Furthermore, *river*, *stream* and *lake* systems are part of larger overall drainage *watershed*s, and their mechanics are linked to the *watershed* processes. The natural importance of *river*, *stream* and *lake* systems in providing physical, biological and chemical support functions for sustaining *ecosystem*s (including that of humans) is well established. These support functions are strongly associated with the physical processes of discharge (flow), erosion, deposition and transport that are inherent in any fluvial system. Given that ecological sustainability is based on the dynamic nature of these systems, it is essential that their physical processes (i.e., flow dynamics) be allowed to function in a natural state.

4.4.1.1 DEFINING THE VALLEY

The exact limit of the valley is determined based on site specific conditions (e.g., height of bank/shoreline, slope inclination, etc.).

According to the MNR and CO Guidelines for Developing Schedules of Regulated Areas, 2005, lake systems in the KRCA watershed are to be examined in a manner that is consistent with that applied to river or stream systems. As such, the limits described below are applied to development along lakes.

River or *stream valleys* are described in the Regulation as "depressional features associated with a *river* or *stream*, whether or not they contain a *watercourse*". They can be identified under two distinct situations, namely:

- where the *river* or *stream valley* is apparent (also considered *confined systems*); or,
- where the *river* or *stream valley* is not apparent (also considered *unconfined systems*).

Apparent Valleys

Where a physical presence of a *valley* corridor containing a *river* or *stream* channel, which may or may not contain flowing water, is visibly discernible (i.e., *valley* walls are clearly definable) from the surrounding landscape, the limit of the *regulated area* associated is based on whether or not the *valley* slopes are stable:

- Where the *valley* slopes are stable, the *regulated area* includes the *river* or *stream* and the *valley* walls extending landward to the stable *top of slope* plus an allowance of 15 metres.

  Note: Valley slopes are considered stable when the valley is not subject to toe erosion, the valley walls are no more than 2 metres in height, and the existing slope angle is no steeper than 3:1 (horizontal:vertical). The valley slopes in these circumstances typically resist slumping and rotational slippage but may become unstable as a consequence of the increased loading forces of development, depending on the soil structure and underlying geology.

- Where the *valley* slopes are unstable, the *regulated area* includes the *river* or *stream* and the *valley* walls extending landward to the predicted long term stable *top of slope* projected at a 3:1 (horizontal:vertical) (or 5:1 (horizontal:vertical) for sandy soils) slope ratio from the predicted stable *toe of slope* (taking into consideration a toe erosion allowance of 15 metres, unless otherwise determined through a technical analysis) plus an allowance of 15 metres.

  Note: Valley slopes are considered unstable when the valley slope may be impacted by toe erosion and/or slope instabilities (i.e., existing slope angle steeper than 3:1 (horizontal:vertical) and/or greater than 2 metres in height).

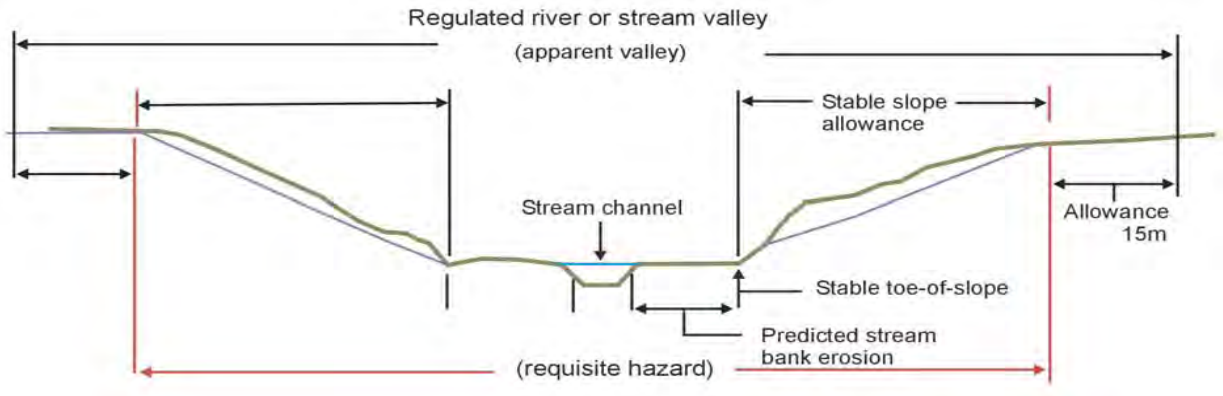


Figure 4A: Regulated area for apparent river or stream valley

In summary, the *regulated area* (or Regulation limit) for apparent *(confined) valley* systems takes into consideration three components: toe erosion, a stable slope limit, and a 15 metre allowance.

Not Apparent Valleys

Where a *watercourse* is not contained within a clearly visible *valley* section; a *river* or *stream* is present but there is no discernible *valley* slope or bank that can be detected from the surrounding landscape, 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 (erosion potential) of the system must be provided. In these *valley* sections, the *regulated area* consists of the maximum extent of the greater of the *floodplain* or predicted *meander belt* width (*erosion hazard*) of the *river* or *stream* plus an allowance of 15 metres.

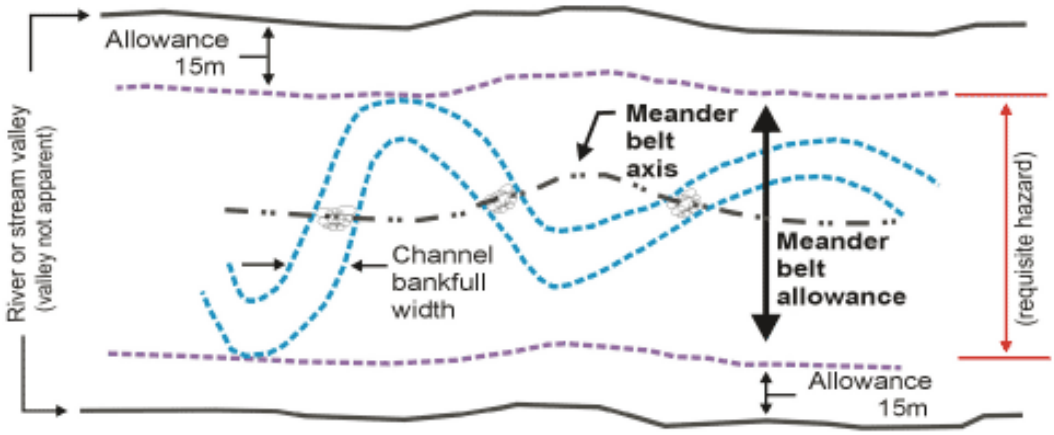


Figure 4B: Regulated area for not apparent river or stream valley

Allowances

Regulated allowances (i.e., the 15 metre allowance referenced above) give KRCA the opportunity to protect access to and along a *valley*. This access may be required for emergency purposes, regular maintenance to existing *structures* or to repair failed *structures*. *Development* within the 15 metre allowance must be regulated to ensure that existing *flooding* and/or *erosion hazards* are not aggravated, that new hazards are not created, and to ensure that *pollution* and the *conservation of land* will not be affected. Regulation of *development* in the allowance is also required to deal with issues related to accuracy of the modeling and analysis tools used to establish the limits of the *flooding* and/or *erosion hazards*.

Any development within a valley of a river, stream or lake system (including the 15 metre allowance) requires permission from KRCA.

4.4.2 SPECIFIC POLICIES TO PROHIBIT OR REGULATE DEVELOPMENT – VALLEYS OF RIVER, STREAM OR LAKE SYSTEMS

The policies in this section are to be applied in conjunction with the General Policies in Section 4.3. As per Policy 4.3(1), development will not be permitted within the regulated area associated with a valley, except in accordance with the policies contained in this section.

Where development is proposed within the requisite hazard associated with a valley (i.e., a flooding hazard and/or erosion hazard), the policies contained within Section 4.5 Hazardous Lands are to be applied in conjunction with the policies in this section.

Identification of the Hazard Limit – *Flooding* and *Erosion Hazard*s

4.4.2(1) **When *development* is proposed within or adjacent to a *valley* where the *watercourse* or *lake* drains an area equal to or greater than 125 hectares and the *floodplain* limits for the *watercourse* or *lake* are not available, KRCA will require that the applicant (or agent) provide appropriate technical reports identifying the *floodplain* limits on the subject lands to the satisfaction of KRCA. The *floodplain* limit is to be based on the flood produced by the greater of the Timmins storm or the *100-year flood*.**

4.4.2(2) **In cases where *development* is proposed within or adjacent to an apparent *valley* and the *valley* is unstable or adjacent to a *river*, *stream* or *lake* where there is no apparent *valley*, KRCA will require that the applicant (or agent) provide appropriate technical reports identifying the extent of the *erosion hazard* limit on the subject lands to the satisfaction of KRCA.**

Development* (Buildings or *Structures*) within or Adjacent to an Apparent *Valley

4.4.2(3) **Where the *valley* slope is stable, *development* (buildings or *structures*) may be permitted within 15 metres of the existing stable *top of slope* provided that:**

- **all buildings or *structures* will be located outside of the *floodplain*;**
- ***access (ingress/egress)* conditions can be considered *safe*;**
- ***development* does not change drainage or vegetation patterns that would compromise slope stability or exacerbate erosion of the slope face;**
- **the potential for erosion has been addressed through proper drainage, erosion and sediment control and site stabilization/restoration plans; and,**
- **if within 15 metres of the *floodplain*: the finished floor/lowest opening of proposed habitable *structures* is to be located at least 0.3 metres above the *regulatory flood* elevation; and, all electrical circuits, outlets and permanently installed electrical equipment are to be located at least 0.3 metres above the *regulatory flood* elevation.**

4.4.2(4) **Notwithstanding Policy 4.4.2(3), where the *valley* slope is stable, *development* (buildings or *structures*) located within the *floodplain* would be considered susceptible to *flooding hazards* and therefore, may be permitted subject to the policies contained in Section 4.5.2 – Flooding Hazards.**

4.4.2(5) **Where the *valley* slope is unstable, *development* (buildings or *structures*) may be permitted within 15 metres of the projected stable *top of slope* provided that:**

- **it can be demonstrated through appropriate technical reports (e.g., topographic survey, stream bank erosion analysis, geotechnical investigation) that all *development* will be located a minimum of 6 metres beyond the projected stable *top of slope* (taking into account toe erosion allowance, where applicable);**
- ***access (ingress/egress)* conditions can be considered *safe*;**
- ***development* does not change drainage or vegetation patterns that would compromise slope stability or exacerbate erosion of the slope face;**
- **the potential for erosion has been addressed through proper drainage, erosion and sediment control and site stabilization/restoration plans; and,**
- **if within 15 metres of the *floodplain*: the finished floor/lowest opening of proposed habitable *structures* is to be located at least 0.3 metres above the *regulatory flood* elevation; and, all electrical circuits, outlets and permanently installed electrical equipment are to be located at least 0.3 metres above the *regulatory flood* elevation.**

4.4.2(6) **Notwithstanding Policy 4.4.2(5), where the *valley* slope is unstable, *development* (buildings or *structures*) located within 6 metres of the projected stable *top of slope* would be considered susceptible to *erosion hazards* and, therefore, may be permitted subject to the policies contained in Section 4.5.3 – Erosion Hazards.**

Development* (Buildings or *Structures*) within or Adjacent to a Not Apparent *Valley

4.4.2(7) ***Development* (buildings or *structures*) may be permitted within 15 metres of the greater of the *floodplain* (for *river*, *stream* or *lake* systems) or predicted *meander belt* width (for *river* or *stream* systems) provided that:**

- **it can be demonstrated through appropriate technical reports (e.g., topographic survey, geomorphologic assessment, *floodplain* mapping) that all *development* will be located a minimum of 6 metres beyond the greater of the *floodplain* OR the predicted *meander belt* width (*erosion hazard*);**
- ***development* does not change drainage or vegetation patterns that would exacerbate *flooding hazards* and/or *erosion hazards*;**
- **the potential for erosion has been addressed through proper drainage, erosion and sediment control and site stabilization/restoration plans;**
- **the finished floor/lowest opening of proposed habitable *structures* is to be located at least 0.3 metres above the *regulatory flood* elevation;**
- **all electrical circuits, outlets and permanently installed electrical equipment are to be located at least 0.3 metres above the *regulatory flood* elevation; and,**
- ***access (ingress/egress)* conditions can be considered *safe*.**

4.4.2(8) **Notwithstanding Policy 4.4.2(7), *development* (buildings or *structures*) within 6 metres of the greater of the *floodplain* OR the predicted *meander belt* width (*erosion hazard*) would be considered susceptible to *erosion hazards* and, therefore, may be permitted subject to the policies contained in Section 4.5.3 – Erosion Hazards.**

Fill* placement, Excavation and/or Grade Modifications within or Adjacent to an Apparent *Valley

4.4.2(9) **Where the valley slope is stable, *fill* placement, excavation and/or grade modifications may be permitted within 15 metres of the existing stable *top of slope* where the works are: associated with existing access roads and driveways; required for the construction of a new access route to serve an existing residential, agricultural, commercial, industrial or institutional use; required for the purpose of flood and/or erosion protection; to facilitate the installation of geothermal, water and/or sewage treatment systems; to facilitate the installation of a new *dug-out* or *isolated pond**; and/or, associated with retrofitting of an existing *dug-out* or *isolated pond** that would result in an enlargement of the pond in area or volume beyond what was previously constructed, provided that:**

- **the *fill* placement, excavation and/or grade modifications does not change drainage or vegetation patterns that would compromise slope stability or exacerbate erosion of the slope face;**
- **for *dug-out* or *isolated ponds**, the pond does not extend beyond the existing stable *top of slope*;**
- **the potential for erosion has been addressed through proper drainage, erosion and sediment control and site stabilization/restoration plans; and,**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* and conduct other studies and/or monitoring as may be required to ensure the control of *pollution* and the *conservation of land* are not adversely affected.**

***Ponds for the specific purpose of watering livestock would not be subject to Policy 4.4.2(9) as they are not regulated by KRCA.**

4.4.2(10) **Where the *valley* slope is stable, *fill* placement, excavation and/or grade modifications required for large-scale fill operations associated with agricultural, commercial, industrial, or multiple residential developments may be permitted within 15 metres of the existing stable *top of slope* provided that:**

- **the limit of all *fill* placement, excavation and/or grade modifications will be set back beyond the existing stable *top of slope;***
- **the *fill* placement, excavation and/or grade modifications will not change drainage or vegetation patterns that would compromise slope stability or exacerbate erosion of the slope face;**
- **the potential for erosion has been addressed through proper drainage, erosion and sediment control and site stabilization/restoration plans; and,**
- **the large-scale placement of fill can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

4.4.2(11) **Where the *valley* slope is unstable, *fill* placement, excavation and/or grade modifications may be permitted within 15 metres of the projected stable *top of slope* where the works are: required for large-scale fill operations associated with agricultural, commercial, industrial, or multiple residential developments; associated with existing access roads and driveways; required for the construction of a new access route to serve an existing residential, agricultural, commercial, industrial or institutional use; required for the purpose of flood and/or erosion protection; to facilitate the installation of geothermal, water and/or sewage treatment systems; to facilitate the installation of a new *dug-out* or *isolated pond**; and/or, associated with retrofitting of an existing *dug-out* or *isolated pond** that would result in an enlargement of the pond in area or volume beyond what was previously constructed, provided that:**

- **it can be demonstrated through appropriate technical reports (e.g., topographic survey, stream bank erosion analysis, geotechnical investigation) that the limit of all *fill* placement, excavation and/or grade modifications will be located a minimum of 6 metres beyond the projected stable *top of slope* (taking into account toe erosion allowance, where applicable);**
- **the *fill* placement, excavation and/or grade modifications will not change drainage or vegetation patterns that would compromise slope stability or exacerbate erosion of the slope face;**
- **the potential for erosion has been addressed through proper drainage, erosion and sediment control and site stabilization/restoration plans;**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* and conduct other studies and/or monitoring as may be required to ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- **the large-scale placement of fill can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

***Ponds for the specific purpose of watering livestock would not be subject to Policy 4.4.2(11) as they are not regulated by KRCA.**

4.4.2(12) Notwithstanding Policy 4.4.2(11), where the *valley* slope is unstable, *fill* placement, excavation and/or grade modifications located within 6 metres of the projected stable *top of slope* would be considered susceptible to *erosion hazard*s and, therefore, may be permitted subject to the policies contained in Section 4.5.3 – Erosion Hazards.

Permitted fill placement, excavation and/or grade modifications may be seasonally restricted and subject to a specified time frame to enable stabilization/revegetation of the disturbed area.

Fill* placement, Excavation and/or Grade Modifications within or Adjacent to a Not Apparent *Valley

4.4.2(13) *Fill* placement, excavation and/or grade modifications may be permitted within 15 metres of the greater of the *floodplain* or predicted *meander belt* width (*erosion hazard*) of the *river* or *stream* where the works are: required for large-scale fill operations associated with agricultural, commercial, industrial, or multiple residential developments; associated with existing access roads and driveways; required for the construction of a new access route to serve an existing residential, agricultural, commercial, industrial or institutional use; required for the purpose of flood and/or erosion protection; to facilitate the installation of geothermal, water and/or sewage treatment systems; to facilitate the installation of a new *dug-out* or *isolated pond; and/or, associated with retrofitting of an existing *dug-out or isolated pond** that would result in an enlargement of the pond in area or volume beyond what was previously constructed, provided that:**

- **it can be demonstrated through appropriate technical reports (i.e., topographic survey, geomorphologic assessment, floodplain mapping) that the limit of all *fill* placement, excavation and/or grade modifications will be located a minimum of 6 metres beyond the greater of the *floodplain* OR the predicted *meander belt* width (*erosion hazard*);**
- **the *fill* placement, excavation and/or grade modifications will not change drainage or vegetation patterns that would exacerbate *flooding hazard*s and/or *erosion hazard*s;**
- **the potential for erosion has been addressed through proper drainage, erosion and sediment control and site stabilization/restoration plans;**

- ***inert fill material*** **will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* and conduct other studies and/or monitoring as may be required to ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- **the large-scale placement of fill can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

***Ponds for the specific purpose of watering livestock would not be subject to Policy 4.4.2(13) as they are not regulated by KRCA.**

4.4.2(14) Notwithstanding Policy 4.4.2(13), *fill* placement, excavation and/or grade modifications located within 6 metres of the greater of the *floodplain* OR the predicted *meander belt width* (*erosion hazard*) would be considered susceptible to *erosion hazard*s and, therefore, may be permitted subject to the policies contained in Section 4.5.3 – Erosion Hazards.

<u>Permitted fill placement, excavation and/or grade modifications may be seasonally restricted and subject to a specified time frame to enable stabilization/revegetation of the disturbed area.</u>

4.5 HAZARDOUS LANDS

4.5.1 DEFINITION AND CONTEXT

Hazardous land is defined by the CA Act as land that could be unsafe for *development* because of naturally-occurring processes associated with flooding, erosion, dynamic beaches or unstable soil or bedrock. The KRCA *watershed* contains *hazardous lands* associated with flooding, erosion, unstable soil and unstable bedrock.

4.5.1.1 DEFINING THE FLOODING HAZARD AND ASSOCIATED REGULATED AREA

In Ontario, either storm-centred events, flood frequency based events, or an observed event may be used to determine the extent of the *flooding hazard* associated with the *regulatory flood*. These events are:

- A storm-centred event, either Hurricane Hazel storm (1954) or in the case of the KRCA *watershed*, Timmins storm (1961). A storm-centred event refers to a major storm of record that is used for land use planning purposes. The rainfall actually experienced during a major storm event can be transposed over another *watershed* and when combined with the local conditions, the limit of the *regulatory flood* can be determined. This centred concept is considered acceptable where the evidence suggests that the storm event could have potentially occurred over other *watershed*s in the general area.
- The *100-year flood* is a frequency based flood event that is determined through analysis of precipitation, snow melt, or a combination thereof, having a return period (or a probability of occurrence) of once every 100 years on average (or having a 1% chance of occurring or being exceeded in any given year). The *100-year flood* event is the minimum acceptable standard for defining the limit of the *regulatory flood*.
- An observed event, which is a flood that is greater that the storm-centred events or greater than the *100-year flood* and which was actually experienced in a particular *watershed*, or portion thereof, for example as a result of ice jams, and which has been approved as the standard for that specific area by the Minister of Natural Resources.

For the KRCA watershed, the flooding hazard is based on the greater of the Timmins Flood Event Standard (the Regional Storm) or the 100 Year Flood Event Standard. The flood produced through these calculations is called the 'regulatory flood', the limits of which define the extent of the flooding hazard. Flood lines for the Regional Storm are calculated using precipitation data from Timmins storm (1961), while the 100-year floodlines are based on a storm that statistically occurs once every one hundred years.

The *regulated area* associated with the *flooding hazard* includes the limit of the *regulatory flood*.

From the planning perspective (see Chapter 3), KRCA applies a one-zone concept to *floodplain* management across the *watershed* based on the *regulatory flood* standard (i.e., flood produced by the greater of the Regional Storm (Timmins) or *100-year flood*), in accordance with Provincial standards. Currently, there are no Two-Zone or Special Policy Areas within the *watershed* (see Appendix K – Floodplain Management (Special Policy Areas and Two-Zone Concept) for details). Application of the two-zone concept may be appropriate in some areas. If a Two-Zone concept is approved within the *watershed*, regulation policies for *development* and/or site alteration within the *floodway* vs. the flood fringe will need to be developed on a reach-by-reach basis. KRCA is of the opinion that there are no situations in the *watershed* that would meet the Special Policy Area criteria.

According to the MNR and CO Guidelines for Developing Schedules of Regulated Areas (2005), the flooding hazard applies to all watercourses and lake systems in the KRCA watershed.

Any development within a flooding hazard requires permission from the KRCA.

4.5.1.2 DEFINING THE EROSION HAZARD AND ASSOCIATED REGULATED AREA

The *erosion hazard* is that area of a *watercourse* bank and lands adjacent to a *watercourse* (i.e., a *watercourse valley*) where erosion is actively occurring and/or where *development* could create slope stability issues. It addresses both erosion potential of the actual *watercourse* bank, as well as erosion or potential slope instability issues related to *valley* walls. *Development* adjacent to *valley* slopes can cause increased loading forces on the *top of slope*, compromise slope stability or worsen erosion of the slope face, and result in the loss of stabilizing vegetation. Where there is no apparent *valley* (see Section 4.4.1.1), the *regulated area* associated with an *erosion hazard* is comprised of the *meander belt* (i.e., the *meander belt allowance*). Where the *valley* is apparent (see Section 4.4.1.1), the *regulated area* associated with an *erosion hazard* is comprised of stream bank and slope erosion (i.e., the toe erosion allowance and the stable slope allowance). See Section 2) of Appendix J – Identifying Erosion Hazard Limits for more information.

In accordance with the PPS and MNR's Technical Guide – River & Stream Systems: Erosion Hazard Limit (2002), KRCA also considers an *erosion access allowance* of 6 metres adjacent to stable *top of slope* and/or *meander belt* when evaluating *development* proposals in relation to *erosion hazards*. An *erosion access allowance* is meant to provide access for emergencies, maintenance and construction activities. As such, *development* within the *erosion access allowance* is considered to be encroaching on the associated *hazardous lands* and would be subject to the policies contained in this section.

According to the MNR and CO Guidelines for Developing Schedules of Regulated Areas (2005), the erosion hazard applies to all watercourses and lake systems in the KRCA watershed.

Detailed information on identifying the limits of erosion hazards can be found in Section 2) of Appendix J – Identifying Erosion Hazard Limits.

Any development within an erosion hazard requires permission from KRCA.

4.5.1.3 DEFINING THE REGULATED AREA ASSOCIATED WITH UNSTABLE SOIL OR BEDROCK

Unstable soil includes but is not limited to areas identified as containing organic soils. These soils are customarily found in association with *wetland*s. Organic and peat soils, formed by the decomposition of vegetative and organic materials into humus can release humic acids to the ground water system and create highly combustible methane gas. Peat and other organic soils also lack soil structure making them susceptible to erosion and unable to support structure because they compress easily.

Unstable bedrock includes but is not limited to areas identified as containing *karst* formations. *Karst* formations may be present in limestone or dolomite bedrock, but are predominantly found in portions of eastern Ontario and Wellington County (Guelph-Elora). They are extremely variable in nature and are best identified through local, site-specific studies.

The *regulated area* associated with unstable soil or bedrock includes the maximum extent of the unstable soil or bedrock.

Any development on unstable soil or unstable bedrock requires permission from KRCA.

4.5.2 SPECIFIC POLICIES TO PROHIBIT OR REGULATE DEVELOPMENT – FLOODING HAZARDS

The policies in this section are to be applied in conjunction with the General Policies in Section 4.3.

New Residential *Development*

4.5.2(1) **New multiple residential *development* will not be permitted within a *flooding hazard*, regardless of previous approvals provided under the Planning Act or other regulatory process (e.g., Building Code Act).**

4.5.2(2) **On an existing *lot of record* where the current* zoning is appropriate to the nature of the proposed *development*, single residential *development* may be permitted within a *flooding hazard* provided it can be demonstrated that:**

- **there is no feasible alternative site outside of the *flooding hazard*;**
- **the site is not subject to *frequent flooding* OR a sub*watershed* study or other *comprehensive plan* has confirmed that flooding has been artificially created as a result of undersized infrastructure such as culverts and bridges (i.e., a *backwater area*);**
- **the dwelling (including any crawlspace) will be floodproofed to an elevation of 0.3 metre above the *regulatory flood* elevation in accordance with floodproofing standards outlined in Appendix L – Floodproofing Guidelines;**
- **no basement is proposed;**
- **any new *accessory building* or *structure* can satisfy all of the conditions of Policy 4.5.2(24);**
- **any new and/or replacement sewage treatment system will be located outside of the *flooding hazard* OR where this is not feasible, can satisfy all of the conditions of Policy 4.5.2(37); *access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*;**

- **design and lot modifications (e.g., *balanced cut and fill* operation designed in 0.3 metre vertical increments) will reduce the risk of flooding and property damage, to ensure that there will be no *adverse hydraulic or fluvial impacts* on *lake*s, *river*s, *creek*s, *stream*s or *watercourse*s. Engineered hydraulic analyses may be required, at the discretion of the Authority, to demonstrate that there will be no detrimental effect on upstream water levels or local stream flow velocities; and,**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* to ensure the control of *pollution* and the *conservation of land* are not adversely affected.**

***Changes to the current zoning will not be supported by KRCA except where the policies contained in Chapter 3 can be satisfied.**

Minor Residential Additions

4.5.2(3) Minor ground floor additions to existing residential dwellings located within a *flooding hazard* may be permitted provided it can be demonstrated:

a. If the addition itself is within the *flooding hazard*, that:

- **there is no feasible alternative site outside of the *flooding hazard*;**
- **the addition does not exceed 50% of the ground floor area of the existing structure or 46.5 metres^2, whichever is less, OR in the case of multiple additions, all additions combined do not exceed 50% of the ground floor area of the existing structure or 46.5 metres^2, whichever is less;**
- **the number of *dwelling units* is the same or less;**
- **the addition will not be subject to flows that could cause structural damage;**
- **an improvement in the existing dwelling will occur with respect to floodproofing of the *structure* (unless the existing dwelling adheres to floodproofing standards outlined in Appendix L – Floodproofing Guidelines);**
- **the addition (including any crawlspace) will be floodproofed to an elevation of 0.3 metre above the *regulatory flood* elevation in accordance with floodproofing standards outlined in Appendix L – Floodproofing Guidelines;**
- **no basement is proposed; and,**
- ***access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*.**

b. If the addition is situated outside of the *flooding hazard*, that:

- **the number of *dwelling units* is the same or less;**
- **an improvement in the existing dwelling will occur with respect to floodproofing of the *structure* (unless the existing dwelling adheres to floodproofing standards outlined in Appendix L – Floodproofing Guidelines);**
- **the addition (including any crawlspace) will be floodproofed to an elevation of 0.3 metre above the *regulatory flood* elevation in accordance with floodproofing standards outlined in Appendix L – Floodproofing Guidelines;**
- **no basement below the *regulatory flood* elevation is proposed; and,**
- ***access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*.**

4.5.2(4) Flood susceptible ground floor additions to existing residential dwellings greater than the size provision identified in Policy 4.5.2(3)a. would be considered New Single Residential *Development* and, therefore, subject to Policy 4.5.2(2).

4.5.2(5) **An additional storey (or extension thereof) on existing residential dwellings located within a *flooding hazard* may be permitted provided it can be demonstrated that the number of *dwelling units* is the same or less and *access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*.**

4.5.2(6) **Crawlspaces associated with existing residential *development* located within a *flooding hazard* may be permitted provided it can be demonstrated that it will be floodproofed to an elevation of 0.3 metre above the *regulatory flood* elevation in accordance with floodproofing standards outlined in Appendix L – Floodproofing Guidelines.**

Residential *Replacement*

4.5.2(7) ***Replacement* of residential dwellings located within a *flooding hazard* may be permitted provided it can be demonstrated that:**

- **the dwelling to be replaced is relocated outside the *flooding hazard*, where feasible;**
- **there is no increase in the number of *dwelling units*;**
- **the new dwelling is the same size or smaller than the previous dwelling;**
- **the use of the new dwelling is the same as the previous dwelling;**
- **the dwelling (including any crawlspace) will be floodproofed to an elevation of 0.3 metre above the *regulatory flood* elevation in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines;**
- ***access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*;**
- **no basement is proposed; and,**
- **there is no risk of structural failure due to potential hydrostatic/dynamic pressures.**

4.5.2(8) ***Replacement* of residential dwellings within a *flooding hazard* that would result in an increase in dwelling size may be permitted provided it can be demonstrated that the conditions for Minor Residential Additions (Policies 4.5.2(3), 4.5.2(4), 4.5.2(5) and 4.5.2(6)) can be satisfied AND that the dwelling to be replaced is relocated outside the *flooding hazard*, where feasible.**

Residential Relocation

4.5.2(9) **Relocation of existing residential dwellings located within a *flooding hazard* may be permitted provided it can be demonstrated that the dwelling is relocated outside of the *flooding hazard*, or where this is not feasible, the dwelling is relocated to an area within the existing lot where the risk of flooding and property damage is reduced to the greatest extent possible, and that the dwelling is floodproofed to an elevation of 0.3 metre above the *regulatory flood* in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines.**

Internal Residential Renovations

4.5.2(10) **Internal renovations to existing residential buildings or *structures* located within a *flooding hazard* which change the use or potential use of the building or *structure* but provide for no additional *dwelling units* may be permitted provided it can be demonstrated that:**

- **the internal renovation does not result in a new use prohibited by the General Policies – Prohibited Uses (Policy 4.3(5)); and,**
- **floodproofing is undertaken to the extent practical, in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines.**

New Agricultural *Development*

4.5.2(11) **New structural agricultural *development* associated with existing agricultural uses may be permitted within a *flooding hazard* provided it can be demonstrated that:**

- **there is no feasible alternative site outside of the *flooding hazard*;**
- **the site is not subject to *frequent flooding* OR a sub*watershed* study or other *comprehensive plan* has confirmed that flooding has been artificially created as a result of undersized infrastructure such as culverts and bridges (i.e., a *backwater area*);**
- **the risk of property damage and *pollution* is minimized through site and facility design to ensure that the *development* will not result in a *pollution* hazard (e.g., release of a biohazard substance, nutrients, pesticides or other chemicals during a flood event);**
- **where dry floodproofing cannot be achieved, wet floodproofing is undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines;**
- **the building or *structure* is securely anchored to either a concrete pad or footings;**
- **no basement is proposed;**
- **design and lot modifications (e.g., *balanced cut and fill* operation designed in 0.3 metre vertical increments) will reduce the risk of flooding and property damage to the greatest extent, wherever possible, to ensure that there will be no *adverse hydraulic or fluvial impacts* on *lake*s, *river*s, *creek*s, *stream*s or *watercourse*s. Engineered hydraulic analyses may be required, at the discretion of the Authority, to demonstrate that there will be no detrimental effect on upstream water levels or local stream flow velocities; and,**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* to ensure the control of *pollution* and the *conservation of land* are not adversely affected.**

Minor Agricultural Additions

4.5.2(12) **Minor additions to existing agricultural buildings or *structures* located within a *flooding hazard* may be permitted provided it can be demonstrated:**

a. **If the addition itself is within the *flooding hazard*, that:**

- **there is no feasible alternative site outside of the *flooding hazard*;**
- **the addition will not facilitate a use prohibited by the General Policies – Prohibited Uses (Policy 4.3(5));**

- **the addition does not exceed 50% of the ground floor area of the existing structure or 100 metres^2, whichever is less, OR in the case of multiple additions, all additions combined do not exceed 50% of the ground floor area of the existing structure or 100 metres^2, whichever is less;**
- **no basement is proposed;**
- **where dry floodproofing cannot be achieved, wet floodproofing is undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines;**
- **an improvement in the existing building or *structure* will occur with respect to floodproofing of the building or *structure* (unless the existing building or *structure* adheres to floodproofing standards outlined in Appendix L –Floodproofing Guidelines); and,**
- **the risk of property damage and *pollution* is minimized through site and facility design to ensure that the *development* will not result in a *pollution* hazard (e.g., release of a biohazard substance, nutrients, pesticides or other chemicals during a flood event).**

b. If the addition is situated outside of the *flooding hazard*, that:

- **no basement below the *regulatory flood* elevation is proposed;**
- **where dry floodproofing cannot be achieved, wet floodproofing is undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines;**
- **an improvement in the existing building or *structure* will occur with respect to floodproofing of the building or *structure* (unless the existing building or *structure* adheres to floodproofing standards outlined in Appendix L –Floodproofing Guidelines); and,**
- **the risk of property damage and *pollution* is minimized through site and facility design to ensure that the *development* will not result in a *pollution* hazard (e.g., release of a biohazard substance, nutrients, pesticides or other chemicals during a flood event).**

4.5.2(13) Flood susceptible additions to existing agricultural buildings or *structures* greater than the size provision identified in Policy 4.5.2(12)a. would be considered New Agricultural *Development* and, therefore, subject to Policy 4.5.2(11).

Agricultural *Replacement*

4.5.2(14) *Replacement* of agricultural buildings or *structures* located within a *flooding hazard* may be permitted provided it can be demonstrated that:

- **the building or *structure* to be replaced is relocated outside the *flooding hazard*, where feasible;**
- **the new building or *structure* is the same size or smaller;**
- **the new building or *structure* is securely anchored to either a concrete pad or footings;**
- **the risk of property damage and *pollution* is minimized through site and facility design to ensure that the *development* will not result in a *pollution* hazard (e.g., release of a biohazard substance, nutrients, pesticides or other chemicals during a flood event);**
- **no basement is proposed; and,**
- **where dry floodproofing cannot be achieved, wet floodproofing is undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines.**

4.5.2(15) *Replacement* of agricultural buildings or *structures* located within a *flooding hazard* that would result in an increase in building or *structure* size may be permitted provided it can be demonstrated that the conditions for Minor Agricultural Additions (Policies 4.5.2(12) and 4.5.2(13)) can be satisfied AND that the building or structure to be replaced is relocated outside the *flooding hazard*, where feasible.

Agricultural Relocation

4.5.2(16) **Relocation of existing agricultural buildings and *structures* located within a *flooding hazard* may be permitted provided it can be demonstrated that the building or *structure* is relocated outside of the *flooding hazard*, or where this is not feasible, the building or *structure* is relocated to an area where the risk of flooding and property damage is reduced to the greatest extent possible, and where dry floodproofing cannot be achieved, wet floodproofing is undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines.**

New Commercial, Industrial or Institutional *Development*

4.5.2(17) **New institutional *development* will not be permitted within a *flooding hazard* regardless of previous approvals provided under the Planning Act or other regulatory process (e.g., Building Code Act).**

4.5.2(18) **Where the principle of *development* has previously been established and *development* has accordingly been approved pursuant to an application made under the Planning Act, new commercial or industrial *development* may be permitted within a *flooding hazard* provided it can be demonstrated that:**

- **there is no feasible alternative site outside of the *flooding hazard*;**
- **the site is not subject to *frequent flooding* OR a sub*watershed* study or other *comprehensive plan* has confirmed that flooding has been artificially created as a result of undersized infrastructure such as culverts and bridges (i.e., a *backwater area*);**
- ***access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*;**
- **the building or *structure* (including any crawlspace) will be floodproofed to an elevation of 0.3 metre above the *regulatory flood* elevation in accordance with floodproofing standards outlined in Appendix L – Floodproofing Guidelines;**
- **no basement is proposed;**
- ***stage-storage discharge relationships* of the *floodplain* will be maintained (e.g., by means of an incrementally *balanced cut and fill* operation designed in 0.3 metre vertical increments) to ensure that there will be no *adverse hydraulic or fluvial impacts* on *lakes*, *rivers*, *creeks*, *streams* or *watercourses*. Engineered hydraulic analyses may be required, at the discretion of the Authority, to demonstrate that the later condition has been met and that there will be no detrimental effect on upstream water levels or local stream flow velocities;**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* to ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

<u>KRCA will encourage flood emergency plans for new commercial or industrial *development* approved pursuant to an application made under the Planning Act.</u>

Minor Commercial or Industrial Additions

4.5.2(19) **Minor additions to existing commercial or industrial buildings or *structures* located within a *flooding hazard* may be permitted provided it can be demonstrated that:**

a. **If the addition is situated outside of the *flooding hazard*, that:**

- **the addition will not facilitate a use prohibited by the General Policies – Prohibited Uses (Policy 4.3(5));**
- **the addition does not exceed 50% of the ground floor area of the existing structure or 100 metres^2, whichever is less, OR in the case of multiple additions, all additions combined do not exceed 50% of the ground floor area of the existing structure or 100 metres^2, whichever is less;**
- ***access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*;**
- **no basement is proposed;**
- **the addition (including any crawlspace) is floodproofed to an elevation of 0.3 metre above the *regulatory flood* elevation in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines;**
- **an improvement in the existing building or *structure* will occur with respect to floodproofing of the building or *structure* (unless the existing building or *structure* adheres to floodproofing standards outlined in Appendix L –Floodproofing Guidelines);**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* to ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

b. **If the addition itself is within the *flooding hazard*, that:**

- ***access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*;**
- **no basement below the *regulatory flood* elevation is proposed;**
- **the addition (including any crawlspace) is floodproofed to an elevation of 0.3 metre above the *regulatory flood* elevation in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines;**
- **an improvement in the existing building or *structure* will occur with respect to floodproofing of the building or *structure* (unless the existing building or *structure* adheres to floodproofing standards outlined in Appendix L –Floodproofing Guidelines);**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* to ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

4.5.2(20) **Flood susceptible additions to existing commercial or industrial buildings or *structures* located within a *flooding hazard* that are greater than the size provision identified in Policy 4.5.2(19)a. would be considered New Commercial/Industrial *Development* and, therefore, subject to Policies 4.5.2(17) and 4.5.2(18).**

KRCA will encourage flood emergency plans for additions to existing commercial or industrial buildings or *structures*.

Commercial, Industrial or Institutional *Replacement*

4.5.2(21) ***Replacement* of commercial/industrial/institutional buildings or *structures* located within a *flooding hazard* may be permitted provided it can be demonstrated that:**

- **there is no feasible alternative site outside of the *flooding hazard*;**
- **the number of *dwelling units* is the same or less;**
- **the new building or *structure* is the same size or smaller;**
- **the building or *structure* (including any crawlspace) is floodproofed to an elevation of 0.3 metre above the *regulatory flood* elevation in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines;**
- ***access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*;**
- **no basement is proposed;**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* to ensure the control of *pollution* and the *conservation of land* is not impacted; and,**
- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

4.5.2(22) ***Replacement* of commercial/industrial buildings or *structures* located within a *flooding hazard* that would result in an increase in building or *structure* size may be permitted provided it can be demonstrated that the conditions for Minor Commercial or Industrial Additions (Policies 4.5.2(19) and 4.5.2(20)) can be satisfied AND that the building or structure to be replaced is relocated outside the *flooding hazard*, where feasible.**

KRCA will encourage flood emergency plans for the *replacement* of commercial/industrial/institutional buildings or *structures*.

Commercial, Industrial or Institutional Relocation

4.5.2(23) **Relocation of existing commercial/industrial/institutional buildings or *structures* located within a *flooding hazard* may be permitted provided it can be demonstrated that the building or *structure* is relocated outside of the *flooding hazard*, or where this is not feasible, the building or *structure* is relocated to an area where the risk of flooding and property damage is reduced to the greatest extent possible, and that the building or *structure* (including any crawlspace) is floodproofed to an elevation of 0.3 metre above the regulatory flood in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines.**

KRCA will encourage flood emergency plans for the relocation of commercial/industrial/ institutional buildings or *structures*.

Accessory Buildings or Structures

4.5.2(24) ***Accessory buildings or structures* associated with an existing residential, agricultural, commercial, industrial or institutional use such as detached garages, sheds, silos, gazebos and other similar *structures* (but not including boathouses: see Policies**

4.5.2(28) and 4.5.2(29)), may be permitted within a *flooding hazard* provided it can be demonstrated that:

- **there is no feasible alternative site outside of the *flooding hazard*;**
- **there is no *habitable floor space* associated with the building or *structure* and no opportunity for conversion into *habitable floor space* in the future;**
- **the site is not subject to *frequent flooding* OR a sub*watershed* study or other *comprehensive plan* has confirmed that flooding has been artificially created as a result of undersized infrastructure such as culverts and bridges (i.e., a *backwater area*);**
- **the building or *structure* does not exceed 46.5 metres^2 for settlement areas or shoreline *development* and for rural areas, the building or *structure* does not exceed 80 metres^2;**
- **the risk of property damage and *pollution* is minimized through site and facility design to ensure that the *development* will not result in a *pollution* hazard (e.g., release of a biohazard substance, nutrients, pesticides or other chemicals during a flood event);**
- **the building or *structure* is securely anchored to either a concrete pad or footings;**
- **no basement is proposed; and,**
- **where dry floodproofing cannot be achieved, wet floodproofing is undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines.**

4.5.2(25) **Additions to existing *accessory buildings or structures* located within a *flooding hazard* may be permitted provided it can be demonstrated that:**

- **the total size of the building or *structure* that would result from the addition does not exceed the maximum size identified in Policy 4.5.2(24);**
- **there is no *habitable floor space* associated with the addition and no opportunity for conversion into *habitable floor space* in the future;**
- **no basement is proposed;**
- **an improvement in the existing building or *structure* will occur with respect to floodproofing;**
- **the risk of property damage and *pollution* is minimized through site and facility design to ensure that the *development* will not result in a *pollution* hazard (e.g., release of a biohazard substance, nutrients, pesticides or other chemicals during a flood event); and,**
- **where dry floodproofing cannot be achieved, wet floodproofing is undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines.**

4.5.2(26) ***Replacement* of *accessory buildings or structures* located within a *flooding hazard* may be permitted provided it can be demonstrated that:**

- **there is no feasible alternative site outside the *flooding hazard*;**
- **the building or *structure* to be replaced is relocated to an area within the existing lot where the risk of flooding and property damage is reduced to the greatest extent, wherever possible;**
- **the new building or *structure* is the same size or smaller than the previous building or *structure* (*replacement* of *accessory buildings or structures* located within a *flooding hazard* that would result in an increase in building or *structure* size would be subject to Policy 4.5.2(25));**
- **there is no *habitable floor space* associated with the building or *structure* and no opportunity for conversion into *habitable floor space* in the future;**
- **the replacement building or *structure* is securely anchored to either a concrete pad or footings;**
- **no basement is proposed; and,**
- **where dry floodproofing cannot be achieved, wet floodproofing is undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines.**

4.5.2(27) **Relocation of an existing *accessory building or structure* located within a *flooding hazard* may be permitted provided it can be demonstrated that the building or *structure* is relocated outside of the *flooding hazard*, or where this is not feasible, the building or *structure* is relocated to an area where the risk of flooding and property damage is reduced to the greatest extent possible, is securely anchored to either a concrete pad or footings in its new location, and where dry floodproofing cannot be achieved, wet floodproofing is undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines.**

4.5.2(28) **On-shore boathouses within a *flooding hazard* may be permitted to be constructed, expanded, replaced and/or relocated provided it can be demonstrated that:**

- **there is no *habitable floor space* associated with the boathouse and there is no opportunity for conversion into *habitable floor space* in the future; (to ensure no habitable component, the boathouse shall be limited to a single-storey only and shall contain no services other than electricity);**
- **the *structure* will not restrict *safe access*;**
- **the total size of the *structure* does not exceed 80 metres^2;**
- **the *structure* will be constructed in a manner to minimize impacts to the natural grade of the shoreline and riparian vegetation;**
- **the structure is securely anchored to either a concrete pad or footings; and,**
- **where dry floodproofing cannot be achieved, wet floodproofing will be undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines.**

4.5.2(29) **In-water boathouses within a flooding hazard may be permitted to be constructed, expanded, replaced and/or relocated provided it can be demonstrated that:**

- **the *structure* does not impede the flow of water;**
- **there is no *habitable floor space* associated with the *structure* and there is no opportunity for conversion into *habitable floor space* in the future (to ensure no habitable component, the boathouse shall be limited to a single-storey only and shall contain no services other than electricity);**
- **the total size of the *structure* does not exceed 80 metres^2;**
- **the *structure* is firmly anchored and attached to the shoreline; and,**
- **the *structure* does not alter the natural contour of the shoreline; there is no impact on near-shore littoral processes.**

KRCA may require the submission of a technical site-specific assessment to evaluate the impact on near-shore littoral processes.

PC's (TSW) Policies for In-water and Shoreline Works and Related Activities currently permits in-water boathouses. It is important that KRCA boathouse policies align with the Federal policies to ensure consistent treatment of boathouse approvals. For in-water boathouses on Federal lands, please see PC's Policies for In-water and Shoreline Works and Related Activities available on the PC website (www.pc.gc.ca).

Infrastructure

4.5.2(30) **Public infrastructure (e.g., roads, sewers, flood and/or erosion control works, water supply, etc.) and private infrastructure (e.g., roads, gas and electrical transmission pipelines/corridors, etc.) may be permitted to be constructed, realigned and/or upgraded within a *flooding hazard* when the location is supported through an approved *Environmental Assessment* and/or in the case of private infrastructure, it has been demonstrated through a *comprehensive plan* that there is no feasible alternative site outside the *flooding hazard*, provided that:**

- **risk of flood damage to upstream or downstream properties is not increased or is minimized through site design;**
- **the risk of *pollution* is minimized through site design to ensure that the *development* will not result in a *pollution* hazard (e.g., release of a biohazard substance, nutrients, pesticides or other chemicals during a flood event);**
- **where applicable, floodproofing measures are incorporated into the design in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines;**
- **where applicable, *access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*;**
- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline; and,**
- **site, facility, and/or landscape design and appropriate *best management practices* will be employed to:**
  - **maintain *stage-storage discharge relationships* of the *floodplain*;**
  - **control sediment and erosion; and,**
  - **minimize impervious surfaces and loss of natural vegetation.**

4.5.2(31) **Parking lots and access routes (e.g., driveways, private access roads, entrance ways, etc.) associated with an existing residential, agricultural, commercial, industrial or institutional use may be permitted to be constructed within a *flooding hazard* provided it can be demonstrated that:**

- **the facility is designed to mitigate impacts on the *flooding hazard* and associated *lake*, *river*, *creek*, *stream* or *watercourse*;**
- **the risk of property damage is minimized through site, facility, and/or landscape design;**
- **drainage of parking lots will take place within 1 hour following the cessation of the rainfall event, and does not result in depth of flooding that would exceed 20 centimetres; and,**
- ***access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*.**

Stormwater Management Facilities

4.5.2(32) **New stormwater management facilities will not be permitted within a *flooding hazard* with the exception of municipal stormwater management facilities required to alleviate a flood problem associated with existing *development,* which may be permitted provided it can be demonstrated that:**

- **natural erosion and sedimentation processes within the receiving *watercours*e are not impacted;**
- **finished side slopes are stable;**
- **facilities are excavated with minimal berming, and all unused excavated material is removed from the *flooding hazard* and/or e*rosion hazard;***
- **design and maintenance performance requirements are met as set out in provincial standards or in certain circumstances, as determined by KRCA to achieve water quality targets determined through *watershed* and sub*watershed* plans; and,**
- **the siting and design incorporate the effect of the *floodplain* flow regime on the intended function of the facility without impacting the upstream *flooding hazard*.**

4.5.2(33) **Retrofitting of existing stormwater management facilities may be permitted within a *flooding hazard* where there is no feasible alternative site to relocate the facility outside the *flooding hazard* provided it can be demonstrated that:**

- **natural erosion and sedimentation processes within the receiving *watercours*e are not impacted;**
- **finished side slopes are stable;**
- **facilities are excavated with minimal berming, and all unused excavated material is removed from the *flooding hazard* and/or e*rosion hazard;***
- **design and maintenance performance requirements as determined by KRCA for the receiving lake, *river*, *creek*, *stream* or *watercours*e are met; and,**
- **the siting and design incorporate the effect of the *floodplain* flow regime on the intended function of the facility without impacting the upstream *flooding hazard*.**

Passive Low-Intensity Recreational Uses and *Conservation Activities*

4.5.2(34) **Passive low-intensity recreational uses associated with public parks, outdoor recreation and education, trail systems, water access points or *conservation activities* may be permitted within a *flooding hazard* provided it can be demonstrated that:**

- **there is no feasible alternative site outside the *flooding hazard*;**
- **site, facility, and/or landscape design and appropriate *best management practices* will mitigate impacts on the *flooding hazard* and associated *lake*, *river*, *creek*, *stream* or *watercourse*;**
- **the risk of property damage is minimized through site, facility, and/or landscape design; and,**
- **where applicable, *access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*.**

<u>KRCA will encourage flood emergency plans for high use publicly accessible areas and facilities (e.g., parks and trail systems).</u>

Marinas

4.5.2(35) **Marina facilities may be permitted within a *flooding hazard* provided it can be demonstrated that:**

- **all boat storage facilities will be constructed on shore and all proposed multiple docking facilities can satisfy policies outlined in Section 4.7.2.1 – Structures;**
- **facilities will be constructed in a manner to minimize impacts to the natural grade of the shoreline;**
- **the marina is designed to mitigate impacts on the *flooding hazard* and associated *lake*, *river*, *creek*, *stream* or *watercourse*;**
- **where dry floodproofing cannot be achieved, wet floodproofing will be undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines; and,**
- ***access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*.**

KRCA will encourage flood emergency plans for marinas.

Proposed buildings or *structures* (e.g., offices, maintenance sheds, etc.) associated with marinas would be subject to the applicable policies.

Golf Courses

4.5.2(36) **Golf courses or golf course expansions may be permitted within a *flooding hazard* provided it can be demonstrated that:**

- **all greens and tees are to be located above the elevation of the 1:10 year flood event;**
- ***watercourse* crossings are minimized and designed in accordance with the policies in Section 4.7.1 – Structures;**
- ***stage-storage discharge relationships* of the *floodplain* will be maintained (e.g., by means of an incrementally *balanced cut and fill* operation designed in 0.3 metre vertical increments) to ensure that there will be no *adverse hydraulic or fluvial impacts* on *lake*s, *rivers*, *creeks*, *streams* or *watercourses*. Engineered hydraulic analyses may be required, at the discretion of the Authority, to demonstrate that the later condition has been met and that there will be no detrimental effect on upstream water levels or local stream flow velocities;**
- **where dry floodproofing cannot be achieved, wet floodproofing will be undertaken in accordance with floodproofing standards identified in Appendix L – Floodproofing Guidelines;**
- **the risk of *pollution* from the application of fertilizers, herbicides, pesticides or insecticides or other chemical or organic compounds is mitigated and addressed in a turf management plan; and,**
- ***access (ingress/egress)* conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than *safe*.**

KRCA will encourage flood emergency plans for golf courses.

Proposed buildings or structures (e.g., clubhouses, maintenance sheds, etc.) associated with golf courses would be subject to the applicable policies.

***Fill* Placement, Excavation and/or Grade Modifications**

4.5.2(37) ***Fill* placement, excavation, and/or grade modifications may be permitted within a *flooding hazard* where the works are: associated with existing access roads and driveways; required for the purpose of floodproofing existing *structures*; required for erosion control; and/or, to facilitate the installation of geothermal, and water and/or sewage treatment systems provided it can be demonstrated that:**

- **the bed for sewage treatment systems will be located outside of the flooding hazard OR where this is not feasible, at a minimum, raised above the *regulatory flood* elevation plus an appropriate* separation distance;**
- ***stage-storage discharge relationship*s of the *floodplain* will be maintained (e.g., by means of an incrementally *balanced cut and fill* operation designed in 0.3 metre vertical increments) to ensure that there will be no *adverse hydraulic or fluvial impacts* on *lake*s, *river*s, *creek*s, *stream*s, or *watercourse*s. Engineered hydraulic analyses may be required, at the discretion of the Authority, to demonstrate that the later condition has been met and that there will be no detrimental effect on upstream water levels or local stream flow velocities; and,**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* to ensure the control of *pollution* and the *conservation of land* are not adversely affected;**

OR where *stage-storage discharge relationship*s of the *floodplain* cannot be maintained:

- ***fill* placement, excavation, and/or grade modifications required for water and/or sewage treatment systems will be limited to the required area and depths as specified by the approval agency while ensuring that an appropriate* separation distance will be provided between the bed and the *regulatory flood* elevation;**
- ***fill* placement, excavation, and/or grade modifications required for floodproofing purposes will not exceed the minimum amount required to floodproof the *structure* in accordance with floodproofing guidelines in Appendix L – Floodproofing Guidelines;**
- ***fill* placement, excavation, and/or grade modifications required for erosion protection works along the water's edge, be in accordance with Erosion Protection, Shoreline/Bank Stabilization and Sediment Control policies (Policies 4.7.2.4(5)), 4.7.2.4(6), and/or 4.7.2.4(7));**
- **impacts on the hydraulic or fluvial functions of the *lake*, *river*, *creek*, *stream*, or *watercourse* will be minimized to the greatest extent possible and upstream and downstream flow velocities related to increased flood risk or damage are unaffected. An engineered hydraulic analysis may be required, at the discretion of the Authority, to ensure that these matters have been addressed;**
- **flood flows are not impeded; and,**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* to ensure the control of *pollution* and the *conservation of land* are not adversely affected.**

***Appropriate separation distance to be determined by KRCA staff in consultation with the approval agency.**

<u>Permitted *fill* placement, excavation and/or grade modifications may be seasonally restricted and subject to a specified time frame to enable stabilization/revegetation of the disturbed area.</u>

4.5.2(38) ***Fill*** **placement, excavation, and/or grade modifications may be permitted within a** ***flooding hazard*** **to facilitate intensification (i.e., infill** ***development*****), provided it can be demonstrated that:**

- ***stage-storage discharge relationships*** **of the** ***floodplain*** **will be maintained (e.g., by means of an incrementally** ***balanced cut and fill*** **operation designed in 0.3 metre vertical increments) to ensure that there will be no** ***adverse hydraulic or fluvial impacts*** **on** ***lake*****s,** ***river*****s,** ***creek*****s,** ***stream*****s, or** ***watercourse*****s. Engineered hydraulic analyses will be required to demonstrate that the later condition has been met and that there will be no detrimental effect on upstream water levels or local stream flow velocities;**
- ***access (ingress/egress)*** **conditions are "dry" where this standard can be practically achieved, or floodproofed to an elevation which is practical and feasible, but no less than** ***safe;inert fill material wi*****ll be used. The proponent may be required to provide proof of the origin and quality of the** ***fill material*** **to ensure the control of** ***pollution*** **and the** ***conservation of land*** **are not adversely affected; and,**
- **the large-scale placement of** ***fill*** **can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

4.5.3 SPECIFIC POLICIES TO PROHIBIT OR REGULATE DEVELOPMENT – EROSION HAZARDS

The policies in this section are to be applied in conjunction with the General Policies in Section 4.3.

New Residential, Agricultural, Commercial, Industrial, or Institutional ***Development***

4.5.3(1) **New residential, agricultural, commercial, industrial or institutional** ***development*** **will not be permitted within an** ***erosion hazard*****, regardless of previous approvals provided under the Planning Act or other regulatory process (e.g., Building Code Act).**

Additions

4.5.3(2) **Additions to existing residential, agricultural, commercial or industrial buildings or *structures* located within an *erosion hazard* may be permitted subject to the following:**

- **a geotechnical study prepared by a qualified professional demonstrates that: there is no feasible alternative to locate the addition outside of the *erosion hazard* and that the addition will be located in an area of least (and acceptable) risk; there is no impact on existing and future slope stability; and, the potential for erosion is addressed through proper drainage, erosion and sediment control and site stabilization/restoration plans;**
- **the addition will not prevent access into and through the *valley* in order to undertake erosion prevention works and/or maintenance of existing buildings or *structures* or during an emergency; and,**
- **the building or *structure* will be protected from the *erosion hazard* through incorporation of appropriate building design parameters.**

***Replacement*/Relocation**

4.5.3(3) **The *replacement* or relocation of an existing building or *structure* within an *erosion hazard* may be permitted subject to the following:**

- **a geotechnical study prepared by a qualified professional demonstrates that: there is no opportunity to relocate the building or *structure* outside of the *erosion hazard* and that the building or *structure* will be located in an area of least (and acceptable) risk; there is no impact on existing and future slope stability; and, the potential for erosion is addressed through proper drainage, erosion and sediment control and site stabilization/restoration plans;**
- **the building or *structure* will not prevent access into and through the *valley* in order to undertake erosion prevention works and/or maintenance of existing buildings or *structures* or during an emergency;**
- **the building or *structure* will be protected from the *erosion hazard* through incorporation of appropriate building design parameters; and,**
- **the building or *structure* will not exceed the original habitable floor area nor the original footprint of the previous *structure*.**

4.5.3(4) ***Replacement* of an existing building or *structure* located within an *erosion hazard* that would result in an increase in building or *structure* size may be permitted provided it can be demonstrated that Policy 4.5.3(2) can be satisfied**

Accessory Buildings or Structures

4.5.3(5) ***Accessory buildings or structures* associated with an existing residential, agricultural, commercial, industrial or institutional use such as detached garages, tool sheds, gazebos and other similar *structures* or additions to existing *accessory buildings or structures* may be permitted within an *erosion hazard* where it can be demonstrated that:**

- **there is no feasible alternative to locate the building or *structure* outside of the *erosion hazard* and that the building or *structure* will be located in an area of least (and acceptable) risk as determined through appropriate technical assessments (e.g., topographic survey, geotechnical study);**
- **there is no impact on existing and future slope stability;**

- **the building or *structure* will not prevent access into and through the *valley* in order to undertake preventative actions or maintenance or during an emergency;**
- **the building or *structure* will be protected from the *erosion hazard* through incorporation of appropriate building design parameters; and,**
- **the potential for erosion has been addressed through the submission of proper drainage, erosion and sediment control and site stabilization/restoration plans.**

Passive Low-Intensity Recreational Uses and *Conservation Activities*

4.5.3(6) **Passive low-intensity recreational uses associated with public parks, outdoor recreation and education, trail systems, water access points or *conservation activities* may be permitted within an *erosion hazard* provided it can be demonstrated that:**

- **there is no feasible alternative to locate the *development* outside of the *erosion hazard* and that the *development* will be located in an area of least (and acceptable) risk as determined through appropriate technical reports (e.g., topographic survey, geotechnical study);**
- **there is no impact on existing and future slope stability;**
- **the use will not prevent access into and through the *valley* in order to undertake preventative actions or maintenance or during an emergency; and,**
- **the potential for erosion has been addressed through the submission of proper drainage, erosion and sediment control and site stabilization/restoration plans.**

Infrastructure

4.5.3(7) **Public infrastructure (e.g., roads, sewers, flood and/or erosion control works, water supply, etc.) and private infrastructure (e.g., roads, gas and electrical transmission pipelines/corridors, etc.) may be permitted to be constructed, realigned and/or upgraded within an *erosion hazard* when the location is supported through an approved *Environmental Assessment* and/or in the case of private infrastructure, it has been demonstrated through a *comprehensive plan* that there is no feasible alternative site outside the *erosion hazard*, provided it can be demonstrated that:**

- **the proposed alignment minimizes encroachment into the *erosion hazard* to the greatest extent possible;**
- **a more detailed site-specific study (i.e., a geotechnical study) consistent with the *Environmental Assessment* or *comprehensive plan* is conducted to determine a more precise *erosion hazard* limit(s) in accordance with Section 2) of Appendix J –Identifying Erosion Hazard Limits, and demonstrate how impacts to the *erosion hazard* will be mitigated to ensure that there is no impact on existing and future slope stability and that the infrastructure will not prevent access into and through the *valley* in order to undertake preventative actions or maintenance or during an emergency;**
- **the risk of *pollution* is minimized through site design to ensure that the *development* will not result in a *pollution* hazard (e.g., release of a biohazard substance, nutrients, pesticides or other chemicals during an erosion event); and,**
- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

***Fill* Placement, Excavation, and/or Grade Modifications**

4.5.3(8) ***Fill* placement, excavation, and/or grade modifications may be permitted within an *erosion hazard* where the works are: associated with existing access roads and driveways; required for the purpose of erosion protection; and/or, to facilitate the installation of geothermal, and water and/or sewage treatment systems provided it can be demonstrated through appropriate technical reports (e.g., topographic survey, geotechnical study) that:**

- **slope stability will not be compromised;**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* to ensure the control of *pollution* and the *conservation of land* is not impacted;**
- ***fill* placement, excavation, and/or grade modifications required for erosion protection works along the water's edge, be in accordance with Erosion Protection, Shoreline/Bank Stabilization and Sediment Control policies (Policies 4.7.2.4(5)), 4.7.2.4(6), and/or 4.7.2.4(7)); and,**
- **the erosion susceptibility of existing *structures* or adjacent properties will not be impacted.**

Permitted *fill* placement, excavation and/or grade modifications may be seasonally restricted and subject to a specified time frame to enable stabilization/revegetation of the disturbed area.

4.5.4 SPECIFIC POLICIES TO PROHIBIT OR REGULATE DEVELOPMENT – UNSTABLE SOIL OR BEDROCK

The policies in this section are to be applied in conjunction with the General Policies in Section 4.3.

Identification of the Hazard Limit – Unstable Soil or Bedrock

4.5.4(1) **In cases where *development* is proposed within or adjacent to *hazardous lands* associated with unstable soil or unstable bedrock, KRCA will require that the applicant (or agent) provide appropriate technical reports identifying a more precise boundary associated with the limit of the unstable soil or bedrock to the satisfaction of KRCA.**

New *Development*

4.5.4(2) **New residential, commercial, industrial, institutional or agricultural *development* will not be permitted within *hazardous lands* associated with unstable soil or unstable bedrock, regardless of previous approvals provided under the Planning Act or other regulatory process (e.g., Building Code Act).**

***Replacement*/Relocation**

4.5.4(3) **The *replacement* or relocation of existing buildings or *structures* within *hazardous lands* associated with unstable soil or unstable bedrock may be permitted subject to the following:**

- **no feasible alternative exists to locate the building or *structure* outside of the *hazardous lands*; and,**

- **a technical site-specific study demonstrates that all hazards/risks associated with unstable soils or unstable bedrock have been adequately addressed.**

Accessory Buildings or Structures

4.5.4(4) ***Accessory buildings or structures*** **associated with an existing residential, commercial, industrial, institutional or agricultural use such as detached garages, tool sheds, gazebos and other similar** ***structures*** **or additions to existing** ***accessory buildings or structures*** **may be permitted within** ***hazardous lands*** **associated with unstable soil or unstable bedrock subject to the following:**

- **there is no feasible alternative to locate the building or** ***structure*** **outside of the** ***hazardous lands*****; and,**
- **a technical site-specific study demonstrates that all hazards/risks associated with unstable soils or unstable bedrock have been adequately addressed.**

Infrastructure

4.5.4(5) **Public infrastructure (e.g., roads, sewers, flood and/or erosion control works, water supply, etc.) and private infrastructure (e.g., roads, gas and electrical transmission pipelines/corridors, etc.) may be permitted to be constructed, realigned and/or upgraded within** ***hazardous lands*** **associated with unstable soil or bedrock when the location is supported through an approved** ***Environmental Assessment*** **and/or in the case of private infrastructure, it has been demonstrated through a** ***comprehensive plan*** **that there is no feasible alternative site outside the** ***hazardous lands*** **provided it can be demonstrated that:**

- **the proposed alignment minimizes encroachment into the hazard to the greatest extent possible;**
- **a more detailed site-specific study (i.e., a geotechnical study) consistent with the** ***Environmental Assessment*** **or** ***comprehensive plan*** **demonstrates how the risks to public safety and impacts to the hazard will be mitigated, if not included in the above-noted plan(s);**
- **the risk of** ***pollution*** **is minimized through site design to ensure that the** ***development*** **will not result in a** ***pollution*** **hazard (e.g., release of a biohazard substance, nutrients, pesticides or other chemicals during soil or bedrock failure); and,**
- **the large-scale placement of** ***fill*** **can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

4.5.4(6) **Access routes (e.g., driveways, private access roads, and entrance ways) associated with an existing residential, agricultural, commercial, industrial or institutional use may be permitted to be constructed within** ***hazardous lands*** **associated with unstable soil or bedrock provided it can be demonstrated through appropriate technical reports (e.g., geotechnical study) that:**

- ***inert fill material*** **will be used. The proponent may be required to provide proof of the origin and quality of the** ***fill material*** **ensure the control of** ***pollution*** **and the** ***conservation of land*** **is not adversely affected; and,**
- **the stability of existing** ***structures*** **or adjacent properties will not be impacted.**

***Fill* Placement, Excavation, and/or Grade Modifications**

4.5.4(7) ***Fill* placement, excavation, and/or grade modifications may be permitted within *hazardous lands* associated with unstable soil or bedrock where the works are: associated with existing access roads and driveways; required for the purpose of flood and/or erosion protection; and/or, to facilitate the installation of geothermal, and water and/or sewage treatment systems provided it can be demonstrated through appropriate technical reports (e.g., geotechnical study) that:**

- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* ensure the control of *pollution* and the *conservation of land* are not adversely affected;**
- ***fill* placement, excavation, and/or grade modifications required for erosion protection works along the water's edge, be in accordance with Erosion Protection, Shoreline/Bank Stabilization and Sediment Control policies (Policies 4.7.2.4(5)), 4.7.2.4(6), and/or 4.7.2.4(7)); and,**
- **the stability of existing *structures* or adjacent properties will not be impacted.**

Permitted *fill* placement, excavation and/or grade modifications may be seasonally restricted and subject to a specified time frame to enable stabilization/revegetation of the disturbed area.

4.6 WETLANDS AND AREAS OF INTERFERENCE

4.6.1 DEFINITION AND CONTEXT

*Wetland*s are important natural features on the landscape, whether they are permanently or seasonally wet. *Wetland*s perform many important *hydrologic* and *ecological functions*. In relation to the CA Act Section 28 regulation, *wetland*s moderate water flow by absorbing much of the surface water runoff from the land and then slowly releasing it, or moving surface water into the groundwater system. This helps to reduce flooding and to sustain *stream* flows during dry spells.

The areas surrounding *wetland*s where *development* could interfere with the *hydrologic function* of the *wetland* are called "*areas of interference*". These areas include lands that are 120 metres from the boundaries of provincially significant *wetland*s and other *wetland*s greater than or equal to 2 hectares or 30 metres from smaller, non-provincially significant *wetland*s, less than 2 hectares in size. These areas may be adjusted where detailed hydrologic studies define a more accurate and more precise *area of interference*.

Development within a *wetland* or an *area of interference* and activities that would interfere in any way with a *wetland* are regulated under the Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (O. Reg. 182/06).

KRCA interprets "interfere in any way" as any anthropogenic act or instance which hinders, disrupts, degrades, or impedes in any way the natural features or hydrologic and ecological functions of a wetland.

It is important to recognize that Ontario Regulation 182/06 applies to all wetlands.

Any development within a wetland or an area of interference and/or any activity that would interfere with a wetland requires permission from KRCA.

4.6.2 SPECIFIC POLICIES TO PROHIBIT OR REGULATE DEVELOPMENT AND INTERFERENCE – WETLANDS

The policies in this section are to be applied in conjunction with the General Policies in Section 4.3.

Proposals that would result in a harmful alteration, disruption or destruction (HADD) of fish habitat would require authorization from Fisheries and Oceans Canada. Habitat compensation is usually required.

***Wetland* Boundary and *Buffer* Identification**

4.6.2(1) **For *development* proposals where a *wetland* is present on or adjacent to lands subject to the *development* proposal, KRCA may require on-site *wetland* boundary delineation/staking. The boundary delineation shall be illustrated on a Reference Plan or Site Plan.**

4.6.2(2) **For *development* proposals within an *area of interference*, KRCA will require the maintenance of a wetland *buffer* of an appropriate width based on intended land use, site conditions and *wetland* type/sensitivity as determined by KRCA staff in consultation with the applicant guided by the following table (adapted from *Best Management Practices 15: Buffer Strips* developed by OMAFRA, 2004) and/or in accordance with the results of an *Environmental Impact Study*, where required:**

Function	*Buffer* Width
Bank and shore protection	5 metres
Some protection from sedimentation and contaminants	5 metres
Moderate protection from sedimentation and contaminants	15 metres
Better protection from sedimentation and contaminants	30 metres
Good protection from sedimentation and contaminants	50 metres

The applicability, width and vegetation composition of riparian buffers around wetlands vary depending on the potential impact (e.g., erosion, pollution) based on intended land use, site conditions (e.g., slope, vegetative characteristics, height of water table), and the sensitivity of the wetland type (e.g., fen, bog). Science indicates that appropriate buffer widths range from 5 metres to 300 metres. (How Much Habitat is Enough, 2nd Edition, Environment Canada, 2004 and Best Management Practices 15: Buffer Strips developed by OMAFRA, 2004). For example, smaller buffer widths may be effective in areas where the ground surface is relatively flat and composed of dense vegetation that can filter and attenuate runoff, depending on the intended land use and wetland type/sensitivity. However, a wetland at the bottom of a steep slope may be highly vulnerable to silt deposition and runoff. In these cases, larger buffer widths would be necessary.

Note: It is important to recognize the difference between wetland buffers and development setbacks specified in this section (also see Appendix A – Definitions). The width of an appropriate wetland buffer may vary from the width of the applicable setback (where specified). A setback is a defined physical separation that prohibits all development and/or site alteration and provides for protection against overall impacts. A buffer can vary in width depending on site circumstances and is generally applied to mitigate specific types of impacts (e.g., sedimentation and contamination). Setbacks and buffers are prescribed mitigation measures; setbacks do not vary from site to site, whereas buffers can be tailored to provide flexibility while maintaining protection of wetland function.

4.6.2.1 DEVELOPMENT WITHIN AND/OR INTERFERENCE WITH A WETLAND

New *Development*

4.6.2.1(1) **New *development* will not be permitted within a *wetland*, regardless of previous approvals provided under the Planning Act or other regulatory process (e.g., Building Code Act), except as outlined below.**

4.6.2.1(2) **On an existing *lot of record* where the current* zoning is appropriate to the nature of the proposed *development*, single residential *development* within a *wetland* may be permitted provided it can be demonstrated that:**

- **there is no feasible alternative site outside of the *wetland*;**
- **a technical site-specific study demonstrates to the satisfaction of KRCA that all hazards/risks associated with flooding and/or unstable soils have been adequately addressed;**
- **it can be demonstrated through an *Environmental Impact Study* that compensation will be accommodated resulting in "no net loss" of the *wetland* function while striving to achieve the principle of "net gain" and, where applicable, the maintenance of existing hydrologic and ecological linkages;**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

***Changes to the current zoning will not be supported by KRCA except where the policies contained in Chapter 3 can be satisfied.**

4.6.2.1(3) **New *development* may be permitted within a *wetland* to facilitate intensification (i.e., infill *development*) provided that:**

- **the *wetland* is not a bog or fen, or part of a provincially significant *wetland*;**
- **a technical site-specific study demonstrates to the satisfaction of KRCA that all hazards/risks associated with flooding and/or unstable soils have been adequately addressed;**
- **it can be demonstrated through an *Environmental Impact Study* that compensation will be accommodated resulting in "no net loss" of the *wetland* function while striving to achieve the principle of "net gain" and, where applicable, the maintenance of existing hydrologic and ecological linkages;**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

Land Conversion for Agricultural Activities

Note: Previously cultivated *buffer* areas around *wetlands* and small isolated wet lands that are not connected to a surface *watercourse* do not meet the definition of a *wetland* under the Conservation Authorities Act. A permit is not required for land conversion in these circumstances.

4.6.2.1(4) Conversion of land for agricultural purposes may be permitted where the *wetland* is disruptive to existing agriculture activity provided that:

- **the *wetland* is not a bog or fen, or part of a provincially significant w*etland*;**
- **there would be a benefit for conversion for agriculture purposes; and,**
- ***wetlands* that are portions of larger *wetlands* or connected to a surface *watercourse* will be subject to a compensation plan or offsetting plan acceptable to KRCA. This plan will demonstrate at a minimum "no net loss" and will strive to achieve the principle of "net gain".**

Agricultural Field Tile Drainage

4.6.2.1(5) The installation of agricultural field tile drainage in a manner inconsistent with the natural drainage grade surrounding a *wetland* may be permitted provided that:

- **it is not feasible to follow the natural drainage grade; and,**
- **a scoped *Environmental Impact Study* demonstrates that the *hydrologic function* of the *wetland* will be maintained and appropriate *best management practices* will be employed to control sediment and erosion.**

Note: It is normal practice for tile drainage to utilize the natural drainage grade as it is the most practical and economically feasible way of installing tile drainage. However, where agricultural field tile drainage would convey water in a manner inconsistent with the natural drainage grade surrounding a wetland, it is KRCA's opinion that it would have the potential to interfere with the wetland and therefore, be subject to Policy 4.6.2.1(4).

Conservation Activities

4.6.2.1(6) *Conservation activities* may be permitted within a *wetland* where it can be demonstrated that the *hydrologic* and *ecological function*s of the *wetland* will be maintained, *restore*d, or *enhance*d. An *Environmental Impact Study* to assess the impacts on the *hydrologic* and *ecological function*s of the *wetland* will be required if the submitted information does not demonstrate that:

- **based on documentation of existing *wetland* characteristics (e.g., *wetland* type, connectivity, size and dominant vegetation communities), there will be direct conservation benefits of the project (e.g., enhancement in *wetland* feature and/or function);**
- **there will be no impact on the functionality of any *watercourse*;**
- ***best management practices* including site and project design and appropriate remedial measures will be employed to mitigate disturbance; and,**
- **maintenance requirements will be minimized.**

Passive Low-Intensity Recreational Uses

4.6.2.1(7) Passive low-intensity recreational uses associated with public parks, outdoor recreation and education, trail systems or water access points may be permitted within a *wetland*

where an *Environmental Impact Study* demonstrates that appropriate *best management practices* and remedial measures will be employed to *mitigate* and/or compensate for *wetland* loss or interference with the natural features and *hydrologic* and *ecological functions*.

Infrastructure

4.6.2.1(8) **Public infrastructure (e.g., roads, sewers, flood and/or erosion control works, water supply, etc.) and private infrastructure (e.g., roads, gas and electrical transmission pipelines/corridors, etc.) may be permitted to be constructed, realigned and/or upgraded within a *wetland* when the location is supported through an approved *Environmental Assessment* and/or in the case of private infrastructure, it has been demonstrated through a *comprehensive plan* that there is no feasible alternative site outside the *wetland* provided it can be demonstrated that:**

- **the proposed alignment minimizes encroachment into the *wetland* to the greatest extent possible;**
- **a more detailed site-specific study (i.e., a scoped *Environmental Impact Study*) consistent with the *Environmental Assessment* or *comprehensive plan* is prepared. This study shall determine a more precise area *wetland* boundary in accordance with the current Provincial *Wetland* Evaluation System, and demonstrate that appropriate *best management practices* and remedial measures will be employed to *mitigate* and/or compensate for *wetland* loss or interference with the natural features and *hydrologic* and *ecological functions*;**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

4.6.2.1(9) **Private utilities (e.g., cable installations, fiberoptics, gas lines and connections, etc.) may be permitted to be installed within a *wetland* provided it can be demonstrated that:**

- **there is no feasible alternative to locate the utility outside of the *wetland*; and,**
- **site, facility, and/or landscape design and appropriate *best management practices* and remedial measures will be employed to *mitigate* and/or compensate for *wetland* loss or interference with the natural features and *hydrologic* and *ecological functions*.**

4.6.2.1(10) **Access routes (e.g., driveways, private access roads, and entrance ways) associated with an existing residential, agricultural, commercial, industrial or institutional use may be permitted to be constructed within a *wetland* provided that:**

- **there is no feasible alternative to locate the access route outside of the *wetland*; and,**
- **an *Environmental Impact Study* demonstrates that appropriate *best management practices* and remedial measures will be employed to *mitigate* and/or compensate for *wetland* loss or interference with the natural features and *hydrologic* and *ecological functions*.**

Municipal Drains and Drainage Ditches

4.6.2.1(11) **New drainage works approved pursuant to the Drainage Act may be permitted within a *wetland* provided that it has or can be demonstrated to the satisfaction of KRCA through an *Environmental Impact Study* that appropriate *best management practices* and**

remedial measures will be employed to *mitigate* and/or compensate for *wetland* loss or interference with the natural features and *hydrologic* and *ecological functions*.

4.6.2.1(12) **Maintenance of the functionality (e.g., bank stabilization, removal of accumulated sediment, etc. but does not include realignment, see Policy 4.7.2.4(1)) of existing agricultural drainage ditches within a *wetland* may be permitted provided it can be demonstrated that:**

- **all dredged material is placed at a suitable distance from the *wetland* or other natural hazard feature;**
- **site, facility, and/or landscape design and appropriate *best management practices* and remedial measures will be employed to *mitigate* and/or compensate for *wetland* loss or interference with the natural features and *hydrologic* and *ecological functions*; and,**
- **there will be no increase in size beyond that resulting from the volume of accumulated sediment removed.**

Organic Soil (Peat) Extraction

4.6.2.1(13) **No new organic soil (peat) extraction operations or expansion of existing organic soil (peat) extraction operations will be permitted within *wetlands*.**

4.6.2.2 DEVELOPMENT WITHIN AN AREA OF INTERFERENCE

***Development* Within 120 Metres of a *Wetland* Greater Than 2 Hectares or a designated Provincially Significant *Wetland*, or within 30 Metres of a *wetland* Less Than 2 Hectares:**

Previous Planning Approvals

4.6.2.2(1) **New *development* associated with existing residential, agricultural, commercial, industrial or institutional use with previous approvals provided under the Planning Act or other regulatory process (e.g., Building Code Act) proposed within an *area of interference* will be subject to policy requirements identified within this section (i.e., 4.6.2.2) and the General Policies outlined in Section 4.3 that may not have been considered in previous approvals.**

New *Development*

4.6.2.2(2) **New residential or structural agricultural *development* within 120 metres of a *wetland* greater than 2 ha in size or a designated provincially significant *wetland* on an existing *lot(s) of record* where the principle of *development* has previously been established may be permitted provided that:**

- ***development* will be *setback* from the *wetland* boundary by at least 30 metres, where feasible;**
- **disturbed area and soil compaction will be minimized;**
- **impervious areas will be minimized;**
- **it can be demonstrated through site review or an *Environmental Impact Study* that there will be no adverse impact on the *hydrologic function* of the *wetland*;**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**

- ***best management practices*** **will be employed to:**
  - **maintain water balance;**
  - **control sediment and erosion; and,**
  - **maintain or *enhance* a *wetland buffer* in accordance with Policy 4.6.2(2).**

4.6.2.2(3) **New *development* on vacant land associated with an existing commercial or industrial use and/or *development* into the water table may be permitted within 120 metres of a *wetland* greater than 2 ha in size or a designated provincially significant w*etland* provided that:**

- ***development*** **will be *setback* from the *wetland* boundary by at least 30 metres;**
- **it can be demonstrated through an *Environmental Impact Study* that there will be no adverse impact on the *hydrologic function* of the *wetland*;**
- ***inert fill material*** **will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* ensure the control of *pollution* and the *conservation of land* are not adversely affected;**
- **the large-scale placement of fill can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline; and,**
- **a *wetland buffer* will be *maintained* or *enhanced* in accordance with Policy 4.6.2(2).**

4.6.2.2(4) **New residential or structural agricultural *development* may be permitted within 30 metres of a *wetland* less than 2 ha in size on an existing *lot(s) of record* where the principle of *development* has previously been established and where it is not feasible to locate the *development* at least 30 metres away from the *wetland* boundary provided that:**

- **disturbed area and soil compaction will be minimized;**
- **impervious areas will be minimized;**
- **it can be demonstrated through site review or an *Environmental Impact Study* that there will be no adverse impact on the *hydrologic function* of the wetland;**
- ***inert fill material*** **will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- ***best management practices*** **will be employed to:**
  - **maintain water balance;**
  - **control sediment and erosion; and,**
  - **maintain or *enhance* a *wetland buffer* in accordance with Policy 4.6.2(2).**

4.6.2.2(5) **New *development* associated with an existing commercial or industrial use may be permitted within 30 metres of a *wetland* less than 2 ha in size on an existing *lot(s) of record* where the principle of *development* has previously been established and where it is not feasible to locate the *development* at least 30 metres away from the *wetland* boundary provided that:**

- **it can be demonstrated through an *Environmental Impact Study* that there will be no adverse impact on the *hydrologic function* of the *wetland*;**
- ***inert fill material*** **will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**

- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

Expansion/*Reconstruction*/Relocation

4.6.2.2(6) **Expansion, *reconstruction* or relocation of an existing building or *structure* within an *area of interference* may be permitted provided that there will be no adverse impact on the *hydrologic function* of the *wetland*. An *Environmental Impact Study* to assess the impacts on the *hydrologic function* of the *wetland* will not be required if the submitted plans demonstrate the following:**

- **disturbed area and soil compaction will be minimized;**
- **impervious areas will be minimized;**
- ***development* will be located above the high water table;**
- **overall existing drainage patterns will be maintained;**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline; and,**
- ***best management practices* will be employed to:**
  - **maintain water balance;**
  - **control sediment and erosion; and,**
  - **maintain or *enhance* a *wetland buffer* in accordance with Policy 4.6.2(2).**

Accessory Buildings or Structures

4.6.2.2(7) ***Accessory buildings or structures* associated with an existing residential, agricultural, commercial or industrial use may be permitted within an *area of interference* provided that there will be no adverse impact on the *hydrologic function* of the *wetland*. An *Environmental Impact Study* to assess the impacts on the *hydrologic function* of the *wetland* will not be required if the submitted plans demonstrate the following:**

- **disturbed area and soil compaction will be minimized;**
- **impervious areas will be minimized;**
- ***development* will be located above the high water table;**
- **overall existing drainage patterns will be maintained; and,**
- ***best management practices* will be employed to:**
  - **maintain water balance;**
  - **control sediment and erosion; and,**
  - **maintain or *enhance* a *wetland buffer* in accordance with Policy 4.6.2(2).**

Infrastructure

4.6.2.2(8) **Public infrastructure (e.g., roads, sewers, flood and/or erosion control works, water supply, etc.) and private infrastructure (e.g., roads, gas and electrical transmission pipelines/corridors, etc.) may be permitted to be constructed, realigned, and/or upgraded within an *area of interference* when the location is supported through an approved *Environmental Assessment* and/or in the case of private infrastructure, it has been demonstrated through a *comprehensive plan* that there is no feasible alternative site outside the *area of interference* provided that:**

- **the proposed alignment minimizes encroachment into the *area of interference* to the greatest extent possible;**
- **a more detailed site-specific study (i.e., an *Environmental Impact Study*) consistent with the *Environmental Assessment* or *comprehensive plan* is prepared. This study shall determine a more precise area *wetland* boundary in accordance with the current Provincial *Wetland* Evaluation System, and demonstrate that appropriate *best management practices* and remedial measures will be employed to *mitigate* the impact on and/or compensate for the loss of the *hydrologic function* of the *wetland*;**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- **the large-scale placement of *fill* can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

4.6.2.2(9) **Access routes (e.g., driveways, private access roads, and entrance ways) associated with an existing residential, agricultural, commercial, industrial or institutional use may be permitted to be constructed within an *area of interference* provided that provided that there will be no adverse impact on the *hydrologic function* of the *wetland* and *inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* to ensure the control of *pollution* is not impacted. An *Environmental Impact Study* to assess the impacts on the *hydrologic function* of the *wetland* will not be required if the submitted plans demonstrate the following:**

- **disturbed area and soil compaction will be minimized;**
- **impervious areas will be minimized;**
- **overall existing drainage patterns will be maintained; and,**
- ***best management practices* will be used to:**
  - **maintain water balance;**
  - **control sediment and erosion; and,**
  - **maintain or *enhance* a *wetland buffer* in accordance with Policy 4.6.2(2).**

Conservation Activities

4.6.2.2(10) ***Conservation activities* may be permitted within an *area of interference* where it can be demonstrated that the *hydrologic function* of the *wetland* will be maintained, *restored*, or *enhanced*. An *Environmental Impact Study* to assess the impacts on the *hydrologic function* of the *wetland* will not be required if the submitted information demonstrates the following:**

- **based on documentation of existing *wetland* characteristics (e.g., *wetland* type, connectivity, size and dominant vegetation communities), there will be direct conservation benefits of the project (e.g., enhancement in *wetland* function);**
- **maintenance requirements will be minimized; and,**
- ***best management practices* will be employed to control sediment and erosion.**

Passive Low-Intensity Recreational Uses

4.6.2.2(11) **Passive low-intensity recreational uses associated with public parks, outdoor recreation and education, trail systems or water access points may be permitted within an *area of interference* provided that there will be no adverse impact on the *hydrologic function* of the *wetland*. An *Environmental Impact Study* to assess the impacts on the *hydrologic function* of the *wetland* will not be required if the submitted information demonstrates the following:**

- **disturbed area and soil compaction will be minimized;**
- **impervious areas will be minimized;**
- **natural materials that integrate with the existing natural features and processes (bio-engineering) will be utilized;**
- **overall existing drainage patterns will be maintained; and,**
- ***best management practices* will be employed to:**
  - **ensure *hydrologic* connectivity;**
  - **control sediment and erosion; and,**
  - **maintain or *enhance* a *wetland buffer* in accordance with Policy 4.6.2(2).**

Organic Soil (Peat) Extraction

4.6.2.2(12) **Organic soil (peat) extraction operations may be permitted within an *area of interference* where it can be demonstrated through an *Environmental Impact Study* that there will be no adverse impact on the *hydrologic function* of the *wetland*.**

Ponds and Municipal Drains

4.6.2.2(13) **New *dug-out* or *isolated ponds** and new drainage works approved pursuant to the Drainage Act may be permitted within an *area of interference* provided that:**

- **it can be demonstrated through site review or an *Environmental Impact Study* that there will be no adverse impact on the *hydrologic function* of the *wetland*; and,**
- ***best management practices* will be employed to:**
  - **maintain water balance;**
  - **control sediment and erosion; and,**
  - **maintain or *enhance* a *wetland buffer* in accordance with Policy 4.6.2(2).**

4.6.2.2(14) **Enlargement of an existing *dug-out* or *isolated pond** located within an *area of interference* may be permitted where it can be demonstrated that the enlargement can satisfy Policy 4.6.2.2(13).**

***Ponds for the specific purpose of watering livestock would not be subject to Policy 4.6.2.2(13) or Policy 4.6.2.2(14) as they are not regulated by KRCA.**

Stormwater Management Facilities

4.6.2.2(15) Stormwater management facilities for water quantity control and/or water quality purposes may be permitted within an *area of interference* provided that:

- **all structural components and actively managed components of the stormwater management facility are located outside of the *wetland*;**
- **a detailed study (e.g., scoped *Environmental Impact Study*) demonstrates that there will be no adverse effect on the *hydrologic function* of the *wetland*;**
- **a *wetland buffer* will be *maintained* or *enhanced* in accordance with Policy 4.6.2(2);**
- **natural erosion and sedimentation processes within the receiving *wetland* and/or downstream *watercourse* are not impacted;**
- **finished side slopes are stable;**
- **design and maintenance performance requirements are met as set out in provincial standards or in certain circumstances, as determined by KRCA to achieve water quality targets determined through *watershed* and *subwatershed* plans; and,**
- ***pollution* and sedimentation during construction and post construction are minimized using *best management practices* including site and facility design, construction controls, and appropriate remedial measures.**

Golf Courses

4.6.2.2(16) Golf courses or golf course expansions may be permitted within an *area of interference* provided that:

- **it can be demonstrated through an *Environmental Impact Study* that there will be no adverse impact on the *hydrologic function* of the *wetland*;**
- **a *wetland buffer* will be *maintained* or *enhanced* in accordance with Policy 4.6.2(2);**
- **natural erosion and sedimentation processes within the *wetland* are not impacted;**
- **the risk of *pollution* from the application of fertilizers, herbicides, pesticides or insecticides or other chemical or organic compounds is mitigated and addressed in a turf management plan; and,**
- ***pollution* and sedimentation during construction and post construction are minimized using *best management practices* including site and facility design, construction controls, and appropriate remedial measures.**

Fill Placement, Excavation and/or Grade Modifications

4.6.2.2(17) ***Fill*** **placement, excavation and/or grade modifications may be permitted within an** ***area of interference*** **where the works are: associated with existing access roads and driveways; required for the purpose of flood and/or erosion protection; and/or, to facilitate the installation of geothermal, water and/or sewage treatment systems provided that there will be no adverse impact on the** ***hydrologic function*** **of the** ***wetland*** **and** ***inert fill material*** **will be used. The proponent may be required to provide proof of the origin and quality of the** ***fill material*** **to ensure the control of** ***pollution*** **is not impacted. An** ***Environmental Impact Study*** **to assess the impacts on the** ***hydrologic function*** **of the** ***wetland*** **will not be required if the submitted plans demonstrate the following:**

- **disturbed area and soil compaction will be minimized;**
- **impervious areas will be minimized;**
- ***fill*** **placement, excavation, and/or grade modifications required for erosion protection works along the water's edge, be in accordance with Erosion Protection, Shoreline/Bank Stabilization and Sediment Control policies (Policies 4.7.2.4(5)), 4.7.2.4(6), and/or 4.7.2.4(7));**
- **all excavation will be located above the high water table, with the exception of excavation required to install a geothermal system;**
- **overall existing drainage patterns will be maintained;**
- ***inert fill material*** **will be used. The proponent may be required to provide proof of the origin and quality of the** ***fill material*** **ensure the control of** ***pollution*** **and the** ***conservation of land*** **are not adversely affected; and,**
- ***best management practices*** **will be used to:**
  - **maintain water balance;**
  - **control sediment and erosion; and,**
  - **maintain or** ***enhance*** **a** ***wetland buffer*** **in accordance with Policy 4.6.2(2).**

4.6.2.2(18) ***Fill*** **placement, excavation and/or grade modifications required for large-scale fill operations associated with agricultural, commercial, industrial, or multiple residential developments may be permitted within an** ***area of interference*** **provided that:**

- **it can be demonstrated through an** ***Environmental Impact Study*** **that there will be no adverse impact on the** ***hydrologic function*** **of the** ***wetland*****;**
- **a** ***wetland buffer*** **will be** ***maintained*** **or** ***enhanced*** **in accordance with Policy 4.6.2(2);**
- ***inert fill material*** **will be used. The proponent may be required to provide proof of the origin and quality of the** ***fill material*** **ensure the control of** ***pollution*** **and the** ***conservation of land*** **are not adversely affected; and,**
- **the large-scale placement of** ***fill*** **can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

Permitted fill placement, excavation and/or grade modifications may be seasonally restricted and subject to a specified time frame to enable stabilization/revegetation of the disturbed area.

4.7 RIVERS, CREEKS, STREAMS OR WATERCOURSES

4.7.1 DEFINITION AND CONTEXT

Watercourses are dynamic, living systems with complex processes that are constantly undergoing change. The structure and function of *watercourses* are influenced by channel morphology, sediment characteristics (soil type, bedrock, and substrate characteristics) and the nature of riparian vegetation both on the overbank and rooted in the bed of the *watercourse*. Any changes to one of these influences can have significant impacts on other parts of the system and in turn, impair the function of the *watercourse*. One of the key influences on the structure and function of the *watercourse* is related to the hydrology of the *stream* and its normal hydrograph – changes in the volume, peaks and timing of flows can significantly impact the channel morphology, sediment transport and even the riparian vegetation.

The *riparian zone* not only provides habitat for a wide range of flora and fauna but also filters surface run-off before it reaches open waterways. As run-off passes through, the *riparian zone* retains excess nutrients, some pollutants and reduces the sediment flow. A healthy zone can also keep *stream* flow going even during the dry seasons, by holding and releasing groundwater back into the *stream*. This interface between terrestrial and aquatic environments acts as a sponge for storing water, which in turn helps to reduce flooding and shelters the banks against shoreline erosion.

Alterations to the channel or shoreline of a *watercourse* can negatively impact the *hydrologic function* of the watercourse and ultimately, the control of flooding and erosion. For example, changes to channel morphology reduce the ability of the *watercourse* to process sediment causing erosion and changing the amount or size of bed load being moved. Loss of riparian vegetation can result in more pollutants and run-off being transported from the land to the water, impacting water quality and flooding downstream reaches.

In general, KRCA discourages altering or interfering with the channel or shoreline of a *river*, *creek*, *stream* or *watercourse*. We recognize that some uses by their nature must locate within or adjacent to *river*, *creek*, *streams* or *watercourses* and furthermore, that channel or shoreline alterations may be necessary to facilitate existing agricultural uses (e.g., channel realignment to square off agricultural field). Any alteration to the channel or shoreline of a *river*, *creek*, *stream* or *watercourse* requires permission from KRCA. This includes activities such as, but not limited to, culvert placement or *replacement*, bridge construction, installation of bed level crossings, *enclosure* of *watercourses*, installation or maintenance of pipeline crossings, cable crossings, maintenance of by-pass, connected or online ponds, straightening and diversions as well as any work on the bed or the banks of the *watercourse* such as dredging or bank protection projects.

Note: Applicants and their agents should be advised that where any in-water or near-water works are being proposed, there may be restrictions relating to the timing of activities (e.g. seasonal restrictions) that may be required by MNR, Fisheries and Oceans Canada (DFO), and PC along the TSW.

4.7.2 SPECIFIC POLICIES TO PROHIBIT OR REGULATE STRAIGHTENING, CHANGING, DIVERTING, OR INTERFERING WITH THE EXISTING CHANNEL OF A RIVER, CREEK, STREAM OR WATERCOURSE

The policies in this section are to be applied in conjunction with the General Policies in Section 4.3.

Proposals that would result in a harmful alteration, disruption or destruction (HADD) of fish habitat would require authorization from Fisheries and Oceans Canada. Habitat compensation is usually required.

4.7.2.1 STRUCTURES

Crossings

4.7.2.1(1) Crossings include but are not limited to: bridges, culverts and causeways, and may be permitted to be constructed, replaced and/or upgraded as follows:

- **in the case of new public infrastructure, all feasible alternative sites and alignments have been considered through an approved *Environmental Assessment*, where applicable, or in the case of replacements and/or upgrades, the crossing design is engineered through site-specific studies;**
- **in the case of private infrastructure, all feasible alternative sites and alignments have been considered and, crossing design engineered through site-specific studies with the possible exception of temporary crossings based on the structural scale and scope, and the purpose of the temporary crossing;**

and, where it can be demonstrated that:

- **crossings avoid any bends in the *watercourse* to the extent practical;**
- **crossings are located to take advantage of existing impacted or open areas on the channel bank or *valley* slope, wherever possible;**
- **crossing *structures* avoid the *erosion hazard* in order to accommodate natural *watercourse* movement;**
- **the risk of flood damage to upstream or downstream properties is reduced through site and crossing design;**
- **interference with *watercourse* functionality (e.g., water quality control, water conveyance, etc.) is minimized and it can be demonstrated that *best management practices* including site and crossing design and appropriate remedial measures will mitigate disturbance to features and functions;**
- **physical realignments or alterations to the *river*, *creek*, *stream* or *watercourse* channel associated with a new crossing are avoided or are in accordance with Policy 4.7.2.4(1); and,**
- **maintenance requirements are minimized.**

4.7.2.1(2) Bed-level crossings may be permitted to be constructed, replaced and/or upgraded where it can be demonstrated that:

- **stable, non-erodible, rounded inorganic *material* (e.g., river rock) is used;**
- **crossings avoid any bends in the *watercourse* to the extent practical;**
- **crossings are located to take advantage of existing impacted or open areas on the channel bank or *valley* slope, wherever possible;**

- **the risk of flood damage to upstream or downstream properties is reduced through site and *structure* design;**
- **there is no inhibition of conveyance of flow;**
- **physical realignments or alterations to the *river*, *creek*, *stream* or *watercourse* channel associated with a new crossing are avoided or are in accordance with the channelization policies that follow;**
- **maintenance requirements are minimized; and,**
- **where the crossing is temporary, the site will be restored to its former condition.**

Note: Culvert replacements of the same length and diameter would be subject to KRCA's Streamlined Review and Approval Process (refer to Policy 4.2.2(1)).

Water Control *Structures*

4.7.2.1(3) **Water control *structures* to: protect existing *development* from a *flooding hazard* OR facilitate approved renewable energy generation projects (for water control *structures* associated with *conservation activities* refer to Policy 4.7.2.2(1)) may be permitted to be constructed, maintained and/or repaired subject to the following:**

- **the water management benefits of the water control *structure* are demonstrated and all feasible alternatives considered through an approved *Environmental Assessment*, or other *comprehensive plan* that is supported by KRCA, whichever is applicable based on the scale and scope of the project;**
- **there will be no *adverse hydraulic or fluvial impacts*; and.**
- **impacts on *watercourse* functionality (e.g., water quality control, water conveyance, etc.) are avoided or it can be demonstrated that *best management practices* including site and *structure* design and appropriate remedial measures will mitigate and/or compensate for disturbance to features and functions.**

4.7.2.1(4) **Water control *structures* for any purpose other than that identified in Policy 4.7.2.1(3) will not be permitted within the channel of a *river*, *creek*, *stream* or *watercourse*.**

MNR is responsible for the approval of dams under the LRIA. Furthermore, dams are subject to various other pieces of legislation and regulations (e.g., GEA and REA Regulation).

Alterations and/or Maintenance of Existing Water Control *Structures*

4.7.2.1(5) **Alterations and/or maintenance of existing water control *structures* may be permitted where it can be demonstrated that:**

- **impacts on *watercourse* functionality (e.g., water quality control, water conveyance, etc.) are avoided or that site and *structure* design and appropriate remedial measures will mitigate and/or compensate for disturbance to features and functions;**
- **there are no adverse impacts on the capacity of the *structure* to pass flows; and,**
- **the integrity of the original *structure* is maintained or improved.**

4.7.2.1(6) **Notwithstanding the above, where the alteration/maintenance will not affect the footprint or height of the existing water control *structure* and in the opinion of KRCA, would not affect the control of flooding, erosion, *pollution* or the *conservation of land***

and would not result in changes to the capacity to pass *river* flows or impact on the integrity of the *structure* or in-water works, a permit will not be required.

4.7.2.1(7) **Decommissioning of *dam*s which are structurally unsound or no longer serve their intended purpose, located within a *river*, *stream*, *creek* or *watercourse* may be permitted provided a decommissioning plan demonstrates, at a minimum, that:**

- **impacts on *watercourse* functionality (e.g., water quality control, water conveyance, etc.) will be avoided or that site and *structure* design and appropriate remedial measures will mitigate and/or compensate for disturbance to features and functions; and,**
- **the risk of *pollution* and sedimentation during and after retirement or removal is addressed through a draw down plan.**

Infrastructure

4.7.2.1(8) **Public infrastructure (e.g., roads, sewers, flood and/or erosion control works, water supply, etc.) and private infrastructure (e.g., roads, gas and electrical transmission pipelines/corridors, etc.) may be permitted to be constructed, realigned, and/or upgraded within a *watercourse* where the location is supported through an approved *Environmental Assessment* and/or in the case of private infrastructure, it has been demonstrated through a *comprehensive plan* that there is no feasible alternative site outside the *watercourse* provided that:**

- **the proposed alignment minimizes encroachment into the *watercourse* to the greatest extent possible;**
- **a more detailed site-specific study (i.e., an *Environmental Impact Study*) consistent with the *Environmental Assessment* or *comprehensive plan* is prepared. This study shall demonstrate that appropriate *best management practices* and remedial measures will be employed to *mitigate* the impact on and/or compensate for the loss of *watercourse* functionality (e.g., water quality control, water conveyance, etc.);**
- ***inert fill material* will be used. The proponent may be required to provide proof of the origin and quality of the *fill material* ensure the control of *pollution* and the *conservation of land* are not adversely affected; and,**
- **the large-scale placement of fill can satisfy the provisions outlined in Appendix O – Large Fill Procedural Guideline.**

4.7.2.1(9) **Private utilities (e.g., cable installations, fiberoptics, gas lines and connections, etc.) may be permitted to be installed within a *watercourse* provided that interference with *watercourse* functionality (e.g., water quality control, water conveyance, etc.) is minimized and it can be demonstrated that *best management practices* including site and infrastructure design and appropriate remedial measures will mitigate disturbance to features and functions.**

Docking Facilities

4.7.2.1(10) **Multiple docking facilities may be permitted to be constructed, replaced and/or upgraded provided it can be demonstrated that:**

- **the *structure* does not impede the flow of water;**
- **the *structure* is firmly anchored and attached to the shoreline;**

- **the *structure* does not alter the natural contour of the shoreline;**
- **access points are centralized and minimized;**
- **access points and the *structure* are located in such a manner to take advantage of existing impacted or open areas along the shoreline, wherever possible;**
- **any electrical components will be floodproofed to an elevation of 0.3 metre above the *regulatory flood* elevation in accordance with floodproofing standards outlined in Appendix L – Floodproofing Guidelines; and,**
- **there is no impact on near-shore littoral processes,**

KRCA may require the submission of a technical site-specific assessment to evaluate the impact on near-shore littoral processes.

4.7.2.2 CONSERVATION ACTIVITIES

Conservation Activities

4.7.2.2(1) ***Conservation activities* (e.g., stream rehabilitation) may be permitted within a *watercourse* provided that *watercourse* functionality (e.g., water quality control, water conveyance, etc.) will be maintained, *restored*, or *enhanced*. An *Environmental Impact Study* to assess the impacts on the *watercourse* will be required if the submitted information does not demonstrate that:**

- **based on documentation of existing *watercourse* characteristics (e.g., thermal regime, substrate type, fish communities), there will be direct conservation benefits of the project (e.g., enhancement in *watercourse* feature and/or function);**
- **there will be no *watercourse* channel or bank realignment;**
- ***best management practices* including site and project design and appropriate remedial measures will be employed to minimize disturbance;**
- **natural channel design practices will be followed; and,**
- **maintenance requirements will be minimized.**

4.7.2.3 PONDS

Ponds exist for many reasons, such as recreation, irrigation, livestock watering, landscaping and aquaculture. This section applies to these types of ponds but not to stormwater management ponds, *headwater* ponds constructed for the purpose of generating hydroelectricity (see Policies 4.7.2.1(3) and 4.7.2.1(4)), or ponds associated with *conservation activities* (see Policy 4.7.2.2(1)).

New Ponds

4.7.2.3(1) **KRCA will not support the construction of ponds that are directly connected to a *watercourse* (i.e., in-stream ponds, bypass ponds, etc.).**

Existing Ponds

4.7.2.3(2) **Bank alterations and/or dredging of existing connected ponds may be permitted provided that:**

- **impacts on the functionality of the pond and the receiving *river*, *creek*, *stream* or *watercourse* (e.g., water quality control, water conveyance) are avoided or it can be demonstrated that *best management practice*s including project design and appropriate remedial measures will mitigate and/or compensate for disturbance to features and functions;**
- **the pond will be disconnected from the *watercourse*, where feasible;**
- **there is no negative impact on the downstream thermal regime; and,**
- **any excavated material is removed from the hazard area.**

4.7.2.4 CHANNEL OR SHORELINE ALTERATIONS

Realignment, Channelization, or Straightening

4.7.2.4(1) **Realignment, channelization and/or straightening of a *river*, creek, *stream* or *watercourse* is generally discouraged, but may be permitted in instances that: would improve hydraulic characteristics and fluvial processes including the facilitation of works approved pursuant to the Drainage Act; accommodate infill *development*; facilitate on-going operations associated with existing agricultural use; improve aquatic habitat or water quality; and/or facilitate public infrastructure projects (e.g., highway construction or reconstruction), provided that:**

- **all feasible alternative alignments have been considered through an approved *Environmental Assessment*, or though site-specific studies supported by KRCA, whichever is applicable based on the scale and scope of the project;**
- ***watercourse* functionality (e.g., water quality control, water conveyance, etc.) is maintained;**
- **there will be no *adverse hydraulic or fluvial impacts* on *rivers*, *creeks*, *streams*, *watercourses* or *lakes*. Engineered hydraulic analyses may be required, at the discretion of the Authority, to demonstrate that this condition has been met; and,**
- **natural channel design practices are followed to the maximum extent possible.**

Enclosures

4.7.2.4(2) ***Enclosure*s of *river*s, creeks, *stream*s or *watercourse*s are discouraged, but may be permitted where there is a risk to public safety and/or potential property damage and where a site specific study demonstrates that:**

- **all feasible options and methods have been explored to address the hazard(s);**
- **impacts on *watercourse* functionality (e.g., water quality control, water conveyance, etc.) are minimized and it can be demonstrated that *best management practice*s including project design and appropriate remedial measures will mitigate and/or compensate for disturbance to features and functions; and,**
- **there is no negative impact on the downstream thermal regime.**

Dredging

4.7.2.4(3) ***Dredging* of an existing channel of a *river*, *creek*, *stream* or *watercourse* may be permitted to maintain boating or shipping channels (e.g., harbours, marinas, canals), enhance water flow in the case of agricultural drainage ditches*, improve hydraulic characteristics and fluvial processes or to improve aquatic habitat or water quality where a *dredging plan* demonstrates that:**

- **stream bank stability is not impacted or is improved;**
- **the size and depth of the area proposed for dredging while meeting the need is minimized;**
- **the *dredging* will not result in a *pollution* hazard (e.g., release of contaminated sediments);**
- **impacts on *watercourse* functionality (e.g., water quality control, water conveyance, etc.) are minimized and it can be demonstrated that *best management practice*s including project design and appropriate remedial measures will mitigate and/or compensate for disturbance to features and functions; and,**
- **all dredged material is removed from the hazard area.**

*** In some instances, agricultural drainage ditches do not convey water regularly or continuously and therefore, are not considered to be *watercourses* under the Conservation Authorities Act. In these instances, their maintenance would not be subject to Ontario Regulation 182/06 and would not require written permission from KRCA.**

Where it is reasonable to believe that the dredgate could be contaminated, KRCA may require testing to ensure that disturbance of the sediment will not result in a *pollution* hazard.

Shoreline Excavation

4.7.2.4(4) **Excavating the shoreline for any purpose will not be permitted, with the exception of excavation works required for erosion protection, shoreline/bank stabilization or sediment control OR single residential water access points in accordance with the following policies.**

Erosion Protection, Shoreline/Bank Stabilization and Sediment Control

4.7.2.4(5) **New and/or *replacement* of erosion protection and shoreline/bank stabilization measures may be permitted where there is a demonstrated erosion or bank instability problem resulting in property loss and/or risk to public safety subject to the following:**

- **shoreline/bank stabilization will employ *best management practices* that utilize natural materials that integrate with the existing natural features and processes (bio-engineering);**
- **impacts on *watercourse* functionality (e.g., water quality control, water conveyance, etc.) are minimized; and,**
- **the works will result in a naturally stable slope (normally, no steeper than 3:1 (horizontal: vertical) slope ratio).**

OR

- **where a qualified engineer demonstrates in writing that erosion protection is necessary and, if a bio-engineering solution is not appropriate, that there is a requirement for an engineered solution to the erosion problem, hardened surfaces (e.g., retaining walls) may be considered.**

4.7.2.4(6) **Repair/maintenance of existing erosion protection and shoreline/bank stabilization *structures* may be permitted. When considering repair/maintenance, proponents are encouraged to replace existing hardened shoreline surfaces with bio-engineered solutions.**

4.7.2.4(7) **Installation, repair and/or maintenance of sediment control *structures* to protect existing *development* (e.g., check *dams*, coffer dams, sediment traps, etc.) may be permitted within a *river*, *creek*, *stream* or *watercourse* channel where it can be demonstrated that:**

- **erosion risk on adjacent, upstream and/or downstream properties is reduced or erosion and sedimentation processes are controlled to reduce existing or potential impacts from adjacent land uses, whichever is appropriate; and,**
- **intrusions on *watercourse* functionality (e.g., water quality control, water conveyance, etc.) are minimized, and it can be demonstrated that *best management practices* including site and *structure* design and appropriate remedial measures mitigate and/or compensate for disturbance features and functions.**

Single Residential Water Access Points

4.7.2.4(8) **Installation of a single water access point (e.g., set of stairs leading into the water) may be permitted for an existing waterfront *lot of record* provided it can be demonstrated that:**

- **stable, non-erodible, inorganic *material* (e.g., armourstone, natural stone) is used;**
- **the access point is located in such a manner to take advantage of existing impacted or open areas along the shoreline, wherever possible;**
- **the maximum width of the access point does not exceed 1.8 metres;**
- **maintenance requirements are minimized; and,**
- **where there is an associated boathouse or dock, the access point shall be situated adjacent to the boathouse or dock, wherever feasible.**

Appendix A – Definitions

Access (ingress/egress) - For the purposes of this manual refer to ***Safe access (ingress/egress)*** definition.

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

Accepted Scientific Principles - Current principles, methods and procedures which are used and applied in disciplines including but not limited to geology, geomorphology, hydrology, botany, and zoology, and that would be judged by a peer group of qualified specialists and practitioners (by virtue of their qualifications, training and experience), as being reasonable for the scale and type of project being considered, the sensitivity of the locations, and the potential threats to life and property.

Accessory Building or Structure - A use or a building or structure that is subordinate and exclusively devoted to a main use, building or structure and located on the same lot.

Adjacent Lands - Lands contiguous to a specific natural heritage feature or area where it is likely that development or site alteration would have a negative impact on the feature or area. The extent of the adjacent lands may be recommended by the Province or based on municipal approaches which achieve the same objectives (adapted from Provincial Policy Statement, 2005).

Adverse Hydraulic and Fluvial Impacts - Flood elevations are not increased, flood and ice flows are not impeded and the risk of flooding to and erosion on adjacent upstream and/or downstream properties is not increased.

Anthropogenic - Created by a human.

Aquifer - An underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, silt or clay).

Areas of Interference - Other areas where development could interfere with the hydrologic function of a wetland; within 120 metres of provincially significant wetlands and wetlands greater than or equal to 2 ha in size or within 30 metres of wetlands less than 2 ha in size.

At capacity lake trout lake – An inland lake on the Canadian Shield which has been identified by the Ministry of Natural Resources as a "lake trout lake" and determined to be at capacity for shoreline development based on Provincial criteria related to the level of dissolved oxygen (i.e., dissolved oxygen criterion of 7 milligrams per litre as threshold) (adapted from Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)).

Backwater Area - A section of watercourse with an elevation that is increased above the normal because of a downstream human-made obstruction such as a narrow bridge opening or culvert that restricts natural water flow.

Balanced Cut and Fill - All fill placed at or below the flood elevation balanced with an equal amount of soil material removal within a defined reach of a watercourse.

Bankfull Width - 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.

Best Management Practices (BMPs) - Methods, facilities and structures which are designed to protect or improve the environment and natural features and functions from the effects of development or interference.

Buffers - An area or band of permanent vegetation, preferably consisting of native species, located adjacent to a natural heritage feature and usually bordering lands that are subject to development or site alteration. The purpose of the buffer is to protect the feature and its function(s) by mitigating the impacts of the proposed land use and allowing an area for edge phenomena to continue (adapted from Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)). The vegetation within a buffer can be managed (e.g., trimmed, cut, thinned, but not cultivated) providing that the integrity of the buffer remains intact.

Comprehensive Plan - A study or plan undertaken at a landscape scale such as a watershed/subwatershed plan, an Environmental Assessment (federal, provincial, or municipal servicing plan), a detailed Environmental Implementation Report that has been prepared to address and document various alternatives and is part of a joint and harmonized planning or Environmental Assessment process, or a community plan that includes a comprehensive Environmental Impact Study.

Confined Valley (River or Stream) System - A watercourse located within a valley corridor, either with or without a floodplain, and is confined by valley walls. The watercourse may be located at the toe of the valley slope, in close proximity to the toe of the valley slope (less than 15 m) or removed from the toe of the valley slope (more than 15 m). The watercourse can contain perennial, intermittent or ephemeral flows and may range in channel configuration, from seepage and natural springs to detectable channels.

Conservation Activities - Projects intended to maintain, enhance, or restore the functions of a wetland, or to create a wetland where one did not exist previously. Projects and activities can include for example: plantings, wetland creation or alteration, landscaping, grading, hydrologic manipulation, and invasive species removal.

Conservation of Land - The management of land resources (soil and related plant life) such that its environmental integrity is not adversely affected (i.e., the integrity of valley systems).

Creek – A natural stream of water normally smaller than, and often tributary to a river.

Cumulative Effects - The combined effects of all activities in an area over time and the incremental effects associated with individual project in an area over time.

Dam - A structure or work holding back or diverting water, and including a dam, tailings dam, dyke, diversion, channel, artificial channel, culvert or causeway (Lakes and Rivers Improvement Act, R.S.O. 1990 c. L3, s. 1).

Development - As defined by the Conservation Authorities Act:

- the construction, reconstruction, erection or placing of a building or structure of any kind;
- 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;
- site grading; or,
- the temporary or permanent placing, dumping or removal of material, originating on the site or elsewhere.

Development - as defined by the Provincial Policy Statement means the creation of a new lot, a change in land use, or the construction of buildings or structures, requiring approval under the Planning Act, but does not include:

- activities that create or maintain infrastructure authorized under an environmental assessment process;
- works subject to the Drainage Act; or,
- underground or surface mining or minerals or advanced exploration on mining lands in significant areas of mineral potential in Ecoregion 5E, where advanced exploration has the same meaning as under the Mining Act.

Drainage Area - The area that contributes runoff to a point.

Dredging Plan - A report prepared to address the potential impacts of dredging on natural features and ecological functions. At a minimum, dredging plans shall include the following:

- statement of purpose;
- dimensions and volume calculations;
- operational details (e.g., timing);
- sediment and erosion control plan;
- edge/bank stabilization details;
- assessment of potential impact on fish and fish habitat*; and,
- dredgate quality confirmation and deposition plan*.

*Not required for routine maintenance projects (e.g., road side ditch or municipal drain maintenances, existing wet slip dredging, etc.).

Dug-out or Isolated Ponds - Anthropogenic waterbodies that are created by excavating basins with no inlet or outlet channels and in which surface and ground water collect.

Dwelling unit - A suite operated as a housekeeping unit, used or intended to be used as a domicile by one or more persons and usually containing cooking, eating, living, sleeping and sanitary facilities.

Ecological Function - The natural processes, products or services that living and non-living environments provide or perform within or between species, ecosystems and landscapes. These may include biological, physical and socio-economic interactions.

Ecosystem - Systems of plants, animals and micro-organisms together with non-living components of their environment, related ecological processes and humans.

Effective Flow Area - That part of a river, stream, creek or watercourse where there are significant flow velocities and most of the flow discharge is conveyed.

Emergency Works - Situations where there is deemed an imminent threat of pollution, injury to persons, loss of life, or loss of property and are unexpected occurrences.

Enclosure - A pipe or other conduit for carrying a creek, stream or watercourse underground.

Endangered Species **(federal)** - A wildlife species that is facing imminent extirpation or extinction, listed in Schedule 1 of the Species at Risk Act as updated and amended from time to time, by order in council (adapted from Species at Risk Act, 2002).

Endangered Species **(provincial)** - A species that is listed or categorized as an "Endangered Species" (i.e., a native species facing extinction or extirpation) on the Ministry of Natural Resources' official Species at Risk in Ontario list, as updated and amended from time to time (adapted from Provincial Policy Statement, 2005).

Enhance - In the context of wetlands and wetland buffers, means the altering of an existing functional wetland to increase or improve selected functions and benefits.

Environmental Assessment - A process that is used to predict the environmental, social and economic effects of proposed initiatives before they are carried out. It is used to identify measure to mitigate adverse effects on the environment and can predict whether there will be significant adverse environmental effects, even after the mitigation is implemented.

Environmental Impact Study - A report prepared to address the potential impacts of development or interference on natural features and ecological functions. There are three types:

- a Comprehensive Environmental Impact Study is a landscape scale, watershed or subwatershed study which sets the width of setbacks and offers guidance for the investigation, establishment and maintenance of buffers.
- a Scoped Environmental Impact Study is an area or site-specific study that addresses the potential negative impacts to features described previously in a comprehensive study.
- a Full Environmental Impact Study is an area or site-specific study prepared, in the absence of a comprehensive study to address possible impacts from a development. Due to the lack of guidance from a comprehensive study, the full EIS is typically much more detailed than a scoped study, and will also include statements to address possible negative impacts at a regional scale.

Erosion Access Allowance - A 6 metre development setback applied to the erosion hazard for confined (apparent) and unconfined (not apparent) river or stream systems. The erosion access allowance is applied to provide for emergency access to erosion prone areas, provide for construction access for regular maintenance and access to the site in the event of an erosion event or failure of a structure, and, provide for protection against unforeseen or predicted external conditions which could have an adverse effect on the natural conditions or processes acting on or within an erosion prone area.

Erosion Hazard - The loss of land, due to human or natural processes, that poses a threat to life and property. The erosion hazard limit associated with confined river and stream systems is determined using considerations that include an allowance for toe erosion, an allowance for slope stability, and an allowance for access. The erosion hazard limit associated with unconfined river and stream systems is determined using considerations that include the flooding hazard limit or the meander belt width, whichever is greater, plus an allowance for access.

Existing Use - The type of activity associated with an existing building or structure or site on the date of a permit application.

Factor of Safety - The ratio of average available strength of the soil along the critical slip surface to that required to maintain equilibrium. The design minimum factors of safety are provided by the Ministry of Natural Resources' Technical Guide – River & Stream Systems: Erosion Hazard Limit (2002). The higher factor of safety is used in complex geotechnical conditions or where there are geologically metastable materials.

Fill - Includes earth, sand, gravel, rubble, rubbish, garbage, or any other matter whether similar to or different from any of the aforementioned materials, whether originating on the site or elsewhere, used or capable of being used to raise, lower, or in any way effect the existing grade (does not include herbaceous or woody plant material).

Fish - means fish, which as defined in S.2 of the Fisheries Act, c. F-14, as amended, includes fish, shellfish, crustaceans and marine animals, at all stages of their life cycles (Provincial Policy Statement, 2005).

Fish Habitat - As defined in the Fisheries Act, c.F-14, means 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 (Provincial Policy Statement, 2005).

Flooding Hazard - The limits of an area of inundation under a flood resulting from the rainfall experienced during the Timmins storm (1961) or the 100-year flood, whichever is greater.

Floodplain - The area, usually low lands, adjoining a river, stream or small inland lake system, which has been or may be subject to flooding hazards.

Floodway - As defined by the Provincial Policy Statement for river, stream and small inland lake systems, means the portion of the floodplain where development and site alteration would cause a danger to public health and safety or property damage. For the KRCA watershed, the entire floodplain is considered to be the floodway.

Frequent flooding - A site that is subject to the 1:25 year flood event or a more frequent flood event.

Habitable Floor Space - Any area that has the potential to be used as or converted to residential living space, including basements.

Hazardous Lands - As defined by the Conservation Authorities Act, means land that could be unsafe for development because of naturally-occurring processes associated with flooding, erosion, dynamic beaches, or unstable soil or bedrock.

Hazardous Lands - As defined by the Provincial Policy Statement, means property or lands that could be unsafe for development due to naturally occurring processes. Along the shorelines of the Great Lakes - St. Lawrence River System, this means the land, including that covered by water, between the international boundary, where applicable, and the furthest landward limit of the flooding hazard, erosion hazard or dynamic beach hazard limits. Along the shorelines of large inland lakes, this means the land, including that covered by water, between a defined offshore distance or depth and the furthest landward limit of the flooding hazard, erosion hazard or dynamic beach hazard limits. Along river, stream and small inland lake

systems, this means the land, including that covered by water, to the furthest landward limit of the flooding hazard or erosion hazard limits.

Hazardous Sites - As defined by the Provincial Policy Statement, means property or lands that could be unsafe for development and site alteration due to naturally occurring hazards. These may include unstable soils (sensitive marine clays (leda), organic soils) or unstable bedrock (karst topography).

Hazardous Substances - Substances which individually or in combination with other substances, are normally considered to pose a danger to or threat to public health, safety and the environment. These substances generally include a wide range of materials that are toxic, ignitable, corrosive, reactive, radioactive or pathological.

Headwater - The source and extreme upper reaches of a river, creek, stream or watercourse.

Hydrologic Function - The functions of the hydrologic cycle that include the occurrence, circulation, distribution and chemical and physical properties of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere, and water's interaction with the environment including its relation to living things.

Hydrologic Study - A report prepared to address the potential impacts of development and interference on the hydrologic functions of a wetland or other natural feature.

Inert - In the context of fill means earth or rock fill or waste of a similar nature that contains no putrescible materials or soluble or decomposable chemical substances.

Karst - An area of irregular limestone in which erosion has produced fissures, sinkholes, underground streams, and caverns.

Lake – A permanent body of relatively still water (compared to rivers or streams) greater than 2 hectares in size contained within a defined depression in the ground surrounded by land. Most lakes are fed and drained by rivers or streams.

Lot of Record - A lot that has been severed from a larger parcel which has not yet been developed.

Material - Includes earth, sand, gravel, stone or woody debris (e.g., root wads, fascines).

Meander Belt Allowance - A limit for development within the areas where the river system is likely to shift. It 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 section of the stream.

Meander Belt Axis - The line or "axis" that the meander belt is centred over which connects all the riffle sections of a stream.

Meander Belt - The area of land in which a watercourse channel moves or is likely to move over a period of time. It is generally considered 20 times of bankfull channel width at riffles in the reach.

Mitigate - To prevent, modify, or alleviate impacts (negative) on the natural environment. Mitigation also includes any action intended to enhance beneficial effects (modified from Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)).

Multi-lot - Four lots or more.

Multi-unit means any building or structure or portion thereof that contains more than one unit for any use (e.g., a residential Dwelling unit, an industrial/commercial/institutional space designed or intended to be occupied or used for business, commercial, industrial or institutional purposes).

Natural Heritage Features - Features and areas including all wetlands, significant woodlands, significant valleylands, fish habitat, significant habitat of endangered and threatened species, significant wildlife habitat, and significant areas of natural and scientific interest, which are important for their environmental and social values as a legacy of the natural landscapes of an area; part of an ecologically functional corridor or linkage between natural areas; or, any other features or areas that are considered ecologically important in terms of contributing to the quality and diversity of an identifiable geographic area or natural heritage system.

Negligible - Not measurable or too small or unimportant to be worth considering.

Normal High-Water Mark - The usual or average level to which a body of water rises at its highest point and remains for a sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the "active channel/bankful level" which is often the one to two year flood flow return level. For inland lakes, it refers to those parts of the waterbody bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominantly aquatic vegetation to terrestrial vegetation (excepting water tolerant species). Along the Trent-Severn Waterway lakes, the Upper Controlled Navigation Limit is deemed to be the high-water mark.

One Hundred Year Flood Event (100-year flood) - 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 per cent during any given year.

One Hundred Year Erosion Rate - The predicted lateral movement of a river, creek, stream or watercourse or inland lake over a period of one hundred years.

Other Water-related Hazards - Water-associated phenomena other than flooding hazards and wave uprush which act on shorelines. This includes, but is not limited to ship-generated waves, ice piling and ice jamming.

Oversteepened Slope - A slope which has a slope inclination equal to or greater than 33 1/3 per cent (3H:1V).

Pollution - Any deleterious physical substance or other contaminant that has the potential to be generated by development.

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

Qualified Professional - A person with specific qualifications, training, and experience authorized to undertake work in accordance with the policies in accepted engineering or scientific principles, provincial standards, criteria and guidelines, and/or to the satisfaction of the KRCA.

Regulated Area - Those areas within the jurisdiction of the KRCA defined in Ontario Regulation 182/06.

Regulatory Flood - The inundation under a flood resulting from the rainfall experienced during the Timmins Storm (1961) or the 100-year flood, wherever it is greater, the limits of which define the flooding hazard. The following table provides regulatory flood elevations for the Trent-Severn Waterway lakes within the KRCA watershed. Elevations for connecting waterways may be available on a case-by-case basis. Where the limit of a flooding hazard has not been determined through an engineering analysis, KRCA sets the regulatory flood elevation at one metre above the normal high-water mark.

Trent-Severn Waterway Lake	**Regulatory Flood Elevation (100-year flood) in mASL (metres above sea level)**
Balsam Lake	256.5
Cameron Lake	255.7
Lake Scugog	250.9
Pigeon Lake	246.9
Sturgeon Lake	248.4

Replacement - The removal of an existing building or structure and the construction of a new building or structure. Replacement does not include reconstruction on remnant foundations or derelict or abandoned buildings or structures.

Riffle - A section of shallow rapids where the water surface is broken by small waves.

River - A large natural stream of water emptying into an ocean, lake, or other body of water and usually fed along its course by converging tributaries.

Restore - In the context of wetlands means the re-establishment or rehabilitation of a former or degraded wetland with goal of returning natural or historic functions and characteristics that have been partially or completely lost by such actions as filling or draining.

Riparian Vegetation - The plant communities in the riparian zone, typically characterized by hydrophilic plants.

Riparian Zone - The interface between land and a flowing surface water body. Riparian is derived from Latin ripa meaning river bank.

Safe Access (Ingress/Egress) - The standards and procedures currently applied in engineering practice associated with providing safe passage for vehicles and people during an emergency situation as a result of flooding, erosion, the failure of floodproofing and/or erosion protection works, that have been reviewed and approved by the Conservation Authority and/or the Ministry of Natural Resources. KRCA looks to the most conservative criteria set out in the Ministry of Natural Resources' Technical Guide – River & Stream Systems: Flooding Hazard Limit (2002), and Technical Guide – River & Stream Systems: Erosion Hazard Limit (2002), to determine safe access. See section (6) Vehicular Access in Appendix L – Floodproofing Guidelines for detailed criteria with respect to flooding hazards.

Setback - A physical separation. Setbacks form boundaries by establishing an exact distance from a fixed point, such as a property line, an adjacent structure, or a natural feature, within which development and/or site alteration is prohibited.

Settlement Area - Urban areas and rural settlement areas within municipalities that are:

- built up areas where development is concentrated and which have a mix of land uses; and,
- lands which have been designated in an official plan for development over the long term planning horizon.

Significant wildlife habitat - Those areas that are ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system (Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)).

Stage-Storage Discharge Relationship - The relationship of flood storage and flood elevation values at various flood flow rates within a particular watercourse/floodplain reach. This relationship is used as a factor to determine whether the hydraulic function of the floodplain is preserved.

Stream - A flow of water in a channel or bed, as a brook, rivulet, or small river.

Structure - Is that which is constructed to contain, convey, hold-back and/or support, comprised of a combination of multiple related parts, elements or constituents.

Thermal Impact - The impairment of water quality through temperature increase or decrease. Changes in temperature can also effect species composition of plants, insects and fish in a water body.

Threatened Species **(federal)** - A wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction, listed in Schedule 1 of the Species at Risk Act as updated and amended from time to time by order in council (adapted from Species at Risk Act, 2002).

Threatened Species **(provincial)** - A species that is listed or categorized as a "Threatened Species" (i.e., a native species at risk of becoming endangered in Ontario) on the Ministry of Natural Resources' official Species at Risk in Ontario list as updated and amended from time to time (adapted from Provincial Policy Statement, 2005).

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

Top of Slope - The point of the slope where the downward inclination of the land begins, or the upward inclination of the land levels off. This point is situated at a higher topographic elevation of land than the remainder of the slope.

Upper Controlled Navigation Limit - Is the upper limit of the navigation range, which is defined by the regulated minimum and maximum water levels on each Trent-Severn Waterway lake (excepting Lake Simcoe and Couchiching).

Trent-Severn Waterway Lake	**Upper Controlled Navigation Limit in mASL (metres above sea level)**
Balsam Lake	256.19
Cameron Lake	255.04
Lake Scugog	249.92
Pigeon Lake	247.76
Sturgeon Lake	246.08

Unconfined Valley (River or Stream) System - A watercourse is not located within a valley corridor with discernable slopes, but within relatively flat to gently rolling plains and is not confined by valley walls. The watercourse can contain perennial, intermittent or ephemeral flows and may range in channel configuration, from seepage and natural springs to detectable channels.

Valley or Valleyland - Land that has depressional features associated with a river or stream, whether or not it contains a watercourse.

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

Watershed - An area that is drained by a river and its tributaries.

Wave Uprush - The rush of water up onto a shoreline or structure following the breaking of a wave; the limit of wave uprush is the point of furthest landward rush of water onto the shoreline.

Wetland - As defined by the Conservation Authorities Act, 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).

Wetland - As defined by the Provincial Policy Statement, means lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. In either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic plants or water tolerant plants. The four major types of wetlands are swamps, marshes, bogs and fens.

Wildlife Habitat - Areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory or non-migratory species.

Appendix B – List of Acronyms

AAP	Agricultural Advisory Panel
ANSI	Area of Natural and Scientific Interest
AR Act	Aggregate Resources Act
CA	Conservation Authority
CA Act	Conservation Authorities Act
CEAA	Canadian Environmental Assessment Act
CFSA	Crown Forest Sustainability Act
CO	Conservation Ontario
CWA	Clean Water Act
DART	Drainage Act and Section 28 Regulation Team
DFO	Department of Fisheries and Oceans Canada
EA Act	Environmental Assessment Act
EPA	Environmental Protection Act
ESA	Endangered Species Act
GEA	Green Energy Act (Green Energy and Green Economy Act)
HADD	Harmful Alteration, Disruption or Destruction
KRCA	Kawartha Region Conservation Authority
LRIA	Lakes and Rivers Improvement Act
LSPA	Lake Simcoe Protection Act
LSPP	Lake Simcoe Protection Plan
LSRCA	Lake Simcoe Region Conservation Authority
MEI	Ministry of Energy and Infrastructure
MLC	Mining and Lands Commissioner
MMAH	Ministry of Municipal Affairs and Housing
MNR	Ministry of Natural Resources
MOE	Ministry of the Environment
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NGO	Non-governmental Organization
NWPA	Navigable Waterways Protection Act
ODWSP	Ontario Drinking Water Stewardship Program
OMAFRA	Ontario Ministry of Agriculture, Food and Rural Affairs
OMB	Ontario Municipal Board
OMLC	Office of the Mining and Lands Commissioner
ORCA	Otonabee Region Conservation Authority
ORMCA	Oak Ridges Moraine Conservation Act
ORMCP	Oak Ridges Moraine Conservation Plan
OWRA	Ontario Water Resources Act
PC	Parks Canada
PLA	Public Lands Act
PPS	Provincial Policy Statement
REA	Renewable Energy Approval
SARA	Species at Risk Act
TSW	Trent-Severn Waterway

Appendix C – Conversions (Metric to Imperial)

Table C-1: Lot Creation Setbacks and Watercourse Buffers (New Development)

Feature	Setback (Metric)	Setback (Imperial)	Resource/Reference
Confined Valley Systems	6 metres from stable top of slope or predicted long term stable slope	~ 20 feet	Ministry of Natural Resources' Technical Guide – River & Stream Systems: Erosion Hazard Limit (2002)
Unconfined Valley Systems	6 metres from maximum extent of flooding hazard limit or predicted meander belt width	~ 20 feet	Ministry of Natural Resources' Technical Guide – River & Stream Systems: Erosion Hazard Limit (2002)
Fish Habitat (lakes, ponds (other than human-made-off-stream ponds), rivers and streams (including agricultural and municipal surface drains), headwaters and intermittent streams, wetlands, seasonally flooded areas)	120 metres OR 300 metres in the case of at capacity lake trout lakes	~394 feet ~984 feet	Provincial Policy Statement (2005) and Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010).
Provincially Significant Wetlands	120 metres	~ 394 feet	Provincial Policy Statement (2005) and Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)
Significant Woodlands	120 metres	~ 394 feet	Provincial Policy Statement (2005) and Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)
Significant Valleylands	120 metres	~ 394 feet	Provincial Policy Statement (2005) and Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)
Provincially Significant Life Science Areas of Natural & Scientific Interest	120 metres	~ 394 feet	Provincial Policy Statement (2005), Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)
Provincially Significant Earth Science Areas of Natural & Scientific Interest	50 metres	~ 164 feet	Provincial Policy Statement (2005) and Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)
Significant Wildlife Habitat	120 metres	~ 394 feet	Provincial Policy Statement (2005) and Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)

Water Feature	Fish Habitat Buffer (Metric)	Fish Habitat Buffer (Imperial)	Reference
Trent-Severn Waterway Lakes and Connecting Rivers	30 metres from the Upper Controlled Navigation Limit	~ 98 feet	Provincial Policy Statement (2005) and Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)
All other Lakes	30 metres from normal high-water mark	~ 98 feet	Provincial Policy Statement (2005) and Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)
Watercourses in the Oak Ridges Moraine	30 metres from meander belt	~ 98 feet	Oak Ridges Moraine Conservation Plan (2001)
Watercourses in the Protected Countryside of the Greenbelt	30 metres from the outside boundary	~98 feet	Greenbelt Plan (2005)
All other watercourses	Meandering stream with defined bed/banks = 30 metres from line connecting each outside curve/concave bank at bankfull stage	~ 98 feet	Provincial Policy Statement (2005) and Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010)
	Non-meandering stream with defined bed/banks = 30 metres from normal high-water mark	~ 98 feet	
	Intermittent stream or drainage feature with no defined bed/banks (including headwater drainage feature) = 30 metres from centerline of channel/depression that concentrates flow.	~ 98 feet	
Wetlands and seasonally flooded areas	30 metres from the edge of open water	~98 feet	Provincial Policy Statement (2005), Ministry of Natural Resources' Natural Heritage Reference Manual, 2nd Edition (2010), Greenbelt Plan (2005) and Oak Ridges Moraine Conservation Plan (2001)

Table C-2: Regulated Allowance associated with Regulated Feature (O. Reg. 182/06)

Hazard	Regulated Allowance (metric)	Regulated Allowance (imperial)
Apparent River or Stream Valley with Stable Slopes	15 metres from the limit of the stable top of slope	~ 49 feet
Apparent River or Stream Valley with Unstable Slopes	15 metres from the limit of the predicted long term stable top of slope, taking into consideration stable slope allowance and toe erosion allowance	~ 49 feet
Not Apparent River or Stream Valley	15 metres from the greater of the maximum extent of the floodplain or the predicted meander belt width	~ 49 feet
Flooding Hazard	n/a unless associated with a river or stream valley that is not apparent, in which case the regulated allowance is 15 metres from the maximum extent of the floodplain	n/a unless associated with a river or stream valley that is not apparent, in which case the regulated allowance is ~ 49 feet from the maximum extent of the floodplain
Erosion Hazard	n/a unless associated with a river or stream valley that is not apparent, in which case the regulated allowance is 15 metres from the predicted meander belt width	n/a unless associated with a river or stream valley that is not apparent, in which case the regulated allowance is ~ 49 feet from the predicted meander belt width
Wetland	Wetlands >/= 2ha: 120 metres (area of interference) Wetlands < 2 ha: 30 metres (area of interference)	~ >/= 5 acres: ~ 394 feet ~ < 5 acres: ~ 98 feet
Unstable Soil or Bedrock	n/a	n/a
River, Creek, Stream or Watercourse	n/a	n/a

Table C-3: Development Restrictions under Regulation Policies (building or structure size, hazard protection (e.g., floodproofing), hydrologic function protection (e.g., buffer))

Feature	Development	Restriction (metric)	Restriction (imperial)
Flooding Hazard	New residential, commercial or industrial buildings or structures, where permitted	Floodproofed to an elevation of 0.3 metre above regulatory flood elevation	~ 1 foot
	Minor residential additions	Maximum footprint of 50% of the original ground floor area or 46.5 metres^2, whichever is less	~ 500 feet2
		Floodproofed to an elevation of 0.3 metre above regulatory flood elevation	~ 1 foot
	Residential replacement	Floodproofed to an elevation of 0.3 metre above regulatory flood elevation	~ 1 foot
	Residential relocation	Floodproofed to an elevation of 0.3 metre above regulatory flood elevation	~ 1 foot

	Minor agricultural additions	Maximum footprint of 50% of the original ground floor area or 100 metres^2, whichever is less	~ 1076 feet2
	Minor commercial or industrial additions	Maximum footprint of 50% of the original ground floor area or 100 metres^2, whichever is less	~ 1076 feet2
		Floodproofed to an elevation of 0.3 metre above regulatory flood elevation	~ 1 foot
	Commercial, industrial or institutional replacement	Floodproofed to an elevation of 0.3 metre above regulatory flood elevation	~ 1 foot
	Commercial, industrial or institutional relocation	Floodproofed to an elevation of 0.3 metre above regulatory flood elevation	~ 1 foot
	Accessory buildings or structures (existing use)	Maximum footprint of 46.5 metres^2 for settlement or shoreline areas Maximum footprint of 100 metres^2 for rural areas	~ 500 feet2 ~ 1076 feet2
	On-shore boathouses	Maximum footprint of 80 metres^2	~ 861 feet2
	Parking lots and access routes (existing use)	Depth of flooding not to exceed 20 centimetres	~ 8 inches
Erosion Hazard	All development	Setback by at least 6 metres from: the projected stable top of slope for apparent unstable valleys OR the greater of the floodplain or predicted meander belt width for not apparent valleys	~ 20 feet
Wetland Allowance (Area of Interference)	Accessory buildings or structures (existing use)	Maximum footprint of 46.5 metres^2 for settlement or shoreline areas Maximum footprint of 100 metres^2 for rural areas	~ 500 feet2 ~ 1076 feet2
	All development	Natural vegetative buffer depending on site conditions, intended land use, and wetland type/sensitivity (unless otherwise determined through an Environmental Impact Study): 5 metres 15 metres 30 metres 50 metres	 ~16 feet ~ 49 feet ~ 98 feet ~ 164 feet
River, Creek, Stream or Watercourse	In-water boathouses	Maximum footprint of 80 metres^2	~ 861 feet2
	Water access points	Maximum width of 1.8 metres	~6 feet

Appendix D – Mapping

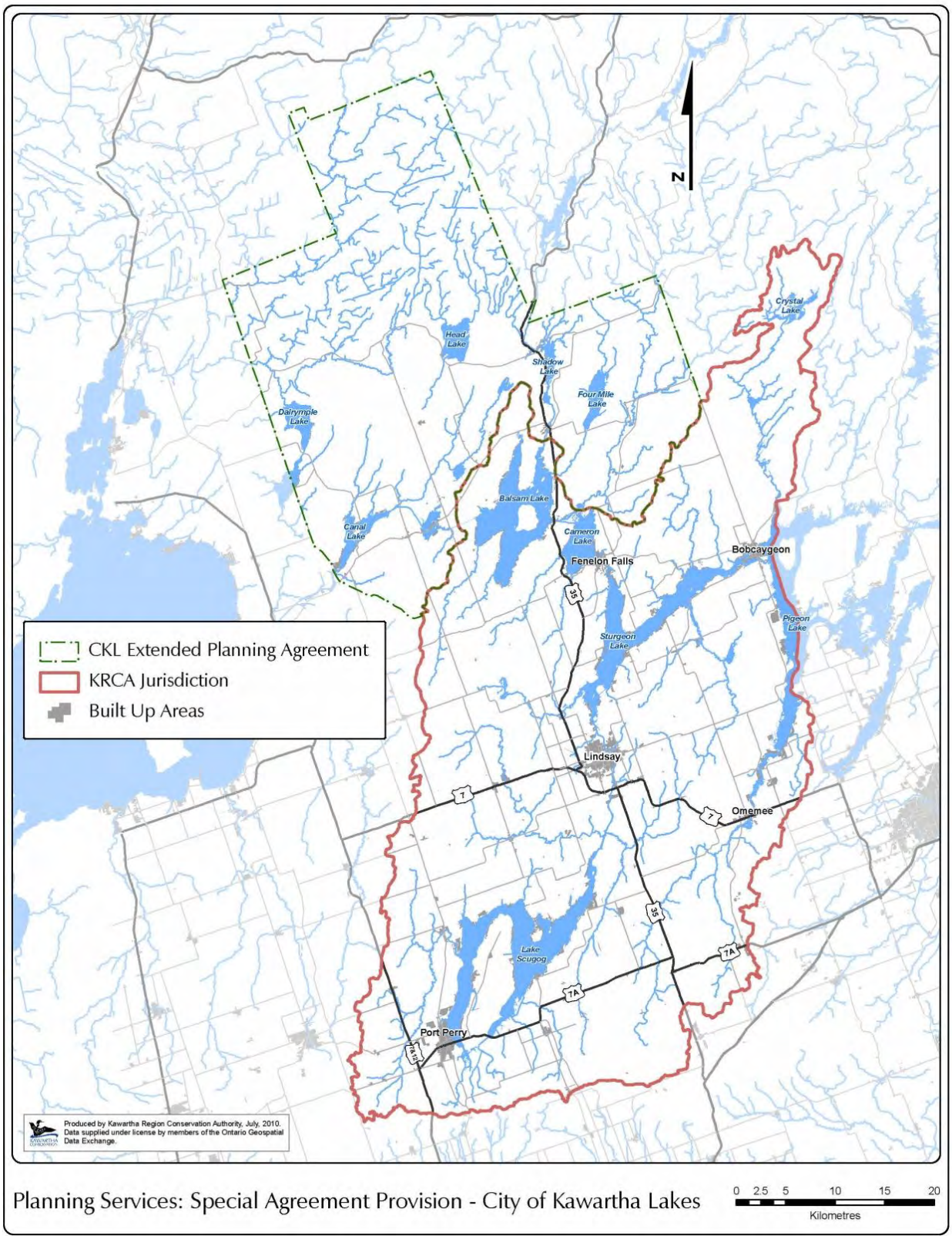


Figure D-1: KRCA Planning Services Boundary

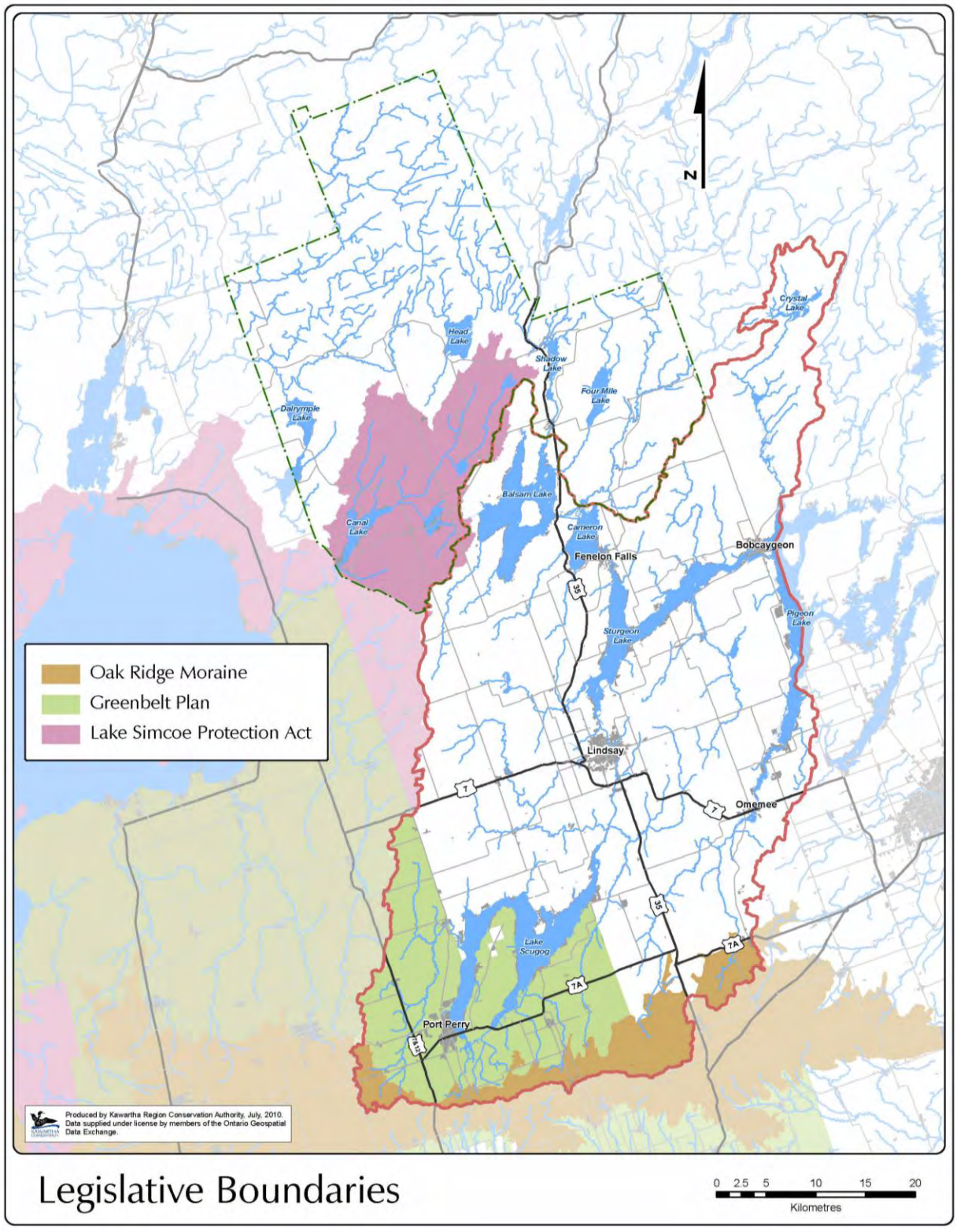


Figure D-2: Provincial Planning Legislative Boundaries

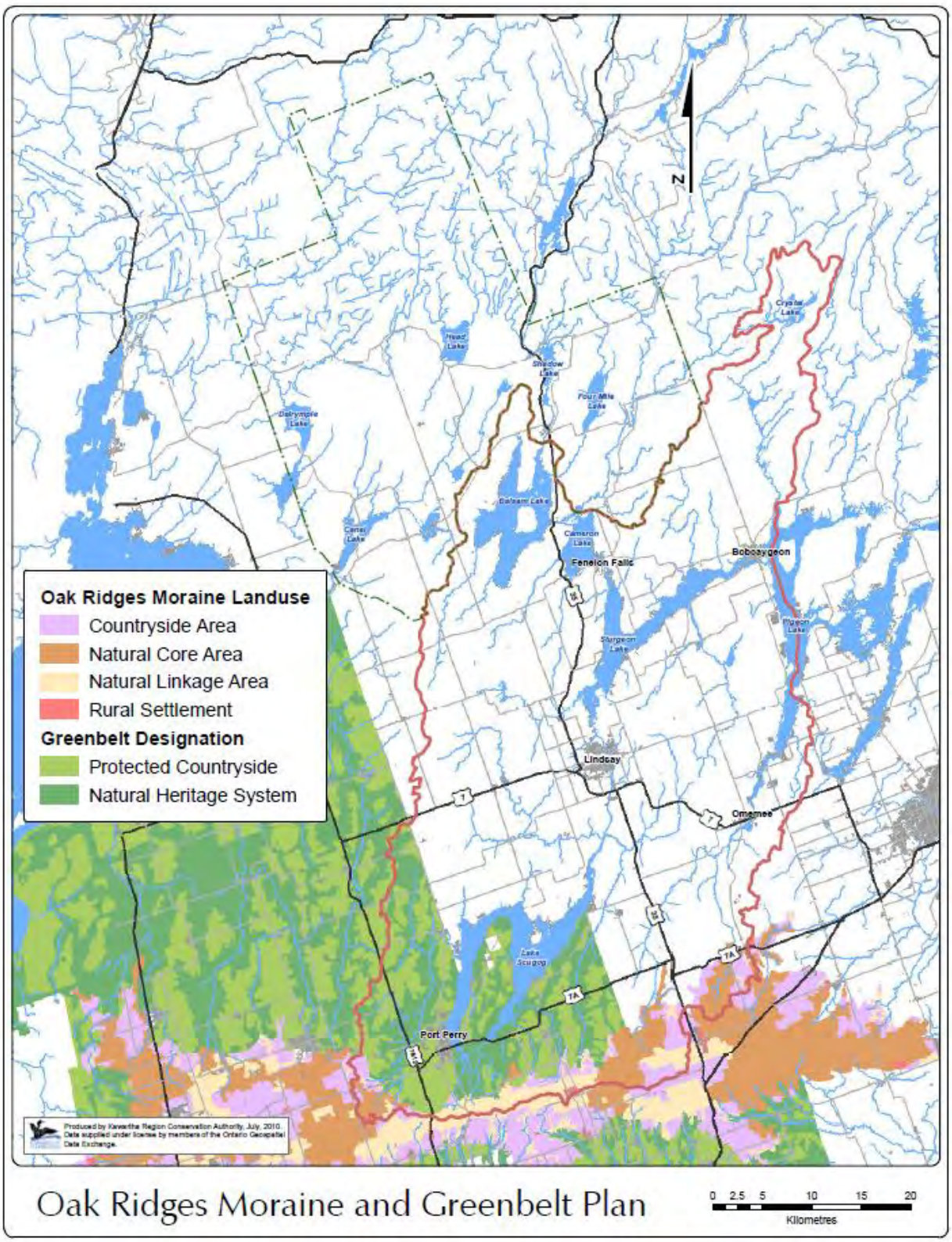


Figure D-3: Oak Ridges Moraine Conservation Plan and Green Belt Plan – Land Use Designation

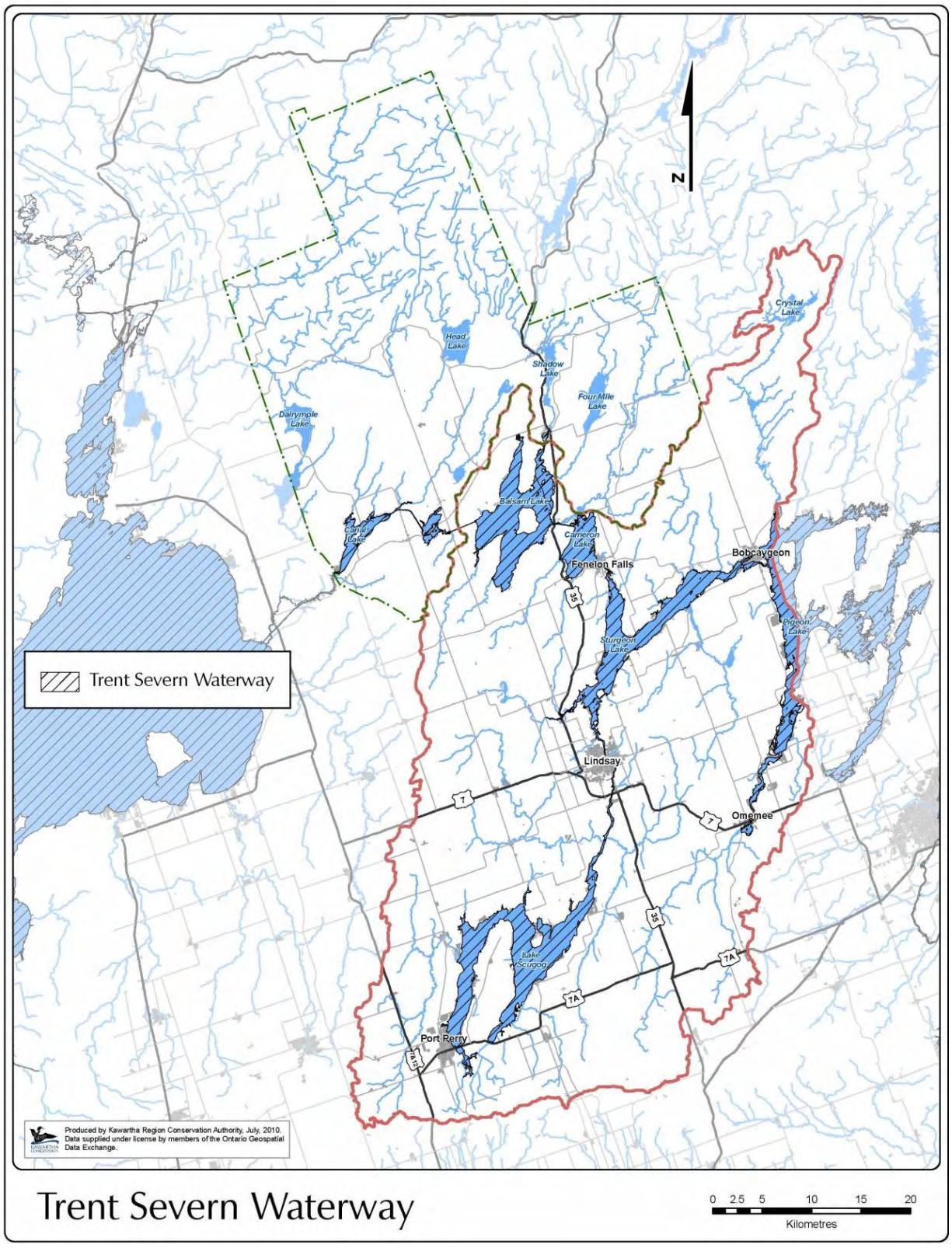


Figure D-4: Trent-Severn Waterway Lakes and Connecting Rivers

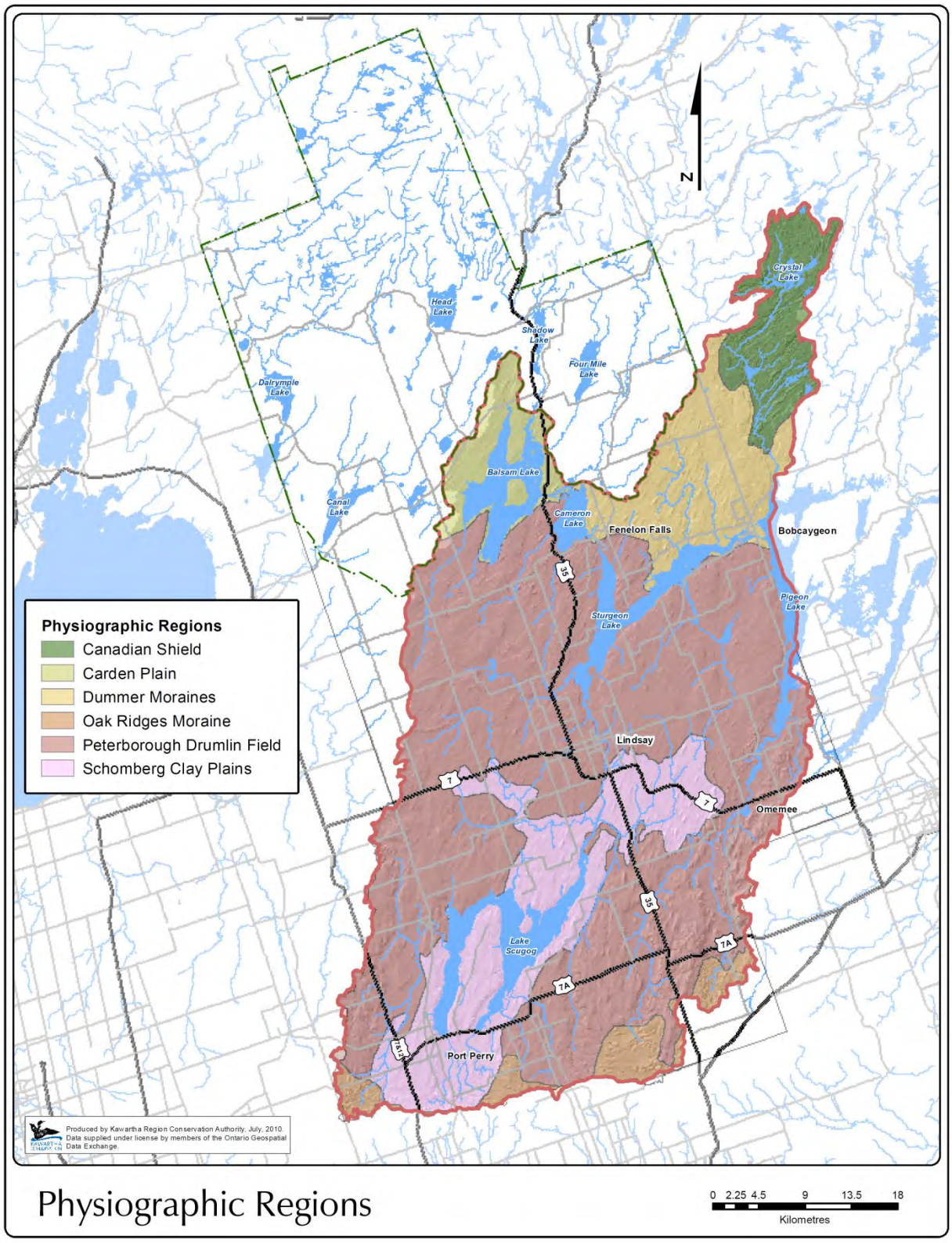


Figure D-5: Physiographic Regions

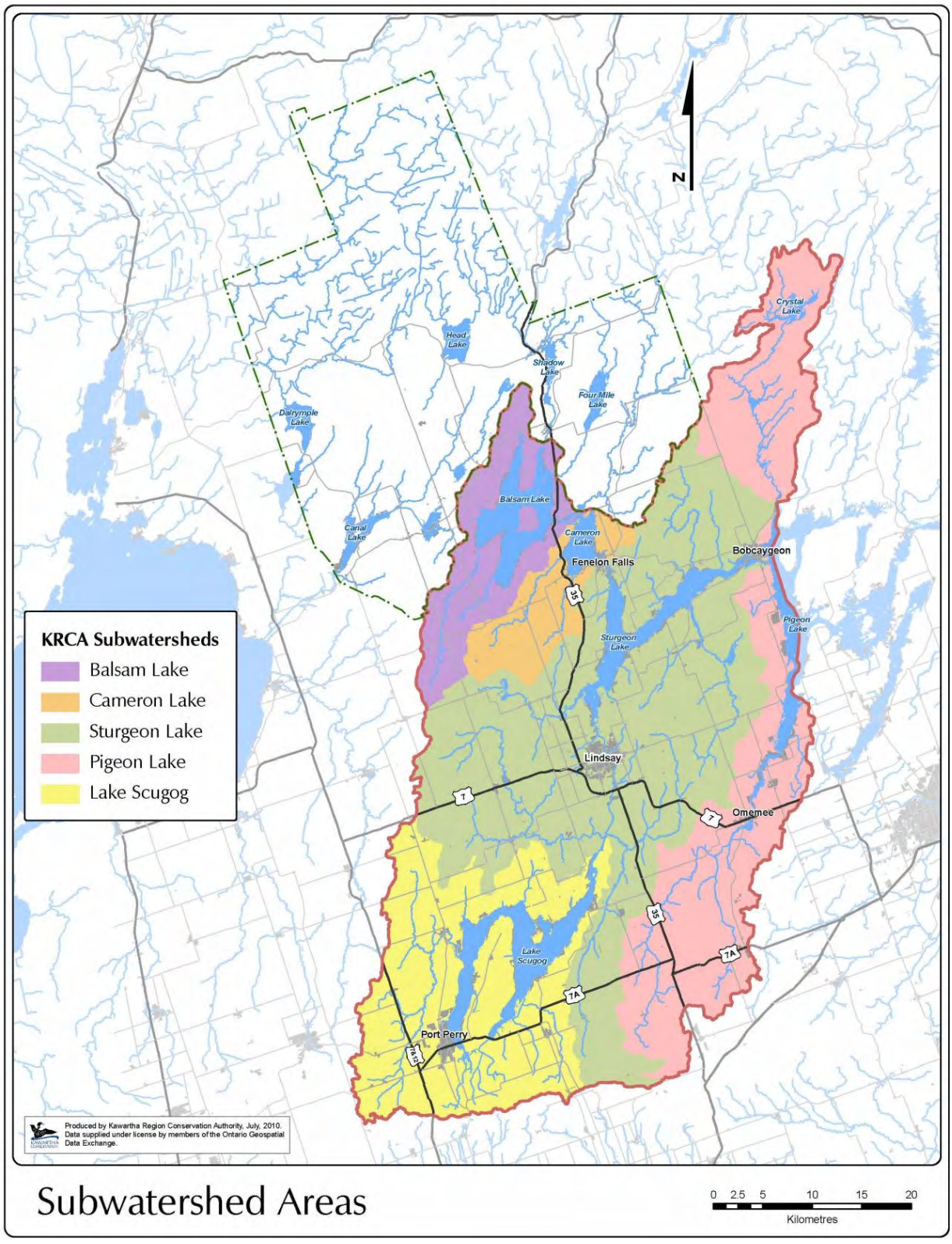


Figure D-6: Subwatershed Areas

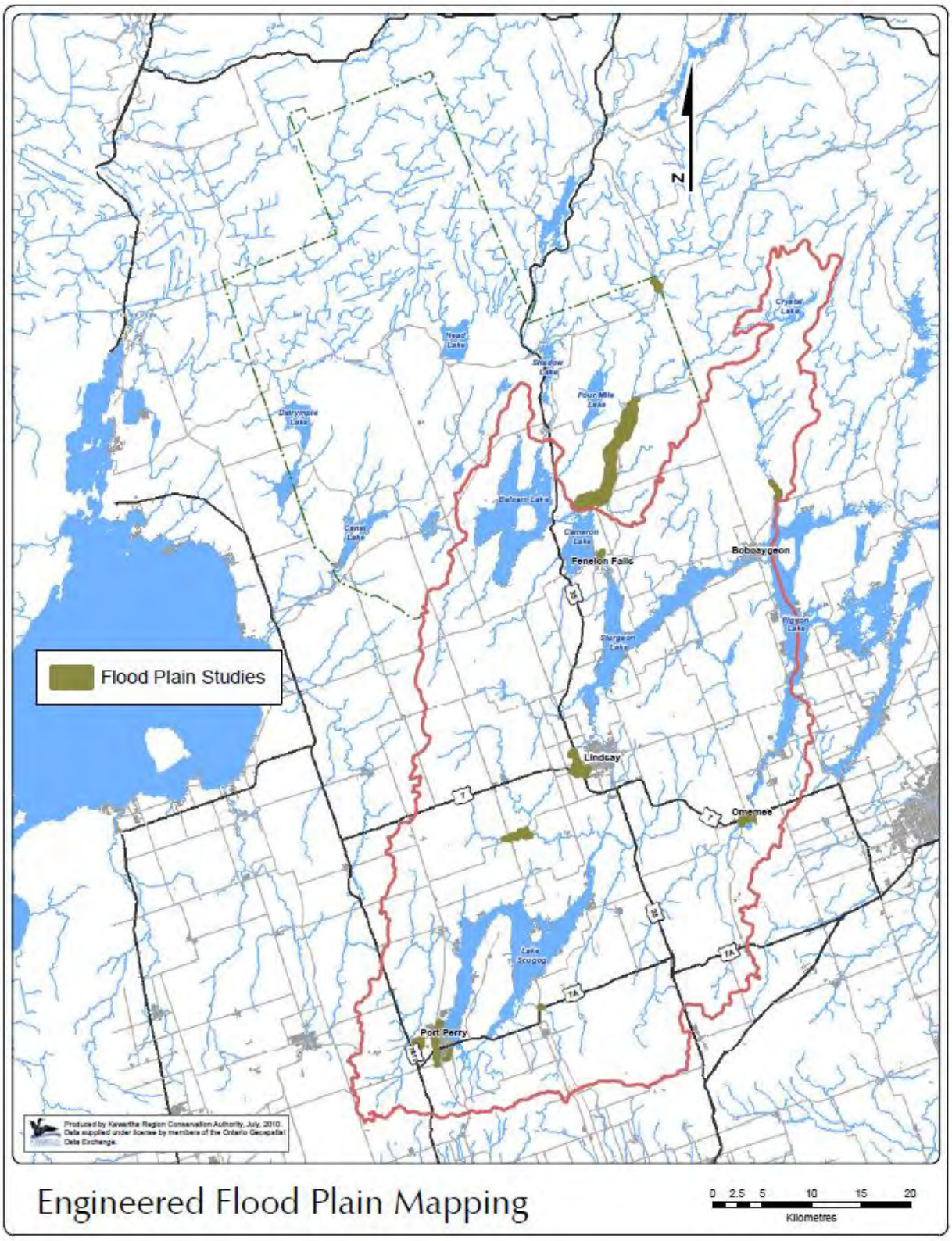


Figure D-7: Engineered Flood Plain Mapping

Appendix E – CA Roles and Associated Legal Authority

Role	Legal Authority – Legislation (or other)
Regulatory Authorities	• CA Act (S. 28) • Ontario Regulation 97/04 • Ontario Regulations 42/06, 146/06 to 179/06, 181/06, 182/06, and 319/09
Delegated 'Provincial Interest' in Plan Review	• CO/MNR/MMAH MOU of CA Delegated Responsibilities • Section 3.1 of the Provincial Policy Statement
Resource Management Agencies	• CA Act (S. 20 and S. 21) • CA Board Approved policies and programs
Public Commenting Bodies	• Planning Act (S. 17.15, S. 17.20, and S. 17.21) • Clean Water Act (S. 4.2, S. 6, S. 7.6, S. 10.1, etc.) • Drainage Act (S. 4, S. 5.1, S. 6.1, S. 10.2, S. 10.8, S. 41.1, S. 49, S. 74, S. 78.2) • Aggregates Resource Act • Environmental Assessment Act • Provincial Plans (e.g., Greenbelt Plan, Lake Simcoe Protection Plan, Oak Ridges Moraine Conservation Plan, etc.)
Service Providers	• CA Act S. 21 • Federal Fisheries Act via Agreements • MOUs (Municipal and other agency)
Landowners	• CA Act (S. 21 and S. 29)

Appendix F – Linkages

LINKS TO KEY REFERENCES

LINKS TO KEY REFERENCES
KRCA Regulation Limit Mapping
http://camaps.ca/

Conservation Authorities Act
http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90c27_e.htm

Ontario Regulation 182/06
http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_060150_e.htm

Provincial Policy Statement
http://www.mah.gov.on.ca/Page215.aspx

Provincial Legislation and Regulations – www.e-laws.gov.on.ca

Federal Legislation and Regulations - http://laws.justice.gc.ca/en/

MUNICIPAL WEBSITES

City of Kawartha Lakes – www.city.kawarthalakes.on.ca

County of Peterborough – www.county.peterborough.on.ca

Municipality of Clarington – www.clarington.net

Regional Municipality of Durham – www.durham.ca

Township of Brock – www.townshipofbrock.ca

Township of Cavan-Monaghan – www.cavanmonaghan.net

Township of Galway-Cavendish & Harvey – www.galwaycavendishharvey.ca

Township of Scugog – www.township.scugog.on.ca

Appendix G – Agricultural Advisory Panel Terms of Reference

Terms of Reference

Agricultural Advisory Panel

Preface:

- The Kawartha Region Conservation Authority (KRCA) watershed landscape is comprised mainly of agricultural lands, wetlands, forests, intersected and dissected by lakes, rivers and municipal drainage works.
- Agriculture is the primary land use throughout the watershed and contributes significantly to the socio-economic sustainability of the watershed communities.
- Agricultural land owners bear a significant land and environmental stewardship responsibility and associated costs which benefit the health of the watershed.
- A major portion of agricultural land owners would include some portion of areas on their lands where development is regulated under Ontario Regulation 182/06 administered by KRCA.
- The agricultural sector practices are complex and continually evolving as are the regulations and policies standards administered by KRCA and other agencies
- KRCA Board of Directors approved a new set of regulation policies for implementation July 1st 2012.
- To help resolve issues that may arise through the implementing of the regulation policies, the City of Kawartha Lakes Agricultural Development Advisory Board and KRCA commit to establish the Agriculture Advisory Panel (AAP).

Anticipated Benefits:

- Improved information sharing and understanding
- Awareness and acceptance of the regulation and permitting process
- Environmental stewardship outcomes
- Recognition of farming practices and costs
- Partnership opportunities

Purpose and Scope:

The AAP is established to assist where possible in resolving issues that that may arise with respect to specific agriculture permit applications in relation to the implementation of the KRCA Watershed Plan Review and Regulation Policies (January 2012). It should be noted that permit decisions under the CA Act and its regulations are the purview of KRCA and its Board of Directors. The AAP is intended not as decision making body but as an advisory body.

It is intended that the AAP provide advice to KRCA on specific agricultural development applications on issues that may arise with respect to the information requested to support an application, the terms and conditions applied to a permit or a staff decision to refuse a permit.

It is also intended that AAP in its review of specific agricultural permit issues provide advice on the policy implications and any changes that are felt to be necessary.

In addition, the AAP through its involvement may provide advice on communication initiatives that would help improve understanding and acceptance of the watershed regulation policies within the agriculture community.

AAP Composition:

The AAP will consist of a roster of six (6) members.

- Three (3) persons appointed by CAO of Kawartha Conservation.
- Two (2) persons nominated by the Agricultural Advisory Development Board of CKL
- One (1) person nominated by the Agricultural Advisory Development Board of Durham Region.

Term:

AAP members can serve on yearly basis for up to three years. However, tenure of a member of the Panel may be extended at the direction of the Agricultural Boards and the KRCA CAO.

Request for Review:

An agricultural land owner may make a request for a permit application review by the AAP. A request to have the AAP review a permit application must be in writing and be presented personally or delivered by registered mail, courier, confirmed e-mail to the KRCA office at any time following the submission of an application to KRCA up to 30 days following formal notice that a permit can not be granted or that the required conditions are unacceptable to the owner.

Upon written notice of the request for a review of a permit application by the AAP, the KRCA Planning and Regulations Manager has 15 days to identify four members from the AAP to form the Review Panel and confirm the Chair. Two members of the Review Panel are to come from KRCA and two from the Agricultural community. If the review involves a land owner in the Durham Region portion of the KRCA watershed, preference will be given to assign the AAP member from Durham. Likewise if the request for review involves a land owner in the City of Kawartha Lakes (CKL), then preference would be given to assigning the members from CKL.

Each application review shall be chaired by a different AAP member on a rotational basis.

The AAP is to be provided, within 10 days of their confirmation on the Review Panel, a copy of the relevant information including:

- The property owners complete application including any technical reports/studies completed to support the application
- Notice of permit decision if applicable
- Applicable KRCA Policies and Procedures
- Other information that the AAP requests from either landowner or the KRCA

The Review Panel shall endeavour to complete the review and provide its recommendations to the CAO of KRCA within 45 days of the land owner's written request to KRCA.

Where a recommendation cannot be made within 45 days the chair may obtain a 30 day extension if agreed and signed by both the Land Owner and KRCA Manager (or designate).

Format of the Advice:

- Advice is to be submitted in the form of written recommendations
- The recommendation(s) to be provided in a consistent format – see attached

Recommendations:

- Determined after a review of all of the available the information
- Based on majority opinion; dissenting opinions are to be noted in the recommendation
- Would form part of any KRCA staff report necessary to obtain Board approval for a permit

Guidance for Review Panel Recommendations:

The Review Panel is to make every effort to make a recommendation which is within the bounds of KRCA policy in effect at the time.

The Review Panel may, by using their best judgment make a recommendation outside of the current KRCA policy when it is beneficial to the objective of the Regulation and agricultural practice.

Action With Respect to Review Panel Recommendations:

The Chair will submit recommendations to KRCA CAO for consideration.

Review Panel recommendations may not be unanimous and contain dissenting opinions. The Review Panel report needs to be considered in its entirety.

If in the opinion of the CAO, the Authority can support the proposal with or without conditions within the bounds of existing KRCA Watershed Policies then a notice of the KRCA decision can be provided within 15 days of receiving the Review Panel Report recommendations.

If in the opinion of the CAO, the Authority can support the proposal but it is outside the bounds of KRCA Watershed Policies, the Board of Directors (BOD) is required to review and approve the proposal in which case the Review Panel Report would be submitted as part of the staff report to the BOD.

- Property owner can be advised of staff level support and the process
- Notice of the decision to the property owner would follow BOD decision

If in the opinion of the CAO, the Authority can still not support the permit, the applicant is entitled to a KRCA Board Hearing. Should the property owner wish to proceed with a Hearing, the Review Panel report would form part of the report to the Hearing Board.

The Review Panel, the Landowner and the KRCA Board will be notified of the course of action within 15 days of receiving the Review Panel recommendations.

Responsibilities:

AAP Members:

- Timely participation in the review process
- Act as Chair on a rotational basis

Chair:

- Coordinate location of the review with the landowner and AAP member
- Ensure full discussion of the information during the review
- Ensure recommendations have the endorsement of Review Panel members

KRCA Planning/Regulation Manager:

- Record keeping for all Request for Reviews
- Identification of Review Panel and confirmation of Chair
- Providing relevant policies, complete application information and other any relevant technical information

Landowner/Applicant:

- To provide consent to AAP for review
- To provide information that may be requested by the Review Panel

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List of Members

- In September 2012, the CKL ADAB nominated Paul Reeds for a one year term, Mark Curtin for a two year term and Rebecca Parker as an alternate

Review Panel Report

Date Submitted:

RE: **Permit Application Number:** _____

Applicant: _____

Property Location: Municipality _____

Township _____

Lot_____ Concession_____

Address _____

_____

_____

PROPOSAL:

KEY ISSUE(S):

REVIEW PANEL MEMBERS NAMES:

RECOMMENDATION(S):

DISSENTINING OPINIONS:

CHAIR SIGNATURE _____

INFORMATION SUMMARY:

KRCA WATERSHED MANAGEMENT POLICIES:

ANALYSIS OF KEY POINTS:

DECISION SUMMARY:

Appendix H – Other Legislation

FEDERAL LEGISLATION

NAVIGABLE WATERS PROTECTION ACT

Administered by Transport Canada
The Navigable Waters Protection Act (NWPA) was first enacted in 1882, declaring the beds of all navigable waters as public domain. The Canadian public right of navigation is not written anywhere – it is a right that has developed over time through Common Law. If the waters are navigable, then the public has the right to navigate. The NWPA minimizes the interference of navigation on navigable waters throughout Canada. It ensures a balance between the public right to navigate and the need to build works such as bridges, dams or docks in navigable waters. The right of navigation is therefore protected under the NWPA, as administered by Transport Canada and is the responsibility of the Canadian Coast Guard.

The NWPA applies to all governments – federal, provincial, or municipal – and to all persons, companies, organizations and Crown Corporations that are planning to construct or modify a work in, on, over, under, through or across any navigable waterway.

CANADIAN ENVIRONMENTAL ASSESSMENT ACT

Administered by Environment Canada
The Canadian Environmental Assessment Act (CEAA) is a federal statute that requires federal departments to conduct Environmental Assessments for prescribed projects and activities prior to providing federal approval or financial support. The Environmental Assessment process is a planning tool that is used to identify the potential effects of projects or activities on the environment including its impact on air, water, land, living organisms and humans.

DEPARTMENT OF TRANSPORT ACT AND HISTORIC CANALS REGULATIONS

Administered by Transport Canada and Parks Canada (PC) and
Administered by Transport Canada under the Department of Transport Act, the Historic Canals Regulations provide PC with jurisdiction over the federally owned and managed 'bed' of the Trent-Severn Waterway, including lakes and rivers that are part of the navigable waterway, excluding Lakes Simcoe and Couchiching, which are administered by provincial bodies and CAs, and reservoir lakes. The regulations contain provisions pertaining to the protection of cultural resources, natural resources, structures, equipment and objects in the historic canals as well as the safe navigation of vessels and operation of locks, dams and bridges in the historic canals.

PC's Policies for In-water and Shoreline Works and Related Activities provide the primary policy and permitting tool by which PC interprets and applies the Historic Canals Regulations along the Trent-Severn Waterway.

SPECIES AT RISK ACT

Administered by Environment Canada
The Species At Risk Act (SARA) is a federal statute, enacted in 2002 and designed to meet one of Canada's key commitments under the International Convention on Biological Diversity. The Act applies only to land under federal ownership. The goal of the Act is to protect endangered or threatened species and their habitats as well as to manage species that are not yet threatened but whose existence or habitat is in jeopardy. Under SARA, steps are identified that must be taken to protect existing healthy environments as well as the recovery of threatened habitats. The Act defines ways in which government, industry and community can work collectively to preserve species at risk.

MIGRATORY BIRDS CONVENTION ACT

Administered by Environment Canada
Canada seasonally hosts over 500 species of migratory birds, and it is the responsibility of Environment Canada to develop and implement policies and regulations to ensure the protection of migratory birds, their eggs and their nests.

Among others, Environment Canada is responsible for implementing the Migratory Birds Convention Act. This Act and its complementary Regulations ensure the conservation of migratory bird populations by regulating potentially harmful human activities. A permit must be issued for all activities affecting migratory birds, with some exceptions detailed in the Regulations. There may be timing restrictions and specific mitigation measures for development proposals under the Act or associated Regulations. Proponents are encouraged be aware of these constraints.

PROVINCIAL LEGISLATION

CROWN FOREST SUSTAINABILITY ACT

Administered by the Ministry of Natural Resources (MNR)
The purpose of the Crown Forest Sustainability Act (CFSA) is to provide for the sustainability of forests on Crown land to meet present and future social, economic and environmental needs. The Act sets out the licensing requirements for forest operations including the preparation of forest management plans that are approved by the Minister. The Act prescribes that Forest management plans are to be prepared in accordance with the Forest Management Planning Manual (MNR, 1994) and provincially approved guidelines developed to protect social and environmental values.

ENDANGERED SPECIES ACT

Administered by the Ministry of Natural Resources (MNR)
Under the Endangered Species Act (ESA), there are provisions to identify and protect species that are at risk as well as their habitats. There is also an opportunity under the legislation to promote stewardship activities to assist in the protection and recovery of species that are at risk.

ENVIRONMENTAL PROTECTION ACT

Administered by the Ministry of the Environment (MOE)
Under the Environmental Protection Act (EPA), Ontario's MOE is provided with specific powers to protect and conserve the natural environment. In particular, the Act provides the Minister of the Environment with the ability to investigate problems relating to pollution, waste management, waste disposal, litter management and litter disposal and to conduct research, carry out studies of the natural environment and convene conferences pertaining to contaminants, pollution, waste and litter.

GREENBELT ACT

Administered by the Ministry of Municipal Affairs and Housing (MMAH)
The Greenbelt Act, proclaimed in 2005, enables the creation of a Greenbelt Plan to protect some 1.8 million acres of environmentally sensitive and agricultural land in the Golden Horseshoe from urban development and uncontrolled urban sprawl. It includes and builds on approximately 800,000 acres of land within the Niagara Escarpment Plan and the Oak Ridges Moraine Conservation Plan (ORMCP) is authorizes the provincial government to designate a Greenbelt Act and establish a Greenbelt Plan. It sets out the key components and objectives for a Greenbelt Plan and requires planning decisions to conform to the Plan.

LAKE SIMCOE PROTECTION ACT

Administered by the Ministry of the Environment (MOE)
The Lake Simcoe Protection Act (LSPA), which was passed in December 2008, provides the legislative framework to protect and restore the ecological health of the Lake Simcoe watershed. The Act includes: clear objectives; the requirement for a protection plan with legally binding policies; the requirement for scientific and stakeholder committees to provide advice; and, the authority for regulation that provides even further protection. It provides the legislative framework for the development of the Lake Simcoe Protection Plan (LSPP), released June 2009, that allows issues such as climate change and invasive species to be addressed in a coordinated manner. This plan represents the first provincial foray into lake management planning, with very strong policies to improve the health of this stressed lake.

LAKE AND RIVERS IMPROVEMENT ACT

Administered by the Ministry of Natural Resources (MNR)
The Lakes and Rivers Improvement Act (LRIA) provides for the management, protection, preservation and use of the waters of the lakes and rivers of Ontario and the land under them. It provides for the protection and equitable access of public rights in or over Ontario's lakes and rivers and addresses the rights of riparian owners. The Act also provides for the management, perpetuation and use of the fish, wildlife and other natural resources that are dependent upon Ontario's lakes and rivers and ensures the protection of the natural amenities of the lakes and rivers, their shores and banks. The Act also provides for the protection of persons and property by ensuring that dams are suitably located, constructed, operated and maintained. In order to avoid duplication in the permitting role and responsibilities between the LRIA and CA Act Section 28 regulations, MNR has withdrawn their planning and approval services where a CA exists with the exception of dams.

NUTRIENT MANAGEMENT ACT

Administered by the Ministry of Agriculture, Food and Rural Affairs (OMAFRA) and the Ministry of the Environment (MOE)
The Nutrient Management Act was passed in 2002 and creates a scheme for a comprehensive, province-wide approach to nutrient management. Proper nutrient management is designed to protect soil and water quality in Ontario's rural communities. OMAFRA and the MOE are responsible for governing the act.

The General Regulation, (O. Reg. 267/03) under the act sets out the legal requirements for handling and storage of nutrients for new farms and farms that are expanding to become larger operations. It specifies the requirement and standards for the preparation of nutrient management plans. CAs may have a regulatory role for development and activities that are required to meet the intent of the Nutrient Management Act and its Regulation (regulatory role for development activities in and adjacent to watercourses (including valleylands), wetlands, shorelines of inland lakes and hazardous lands and activities that may cause the straightening, changing, diverting or interfering in any way with the existing channel of a river, creek, stream, watercourse or for changing or interfering in any way with a wetland).

OAK RIDGES MORAINE CONSERVATION ACT

Administered by the Ministry of Municipal Affairs and Housing (MMAH)
The Oak Ridges Moraine Conservation Act (ORMCA) was passed in 2001 and provides the legislative framework for the development of the Oak Ridges Moraine Conservation Plan (ORMCP). The primary purpose of the Act is to protect the ecological and hydrological integrity of the Oak Ridges Moraine.

ONTARIO BEDS OF NAVIGABLE WATERS ACT

Administered by the Ministry of Natural Resources (MNR)
The Ontario Beds of Navigable Waters Act is declaratory legislation that pertains to title in the beds of navigable waters. The Act was enacted in response to a 1911 case involving Keewatin Power and the Town of Kenora and was enacted to provide clarification with respect to the ownership of the beds of navigable waters. The Act provides clarity around the ownership of the bed of a navigable body of water and indicates that any land grant that may have been provided to a grantee bordering Crown land does not include the bed of that navigable body of water.

ONTARIO BUILDING CODE ACT

Administered by the Ministry of Municipal Affairs and Housing (MMAH)
The Ontario Building Code and the Ontario Building Code Act set standards for all types of construction and building project in Ontario. Municipal Councils are responsible for enforcing the Act and for appointing a Chief Building Official and inspectors to enforce the Act. The Act prohibits any person from constructing or demolishing a building unless the Chief Building Official has issued a permit. The Ontario Building Code also provides directives for the construction of septic systems, and outlines responsibilities to be carried out by the municipality or an appointed representative (e.g., health unit). A permit must be issued unless the proposed building, construction or demolition will contravene the Act, the Building Code or any other applicable law.

PUBLIC LANDS ACT

Administered by the Ministry of Natural Resources (MNR)

The Public Lands Act provides specific powers to the Minister of Natural Resources for the management, sale and disposition of public lands and forests in Ontario. Third party works on public lands require authorization from the MNR under the Public Lands Act (PLA).

Appendix I – Violations

GENERAL PROCEDURES

Staff will make every effort to resolve issues from contraventions of the Conservation Authorities Act and Ontario Regulation 182/06 within six months of the works taking place.

The laying of charges against a landowner or other individuals involved may be pursued where a resolution to the issues resulting from contraventions of the Conservation Authorities Act and Ontario Regulation 182/06 is not achieved.
Where other legislation and regulations in addition to the Conservation Authorities Act, such as the federal Fisheries Act and municipal by-laws have been contravened, Kawartha Region Conservation Authority (KRCA) may:

- notify the appropriate agencies and work with them to carry out a coordinated inspection, investigation and/or prosecution, and
- encourage the agency with the strongest mandate to take the lead.

In addition to any penalty levied by the court upon conviction, the KRCA will seek an order for rehabilitation of the site and/or removal of any building or structure ruled in contravention of Ontario Regulation 182/06.

KRCA staff will use field inspections as an opportunity to inform and educate landowners, individuals involved and the public about the roles and responsibilities of the KRCA in administering the Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation (O. Reg. 182/06).

When carrying out investigations, KRCA staff will carefully record and consider all of the facts and circumstances prior to taking action. Inspections of approved permits enable the KRCA to meet stated policy objectives and achieve five operational goals:

- To ensure compliance with the terms and conditions of the permit issued
- To avoid the need for costly corrective actions through early identification of activities that do not comply with the terms and conditions of the permit issued
- To improve communications between applicants and the KRCA
- To provide greater surety to applicants about what activities are deemed acceptable to the KRCA
- To clarify and improve the permit process

Completing inspections ensures that works and activities are completed in accordance with the specifications and site plans submitted with the permit application and any associated conditions that were approved by the KRCA. In addition to inspections, the KRCA will work with other agencies and municipalities to ensure early detection of activities that are in non-compliance.

During an inspection, KRCA staff can improve communications by addressing questions or concerns about the terms and conditions of the permit and clarify issues that arise during the inspection. Early identification of non-compliance activities allows KRCA staff to work with the permit holder to remedy issues at a minimal cost. When contraventions are easily remedied, there is no need to pursue legal action which could delay construction and result in costly fines, penalties and legal fees for the permit holder.

There are two components to an initial investigation, an office investigation and a field investigation. The office investigation involves collecting background information on the property and the landowner and/or individuals involved and consulting with other agencies.

If the office investigation reveals information that confirms that a violation may have occurred, a field investigation begins. KRCA staff, a municipal building inspector or a municipal by-law enforcement officer may carry out an initial assessment where the activity is clearly visible from a public road and access to private property is not required. Photographs of the activity taking place and notes describing the activity will be taken. If the activity is not clearly visible from a public location, KRCA staff will attempt to arrange a site visit with the landowner and/or individuals involved. A determination regarding whether or not an offence has occurred is made. If it is found that no violation occurred, no further action is taken.

Where further action is required, a Site Investigation Report is completed. The report includes a description of all findings with a copy of photos, witness statements, maps and references to other related files, if applicable. A Notice of Violation is sent to the landowner and/or individuals involved as well as the Clerk of the respective municipality and others as appropriate.

A Notice of Violation is not a legal document. It is a formal letter that notifies the landowner and/or the individuals involved in committing the probable offence that a violation of Ontario Regulation 182/06 has occurred. The Notice of Violation identifies the specific activities that are subject to the infraction as well as specifies the particular section of the Regulation that has been contravened. The notice requests the recipient to stop work and to contact the KRCA to discuss options to resolve the violation. To ensure that the recipient receives the notice in a timely manner, it is delivered by personal delivery or sent by registered mail. The Notice of Violation contains the following information:

1. A map showing the location of the property and the Regulated Area
2. An information sheet explaining the nature and scope of the Regulation and the permit process administered by the KRCA under Ontario Regulation 182/06
3. Date of inspection
4. Offence Wording
5. Section of Ontario Regulation 182/06 contravened
6. Description of the work
7. Contact information for the appropriate KRCA staff person
8. Due date by which the KRCA must be contacted

The landowner and/or individuals involved have two options:

1. Cease the activity and have the activity approved by the KRCA through the permit process, provided that the activity adheres to the Board-approved policies for the administration of Ontario Regulation 182/06, or
2. Remove the offending development or cease the activity and restore the area to its original condition at the owner's expense.

If neither option is acceptable, the KRCA may proceed to court.

It is the preference of the KRCA to address the violation using the first two options. All efforts to avoid pursuing legal action will be made. However, if an acceptable solution cannot be found, KRCA has the authority to lay charges and follow through with legal action.

If the offender chooses to apply for a permit after the development, interference or alteration has commenced or occurred, a fee surcharge applies. KRCA staff will work with the applicant to ensure that the works adhere to the KRCA policies for the administration of Ontario Regulation 182/06. If a permit is granted, the works may proceed.

Restoration

Where works have been undertaken without approval of the KRCA or where the works do not meet the terms and conditions of the approved permit and the landowner and/or individuals involved are willing to remove the works and/or satisfactorily restore the site to its original condition, a violation may be easily resolved. In this case, KRCA staff will work with the landowner and/or individuals involved to effect removal of the works and/or restore the site. Where restoration works require detailed plans or studies, the landowner and/or individuals involved will be required to apply for a permit.

Court Proceedings

Where violations cannot be resolved, the KRCA may decide to lay charges and proceed with court proceedings before a Justice of the Peace under oath. Laying an information is the procedure by which a magistrate is informed in writing of an offence for which a summons or warrant is required. If the Justice of the Peace considers that the allegations establish that an offence has probably been committed, a **summons** will be issued to the person(s) charged. A summons states when and where the person(s) named must appear to answer the charges.

The formal trial begins with an arraignment. If the defendant pleads guilty, a trial is unnecessary. If the defendant pleads not guilty, the trial proceeds. Upon a guilty plea or conviction, the prosecution and the defence make submissions concerning sentencing. Through the prosecution, the KRCA will seek an order for rehabilitation of the site and/or removal of any building or structure ruled in contravention of Ontario Regulation 182/06, in addition to any penalty levied.

KRCA Powers of Entry are outlined below:

Powers of entry

s. 28 (20) an authority or an officer appointed under a regulation made under clause (1) (d) or (e) may enter private property, other than a dwelling or building, without the consent of the owner or occupier and without a warrant, if,

- *a. the entry is for the purpose of considering a request related to the property for permission that is required by a regulation made under clause (1) (b) or (c); or*
- *b. the entry is for the purpose of enforcing a regulation made under clause (1) (a), (b) or (c) and the authority or officer has reasonable grounds to believe that a contravention of the regulation is causing or is likely to cause significant environmental damage and that the entry is required to prevent or reduce the damage.*

(21) Subject to subsection (22), the power to enter property under subsection (20) may be exercised at any reasonable time

(22) The power to enter property under subsection (20) shall not be exercised unless,

- *a. the authority or officer has given reasonable notice of the entry to the owner of the property and, if the occupier of the property is not the owner, to the occupier of the property; or*
- *b. the authority or officer has reasonable grounds to believe that significant environmental damage is likely to be caused during the time that would be required to give notice under clause (a).*

(23) Subsection (20) does not authorize the use of force.

(24) Any person who prevents or obstructs an authority or officer from entering property under subsection (20) is guilty of an offence and on conviction is liable to a fine of not more than $10,000.

Restriction on entry
s. 30.1(1) An authority or an officer appointed under a regulation made under clause 28 (1) (d) or (e) shall not enter land without,

- *a. the consent of the owner of the land, and if the occupier of the land is not the owner, the consent of the occupier of the land; or*
- *b. the authority of a warrant under the Provincial Offences Act.*

Exceptions
s. 30.1(2) Subsection (1) does not apply to entry under clause 21 (1) (b) or subsection 28 (20). 1998, c. 18, Sched. I, s. 14.

Appendix J – Identifying Erosion Hazard Limits

I) FOR THE PURPOSE OF CHAPTER 3 – LAND USE PLANNING POLICIES

With respect to hazardous lands as defined by the Provincial Policy Statement (PPS), the following detailed information shall be applied to river, stream and small inland lake systems when determining the extent of the erosion hazard limit. When providing plan review comments to municipalities on erosion hazards under the delegated 'provincial interest' to ensure conformity with the natural hazard policies (S. 3.1) of the PPS, KRCA adheres to these guidelines, which are in accordance with the Ministry of Natural Resources' Technical Guide - River & Stream Systems: Erosion Hazard Limit (2002).

Provincial guidelines identify river and stream systems under two distinct situations:

- Confined systems (physical presence of a valley corridor containing a river or stream channel (which may or may not contain flowing water) is visibly evident – that is, the valley walls are clearly definable from the surrounding landscape, either by field investigations, aerial photography or map interpretation); and,
- Unconfined systems (river or stream is present but there is no identifiable valley slope or bank that can be detected from the surrounding landscape; generally found in flatter or gently rolling landscapes and may be described as headwater areas).

When determining the extent of the erosion hazard limit associated with a river or stream system, the following components must be considered.

1) **Toe erosion allowance (where the river is within 15 metres of the toe of slope)**; the setback that ensures safety if the toe of the slope adjacent to the river or stream erodes and weakens the bank, increasing the risk of slumping. Normally only applied to confined systems and may be determined in one of four ways:
    - Use of the average annual recession rate. A minimum 25 years or record or data is required to provide a measure of reliability when determining the annual recession rate extended over a 100 year planning horizon. Data sources could include survey information, aerial photographs and through field monitoring and measurement using equipment having sufficient precision and accuracy to provide a reliable indication of recession.
    - Use of a 15 metre toe erosion allowance measured inland horizontally and perpendicular to the toe of the watercourse slope where the distance between the watercourse and the base of the valley wall is 15 metres or less.
    - Use of a study using accepted geotechnical and engineering principles and based on a minimum of 25 years of record or data.
    - Toe erosion allowance based on soil types and hydraulic processes (flow rates, volume, etc.), based on visual observations or analytical studies, and where the watercourse is 15 metres or less from the base of the valley wall. See table below.

Table J-1: Minimum toe erosion allowance based on soil types and hydraulic processes, where the river is within 15 metres of the toe of slope.

Type of material Native Soil Structure	Evidence of active erosion* or where the bankfull flow velocity is greater than competent flow velocity	No evidence of active erosion		
		bankfull width		
		< 5 m	5-30 m	> 30 m
Hard rock (e.g. granite)	0 – 2 m	0 m	0 m	1 m
Soft rock (shale, limestone), cobbles, boulders	2 - 5 m	0 m	1 m	2 m
Clays, clay-silt, gravels	5 – 8 m	1 m	2 m	4 m
Sand, silt	8 – 15 m	1 – 2m	5 m	7 m

Note: Where a combination of different native soil structures occurs, the greater or largest range of applicable toe erosion allowances for the materials found at the site should be applied.
*Active erosion is defined as: bank material exposed directly to stream flow under normal or flood flow conditions where undercutting, oversteepening, slumping of a bank or down stream sediment loading is occurring.

2) **Stable slope allowance**; the setback that ensures safety if the slumping or slope failure occur. The stability of slopes can be affected by everything from increases in loading, such as the placement of buildings, and changes in drainage patterns to erosion of the toe of a slope and loss of stabilizing vegetation on the slope face.
   - The stable slope allowance is determined by using a horizontal allowance measured landward from the toe erosion allowance equivalent to three times the height of the slope (3:1) OR through a valid study. The 3:1 is considered a minimum allowance.

3) **Meander belt allowance**; the setback that keeps development from being affected by river and stream meandering.
   - The meander belt allowance is normally used when planning authorities are considering development along unconfined river and stream systems flowing. The allowance is determined to ensure that development is not placed in harm's way, but also to ensure that the flow of water and its associated natural processes, including erosion, are maintained.
   - Meander belt allowance: The term meander belt allowance is the maximum extent that a water channel migrates. Other terms associated with meander belts are amplitude, wavelength, bend radius, bankfull width, point bars, pools, riffles and concave and convex banks. A meandering channel is a series of interconnected reaches. A reach is a length of channel over which the channel characteristics are stable or similar. For each reach, the meander belt should be centred on a line of axis drawn through the middle of the meanders or riffle zones, a line that essentially divides each of the meanders in half.
   - The width of a meander belt can be determined by analyzing the bankfull channel width of the largest amplitude meander. The meander belt allowance is defined as 20 times the bankfull channel width of the reach and centred on the meander belt axis. When determining the meander belt for these relatively straight reaches, the meander belt should be centred on the mid-line of the channel.

4) **Erosion access allowance;** the setback needed to ensure there's a big enough safety zone for people and vehicles to enter and exit an area during an emergency, such as a slope failure or flooding. This is the final component used to determine the landward limit of the erosion hazards and should be applied within confined and unconfined systems. Planning authorities should provide erosion access allowance for 1) access during emergencies, 2) regular maintenance or repair failed structures and 3) protection from external events that affect an erosion prone area (for example, a low-level earthquake in Ontario's quake zone along the St. Lawrence or Ottawa rivers). The suggested minimum erosion access allowance for river and stream systems should be six metres.

More detailed information on the four components identified above can be found in the Ministry of Natural Resources' Technical Guide - River & Stream Systems: Erosion Hazard Limit (2002), available at the KRCA office.

The following schematics summarize how the components listed above are applied to determine the erosion hazard limit.

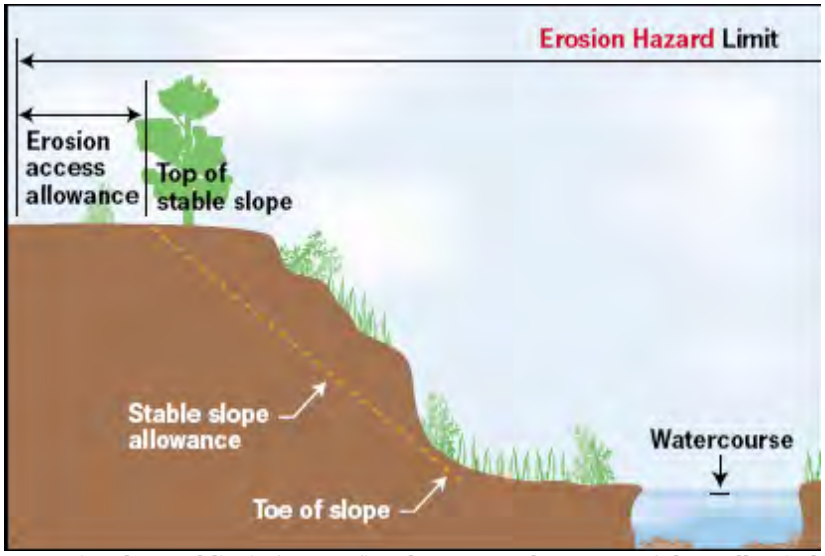


Figure J-1: Erosion hazard limit for confined system where toe of the valley is located more than 15 metres from the watercourse (Technical Guide – River & Stream Systems: Erosion Hazard Limit, MNR, 2002)

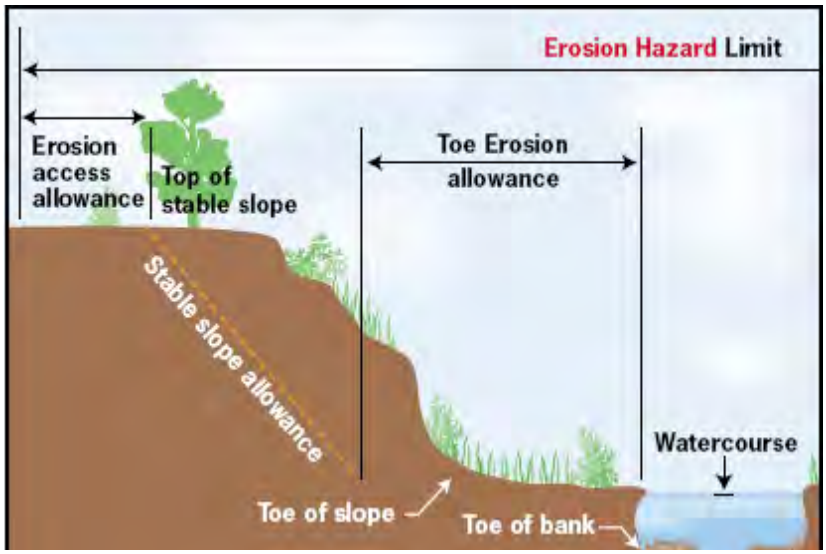


Figure J-2: **Erosion hazard limit for confined system where toe of the valley is located within 15 metres of the watercourse (Technical Guide – River & Stream Systems: Erosion Hazard Limit, MNR, 2002)**

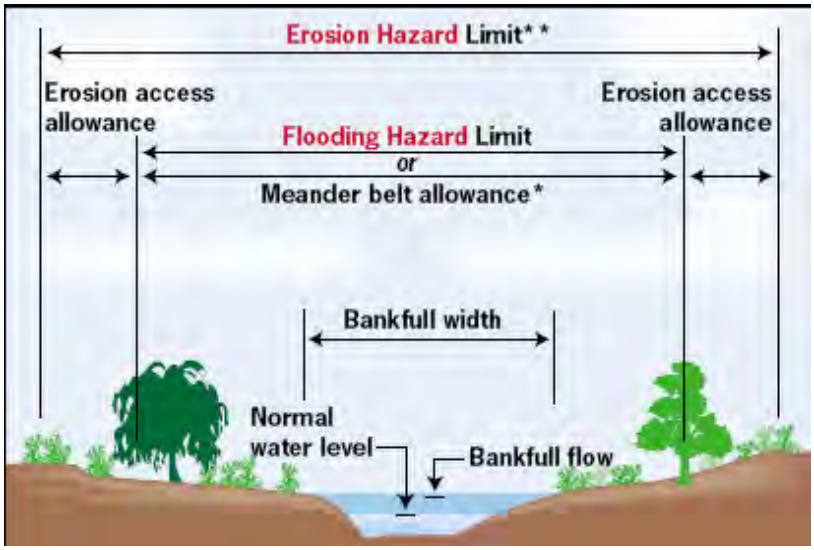


Figure J-3: **Erosion hazard limit for unconfined system (Technical Guide – River & Stream Systems: Erosion Hazard Limit, MNR, 2002)**

2) FOR THE PURPOSE OF CHAPTER 4 – REGULATION POLICIES

According to the Ministry of Natural Resources' and Conservation Ontario's *Guidelines for Developing Scheduled Area* (2005), erosion hazard lands associated with river and stream systems (including lakes and their shorelines in the KRCA watershed) are in general terms, comprised of the following:

- Meander belt (no apparent river or stream valley) – maximum extent of the predicted river or stream meander belt
- Stream bank and slope erosion (apparent river or stream valley) – 100-year erosion allowance plus stable slope allowance

For the purposes of administration of Ontario Regulation 182/06, where the river or stream valley (including lake systems) is apparent (visibly evident) and has unstable slopes (i.e., slopes steeper than 3:1 (horizontal:vertical) or 5:1 if in sandy soils, with a height greater than 2 metres and/or subject to toe erosion) the erosion hazard shall be determined using the following criteria:

- Predicted stable toe of slope (including an allowance for 100-years of erosion)
    - Stream bank erosion analysis;
    - 100x average annual erosion rate based on interpretation of air photos with a minimum of 25 years of data; or where no study information is available,
    - 15 metres from the edge of the stream or river bank.
- Long term stable slope allowance (projected from the predicted stable toe of slope)
    - Geo-technical investigation; or where there is no study information available,
    - 3:1 slope (5:1 if sandy soils) using topographic survey.

For the purposes of administration of Ontario Regulation 182/06, where the river or stream valley is not apparent (not contained within a clearly visible valley section) the erosion hazard shall be determined using the following criteria:

- Maximum extent of the predicted meander belt of the river or stream
    - Geomorphological assessment; or where there is no study information available,
    - 20x channel bankfull width centred over the axis of the meander belt.

Appendix K – Floodplain Management (Special Policy Areas and Two-Zone Concept)

Special Policy Areas:

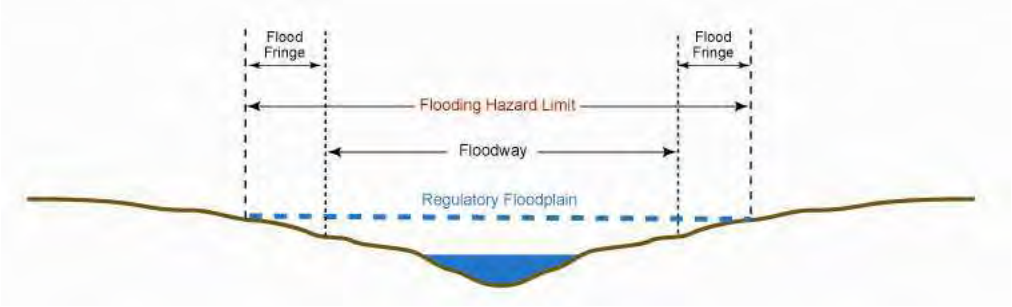
Special Policy Areas are areas where provisions are made to accommodate pre-existing and historical development that may have taken place in flood susceptible areas (e.g. Central Downtown Core Areas that were settled hundreds of years ago before the introduction of the PPS). SPAs are not intended to facilitate new or intensified development particularly where municipalities have the ability to develop outside of the floodplain. Where an SPA is warranted, approval is first required by the Ministers of Municipal Affairs and Housing and Natural Resources.

Generally, special policy areas may be considered where flood remediation strategies and the two-zone concept are not practical, and adhering to the one-zone concept will impose significant social and economic hardship to the historically existing flood-prone community. Where a special policy area is applied, the relevant agencies agree to reduce Provincial floodproofing standards and accept a higher level of risk. A special policy area is not intended to be considered on a lot-by-lot basis, but on a subwatershed or major reach basis considering several community related and technical criteria such as municipal commitment, designated growth centre, infrastructure investment, limited alternatives, flow characteristics, frequency of flooding, floodproofing measures, upstream and downstream effects, frequency of ice jams, berms and flood walls, and reduced flood standards. Currently, there are no approved special policy areas within KRCA's jurisdiction.

Two-Zone Concept:

Although there are currently no areas within the Kawartha Region watershed where two-zone concept provisions apply, KRCA may consider the application of the two-zone concept where appropriate and where such a request is supported by a Master Drainage Plan, Master Drainage Study or Subwatershed Plan. It is not the intention that a two-zone concept would apply across the watershed. A two-zone concept may be for considered for new infill development in existing settlement areas.

The two-zone concept separates the floodplain into two main components (floodway and flood fringe):



i. the floodway - the portion of the floodplain where development and site alteration would cause a danger to public health and safety or property damage; and
ii. the flood fringe - the portion of the floodplain that could potentially be safely developed or altered with no adverse impacts.

In addition to the above, the two-zone concept is not intended to be considered on a lot-by-lot basis, but on a subwatershed or major reach basis considering several community related and technical criteria as outlined by the Province including local need, changes in land use, administrative capability, constraints to the provision of services, frequency of flooding, physical characteristics of the valley, impacts of proposed development (flood levels at the site, upstream, and downstream), feasibility of floodproofing, and ingress and egress.

Appendix L – Floodproofing Guidelines

INTRODUCTION

Floodproofing is defined as a combination of structural changes and/or adjustments incorporated into the basic design and/or construction or alteration of individual buildings, structures or properties subject to flooding so as to reduce or eliminate flood damages. It is acknowledged that this term is somewhat misleading, since total protection from flood damage cannot always be assured. However, if applied effectively, floodproofing can play a significant role in comprehensive flood plain management.

Floodproofing is generally most appropriate in situations where moderate flooding with low velocity and short duration is experienced and where traditional structural flood protection, such as dams and channels are not considered to be feasible. Although measures can be applied to both existing and new developments, it is usually impractical, expensive and extremely difficult to floodproof existing buildings.

Since floodproofing is best incorporated into the initial planning and design stages, new development has the greatest potential for permanent structural adjustment. In general, floodproofing can be applied most economically and effectively in the design of new buildings in developing areas. It can also be applied to infilling situations and proposed additions in developed areas. However, as well as providing adequate flood protection, new development within developed areas will have to take into account special considerations such as the aesthetic blend with neighbouring properties.

Floodproofing, whether wet or dry should be no lower than the 1:100 year flood level. The only exceptions are in cases where an addition is proposed to an existing structure or there is one remaining infilling lot in a neighbourhood. In these instances, the floodproofing level should be no lower than the first floor levels of the existing structure or the adjacent structures.

TYPES OF FLOODPROOFING

All floodproofing measures can be described as active or passive and providing wet or dry protection.

Active vs Passive

Active floodproofing requires some action, i.e. closing watertight doors or sandbagging for the measure to be effective. Advance flood warning is almost always required in order to make the flood protection operational.

Passive floodproofing measures are defined as those that are in place and do not require flood warning or any other action to put the flood protection into effect. These include construction of development at or above the flood standard, or the use of continuous berms or floodwalls.

Dry vs Wet Protection

The object of dry floodproofing is to keep a development and its contents completely dry. Such can be carried out by elevating the development above the level of the flood standard or by designing walls to be watertight and installing watertight doors and seals to withstand the forces of flood waters. The benefit of elevated floodproofing is that it is passive and advance warning of an impending flood is not required. Temporary watertight closures, on the other hand, are considered to be active floodproofing usually requiring advance warning for operation.

Wet floodproofing is undertaken in expectation of possible flooding. Its use is generally limited to certain specific non-residential/non-habitable structures (e.g. arena, stadium, parking garage), but many of the techniques of wet floodproofing can be used with certain dry floodproofing approaches. The intent of wet floodproofing is to maintain structural integrity by avoiding external unbalanced forces from acting on buildings during and after a flood, to reduce flood damage to contents, and to reduce the cost of post flood clean up. As such, wet floodproofing requires that the interior space below the level of the flood standard remain unfinished, be non-habitable, and be free of service units and panels, thereby ensuring minimal damage. Also, this space must not be used for storage of immovable or hazardous

materials that are buoyant, flammable, explosive or toxic. Furthermore, access ways into and from a wet floodproofed building must allow for safe pedestrian movement.

For new development, dry floodproofing above the level of the flood standard can generally be economically and easily achieved in the design and early construction phase. However, dry floodproofing of structures which will have portions below the level of the flood standard will require additional special design attention so that the structure will resist all loads including hydrostatic pressures.

TECHNICAL CONSIDERATIONS

Once flood waters enter a development, the risk of loss of life and flood damage will be determined by the location of the habitable portion of the buildings. The habitable portion of a structure is defined as living space intended for use by the occupant with the key concern being overnight occupancy. This includes buildings used for residential, commercial, recreational, and institutional purposes. In considering appropriate floodproofing measures, the habitable portion of the building should be designed to eliminate or minimize the risk of flood damage and loss of life.

As a rule, damages increase rapidly with the depth of flooding. Major structural damage occurs when a structure is weakened, totally collapses or is displaced. Damage to contents, such as finishes, trimwork, furniture, appliances, equipment and storage materials, also represents a substantial portion of the total loss. In addition, it is difficult to assign a dollar value to compensate for human suffering caused by a flood.

Thus, protection to at least the level of the flood standard is significant in reducing human suffering and property damage. In selecting between wet or dry flood protection, consideration must be given to the type of development, need for floodproofing and cost effectiveness. Further, selection of active or passive measures will depend on location of the habitable portion of the development below or above the level of the flood standard, local flood warning, and accessways.

As well, all mechanical and electrical systems should be designed and installed so that the heating, lighting, ventilation, air conditioning and other sys tems are not vulnerable to flood damage during the flood standard. Where flooding could interrupt key power supplies, it may be necessary to provide stand-by or backup systems, with power and controls located above the level of the flood standard.

In order to determine the most appropriate floodproofing measure, the full extent of the flood hazard must be evaluated. This section outlines technical considerations which can assist in determining the most suitable floodproofing measure.

(1) Flooding as a Threat to Life

Hazard to life is linked to the frequency of flooding, and to depth of flood waters and the velocity of flow in the floodplain. Depth increases buoyancy and velocity increases instability, so that each of depth and velocity should be studied independently or as a combined function.

a) Depth

Any person in the midst of a flooded area will be acted upon by a buoyant force equal to the weight of water displaced by that person. The volume of displaced water and this force increases with depth until neutral equilibrium is reached and the person begins to float.

Average adults and teenage children remain stable when standing in flood depths up to about 1.37 m (4.5 ft). The average school child 6 – 10 years old would float at about 1.1 m (3.5 ft), although smaller, younger children in this range would float at a depth of about 0.98 m (3.2 ft).

Hence, in terms of depth and individuals who could be present in the floodplain during a flood:

- depths in excess of about 0.98 m (3.2 ft) would be sufficient to float young school children;
- a depth of about 1.37 m (4.5 ft) is the threshold of stability for teenage children and most adults.

(b) Velocity

Moving water in the floodplain exerts a lateral force resulting from momentum thrust of the flood flow. This force acts to displace objects in a downstream direction. The shear force of friction of a person on the wet

surface of the floodplain resists this force. However, even relatively low velocities of flow in the floodplain can pose possible flood hazards.

The force exerted by various flow velocities can be developed for different age and size groups, but because its effect is tied to depth, a better appreciation of velocity effects can be gained by looking at both depth and velocity in combination.

(c) Combination of Depth and Velocity

As a guide for personnel involved in stream flow/depth monitoring, the simple "3 x 3 rule" was developed in the U.S. based on 3 ft depth and 3 ft/s velocity values. The rule suggests that people would be at risk if the product (multiple) of the velocity and the depth exceeded 0.8 m^2/s (9 ft^2/s).

The Water Survey of Canada has the same rule of thumb and its Hydrometric Field Manual (1981) states, "a general rule of thumb which has been used in the past is arrived at through the product of the depth and velocity. Generally speaking, if the bed is firm and provides good footing, the product of these two factors should be slightly less than 1 m^2/s, or roughly 9 ft^2/s".

It should be noted that this rule of thumb applies to trained professionals whose regular work accustoms them to the dynamic forces of river flows, buoyant forces from partial submergence and recognition of potential hazards, e.g. rocks, depressions, etc. They also enter the stream with equipment which will assist them in maintaining stability, e.g. tag line, wading rod, strap-on cleats for greater stability.

It is considered highly unlikely that such equipment would be available to most occupants of floodproofed buildings in the flood plain. It seems equally unlikely that these occupants would have the same level of experience as water survey staff in dealing with high depths, current speeds, unsteady footing, or cold weather/water conditions.

As a result, it is likely that the simple rule of 3 x 3 product (1 m^2/s or 9 ft. $^2/s$) represents an upper limit for adult male occupants in the flood plain and that it would be reasonable to consider something lower as being more representative of a safe upper limit for most flood plain occupants.

As noted earlier, any person on foot during a flood may be subject to a number of forces in the floodplain. Excluding impact by ice and/or other debris, these forces include:

- an upward buoyant force, equal to the weight of the fluid displaced;
- a lateral force exerted by the moving water (linear momentum); and,
- unbalanced hydrostatic forces.

Resisting these forces are:

- the shear force of friction acting through the weight of the person standing on a wet surface in the floodplain.

Adults of average size would fall into the range between 976 -1952 kg/m^2 (200 - 400 lb/ft^2) but young children would more appropriately fall into a range of 732 - 1464 kg/m^2 (150 - 300 lb/ft^2). Only 7% of Ontario's population is within the 6 - 10 year age range, i.e. young children (Statistics Canada, 1981).

The coefficient of friction between foot apparel and wet grass, gravel, bare soils, pavements or other wet surfaces under flood conditions is not well known. A standard table of friction coefficients suggests that friction factors in the order of 0.3 to 0.6 could be characteristics of the ratio of the force to body weight required to initiate movement over unlubricated, dry surfaces. It is assumed that a lower friction factor range would be representative of the same state for a person standing on wet grass or pavement under flood conditions.

Any flood plain situation giving velocity and depth conditions lower than the appropriate curve for that individual is one where that person would be in a stable condition in the flood plain. Conditions of velocity or depth exceeding the appropriate stability curve would be unstable conditions for the same individual.

It is also appropriate to note that this analysis is based on a person standing still in the flood plain. Once a person begins to move to install floodproofing measures or leave the flood-prone area, stability is reduced further.

At low velocity but depths greater than 0.9 - 1.2 m (3 - 4 ft), most individuals would become buoyant. Similarly, in areas where flood plain depths may be less than 0.3 m (1 ft) but where velocities exceed 1.5 - 1.8 m/s (5 - 6 ft/s) encountered on roadways or bridge crossings, for example, stability conditions would be exceeded and some individuals would be swept off their feet.

Although no product rule exactly defines this region, a reasonable approximation of the low risk area can be made with a product rule that includes some constraints on the domain of depth and velocity. For example, a product depth and velocity less than or equal to 0.4 m_2/s (4 ft_2/s) defines the low risk area providing that depth does not exceed 0.8 m (2.6 ft) and that the velocity does not exceed 1.7 m/s (5.5 ft/s). By contrast, in a situation where the depth and velocity are 1.1 m (3.5 ft) and 0.3 m/s (1 ft/s) respectively, the product is less than 0.4 m_2/s (4 ft_2/s) but the depth limit is exceeded. Hence, these conditions define a high risk area for some individuals.

It is evident that this approximate classification is somewhat conservative; but until further research is undertaken, it provides a reasonable factor of safety for all individuals - young and old - who may be present in the floodplain.

(2) Duration of Flood

The duration of a flood or the length of time a river overflows its banks, reaches its crest and recedes to within its banks depends on the efficiency of the river to transport the flood waters. Since the size of the watershed, time of concentration and duration of a flood affects the type of impact and pressure on the development, floodproofing measures must be designed to withstand these forces for the required period of time.

(3) Rate of Rise and Fall

The rate of rise and fall of a flood to and from its crest can affect the type and extent of floodproofing. For example, where the rise and fall are very sudden, there may not be time to implement active floodproofing measures, such as watertight seals and doors and thus these approaches would be deemed unacceptable. The rate should also be considered in investigations of slope stability for certain types of soils where a quick drawdown of flood waters may pose problems.

(4) Flood Warning System

The availability of advance warning can play an important role in determining the most appropriate measure. Where active floodproofing procedures are contemplated, lead time for implementation of appropriate protective measures and devices must be related to the amount of advance warning.

(5) Structural Integrity

When buildings and structures are surrounded by flood waters, they cause unbalanced pressures and loadings on all wetted surfaces, which increase rapidly with depth. Unbalanced pressures can cause structural and sub-structural damages which can completely collapse or displace the development. In order to design the most appropriate floodproofing measures, it is important to determine the effect of stresses on the proposed building.

The stresses imposed on a building are due to hydrostatic, hydrodynamic and impact loadings, depending on its location. Hydrostatic loads are developed by water that is either still or moving at a low velocity. These loads may be defined as acting vertically downward (i.e., on floors), or vertically upward (i.e., uplift), or laterally when acting horizontally on walls. Hydrodynamic loads results from the flow of water against or around a structure at moderate or higher velocities. These loads are directly dependent on the velocity of flow, and can also adversely affect the floodproofing measures by causing erosion and scour. Impact loads are caused by water-borne objectives, debris and ice. Their effects become greater and more crucial as the velocity and weight of objects increase. Impact loads are difficult to predict and define accurately. However, a reasonable allowance can be made with the knowledge of the conditions of the site.

(a) Superstructures (Above Ground)

Hydrostatic Loading Effects

Until the mid-1970s, it was assumed that standard design and construction practices - without modification - would be adequate to ensure that floodproofing by closures and seals could be conducted to moderate depth/ hydrostatic loading without threatening the structural integrity of the above ground/superstructure of most buildings. However, various research by the U.S. Corps of Engineers over the years, has suggested otherwise.

Studies on structures of conventional design have determined that:

- brick veneer, frame structures (such as a typical home) would resist hydrostatic loading up to about 0.8 m (2.5 ft) without damage;
- concrete block structures with limited or no reinforcement (such as the small warehouse building) displayed similar resistance characteristics and would not be damaged by hydrostatic loading up to 0.8 m (2.5 ft). Above this at 0.9 and 1.2 (3 and 4 ft) depths deflection and cracking became significant;
- solid brick structures responded in a similar manner. Tests with these also included end and side walls and walls with and without door openings. Walls with ceiling joists (with and without door openings) werefound adequate to resist loadings to about 0.8 m (2.5 ft). Walls with ceiling joists provide much stronger, but failed explosively when 2 x 4 supports were snapped; and,
- poured concrete walls were not tested, but from experience with other structural designs it was presumed that conventional design techniques would prove adequate against hydrostatic loads to at least 0.9 (3 ft).

Therefore, 0.8 m (2.5 ft) would appear to be the upper limit of effective flood depth (static plus equivalent hydrodynamic head) which can be resisted by conventionally designed structures without affecting structural integrity.

Studies on structural integrity during flow conditions have also given an appreciation of the permeability of conventional structures, in that:

- brick structures of conventional design begin to leak almost immediately and badly, when in contact with flood waters; and,
- concrete block structures of conventional design also leak badly at a rate that exceeds that of brick structures.

Tests also conducted to determine if materials or surface coatings would enhance water tightness found:

- no clear sealants (e.g. epoxy) were completely effective;
- no asphaltic material was completely effective;
- embedded roofing felts with polyethylene sheeting laid between a second brick course were found effective - but exceptionally stringent quality control of workmanship was required (particularly at joints);
- flood shields/bulkheads also presented difficulties and were for the most part ineffective unless designed especially with gaskets, smooth surfaces and locking bolts; and,
- certain thick, non-tear materials can be used as external “wrappings” to effectively seal buildings against infiltration. These are very special materials and fall into the category of “active” measures vs “passive”, permanent measures.

In summary then:

- conventional designs are not water resistant/waterproof for even low depths of flooding;
- new structures should be designed from scratch for complete water tightness (or if not completely watertight must incorporate an internal system to collect and remove water seepage); and,
- new structures using conventional designs can be made watertight (without re-design) but the only proven approach so far uses external “wrapping”.

Erosion

Flow velocities which will cause erosion of grass covered slopes or erosion around foundations are difficult to determine. Factors such as type of cover, slope and soil conditions must be taken into account. For most common situations, the range lies between 0.8 m/s and 1.2 m/s (2.5 ft/s and 4 ft/s) for easily eroded soils and 1.1 m/s to 1.5 m/s (3.5 ft/s to 5 ft/s) for more erosion resistant soils.

Impact Loading and Debris Accumulation

This aspect of structural integrity has not been studied in the field because it is practically impossible to establish velocity/depth limits associated with loadings caused by debris accumulation and the impact of floating objects on the flood plain. The nature of debris accumulations and size and shape of floatables simply varies too significantly.

Ice, debris and other floating materials can result in significant impact loading on buildings within the flood plain or increase the loads on buildings as a result of blockage. Although these loads are difficult to estimate a reasonable allowance must be made in design. Sites where the potential for such loading is high should simply be avoided or buildings should be designed/ landscaped to intercept/deflect materials before the building is affected.

In cases where floodproofing is achieved by elevation on columns or piles, the clearing space between the columns or piles should measure perpendicular to the general direction of flood flow and should be adequately designed to minimize possible debris blockage. The open space created below the level of the flood standard should remain essentially free of more buoyant or hazardous materials.

(b) Substructures/Basements (Below Ground)

Based on normal (conventional) construction methods, any hydrostatic head in excess of 0.2 m (0.7 ft) may result in damage to basement floors (i.e. the upward force of groundwater on the basement floor).

Even where the basement of a single storey brick or masonry structure has been structurally reinforced and/or made watertight, structural integrity or buoyancy may pose problems when groundwater (saturated soil) levels are 1.2 - 1.5 m (4 - 5 ft) above the level of the basement floor. Much depends on the duration of the flooding, type of soil and the presence/effectiveness of the drainage system.

(6) Vehicular Access

Little or no information exists in the literature regarding ingress/egress criteria for vehicles.
The question of safety for the passage of vehicles can be subdivided into:

- flood depth and velocity considerations affecting egress of private vehicles from floodproofed areas; and,
- flood depth and velocity affecting access of private and emergency vehicles to floodproofed areas.

(a) Private Vehicles

In general, water contact is one critical issue in terms of its effect on the ignition/electrical system and the exhaust system. In the former, the distributor and/or spark plugs are the main items of concerns and those which are typical problem areas for most motorists.

Private vehicles come in all shapes and sizes and it is practically impossible to identify “typical” vehicles for assessing the elevation of key electrical components from the road surface. It appears likely that a depth of about 0.4 m - 0.6 m (1.5 - 2 ft) would be sufficient to reach the distributor or plugs of most private vehicles. They would fail to start at this depth and hence vehicular egress will be halted. Cars may start at lower depths but then “splash” from driving on wet pavement or from the radiator fan would become a concern.

The issue of the exhaust system and the effect that flooding can play on engine back pressures/expulsion of exhaust gases appears to be the controlling factor. Difficulty would probably be experienced in starting most vehicles if the vehicle is standing in water at a depth that covers the muffler. The vehicle may start and continue to run if it is quickly removed from the water but if remains at that depth, there is a strong possibility that it will fail soon after.

Again, it is practically impossible to generalize this depth but for most family automobiles something in the range of about 0.3 m - 0.4 m (1 - 1.5 ft) would be the maximum depth of flooding before potential egress problems would result.

A "typical" North American car would not be significantly affected by velocities up to about 4.5 m/s (15 ft/s) or more at flood depths at less than 0.3 m (1 ft). At running board depth or slightly above 0.3 m (1 ft) the maximum velocity for stability drops to about 3 m/s (10 ft/s) and at about 0.4 m (1.5 ft) depth an average vehicle may be displaced by velocities as low as 0.3 - 0.6 m/s (1 - 2 ft/s), with smaller vehicles becoming buoyant.

(b) Emergency Vehicles

Emergency vehicles operate under the same constraints relating to the electrical/exhaust system. Most police vehicles and ambulances would be limited by exhaust considerations, although emergency vans are better equipped to avoid splash problems since the key electrical components are higher above the road surface.

Diesel fire vehicles with top exhausts appear best suited for flood conditions. Their road clearance is high and it is suggested that 0.9 m -1.2 m (3 - 4 ft) of flood depth would not present a problem. These vehicles are about 10 times heavier than most automobiles and hence are resistant to displacement by higher velocity flood flows. Operations at velocities in excess of 4.5 m (15 ft/s) would probably not pose a problem when these vehicles are moving over a good/non-eroding base.

(7) Portable or Mobile Buildings and Structures

A portable or mobile building is one that is not permanently tied or anchored to a foundation and can be transported by means of a hauler. Portable or mobile buildings can be located on individual sites or in a park or subdivision. They can be used for temporary purposes, such as for construction crews or as full-time residences/seasonal homes with overnight occupancy.

When located in flood plains, portable or mobile buildings are highly susceptible to flood damage. Since they are not affixed to a permanent foundation, flood waters may easily sweep such buildings off their sites. Without advance warning, residents can be entrapped in the building. In addition, portable or mobile buildings can increase the flood hazard as they collide with other structures or block bridge openings or culverts. Despite this, portable or mobile buildings often are located in flood plains because:

- flood plain land acquisition costs may be lower;
- swamp conditions and higher water table which prevail in flood plain areas may preclude construction of permanent homes with basements; and/or,
- potential recreational access by locating close to the water's edge.

Ideally, portable or mobile buildings should not be located in the flood plain. However, when located in the flood fringe, they should be properly floodproofed to the flood standard, in order to prevent flotation, collapse and lateral movement. Due to the inherent hazard of remaining in a mobile building during a flood, contingency plans indicating escape routes and alternative vehicular accessways should be prepared.

Where the portable or mobile building is on site temporarily, it may not be feasible to meet all the requirements for floodproofing. In such cases, temporary location of portable and mobile buildings in the flood fringe may be considered where the time frame is very short and sufficient flood warning would allow the structure to be hauled away in advance of the flood.

(8) Floodproofing Complexity

The complexity of floodproofing techniques (and to a degree the cost) is best related to depth and type of floodproofing considered.

(a) Closures and Seals

It appears that external walls can be floodproofed by closures and seals to a flood depth of about 0.8 m (2.5 ft). Beyond this depth, structural integrity is threatened and special reinforcing or revised designs (with poured concrete walls for example) are required.

Dry floodproofing to this depth can be completed with the use of impervious external "wrappings". These contingency wrappings are anchored beneath the ground surface along the foundation and rolled upward and hung into place along the walls of building prior to flooding. Equivalent dry floodproofing using internal sealants, doubled walls, etc. with flood shields at openings is more complex, expensive and uncertain as to effectiveness.

Basements can be closed and sealed to levels of about 1.2 - 1.5 m (4 - 5 ft) above the floor slab with poured concrete designs employing additional reinforcement and special attention to monolithic construction. Beyond this level, the procedure becomes complicated as buoyancy/uplift must be addressed through anchors and/or added wall and slab thickness.

Overall, closures and seals is fraught with possible problems and is considerably more complicated than other floodproofing approaches.

(b) Elevated structures

Structures on Fill

Floodproofing on fill is generally considered for slab on grade construction. It is not a complex procedure and conventional building techniques are employed once the pad is down. The principal concern is fill compaction which must usually be done in 0.2 - 0.3 m (0.5 - 1 ft) lifts. Beyond 0.6 - 0.9 m (2 - 3 ft). however, pad sizes increase, compaction requirements become more important and an engineer or soils consultant should be employed for design review and inspection. Increased elevation may also lead to requirements for pad sizes in excess of lot size and, hence, additional requirements for erosion protection, etc.

Houses with conventional basements can also be placed in fill to elevate the first floor to a level about 2.1 - 2.4 m (7 - 8 ft) above grade (i.e. the basement is founded on grade and the basement walls are surrounded by fill). At 1.2 - 1.5 m (4 - 5 ft) above grade, the procedure is complicated by the need for wall and slab reinforcement, and anchors to prevent buoyancy.

Elevation on Columns, Piles, Piers and Extended Foundation Walls

Elevated structures using these techniques must be designed with consideration for debris loading, orientation of supports, effective submergence on foundation soil conditions and anchorage, bracing and connection details, availability of mechanical equipment, etc. In most instances, an engineer should be consulted to ensure that the possible effects of flooding are considered in the design. There are more factors to consider than conventional house construction on fill and, hence, these approaches could be considered more complex.

The majority of elevated buildings use posts for support (steel or timber). Installation becomes more complex at lengths in the range of 3.6 - 4.8 m (12 - 16 ft) since machinery is needed for installation. A range of 3 - 3.6 m (10 - 12 ft) seems typical for most homes which use extended posts.

Mechanically-driven piles are reported to be the best solution if severe erosion is anticipated. Pile driving equipment and skilled operators are at a premium and, because of the initial expense, this technique may be too complex/unnecessary for flood depths less than 1.5 - 1.8 m (5 - 6 ft).

Piers/columns are generally constructed with brick, concrete block or poured concrete. The common elevation range for each of these approaches is as follows, beyond which increasing complexity is assumed:

- 0.4 - 1.8 m (1.5 - 6 ft) for brick piers;
- 0.4 - 2.4 m 91.5 - 8 ft) for reinforced concrete masonry piers; and,
- 0.4 - 3.6 m (1.5 - 12 ft) (or more) for poured in place, reinforced concrete piers.

Extended foundation walls make a relatively simple and effective foundation for elevated structures but again must be designed with consideration for loads and pressures anticipated in the flood plain.

Berms and Floodwalls

Berms (or levees) and floodwalls used for floodproofing are low structures built around single homes or individual industrial complexes. Property design is more complex since material and construction practices must be closely monitored, they must be regularly maintained (in the case of berms), and they usually require adequate pumping facilities to handle interior drainage and seepage. Both berms and floodwalls usually have some opening for access and consideration must be given to closure.

In many instances, berms and floodwalls should be designed by qualified professional engineers.

Intentionally Flooding a Building (Wet Floodproofing)

Intentionally flooding a building for the purpose of balancing internal and external pressures so as to maintain structural integrity is in itself not complex. To ensure minimal damage and quick clean up, a number of conditions have been placed on the use of wet floodproofing by agencies such as Canada Mortgage and Housing Corporation. Requirements include:

- at least two openable windows located on opposite sides of the building;
- tops of window sills to be not less than 150 mm below grade (to allow flood water into the basement);
- basements to remain unfurnished and contain nonhabitable space only;
- mechanical and electrical equipment, heating units and duct work to be located above the flood standard; and,
- sump pump required.

While wet floodproofing may be designed and provided for in a building, there is no guarantee over time that the requirements will be maintained. In particular, it is difficult to control the "finishing off" of basements which would then result in damages when wet floodproofing measures were put into effect. Therefore, while wet floodproofing may appear desirable initially, the ability to ensure the principles and requirements of wet floodproofing are maintained in the future must also be considered.

Above taken from Appendix 6: Floodproofing of Technical Guide – River & Stream Systems: Flooding Hazard Limit, MNR (2002).

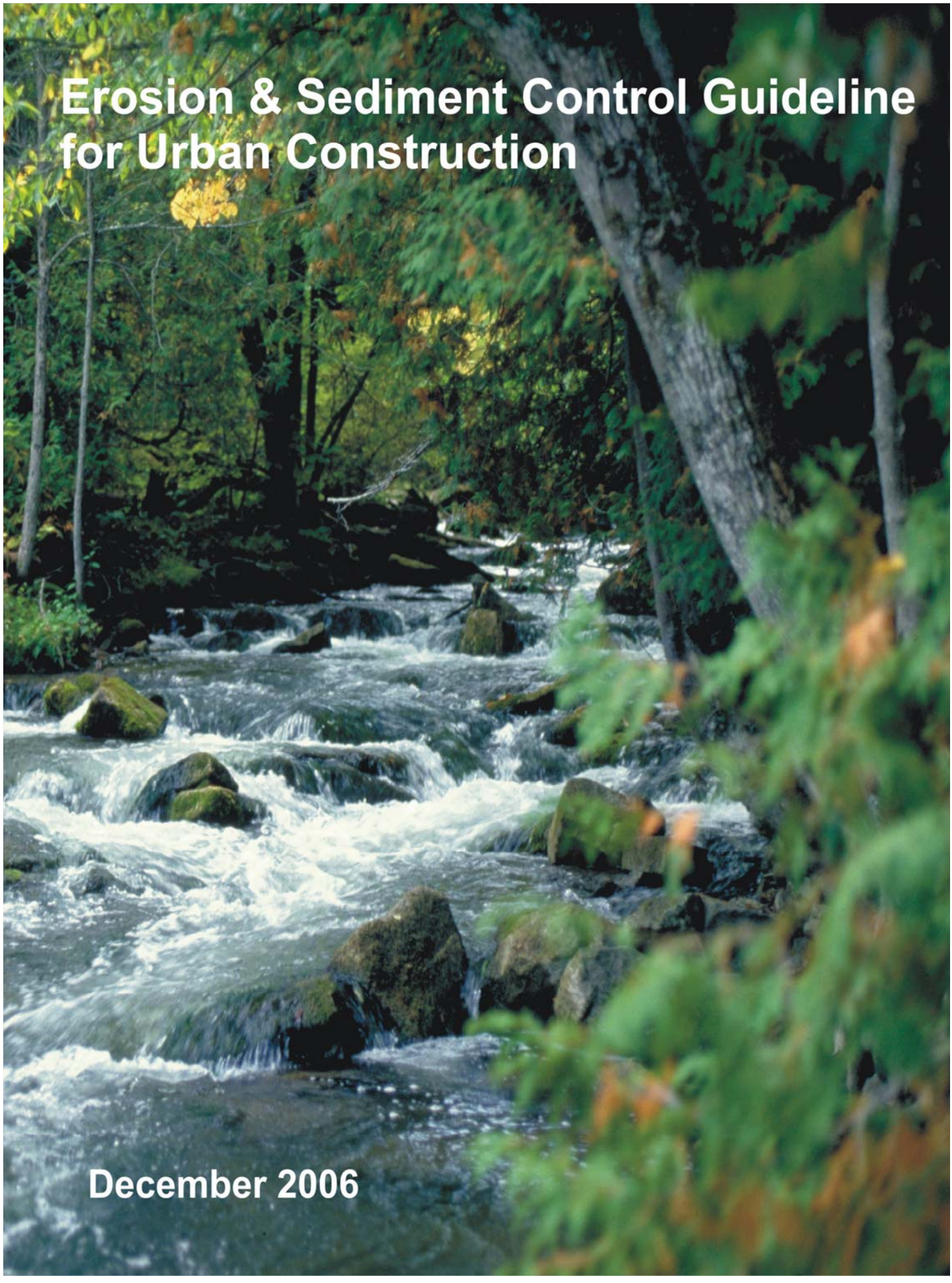
Appendix M – Guidelines for Conducting Environmental Impact Studies

(To be completed)

Appendix N – Erosion and Sediment Control Guidelines

(To be completed)

Erosion & Sediment Control Guideline for Urban Construction



December 2006

EROSION & SEDIMENT CONTROL GUIDELINES FOR URBAN CONSTRUCTION

DECEMBER, 2006

These erosion and sediment control guidelines have been prepared for common usage in an effort to coordinate the response of various municipalities and agencies involved in land development, construction and water management. While a wide variety of sediment control manuals exist in various North American jurisdictions, this document was created with regard for the principles and guidelines that best suit the Greater Golden Horseshoe Area Conservation Authorities (GGHA CAs), which are listed below.

Greater Golden Horseshoe Area Conservation Authorities

The “Greater Golden Horseshoe Area Conservation Authorities’ Erosion and Sediment Control Guideline for Urban Construction” is intended to be applied within all member municipalities encompassed within the GGHA watersheds to protect and preserve the water quality, aquatic and terrestrial habitats, and form and function of their natural water resources. It was prepared to include best management practices from all of the various erosion and sediment control guidelines currently applied by municipal and provincial agencies within the Greater Golden Horseshoe Area (GGHA) with additional information from various sources. This guideline provides a consistent approach to erosion and sediment control (ESC) in the GGHA. It provides the practitioners with greater certainty in the application of ESC along with improved environmental protection.

The document has been reviewed by the GGHA Conservation Authorities, Fisheries and Oceans Canada, Environment Canada, and Ontario Ministry of Natural Resources and provides sediment control practices and mitigation measures, which if implemented appropriately, are meant to provide guidance to be used by the proponent and practitioners. It is the responsibility of the proponent and practitioners to stay up to date with current best management practices available. It is also the proponent’s and their representing agents’ responsibility to understand the sensitivity of the receiving ecosystem along with the level of protection provided by the different erosion and sediment control practices and to develop an erosion and sediment control plan that is appropriate for protecting the ecosystem. The advice in this document is related solely to erosion and sediment control at urban construction sites in the GGHA and it should be noted that this document does not release the proponent or practitioner from responsibility for obtaining any permits, approvals or authorizations required under federal, provincial or municipal legislation for any aspects of their plan, work, undertaking or activity.

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The Great Lakes Sustainability Fund is a component of the Federal Government's Great Lakes program. The Sustainability Fund provides resources for demonstrating and implementing technologies and techniques that help remediate Areas of Concern and other priority areas in the Great Lakes. The following report sponsored by the Great Lakes Sustainability Fund, addresses Erosion and Sediment Control issues within the Greater Golden Horseshoe Area Conservation Authorities. Although the report underwent technical review, it does not necessarily reflect the opinions or views of the Sustainability Fund or Environment Canada.

The Conservation Authorities also wish to thank Environment Canada and the Ministry of the Environment for their generous support for the Erosion and Sediment Control Guideline through the Toronto and Hamilton Remedial Action Plans (RAPs).

We would also like to acknowledge the valuable comments received from municipal staff, consultants and the development industry representatives.

DISCLAIMER

The guidelines and procedures presented in this document are meant to serve as useful information that can be used to address erosion and sediment control (ESC) issues that result from urban construction activities. These guidelines and procedures should not be regarded as rigid, since those responsible for implementing them should employ innovative approaches that address site-specific conditions to protect the surrounding ecosystem. While the recommendations contained in this document have been researched and adopted from various ESC guidelines, no warranty, expressed or implied, is given on the accuracy of the document's contents or their extraction from reference publications. Nor shall the fact of distribution constitute any responsibility upon the GGHA Conservation Authorities, DFO, contributors, or others for any omissions, errors, or any possible misrepresentations that may result from the use or interpretation of the material contained herein. Mention of trade names or commercial products does not constitute endorsement or recommendation of those products. No financial support was received from developers, manufacturers or suppliers of technology used or evaluated in this document.

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1.0 Introduction

1.1 Background

Soil erosion occurs naturally as a result of the dispersive action of rain and the power of water and wind to initiate soil detachment and transport soil particles across the surface. The extent of erosion losses will depend on climate, topography, and the ability of soils to resist detachment and infiltrate water, but a good vegetative cover can largely offset the effect of these factors. Plant cover and natural vegetative residue protect the soil from the impact of raindrops, slows runoff and enhances infiltration of water.

Unfortunately, the substantial benefits of vegetative cover are lost during the process of land development, because trees and plants are removed, natural drainage pathways are altered and stable topsoil aggregates are stripped away as part of the grading process. If left uncontrolled, erosion of exposed soils can cause local air quality problems, degradation of aquatic habitats, and damage to downstream recreational areas and infrastructure. Monitoring in the Greater Toronto Area shows that suspended solid concentrations in untreated runoff from construction sites can be up to 30 times greater than that of stabilized residential areas and roughly 90 to 100 times greater than stream concentrations downstream of agricultural areas (SWAMP, 2005; TRCA and U of G, 2006; TRCA 2006).

The deleterious effects of excess sediment discharges on aquatic life are well documented (e.g. Waters, 1995; Newcombe and MacDonald, 1991). Effects on fish may include impairment to respiratory functions, lower tolerance to toxicants or disease, increased physiological stress, decreased reproductive success, and reduced vision, which inhibits their ability to find food. Migrating fish will avoid rivers with high suspended solids concentrations. Reduced light transmission caused by increased turbidity can also reduce primary production (plant growth) in streams, which can have important repercussions on community dynamics (Waters 1995). Spawning and egg incubation periods are particularly sensitive times, because sediment (especially clay and silt) may attach to the adhesive surface of eggs resulting in increased egg mortality (Ward, 1992). Excess sediment discharge to downstream watercourses may also have degradation on water quality, increase stream flooding, elevation levels of in-stream erosion influencing the geomorphic stability/instability of the watercourse channel, and reduce navigation in waterways.

Sediment control measures have been required on construction sites for over a decade. However, even on sites where recommended practices are applied, sediment continues to be discharged at concentrations above those required to protect aquatic life. In one Toronto area study, monitoring of a channel reach upstream and downstream of a construction site showed an average increase in suspended solids concentration of 500%. This increase in stream sediment concentration occurred even though runoff volumes from the construction site comprised less than 25% of total stream flow and sediment control practices were in compliance with interim guidelines (Greenland International and TRCA, 2001). Subsequent studies of temporary sediment control ponds draining construction sites reported similar results (TRCA and U of G, 2006; Clarifica, 2004). During one storm, peak effluent concentrations of suspended solids were over 100 times the target level.

Numerous guideline documents have been prepared since the 1980s, which emphasized the importance of protecting the natural environment during construction activities. Other documents include the technical guidelines produced by the Ministry of Natural Resources (MNR) in 1989. In the years that followed, there have been significant improvements to the application of erosion

and sediment control practices by the construction industry in the GGHA. While these are notable improvements that have effectively improved mitigation of environmental disturbances in construction projects, there have also been many examples of where adequate protection measures for the natural environment have not been diligently applied.

For example, the Ministry of Natural Resources (MNR) 1989 Technical Guideline provided a description of a variety of standard erosion and sediment control measures, which concluded that soil particles greater than 40 microns could be settled out from sediment laden runoff particularly within temporary sediment ponds. Removal of sediment particles less than 40 microns was considered not practical with any of the erosion and sediment control measures utilized at the time. It should be noted that soil particles of less than 40 microns in size are extremely difficult to remove from water once they have been suspended as sediment. However, the effects of the fine grained soil particles can be detrimental to aquatic habitat. Therefore, extra care should be taken to avoid erosion on construction sites, where soils less than 40 microns are found. Based on monitoring of recently designed sediment ponds, clay sized particles less than 4 microns in size can settle out of suspension (TRCA and U of G, 2006).

Field surveys of erosion and sediment control practices on construction sites have revealed a number of serious deficiencies in current planning and implementation (e.g. Greenland and TRCA, 2001). These include:

- The absence of development phasing in which only a portion of the construction site is cleared and graded at any one time;
- Long time lags between soil disturbance and soil stabilization;
- Unnecessary clearing of environmental sensitive areas, such as stream riparian buffers, steep slopes, wetlands and seeps;
- Inadequate maintenance of sediment controls (e.g. sediment ponds, etc.); and,
- Poor field inspection practices and ESC plan enforcement.

This Guideline is intended to help improve the practice of erosion and sediment control, and ensure that a well-defined process is in place to ensure ESC plans are prepared, implemented and enforced.

1.2 Guiding Principle

The pressures of urban development have large scale impacts to the natural environment and in particular aquatic resources and their natural corridors. Changes to the land use can decrease permeability, increase fine sediment inputs, impact on water quality and increase runoff. These changes create an unbalance in the natural processes and lead to increased flood events, reduce base flows, decrease habitat diversity and channel erosion. Sedimentation from construction activities is a major contributor to these problems. This added sediment contributes to the destabilization of watercourses that not only has extreme ecological costs, but results in the loss of property, costly infrastructure repairs and stabilization efforts that could take a lifetime to complete. It is everyone's responsibility to prevent construction related sediment from impacting aquatic resources and other natural features.

1.3 The Approach

An undermined or breached silt fence provides an obvious example of containment problems, but unfortunately, the signs and symptoms revealing more dire threats to sensitive environmental

features remain hidden until the project is well underway or complete. For this reason, all the parties involved, from the earliest assessment stages of a project right through to implementation, must have regard for the natural environment associated with the project. This common understanding of the environmental sensitivities will allow for the collaboration of individuals representing a diverse range of disciplines throughout the lifespan of a project. The outcome of this unified effort will be an effective implementation of erosion and sediment control strategies, an appreciable improvement in the prevention and mitigation of environmental impacts, compliance with regulatory responsibilities and more effective management of the fiscal aspects of the project.

It is important to consider that effective erosion and sediment control must move beyond the installation of devices such as silt fence and move towards an ongoing "process" within a project framework - from conception to construction. This would provide a framework where environmental issues are routinely discussed and addressed through specific design elements, influence on project schedule or navigating constructability issues. Shifting to a dynamic and integrated process of erosion, sediment control and environmental awareness will contribute greatly to eliminating oversights in the protection measures prescribed for the project and ensure adequate and responsible protection of the natural environment. The timely consideration of the environmental constraints will also significantly reduce delays in approval acquisitions, potential for severe environmental mishaps, costly restoration, along with impacts to project schedules and missed deadlines/delivery dates.

The best starting point for any project relating to urban development is to have a clear understanding of the proposed undertaking and the results of the undertaking on the surrounding environment. When an undertaking is clearly defined and the geographic boundaries delineated, a suitable assessment of the environmental features within the project limits can be determined. Environmental assessments tailored to capture the specific undertaking, will provide an understanding of environmental constraints and sensitivities. Such assessments require significant detail within the project to clarify the extent of sensitivities and resulting environmental constraints. Open discussions between the proponent and/or the proponent's agents and the regulatory agencies should be encouraged to ensure that the proposed level of effort and assessment components are sufficiently detailed to satisfy the approval requirements of the proposed undertaking. This is encouraged for all urban development projects, but should be applied particularly to large-scale, complex projects and those situated in sensitive natural areas.

Construction projects vary widely in type, size and complexity. There is usually a variety of professionals contributing at any stage of the project. Environmental studies including terrestrial, wetland and aquatic issues along with other aspects such as groundwater investigations, geotechnical, fluvial geomorphic and topographic surveys that were completed in support of an undertaking, will form the base of information that can influence the development of the design. In addition, these studies lead to the efficient acquisition of necessary approvals/permits and ultimately provide the operational constraints and details of construction. Skilled and experienced professionals in each represented discipline will consider the implications of the proposed undertaking and offer solutions that ultimately result in an environmentally sound and operational design. It is important to note that the professionals included in the design team often have regulatory agency and/or third party counterparts, who review the proposed undertaking in light of applicable governing legislation and specific interests. These perspectives and design elements are united by the project engineers, who integrate them into the final detail design and approval submission. Included as an integral part of the submission and a key component of this Guideline is an erosion and sediment control plan that has been developed by combining environmental site

conditions with all the construction elements required for an undertaking. The end product is an effective erosion and sediment control strategy.

1.4 The Focus

The following sections of this document are intended to provide proponents and practitioners with a review of erosion and sedimentation processes; an overview of the current regulatory framework in which these undertakings are reviewed; clarify the roles and responsibilities of those involved in the construction process; identify the elements of an effective erosion and sediment control plan and offer methods of the current erosion and sediment control measures routinely employed to protect natural environments within an urban construction project. The implementation of the developed erosion and sediment control plan including inspection and maintenance will also be addressed.

The Guideline will expand on methods to prevent erosion and minimize sediment transport through the multi barrier approach, create dynamic ESC plans, and improved inspection, monitoring and maintenance protocols. Easy reference tools such as tables and charts will enable all users of this guideline to make the appropriate decision, when preparing and implementing an ESC Plan within the GGHA.

1.5 The Purpose

The uniqueness of each construction project challenges the land owners, developers, builders, contractors, consultants, municipalities and regulatory agencies (conservation authorities, municipal, provincial, federal) to remain knowledgeable of the most current erosion and sediment control measures. In concert, those approaches with technologies currently in use must be critically evaluated for applicability and effectiveness. The effort to remain aware of new controls and installations improves the overall long-term performance of the ESC measures and provides protection for the environment.

It is the intent of this document to provide sufficient information to assist all parties in the prevention of erosion during the construction process, including dealing with suspended sediment at the source and minimizing sediment transport from leaving the construction site. Stringent inspections, monitoring, maintenance, and reporting protocols combined with improved installation methods and design improvements through the use of new technologies and combination of existing ESC measures will ensure an improvement to the overall performance of ESC measures.

The recommendations in this document are related to erosion and sediment control at urban construction sites within the GGHA, and it should be noted that this document does not release the proponent or practitioner from responsibility for obtaining any other permits, approvals or authorizations required under federal, provincial or municipal legislations for any aspects of their plan, work, undertaking, or activity.

The Guideline is intended to fulfill the following needs:

- Provide a consolidated statement of Regulatory requirements and expectation regarding ESC;
- Clarify the respective roles and responsibilities for all Regulatory agencies, land owners, developers, builders, contractors and consultants;

- Encourage awareness of and conformance with federal and provincial legislation and with municipal by-laws, permits and standards related to ESC;
- Improve communications among all parties responsible for ESC;
- Assist parties in recognizing the causes of environmental damage and the various means of mitigating the risks, thereby reducing the environmental impacts; and,
- Promote consistency, quality and continual improvement in the standard of efforts to protect the environment

For additional information on erosion and sediment control specifically for road improvement projects, it is suggested that the National Guide to Erosion and Sediment Control on Roadway Projects, May 2005, Transportation Association of Canada (TAC) be referenced.

The TAC document can be obtained via:

Internet: TAC online bookstore: www.tac-atc.ca/english/projectsandpublications/bookstore.cfm

Email: publications@tac-atc.ca

Mail: Publications Department, Transportation Association of Canada
2323 St. Laurent Blvd.
Ottawa, ON, K1G 4J8

Telephone: Monday to Friday from 8:00am to 4:00pm
613.736-1350 ext. 221

This is a "living document" and will be updated periodically as new technologies and installation methods are tested and approved. All users of this Guideline should ensure the most up to date edition of the Guideline is utilized. The local Conservation Authority should be contacted to obtain the most up to date ESC Guideline.

Currently, the most up to date Erosion and Sediment Control Guideline can be found on the ***Sustainable Technologies Evaluation Program (STEP)*** website – www.sustainabletechnologies.ca.

2.0 Erosion and Sedimentation Processes

Erosion and sedimentation are naturally occurring processes that involve particle detachment, sediment transport and deposition of soil particles. Construction activities commonly alter the landscapes where they are located, exacerbating these natural processes. One of the most significant alterations encountered during construction is the removal of the vegetation that stabilizes the subsoil. In the absence of the vegetation, the underlying soils are fully or partially exposed to various natural forces such as rain, flowing water, wind, and gravity.

For the purpose of this guideline, **erosion** is defined as the physical removal or detachment of soil materials. The subsequent transport and deposition of these detached particles (sediment) from the source location by the action of a mobile agent is referred to as **sedimentation**. This guideline will address two common mobile agents: water and wind. The factors that influence the type and severity of erosion include vegetation cover, topography, soil erodibility/permeability and precipitation.

The transport of sediment overland and deposition into surrounding natural areas, including watercourses (fish habitat), woodlots and wetlands as well as adjacent private lands, needs to be prevented. The consequence of off-site movement of sediment from a construction site varies with the characteristics of the drainage pathways and the final area of deposition. In the case where the sediment is transported downstream through a watercourse, there can be significant negative affects to fish habitat, floodplains, water supplies, infrastructure, flood control, navigation and recreational activities.

Clearly, the best way to prevent sedimentation is to prevent erosion. This fundamental truth is the reason to understand the erosion potential of a site at every project stage. **Appendix A** lists the Ministry of Natural Resources Erosion Potential Reference Charts. In cases where the surrounding environmental features are sensitive, erosion control efforts should be effective and significantly constrain the approach to an undertaking including controlled vegetation clearing, which is usually conducted in phases and the utilization of unobtrusive construction methodologies. **Erosion prevention is the preferred mitigation measure for eliminating and/or reducing the potential for sedimentation.**

Understanding the influences that topography has on a site begins with an assumption that the larger the project area, the greater the disturbed surface area and consequently, the greater the influence that precipitation and resulting runoff has on a site. Topography is one of the factors that directs runoff and increases velocity and erosion rates. Where steep slopes are found within a project boundary, runoff may be accelerated down slope to receiving features such as watercourse, wetlands, swales and woodlots. In the absence of surface roughness both through the lack of vegetation or loose permeable surfaces, runoff velocities will be accelerated by gravity and the ability to attenuate storm events will be compromised. These conditions make the control of sediment nearly unattainable without significant planning, an effective sediment control strategy, contingencies, exhaustive maintenance, and costly restoration. Particular care should be taken when undertakings involve interconnected projects that mainly consist of construction activities on the landscape. The resulting overlap of large project areas with construction activities on the landscape can expose expansive tracts of land to construction related disturbances, thereby increasing the potential for environmental impacts. This concentration of construction can greatly influence the severity of the impacts to receiving natural features.

The ease at which soil particles come apart by water or wind is considered a measure of erodibility. The cohesiveness of a soil allows it to resist against the erosive forces acting against

the surface, such as demonstrated with most clays and compacted tills. Less cohesive particles like silt and fine sands not only come apart easily by water, but they also represent the characteristics of most containment methods. The small size of these particles challenges effective filtration by standard control measures. Filtration is the process of sediment laden water passing through a medium (e.g. geotextile, sand) with small voids. These small voids trap the targeted size range of sediment. The length of time these particles remain suspended is considerable and an extended detention time is required to allow for particle settlement. Settlement of the suspended soil particles occurs when the kinetic energy of the moving water is no longer sufficient enough to carry these particles against the forces of gravity and friction. When in motion, the suspension time of the particles in the sediment laden water is magnified and in the absence of containment could travel greater distances, which will amplify the environmental impacts.

Increasing runoff velocities allow for the detachment and transport of proportionately larger particle sizes. Large particles, such as gravel and coarse sand, settle out from the flow first. This is primarily encouraged through the use of containment measures, flow restrictions and velocity controls. These are often used in conjunction with a level of filtration. As noted above, smaller particles such as fine sands, silt, and clay-sized fractions require extended detention to be removed from suspension. Extended detention is the process of allowing the suspended solids to settle, through detaining the sediment laden water for a period of time within a basin such as a temporary sediment pond or storage container. There is usually a controlled outflow release rate for the containment method that allows for this extended time. In some cases a chemical flocculent can be introduced that reacts with suspended sediment and encourages their settlement, filtration and retention. This process of coagulation and flocculation allows for the settling out of very small soil particles.

To help maintain the cohesiveness of underlying soils and reduce runoff velocities, vegetation cover should be maintained to provide necessary roughness. Staging and scheduling of both construction activities and restoration efforts are pre-requisites for this preferred method of erosion control. Buffer strips between an undertaking and surrounding natural areas are often part of erosion control and in some cases a recommendation of some approvals. The extent of these vegetated areas needs to be protected fully from construction impacts, unless previously approved for such cases as with some dewatering operations. Vehicular traffic within a construction site should also be restricted to ensure that disturbances from machinery are controlled.

For underlying soils exposed through vegetation removal or excavation, alternative erosion prevention measures should be implemented where practical. Steps should be taken to reduce runoff volumes.

Once the soil particles have been suspended by water and begin to move off-site, the true challenges of sediment control begin. With measures being taken to prevent erosion and reduce runoff volumes, the next efforts are dedicated to containing active work areas including in-stream construction activities and dewatering operations from land based operations, such as the discharged water from pumping operations. Containment of the construction site is achieved through the use of sediment controls.

As mentioned above, erosion and sedimentation are naturally occurring processes that involve particle detachment, sediment transport and deposition of soil particles. These natural processes are connected to urban construction projects through a number of avenues. If construction activities are not effectively mitigated and contained, the exacerbation of these processes can contribute a significant amount of sediment to downstream watercourses. While it is true that

sediment is transported naturally in most watercourses as “bedload”, artificial inputs from construction can upset the natural balance of bedload distribution.

The discharge of high sediment loads to natural watercourses has major effects on receiving waters and aquatic habitat. Some specific examples include:

- Degradation of water quality;
- Damage or destruction of fish habitat;
- Increased flooding;
- Elevated levels of in-stream erosion influencing the geomorphic stability/instability of the watercourse channel (channel width and depth as well as riffle and pool characteristics); and,
- Reduced navigation in waterways (aggradations).

Silt and sediment deposits and elevated levels of turbidity can cause a variety of harmful impacts to fish and fish habitat (DFO *et al.*, 2003) by contributing to the following:

- Reducing the diversity and abundance of bottom-dwelling organisms that fish feed upon;
- Blanketing spawning substrates such that they may not be suitable for spawning or food production;
- Reducing the survival of fish eggs by smothering the spawning beds and preventing the escape of hatching fry;
- Destroying aquatic vegetation that is buried by sediments;
- Clogging fish gills and damaging gill membranes; and
- Reducing the ability of fish to feed by sight.

The costs associated with the impacts of erosion and sedimentation both on and off construction sites can be quite significant. The costs can be more severe if critical elements have been missed in the design process and/or the identification of effective erosion control and sediment containment is implemented only after a significant environmental mishap has occurred. Consequently, there are even greater costs to a project that can be incurred for a development to address the impacts of erosion and sedimentation.

The costs associated with the impacts of erosion and sedimentation include, but are not limited to:

- Removal of sediment;
- Repair and stabilization of slopes and channels;
- Construction delays and stop-work orders;
- Charges and fines; and,
- Construction of new ecosystem habitat.

3.0 Regulations – Federal, Provincial, Municipal, and Conservation Authorities

There are extensive environmental legislations and regulations that have been enacted to guide construction activities away from natural environment impacts. It is from within these regulatory boundaries that a construction project must be considered at the beginning through to completion. Understanding the regulatory environment in which an undertaking is developed and implemented is critical in ensuring that every effort is made to acquire and comply with all the necessary approvals and permits.

The potential consequences of non-compliance with any such applicable legislation are extensive. These might include, but are not limited to:

- Increased regulatory scrutiny;
- Tarnished professional reputations;
- Construction shutdowns;
- Costs of additional assessments/restoration;
- Substantial legal costs;
- Monetary fines;
- Relinquished work permits; and/or,
- Imprisonment – in some cases.

It is important to note that the specific details provided below are not meant to be exhaustive as the intricacies of each undertaking are matched equally to the regulatory requirements. It is highly recommended that practitioners familiarize themselves with the specific details of all applicable legislations.

References to the Federal and Provincial legislations, Municipal bylaws and ***Conservation Authorities Act*** discussed in this Guideline are found in **Appendix B**. The Acts and By-Laws pertaining to erosion and sediment control are not limited to those listed in this Guideline.

3.1 Federal

The ***Federal Fisheries Act*** applies to urban construction activities in two primary ways: fish habitat and deleterious substance. The Act requires that fish and fish habitat are protected during all stages of construction. Commonly, undertakings will intrude into this realm where there is:

- Realignment or intrusion into a stream channel;
- Restrictions to fluvial processes;
- Impacts to riparian corridors;
- Infilling of lacustrine habitats, wetlands and coastal marshes;
- Channelizing and piping headwater inputs;
- Inputs of substances from construction deemed deleterious (harmful) to aquatic life; and,
- Dewatering operations.

The Fisheries Act Applies to all Canadian waters (public or private) that provide fish habitat or support fish habitat opportunities at any life stage and is intended to conserve and protect fish and

these habitats. This Act applies both to permanently wetted areas and those habitat features that are intermittently wetted. In addition to the naturally occurring fish habitat, this Act also may include manmade features. Through this legislation, management of physical, chemical and biological attributes, which are required by fish to carry out their life processes, can occur.

Two critical definitions within the Fisheries Act include:

> **Fish** (S. 21): Parts of a fish; shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals; and the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals.
>
> **Fish Habitat** (S. 34): Spawning grounds and the nursery, rearing, food supply and migration area on which fish depend directly or indirectly in order to carry out their life processes.

Of specific interest to some undertakings, the Fisheries Act prohibits obstructions to fish passage (S.29), destruction of fish unless authorized (S.32), and prohibits the intentional or unintentional release of deleterious substances (S.36). Defined in the act as:

> **Deleterious Substance** (S.34): A substance or water containing a substance that degrades or alters water quality to the determent of fish, fish habitat or use by man of fish found in the receiving water.

This can in many instances include construction related sedimentation. It should be understood that there can be no Authorization secured that allows for the release of a deleterious substance. It is also the responsibility of the party that owns the substance to report any release.

When an undertaking has the potential to impact on any of the constraints detailed in the Act, Fisheries and Oceans Canada – Ontario – Great Lakes area (DFO) is the governing agency that is consulted and who is ultimately responsible for issuing the binding Authorizations that are required to operate within this legal framework of the Fisheries Act. They are mandated to provide habitat conservation and protection.

Fisheries Act Authorizations allow for the “harmful alteration, disruption or destruction of fish habitat” or HADD (S.35). Authorizations are provided for a project when a proponent develops an appropriate mitigation and compensation strategy that is ultimately accepted by DFO. DFO requires that the proponent provide design details of the undertaking including the specifics of the mitigation and compensation agreement (S.37). These plans must be compliant with the intent of the Act and are legally binding components of an Authorization. Conservation Authorities provide a hub for the screening of the proposed undertakings. Building from this initial role, there is a hierarchy of agreements negotiated between DFO and the Authorities that allow for an increasing level of responsibility. At the highest level, the Conservation Authorities, as agents, can fully negotiate the mitigation/compensation measures as well as monitoring programs, review the design details and draft the Authorization. Through internal process DFO is kept aware of the particulars of the undertakings under review and upon receipt of the final plans, formally issue the Authorization.

In addition to Authorizations, DFO can issue a Letter of Advice regarding a particular undertaking that essentially acknowledges awareness of the undertaking and allows the proponent to proceed without the requirement of an Authorization with the caveat that the provisions detailed in the Letter are respected and all other permits secured.

In order to ensure compliance with the Fisheries Act, Fishery Officers and other DFO designates have the power of inspection and can direct works through an Inspector's Direction Order (S.38). With these powers, compliance with the conditions of the Authorization can be determined at any time at any location through site inspections.

Contraventions of Sections 35(1) and 36(3) include the following offences:

- Releasing or depositing deleterious substances (including sediment);
- Failing to report the release or deposit; and/or,
- Failing to mitigate or restore.

The ***Navigable Waters Protection Act*** (NWPA) is a federal statute that regulates a broad range of works that affect navigable waters. These coastal and inland waters are considered any body of water capable of being navigated by floating vessels of any description for the purpose of transportation, commerce or recreation. The provisions of this Act are meant to ensure the public right of passage on Canadian Waterways.

The NWPA would apply essentially to undertakings (structures, devices or things) that may interfere with navigation. Included in this would be any bridges, dams, pipelines, tunnels, power cables, docks and weirs. Also encompassed in this Act is the infilling of navigable waters or the removal of materials from the bed of navigable waters. Transport Canada is responsible to administer the Act.

The ***Canadian Environmental Assessment Act*** (CEAA) is the jurisdiction of the Canadian Environmental Agency, whose interest is to ensure environmental effects are identified and mitigated wherever possible. Not unlike the approach presented in the Guiding Principle (Section 1.2) of this Guideline, an objective of CEAA is to ensure that identification and assessment of environmental effects leads to the development of effective mitigation through the prescribed planning process. This process allows for the review of undertakings by other regulatory agencies and a decision is made on whether to let the project proceed. These agencies may include the Canadian Wildlife Service, Environment Canada, Ministry of the Environment, Ministry of Natural Resources and local governing bodies. This examination is intended to evaluate the environmental effects and proposed mitigation measures. There is an opportunity through this process for the prescription of conditions and provisions in other agency approvals. CEAA can be triggered for a range of public and private projects that are under review by other federal agencies such as DFO, Canadian Coast Guard, Transport Canada, as well as by projects fully or partially funded by federal reserves. Projects located on or potentially affecting Aboriginal lands are also a trigger of the CEAA review process. Approval through a CEAA review is directly tied to the release of all the federal permits, Authorizations and the approvals of all regulatory agencies.

Other federal legislation to be aware of include the Migratory Birds Convention Act, Endangered Species Act, Environmental Protection Act and the Canadian Wildlife Act.

The ***Species at Risk Act*** is expected to have an increasing effect on every stage of a construction project and in particular during the assessment stages. With a growing understanding of the distribution and biology of these species, operational constraints during construction will likely be more restrictive and the requirements for post construction monitoring will be extensive.

3.2 Provincial

The Ministry of Natural Resources (MNR) is the regulatory agency for a number of provincial acts and legislations that could apply to some undertakings. The ***Lakes and Rivers Act***, ***Provincial Policy Statements*** and ***Planning Acts*** can influence undertakings both during the development and completion of a project.

The Ministry of the Environment (MOE) is responsible for administering the ***Ontario Water Resources Act*** (OWRA). The purpose of the OWRA is to protect and manage the quality and quantity of surface and ground water. The OWRA prohibits discharging or depositing material in any water or on any bank that may degrade the quality of surface water such as rivers and streams (s.30). The Act also establishes an approval regime (S.30-33). This is generally encountered when there is a requirement for stormwater management associated with an undertaking. In this case it is recommended that the "Stormwater Management Planning and Design Manual, March 2003" be referenced.

The ***Oak Ridges Moraine Conservation Plan Act*** protects the ecological and hydrological integrity of the Oak Ridges Moraine Area. The purpose of the Oak Ridges Moraine Conservation Plan Act is to provide land use and resource management planning direction to provincial ministers, ministries (and agencies), municipalities, municipal planning authorities, landowners, and other stakeholders on how to protect the Moraine's ecological and hydrological features and functions.

Other provincial legislation to be aware of include the Permit To Take Water, Source Water Protection Act, and the Environmental Protection Act.

3.3 Conservation Authority and Municipal

Among their other roles, Conservation Authority staff are also involved with the technical review of erosion and sediment controls related to their regulations for construction activities or developments that interfere with wetlands, or alter floodplain and watercourse channels. Also, many Conservation Authorities (CAs) in the GGHA have entered into a memorandum of understanding (MOU) with their member municipalities. These MOUs, allow CA staff to review and provide comments and recommendations regarding site plan and subdivision plans and agreements with regards to stormwater management (water quality and quantity controls), watercourse and floodplain form and function, and overall area or site based ESC. However, the respective municipal staff will still maintain the lead role in approving ESC plans.

ESC plan review is conducted through the application process under the provisions of the Section 28 Regulations of the GGHA CAs. All conservation authorities in the province of Ontario administer a **Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation** under Section 28(1) of the ***Conservation Authorities Act*** (CAA). The areas regulated by a conservation authority are defined in the written text of their individual Regulation. Mapping of these regulated areas is typically used by the conservation authority to assist with the implementation of their Regulation. A permit from the local conservation authority is required for the straightening, changing, diverting or interfering in any way with the existing channel of a river, creek, stream or watercourse, or for changing or interfering in any way with a wetland; and for development within regulated areas if, in the opinion of the authority, the control of flooding, erosion, dynamic beaches or pollution or the conservation of land may be affected by the development. Development activities include the construction, reconstruction, erection or placing of a building or structure of any kind; 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; site grading, or the temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere.

The **Planning Act** authorizes municipalities to pass "Sediment and Erosion Control" Bylaws (S.142) that regulate activities and undertakings that disturb the natural ground conditions and alter soil sediment distribution (S. O. 2001, Chapter 25). This section is comprehensive and proactive in controlling land-disturbing activities early in the development process. Bylaws require permits to be secured for site alterations that routinely require environmental assessments and as a condition of approval erosion and sediment control plan and/or Environmental Control Plan. Additional requirements of the Planning Act may also control tree removal, maintenance of buffers, stormwater management, and restoration components. The applicable requirements of the Planning Act vary with both the jurisdiction and specifics of the undertakings and usually reveal themselves during the planning process.

Each municipality has its own process to allow earthworks and the construction process to be initiated either through a top soil bylaw, tree removal bylaw, site alternation permit or pre-servicing agreements. The ESC plan forms a key component of this process and the land owner is required to meet the conditions of the identified municipal approval process. The conditions of the approval generally include a letter of credit for a predetermined percentage of the cost to implement, maintain and decommission the ESC plan. Below is an example of wording that can be included in the municipal process to ensure the ESC devices are properly maintained throughout the development process:

"The Developer shall take the necessary precautions to prevent erosion and sedimentation of sewers, ditches, watercourses, culverts, slopes and other related features both within the plan and down gradient from the plan during and after the completion of construction. The Developer will be responsible for maintaining the erosion and sedimentation controls until assumption of the subdivision by the Municipality, correcting any damage, or paying the costs of same, caused by failing to take proper control measures. One hundred percent of the Erosion and Sediment control securities will be released to the developer/owner(s) at the time of subdivision assumption, provided the ESC measure(s) functioned according to plan and that all additional maintenance was provided by the owner."

4.0 Key Participants Roles and Responsibilities

The approach to the protection of the environment during construction requires that every person shares in the responsibility for that overall success. The extent of that responsibility is allocated to participants according to their respective roles. It is important not to forget that significant environmental mishaps can be tied to an event as simple as refuelling a bypass pump. Often critical responsibilities are held in the hands of the construction worker. This should highlight the importance of shared responsibility. This responsibility can be shared effectively through environmental awareness, training, quality control/assurance and compliance monitoring.

Table 1 summarizes the roles and responsibilities of each participant in the ESC process. Provisions from federal and provincial regulations, as well as municipal by-laws, enforce these responsibilities. The local municipality in coordination with the local Conservation Authority are generally the lead agencies in reviewing the proposed ESC plan and inspecting the initial installation of the ESC measures implemented for a construction site within their jurisdiction. Other agencies will become involved in the review and/or enforcement of ESC practices, if site conditions and/or construction activities are applicable under their respective legislation or regulations.

With an accepted level of responsibility, consideration must be given to the two often overlapping components: personal/professional responsibilities and legal liability. One of the most difficult messages to convey is the individual connection that we all have when involved in this process. This is due in part to its' intrinsic nature and the ways that each person respects their role with regard to the environment. Often this is personally measured against competing influences such as preconceived ideas, attitude, time and money. It can be demonstrated through project experience that increased environmental awareness can result in a better and more predictable "bottom line" while protecting resources. This awareness can be enhanced through construction experience, education/training and willingness. This Guideline intends to promote this awareness and provide an avenue for education. It is expected that this benefit will be immediately realized by those attending specific training sessions. It is also anticipated that this message will be emphasized in future undertakings and received by other project contributors.

As professionals, affiliation, accreditation and certification is sought through a variety of governing bodies and Associations such as the Professional Engineers of Ontario (PEO), Ontario Association of Certified Engineering Technicians and Technologists (OACETT), and Association of Professional Geoscientists of Ontario (APGO). Many of these organizations have codes of professional conduct and ethics that are relevant to environmental protection. The specifics should be researched by those encompassed by these groups.

Legal liability, as it relates to environmental protection, is directly tied to the specifics of the applicable regulations and laws in both secured permits, approvals and Authorizations as well as in action. Compliance with these constraints is often measured through demonstration of **"due diligence"**.

Due Diligence can be defined as:

> Such a measure of prudence, activity, or assiduity, as is properly to be expected from, and ordinarily exercised by, a reasonable and prudent person under the particular circumstances; not measured by any absolute standard, but depending on the relative facts of the special case. (Blacks Legal Dictionary)

Due diligence is also simply being able to demonstrate that every reasonable effort was made to ensure compliance. Compliance or the exercise of due diligence is determined through investigations and audits by regulatory agencies and/or independent parties.

Ultimately, the burden of erosion and sediment control is the responsibility of the owners or proponents of the undertaking because they are the parties driving the project and the potential environmental impacts. From this point, the partitioning of individual responsibility can commence. Logically, the owner shares liability for the undertaking with the professionals retained to manage the undertaking on their behalf. This responsibility is delegated within the project team and ultimately carried to the site level or construction phase by Contract Administrators, Contractors and Compliance Monitors.

Due diligence is strengthened throughout the design process and demonstrated on the ground during construction through an effective and practical erosion and sediment control approach. The protection of the environment and project success will be the proof of compliance. The execution of an undertaking is never that simple and the reality is “things” do happen. The next test of due diligence is whether or not those “things” were foreseeable, preventable and ultimately in whether the required action was conducted in a reasonable and timely manner. This level of protection is typically limited to the events surrounding construction and is enforced through “on the ground” inspections and environmental compliance monitoring.

Numerous individuals comprise the layers of quality control/assurance inspectors and monitors during construction. For the purposes of this Guideline, the construction team is comprised of members representing various specialties and interests similar to those utilized during the design stage of the project. The roles of these individuals should be established prior to construction and have developed communication protocols that include the owner, key participants and the regulatory agencies as required. The strength of an erosion and sediment control plan often lies with a thorough understanding of the undertaking. This comprehension is normally found in the Contract Administrator (Administrator) who forms the core of the construction team. The Administrator is traditionally the owner’s representative on the project who liaises with all parties including the constructor and review agencies. Added professionals/inspectors involved in construction can usually be divided into those who work on behalf of the owner or those employed by the constructor. Roles in this regard are sometimes duplicated. The Administrator provides construction specifics and schedules to the rest of the team who assess the construction details and makes recommendations for the specialty. Notably, the team size expands and contracts in response to project progress where specific expertise is needed. Effective construction teams recognize the need for additional expertise and rapidly engage those services to allow the most time for design input.

One key role that can often be played by an individual throughout an entire construction project is that of the Environmental Monitor (EM). The EM role is that generally of an environmental professional who assumes a quality control/assurance focus as it relates to environmental compliance. These individuals should have demonstrated ability and experience overseeing the environmental intricacies of an undertaking. This role should include an understanding of environmental impacts relating to construction activities, an awareness of the regulatory context of a project (permits and approvals), a working knowledge of the undertaking as it relates to the environment and be intimately familiar with the erosion and sediment control plan. During construction the environmental monitor can provide practical advice on environmental management which can protect the project/owner from unnecessary environmental risk and potential liabilities. Among the other broad range of roles assumed, the EM can also play an integral role in the event of a mishap. This can involve the coordination of event reporting,

development of containment measures, creation of restoration plans as well as forming a communication bridge between the site participants and the regulatory agency representatives/ enforcement officers. The boundaries of the EM role are developed based on the environmental sensitivities, experience level, construction specifics and solidified in the working agreement/contract negotiated between the EM and the employer (owner/contractor/agency).

Additional personnel may be required for an undertaking to conduct specific tasks and are referred to as Construction Specialists. These potential participants of the construction team can include fluvial geomorphologist, geotechnical engineers, hydrogeologists and product/service representatives.

Table 1. Roles and Responsibilities of Involved Parties

Party	Roles and Responsibilities
Land Owner, Developer, Builder	▪ Ultimate responsibility for ESC planning, design, implementation, inspection, monitoring, maintenance, operation, and decommissioning. ▪ May delegate this responsibility to numerous design and construction professionals to construct/implement, maintain and inspect /monitor for the duration of the undertaking. ▪ Signs agreements, approvals permits and Authorizations to which compliance is legally binding ▪ Ultimately responsible for the proper planning, design, implementation of a project and specifically the execution of an ESC Plan. ▪ Ensure constructors have copies of all pertinent approvals and permits as well as the details of an ESC Plan, ▪ Ensure contractors are aware of their responsibilities and are back charged for construction of ESC measures installed, maintained and specific restorations requirements. ▪ Liable for failure of ESC or regulatory violation. ▪ Participate in every step of ESC process.
Project Manager/ Design Engineers/ Sub-consultants/Specialties	▪ Provide accurate and applicable impact assessment and design details which considers the potential for environmental effects ▪ Assist ESC Plan designer in planning ESC as it relates to construction phases, schedules and local sensitivities including soil conditions, vegetation, and public safety. ▪ Maintain awareness of consequences regarding ESC failures from a regulatory perspective and maintain ongoing contact with Owner. ▪ Aware of contingency Plan and direct use when/if necessary.
Erosion and Sediment Control (ESC) Plan Designer	▪ Lead the development of the ESC Plan. ▪ Select and design ESC practices that suit the construction site/ environmental conditions. ▪ Visit site before designing the Plan and during its implementation. ▪ Review and approve of on-site design modifications. ▪ Develop contingency Plan for problems. ▪ Implement contingency Plan if warranted. ▪ Ensure inspection services are provided for the duration of the four phase construction process and stabilization period. ▪ Responsible for all four phases of construction process. Assigns personnel to inspect/monitor approved Plan throughout the construction process.
Contract Administrator	▪ Traditionally owner's representative. ▪ Forms core of construction team. ▪ Provides construction specifics and schedules to rest of construction team. ▪ Liases with all parties including constructor and agencies, and ▪ Makes recommendations for the requirement of Specialists.

Table 1. Roles and Responsibilities of Involved Parties

Party	Roles and Responsibilities
Environmental Monitor (EM)	▪ Understand the ESC Plan and construction methods. ▪ Inform ESC Plan designer about any changes to the construction phases and schedules. ▪ Recognizes the effective applications of ESC measures and communicates recommendations with contractor and Municipal Inspector. ▪ Inspects all ESC measures every seven days and after all rainfall event and/or significant snowmelts. ▪ Be aware of contingency plan and direct use when/if necessary ▪ Provide feedback to contractor. ▪ Keep track of construction phase modifications. ▪ Document site inspections and corrective actions. ▪ Maintain log books – records from weekly/event based inspections.
Contractor	▪ Controls the implementation and effectiveness of ESC Plan. ▪ Install the ESC measures as per specification. ▪ Communicate with CA and site inspector of any failure of the control measure. ▪ Should communicate with Inspector and ESC Plan designer concerns with ESC practice and on-site condition. ▪ Vigilant for operation and maintenance of ESC measures. ▪ Respond promptly to feedback from site inspector, regulator, or project manager.
Regulatory Agencies	▪ Establish guidelines and updates as required. ▪ Enforce the laws under the federal, provincial legislation and municipal by-laws. ▪ Performance evaluation monitoring. ▪ Should clearly communicate the submission requirements such as ESC Plan and Letter of Credit. ▪ Review plans and provide comments/directions to EM. ▪ Provide training workshops.

5.0 Environmental Management

Environmental management is the product of the planning and design of an undertaking related to the mitigation of environmental effect. Components of this environmental management are visible in various forms including permits, approvals, tender documents, design drawings, operational standards and restoration plans which are interwoven into the project. An important function of environmental management is to translate all the operational constraints, mitigation, compensation and restoration measures detailed in the approvals package to the construction operations.

Environmental management can include specific elements including:

- Erosion and Sediment Control (ESC) Plans;
- Worksite isolation plans for in-stream construction; and,
- Spill Control and Response Plans.

The plans should encompass all elements of an undertaking and provide a substantial measure of diligence if the site-specific details have been incorporated.

5.1 Environmental Management Details for Erosion and Sediment Control Consideration

Periodic reconnaissance visits before construction will allow for the identification of environmental management details. This is due in part to the fact that there could be a number of years between the design, approval and implementation of a project. A number of changes can occur during these periods that can affect construction and in urban areas this could involve other development projects. Watercourse characteristics can also significantly change in a small period of time due to erosion and depositional forces. These changes can be even more pronounced in an urban environment and can significantly impact on in-stream construction. A common verification activity is updating critical ground elevations, watercourse details (top of bank, wetted edge, and longitudinal profiles) and location information such as limits of existing vegetation, underground/overhead services, property lines and working easements.

When the design gets handed over to the construction team many parties may be looking at the site for the first time. This early visit should be considered mandatory for all construction participants and is often satisfied during the formal pre-construction meeting. The importance of time on a project should be the driving factor to gain site familiarity as soon as possible. Constructability and approval compliance issues can be identified before construction begins allowing for conflict resolution. Photographic records of the site should be taken at all stages of construction with particular focus on environmental features, private property and other infrastructure.

The site-specific details commonly considered during the development of an ESC Plan such as environmental features have been identified early in the process. Environmental features such as wetlands, riparian corridors, woodlots and watercourses have been assigned a suite of protection measures driven by layers of regulations and permitting. These features should be well buffered by layers of erosion protection and sediment containment measures. In addition, contingency plans are often developed to cope with “worst case” scenarios relating to these features that are envisioned as a potential. These plans should be continually developed to respond to changing site conditions.

The characteristics of these natural features will also provide insight into the topography of the site. For example: the topography for a valley will usually be steep as the slopes of a valley wall leading down to a watercourse are steep, and the topography for a low lying area of a wetland will be gentle. The specific prescription of mitigation measures will vary according to the potential threats of construction. In many cases this will involve a setback from the top-of-bank or established wetland boundary that remains undisturbed. This may guard against geotechnical concerns as well as the erosion potential of steeper slopes. Undertakings often result in significant changes to topography and drainage pathways through fill placement or re-grading. Particular care should be given to specific erosion and sediment control measures that protect during each stage of the construction process. Topsoil stripping should be conducted in a logical sequence in order to minimize the areas where soil is exposed. Topsoil removal should be organized and timed according to the schedule for grading and development works within the overall property. In many instances bulk earthworks cut/fill operations follow immediately after topsoil stripping and it is necessary to strip all topsoil. Information on topography can be obtained through existing topographic mapping, aerial photography and terrain modelling. At a minimum the scale of the mapping should be at least 1:2000, and should provide at minimum 0.5-metre contour intervals to illustrate adequate drawing details although many new technologies allow for much greater resolution (0.1-metre contours). These same sources will identify general drainage direction and existing pathways.

Environmental features are indicators of other important site-specific characteristics. The potential for groundwater interference can be anticipated if there is a deep excavation near a wetland. Borehole logs, geological mapping and other relevant data should be collected and reviewed to predict the risks. Consider an undertaking with requirements for deep excavations adjacent to a Provincially Significant wetland classified in part because of groundwater influences. In this case, a Permit To Take Water (PTTW) from the Ministry of Environment may be required. The need for this permit is driven by a number of factors including the duration and rate of pumping anticipated. This permit can be tied to a monitoring program to ensure compliance. This may include monitoring of biological components, as well as groundwater levels through borehole monitoring, mini piezometers and residential wells. Permits conditions may also stipulate the monitoring of the release waters from this operation which have an acceptable range of critical chemical parameters (temperature, turbidity).

Closely tied to the groundwater conditions of a site is the underlying soil and geological conditions. Through the review of test pit and bore hole logs the soil conditions and a measure of erodibility can also be predicted. This review should provide details on moisture content, particle size and structure, as well as compactness. Particular attention should be given to the soil conditions that are affected by the undertaking such as at the elevations of excavations not just the surficial conditions. Knowledge and understanding of the type of soil present on a site and its particular erosion and sedimentation “qualities” is essential to developing an appropriate ESC Plan. **Appendix A** contains reference charts for aid in determining the susceptibility of a range of different soil types to the forces of erosion.

6.0 Developing an Effective Erosion and Sediment Control Plan

Designing and implementing an effective Erosion and Sediment Control (ESC) Plan is essential for minimizing the potentially adverse environmental effects originating from a construction site. A good ESC plan should use a multi barrier approach which includes two key elements: prevent erosion during the construction process to deal with suspended sediment at the source and minimize sediment transport from leaving the construction site. The ESC Plan requires the following steps to ensure that a practical design is chosen and effectively implemented:

- The multi barrier approach should be considered when designing the ESC Plan. Improved installation methods and design improvements of new technologies must be considered along with traditional ESC measures; and,
- The ESC mitigation measures must be installed correctly.

The mitigation measures must be maintained through regular inspections, monitoring, and maintenance until the soil has been stabilized. Reporting protocols should be used to document the steps taken on the construction site to control erosion and sediment.

A well designed ESC Plan includes appropriate locations of selected control measures, scheduling information for the installation of ESC practices, and details of the assigned responsibilities for implementation, operation, modification, inspection and maintenance.

The following principles will assist in creating an effective ESC Plan:

- Adopt a multi-barrier approach to provide erosion and sediment control through erosion controls first,
- Retain existing vegetation and stabilize exposed soils with vegetation where possible, erosion prevention is key in reducing sediment to downstream aquatic habitat;
- Limit the duration of soil exposure and phase construction when possible;
- Limit the size of disturbed areas by minimizing nonessential clearing and grading;
- Minimize slope length and gradient of disturbed areas;
- Maintain overland sheet flow and avoid concentrated flows;
- Store/stockpile soil away (e.g. greater than 15 metres) from watercourses, drainage features and top of steep slopes;
- Ensure contractors and all involved in ESC practices are trained in ESC Plan, implementation, inspections, maintenance, and repairs;
- Adjust ESC Plan at construction site to adapt to site features, and
- Assess all ESC practices before and after all rainfall and significant snowmelt events.

Specific details of current erosion and sediment control measures have been presented in **Appendix C**. The erosion and sediment control measures have been categorized as:

- Erosion prevention controls; and,
- Sediment controls including: perimeter controls, settling controls, and filtration controls.

Refer to **Appendix D**, Seed Mix Guidelines, April 2005 when working with vegetative erosion control measures.

6.1 Erosion and Sediment Control Plan Requirements

An erosion and sediment control (ESC) plan can be submitted as a written report and/or separate drawing.

6.1.1 Erosion and Sediment Control Plan Requirements – Report

An ESC Plan Report is required in addition to the ESC Plan drawing(s), in order to effectively summarize the base information, descriptions, and calculations upon which the ESC Plan was formulated. For example, a Stormwater Management Design Brief or similar type report typically includes documentation of the ESC requirements not listed or effectively illustrated on the ESC Plan drawings. **Table 2** below list the requirements for an ESC Plan Report.

Table 2. Erosion and Sediment Control Requirements – Report.

ESC Plan Requirements – Report	Check
Project Descriptions: Brief description of the nature and purpose of the land disturbing activity. Also include the legal description of the property and a reference to adjacent properties and landmarks.	☐
Condition of Existing Site: Description of the land use, site topography, vegetation, and drainage of the site under existing conditions.	☐
Condition of Existing Receiving Water: Description of local receiving waters such as watercourses and lakes (e.g. warm water fisheries, cold water fisheries; aquatic habitat use, confined or unconfined valley).	☐
Adjacent Areas and Features: Description of neighbouring areas, such as residential and commercial areas, reserves, natural areas, parks, storm sewers, and roads that might be affected by the land disturbance.	☐
Soils: A description of soils on the site, including erodibility, and grain size analysis. This description should include a summary of the soils/geotechnical report for the site.	☐
Critical Areas: Description of areas within the development site that have potential for serious erosion or sediment problems.	☐
Permanent Stabilization: Description of how the site will be stabilized after construction is completed. This will require a phasing plan (to be provided on the ESC Plan drawing) of the stripped area to be reseeded and the expected time of stabilization.	☐
Design Details of Erosion and Sediment Control Measures: The supporting calculations and design details of the sediment control measures. Specifically for ESC ponds - calculations and details include permanent pool and extended detention volumes, pond sizing volume, and calculations for the pond outlet and emergency overflow outlet.	☐
Record Keeping Procedure: Include sample inspection and maintenance forms. Maintenance Record keeping procedure including name/designate of the personal who will keep the inspection and maintenance record.	☐
Stockpile Details: Stockpile details to include the height and volume at each proposed location.	☐
Emergency Contact: Provide a list of emergency and non-emergency contacts (e.g. owner, site supervisor)	☐
Stamped and Signed: ESC document/report must be stamped and signed by a Professional Engineer.	☐

6.1.2 Erosion and Sediment Control Plan Requirements – Drawings.

A complete application submission should provide the information and address the items identified in **Table 3** listed below. The information items that can be addressed on the drawings may be submitted provided that the overall format and content of the drawings are clearly presented for review. However, for effective presentation, a comprehensive ESC Plan often necessitates that the design rationale, calculations, and decisions upon which the ESC Plan drawing(s) are based, are summarized within a separate ESC Plan Report.

Table 3. Erosion and Sediment Control Plan Requirements - Drawing(s)

ESC Plan Requirements - Drawing(s)	Check
General Items: • Site address including application number (e.g. SP or T number) • Key map including site boundary limits • A legend identifying ESC measures • Drawing scale • North arrow • Location of any existing or proposed building(s) or structure(s) on the site	☐
Existing Contours: Existing elevation of the site at 0.5-1.0 m intervals to determine drainage patterns. Spot elevations may also be required. Extend existing contours to beyond property limit by a minimum of 30 meters.	☐
Existing Vegetation: Location of any trees, shrubs, grasses, and unique vegetation to be preserved or removed. Tree hoarding area(s) to be clearly shown.	☐
Water Resources Location(s): Location of any water body such as wetlands, lakes, rivers, streams, or drainage course on or adjacent to the site.	☐
Regional Storm Flood Plain and Fill Regulated Areas: Regional flood line level, fill regulated line and reference to relevant hydraulic model cross-section where applicable.	☐
Critical Areas: Area within or near the proposed development with potential for serious erosion or sediment problems.	☐
Proposed Contours/Elevation: Proposed changes in existing elevation contours for each stage of grading. A cut/fill plan showing existing and proposed contours. Spot elevation for proposed conditions should also be illustrated.	☐
Site Boundary Limits and Limits of Clearing and Grading: Site boundary limits and the limits of all proposed land disturbing activities.	☐
Existing and Proposed Drainage Systems: Location and direction of any existing/proposed storm drainage system (e.g. storm sewers, swales, ditches, etc.) and overland flow drainage patterns within and adjacent to the site.	☐
Limits of Clearing and Grading: A line defining the boundary of the area to be disturbed.	☐
Stockpile and Berm Data: Stockpile and/or berm locations, size and the diversion route of the runoff. Consideration will include proximity to existing homes	☐
Erosion and Sediment Control Measures Locations and Details: Location and details for all ESC measures proposed with notes provided to direct their timing/phasing such that there is an appropriate level of protection provided during all stages of construction (e.g. Sediment fence should be installed prior to any land disturbing activities).	☐

Stormwater Management Systems: Plan and cross section profiles of ESC ponds/SWM ponds and location(s) to be shown. Also include the storm inlet, outlet, emergency outlet, and other permanent and temporary drainage facilities (swale, waterways, and channels). Volume, depth, and inflow and outflow rates should be provided. ESC pond maintenance target volumes and drainage areas to the pond to be specified.	☐
Stormwater Discharge Locations: All stormwater discharge locations are to be identified and detailed.	☐
Access Road: A description of the site's access and measures to be taken to prevent the transfer of sediment off site via construction vehicles	☐
Internal Haul Road: The information about the internal haul road that will be used during construction and its maintenance schedule	☐
Construction Phasing and Scheduling: Details of phasing of the construction project and the scheduling of the proposed construction works	☐
Inspection and Maintenance: A schedule of regular inspections and repairs to erosion and sediment control practices that are provided in the ESC Plan. Monitoring and maintenance plan for sediment accumulation within the pond.	☐
Stamped and Signed: All drawings must be stamped and signed as approved by a Professional Engineer.	☐

6.2 Developing a Worksite Isolation Plan for In-stream Construction

A work site isolation plan becomes a primary feature in an ESC Plan when an undertaking is proposed for an area that includes all or a portion of the wetted areas of watercourses, lakes or wetlands. In this case, the review of design alternatives and alternate construction methodologies should be investigated to minimize the potential for in-stream impacts. Examples of these would be jack and bore, directional drilling, tunneling, and pipe ramming. It is normal during this stage to also review the construction activities required, financial implications and the project schedule. Respecting the assessment stage of a project, the impact analysis of the undertaking has been completed with an understanding of the environmental conditions and a preferred construction methodology has been identified. This also allows for the development of layers of contingencies to further protect the environment from sediment and other disturbances. The plan is generally well understood during the approval process and specific conditions of this plan may be itemized in the permits and conditions.

All in-stream construction activities should adhere to MNR's Fisheries Construction Timing Guidelines based on watercourse species classifications (e.g. MNR, Maple District, Fisheries Management Plan, 1989-2000). More recent watershed based Fisheries Watershed Plans provide more recent information on construction timing windows. Please be advised that a mixture of both coldwater and warmwater species may be encountered in a watercourse. In this case, the construction timing will be a combination of the warmwater and coldwater construction timing window. The presence of redside dace in a watercourse will also follow the warmwater/coldwater

timing window combination. Local Conservation Authority or Ministry of Natural Resources staff should be consulted for site specific classifications and designated construction timing windows.

A general guideline for the Maple District in-stream construction windows is listed in **Table 4**, below. However, the local Conservation Authority should be contacted to confrim the timing guideline for other districts.

Table 4. MNR's Fisheries Construction Timing Guideline (MNR, 1989)

Creek Classification	Construction Permitted *
WARMWATER CREEK (supports or contributes to warm water fisheries)	July 1 to March 31
COLDWATER CREEK (supports or contributes to coldwater fisheries)	June 15 to September 15
WARMWATER/COLDWATER SPECIES (both encountered in a watercourse and/or evidence of Redside Dace)	July 1 to September 15

***Contact the local CA to confirm the construction timing window for a specific watercourse. The Fisheries Management Plan for the Watershed and GIS thermal layers may be utilized to confirm these timing windows.**

In addition, monitoring requirements can be prescribed by the approvals to ensure that the activity is being supervised by appropriately trained and knowledgeable professionals both during and after completion of an undertaking.

Planning is critical during the days leading up to the execution of an isolation plan and the associated undertaking. The full duration of an in-water construction period may be needed to complete some large undertakings. Therefore it is ideal to allow the maximum permitted time available for this proposed construction. In other cases, weather conditions and water levels may drastically impact on the working days available within this construction period. The rule of thumb often quoted by risk managers is "the earlier and quicker the better". In fact, a contract should be developed and funds allocated to complete these activities with that sentiment in mind to eliminate the exponential increases in project costs that can occur. All the required machinery, materials and person power should be on-site at the start of an in-water activity to avoid the risk of delays that could be encountered. A number of meetings are usually scheduled with the construction team as well as regulatory agencies to ensure that all parties know their roles and responsibilities. Long term and short term weather is observed routinely to provide the best prediction available to ensure the best conditions for construction.

Generally, the intent of the Worksite Isolation Plan is to isolate the construction activities and prevent impacts to receiving water bodies. The impact is generally the direct release of construction related sediment into a sensitive feature. This is one of the most significant aspects of any undertaking due largely to the heightened risk of construction in the water body. Essentially, the work area is isolated from the influence of surface water and/or groundwater or the water is removed through pumping. Removal of groundwater from an active construction area is done through dewatering.

Dewatering can draw groundwater levels down to elevations not impacted by construction through pumping wells and/or a connected well point system. A thorough understanding of the underlying soils and groundwater conditions is required to develop this type of design input. Particular care should be taken to limit the footprint of the construction in the adjacent areas from

any of these operations. Caution should be exhibited when dealing with adjacent landowners, land uses and environmental areas to ensure that the undertaking will not result in conflict (domestic water supply wells, watercourses, wetlands.). Surface water in streams and rivers can either be diverted or pumped around an active construction area or work can proceed after water containment is established.

Isolation can be accomplished through a number of measures itemized in **Appendix E** along with specifics regarding pumping and dewatering activities.

6.3 Developing a Spill Control and Response Plan

Spill control and a spill response system is a requirement of construction that is governed by legislation from both environmental and health and safety perspectives. This care and control should heighten "housekeeping" efforts to promote the control of these substances as well as to demonstrate compliance and due diligence. This scrutiny ensures that the machinery and equipment used during construction operations in sensitive environments be appropriately sized for the activity and also be well maintained. The materials and fluids required to operate and maintain the equipment as well as to complete the project must be controlled. The largest buffers possible between the feature and the re-fuelling or maintenance operation should be provided. Many different types of fluids and materials are required for construction and above the requirements stipulated in health and safety legislations, the constructor is required to have care and control of all of these fluids and materials that are deleterious to fish and fish habitat. The staging and stockpiling of materials should be scrutinized to ensure the minimum risk to the environment. Containment and use of these materials around environmental areas should comply with all applicable legislation. Spill prevention is the key to this plan requiring regular and preventative maintenance of all vehicles as well as proper containment and use of materials. Spill containment equipment and response plans provide added protection to a construction project. All required materials and equipment necessary for containment and clean up should be stored in an accessible location on site as well as in key vehicles. Minor spills should be immediately contained, cleaned up and removed from site. Significant mishaps should be reported immediately to the supervising engineer and environmental monitor who notifies the Spills Action Centre (**1-800-268-6060**) via the Contract Adiminstrator. Details of the incident as well as updates on site conditions and containment/clean up efforts must be provided to the attending agency.

7.0 Inspections and Performance Monitoring

The environmental plans developed for an undertaking commonly provides a level of monitoring or supervision suitable for the sensitivity of the surrounding environment, the scale of a project and the expected time frames. Specific monitoring requirements are provided with the environmental approvals and permits, which are undertaken as a measure of compliance. The intention of this monitoring is to provide environmental protection, and compliance with all applicable legislation while contributing to the overall success of a project. This generally includes a number of inspections prior to the start of an undertaking to document the pre-disturbance conditions, and to ensure that the erosion and sediment control plan is initiated at the start of the project. Often, post construction monitoring is required to ensure the restoration, stabilization, and required monitoring of constructed features/habitats is established.

As a basis of monitoring an undertaking, it is essential to ensure that the erosion and sediment control measures are properly installed, well maintained and functioning as intended on a daily basis. The scrutiny placed on erosion and sediment control measures is applied by many parties involved in the project including environmental monitors, contractors, site inspectors and the Contract Administrator. The ESC plan should provide the framework for the inspection, maintenance including the need for repair, and record-keeping procedures during all stage of construction. The effectiveness of the ESC Plan depends directly on the frequency the ESC measures are inspected and what actions are taken to address any failures that may occur with the measures. A timely response by the contractor to any noted deficiencies is critical for demonstrating due diligence in compliance with regulatory requirements. As such, a regular inspection program should be planned and implemented to determine when ESC measures need maintenance and/or repair. Documentation of all inspections should be kept on site for a minimum of one (1) year after the development is substantially completed.

An Environmental Monitor (EM) can be retained by the project owner, the contractor or in some cases regulatory agencies and interested third parties. The role of the EM is to assure project construction activities comply with the environmental provisions defined in the project approvals, Authorizations and permits. It is important to note that an EM has no power to enforce compliance with any environmental laws. Environmental monitoring also offers a level of quality control and assurance not unlike other engineering inspectors retained for a project to ensure design standards are met. The EM is expected to provide timely and relevant advice in regards to the environmental management of a site, construction timing and methodologies. The EM should strive to remain neutral and independent in order to assess compliance of all project parties and allow for the accurate reporting of non-compliance events to the regulatory agencies.

An effective inspection program should include the following:

1. Identification of Personnel: Names and contact information of project members assigned to each task as well as agency/enforcement contacts. A communication protocol should also be developed to ensure effective reporting and compliance.

2. Details and locations of the environmental constraints for an undertaking including maps, reports, approvals and permits. Specific attention should be directed to timing restrictions and reporting requirements.

3. Construction drawings detailing the erosion and sediment controls installed which is updated through the construction period.

4. High risk areas should be identified on these drawings and routinely evaluated. Greater frequency of monitoring requirements may be required for areas and protection measures immediately adjacent to soil stockpiles, excavations, dewatering locations, protected features/areas, and locations where site runoff discharges into a receiving watercourse, water body, or municipal sewer system.

5. Inspection schedule: This should include inspection times, areas, and person(s) responsible for the inspections. A 'walk-through' inspection of the construction site should be undertaken in anticipation of large storm events (or a series of rainfall and/or snowmelt days) that could potentially yield significant runoff volumes The regular inspections should occur during all construction stages and should be based on at a minimum the requirements identified in the permits and approvals. Commonly this frequency is:

    - on a weekly basis;
    - after every rainfall event;
    - after significant snowmelt events; and,
    - daily during extended rain or snowmelt periods.

6. During inactive construction periods, where the site is left alone for 30 days or longer, a monthly inspection should be conducted.

7. All damaged ESC measures should be repaired and/or replacement within 48 hours of the inspection.

A sample inspection and monitoring sheet is located in **Appendix F**.

8.0 References

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Transportation Association of Canada (TAC), May 2005, National Guide to Erosion and Sediment Control on Roadway Projects, Ottawa, Ontario.

APPENDIX A

EROSION POTENTIAL REFERENCE CHARTS

Evaluation of Erosion Potential

Before selecting ESC practices, the erosion potential and sediment transport path must be evaluated. A methodical approach to assessing the potential for erosion and sedimentation from construction activities involves a number of screening evaluations. The following factors regarding the development site should be considered during the erosion potential evaluation:

- Soil Erodibility;
- Surface slope gradients;
- Length of slopes;
- Rainfall intensities; and,
- Runoff potential.

Table A1 classifies erodibility for the various soil types. The texture and drainage of the soil are considered when estimating its erodibility.

Table A1: Hierarchy of Soil Erodibility

Soil Type	Erodibility Classification	Soil Erodibibility Rating
Silt	Most	High
Silt Loam		High
Loam		High
Silty Sand		High
Sandy Loam		Medium
Silty Clay Loam		Medium
Sany Clay Loam		Medium
Silty Clay		Medium
Sandy Clay		Low
Clay		Low
Heavy Clay		Low
Loamy Sand		Low
Sand		Low
Poorly Graded Gravel		Low
Well Graded Gravel	Least	Low

Source: Adapted from Guidelines on Erosion and Sediment Control for Urban Construction Sites (MNR *et al.*,1987)

Table A2 shows erosion potential based on soil erodibility, ground slope, and slope length. The surface gradients are generally grouped into three classes: gentle (0 to 10 %), moderate (10 to 15 %), and steep (> 15 %). Slope lengths are assessed as either moderate (under 30 m) or long (over 30 m).

Table A2: Erosion Potential for Graded Slopes

Slope Gradient	Soil Erodibility	Slope Length	
		< 30 m	> 30 m
< 2 % Gentle Slope	Low	Low	Moderate
	Medium	Moderate	Moderate
	High	Moderate	High
2 – 10 % Moderate Slope	Low	Low	Moderate
	Medium	Moderate	High
	High	High	High
> 10 % Steep Slope	Low	Low	Moderate
	Medium	High	High
	High	High	High

Source: Adapted from Guidelines on Erosion and Sediment Control for Urban Construction Sites (MNR *et al.*,1987)

Table A3 shows erosion potential based on soil erodibility, channel slope, and slope length of channel.

Table A3: Erosion Potential for Graded Conveyance Channels

Channel Gradient	Soil Erodibility	Slope Length	
		< 30 m	> 30 m
< 2 % Gentle Slope	Low	Low	Moderate
	Medium	Moderate	Moderate
	High	Moderate	High
2 – 10 % Moderate Slope	Low	Low	Moderate
	Medium	Moderate	High
	High	High	High
> 10 % Steep Slope	Low	Low	Moderate
	Medium	High	High
	High	High	High

Source: Adapted from Guidelines on Erosion and Sediment Control for Urban Construction Sites (MNR *et al.*,1987)

Special attention must be given to critical areas within the proposed development that have the potential for serious erosion problems. For example, critical areas may include highly erodible soils, shorelines, human-made watercourses or ditches that outlet to a watercourse, and natural courses that may receive increased sediment-laden water.

APPENDIX B

REFERENCES FOR
FEDERAL & PROVINCIAL REGULATIONS, MUNICIPAL BY-LAW(S) AND CONSERVATION AUTHORITIES ACT

REFERENCES FOR ADDITIONAL INFORMATION

FEDERAL REGULATIONS

Environmental Protection Act
Provincial - http://www.e-laws.gov.on.ca:81/ISYSquery/IRL8C89.tmp/66/doc or
Federal - http://laws.justice.gc.ca/en/C-15.31/text.html

Federal Fisheries Act
http://laws.justice.gc.ca/en/F-14/240479.html or
http://laws.justice.gc.ca/en/F-14/text.html

Navigable Waters Protection Act
http://laws.justice.gc.ca/en/N-22/251715.html or
http://laws.justice.gc.ca/en/N-22/text.html

Canadian Environmental Assessment Act
http://laws.justice.gc.ca/en/C-15.2/275414.html or
http://laws.justice.gc.ca/en/c-15.2/text.html

Migratory Birds Convention Act
http://laws.justice.gc.ca/en/M-7.01/250946.html or
http://laws.justice.gc.ca/en/M-7.01/text.html

Species at Risk Act
http://laws.justice.gc.ca/en/S-15.3/276773.html or
http://laws.justice.gc.ca/en/s-15.3/text.html

Canadian Wildlife Act
http://laws.justice.gc.ca/en/W-9/265232.html or
http://laws.justice.gc.ca/en/W-9/text.html

Endangered Species Act
http://www.gnb.ca/0062/acts/acts/e-09-101.htm

PROVINCIAL REGULATIONS

Ontario Water Resources Act (OWRA)
http://www.e-laws.gov.on.ca/DBLaws/Statutes/English/90o40_e.htm

Lakes and Rivers Improvement Act
http://www.e-laws.gov.on.ca/DBLaws/Statutes/English/90l03_e.htm

Provincial Policy Statements and Planning Act
http://www.mah.gov.on.ca/userfiles/page_attachments/Library/1/789108_ppsenglish.pdf

For more copies of Provincial legislations in either English or French please contact:
Publications Ontario Bookstore
880 Bay Street
Toronto, Ontario
M7A 1N8
1-416-326-5300 or

1-800-668-9938
TTY number (teletypewriter): 1-800-268-7095 or 416-325-3408
Or on-line: http://www.gov.on.ca/MBS/english/publications/

Oak Ridges Moraine Conservation Plan
http://www.e-laws.gov.on.ca:81/ISYSquery/IRL8E2A.tmp/7/doc

Permit to Take Water
http://www.e-laws.gov.on.ca:81/ISYSquery/IRL8E47.tmp/2/doc

Source Water Protection Act
http://www.ene.gov.on.ca/envision/env_reg/er/documents/2004/aa04e0002.pdf or
http://cela.ca/uploads/f8e04c51a8e04041f6f7faa046b03a7c/479dwspa2004.pdf

MUNICIPAL BY-LAW(S) AND CONSERVATION AUTHORITIES ACT

Conservation Authorities Act
http://www.e-laws.gov.on.ca/DBLaws/Statutes/English/90c27_e.htm

Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation
http://www.svca.on.ca/ro6169.htm

Section 142 of the Ontario Municipal Act, 2001
http://www.e-laws.gov.on.ca/DBLaws/Statutes/English/01m25_e.htm#BK164

The municipality should be contacted for by-laws they may have regarding, but not limited to: erosion and sediment control; top-soil removal; tree removal; and, site alteration and servicing agreement.

The website links listed above are valid as of December 2006 and may be updated in the future.

REFERENCES FOR ADDITIONAL INFORMATION:

Transportation Association of Canada (TAC), 2005, **National Guide to Erosion and Sediment Control on Roadway Projects**.

Ontario Ministry of Transportation, Ontario Ministry of Natural Resources, 2003. **A Fisheries Protocol: agreement between the Ontario Ministry of Transportation and Ontario Ministry of Natural Resources for protecting fisheries resources on provincial highway undertakings**.

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Environmental monitoring for construction projects. Nanaimo, BC. Malaspina University-College, 2005.

Department of Fisheries and Oceans, Ontario Ministry of Natural Resources, 2000. **Extension Notes: Protecting fish habitat from sediment**.

Sutherland. Ross. A. Ziegler. Alan D. **Hillslope runoff and erosion as affected by rolled erosion control systems: a field study**. University of Hawaii, 2006.

Consumer Gas Company Limited, 1994. **Environmental management manual for environmental protection during pipeline construction**.

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Ministry of Transportation, 2002. **Environmental reference for highway design.**

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APPENDIX C

EROSION CONTROL PRACTICES
SEDIMENT CONTROL PRACTICES

EROSION CONTROL PRACTICES

Erosion prevention is essential and is the most effective method in protecting downstream aquatic habitat during the construction process. Erosion controls involve minimizing the extent of disturbed areas by clearing only what needs to be cleared, preserving and protecting natural cover and immediately stabilizing disturbed areas. **Table C1** lists some commonly used erosion prevention controls, but should not be limited to this list.

Table C1. Erosion Control Measures.

Name of Erosion Control Measure	Applicability						Temporary	Permanent	Reference Page
	Slopes	Streams/Rivers	Surface Drainage Ways	Table Lands	Borrow/Stockpile	Adjacent Property			
Vegetative Filter Strips	√	√	√	√	√	√	√		C-2
Mechanical Seeding*	√		√	√	√	√	√	√	C-3
Terraseeding*	√		√	√	√	√	√	√	C-5
Hydroseeding*	√		√	√	√	√	√	√	C-7
Top soiling	√		√	√	√	√		√	
Sodding	√		√	√	√	√		√	
Mulching	√		√	√	√	√	√	√	
Re-vegetative Systems	√		√	√	√	√	√	√	
Tree and Shrub Planting	√	√	√	√	√	√		√	
Erosion Control Matting/Blanket/Net (with Seed)	√		√	√	√	√		√	C-8
Growth Media Erosion Control Blanket	√	√	√	√	√	√	√	√	C-11
Lockdown Netting	√		√	√			√	√	C-14
Buffer/Riparian Zone Preservation		√						√	
Surface Roughening (Scarification)	√				√		√		C-16
Edge Saver	√	√		√				√	C-18

Note: * Various seeding practices.

VEGETATIVE FILTER STRIPS (VFS)

DEFINITION & PURPOSE

Most sites contain some type of existing natural vegetation or a planted area particularly on slopes and adjacent to drainage courses. Making use of existing vegetation to filter out sediment is an effective, low cost measure for protecting the ground surface from erosion, enforcing sediment control, and improving the infiltration capacity of the soil. Thick and matted existing grass and vegetation is the most effective type of vegetative filter.

APPLICATION

Vegetative filter strips are located immediately adjacent to a watercourse and act as living sediment filters that intercept and detain stormwater runoff from up-gradient disturbed areas. They reduce the flow and velocity of surface runoff, promote infiltration, and reduce pollutant discharge by capturing and holding sediments and other pollutants carried in the runoff water. Filter strips are fairly level and treat sheet flow across them.

DESIGN CONSIDERATIONS

- Vegetative filter strips should be maintained 30 metres wide adjacent to cold water creeks (capable of sustaining trout) and 15 metres wide adjacent to warm water creeks (capable of sustaining other fish species). MNR should be contacted for the particular creek classification.
- Additional ESC measure such as sediment control practices should be installed up-gradient to help prevent overloading of the filter strip and prevent construction vehicles from entering the area
- Limit of work devices must extend to the edge of the tree “drip line” in order to protect tree roots from damage due to tracked vehicles and soil compaction.

INSTALLATION & MAINTENANCE CONSIDERATIONS

- Construction vehicles are not permitted to travel over existing vegetation or planted vegetation, which act as a vegetative filter strips.
- Stored equipment and materials, soil stockpiles, and vehicles must be kept away from preserved trees to prevent soil compaction and/or vehicle tracking. Root damage will result in the slow death of the tree.
- Explain to all construction equipment operators the importance of remaining outside of the fenced vegetated filter strip.
- Not effective for filtering high velocity flows from paved areas, steep slopes or hilly areas.
- Inspect and maintain vegetative filter strips on a weekly basis.

MECHANICAL SEEDING

DEFINITION & PURPOSE

The establishment of vegetative cover achieved by seeding disturbed areas with the use of machinery. An effective, long term, relatively inexpensive measure. Vegetative cover is one of the most effective methods of stabilizing exposed soil and reducing erosion due to rainfall and runoff.

APPLICATION

Should be applied to any disturbed surface that is to be left exposed for 30 days or greater and for areas that are at final grade. Seeding can be applied to stabilize floodplain and valley bank surfaces, and stormwater pond embankments.

DESIGN CONSIDERATIONS

- Manufacturer must be consulted to confirm appropriate method of seeding and seed species to ensure successful germination and provide an effective measure.
- Local Conservation Authority must be contacted for approval of seeding method and seeding species utilized.
- Effective on shallow slopes typically 3H:1V or flatter.
- Seed mix design and application rate will depend on the season, soil type and if cover is permanent or temporary.
- Methods include Broadcast seeder or Drill seeder.
- Native vegetation species should be utilized wherever possible. Refer to the April 2005 Seed Mix Guideline (Appendix D) for preferred vegetative species. Contact local Conservation Authority for a most current vegetative list.
- For interim erosion control measures, the proponent must ensure no sediment is entrained off the area and must provide at minimum temporary seeding of native or non-invasive species whether perennial or annual.
- Optimal seeding time for all seeding – April 15 to May 30 and August 15 to September 30. If seeding occurs after September 30, additional erosion and sediment control measures may be required to minimize sediment transport off-site, and seeding may be required the following growing season.
- Caution should be used when seeding during drought conditions. Subsequent applications of mechanical seeding may be required for successful vegetation establishment and soil stabilization.
- Optimal seeding time for dormant wildflower seed is in the autumn. However, seeding may also occur in late spring, during drier conditions.
- Mulch application following or in conjunction with seed application is highly recommended as the mulch serves as a barrier against solar heat, moisture loss and physical transport due to runoff.
- A minimum 150 mm of top soil should be applied to all areas subject to permanent landscaping. ***The top-soil may need to be stabilized with and erosion control process after seeding application has been completed.***

INSTALLATION & MAINTENANCE CONSIDERATION

- Seedbed surface should be rough, firm but not too loose or too compacted.
- Seed can be spread by hand for small areas and topsoil stockpiles. Mechanical methods are recommended for larger areas to ensure proper application rate.
- Localized areas which may have a “poor” catch of seed will require re-seeding or alternative measures.
- Some sites, particularly large ones, may have to be cleared and seeded several times during the project construction period.

TERRASEEDING™

DEFINITION & PURPOSE

Terraseeding™ is the computer calibrated injection of seed into a non-slurried mulch, compost, fibre, or growth media during the application process by an Express Blower™ truck. This measure protects the soil surface from direct rainfall impact, reduces the velocity of overland runoff, and fosters the growth of vegetation by conserving moisture and preventing the washing away of seed.

APPLICATION

Applied for the stabilization of exposed soil surfaces and the rapid establishment of both temporary and permanent vegetation. Terraseeding provides the establishment of vegetation quicker than hydroseeding.

DESIGN CONSIDERATIONS

- Manufacturer must be consulted to confirm appropriate method of seeding and seed species to ensure successful germination and provide an effective measure.
- Local Conservation Authority must be contacted for approval of seeding method and seeding species utilized.
- Terraseeding is quite effective and can be used to protect seedbeds on difficult slopes (i.e. greater than 3:1) and/or where access is limited.
- Depth of non-slurried mulch, compost, fibre or growth media changes for different applications (i.e. topdressing on a 5:1 slope – 12.5mm depth to erosion control on a 1:1 slope – 100mm depth)
- Growth Media is derived from composted materials and shall be weed free and derived from a well-decomposed source of organic matter. The growth media shall be produced using an aerobic composting process meeting or exceeding, M.O.E. 101, C.C.M.E. Type “A” and Type “AA” regulations, and Compost Quality Alliance Program (C.Q.A.) including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The growth media shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:
    - PH – 5.0-8.0 in accordance with TMECC 04.11-A, “Electrometric pH Determinations for Compost”
- For seeded Growth media, seed should be incorporated at the time of application in the entire depth of the growth media blanket, at rates per unit area as acceptable to the engineer. The following particle sizes shall also be followed: 100% passing a 50mm sieve, 99% passing a 25mm sieve, minimum of 60% passing a 12.5mm sieve. All other testing parameters remain the same
- The effectiveness of some terraseeding is limited by the season; therefore follow specific manufacturer's specifications.

INSTALLATION & MAINTENANCE CONSIDERATIONS

- Terraseeding application must follow manufacturer's specification.

- Inspect periodically, especially after rainfall for any damage to the mulch and repair or reapply terraseed as soon as possible.

HYDROSEEDING

DEFINITION & PURPOSE

Hydroseeding is a process of mixing seed, fertilizer, paper mulch with dye and water inside a tank, then spraying the mixture onto exposed surfaces. It is not an erosion control method unless a bonded fibre matrix is applied with the material or a straw, wood fibre, coconut fibre mat or equivalent, blanket is applied overtop and secured into place by staples. These measures protect the soil surface from direct rainfall impact, reduce the velocity of overland runoff, and foster the growth of vegetation by conserving moisture and preventing the washing away of seed.

APPLICATION

Applied on-top of freshly prepared, cultivated soil. Application for the stabilization of exposed soil surfaces and the rapid establishment of both temporary and permanent vegetation.

DESIGN CONSIDERATIONS

- Manufacturer must be consulted to confirm appropriate method of seeding and seed species to ensure successful germination and provide an effective measure.
- Local Conservation Authority must be contacted for approval of seeding method and seeding species utilized.
- The effectiveness of some hydroseed is also limited by the season; therefore follow specific manufacturer's specifications.
- Hydroseed is quite effective and can be used to protect seedbeds on difficult slopes (i.e. greater than 3:1) and/or where access is limited.
- Straw mulch is most desirable, but it must be anchored/crimped to avoid becoming wind blown.

INSTALLATION & MAINTENANCE CONSIDERATIONS

- Hydroseed application must follow manufacturer's specification (e.g. rate, depth of cover).
- Straw mulch should be applied to a depth of 25 mm to 50 mm at a rate of 4 tonnes/ha.
- Loose straw mulch can be crimped or indented into the ground 35 mm to 60 mm by using a steel tracked vehicle with deep cleats or by using dull, vertically set agricultural disks.
- Inspect periodically, especially after rainfall for any damage to the mulch and repair or reapply mulch as soon as possible.

NOTES

- Thickness of mulch application may need to be increased for disturbed areas in or near sensitive water resources or other areas highly susceptible to erosion.

EROSION CONTROL BLANKETS, MATS, NETS

DEFINITION & PURPOSE

Erosion control blankets, mats or nets, are prefabricated layers of material, generally biodegradable, which are laid on a soil surface to prevent erosion and promote seed growth. Nets consist of degradable material tightly woven into a photodegradable mesh. Blankets are simply fibres woven within a photodegradable netting to form a thick fibre blanket. Mats may consist of hardy materials such as coconut husk fibres, wood shavings or synthetic fibres that form a stronger/heavier material layer or "mat".

APPLICATION

Erosion control blankets, mats or nets should be applied to un-vegetated conveyance systems including swales and ditches as these systems receive concentrated flows. They should also be applied to all exposed slopes with greater than 2H:1V and are subject to rainfall and runoff. Erosion control blankets, nets and mats may be applied within a watercourse, however, the local Conservation Authority must be contacted for approval of these measures.

DESIGN CONSIDERATIONS

The many different site conditions will dictate whether a net, blanket or mat is required. For example, a temporary diversion swale required for watercourse realignment would require a mat due the long duration for the temporary swale to be in place (6 to 12 months) and the potential for higher flows. It is recommended that the manufacturer and the local CA be consulted prior to installation.

NETS

- Woven structure forms a high-tensile strength net.
- Highly erodible slopes may require application of a sub layer of straw mulch overlain with netting, which is stapled through to enhance ground contact.
- Typically composed of jute, straw or Coir (coconut fibres) material.

BLANKETS

- Simply woven structure reduces tensile strength, but enhances contact with the ground.
- Typically composed of Coir, straw or wood fibre material.

MATS

- Material strength provides turf reinforcement, and reduces the energy of run-off to provide lasting erosion protection.
- Matting can be placed directly on seeded slope or with a sub-layer of mulch to enhance ground contact.
- Typically composed of 100% coconut husk fibres or synthetic polypropylene fibres.

ALL

- Retains moisture from precipitation thereby significantly reducing runoff from bare slopes and in turn promoting the early germination of seeds.
- Straw and/or combination straw and Coir blankets should be applied to steep slopes.

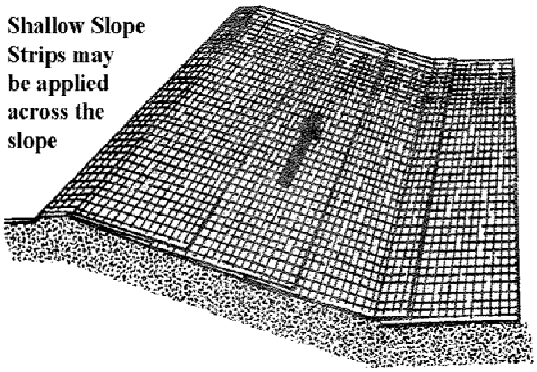
- Synthetic materials used in netting typically deteriorate in three to four months but some types may not biodegrade as quickly and manufacturers should be consulted regarding the specific application.
- Follow specific manufacturer's specifications regarding maximum allowable slopes and flow velocities.

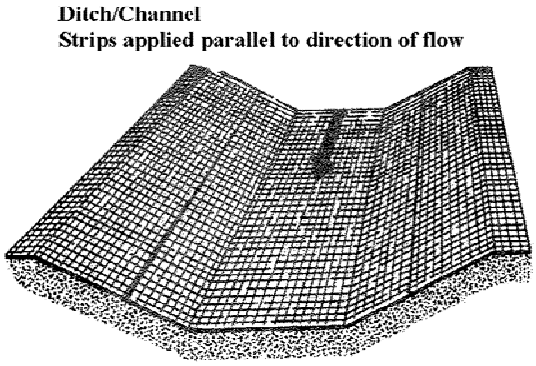
INSTALLATION & MAINTENANCE CONSIDERATIONS

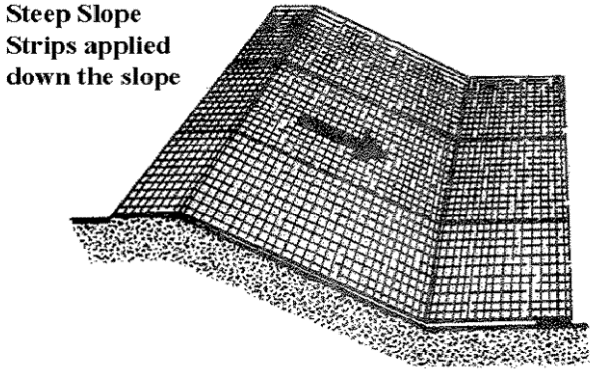
To be installed on a seeded slope (with or without mulch).

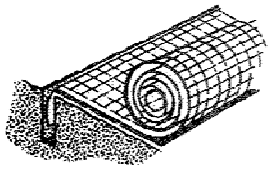
- A firm, continuous contact between the blanket and soil is critical. Careful rolling after installation and stapling may be required to obtain firm contact.
- Care must be taken during installation to remove all foreign debris (i.e. rocks, branches, plastics) to prevent blanket, mats or nets from tenting due to lack of firm contact with the soil surface. Tenting creates a drip zone which causes erosion under the blanket (i.e. distance between blanket and soil surface).
- Specific manufacturer's instructions must be followed (re: blanket type/application, anchoring, and staple pattern).
- Orientation of the nets/blankets/mats within the :
  - ⇒ **Conveyance System Side Slopes -** Orient nets/blankets/mats vertically down the slope (i.e. with the direction of runoff).
  - ⇒ **Channels** - Orient nets/blankets/mats with the direction of flow. Erosion control blankets, nets, and mats may be applied within the channel of a watercourse; however, the governing Conservation Authority will need to be contacted for approval.
- Blankets should overlap at edges and at end – Refer to manufacturer’s instructions for the exact details of installation.
- Metal staples or wooden stakes are used to anchor nets/blankets/mats to the ground. Refer to manufacturer’s instructions for the exact details of staple/stake spacing.
- Top and bottom ends may need to be secured in an anchor trench.
- Inspect periodically until vegetative cover is established, particularly after each rainfall event for any damage to the blanket. Repair all damaged areas immediately.

Figures illustrating the installation of erosion control mats, blankets, and nets from Keeping Soil on Construction Sties (HRCA &HCA, 1994).





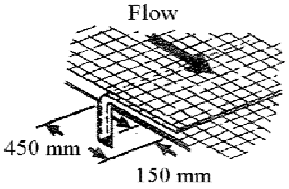




Anchor top/high end of roll in a 150 mm deep trench

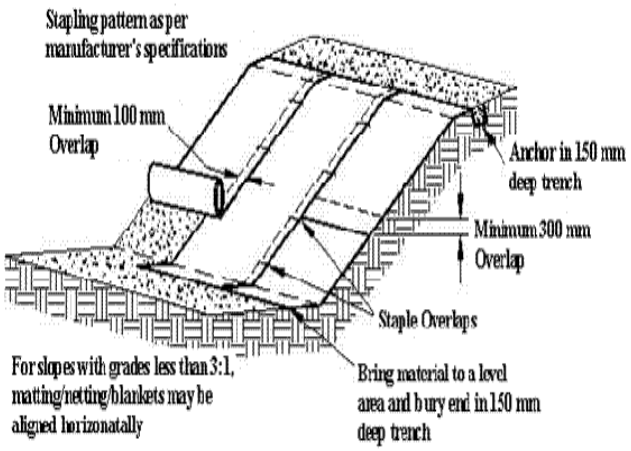
Staple across net at 300 mm intervals

Overlap ends by 450 mm



Staple across area of overlap at regular intervals (300 mm)

Material	Rate Per Acre	Notes
Straw	1 –2 tons	From wheat or oats; spread by hand or machine; should be tacked down.
Wood Fiber	0.1 – 1 ton	May be hydroseeded; Do not use in hot weather.
Bark	35 cubic yards	Apply with mulch blower, chip handler, or by hand; do not use asphalt tack.
Jute Net	Cover Area	Withstands water flow; best if used with organic mulch.
Fiberglass Net	Cover Area	Withstands water flow; best if used with organic mulch.
Wood Fiber Net	Cover Area	Withstands water flow.



GROWTH MEDIA EROSION CONTROL BLANKETS

DEFINITION & PURPOSE

Growth media erosion control blankets are applications of growth media derived from composted materials applied with a pneumatic blower device or equivalent that help to reduce or prevent erosion on slopes in a living or non-living form. Growth media erosion control blankets prevent erosion by covering the exposed soil surfaces and keeping the water flowing on/within the materials. Growth media erosion control blankets also help increase infiltration and retention of rainwater, which aids in vegetation establishment and storm water management.

APPLICATION

Growth media erosion control blankets are to be used on exposed soil areas either for temporary or long-term protection against erosion. Growth media erosion control blankets may be used in place of other traditional blanket technology (e.g. geotextiles) with similar or superior results. Growth media erosion control blankets are especially effective on extreme slopes of 3:1 to 1:1 or greater and for situations where many other erosion control tools do not work. Growth media used in the blanket also has the ability to bind various contaminants contained in runoff.

DESIGN CONSIDERATIONS

- For most applications, it is important to apply Growth media erosion control blankets at about a 25mm-100mm depth; however, this may vary depending on slope and size of the drainage area. Growth media meeting or exceeding the specification attached is predictably successful at reducing or eliminating erosion.
- Growth media erosion control blankets are normally installed using a pneumatic blower device or 'blower truck'. This equipment must be used to comply with this specification and the vehicles must have a calibrated seeder attachment for 'living blanket' applications that require seeding. Alternate seeding mechanisms may be used, including blending seed into the growth media evenly prior to application with the blower trucks.
- There are no major limitations to the use of Growth media erosion control blankets, if installed properly. However, when slopes exceed 2:1, care should be taken to make sure the depth of the blanket is at least 50mm. If slopes approach 1:1, an additional 25mm to 50mm should be added to make the blankets a total of 75mm to 100mm depth. The Engineer may also require additional LockDown™ netting be placed over the blankets and stapled into the soil for further protection against sheer strength of underlying soil or movement of Growth media during severe storm events.
- It is imperative at all times that Growth media erosion control blankets are 'lapped' over the top of the shoulder of the slope they are applied to. A minimum overlap of 1m to 3m is suggested in order to make sure water runs on top of the Growth media blanket, not under it. If the Growth media erosion control blankets are not installed properly and water is allowed to get under the Growth media blanket at the top of the slope, rills may form and the slopes will have to be repaired.
- Growth Media is derived from composted materials and shall be weed free and derived from a well-decomposed source of organic matter. The growth media shall be produced using an aerobic composting process meeting or exceeding, M.O.E. 101, C.C.M.E.

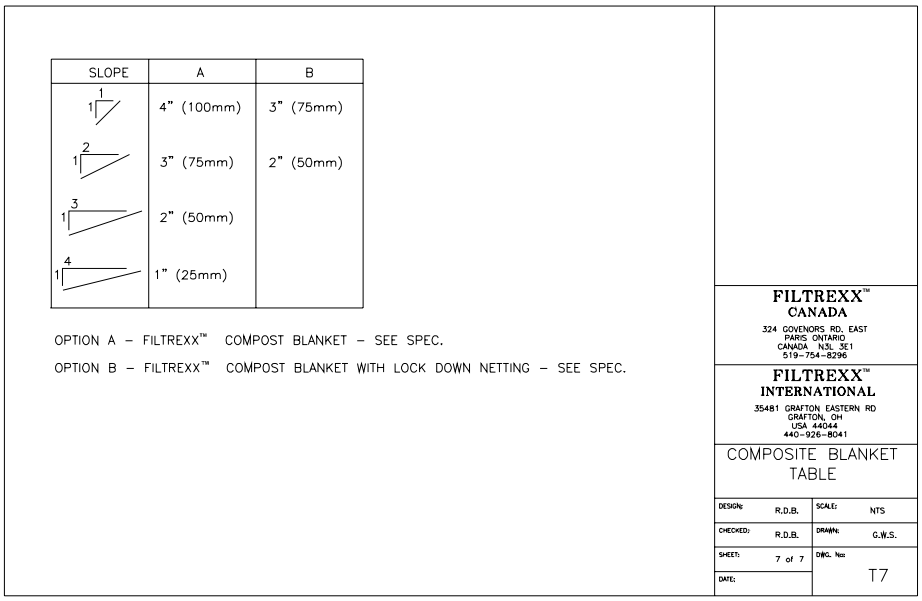
Type “A” and Type “AA” regulations, and Compost Quality Alliance Program (C.Q.A.) including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The growth media shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:

- PH – 5.0-8.0 in accordance with TMECC 04.11-A, “Electrometric pH Determinations for Compost”
- Non seeded Growth media erosion control blankets: Particle size – 100% passing a 50mm sieve, 99% passing a 25mm sieve, minimum of 90% passing a 18.25mm sieve in accordance with TMECC 02.02-B, “Sample Sieving for Aggregate Size Classification”.
- For seeded Growth media erosion control blankets, seed should be incorporated at the time of application in the entire depth of the Growth media blanket, at rates per unit area as acceptable to the engineer. The following particle sizes shall also be followed: 100% passing a 50mm sieve, 99% passing a 25mm sieve, minimum of 60% passing a 12.5mm sieve. All other testing parameters remain the same.
- Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
- Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
- A sample shall be submitted to the engineer for approval prior to being used and must be a certified Filtrexx growing media which also complies with all local, provincial and federal regulations.
- Installer is required to be a certified as determined by Filtrexx Canada Inc. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application.

INSTALLATION AND MAINTENANCE CONSIDERATION

- Description: This work shall consist of furnishing, installing, maintaining and seeding a water permeable Growth media erosion control blanket to reduce soil erosion and sediment by preventing soil particles from water moving off site into adjacent waterways or storm water drainage systems.
- Growth media erosion control blankets should be inspected weekly and after all rainfall and/or snowmelt events to make sure they hold and are protecting the soil adequately. In cases where minor rills form, they should be repaired immediately by blowing more product onto the slopes and into the rills and compacting the area with foot traffic and a Siltsoxx™ or berm may be required to slow water down to sheet flow.
- Growth media erosion control blankets will be placed at locations indicated on plans as directed by the Engineer. Unless otherwise specified, Growth media erosion control blankets should be installed at a minimum depth of 25mm. Consult with the manufacturer for the depth requirements. Depth requirements are also listed in Figure below.
- Growth media erosion control blankets may be seeded at time of installation for establishment of permanent vegetation. The Engineer will specify seed requirements.

- Growth media erosion control blankets are not to be used in direct flow situations or in runoff channels.
- See attached schematic for Growth Media Erosion Control Blanket Installation.
- If required, combining Growth media erosion control blankets with SiltSoxx™ or Filter Berms may offer additional protection from slopes that have heavy run-on water. In these situations, SiltSoxx™, Filter Berms and Growth media erosion control blankets may be used in combination.



- The installer shall maintain the Growth media erosion Control Blanket in a functional condition at all times and it shall be inspected weekly and after all rainfall and/or snowmelt events.
- The Growth media erosion Control Blanket will be seeded on site, at rates and seed types as determined by the Engineer or the Conservation Authority.
- Installer shall provide the Engineer with proof that (e.g. a 50mm) Growth media erosion Control Blanket has been applied. This rate equals approximately 510 cubic meters per hectare. Contractor will supply ample evidence showing this amount of material has been effectively placed (e.g. truck load tickets, depth to be measured at time of application by site inspector).

LOCKDOWN™ NETTING

DEFINITION & PURPOSE

For slopes that are greater than a 3:1 with loose, highly erodable soil. Soils that are sandy or low in organic matter are particularly prone to erosion and would be excellent candidates for this product.

Where concerns for slope stability is high and where shear strength is a concern. The Lockdown™ Netting allows the roots to help hold the slope and keeps the turf from sliding off the slope, once vegetated.

APPLICATIONS

For areas where long term reinforcement is required due to high flow rates or where extra shear strength is needed to retain the vegetation on steep slopes.

DESIGN CONSIDERATIONS

Material used may be either cotton or HDPE netting materials. For more permanent applications, use of the HDPE is recommended. For stabilization that is not required beyond the vegetation establishment phase, the cotton product is recommended.

Cotton material and netting specs:

- The 2.4m cotton LockDown Netting™ is made up of 143 chain stitches of 20/2 cotton yarn across the width of the fabric.
- Approximately 14mm wide by 25mm long holes.
- The fabric is reinforced at both edges. Each edge consists of 5 interlocking chain stitches made with 20/2 cotton to form an 18.75mm wide edge.
- The roll is 1000 meters long and 2.4m wide.
- The roll weighs approximately 50kg.

HDPE material and netting specs:

Material:	HDPE Plastic 9.2 m wide lay flat netting 5 mil PLASTIC – with Kelly Green UV colorant
Thermal Properties:	Melts at approximately 97 °C
UV Life:	UV inhibitor is added to the colorant to extend the life of the product in direct exposure to sunlight. The UV level provides a 3-5 year life, however actual testing has not been performed.
Mesh Pattern:	HEXAGON ~ 25mm mesh opening
Stretch Width:	9.2m
Roll Length:	114.3m

INSTALLATION & MAINTENANCE

- This work shall consist of furnishing, installing, & maintaining LockDown™ Netting prior to installation of a Growth media Erosion Control Blanket.

- ***LockDown™ Netting shall be installed to cover the slope completely. Staking must be done prior to Growth media applications and a minimum of 3 stakes (sod staple or equivalent) per 0.91 square metre must be used.***
- If using the cotton material, roll out the netting on the slope and stretch until taut. Lay the cotton material on top of the soil and stake accordingly.
- If using the green HDPE material, unfold the netting and stretch to 9.14m. Stretch material across slope until taught, then stake accordingly.
- For extreme slopes that require installers to use repelling gear, care should be taken to tie off HDPE netting at the top of the slope to a firmly anchored item in the landscape, such as a tree or permanent stake. This ensures the staking system is not the only anchoring device used on such a steep slope.
- The installer shall maintain the system and repair it if it fails for the period of vegetation establishment.
- Vegetation established on top of LockDown™ Netting shall be rated at over 70% establishment/coverage in order for the project to be considered 'fully vegetated and protected'.
- Installer is responsible for establishing a working erosion control system and may, with approval of the Engineer, work outside the minimum construction requirements as needed.
- Installer is required to be certified as determined by Filtrexx Canada Inc. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application.
- Lockdown™ Netting shall be installed on site as detailed above.

SURFACE ROUGHENING (SCARIFICATION)

DEFINITION & PURPOSE

This measure is also referred to as scarification and provides for a rough soil surface with the horizontal depressions created by operating suitable equipment on the contour, or by leaving slopes in a roughened condition without fine grading. This measure aids in seed bed preparation and establishment of vegetative cover, reduces runoff velocity and quantity, increases infiltration and provides some sediment trapping.

APPLICATION

Can be applied to any disturbed surface that is to be left temporarily exposed (i.e. less than 30 days).

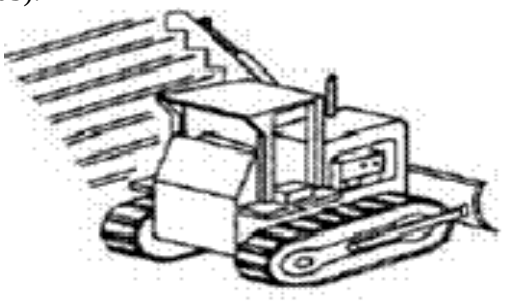
DESIGN CONSIDERATIONS

- Useful where vegetation cannot be immediately established due to the season.
- Should be performed after final grading.
- Should be used in conjunction with other measures such as mulch
- Has limited impact on very sandy or rocky soil.
- Roughening should follow parallel to the site contours.

INSTALLATION & MAINTENANCE CONSIDERATION

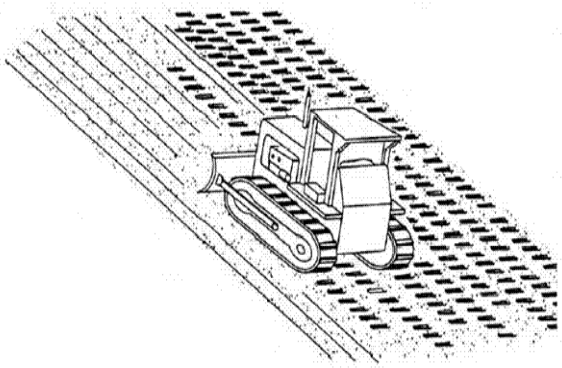
- Surface is considered roughened if depressions are created which, are at least 50 mm to 100 mm deep and about 100 mm to 150mm apart.
- A chisel or ripping instrument can be used in most soil conditions.
- On slopes steeper than 2:1, the tracks left by a bulldozer working perpendicular to the contour can leave acceptable horizontal depressions.
- Vehicles and equipment should not be driven over areas that have been roughened as these results in the creation of tracks which channel water down slopes and encourage runoff and erosion.

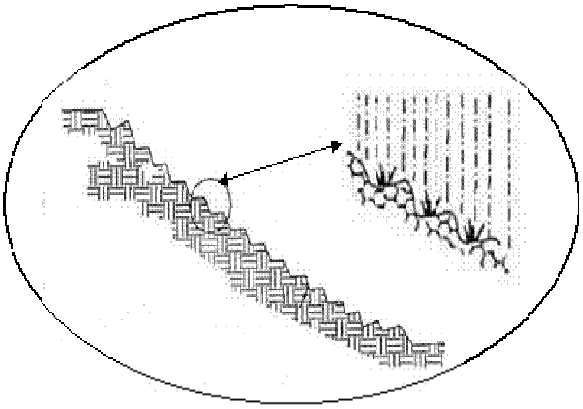
Figure illustrating surface roughening from Water Related Best Management Practices in the Landscape (NRCS/USDA, 1999) and University of Virgin Island Cooperative Extensions Service (2003).



Slopes with grades < 2:1 - roughening should follow parallel to site contours

Slopes with grades > 2:1 - tracking with machinery working perpendicular to the contour





Roughening slope surfaces provides depressions and grooves that catch seed mulch and moisture and reduce runoff velocity.

EDGE SAVER™ SYSTEM

DEFINITION & PURPOSE

Edgesaver™ is a sustainable, customizable, scalable solution to a challenging area of eroded stream banks or pond banks. Eroded edges of ponds and streams are difficult to re-vegetate because it is hard to establish a solid edge to assist in the re-vegetation process. Loose products like soil or mulch are commonly added to edges only to find them eroded or washed away after the first rain. As such, the EdgeSaver™ are used to establish the edge against to which additional backfill can be added, without allowing it to fall into the stream or pond.

By allowing vegetation to become established prior to the next high water event, the system allows sediment to become deposited on top of and in vegetation during all subsequent events. In turn, the vegetation grows through these layers of sediment, establishing sustainability in a long-term system.

Growth media also offers some properties of chemical filtration (binding of metals and nutrients) and biological filtration (destruction of harmful substances) from the unique growth media blend contained in the netting materials.

APPLICATION

The EdgeSaver™ system needs to include a good source of vegetation capable of being established and growing on the banks for a long-term solution. Although turf grasses are ideal at initial establishment and holding power for the Edgesaver™ and backfill media within the system, they should be considered along with other perennial or shrub species that are available by seed, live cuttings, plugs or stakes. Consideration for future habitat should include water flow, animals living in the area, concerns for spreading of invasive species, and aesthetic concerns with the surrounding area. Finally, long-term maintenance should be considered during plant selection stage to ensure that a minimal maintenance plan over the next several years helps to maintain the sustainable design of the EdgeSaver™ system.

This work shall consist of furnishing, installing, & maintaining an Edgesaver™ to offer containment of materials capable of supporting vegetation & preventing erosion along a stream or pond bank in the EdgeSaver™ system. Edgesaver™ will be used in combination with backfill media (see drawing below) where required to re-establish appropriate grades along banks of ponds or creeks. Backfill media will be able to support vegetation and blend in with the edge of the system (which is the Edgesaver™ itself).

DESIGN CONSIDERATION

- Edgesaver™ shall be made on site using an approved multi filament, heavy duty or Safety Soxx of continuous, tubular HDPE, knitted, 9.38mm mesh netting material, filled with growth media and/or pea gravel (or 3/4 clear gravel), passing the specifications for Growth media/filter media products as outlined in growing media specifications.
- Edgesaver™ netting materials are available only from Filtrexx™ Canada Inc. and are the only Certified mesh materials accepted on site. Standard color coding systems for EdgeSaver™ programs include Black or Green. Other colors are only acceptable as approved by the engineer.
- Specifications for Media Mix With-in EdgeSaver™ Applications:

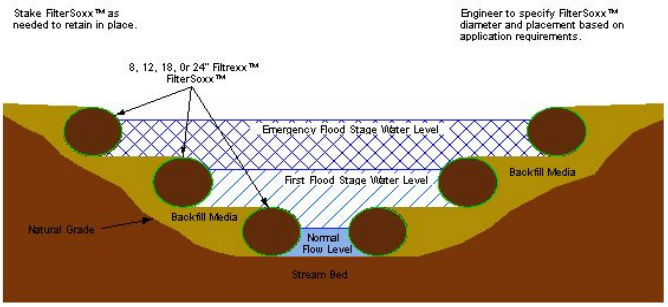
- Material used to fill the Edgesaver™ will be a blend of 50% growth media, 25% pea gravel or 3/4 clear gravel, & 25% filtermedia. The materials shall be appropriately blended prior to filling Edgesaver™. Pea Gravel (or equivalent sized aggregate, ¾ clear gravel) will be obtained locally. Other customized filler materials may be used upon approval of either the Engineer or Conservation Authority. In some cases, the above specification will be used only for the bottom tier or most exposed layers of Edgesaver™. If a higher height is required, subsequent layers of Edgesaver™ may be added using 100% growth media in order to reduce weight and compression of bottom layers.
- Growth/filter Media - shall be weed free and derived from a well-decomposed source of organic matter. The growth media shall be produced using an aerobic composting process meeting or exceeding , M.O.E. 101, C.C.M.E. Type "A" and Type "AA" regulations, and Compost Quality Alliance (CQA) , including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The compost shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:
    - PH – 5.0-8.0 in accordance with TMECC 04.11-A, "Electrometric pH Determinations for Compost"
    - Particle size growth media – 99% passing a 25mm sieve, 90% passing a 18.5mm sieve and a minimum of 50% passing the 9.38mm sieve, in accordance with TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification".
    - Particle size filter media - 99% passing a 50 mm sieve and a minimum of 70% greater than the 9.38 mm sieve, in accordance with TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification".
    - Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
    - Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
    - Nutrient content shall be no greater than a 2-2-2- analysis of N-P-K using traditional nutrient analysis. However, at least 90% of the nitrogen shall be in the organic form, in order to reduce concerns about nutrient transport and leaching.
    - A sample shall be submitted to the engineer for approval prior to being used and must be a certified Filtrexx growth media / filter media mix which also complies with all local, provincial and federal regulations

INSTALLATION AND MAINTENANCE

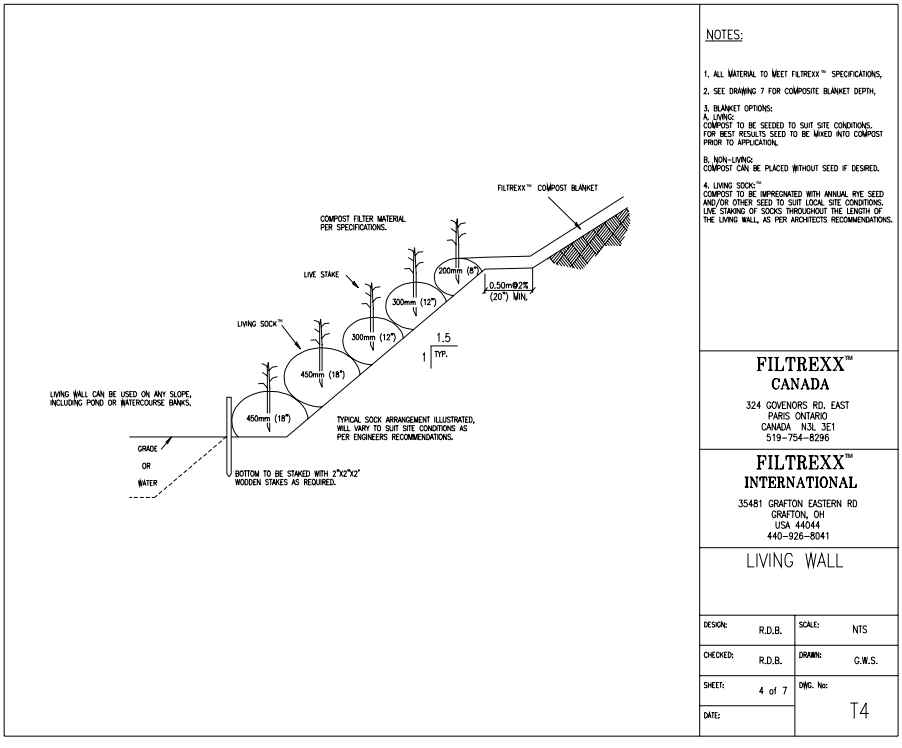
- Edgesaver™ will be used as a form of containment to create new edges within existing stream banks or pond banks. The Edgesaver™ filler material shall be pneumatically injected into the Edgesaver™ and filled on site.
- Edgesaver™ shall be placed at locations indicated on plans as directed by the Engineer. Edgesaver™ should be installed in a pattern that allows complete protection of the stream bank or pond bank area. When required, multiple Edgesaver™ will be placed in

a pyramid fashion or a stair stepped design to allow for the creation of terraces within the floodplain. (See figures below).

- Installation of Edgesaver™ must ensure a continuous length. When completing one section of Edgesaver™ filling, the next section shall be 'sleeved' over the first full section by a minimum of at least .3 (1')meter overlap. A stake shall be placed in this overlap section, securing the two sections together.
- Standard sizes of Edgesaver™ will be 20cm, 30cm, 45cm & 60cm diameter products. Other diameters are available upon special request. In severe flow situations, larger Edgesaver™ may be recommended by the Engineer. For cases of pyramid stacking of Edgesaver™ or in terrace applications, larger diameter, heavier Edgesaver™ will be placed on the bottom and sequentially smaller Edgesaver™ placed on top.
- Edgesaver™ shall be constructed of a heavy duty multifilament, continuous, tubular HDPE, knitted, 9.38mm mesh netting material or Safety Soxx with a 1/16 weave and filled with a growing media that passes the criteria listed in growth media specification.
- EdgeSaver™ applications must be seeded during time of installation to create better anchoring to the soil and surrounding site. The choice of seed is nearly unlimited but Conservation Authority should be consulted in seed selection to assure native plant species prevail and that no invasive species are introduced. Live stakes (live cuttings) or plugs should be used in conjunction with seeding mixtures.
- All layers of Edgesaver™ should be staked to hold the Edgesaver™ against existing banks. As vegetation grows in over time it will establish root system into bank.
- Per the Engineer, terraces may be constructed on the stream bank, using a combination of Edgesaver™ and backfill media. This combination may be used to redirect some of the flows of stream banks in low flow conditions while allowing higher terrace areas to accept flood waters without damage to the channel itself. See figures below.
- The installer shall maintain the EdgeSaver™ system as functional at all times for a period of one year and it shall be routinely inspected. Normally, maintenance and repair of the EdgeSaver™ system is not a requirement due to the design being a sustainable system. However, if seed and vegetation does not grow into the Edgesaver™ then live staking or additional seed may need to be added at a later date. This can be done by adding a second backfill layer across the Edgesaver™ during low water (draw down) times. It may be necessary to water this second seeding if normal rainfall is not adequate.
- After the first season, when vegetation is established within the EdgeSaver™ system and growing well into the Edgesaver™, it may be necessary to consider adding other layers of Edgesaver™ to the design of the stream bank for further stabilization, or to add other choices of native plants that can be added as live stakes or plug plantings into the existing.
- Stabilization, or to add other choices of native plants that can be added as live stakes or plug plantings into the existing system. These choices should be made with the advice of the Conservation Authority familiar with such species as well as avoidance of invasive plants.
- Installer is required to be a certified as determined by Filtrexx Canada Inc. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application.



Filtrexx™ "Terrace System"



SEDIMENT CONTROL PRACTICES

Sediment controls are the next barrier(s) of the multi barrier approach, and are implemented when areas are continually disturbed and/or when a finite amount of time is required before vegetative practices can be employed and become fully effective. The design and selection of site specific sediment control measures are primarily governed by drainage area, length of upstream gradient/slopes, soil cover/type, construction schedule, and season in combination with cost and effectiveness.

Sediment controls have been categorized into three sections:

1. Perimeter Controls;
2. Settling Controls; and,
3. Filtration Controls.

Tables C2, **C3**, and **C4** list the sediment control measures commonly utilized during the construction process. However, the list presented in this Guideline is not inclusive of all sediment control measures that exist.

PERIMETER CONTROLS

Perimeter controls, such as sediment control fences and temporary flow diversion swales and/or dykes, are implemented to protect adjacent areas down gradient from the construction site and/or divert sediment laden runoff away from unprotected/disturbed slopes and areas. Perimeter controls are also utilized to convey runoff from external drainage away from a construction site. Although some perimeter controls may provide some sedimentation, its main function is to prevent sediment laden runoff from encroaching onto adjacent undisturbed areas and/or unprotected slopes.

Table C2 on the next page lists the perimeter control measures commonly utilized during the construction process.

Table C2. Perimeter Control Practices

Name	OPSD Reference	Applicability						Applications	Temporary	Permanent	Reference Page
		Slopes	Streams/Rivers	Surface Drainage ways	Table Lands	Borrow/Stockpile	Adjacent Property				
Sediment/Silt Fence	219.130	√			√	√	√	Acts to re-direct runoff and reduce velocity. Should be used on the same contour level for higher effectiveness. Can be used on slopes if combined with additional controls such as mid-slope berms, cut-off swales and vegetative filters. Failure of the fence may create flow concentrations and cause erosion. Silt fences have a service life of approximately one year and must have sediment removed frequently. Silt fences are susceptible to damage during sediment removal. Limitations in terms of availability to filter sediments. (i.e. > 50 micron particles).	√		C-24
Interceptor Swale/Dike					√	√	√	An excavated swale or fill and compacted berm along the perimeter of the site or near a disturbed area. Used to prevent and/or divert off site sediment laden runoff from entering or leaving a construction site. Periodic maintenance is required.	√		C-27
SiltSoxx		√			√	√	√	Continuous tubular knitted mesh netting filled with filter media and placed along the downstream perimeter of a construction area to filter silt and prevent sediment from entering onto adjacent lands and waterways.			C-29
Vehicle Tracking Control/Mud Mat					√			Pad constructed of clear stone underlain with a geotextile material at the vehicle access point of the construction site. Utilized to remove sediment (mud and debris) from construction vehicles leaving the site and entering adjacent established roadways.	√		C-32
Vehicle Wheel Washers					√			Machine structure/product to spray construction vehicle tires prior to the vehicle exiting the site and entering onto adjacent existing roads. Utilized to remove sediment from construction vehicles prior to entering developed areas with paved roadways.	√		C-34
Channel Soxx				√	√			Continuous tubular knitted mesh netting filled with a blend of media and seed, placed in the direction of flow to protect the invert of the ditch or swale.	√	√	C-35

SEDIMENT/SILT CONTROL FENCE

DEFINITION & PURPOSE

This measure consists of a non-woven synthetic fabric material (geotextile) stretched across and attached to supporting post and wire fence. The non-woven geotextile must be entrenched. This measure does NOT filter runoff, but acts as a linear barrier creating upstream ponding which allows soil particles to settle out thereby reducing the amount of soil leaving a disturbed area. The sediment control fence also decreases the velocity of sheet flow and low to moderate level concentrated flows.

The use of snow fence as structural support for the sediment fence should be discussed with the local Conservation Authority, and plans revised accordingly.

APPLICATION

Sediment control fencing should be implemented along the perimeter and on the up-gradient side of sensitive areas, stream and river corridors, and at the base of moderate slopes. Silt fence is intended to treat moderate sheet flow, and is not suitable to treat concentrated flows, or substantial amounts of overland flow.

A separate fence (not necessarily a silt fence) may be utilized at a high point of a site and at areas to delineate between work areas and sensitive areas.

DESIGN CONSIDERATIONS

- Geotextile material should be woven with a weave density of 270R or equivalent;
- Sediment/silt control fences should NOT be used in creeks or other areas of highly concentrated flows as it will not be able to allow for ponding of water for sediment removal and will fail structurally under high flows;
- Structural fencing must be used to back the sediment fence. A reinforced sediment fence also doubles as a limit of work fence;
- Prefabricated sediment control fence products with wooden stakes already attached to geotextile are not preferred since they are not structurally stable and are incapable of deep water ponding;
- Maximum allowable slope lengths and grades:

Grade	Length
2:1	15 metres
3:1	25 metres
4:1	40 metres;

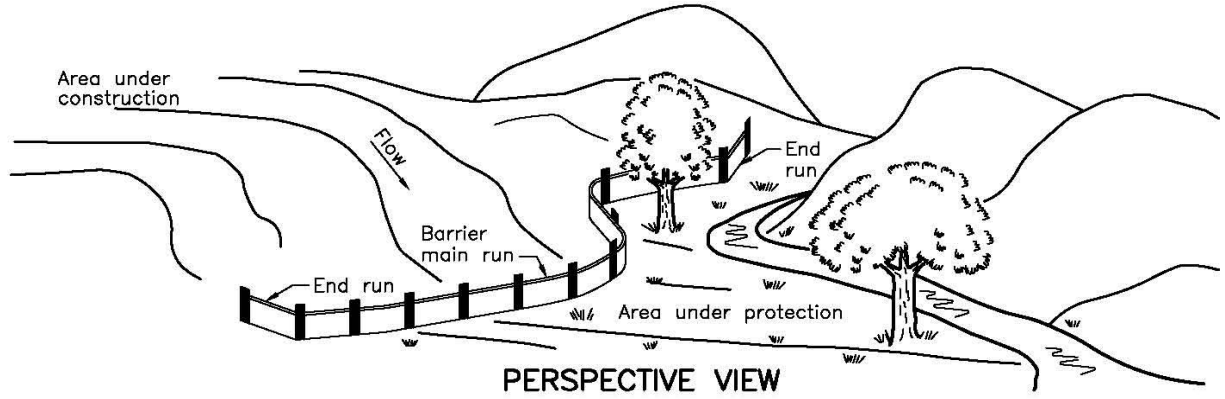
- Maximizing the pond volume increases the amount of sediment to be trapped, therefore fences must be located and installed:
  - ⇒ along the contour and not on up and down slopes;
  - ⇒ with end sections constructed up the slope to stop runoff from flowing around the ends of the fence (e.g. flanking); and,
  - ⇒ on the flat area away from the toe of a slope.
- Vegetative buffer strips to be provided down gradient of sediment fencing according to the following criteria:
  - ⇒ > 3 m for perimeter fencing;

- ⇒ > 15 m for fencing adjacent to a warm water watercourse (as identified by local Conservation Authority or MNR staff); and,
- ⇒ > 30 m for fencing adjacent to a coldwater watercourse supplemented with a second row of fencing 2 metres beyond the initial row (as identified by local Conservation Authority or MNR staff).

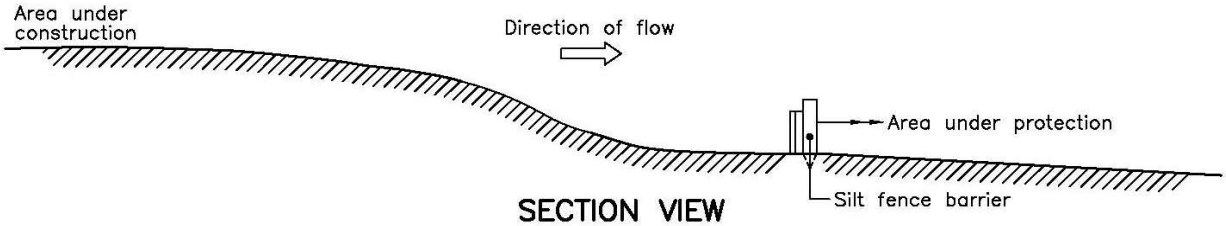
- Refer to OPSD 219.13 for the Heavy Duty Silt Fence Barrier and illustrated on the following page.

INSTALLATION & MAINTENANCE CONSIDERATIONS

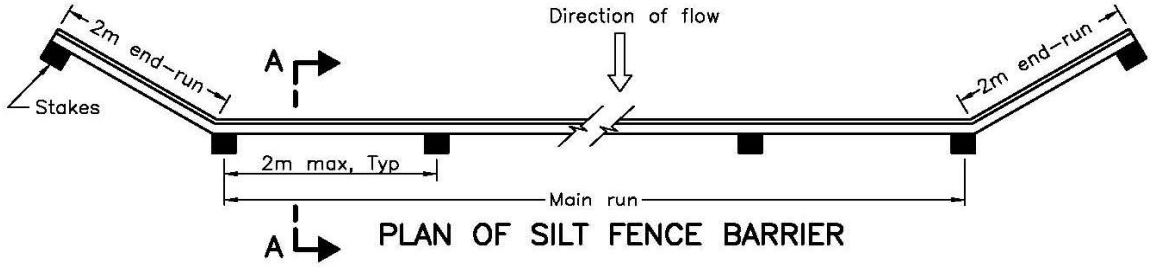
- The proper installation of a sediment control fence is critical to its functionality. See the figures below for an example of a properly installed sediment fence;
- The geotextile material must be stretched tight when installing the material and the bottom edge buried a minimum of 150 mm with compaction of the excavated backfill. Diagonal bracing of the posts is recommended where deep ponding is experienced or anticipated;
- Clear granular stone placement can be used in frozen as well as un-frozen conditions to assist in filtering sediment laden waters;
- Any failure must be repaired immediately;
- Sediment control fence must be inspected regularly, and after every rainfall, to identify failed sections. If wet conditions persist, repairs must be undertaken to restore the integrity of the fencing;
- When sediment accumulates to half the height of the geotextile it should be removed and disposed of in a controlled area; and,
- A supply of sediment control fence should be kept on site to provide for quick repairs or the installation of an additional fence as required.



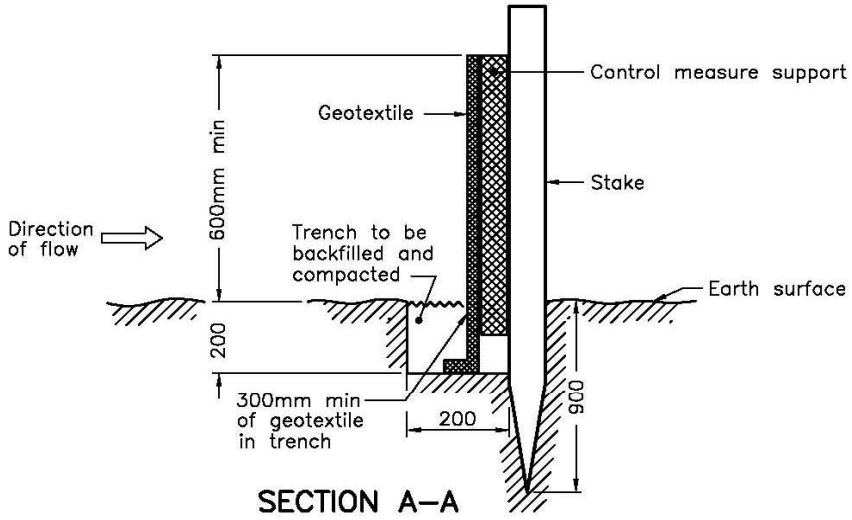
PERSPECTIVE VIEW



SECTION VIEW



PLAN OF SILT FENCE BARRIER



SECTION A–A

NOTE:

A All dimensions are in millimetres or metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	1996 02 01	Rev	
HEAVY DUTY SILT FENCE BARRIER	Date _____		
	OPSD – 219.130		

INTERCEPTOR/DIVERSION SWALES AND DYKES

DEFINITION & PURPOSE

Interceptor swales and dykes involve the use of temporary grading of conveyance systems to collect and convey runoff away from unprotected/disturbed slopes, as well as convey runoff from disturbed slopes to a downstream sediment trap or basin/pond. Diversion swales/dykes reduce sheet and rill erosion on slopes to allow re-vegetation to proceed and slopes to stabilize.

APPLICATION

Can be applied to intercept surface water runoff from undisturbed or disturbed slopes and convey flows to the appropriate discharge or treatment location. Diversion dykes and swales are intended to convey small flows along low-gradient channels. Should be considered along all toe of slopes and adjacent to valley and stream corridors.

DESIGN CONSIDERATIONS

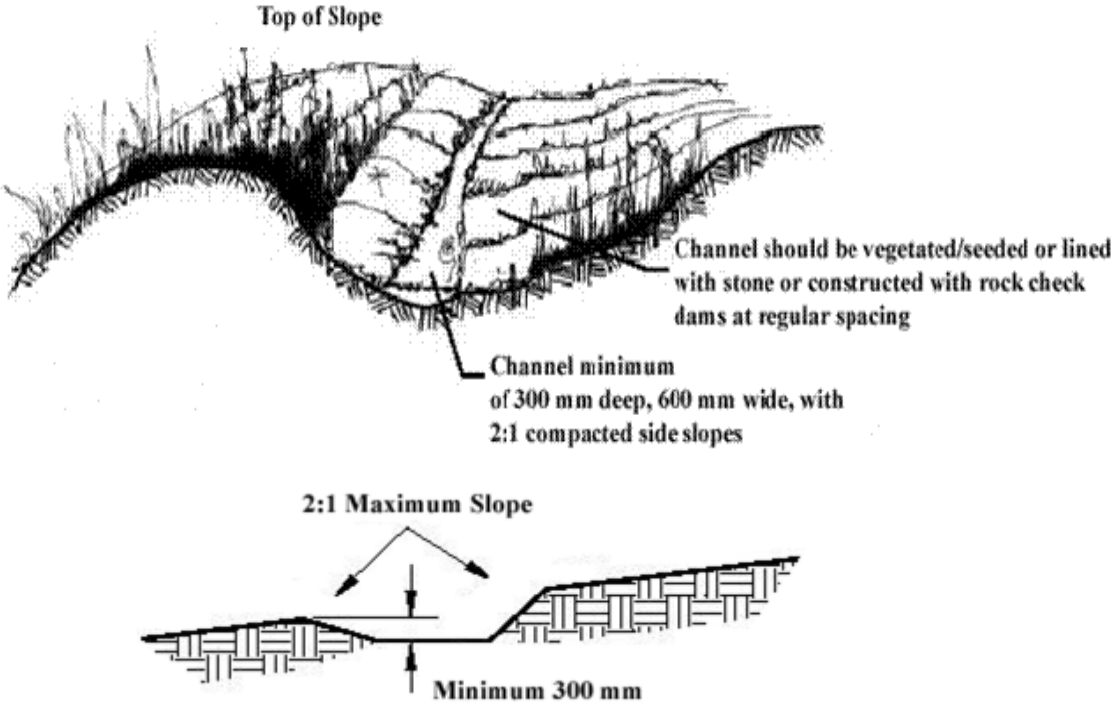
- Temporary diversion dykes and swales should be constructed on the top of long or steep slopes or whenever the up-gradient tributary drainage area exceeds two (2) hectares. (See figure below).
- Flow diversions should be considered when:

  $S^2*L>0.75$ where,
  - S = slope of the upslope tributary area (metres/metre); and,
  - L = length of the upstream slope (metres)
- Diversions should be considered at the top of all slopes in excess of 3:1;
- Dykes should be compacted and constructed with maximum 2:1 side slopes. Swale channel slopes should not be greater than 2:1;
- Concentrated flows from diversions should not be allowed to flow down unprotected slopes, and should be directed to an appropriate sediment control device such as a sediment trap or pond/basin;
- Velocities within a swale should be controlled with rock check dams to prevent channel erosion. (e.g. velocities greater than 1.2 m/s will erode the invert of grassed diversions); and,
- Swales/Ditches should be vegetated if possible. Riprap stabilization may be required at the inlet/outlet to prevent erosion.

INSTALLATION & MAINTENANCE CONSIDERATIONS

- The grading of interceptor swales/dykes can be undertaken at any time during construction, provided that the runoff water is directed to an appropriate sediment control device; and,
- If the diversion is anticipated to exist for more than 30 days, it should be seeded. In some cases sod or rip-rap may be required to protect the invert from down cutting.

Example of Interceptor Swale/Dyke. Figures from Surface Water Design Manual, Appendix D (King County Department of Natural Resources, 1995); Water Related Best Management Practices in the Landscape (NRCS/USDA, 1999).



SILTSOXX™ FOR PERIMETER EROSION CONTROL

DEFINITION & PURPOSE

Siltsoxx ™ is a sediment-trapping device using filtermedia materials applied with a pneumatic blower device or equivalent. Siltsoxx™ trap sediment by filtering the water passing through the Siltsoxx™ also allowing water to pond, creating a settling of solids behind Siltsoxx™.

APPLICATION

Siltsoxx™ is to be used in any area requiring sediment control to keep runoff in the form of sheet flow. The use of Siltsoxx™ apply to areas of high sheet erosion, on steep slopes up to and exceeding a 2:1 slope, and in other disturbed areas of construction sites requiring sediment control. Siltsoxx™ may also be used in sensitive environmental areas, where migration of aquatic life is impeded by the use of other sediment controls. Filter Media used in Silt Soxx™ also has the ability to bind various contaminants contained in runoff.

DESIGN CONSIDERATION

The sedimentation removal process associated with Siltsoxx™ involves both filtering and deposition from settling. This is different than other methods using only ponding for deposition of sediment. Ponding occurs when water flowing to the Siltsoxx ™ accumulates faster than it can flow through the SiltSoxx™. However, installation technique is important for them to work effectively.

For most applications, standard Siltsoxx ™ size for perimeter control is 30mm

- Level Contour: Place Siltsoxx ™ on level contours to assist in dissipating flow into sheet flow rather than concentrated flows. Do not construct Siltsoxx™ that concentrate runoff or channel water. Sheet flow of water should be perpendicular to the Siltsoxx™ at impact and relatively un-concentrated.
- Flat Slopes: When possible, place Siltsoxx™ at a 1.5m or greater distance away from the toe of the slopes in order for the water coming from the slopes to maximize space available for sediment deposit. When this 1.5m distance is not available due to construction restrictions, a second Siltsoxx ™ may be required (see drainage area chart below).
- Flow around ends: In order to prevent water from flowing around the ends, Siltsoxx ™ must be constructed with the ends pointing upslope so they are at a higher elevation.
- Vegetation: For permanent areas, seeded Siltsoxx™ allows vegetation to be established directly in the Soxx and immediately in front and back of the Soxx at a distance of 1.5m. Vegetation on and around the Siltsoxx™ will assist in slowing down water for filtration. The option of adding vegetation will be at the discretion of the Engineer and Conservation Authority. No other soil amendments or fertilizer are required for vegetation establishment.

Siltsoxx™ - Maximum Drainage Area
Based on Slope and Slope Length

Slope		Slope Length (linear meters)	Siltsoxx™ Required (Diameter)
0%-2%	Flatter than 50:1	76.2m	30cm
2%-10%	50:1-10:1	38.1m	30cm
10%-20%	10:1-5:1	30.48m	30cm
20%-33%	3:1-2:1	15.24m	45cm
>50%	>2:1	7.62m	45cm

- Siltsoxx™ should be installed parallel to the base of the slope or other affected area. In extreme conditions (e.g. 2:1 slopes), a second Siltsoxx™ shall be constructed at the top of the slope. (Consult with manufacture for details).
- If the Siltsoxx™ is to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for establishment of permanent vegetation. The Engineer will specify seed requirements in conjunction with Conservation Authority.

Dispersing flow:
Sheet flow and runoff should not exceed height of Siltsoxx™ capacity in most storm events. If overflow of the Siltsoxx™ is a possibility, larger SiltSoxx™ should be constructed.

- Siltsoxx™ shall either be made on site or delivered to the jobsite using Siltsoxx™ materials in a 5 mil monofilament or heavy duty multifilament continuous, tubular, HDPE 9.38mm knitted mesh netting material, filled with filtermedia passing the requirements for filtermedia products as outlined in specs.
- Standard Siltsoxx™ color coding systems include Yellow and Black 20.cm, Orange and Black 30cm, or Red and Black 45cm striped mesh netting with 9.38mm mesh openings.

INSTALLATION & MAINTENANCE CONSIDERATIONS

- This work shall consist of furnishing, installing, maintaining and dispersing (if needed) a water permeable filtermedia Siltsoxx™ to contain soil erosion and sediment by removing soil particles from water moving off site into adjacent waterways or storm water drainage systems.
- The installer shall remove sediments collected at the base of the Siltsoxx™ when they reach 1/2 of the exposed height of the Siltsoxx™, or as directed by the Engineer.
- Siltsoxx ™ should be inspected weekly and after all rainfall and/or snowmelt events to make sure they hold their shape and are producing adequate flow through. For purposes of longer-term sediment control objectives, Siltsoxx™ can be seeded at the time of installation to create an additional vegetative filtering component.
- When construction is completed on site, the Siltsoxx™ may be dispersed with a loader, rake, bulldozer or other device to be incorporated in the soil or left on top of the soil for final seeding to occur. The mesh netting material will be disposed of in normal trash container or removed by the Installer.

Specifications for FilterMedia Derived from Composted Products.

- Filtermedia derived from Compost used for Siltsoxx™ shall be weed free and derived from a well-decomposed source of organic matter. The compost shall be produced using an aerobic composting process meeting or exceeding , M.O.E. 101, C.C.M.E. Type “A” and Type “AA” regulations, and Compost Quality Alliance Program

(C.Q.A.) including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The compost shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:

- PH – 5.0-8.0 in accordance with TMECC 04.11-A, “Electrometric pH Determinations for Compost”
- Particle size – 99% passing a 50mm sieve and a minimum of 70% greater than the 9.38mm sieve, in accordance with TMECC 02.02-B, “Sample Sieving for Aggregate Size Classification”. (In the field, the product commonly requested is between 25mm and 50mm particle size.)
- Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
- Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
- A sample shall be submitted to the engineer for approval prior to being used and must be a certified Filtrexx filter media which also complies with all local, provincial and federal regulations.
- Installer is required to be certified as determined by Filtrexx Canada Inc. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application.

Example of Silt Soxx for Perimeter Control.

VEHICLE TRACKING CONTROL/MUD MATS

DEFINITION & PURPOSE

When construction vehicles enter onto existing paved, public roads, provisions must be made to prevent the transport of sediment in the form of mud and dirt, onto the paved surface. This sediment can enter natural bodies of water by way of unprotected storm inlets in areas which have already been developed. A stabilized vehicle access and egress point must be constructed of coarse granular material, to reduce the transport of debris. See figures below for example of a mud mat.

APPLICATION

The mud mat should be built at the entranceway of construction site where the site is greater than one (1) hectare in size and/or subject to grading and fill movement/placement activities in close proximity to the entrance.

DESIGN CONSIDERATIONS

- Stone pad must be a minimum of 20 metres in length and the full width of the entrance;
- The pad should be a minimum of 300 mm thick, but 450mm thickness is recommended. The pad should be underlain with a geotextile (or graded aggregate filter) and consist of 50 mm diameter clear stone for the first 10 metres (extending from the street) and the remainder of the length to consist of 150 mm diameter clear stone;
- In some cases, municipal inspectors may deem wash racks necessary as illustrated in the figures below; and,
- In the case that the access crosses a culvert or ditch, sediment fencing or approved equivalent should be installed along the edges of the access to prevent sediment from being washed away with runoff.

INSTALLATION & MAINTENANCE CONSIDERATIONS

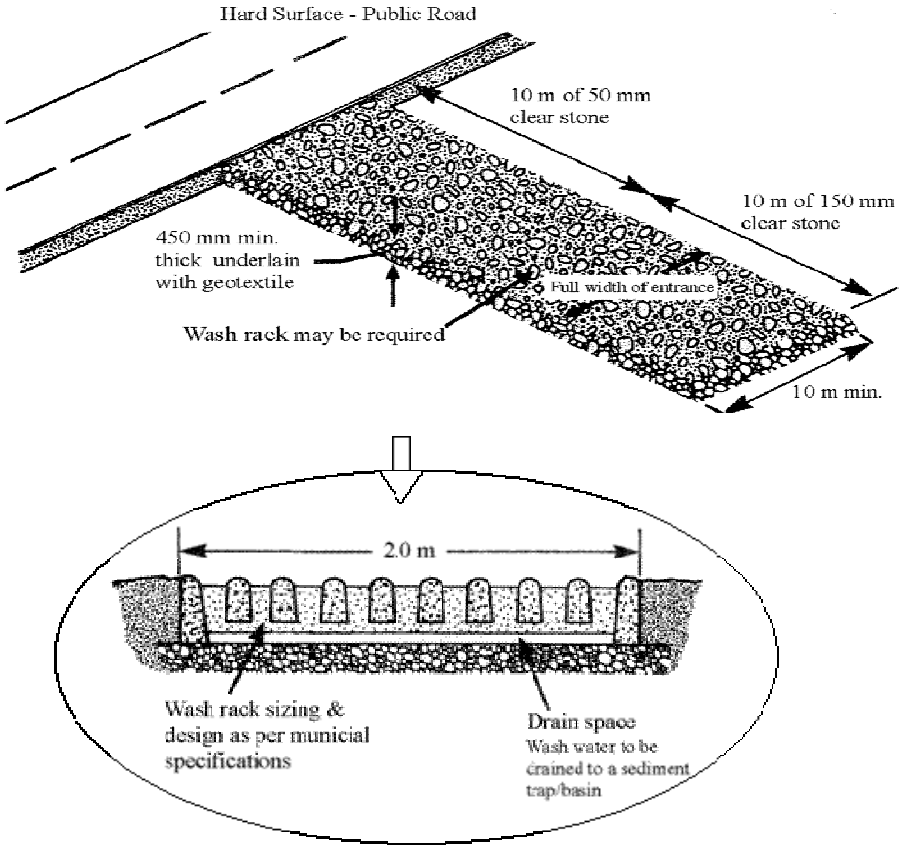
- The granular material will require periodic replacement as it becomes contaminated by vehicle traffic;
- Sediment shall be cleaned from public roads at the end of each day;
- Sediment shall be removed from public roads by shovelling or sweeping and disposed of properly in a controlled sediment disposal area; and,
- Storm inlets both on and in proximity of the site shall be protected with inlet control measures prior to site development and road cleaning activities.

NOTES

- Additional measures such as wheel washing systems may be required along with a mud mat to ensure sediment from a construction site will not be transported off the site via the exiting construction vehicles.
- For construction sites not capable of constructing a mud map at the vehicle access point, a wheel washing system is essential in preventing sediment from being transported off the site.

- moby dick is a company providing several wheel washing systems for vehicles exiting a construction site. Their website lists these various products – www.mobydick.com.

Example of a mud mat from Surface Water Design Manual, Appendix D (King County Department of Natural Resources, 1995)



VEHICLE WHEEL WASHING SYSTEMS

DEFINITION & PURPOSE

Wheel washing systems are additional measures to ensure sediment will not be transported from a construction site to existing adjacent roads. If sediment is transported from a construction site to the existing paved roads, this sediment can enter natural bodies of water by way of unprotected storm inlets in areas which have already been developed. See figures below for examples of wheel washing systems.

APPLICATION

The wheel washing system should be placed at the entranceway of construction site which is subject to grading and fill movement/placement activities in close proximity to the entrance. A wheel washing system can be used in combination with a mud mat or alone where a mud mat is not constructed.

DESIGN CONSIDERATIONS

- The particular model of wheel washing system is dependant on the number of vehicles required for cleaning on a daily basis and the degree (heavy, middle or light) of sediment to be cleaned for each vehicle;
- moby dick is one of many existing companies that supply such wheel washing systems. See moby dick's website www.mobydick.com for more information of their products.

INSTALLATION & MAINTENANCE CONSIDERATIONS

- See manufacturer's details for installation/placement and maintenance of the wheel washing system.

Figures illustrating some wheel washing systems from moby dick website (www.mobydick.com)

CHANNEL SOXX ™

DEFINITION & PURPOSE

Channel Soxx™ are to be used in place of rip rap or other channel designs for directing water off site and preventing invert erosion on a channel or swale. Channel Soxx™ is normally seeded during the time of installation, which allows them to become part of the living landscape.

APPLICATION

Use Channel Soxx™ in place of rip rap for channels when concerned about maintenance of the rest of the slopes. In many cases, maintenance of the rip rap/grass zone is challenging and can be an area of concern for liability. The Channel Soxx™ allow permanent vegetation, along with growing media and mesh netting, to provide the conveyance for water for many years. This design is similar to 'sod waterways' commonly used in agricultural applications, except that the Channel Soxx™ offer additional reinforcement from the netting materials. The Channel Soxx™ also allows less sediment discharge due to intimate ground contact and the depth of growing media within the Channel Soxx™ system. Growth media used in the Channel Soxx™ also has the ability to bind various contaminants contained in runoff.

DESIGN CONSIDERATIONS

- Channel Soxx™ is used to handle similar flows as those with rip rap or other tools. However, they are not for the bottoms of raging rivers or extremely rough waters. Typically, Channel Soxx™ is applied on 3:1 or steeper grades and should be worked into the slope stabilization plan via the engineer or architect.
- In general, Channel Soxx™ is placed edge to edge and will grow together if installed correctly. Proper installation will achieve a 30cm width per Channel Soxx installed. Depth should be about 75mm.
- The Channel Soxx ™should be installed with the edges of the top of the Channel being under the water flow. It is imperative to get the water flowing on top of the system at the top of the slope. Channel Soxx™ is installed using a special filling device that flattens the Channel Soxx™ into approximately10cm deep x 30cm wide configurations (see figures below).
- The ends of the Channel Soxx ™should be staked to hold the product in place. Additional stakes should be placed at a minimum of every 3m

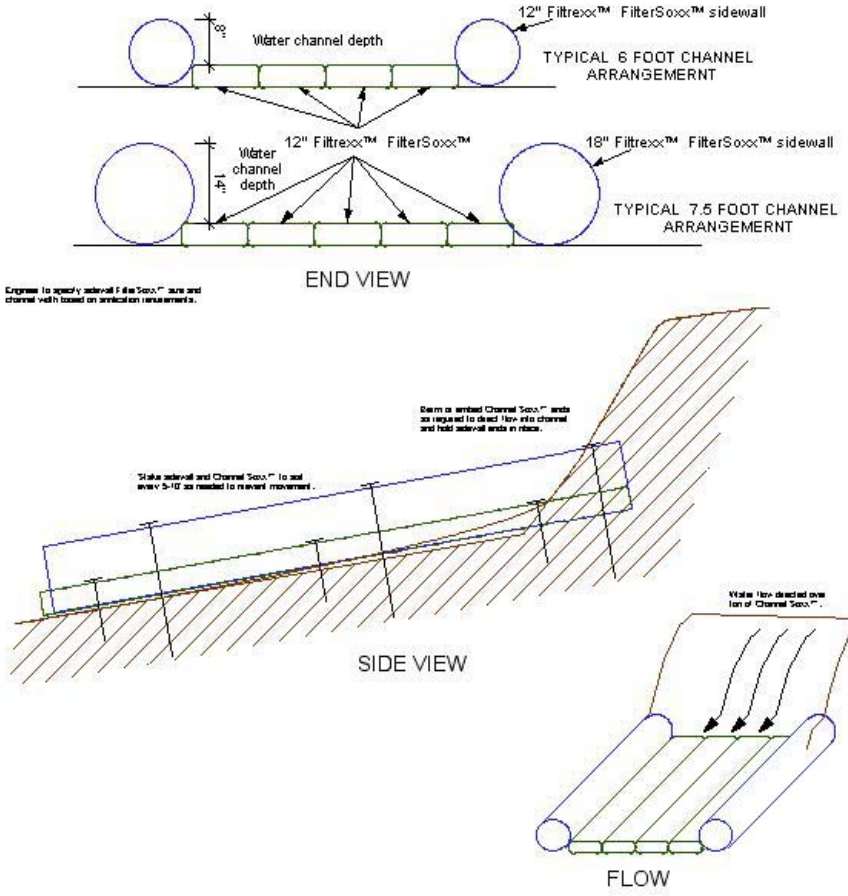
INSTALLATION & MAINTENANCE CONSIDERATIONS

- Channel Soxx™ will be used as a form of drainage channel protection on construction sites, which require protection against sediment-laden water or high runoff rates created from construction site configurations.
- Channel Soxx™ will be placed at locations indicated on plans as directed by the Engineer.
- Standard sizes of Channel Soxx™ should be 30cm width products (see figures below) and a depth of about 10cm. In severe flow situations, the Engineer may recommend larger Channel Soxx™.

- Channel Soxx™ shall be constructed of a heavy duty multi-filament, continuous tubular HDPE, knitted, 9.38mm mesh netting material and filled with a growing media product that passes the criteria listed in growing media specs.
- If the Channel Soxx™ becomes clogged with debris and sediment, they shall be maintained so as to assure a proper drainage and water flow into the drainage channel.
- Channel Soxx™ are to be left as a permanent part of the landscape, Channel Soxx™ need to be seeded during time of installation as specified by the Engineer. Seed will not be necessary if installation is temporary.
- The contractor shall maintain Channel Soxx™ in a functional condition at all times and it shall be routinely inspected.

Specifications for Growth Media Derived from a Composted Product.

- Growth Media used for Channel Soxx™ shall be weed free and derived from a well-decomposed source of organic matter. The compost shall be produced using an aerobic composting process meeting or exceeding M.O.E. 101, C.C.M.E. Type "A" and Type "AA" regulations, and Compost Quality Alliance Program (C.Q.A) including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The compost shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:
    - PH – 5.0-8.0 in accordance with TMECC 04.11-A, "Electrometric pH Determinations for Compost"
    - Particle size – 99% passing a 25mm sieve, and a minimum of 90% passing a 18.75mm sieve, in accordance with TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification"
    - Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
    - Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
    - A sample shall be submitted to the engineer for approval prior to being used and must be a certified Filtrexx filter media which also complies with all local, provincial and federal regulations.
    - Installer is required to be certified as determined by Filtrexx Canada Inc. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application.


12" Filtrexx™ FilterSoxx™ sidewall
Water channel depth
TYPICAL 6 FOOT CHANNEL ARRANGEMERNT
12" Filtrexx™ FilterSoxx™
18" Filtrexx™ FilterSoxx™ sidewall
Water channel depth
TYPICAL 7.5 FOOT CHANNEL ARRANGEMERNT
END VIEW
SIDE VIEW
FLOW

SETTLING CONTROLS

Settling controls allow for a reduction in runoff velocity, resulting in the settlement of suspended soil particles from the sediment laden runoff. Extended detention and/or filtration sediment control measures will be needed to remove finer particles.

Extended detention is the process of allowing the suspended solids to settle, through detaining the sediment laden water for an extended period of time within a settling basin. There is usually a slowly controlled outflow release rate for the temporary sediment pond to allow for the extended detention time.

In keeping with the multi barrier approach, settling controls such as a temporary sediment control pond should not be the only ESC control implemented for a development site. Erosion prevention controls and additional sediment controls should be included in the ESC Plan to ensure effective erosion and sediment controls.

Implementation of the temporary sediment pond at the location of the Ultimate stormwater management facility should be discussed with the governing Conservation Authority, and Plans prepared accordingly.

Table C3 on the next page lists the settling control measures commonly utilized during the construction process.

Table C3. Settling Control Practices

Name	OPSD Reference	Applicability						Applications	Temporary	Permanent	Reference Page
		Slopes	Streams/Rivers	Surface Drainage ways	Table Lands	Borrow/Stockpile	Adjacent Property				
Ditch/Swale Sediment Trap				√	√			These are placed in surface drains just before water leaves the site, enters a watercourse or a ditch inlet. Can be planned with rock check dams to reduce velocities and flow should pass through stabilized vegetation before entering to water body.	√		C-40
Sediment Traps	219.220 /.240	√		√	√	√		Traps are designed to intercept sediment-laden runoff and to trap suspended sediment. Constructed by excavation or by berming. Traps have limited capacity and must be inspected regularly.	√		C-40
Rock Check Dam	219.210/ .211	√			√			Check dams can be constructed of rock, aggregate-filled sandbags or logs to reduce flow velocities in drainage channels. Regular inspection and maintenance of such structures is essential to their effective operation.	√		C-42
Ditch Chexx		√			√			Continuous tubular knitted, mesh netting filled with filtermedia and placed across ditch areas to reduce velocities and filter sediment.	√		C-46
Filter Berms				√	√			Sediment trapping device using filter media derived from composted materials. Traps sediment by filtering water passing through the berm and allowing water to slow down, creating a settling of solids.	√	√	C-49
Straw/Wood Fibre Logs				√	√			Intended to be utilized on slopes to minimize displacement of sediments, in channels as small ditch checks and to restrict sediment laden flow from inlets and drains.	√		C-53
Straw Bales				√	√			Permeable barriers consist of a line of organic material, implemented along the contours of mild slopes to assist in reducing flow and increase the interception of suspended sediments. Contact the local Conservation for approval to utilize this measure.	√	√	C-55
Sediment Control Ponds		√	√	√				Sediment control ponds reduce flow velocities and encourage sediment deposition. Sediment ponds require maintenance to remove sediment and must be designed by qualified personnel.	√		C-56
Storm Drain Outfall Protection					√			Energy dissipating devices placed at the base of a pipe or channel outlet to prevent scour at these outlets and minimize the potential for downstream systems by reducing the velocity of concentrated flows.	√		C-60
Bulkheads within storm sewers				√	√			They are set at the bottom of storm sewers and about half the height of the sewer. Bulkheads assist in reducing flow velocities to allow for sediment particles to settle out from the construction site runoff. Blocks usually constructed of brick and mortar and usually placed at the downstream end of a maintenance hole for ease of clean out.	√		

SEDIMENT TRAPS

DEFINITION & PURPOSE

A sediment trap is a depression area allowing runoff to pond. The depression area is formed by constructing an earth embankment across a drainage ditch, or by excavating a depression below original grade. The sediment trap consists of a stable spillway outlet. The purpose of the trap is to detain runoff from disturbed areas for a long enough period of time to allow for a majority of the coarser suspended soil particles in the runoff to settle out.

APPLICATION

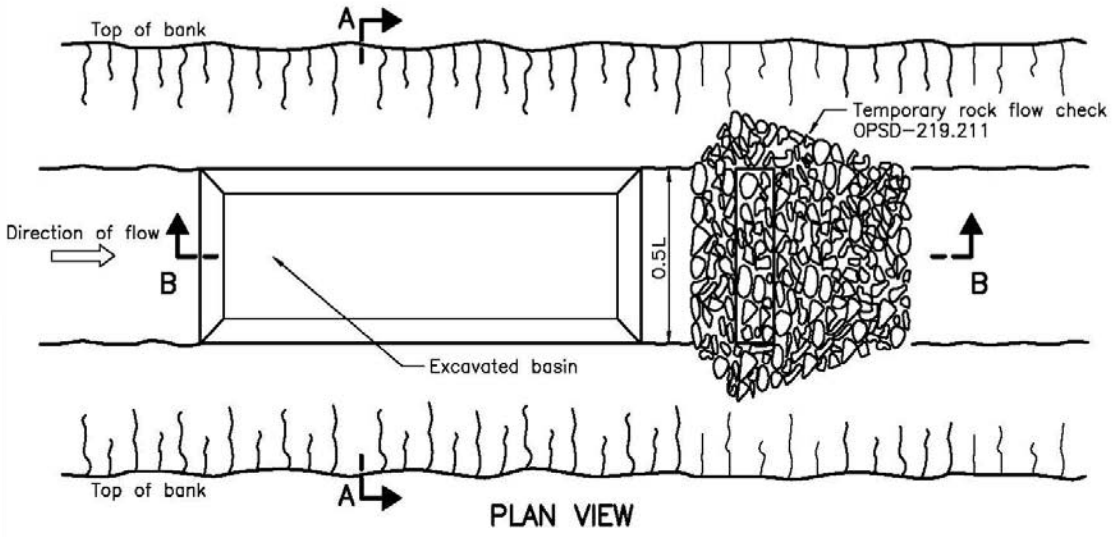
To be implemented on sites with disturbed drainage areas up to two (2) hectares in size.

DESIGN CONSIDERATIONS

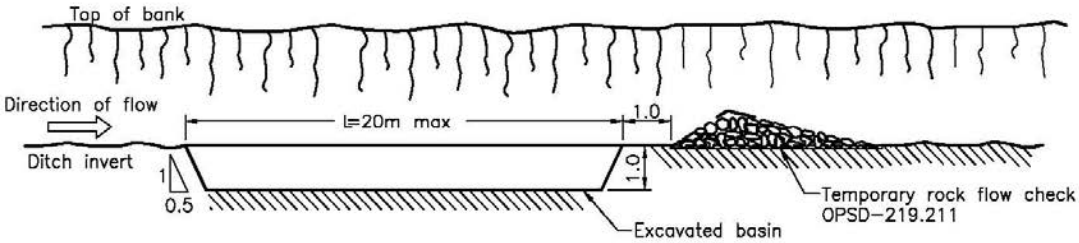
- Provide a minimum of 125 cubic metres of storage volume per hectare of contributing drainage area;
- A stable open channel spillway must be designed by a qualified professional. If the trap is to remain in place for more than one season it should be sized to safely pass the 1 in 100 year storm;
- The lining of the channel can consist of rock or other suitably stable material underlain with filter fabric (270R geotextile or approved equivalent) or self filtering stone. Erosion protection will be required immediately downstream of the spillway;
- Sediment trap may be formed by constructing a berm or by excavating a basin completely or partially;
- The trap should be a minimum of 1.0 metres deep to avoid re-suspension of previously settled out sediment. Trap depths of greater than 2.0 metres should be avoided due to safety concerns. If the maximum 2.0 m depth is unavoidable, the municipality may require a fence around the trap to prevent access to it;
- The basin outlet should be directed with the flow in the downstream direction; and,
- Sediment trap and overflow configurations are illustrated in the figures below.
- Refer to OPSD 219.220 for the Excavated Sediment Trap. A copy of OPSD 219.220 is located on the following page.

INSTALLATION & MAINTENANCE CONSIDERATIONS

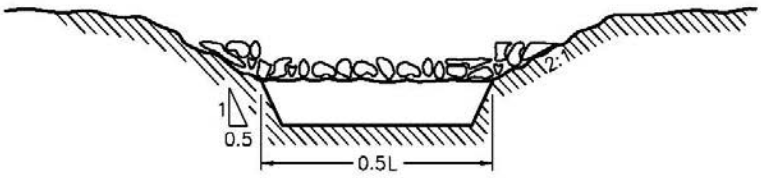
- Proper compaction control must be used when constructing the embankment to ensure its stability;
- The spillway installation is critical to prevent failure of the structure during high flows and all specifications provided by the designer must be implemented;
- Sediment traps should be inspected on a weekly basis and after all rainfall and significant snowmelt events. Any damages to the sediment trap(s) should be repaired in 24 hours of the discovery of the damage.; and,
- When sediment accumulates to half the height of the sediment trap it should be removed and disposed of in a controlled area and stabilized. Caution must be used to avoid damaging the embankment or spillway during this maintenance operation.



PLAN VIEW



SECTION B–B



SECTION A–A

NOTES:

A Ditch cross section upstream or downstream of sediment trap may be flat bottom or 'V' shaped.

B All dimensions are in millimetres or metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	1996 02 01	Rev
EXCAVATED SEDIMENT TRAP	Date _____	
	OPSD – 219.220	

ROCK CHECK DAMS

DEFINITION & PURPOSE

A rock check dam consists of granular material placed temporarily across a ditch, minor stream or drainage way. Its purpose is to reduce the velocity of runoff to reduce the erosion of ditch and drainage way inverts. Rock check dams allow for little ponding and is therefore not very effective in settling out sediment, particularly fine soil particles.

APPLICATION

Rock check dams are applied across intermittent and low flow swales, ditches, and diversion channels. Additional sediment control measures should also be incorporated with rock check dams.

DESIGN CONSIDERATIONS

- Rock is to be placed with a layer of smaller stone under a layer of larger stone. The layers of different stone sizes are to be separated by a non-woven geotextile.
    - ⇒ Bottom layer: should consist of 50 millimetre diameter stones and stacked to 0.45 meters high;
    - ⇒ Middle layer/material: non-woven geotextile; and,
    - ⇒ Top layer: should consist of 150 millimetre diameter stones that extend from the conveyance system invert (i.e. swale invert) to the top of the bottom layer. The top layer should be a minimum 100 millimetres thick and should form a low center spillway. The spillway should be a minimum of 0.3 meters below the top of the channel to prevent erosion flanking.
- The geotextile should be extended along the bottom of the swale/channel on the downstream side and anchored with the second layer of stone to form an underlying "spill apron".
- The rock is to be piled with a maximum upstream slope of 2:1 and a maximum downstream slope of 4:1.
- Centre height of dam should not exceed 1.0 m. The centres of the dam should be notched to concentrate flow towards the centre (approximately 0.15 m). The outer sides of the dam that transition into the ditch slopes should be at 0.5 m higher than the centre of the dam to avoid any potential for the side slopes of the dam to be undermined.
- A series of check dams should be used for swales/ditches with a significant gradient or slope length.
- Height of subsequent check dams must be equal to the elevation of the base of the previous dam.
- Refer to OPSD 219.210 for the Temporary Rock Flow Check with V-Ditch and OPSD 219.211 for the Temporary Rock Flow Check. A copy of OPSD 219.210 and 219.211 are located on the following pages.

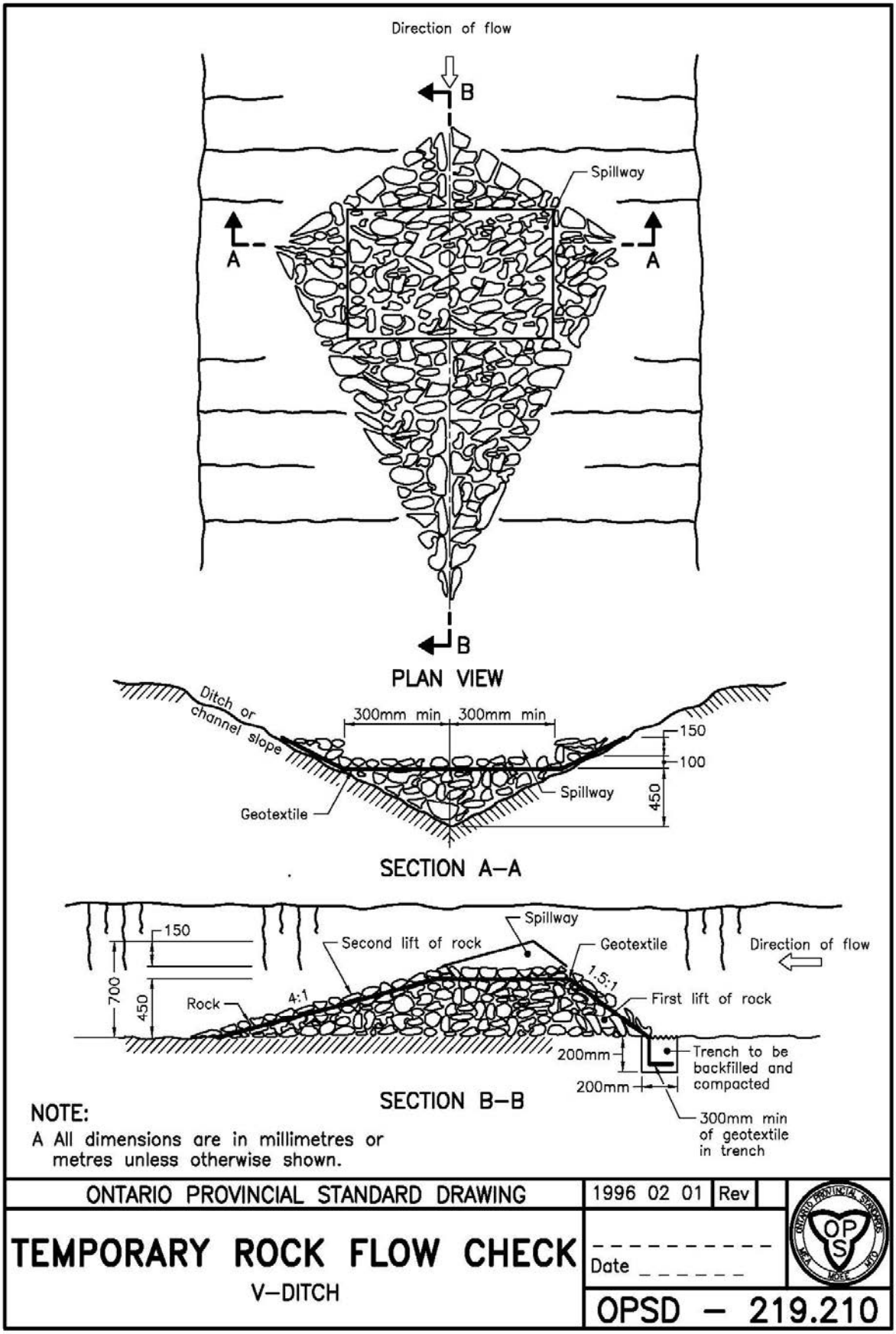
INSTALLATION & MAINTENANCE CONSIDERATIONS

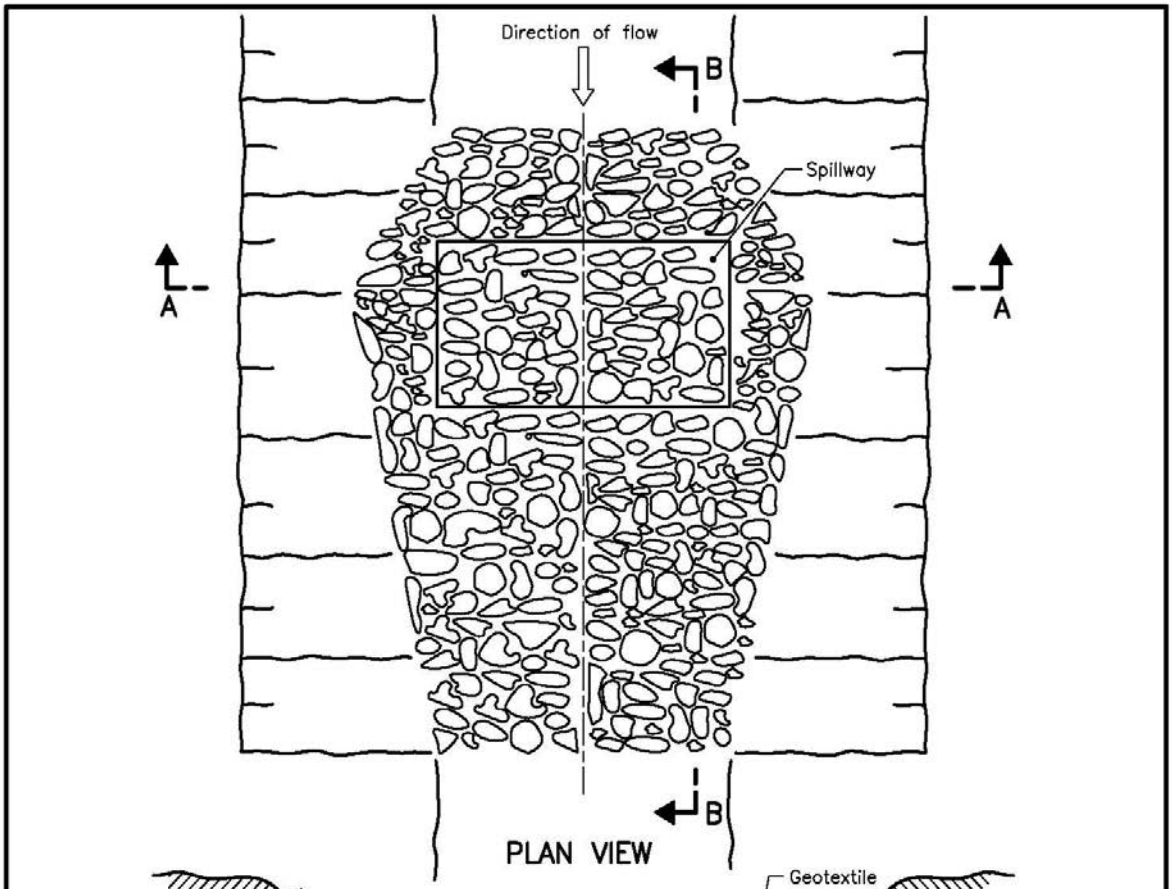
- Sediment monitoring and removal required from the base of the structure when accumulation becomes visible.

- Inspection should take place weekly and after every rainfall and significant snowmelt events to identify any problem areas.
- Repair of the sediment trap should take place within 24 hours of determining the deficiency.

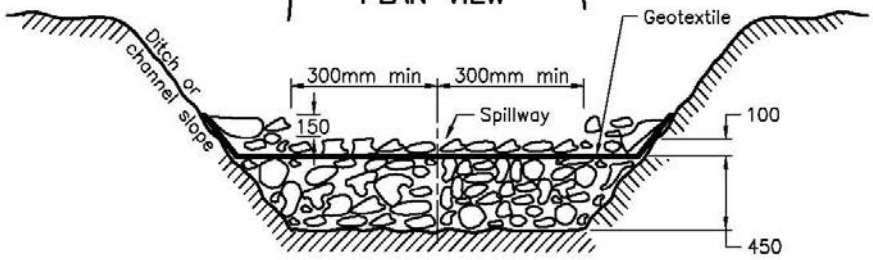
NOTES

- Rock check dams do not serve as in-stream sediment traps.
- Rock check dams should only be used in channels or swales that are designed for drainage areas not exceeding 3 ha. These are not appropriate for natural watercourses and should not be used for lined or vegetated channels.

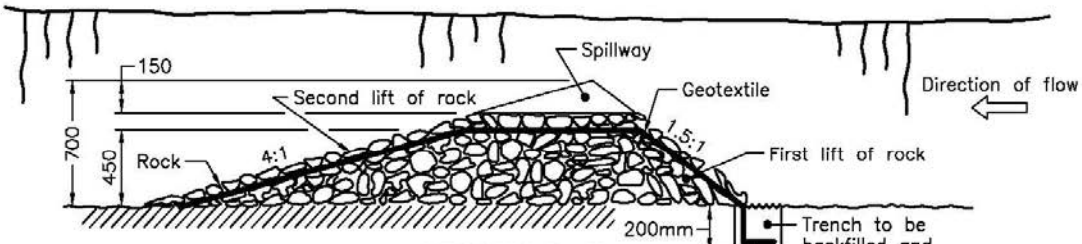

Direction of flow
B
Spillway
A
A
B
PLAN VIEW
Ditch or channel slope
300mm min
300mm min
150
100
Spillway
450
Geotextile
SECTION A–A
150
Second lift of rock
Spillway
Geotextile
Direction of flow
700
450
Rock
4:1
1.5:1
First lift of rock
200mm
Trench to be backfilled and compacted
200mm
SECTION B–B
300mm min of geotextile in trench
NOTE:
A All dimensions are in millimetres or metres unless otherwise shown.
ONTARIO PROVINCIAL STANDARD DRAWING
1996 02 01
Rev
TEMPORARY ROCK FLOW CHECK
V–DITCH
Date
OPSD – 219.210



PLAN VIEW



SECTION A–A



SECTION B–B

NOTE:

A All dimensions are in millimetres or metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | 1996 02 01 | Rev

TEMPORARY ROCK FLOW CHECK

FLAT BOTTOM DITCH OR CHANNEL

Date _ _ _ _ _ _

OPSD – 219.211

DITCH CHEXX™

DEFINITION & PURPOSE

Ditch Chexx™ are made from a filtermedia derived from a composted material contained in a mesh tube of various diameters for varying situations and directional flows. Ditch Chexx™ are used for filtering channel flow of sediment-laden waters generated from construction activities during storm events. Ditch Chexx™ filter and help reduce runoff velocities, creating a settling and filtering effect of sediment laden stormwater runoff. Filter Media used in Ditch Chexx™ also has the ability to bind various contaminants contained in runoff.

APPLICATION

Ditch Chexx™ can be used in place of traditional methods of ditch erosion and sediment control tools, including straw bales, and rock check dams. Ditch Chexx™ can be used in small open channels where it is necessary to slow down the velocity of the stormwater prior to leaving the ditch area. Applications include temporary runoff channels, swales, and other areas that may be used as an integrated approach to overall erosion and sediment control plans for the project.

DESIGN CONSIDERATIONS

- Ditch Chexx™ are not reliable as the only form of erosion and sediment control for an entire project. Ditch Chexx™ are normally 30cm or 45cm in diameter and are limited in the amount of water they can treat due to limited height and width across the channel. Ditch Chexx™ should be used in combination with other tools as an integrated approach.
- In general, Ditch Chexx™ should be installed every 6-23m, depending on the slope and amount of water requiring treatment. In areas of high rainfall, closer spacing is required. In dryer areas, larger spacing between Ditch Chexx™ and smaller diameters may be sufficient.
- In general, the Ditch Chexx™ should be installed with the ends of the materials forming a “U”-shaped figure towards incoming channeled water, so as to create a ponding effect rather than a deflecting, or water shedding, effect. In the event water runs over the Ditch Chexx™ in severe storm events, the water should run over the center of the Ditch Chexx™, not around the ends.
- Minimally, the ends and center of the Ditch Chexx™ should be staked to hold the product in place. Under severe flow situations and longer installations, more stakes may be required at an interval of every 1m.
- Ditch Chexx™ are able to achieve a large ‘footprint’ of ground contact when installed properly. Ditch Chexx™ should be pressed into place to achieve a maximum contact with the ground surface.

INSTALLATION & MAINTENANCE CONSIDERATIONS

- Ditch Chexx™ will be used as a form of drainage channel protection and sediment removal on construction sites, which require protection against sediment laden water.
- Installation of Ditch Chexx™ will ensure that the Ditch Chexx™ exceed the normal drainage area by at least 1.2m on the upslope of both banks. The Ditch Chexx™ will be anchored to the soil using stakes.

- Standard sizes of Ditch Chexx™ for normal protection should be 30cm diameter. In severe flow situations, the Engineer may recommend larger Ditch Chexx™ of 45cm or 60cm. Ditch Chexx™ can be stacked one on top of the other, if additional height is required.
- Ditch Chexx™ shall be constructed of a continuous, tubular, HDPE 9.38mm knitted mesh material and filled with a filtermedia that passes the criteria listed in specification section.
- If the Ditch Chexx™ becomes clogged with debris and sediment, they shall be maintained so as to assure a proper drainage and water flow into the drainage channel.
- For areas where Ditch Chexx™ are to be left as a permanent part of the landscape, Ditch Chexx™ may be seeded during time of manufacture to create a 'living' Ditch Chexx™. For seeding options, the Engineer shall specify seed type and seeding rate.
- The installer shall maintain Ditch Chexx™ in a functional condition at all times and it shall be routinely inspected.
- The installer shall remove sediments collected at the base of the Ditch Chexx™ when they reach 1/3 of the exposed height of the Ditch Chexx™, or as directed by the Engineer. Alternatively, another Ditch Chexx™ may be installed behind the first, slightly upslope, to minimize soil disturbance activities.
- The Ditch Chexx™ will be dispersed on site when no longer required, as determined by the Engineer. The netting material will be disposed of in a normal trash container or removed by the installer.

Specification for FilterMedia Derived from a Composted Product

- Filter Media- shall be weed free and derived from a well-decomposed source of organic matter. The focus on product selection should be for water flow and movement more than a growing media. The filtermedia shall be produced using an aerobic composting process meeting or exceeding , M.O.E. 101, C.C.M.E. Type "A" and Type "AA" regulations, and Compost Quality Alliance Program (CQA), including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The filter media shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:
    - PH – 5.0-8.0 in accordance with TMECC 04.11-A, "Electrometric pH Determinations for Compost"
    - Particle size – 99% passing a 50mm sieve and a minimum of 70% greater than the 9.38mm sieve, in accordance with TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification". (In the field, the product commonly requested is between 12.5mm and 50mm particle size.)
    - Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
    - Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
    - A sample shall be submitted to the engineer for approval prior to being used and must be a certified Filtrexx filter media which also complies with all local, provincial and federal regulations.

- Installer required to be certified as determined by Filtrexx Canada Inc. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application.

Example of Ditch Chexx™.

FILTER BERMS

DEFINITION & PURPOSE

Filter Berms are sediment trapping devices using filter media derived from composted materials applied with a pneumatic blower device or equivalent. Filter Berms trap sediment by filtering water passing through the berm and allowing water to slow down, creating a settling of solids. Filter Media used in Filter Berms has the ability to bind various contaminates contained in runoff.

APPLICATIONS

Filter berms are to be used in any area requiring sediment or erosion control where runoff is in the form of sheet flow. The use of filter berms apply to areas of high sheet erosion, on steep slopes up to a 2:1 slope, and in other disturbed areas of construction sites requiring sediment control. Filter berms may also be used in sensitive environmental areas, where there is migration of aquatic life, including turtles, salamanders etc.

DESIGN CONSIDERATIONS

Filter berms control erosion by trapping sediment and slowing water that filters through the berm . This will create temporary ponding during heavy rains. It is possible to drive over filter berms during construction, but these areas should be immediately repaired with a rake or shovel. Continued heavy construction traffic will reduce the effectiveness of the berms.

The sedimentation removal process associated with filter berms involves both filtering and deposition from settling. This is different than other methods using only ponding for deposition of sediment. Ponding occurs when water flowing to and through the filter berm accumulates faster than it can flow through the berm. However, installation technique is especially important for them to work effectively.

For most applications, it is important to maintain a 2:1 base to height ratio for the berms to be dependably stable.

- *Level Contour*: Place berms on level contours to assist in dissipating flow into sheet flow rather than concentrated flows. Do not construct berms, which concentrate runoff or channel water. Sheet flow of water should be perpendicular to the berm at impact and relatively non-concentrated.
- *Flat Slopes*: When possible, place berms at a 1.5m or greater distance away from the toe of the slopes in order for the water coming from the slopes to maximize space available for sediment deposit (see figure below). When this 1.5m distance is not available due to construction restrictions, a second berm may be required (see drainage area chart below).
- *Flow around ends*: In order to prevent water flowing around the ends of the berms, the ends of the berm must be constructed pointing upslope so the ends are at a higher elevation.
- *Vegetatio*n: For permanent areas, seeded berms allow vegetation to be established directly on the berm and immediately in front and back of the berm at a distance of 1.5m. Vegetation on and around the berms will assist in slowing down water for filtration. The option of adding vegetation will be at the discretion of the Engineer. No other soil amendments or fertilizer are required for vegetation establishment.

- Drainage area:

Filter Berm Maximum Drainage Area
Based on Slope and Slope Length

Slope		Slope Length (linear meters)	Berm Size Required (Height x width)
0%-2%	Flatter than 50:1	76.2m	0.3 x 0.6m
2%-10%	50:1-10:1	38.1m	0.3 x 0.6m
10%-20%	10:1-5:1	30.48m	0.3 x 0.6m
20%-33%	3:1-2:1	15.24m	0.4 x 0.8m
>50%	>2:1	7.62m	0.46 x 0.9m

(Note: a 0.3m high berm is interchangeable with a 0.3m diameter Siltsoxx)

- Dispersing flow: Sheet flow and runoff should not exceed height of berm capacity in most storm events. If overflow of the berm is a possibility, larger berms should be constructed, or other possible sediment control tools may be used. Alternatively, a second berm may be constructed or used in combination with growth media erosion control blankets to prevent sediment from moving.

INSTALLATION & MAINTENANCE CONSIDERATIONS

This work shall consist of furnishing, installing, maintaining and dispersing (if needed) a water permeable filter berm to contain soil erosion and sediment by removing soil particles from water moving off site into adjacent waterways or storm water drainage systems.

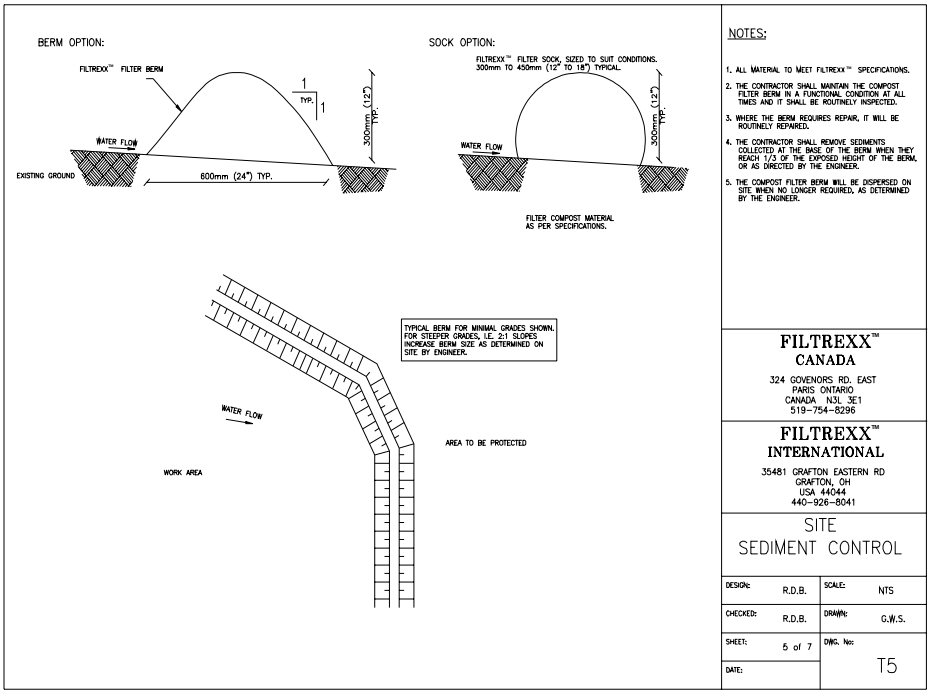
Filter berms should be inspected weekly and after all rainfall and/or snowmelt events to make sure they hold their shape and are producing adequate flow through. If ponding becomes excessive, berms should be dispersed and reconstructed. For purposes of long-term sediment control objectives, berms can be seeded at the time of installation to create an additional vegetative filtering component.

When construction is completed on site, the berms may be dispersed with a loader, rake, bulldozer or other device to be incorporated in the soil or left on top of the soil for final seeding to occur. No other disposal is required.

- Filter berms will be placed at locations indicated on plans as directed by the Engineer. Berms should be installed parallel to the base of the slope or other affected areas construct a 0.3m high by 0.6m wide berm. In extreme conditions (e.g. 2:1 slopes), a second berm shall be constructed at the top of the slope. (See berm size indications in the drainage chart below)
- If the berm is to be left as a permanent filter or part of the natural landscape the filter media berm may be seeded at time of installation for establishment of permanent vegetation. The Engineer will specify seed requirements.
- Filter berms are not to be used in direct flow situations or in runoff channels. If direct water flow is possible, use DitchChexx™ in similar diameters and stake according to specifications.
- The installer shall remove sediments collected at the base of the berm when they reach 1/3 of the exposed height of the berm, or as directed by the Engineer. Alternatively, an additional berm may be placed upslope of the existing berm in order to minimize sediment disturbance activities.
- The filter berm will be dispersed on site when no longer required, as determined by the Engineer.

Specifications for Filter Media Derived from Composted Materials

- Filtermedia derived from compost used for Filter Berms shall be weed free and derived from a well decomposed source of organic matter. The filtermedia shall be produced using an aerobic composting process meeting or exceeding M.O.E. 101, C.C.M.E. Type "A" and Type "AA" regulations, and Compost Quality Alliance (C.Q.A) Program including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The filtermedia shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:
    - PH – 5.0-8.0 in accordance with TMECC 04.11-A, "Electrometric pH Determinations for Compost"
    - Particle size – 99% passing a 50mm sieve and a minimum of 70% greater than the 9.38mm sieve, in accordance with TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification". (In the field, the product commonly requested is between 12.5mm and 50mm particle size).
    - Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
    - Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
    - A sample shall be submitted to the engineer for approval prior to being used and must be a certified Filtrexx filter media which also complies with all local, provincial and federal regulations.
    - Installer is required to be certified as determined by Filtrexx Canada Inc. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application.


BERM OPTION:
FILTREXX™ FILTER BERM
1
TYP.
1
300mm (12")
TYP.
WATER FLOW
EXISTING GROUND
600mm (24") TYP.
SOCK OPTION:
FILTREXX™ FILTER SOCK, SIZED TO SUIT CONDITIONS.
300mm TO 450mm (12" TO 18") TYPICAL.
300mm (12")
TYP.
WATER FLOW
FILTER COMPOST MATERIAL
AS PER SPECIFICATIONS.
TYPICAL BERM FOR MINIMAL GRADES SHOWN.
FOR STEEPER GRADES, I.E. 2:1 SLOPES
INCREASE BERM SIZE AS DETERMINED ON
SITE BY ENGINEER.
WATER FLOW
AREA TO BE PROTECTED
WORK AREA
NOTES:
1. ALL MATERIAL TO MEET FILTREXX™ SPECIFICATIONS.
2. THE CONTRACTOR SHALL MAINTAIN THE COMPOST FILTER BERM IN A FUNCTIONAL CONDITION AT ALL TIMES AND IT SHALL BE ROUTINELY INSPECTED.
3. WHERE THE BERM REQUIRES REPAIR, IT WILL BE ROUTINELY REPAIRED.
4. THE CONTRACTOR SHALL REMOVE SEDIMENTS COLLECTED AT THE BASE OF THE BERM WHEN THEY REACH 1/3 OF THE EXPOSED HEIGHT OF THE BERM, OR AS DIRECTED BY THE ENGINEER.
5. THE COMPOST FILTER BERM WILL BE DISPERSED ON SITE WHEN NO LONGER REQUIRED, AS DETERMINED BY THE ENGINEER.
FILTREXX™
CANADA
324 GOVENORS RD. EAST
PARIS ONTARIO
CANADA N3L 3E1
519-754-8296
FILTREXX™
INTERNATIONAL
35481 GRAFTON EASTERN RD
GRAFTON, OH
USA 44044
440-926-8041
SITE
SEDIMENT CONTROL
DESIGN: R.D.B.
SCALE: NTS
CHECKED: R.D.B.
DRAWN: G.W.S.
SHEET: 5 of 7
DWG. No: T5
DATE:

STRAW LOGS – WOOD FIBRE LOGS

DEFINITION & PURPOSE

Permeable barriers consist of a line of organic material, implemented along the contours of mild slopes (< 5 %) to assist in reducing flow and increase the interception of suspended sediments.

Straw logs are in rolled tubular form and are designed to reduce hydraulic energy and filter sediment laden flow in channels and on slopes. The logs are flexible to conform to the soil surface.

APPLICATION

Straw logs are intended to be utilized on slopes to minimize displacement of sediments, in channels as small ditch checks and to restrict sediment laden flow from inlets and drains.

Straw logs must be installed in conjunction with RECP Apron or blanket (Rolled Erosion Control Product) according to standard manufacturer's installation instructions.

The local Conservation Authority must be contacted to confirm the use of straw logs within it's jurisdiction for sediment control.

DESIGN CONSIDERATIONS

- Straw logs consist of a certified 100% agricultural, weed free, straw matrix confined by a tubular (0.50 x 0.50 Heavy Duty) synthetic netting that is closed at ends with Hog Rings or tied. Available in 23cm, 30cm, and 50cm diameters with a standard length of 3m – other sizes are also available.
- Straw logs require a minimum of 0.3m of upstream apron and 0.6m of downstream apron for installation. Subsequent down slope rows of logs should be spaced appropriately for site conditions to minimize acceleration of flow.
- Straw log seams should be offset to ensure continuous filtration.
- Straw logs must be staked with a minimum length stake of 25mm x 25mm x 0.6m (sandy or loose soil may require longer stakes).
- Straw log must maintain intimate contact with ground surface over entire application.

INSTALLATION AND MAINTENANCE CONSIDERATIONS

- Site must be fully prepared (free of debris, rocks etc) to ensure log remains in contact with slope.

NOTES

- Product certified by Western Excelsior Corp.

EXCEL Straw Logs

STRAW BALES

DEFINITION & PURPOSE

Permeable barriers consist of a line of organic material, implemented along the contours of mild slopes (< 5 %) to assist in reducing flow and increase the interception of suspended sediments.

Straw bales can be oriented end to end and in multiple layers to form a consistent and continuous permeable barrier to flow.

APPLICATION

Straw bales can be applied across constructed conveyance systems and along the contours of mild to gentle slopes. Straw bales should not be used alone, but should be used in combination with other controls for effective performance.

The local Conservation Authority must be contacted to confirm the use of straw bales within it's jurisdiction for sediment control.

DESIGN CONSIDERATIONS

- Straw bales should be firmly butted together and staked with wooden stakes or T-bars. In ditches or swales, a second row of bales should be placed behind the first row, overlapping at the joints.
- To prevent flanking, bales should extend up the channel slopes a minimum of 1 metre above the high flow depth.
- Straw bales can be applied at the base of the slope, as well as the top of the slope for added protection.

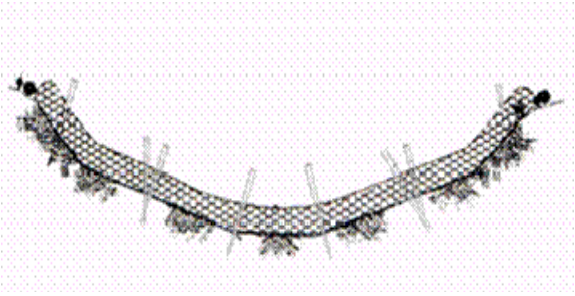
INSTALLATION AND MAINTENANCE CONSIDERATIONS

- Following their replacement/removal, straw bales can be broken apart and spread as mulch to promote vegetation establishment.

NOTES

- Straw bales must be applied in combination with other controls (e.g. vegetated buffer strip, silt fence, silt soxx, filter fabric or approved equivalents).

Figures illustrating straw bales.



SEDIMENT CONTROL PONDS/BASINS

DEFINITION & PURPOSE

A sediment control pond/basin is a runoff storage area formed by constructing a compacted earth embankment or by excavating a depression across or at the end of a drainage path. The sediment control pond/basin consists of an outlet structure to control the stormwater release rate. Its purpose is to detain runoff long enough to allow the majority of soil particles to settle out of suspension. Sediment ponds/basins typically serve as an "end of pipe" control, which receive flows from other ESC controls and overland flow during extensive grading operations. (See following figures).

Incorporating the sediment control pond at the location of the ultimate stormwater management pond must be discussed and approved by the local Conservation Authority.

APPLICATION

To be implemented on sites with disturbed drainage areas exceeding two (2) hectares in size. Sediment basins are typically capable of removing sediment as small as 4 microns. Location of the pond should be based on topography, the low point of runoff concentration that allows the maximum control of runoff from the disturbed areas.

DESIGN CONSIDERATIONS

- Basin specifications and configurations are detailed in the figures below.
- Sediment ponds should have two components:
    1. Active Storage Volume:
       Should be designed with a minimum of 125 m^3/hectare contributing drainage area with a minimum 48 hour drawdown time (minimum 75mm diameter orifice), and a minimum 4:1 L:W ratio of the pond; and,
    2. Permanent Pool Volume:
        i. Minimum 125 m^3 storage volume/hectare drainage; or,
        ii. Minimum 185 m^3 storage volume/hectare drainage area if L:W ratio is less than 4:1 or the drawdown time for active storage is less than 48 hours.
- ***The local Conservation Authority must be contacted to confirm the appropriate permanent pool volume.***
- A forebay should be provided for the sediment control pond and designed in accordance with the MOE SWM Planning and Design Manual, 2003.
- In addition to the initial sediment forebay, another forebay or silt/turbidity curtain should be constructed within the stormwater management pond and in series to the first forebay. The distance of the second forebay berm or curtain should be approximately half the distance between the initial forebay berm and the pond outlet structure.
- Velocity calculations must be submitted to ensure that settling velocities are achieved.
- A Hickenbottom riser outlet or approved equivalent must be used to release detained flows. The riser pipe must be covered with a layer of smaller clear stone (25 mm - 50mm) over a layer of larger size (150 mm - 200 mm) clear stones (See figure below). A minimum 75 mm diameter orifice is required as part of this outlet structure.

- The basin length to width ratio should be a minimum 4:1. A baffle may be required to increase the flow length to prevent potential short circuiting.
- Maximum 4:1 interior side slopes and maximum 2:1 exterior slopes.
- The basin should be a minimum of 1.0 metre deep to avoid re-suspension of previously settled out sediment and a mean depth of 1.0m to 2.0m and maximum depth of 3.0m.
- An emergency spillway must be designed by a qualified professional and it should be sized to safely pass the 1:100 Year storm event. Supporting calculations, reports and drawings must be provided. The lining of the spillway can consist of riprap or other suitably stable material underlain with filter fabric. Erosion protection will be required immediately downstream of the spillway.
- Sediment basins have a high trapping efficiency, fewer maintenance requirements and can function through more phases of construction. However, on-site and conveyance erosion and sediment control measures must be implemented with a proposed sediment control pond.

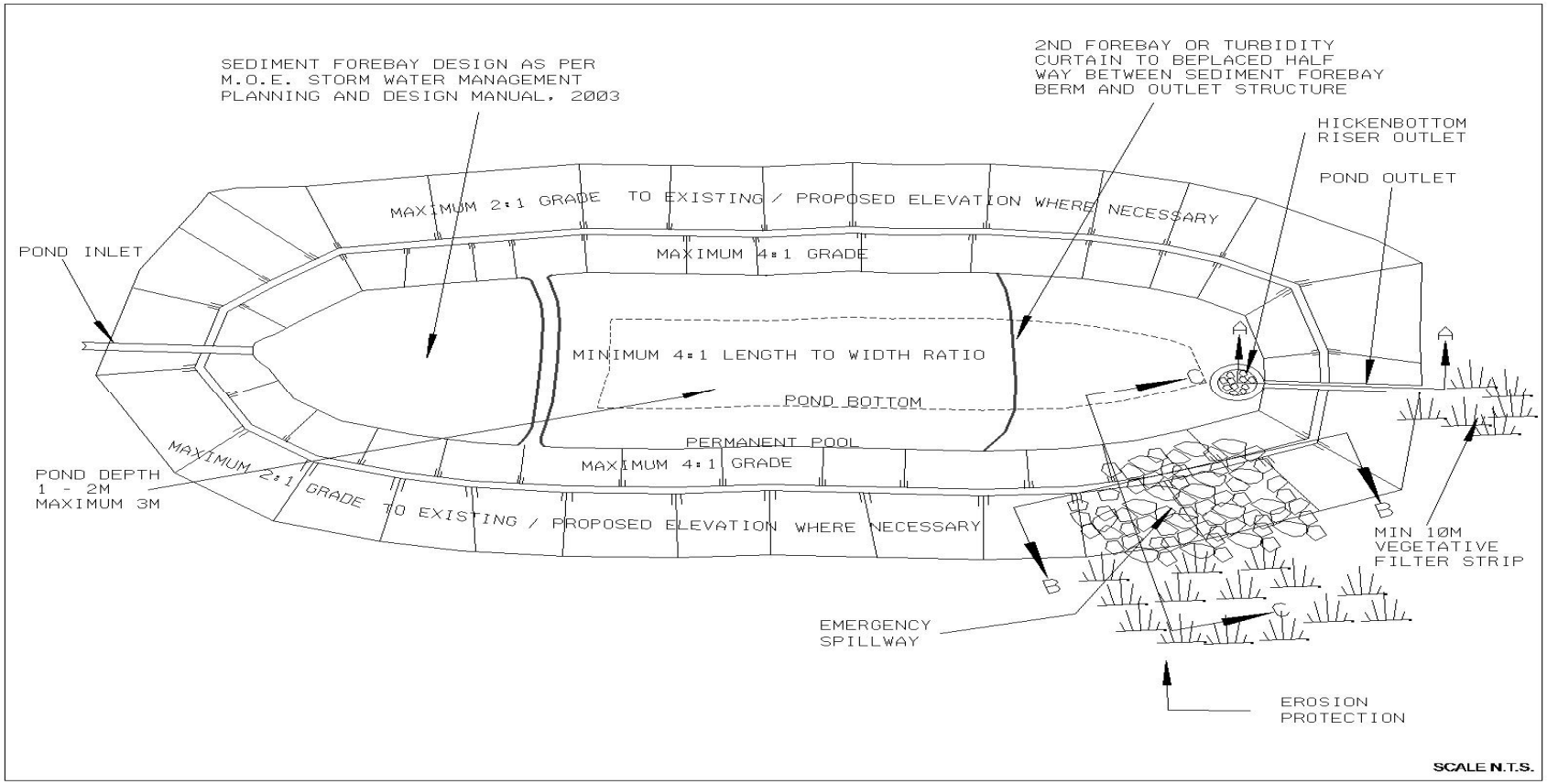
INSTALLATION & MAINTENANCE CONSIDERATIONS

- Sediment ponds/basins must be constructed prior to any construction activities except for topsoil stripping and grading operations associated with the construction of the temporary ESC pond.
- Proper compaction control must be used when constructing the embankment to ensure its stability.
- Pond banks must be stabilized with vegetation once the excavation of the pond is complete.
- The emergency spillway installation is critical to preventing failure of the structure during high flows and all specifications provided by the designer must be followed.
- ***Sediment accumulation in the ponds must be measured a minimum of once every six (6) months. The pond will require cleaning when sediment accumulation reaches 50% of the forebay design capacity.***
- Sediment pond embankments, outlet, and spillway should be inspected weekly and after each rainfall and significant snowmelt events.
- In the case where the temporary sediment pond is in the location of the ultimate pond, and the construction of the subdivision is complete, the accumulated sediment within the pond must be removed and the permanent pool storage must be restored to the design level.

NOTES

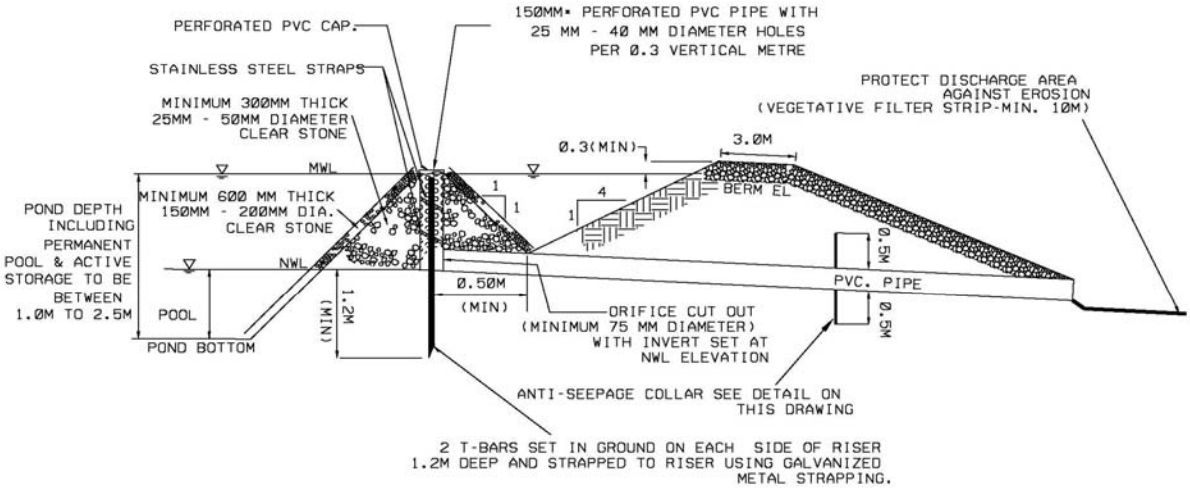
- At-source and conveyance ESC measures must be used in addition to sediment ponds to minimize the amount of sediment entering the sediment pond. Vegetative filter strips (minimum of 10 m length) are recommended at the outlet of the pond.

Plan View of Sediment Control Pond

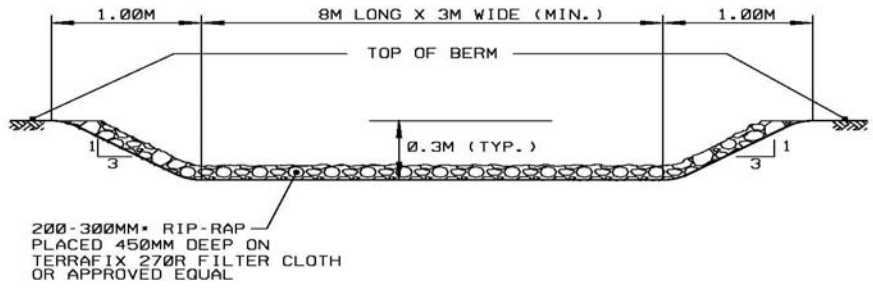


Notes:

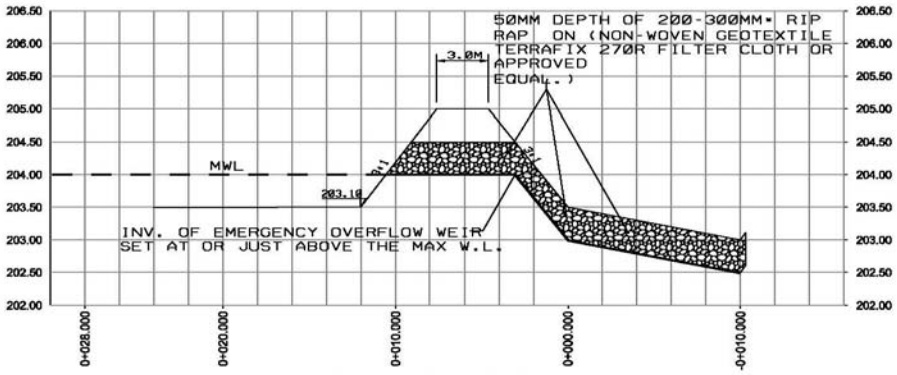
1. ***Pond side slopes to be stablized immediately***;
2. Minimum 48 Hour drawdown time with minimum 75mm diameter orifice;
3. Active Storage Volume:
   Should be designed with a minimum of 125 m^3/hectare contributing drainage area with a minimum 48 hour drawdown time (minimum 75mm diameter orifice) and minimum 4:1 L:W pond ratio; and,
4. Permanent Pool Volume:
   i. Minimum 125 m^3/hectare drainage area; or
   ii. Minimum 185 m^3/hectare drainage area if L:W ratio is less than 4:1 or the drawdown time for the active storage is less than 48 hours.



SECTION A-A



SECTION B-B
EMERGENCY WEIR



SECTION C-C
EMERGENCY WEIR PROFILE

STORM DRAIN OUTFALL PROTECTION

DEFINITION & PURPOSE

Storm drain outfall protection consists of structurally lined aprons or other acceptable energy dissipating devices placed at the base of pipe or channel outlets. The outfall protection prevents scour at these outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated flows. (See figure below)

APPLICATION

Outfall protection should be applied at the base of any stormwater outfall structure including, drainage tiles, stormwater facility outlets, and piped or channel conveyance systems. Storm drain outfalls are applied to areas with concentrated flows.

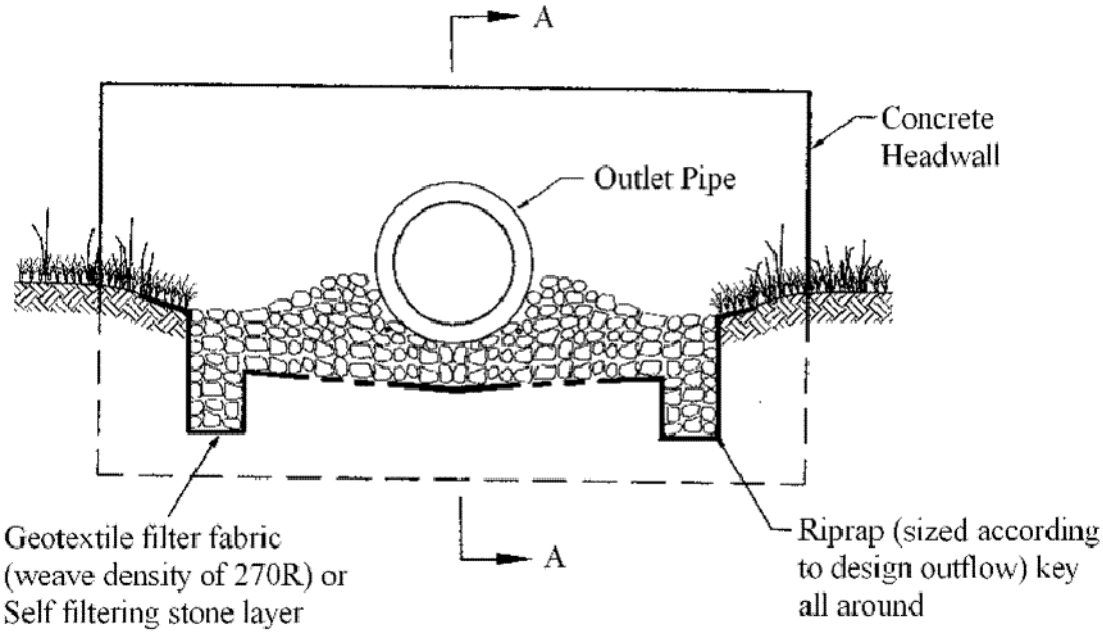
DESIGN CONSIDERATIONS

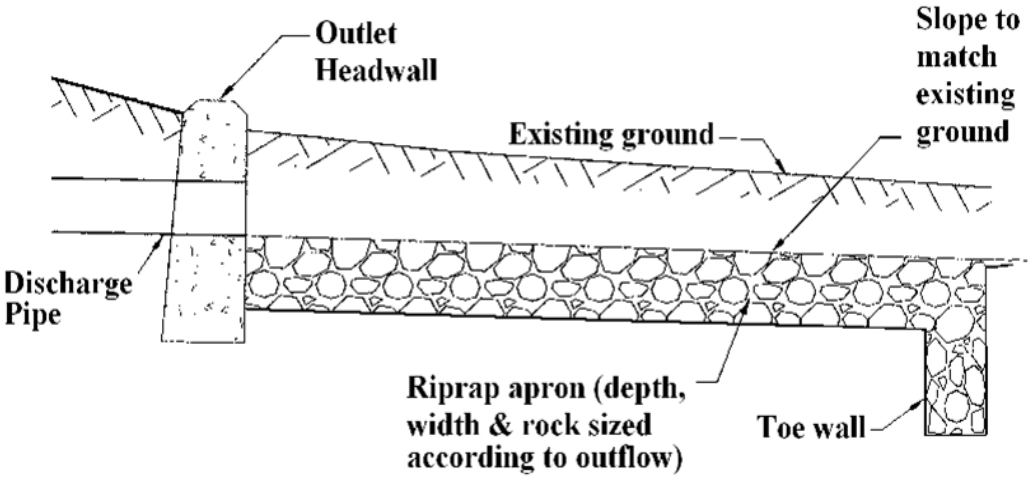
- Outfall designs are encouraged to blend in with the environment by using natural materials such as native vegetation, and armour stone where possible. These should be placed in as natural a configuration as possible while still retaining their function;
- Most outfalls require some minimal amount of riprap stone to prevent scour of the receiving channel. Riprap stone must be underlain with a geotextile (or graded aggregate filter), covered with a stone base, and be sized to resist the tractive forces of the flow from the outfall as well as the lateral flow of the receiving channel. Typically the minimum diameter of riprap stone should be 300 mm;
- Outfall pipes and structures must be aligned so that lateral flows in the receiving channel do not erode in the vicinity of the exposed structure;
- Velocities greater than 3.0 m/s may require structural stilling basins, chute blocks or other structural measures to reduce velocities and erosion/scour impacts; and,
- In many cases the receiving channel is a grass lined ditch. The typical threshold velocity before a well-grassed channel begins to erode is 1.2 m/s. Any storm drain outfall protection in this situation must limit velocities to this threshold maximum.

INSTALLATION & MAINTENANCE CONSIDERATIONS

- Installation of outfall structures must follow specifications regarding riprap stone size, geotextile etc., in order to prevent failure of the measure; and,
- Outfall protection must be in place prior to any conveyance of runoff through the outfall structure.

Figures illustrating a storm drain outfall protection from Sediment & Erosion Control on Construction Sites – Field Guide (University of Virgin Islands, 2003)





FILTRATION CONTROLS

Filtration is the process in which sediment laden water passes through a porous media (e.g. geotextile, sand) consisting of small voids to trap the suspended sediment. The mechanism that makes each mitigation method effective must be understood when considering appropriate application of ESC measures. The number of barriers that may be required to trap sediment before it reaches the aquatic ecosystem will also determine the effectiveness of the mitigation methods.

Table C4 below, lists the filtration control measures commonly utilized during the construction process.

Table C4. Filtration Control Practices

Name	Applicability						Applications	Temporary	Permanent	Reference Page
	Slopes	Streams/Rivers	Surface Drainage ways	Table Lands	Borrow/Stockpile	Adjacent Property				
Storm Drain Inlet Protection			√	√			Sediment control barrier consisting of either a filter fabric around the catchbasin inlet with crushed stone over the grate or filter fabric inserted inside the catchbasin.	√		C-63
InletSoxx Inlet Protection			√	√			Continuous tubular, knitted, mesh, netting filled with filtermedia and placed around inlets and drains to filter contaminants from water while also creating a sediment control barrier.	√		C-64
Sediment Bags			√	√			Geotextile material constructed into a rectangular configuration. Sediment laden runoff/discharge is pumped into the sediment bag where the suspended sediment is filtered out	√		C-67
Filter Rings			√	√			Single, multiple or stackable rings made of continuous tubular, knitted, mesh, netting, filled with a filtermedia, that provides filtration of contaminants and removes sediment when de-watering or as a concrete vehicle wash-out areas	√		C-68

STORM DRAIN INLET PROTECTION

DEFINITION & PURPOSE

Storm drain inlet protection consists of a sediment control barrier either around or in the catchbasin inlet. The inlet protection filters runoff before it is released to the sewer system. Drain/sewer inlet protection reduces the amount of sediment entering the storm drainage system prior to the permanent stabilization of disturbed areas.

APPLICATION

Storm drain inlet controls are implemented to existing frame and grate catchbasins that receive runoff from drainage areas of 1 hectare or less.

DESIGN CONSIDERATIONS

- The local Conservation Authority and municipality should be contacted to confirm use of this sediment control measure.
- Inlet protection generally provides limited sediment removal and should not be used as the principle, means of sediment control.
- All storm inlets which are operable during construction must be protected to limit sediment from entering the conveyance system.
- Refer to Inletsoxx™ for inlet protection for additional details.

INLETSOXX™ FOR INLET PROTECTION

DEFINITION & PURPOSE

Inletsoxx™ are used as a storm drain inlet protection by providing filtration of water and physical barrier that reduces the rate at which sediment-laden water can enter the storm drain. Inlet protection allows construction to continue while protecting storm systems from sediment overloads. Inletsoxx™ offer unique 3 way filtration, unavailable in most other types of erosion and sediment control devices, by including physical (settling of solids), chemical (some binding of metals and nutrients) and biological (some destruction of harmful substances) filtration from the unique filter media blend contained in the netting materials.

APPLICATIONS

This work shall consist of furnishing, installing, maintaining and dispersing (if needed) a water permeable filtermedia filled inletsoxx™ to contain soil erosion and sediment by removing soil particles from water moving off site into adjacent waterways or storm water drainage systems. Inletsoxx™ will be used as a form of inlet protection for operational storm drainage systems. Inlet protection using Inletsoxx™ is not considered to be a primary means of sediment control and should be used within an overall integrated erosion and sediment control program. The blocking of the storm drains by the use of Inletsoxx™ should be considered in the overall site planning, especially where ponding water will create disturbances.

DESIGN CONSIDERATIONS

- Inletsoxx™ shall either be made on site or delivered to the jobsite using Inletsoxx™ materials in a 5 mil monofilament or heavy duty multifilament continuous, tubular, HDPE 9.38mm knitted mesh netting material, filled with filtermedia passing the specifications for filter media derived from a composted product.
- Inletsoxx™ netting materials are available only from Filtrexx Canada Inc. and are the only Certified mesh materials accepted. Standard colour coding systems include Yellow and Black 20cm, Orange and Black 30cm, or Red and Black 45cm striped mesh netting with 9.38mm mesh openings for inlet protection.

Specifications FilterMedia Derived from a Composted Product

- Filtermedia used for Inletsoxx™ shall be weed free and derived from a well-decomposed source of organic matter. The filtermedia shall be produced using an aerobic composting process meeting or exceeding, M.O.E. 101, C.C.M.E. Type “A” and “AA” regulations, and Compost Quality Alliance Program (CQA), including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The filtermedia shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:
    - PH – 5.0-8.0 in accordance with TMECC 04.11-A, “Electrometric pH Determinations for Compost”
    - Particle size – 99% passing a 50mm sieve and a minimum of 70% greater than the 9.38mm sieve, in accordance with TMECC 02.02-B, “Sample Sieving for Aggregate Size Classification”. (In the field, the product commonly requested is between 12.5mm and 50mm particle size).

- Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
- Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
- A sample shall be submitted to the engineer for approval prior to being used and must be a certified Filtrexx filter media which also complies with all local, provincial and federal regulations.

INSTALLATION & MAINTENANCE CONSIDERATIONS

- Inletsoxx™ will be used as a form of inlet protection on construction sites that require protection against sediment-laden water after storm drains become operational.
- Inletsoxx™ will be placed at locations indicated on plans as directed by the Engineer. Inletsoxx™ should be installed in a pattern that allows complete protection of the inlet area.
- Installation of Inletsoxx™ will ensure a minimal overlap of at least one foot on either side of the opening being protected. The Inletsoxx™ will be anchored to the soil behind the curb using staples, stakes or other devices capable of holding the Inletsoxx™ in place.
- Standard sizes of Inletsoxx™ for inlet protection will be 20cm diameter products. In severe flow situations, larger Inletsoxx™ may be recommended by the Engineer.
- Inletsoxx™ shall be constructed of 5 mil monofilament or heavy duty multifilament continuous, tubular, HDPE 9.38mm knitted mesh netting material and filled with a filter media product that passes the criteria listed in filtermedia specs
- ***If the Inletsoxx™ becomes clogged with debris and sediment, they shall be maintained so as to assure proper drainage and water flow into the storm drain. In severe storm events, overflow of the Inletsoxx™ may be acceptable in order to keep the area from flooding.***
- The Inletsoxx™ shall be positioned so as to provide a complete physical barrier to the drain itself, allowing sediment to collect on the outside of the Inletsoxx™. See attached schematic for Inletsoxx™ Installation.
- For drains and inlets that have only curb cuts, without street grates, a spacer is required in order to keep the Inletsoxx™ away from the drain opening. This spacer can be 2x4 bracing or simply standard concrete block. Use at least one spacer for every 1.2m of curb drain opening.
- The Installer shall maintain Inletsoxx™ in a functional condition at all times and it shall be routinely inspected.
- The Installer shall remove sediments collected at the base of the Inletsoxx™ when they reach 1/3 of the exposed height of the Inletsoxx™, or as directed by the Engineer.
- The Inletsoxx™ will be dispersed on site when no longer required, as determined by the Engineer. The mesh netting material will be disposed of in normal trash containers or removed by the contractor.
- Regular maintenance includes lifting the Inletsoxx™ and cleaning under them as sediment collects.

- Installer is responsible for establishing a working erosion control system and may, with approval of the Engineer, work outside the minimum construction requirements as needed.
- Installer is required to be certified determined by Filtrexx Canada Inc. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application.

SEDIMENT BAGS

DEFINITION & PURPOSE

Sediment bags consist of UV stabilized, geotextile material sewn into a rectangular bag structure and are used to filter out suspended sediment from dewatering discharge. For smaller sites, sediment bags are often a more economic and effective method of filtering sediment laden waters than sediment basins or ponds. (See figure below)

APPLICATION

Sediment control for the dewatering of sediment laden runoff from a construction area. Sediment bags are usually utilized as part of the ESC measures for in-stream works or when dewatering is required for a construction site. Sediment laden water from the construction site must be treated prior to entering the watercourse.

DESIGN CONSIDERATIONS

- Only sediment laden water should be pumped to the sediment bag.
- ***Sediment bags are manufactured in various sizes (typically with a standard width and varying length) and are pre-sealed on all sides except for a small opening on one end, adequately sized for a dewatering hose;***
- Refer to manufacturer's specifications for capacity and sizing details as well as proper installation (i.e. clamping procedure); and,
- Sediment bag should be located on a grassed area a minimum of 30m (coldwater creeks) and 10m (warmwater creeks) away from the receiving waterbody. If a suitable grassed location is not available/possible, the filter bag will need to be placed on top of a rock pad and surrounded with sediment fencing or approved equivalent.

INSTALLATION & MAINTENANCE

- The sediment bag must be securely clamped to the outside of the discharge hose to form a secure seal; and,
- The bag must be routinely monitored for efficiency (i.e. outflow) and deficiencies in the bag and hose clamp, and replaced or repaired accordingly.

Example of a sediment bag from Sediment Filter Bag – Pennsylvania Groundwater Association Inc.

FILTER RINGS™

DEFINITION & PURPOSE

Filter Rings™ are to be used for temporary filtration in situations that allow space for separation of water from solids in a passive manner. Filter Rings™ are a scalable system for filtering a number of contaminants from stormwater, sump water, and other situations requiring filtration prior to offsite discharge. Scaleable filtration is available via sizes in diameter, changing filtration rate of material, increasing ring diameter or adding additional Filter Rings™. Filter media used in the Filter Ring™ also has the ability to bind various contaminants contained in the runoff.

APPLICATION

Use Filter Rings™ in areas where dredging slurry or high water content effluent create problems with water quality. This might include pump around situations in stream bank construction projects, overflow situations and other temporary pumping projects. It is imperative to have enough space on site to allow water to percolate through the FilterRing™ and drain away, leaving the sediment or filtrate behind (e.g. concrete truck washout area).

DESIGN CONSIDERATION

- Filter Rings™ are designed to be used outdoors and are subject to ambient weather conditions. Additional rainfall may reduce speed and effectiveness. During project design, flow through rates should be selected that match design goals for the project.
- See specifications. Filter Rings™ are friendly in design because if the flow rates are higher or lower than expected, new ones may be constructed larger or smaller in diameter to accommodate the difference. If more than one ring is required to slow filtration water, leave a minimum of .3m spacing between Filter Rings™.
- In general, the Filter Rings™ are installed in a circular pattern. However, depending on the site conditions, many other shapes may be used, including a partially open horseshoe or half circle.
- The ends of the Filter Rings™ should be overlapped and staked (see figures below). In areas of poor ground contact, additional stakes should be added every 0.6 -1.5m. On pavement or concrete applications, Filter Rings™ should be depressed when installed in order to maximize ground contact and footprint.
- Filter Rings™ are a passive filtration device and operate based on a constant or reducing flow through rate. Care must be taken to not under estimate the amount of water and effluent going into the ring so that the ring size has an adequate filtration capacity.

INSTALLATION & MAINTENANCE CONSIDERATIONS

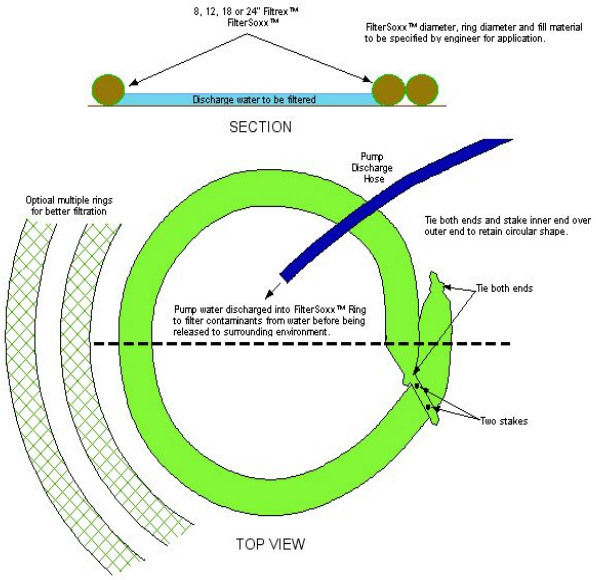
- Filter Rings™ will be used as a form of drainage channel protection on construction sites, which require protection against sediment-laden water.
- Filter Rings™ will be placed at locations indicated on plans as directed by the Engineer or Conservation Authority.
- Installation of Filter Rings™ will ensure that the Filter Rings™ exceed the normal drainage area by at least 1.2m on the upslope of both banks. The Filter Rings™ will be anchored to the soil using stakes where required.

- Standard sizes of Filter Rings™ for inlet protection should be 30cm diameter products. In severe flow situations, the Engineer may recommend larger Filter Rings™ or can be stacked one on top of the other, if additional height is required.
- Filter Rings™ shall be constructed of a HDPE 9.38mm tubular knitted mesh material and filled with a filtermedia product that passes the criteria listed in specification section.
- If the Filter Rings™ become clogged with debris and sediment, they shall be maintained so as to assure a proper drainage and water flow into the drainage channel.
- The contractor shall maintain Filter Rings™ in a functional condition at all times and it shall be routinely inspected.
- If the Filter Rings™ requires repair, it will be routinely repaired.
- The contractor shall remove sediments collected by the Filter Rings™ when they become 80% full, or as directed by the Engineer.
- The Filter Rings™ will be dispersed on site when no longer required, as determined by the Engineer. The netting material will be disposed of in normal trash containers or removed by the installer.
- For materials that are filtered and contain hazardous or toxic compounds, additional disposal requirements will be directed by the Engineer.
- For Filter Rings™ made with biodegradable netting materials, no disposal of netting will be needed.

Specification for FilterMedia Derived From a Composted Product:

- Filter Media- shall be weed free and derived from a well-decomposed source of organic matter. The focus on product selection should be for water flow thru rate and filtration. The filtermedia shall be produced using an aerobic composting process meeting or exceeding M.O.E. 101, C.C.M.E. Type “A” and Type “AA” regulations, and Compost Quality Alliance program (CQA) including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The filter media shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:
    - PH – 5.0-8.0 in accordance with TMECC 04.11-A, “Electrometric pH Determinations for Compost”
    - Particle size – 99% passing a 50mm sieve and a minimum of 70% greater than the 9.38mm sieve, in accordance with TMECC 02.02-B, “Sample Sieving for Aggregate Size Classification”. (In the field, the product commonly requested is between 12.5mm and 50mm particle size.)
    - Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
    - Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
    - A sample shall be submitted to the engineer for approval prior to being used and must be a certified Filtrexx filter media which also complies with all local, provincial and federal regulations.

- Installer is required to certify as determined by Filtrexx Canada Inc. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application.



Example of Filtrexx™ Filter Ring™

APPENDIX D

SEED MIX GUIDELINES
APRIL 2005

SEED MIX GUIDELINES

APRIL 2005

The GTA CAs require seed mixes to restore and stabilize disturbed soils within valley corridors and associated buffers. Unacceptable mixes can undermine the ecological integrity of valleys and other adjacent natural areas when:

- The mix is not suited to site conditions and fails to stabilize soils; sedimentation of watercourses ensues; and/or
- Aggressive alien species invade and dominate over native species. Invasive exotic species can limit the regeneration of indigenous vegetation, restrict native biodiversity and alter the nature of the ecosite.

The following guidelines are recommended when using seed mixes:

1. Seed mixes must contain native species that are suitable to the local soil, moisture, and lighting conditions. Species should be compatible and complementary to the existing vegetation communities. Some suppliers offer mixtures that are suited to various conditions, including a slope stabilization mix, meadow mix, and wetland mix. When selecting species, consideration should be given to the soil fertility and texture of the site as these are important factors in controlling the invasion of aggressive exotics since nutrient-rich, clayey, or loamy disturbed soils favour these species. Less fertile soils can sometimes support more sensitive species less tolerant of competition.
2. Attached is a list of herbaceous species that indicates whether a species is exotic or native within the GTA CAs jurisdiction. Please note the caveats indicated below. General conditions where specific species may be appropriate are indicated. Species labeled 'Problem Exotics' are generally not permitted, because they can be invasive. Species labeled 'Acceptable Exotics' are short-lived species and can be used as a nurse crop to complement native mixes, thus ensuring cover during the first year following application. If the species cannot be found in this reference, it is likely exotic and not acceptable.
3. Proposed percentages for each species in the mix should be provided. Attempt to provide between 30-50 per cent "Acceptable Exotic" species in the seed mix.
4. All disturbed areas should be seeded as soon as possible following the completion of works. Erosion controls must remain in place until seeding has sufficiently stabilized the site (i.e. more than 80 per cent cover). Works occurring during the winter months should specify interim soil stabilization measures to secure the site during the spring freshet.
5. If possible, seeds should be derived from locally adapted sources within the bioregion.
6. Seeding should not be executed during the drought-prone season (i.e. June through August), unless adequate irrigation can be supplied.
7. In general, a minimum of 15 cm of topsoil should be applied to disturbed areas prior to seeding applications. Topsoil and mulch should be carefully selected, as they can contain seeds or tubers of invasive exotics, such as creeping thistle and Manitoba maple.
8. In instances where seedbank salvage operations are employed, stockpiled soil should be stabilized over winter using a tackifier or mulch.

NB: This document is dated April 2005 and is consistent with current policies adopted by the GTA CAs. These guidelines are not meant to be exhaustive but present the typical requirements of the GTA CAs and are subject to change.

SEED MIX SPECIES LIST CAVEATS

Attached is the list of suitable species for seed mixes within the GTA CAs jurisdiction, based upon several general site criteria. Please note that:

1. This is a working list of species that may be appropriate for seed mixes in the GTA CAs jurisdiction, and may be subject to additions, subtractions, or other changes.
2. The species on this list will be subject to availability. Some of these species are not available in seed mixes at this time.
3. Many of the more common species can be directly collected as seed heads from roadsides and wetlands, such as tall goldenrod, and do not need to be grown for harvest. Rare native successional plants (which have largely been replaced by the exotics) need to be propagated first, to produce a seed source that can be harvested.
4. Site conditions are assumed to be open, sunny, newly disturbed, but distinguished according to soil and moisture considerations. Note that the clay/loam is very different from clay barren. The former is rich, heavy soil (not pure clay and often with topsoil) that grows in fast with weedy species, and is by far the most common situation one would encounter. This category represents soil that is typical of natural forest soil in the TRCA region and tree planting should be considered. Clay barren is exposed subsoil that supports a very thin growth of plants, including however, some rare species that cannot compete with more tolerant species, such as tall goldenrod.
5. Note that a few woody plants such as paper birch have been included. These have small, storable seeds that can be easily thrown into a seed mix, and tend also to be tricky to transplant, so seeding might be better than using nursery stock, or at least as an adjunct to direct planting.

TABLE D1: Seed Mix Summary List.

April 2005		Dry	Clay	Clay Loam	Wetland /	Special	Acceptable	Problem	Native
		Sandy	Barren /	(generally)	(storm water)	Prairie &	Exotics	Exotics	Exotic
Scientific name	Common Name	Sites	Subsoil	(fertile sites)		Coastal	(short-lived)		Exotic/Invasive
Achillea millefolium ssp. lanulosum	woolly yarrow	x	x	x					Native
Acorus americanus (A. calamus misapplied)	sweet flag				x				Native
Agrostis scabra	ticklegrass				x				Native
Alisma plantago-aquatica (A. triviale)	water-plantain				x				Native
Alopecurus aequalis	short-awned foxtail				x				Native
Ammophila breviligulata	marram or beach grass					x			Native
Amphicarpaea bracteata	hog-peanut			x	x				Native
Anaphalis margaritacea	pearly everlasting	x							Native
Andropogon gerardii	big bluestem	x							Native
Anemone canadensis	Canada anemone			x	x				Native
Anemone virginiana (inc. vs. alba, cylindroidea, riparia)	common thimbleweed		x	x					Native
Angelica atropurpurea	angelica				x				Native
Antennaria neglecta	field pussytoes	x	x						Native
Apocynum androsaemifolium	spreading dogbane	x		x					Native
Apocynum cannibinum (inc. var. hypericifolium)	Indian-hemp dogbane			x	x				Native
Arabis glabra	tower mustard	x				x			Native
Artemisia campestris ssp. caudata	beach wormwood					x			Native
Asclepias incarnata ssp. incarnata	swamp milkweed				x				Native
Asclepias syriaca	common milkweed	x		x					Native
Aster cordifolius	heart-leaved aster		x	x					Native
Aster ericoides ssp. ericoides (Virgulus ericoides)	heath aster		x	x					Native
Aster lanceolatus ssp. lanceolatus	panicled or tall white aster			x	x				Native
Aster lateriflorus	calico or one-sided aster			x					Native
Aster novae-angliae (Virgulus novae-angliae)	New England aster			x					Native
Aster oolentangiensis (A. azureus)	sky-blue or azure aster	x				x			Native
Aster puniceus var. puniceus	swamp or purple-stemmed aster				x				Native
Aster umbellatus var. umbellatus	flat-topped aster			x	x				Native
Aster urophyllus (A. sagittifolius)	arrow-leaved aster	x							Native
Astragalus canadensis	Canada milk-vetch	x		x					Native
Beckmannia syzigachne	slough grass				x				Native
Betula papyrifera	paper or white birch	x		x					Native
Bidens cernuus	nodding bur-marigold				x				Native
Bidens tripartitus (inc. B. connatus, B. comosus)	three-parted beggar's ticks				x				Native
Bromus latiglumis	eared or tall brome				x				Native
Calamagrostis canadensis	Canada blue joint				x				Native

April 2005		Dry	Clay	Clay Loam	Wetland /	Special	Acceptable	Problem	Native
		Sandy	Barren /	(generally)	(storm water)	Prairie &	Exotics	Exotics	Exotic
Scientific name	Common Name	Sites	Subsoil	(fertile sites)		Coastal	(short-lived)		Exotic/Invasive
Calystegia sepium (incl. ssp. americanum, angulatum, erraticum)	hedge bindweed			x					Native
Campanula aparinoides	marsh bellflower				x				Native
Campanula rotundifolia	harebell	x				x			Native
Carex alopecoidea	foxtail or brown-headed wood sedge				x				Native
Carex aquatilis	water or Goodenough's sedge				x				Native
Carex atherodes	awned sedge				x				Native
Carex aurea	golden-fruited sedge		x		x				Native
Carex bebbii	Bebb's sedge			x	x				Native
Carex blanda (C. laxiflora var. blanda)	common wood sedge		x	x					Native
Carex brevior	short-fruited sedge	x				x			Native
Carex crinita	fringed sedge				x				Native
Carex cristatella	crested sedge			x	x				Native
Carex cryptolepis	small yellow sedge		x						Native
Carex eburnea	bristle-leaved sedge		x						Native
Carex flava	yellow sedge		x						Native
Carex granularis	meadow sedge		x	x					Native
Carex hystericina (C. hystricina)	porcupine sedge				x				Native
Carex lacustris	lake-bank sedge				x				Native
Carex merritt-fernaldii	Fernald's sedge	x							Native
Carex molesta	troublesome sedge				x				Native
Carex muhlenbergii var. muhlenbergii	Muhlenberg's sedge	x				x			Native
Carex pallescens	pale sedge		x		x				Native
Carex pellita (C. lanuginosa; C. filiformis var. lanuginosa)	woolly sedge			x	x				Native
Carex projecta	necklace or loose-headed oval sedge				x				Native
Carex pseudo-cyperus	pseudocyperus sedge				x				Native
Carex siccata (C. foenea)	sand-bank, hillside, or hay sedge	x				x			Native
Carex stipata	awl-fruited sedge				x				Native
Carex stricta	tussock sedge				x				Native
Carex sychnocephala	dense long-beaked sedge				x				Native
Carex tribuloides	blunt broom sedge				x				Native
Carex trichocarpa	hairy-fruited sedge				x				Native
Carex vulpinoidea	fox sedge			x	x				Native
Ceanothus americanus	New Jersey tea	x				x			Native
Chelone glabra	turtlehead				x				Native
Chenopodium capitatum	strawberry-blite	x							Native
Chenopodium simplex (C. hybridum; C. gigantospermum))	maple-leaved goosefoot	x		x	x				Native

April 2005		Dry	Clay	Clay Loam	Wetland /	Special	Acceptable	Problem	Native
		Sandy	Barren /	(generally)	(storm water)	Prairie &	Exotics	Exotics	Exotic
Scientific name	Common Name	Sites	Subsoil	(fertile sites)		Coastal	(short-lived)		Exotic/Invasive
Clematis virginiana	virgin's bower			x	x				Native
Clinopodium vulgare (Satureja vulgaris)	dogmint or wild basil	x		x					Native
Comptonia peregrina	sweet-fern	x				x			Native
Corydalis aurea ssp. aurea	golden corydalis	x							Native
Crataegus macracantha (C. succulenta var. macracantha)	long-spined hawthorn	x		x					Native
Crataegus pedicellata	scarlet or pedicelled hawthorn			x					Native
Crataegus pringlei	Pringle's hawthorn			x					Native
Crataegus punctata	dotted hawthorn			x	x				Native
Crataegus submollis	Emerson's hawthorn			x					Native
Crataegus succulenta	long-spined or succulent hawthorn			x					Native
Cyperus lupulinus (C. filiculmis)(incl. ssp. macilentus)	slender umbrella-sedge or galingale					x			Native
Danthonia spicata	poverty oat grass	x	x						Native
Desmodium canadense	showy tick-trefoil	x			x				Native
Echinocystis lobata	wild cucumber			x	x				Native
Eleocharis erythropoda (E. calva; E. palustris v. calva)	creeping or red-stemmed spike-rush				x				Native
Eleocharis obtusa	blunt spike-rush				x				Native
Elymus canadensis	Canada wild rye	x							Native
Elymus riparius	riverbank wild rye				x				Native
Elymus virginicus var. virginicus	Virginia wild rye				x				Native
Epilobium angustifolium	fire-weed			x					Native
Epilobium ciliatum ssp. ciliatum	sticky willow-herb				x				Native
Epilobium coloratum	purple-leaved willow-herb				x				Native
Equisetum arvense	field or common horsetail		x	x	x				Native
Erigeron annuus	annual or daisy fleabane	x	x	x					Native
Erigeron philadelphicus ssp. philadelphicus	Philadelphia fleabane			x					Native
Erigeron pulchellus	Robin's plantain	x							Native
Erigeron strigosus (E. annuus ssp. strigosus)	rough fleabane	x	x	x					Native
Eupatorium maculatum ssp. maculatum	spotted Joe-Pye weed				x				Native
Eupatorium perfoliatum	boneset				x				Native
Eupatorium rugosum	white snakeroot			x					Native
Euthamia graminifolia (Solidago graminifolia)	grass- or narrow-leaved goldenrod			x	x				Native
Fragaria virginiana (incl. ssps. glauca & virginiana)	wild or common strawberry	x	x	x					Native
Galium palustre	marsh bedstraw				x				Native
Galium triflorum	sweet-scented bedstraw			x	x				Native
Geum aleppicum (G. strictum)	yellow avens			x	x				Native
Geum canadense	white avens			x					Native

April 2005		Dry	Clay	Clay Loam	Wetland /	Special	Acceptable	Problem	Native
		Sandy	Barren /	(generally)	(storm water)	Prairie &	Exotics	Exotics	Exotic
Scientific name	Common Name	Sites	Subsoil	(fertile sites)		Coastal	(short-lived)		Exotic/Invasive
Glyceria grandis	tall manna grass				x				Native
Glyceria septentrionalis	eastern manna grass				x				Native
Glyceria striata (incl. vars. striata & stricta)	fowl manna grass				x				Native
Gnaphalium macounii	viscid cudweed	x							Native
Gnaphalium obtusifolium	fragrant cudweed	x							Native
Hackelia virginiana	Virginia stickseed	x		x					Native
Hedeoma hispidum	rough pennyroyal	x							Native
Hedeoma pulegioides	American pennyroyal	x							Native
Helianthemum bicknellii	Bicknell's frostweed					x			Native
Helianthemum canadense	frostweed					x			Native
Helianthus divaricatus	woodland sunflower	x				x			Native
Hieracium kalmii (H. canadense)	Canada hawkweed	x				x			Native
Hypericum ascyron	great St.Johnswort				x				Native
Impatiens capensis (I. biflora)	orange touch-me-not (spotted jewelweed)				x				Native
Iris versicolor	blue flag				x				Native
Juncus articulatus	jointed rush		x		x				Native
Juncus balticus	Baltic rush					x			Native
Juncus bufonius	toad rush		x	x	x				Native
Juncus dudleyi	Dudley's rush			x	x				Native
Juncus effusus ssp. solutus	soft rush				x				Native
Juncus tenuis	path rush			x					Native
Juncus torreyi	Torrey's rush				x				Native
Juniperus communis	common juniper	x	x						Native
Juniperus virginiana	red cedar	x	x						Native
Lactuca biennis	tall blue lettuce			x					Native
Lactuca canadensis	wild lettuce			x					Native
Lathyrus palustris	marsh vetchling				x				Native
Leersia oryzoides	rice cut grass				x				Native
Lepidium virginicum	Virginia pepper-grass	x	x	x					Native
Lespedeza capitata	round-headed bush-clover	x				x			Native
Liatris cylindracea	cylindric blazing-star					x			Native
Liatris spicata	spike blazing-star					x			Native
Lilium michiganense	Michigan or Turk's cap lily			x	x				Native
Lindernia dubia var. dubia	false pimpernel				x				Native
Lobelia inflata	Indian tobacco	x							Native
Lobelia siphilitica	great blue lobelia				x				Native
Lycopus americanus	American or cut-leaved water-horehound				x				Native
Lycopus uniflorus	northern water-horehound or bugleweed				x				Native

April 2005		Dry	Clay	Clay Loam	Wetland /	Special	Acceptable	Problem	Native
		Sandy	Barren /	(generally)	(storm water)	Prairie &	Exotics	Exotics	Exotic
Scientific name	Common Name	Sites	Subsoil	(fertile sites)		Coastal	(short-lived)		Exotic/Invasive
Lysimachia ciliata	fringed loosestrife				x				Native
Maianthemum stellatum (Smilacina stellata)	starry false Solomon's seal					x			Native
Mentha arvensis ssp. borealis	wild mint			x	x				Native
Mimulus ringens	square-stemmed monkey-flower				x				Native
Monarda fistulosa	wild bergamot	x		x					Native
Muhlenbergia frondosa	wire-stemmed or leafy muhly grass			x	x				Native
Muhlenbergia mexicana var. mexicana	common muhly grass		x	x	x				Native
Myosotis laxa	smaller forget-me-not				x				Native
Oenothera biennis	common or hairy evening-primrose	x		x					Native
Panicum acuminatum (P. implicatum; P. lanuginosum)	hairy panic grass	x	x						Native
Panicum capillare	panic or witch grass			x	x				Native
Panicum virgatum	switch grass					x			Native
Penstemon digitalis	foxglove beard-tongue		x	x		x			Native
Penstemon hirsutus	hairy beard-tongue	x				x			Native
Penthorum sedoides	ditch stonecrop				x				Native
Plantago rugelii	red-stemmed or Rugel's plantain		x	x					Native
Poa compressa	Canada or flat-stemmed bluegrass						x		Native?
Poa palustris	fowl meadow-grass				x				Native
Polygonum cilinode	fringed black bindweed	x		x		x			Native
Polygonum scandens	climbing false buckwheat	x		x	x	x			Native
Potentialla arguta var. arguta	tall or prairie cinquefoil					x			Native
Potentilla paradoxa	bushy cinquefoil					x			Native
Ranunculus sceleratus	cursed crowfoot				x				Native
Rorippa palustris ssp. fernaldiana (R. islandica var. fernaldiana)	Fernald's marsh cress				x				Native
Rorippa palustris ssp. hispida (R. islandica var. hispida)	hispid marsh cress				x				Native
Rosa blanda	smooth wild rose	x	x						Native
Rubus allegheniensis	common blackberry			x					Native
Rubus flagellaris	northern dewberry	x							Native
Rubus idaeus ssp. melanolasius (R. strigosus)	wild red raspberry			x					Native
Rubus occidentalis	wild black raspberry			x					Native
Rudbeckia hirta (R. serotina)	black-eyed Susan	x	x	x		x			Native
Rudbeckia laciniata	cut-leaved or green-headed coneflower			x	x				Native
Rumex acetosella ssp. acetosella	sheep sorrel	x							Native
Rumex orbiculatus	great water dock				x				Native

April 2005		Dry	Clay	Clay Loam	Wetland /	Special	Acceptable	Problem	Native
		Sandy	Barren /	(generally)	(storm water)	Prairie &	Exotics	Exotics	Exotic
Scientific name	Common Name	Sites	Subsoil	(fertile sites)		Coastal	(short-lived)		Exotic/Invasive
Rumex verticillatus	swamp dock				x				Native
Sagittaria latifolia	common arrowhead				x				Native
Schizachyrium scoparium (Andropogon scoparius)	little bluestem					x			Native
Scirpus acutus	hard-stemmed bulrush				x				Native
Scirpus atrovirens	black-fruited or dark green bulrush				x				Native
Scirpus cyperinus	woolly bulrush or wool-grass				x				Native
Scirpus fluviatilis	river bulrush				x				Native
Scirpus microcarpus (S. rubrotinctus)	barber-pole sedge or bulrush				x				Native
Scirpus pendulus	drooping, nodding, or red bulrush		x		x				Native
Scirpus pungens (S. americanus)	three-square or chairmaker's rush				x				Native
Scirpus validus	soft-stemmed bulrush				x				Native
Scutellaria galericulata (S. epilobiifolia)	common skullcap				x				Native
Scutellaria lateriflora	mad-dog skullcap				x				Native
Silene antirrhina	sleepy catchfly	x				x			Native
Sisyrinchium montanum	blue-eyed grass		x						Native
Solidago altissima	tall goldenrod			x					Native
Solidago bicolor	silver-rod or white goldenrod	x							Native
Solidago canadensis var. canadensis	Canada goldenrod			x					Native
Solidago gigantea	late goldenrod			x	x				Native
Solidago hispida	hairy goldenrod	x							Native
Solidago juncea	early goldenrod	x	x						Native
Solidago nemoralis ssp. nemoralis	gray goldenrod	x	x						Native
Solidago rugosa ssp. rugosa	rough-stemmed goldenrod			x	x				Native
Solidago squarrosa	stout goldenrod	x				x			Native
Sorghastrum nutans	Indian grass					x			Native
Sparganium eurycarpum	giant or great bur-reed				x				Native
Spartina pectinata	prairie cord grass				x	x			Native
Sporobolus cryptandrus	sand dropseed	x				x			Native
Stellaria longifolia	long-leaved chickweed				x				Native
Thalictrum pubescens (T. polygamum)	tall meadow rue				x				Native
Typha latifolia	broad-leaved cattail				x				Native
Verbena hastata	blue vervain				x				Native
Verbena stricta	hoary vervain	x				x			Native
Verbena urticifolia	white vervain			x	x				Native
Veronica americana	American speedwell or brooklime				x				Native
Vicia americana	American vetch	x							Native
Agrostis stolonifera (A. alba var. palustris)	creeping bent grass						x		Exotic?

April 2005		Dry	Clay	Clay Loam	Wetland /	Special	Acceptable	Problem	Native
		Sandy	Barren /	(generally)	(storm water)	Prairie &	Exotics	Exotics	Exotic
Scientific name	Common Name	Sites	Subsoil	(fertile sites)		Coastal	(short-lived)		Exotic/Invasive
Atriplex patula (A. patula var. hastata)	halberd-leaved orache or spearscale						x		Exotic?
Atriplex prostrata (A. patula)	spreading orache						x		Exotic?
Avena sativa	oats						x		Exotic
Cyperus esculentus	yellow nut-sedge or chufa						x		Exotic?
Fagopyrum esculentum (F. sagittatum)	buckwheat						x		Exotic
Helianthus annuus (incl. ssps. annuus & lenticularis)	common sunflower						x		Exotic
Hordeum hystrix	barley						x		Exotic
Hordeum jubatum ssp. jubatum	squirrel-tail barley						x		Exotic
Lolium perenne (inc. var. aristatum)	perennial rye						x		Exotic
Panicum miliaceum	millet						x		Exotic
Polygonum achoreum	striate knotweed						x		Exotic
Portulaca oleracea	purslane						x		Exotic
Secale cereale	rye						x		Exotic
Sporobolus neglectus	overlooked dropseed	x	x						Exotic?
Sporobolus vaginiflorus	ensheathed dropseed	x	x						Exotic?
Triticum aestivum	wheat						x		Exotic
Agrostis gigantea	**Red top**							**x**	**Exotic/Invasive**
Bromus inermis ssp. inermis	**smooth brome grass**							**x**	**Exotic/Invasive**
Carex spicata	**spiked or European meadow sedge**							**x**	**Exotic/Invasive**
Chrysanthemum leucanthemum	**ox-eye daisy**							**x**	**Exotic/Invasive**
Convallaria majalis	**lily-of-the-valley**							**x**	**Exotic/Invasive**
Convolvulus arvensis	**field bindweed**							**x**	**Exotic/Invasive**
Coronilla varia	**crown vetch**							**x**	**Exotic/Invasive**
Dactylis glomerata	**orchard grass**							**x**	**Exotic/Invasive**
Elymus repens (Agropyron repens; Elytrigia repens)	**quack grass**							**x**	**Exotic/Invasive**
Festuca arundinacea (F. elatior ssp. arundinacea)	**tall fescue**							**x**	**Exotic/Invasive**
Festuca pratensis (F. elatior var. pratensis)	**meadow fescue**							**x**	**Exotic/Invasive**
Festuca rubra	**(creeping) red fescue**							**x**	**Exotic/Invasive**
Festuca trachyphylla (F. longifolia; F. brevipila; F. ovina)	**hard or sheep fescue**							**x**	**Exotic/Invasive**
Glechoma hederacea	**creeping Charlie or ground-ivy**							**x**	**Exotic/Invasive**
Glyceria maxima	**giant or rough manna grass**							**x**	**Exotic/Invasive**
Hemerocallis fulva	**orange day-lily**							**x**	**Exotic/Invasive**
Hesperis matronalis	**dame's rocket**							**x**	**Exotic/Invasive**
Iris pseudacorus	**yellow flag**							**x**	**Exotic/Invasive**
Iris virginica	**southern blue flag**							**x**	**Exotic/Invasive**
Juncus compressus	**round-fruited or**							**x**	**Exotic/Invasive**

	compressed rush								
April 2005		Dry	Clay	Clay Loam	Wetland /	Special	Acceptable	Problem	Native
		Sandy	Barren /	(generally)	(storm water)	Prairie &	Exotics	Exotics	Exotic
Scientific name	Common Name	Sites	Subsoil	(fertile sites)		Coastal	(short-lived)		Exotic/Invasive
Linum perenne	perennial flax							x	Exotic/Invasive
Linum usitatissimum	common flax							x	Exotic/Invasive
Lotus corniculatus	bird's foot trefoil							x	Exotic/Invasive
Lycopus europaeus	European water-horehound or bugleweed							x	Exotic/Invasive
Medicago lupulina	black medick							x	Exotic/Invasive
Medicago sativa ssp. falcata	alfalfa							x	Exotic/Invasive
Medicago sativa ssp. sativa	alfalfa							x	Exotic/Invasive
Melilotus alba	white sweet clover							x	Exotic/Invasive
Melilotus officinalis	yellow sweet clover							x	Exotic/Invasive
Miscanthus sacchariflorus	eulalia or Amur silver grass							x	Exotic/Invasive
Myosotis scorpioides	true or European forget-me-not							x	Exotic/Invasive
Phalaris arundinacea	reed canary grass							x	Exotic/Invasive
Phleum pratense	timothy grass							x	Exotic/Invasive
Phragmites australis (P. communis)	common, giant, or great reed							x	Exotic/Invasive
Poa pratensis ssp. pratensis	Kentucky blue grass							x	Exotic/Invasive
Polygonum convolvulus	black bindweed							x	Exotic/Invasive
Setaria faberi	giant foxtail							x	Exotic/Invasive
Setaria glauca (S. pumila)	yellow foxtail							x	Exotic/Invasive
Setaria italica	foxtail millet							x	Exotic/Invasive
Setaria verticillata var. verticillata	bristly foxtail							x	Exotic/Invasive
Setaria viridis	green foxtail							x	Exotic/Invasive
Trifolium arvense	rabbit-foot clover							x	Exotic/Invasive
Trifolium aureum (T. agrarium)	hop-clover							x	Exotic/Invasive
Trifolium campestre	large hop-clover							x	Exotic/Invasive
Trifolium hybridum	alsike clover							x	Exotic/Invasive
Trifolium incarnatum	crimson clover							x	Exotic/Invasive
Trifolium medium	zig-zag clover							x	Exotic/Invasive
Trifolium pratense	red clover							x	Exotic/Invasive
Trifolium repens	white clover							x	Exotic/Invasive
Vicia cracca	cow, tufted, or bird vetch							x	Exotic/Invasive
Vicia sativa ssp. nigra (V. angustifolia)	common vetch							x	Exotic/Invasive

APPENDIX E

IN-STREAM CONTROL PRACTICES

IN-STREAM CONTROL PRACTICES

It is prefered that in-stream construction activities be avoided if at all possible. If in-stream works are necessary, it is essential that erosion and sedimentation be prevented and the associated impacts mitigated through the careful design and effective implementation of ESC measures. Often the best approach for in-stream protection is restricting the work area to as small a footprint as possible and employ controls to isolate the work area from the rest of the water body. Effective in-stream practices serve to trap sediment suspended in work area water before it leaves the site for decommissioning.

All in-stream construction activities should adhere to MNR's Fisheries Construction Timing Guidelines based on watercourse species classifications (e.g. MNR, Maple District, Fisheries Management Plan, 1989-2000). More recent watershed based Fisheries Watershed Plans provide more recent information on construction timing windows. Please be advised that a mixture of both coldwater and warmwater species may be encountered in a watercourse. In this case, the construction timing will be a combination of the warmwater and coldwater construction timing window. The presence of redside dace in a watercourse will also follow the warmwater/coldwater timing window combination. Local Conservation Authority or Ministry of Natural Resources staff should be consulted for site specific classifications and designated construction timing windows.

A general guideline for Maple District in-stream construction windows is listed in Table E1, below:

Table E1 : MNR's Fisheries Construction Timing Guideline (MNR, 1989)

Creek Classification	Construction Permitted *
WARMWATER CREEK (supports or contributes to warm water fisheries)	July 1 to March 31
COLDWATER CREEK (supports or contributes to coldwater fisheries)	June 15 to September 15
WARMWATER/COLDWATER SPECIES (both encountered in a watercourse and/or evidence of Redside Dace)	July 1 to September 15

* **Contact the local CA to confirm the construction timing window for a specific watercourse. The Fisheries Management Plan for the Watershed and GIS thermal layers may be utilized to confirm these timing windows.**

Although there are many in-stream ESC measures that exist, Table E2 provides a list of common in-stream erosion and sediment control practices.

Table E2: In-Stream Erosion and Sediment Control Practices				
In-Stream		**OPSD Reference**	**Comments**	**Reference Page**
Auguring and Directional Drilling			Auguring consists of an excavated pit on either side of the watercourse. One pit acts as a launch point and the other as receiving point for one of the many boring techniques used to tunnel under a watercourse or other structure(s). Directional drilling utilizes machinery to drill pole type bits to tunnel through the ground. The machinery should be located outside the riparian zone.	
Sediment/ Turbidity Curtains		219.260/ .261	Consists of geotextile material vertically suspended in water to enclose an in-water work area and contain sediment transport to a limited area within the disturbed water body. Implemented around construction activities undertaken in-water. The sediment curtains act as a filter baffle and isolate/protect an important or sensitive in-water feature.	E-3
Temporary Stream Crossings via Culvert(s)			Consists of a raised gravel embankment constructed across a watercourse stream for use by construction vehicles. Water conveyance through the embankment is provided via culvert(s) incorporated within the gravel. Temporary crossings are intended to allow access to both sides of a watercourse at a stable concentrated point thereby limiting disruption and erosion impacts at multiple points along the watercourse.	E-6
Construction in the Dry	Dry Flume/By-Pass Pumping		Isolate work area by blocking the flow upstream and downstream with stone and impermeable sheeting, pea gravel bags or aqua dam. Sediment laden flow can be pumped around the site and released to a splashed pad and filter bag for treatment. A flume (CSP culvert) may be used in combination with a pumping system to assist in conveying flow. If dewatering of work area is necessary, a filter bag or sediment pond should be considered to treat discharge. Flumes may not be suitable for sensitive streams.	
	Cofferdam		A sealed structural barrier surrounding the work area adjacent to or within a watercourse channel. The cofferdam constricts the flow to the remainder of the channel (maximum 50% reduction in channel width). Material such as jersey barriers, stone and impermeable sheeting, and pea gravel bags can be utilized to create the cofferdam. Dewatering operations may be utilized to provide a dry work area.	E-8
	Temporary By-Pass or Full Diversion	221.030	By pass or full diversion may be necessary where the flume or cofferdam methods are not applicable. Construct by-pass or full diversion, leaving inlet and outlet plugged with clean rock filled material. Place filter cloth liner or approved equivalent and rip rap in channel to prevent erosion. The temporary channel must be excavated beyond the working area. For the by-pass/diversion method, a channel with a capacity to convey minimum 2 year flow should be designed.	E-10
	Site Dewatering		The removal of water within the immediate construction area to facilitate working in the dry. Discharge from dewatering must be dispersed from a riprap splash pad or constructed sediment trap through the vegetated area. The splash pad or constructed sediment trap must be set at a minimum of 30 m (coldwater creeks) and 10m (warmwater creeks) from the stream bank watercourse or sealed container.	E-12

SEDIMENT/TURBIDITY CURTAIN

DEFINITION & PURPOSE

Sediment or turbidity curtains consist of geotextile material that is vertically suspended in water to enclose an in-water work area. This allows for sediment transport containment to a limited area within the disturbed water body.

APPLICATION

Sediment/turbidity curtains are usually implemented around construction activities requiring in-water works such as dredging or filling activities undertaken without site isolation and dewatering. They are applied to isolate and protect an important or sensitive in-water feature.

Sediment/turbidity curtains are not appropriate for use perpendicular to flowing water, margins of large rivers and on lakes/ponds.

DESIGN CONSIDERATIONS

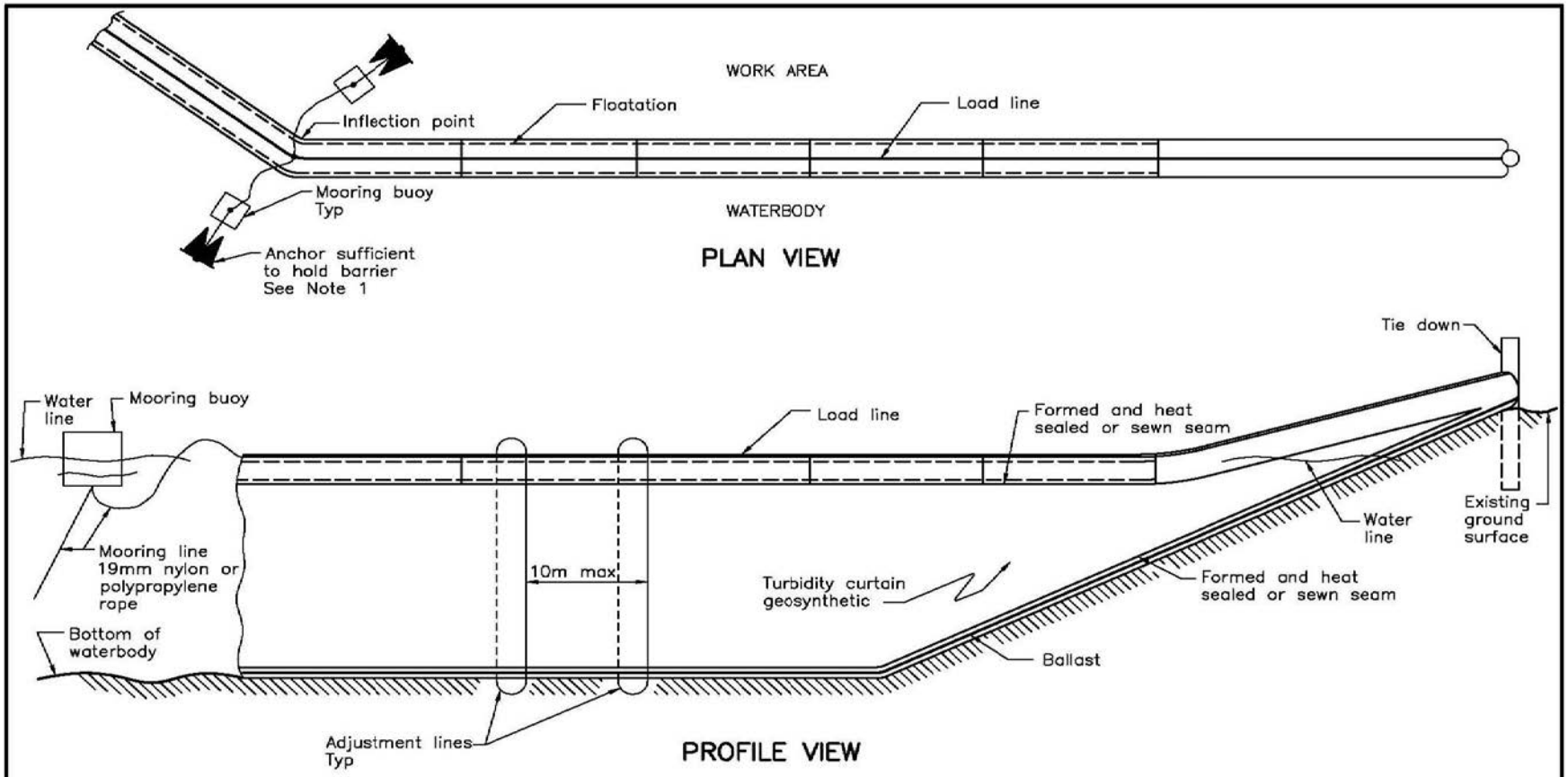
- Reduces the movement of water out of the contained work area and allow sediment to settle out of suspension;
- Geotextile curtains are suspended with floatation/buoy devices and are affixed to the base of the water body with anchors and physically secured in location with cable or rope mooring;
- Sediment curtains are produced in varying lengths typically between 30 and 100 m.
- Anchors may vary for different bed types – mud bottoms vs. sandy bottoms. Refer to manufacturer's instructions for appropriate application and configuration.
- Refer to OPSD 219.260 and 219.261 for the Turbidity Curtain. A copy of OPSD 219.260 and 219.261 are located below.

INSTALLATION & MAINTENANCE

- Curtain should be positioned at least five (5) metres outside of the perimeter of the area of disturbance.
- Floatation device should provide greater than 50 mm of freeboard.
- Curtains should be overlapped by at least 75 mm at the ends and should be sewn or threaded to form a continuous barrier.

NOTES

- Proper and careful removal of the curtain following the completion of construction activities is highly important as physical disruption of the curtain may result in the re-suspension of sediment in the water column. Refer to manufacturer's instructions for proper removal procedures.



NOTES:

1 Anchoring is to provide positive positioning for turbidity curtain.

A All dimensions are in millimetres or metres unless otherwise shown.

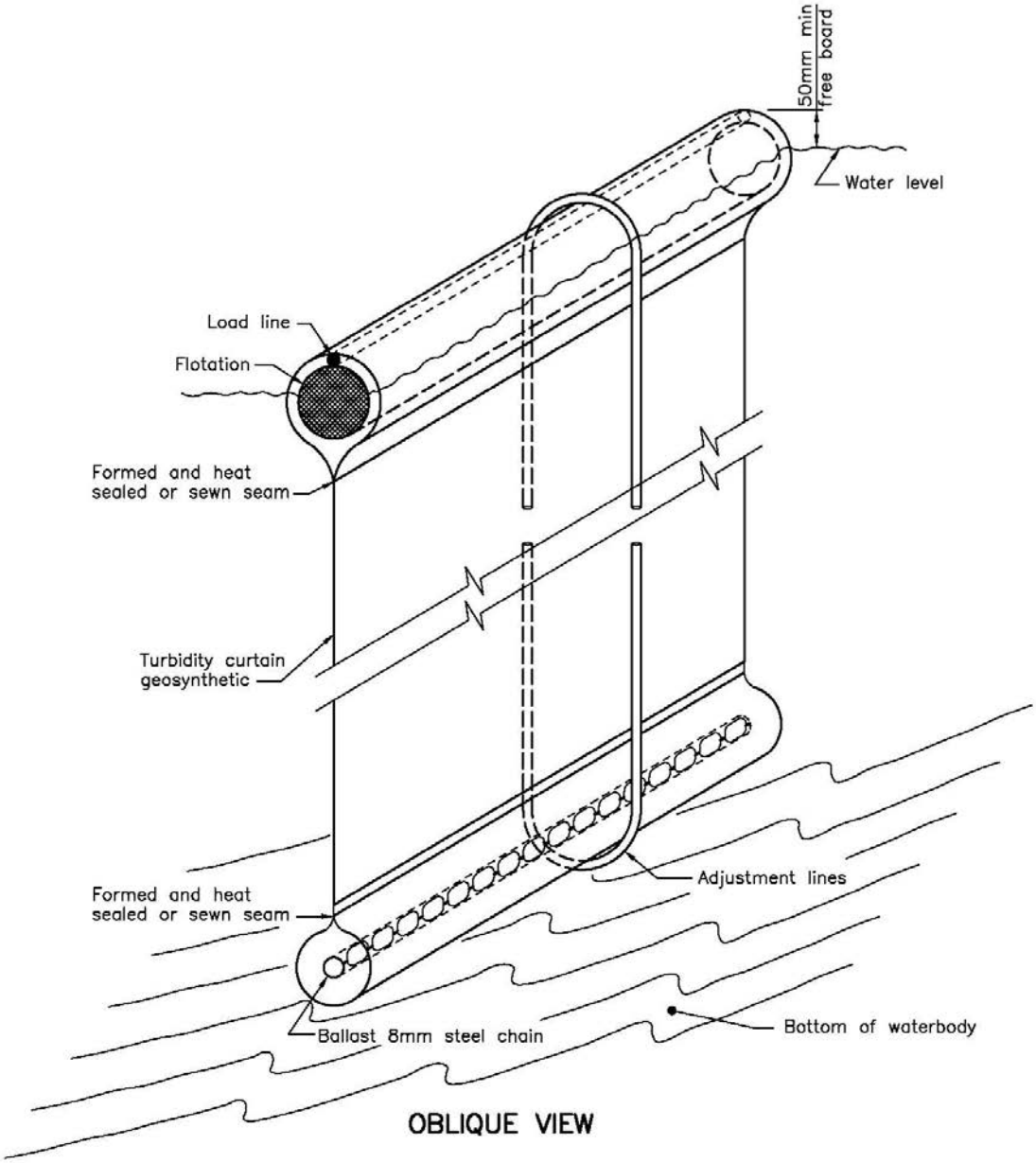
ONTARIO PROVINCIAL STANDARD DRAWING

TURBIDITY CURTAIN

1996 02 01 | Rev

Date _ _ _ _ _ _

OPSD – 219.260



OBLIQUE VIEW

NOTE:

A All dimensions are in millimetres or metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	1996 02 01	Rev	
TURBIDITY CURTAIN SEAM DETAIL	Date _____		OPSD – 219.261

TEMPORARY STREAM CROSSINGS VIA CULVERT(S)

DEFINITION, PURPOSE & APPLICATION

A temporary crossing consists of a raised gravel embankment constructed across a watercourse stream for use by construction vehicles. Water conveyance through the embankment is provided by culvert(s) incorporated within the gravel. Temporary crossings are intended to allow access to both sides of a watercourse at a stable concentrated point thereby limiting disruption and erosion impacts at multiple points along the watercourse.

DESIGN CONSIDERATIONS

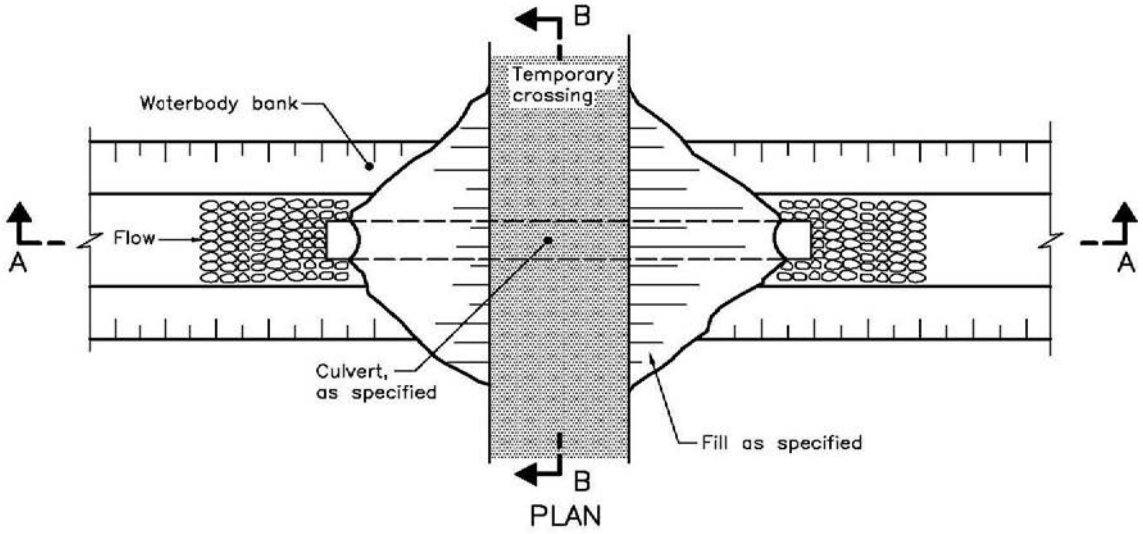
- The culvert capacity should be designed for a one in five (5) year return period storm;
- Geotextile filter fabric (270R weave density or equivalent) should be placed at the base of the channel beneath the culvert(s) and road. The geotextile must be removed with the removal of the culvert;
- Gravel such as crushed limestone or clear stone should be washed free of sediment;
- Fish presence and habitat considerations may require that the culvert be constructed in the dry – refer to the de-watering techniques;
- Culverts should be placed so they are 15% to 30% submerged during normal flow periods to provide for fish passage. However, the local Conservation Authority must be contacted to confirm the proposed alignment of the culvert;
- The outlet velocities from the culvert(s) will need to be reviewed for the provision of fish passage under high flows.
- Culverts must be long enough to establish stable fill slopes and prevent blockage, due to slope failures;
- When two culverts are required one culvert should be counter-sunk to convey low flows; and,
- A rock check dam may be required downstream of the crossing to reduce water velocities and associated erosion impacts.
- Refer to OPSD 221.040 for Temporary Water body Crossing, Fill and Culvert. A copy of OPSD 221.040 is located below.

INSTALLATION & MAINTENANCE CONSIDERATIONS

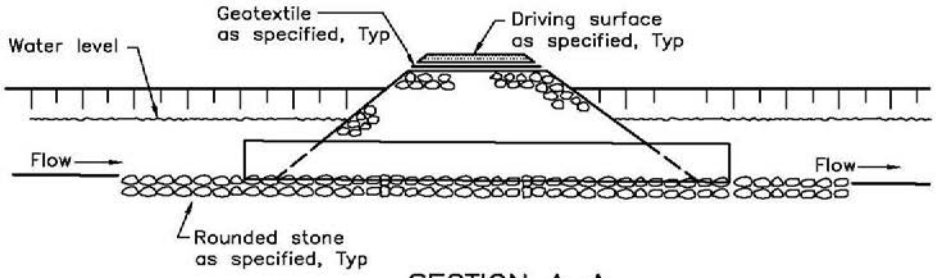
- Construction in a stream should be sequenced to begin at the downstream point and work progressively upstream;
- Crossings should be inspected after every rainfall and any debris accumulation in front of culverts removed and any localized slope failures or erosion control failures repaired immediately; and,
- All materials used in the construction of temporary crossing are to be removed cautiously and completely from the watercourse following completion of equipment crossing and the channel restored to pre-existing conditions or better.

NOTES:

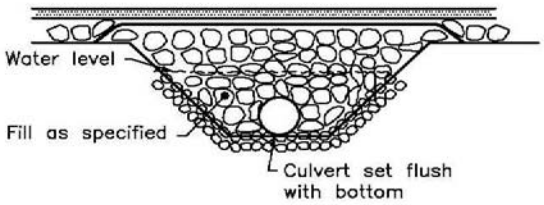
- Use of a structure such as a baley bridge is an alternative to the use of culverts for in-stream crossings.
- Extending the structure for temporary crossing from bank to bank will avoid in-stream disturbance.



PLAN



SECTION A–A



SECTION B–B

NOTE:

A Approaches to the temporary crossing shall be clearly marked

B Schematic only.

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TEMPORARY WATERBODY CROSSING

FILL AND CULVERT

OPSD – 221.040

COFFERDAMS

DEFINITION & APPLICATION

A cofferdam consists of a temporary dam used to isolate areas adjacent to or sections of a watercourse channel. The isolated area is to be dewatered which allows for construction to be conducted in dry conditions.

DESIGN CONSIDERATIONS

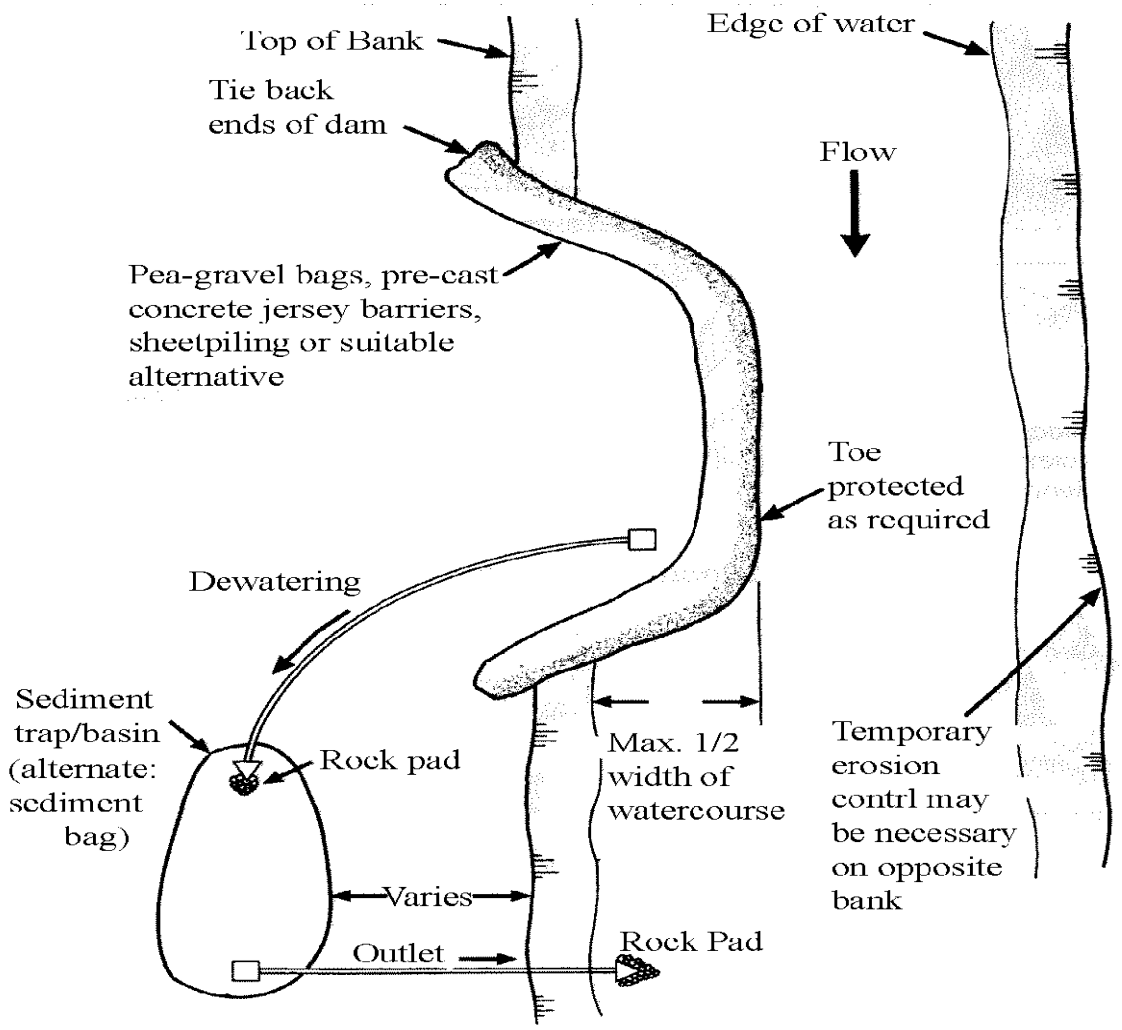
- Cofferdam configurations and design details are provided in the figure below.
- Cofferdam may be constructed of pea-gravel bags, pre-cast concrete jersey barriers, sheet piling or other suitable waterproof alternatives such as an aqua dam;
- A waterproof membrane is required over the jersey barriers and may be required over the pea-gravel bags. The waterproof membrane must be keyed in under the barrier to minimize leakage;
- Pea-gravel bag dams should consist of a double line wall with a layer of impermeable liner secured between;
- The isolated work area must be dewatered according the procedures detailed in the De-watering section;
- Dams designed to block the entire channel width will need to divert water according to the procedures detailed in Site Dewatering and Water Diversions section, or through the construction of a Temporary Stream Diversion.
- The width of the cofferdam relative to the stream channel should not be so large as to produce velocities which cause erosion of the stream bank or invert. Velocities are also a concern for the passage of fish;
- When more than 1/3 of a stream is isolated, the impact to the local channel section should be assessed by qualified personnel; and,
- The height of the cofferdam should be sufficient to prevent overtopping by a minimum of the 5 Year storm.

INSTALLATION & MAINTENANCE CONSIDERATIONS

- Equipment used in constructing a cofferdam should work off the shoreline to avoid disturbing bottom sediment;
- Any required erosion protection must be placed as soon as the cofferdam is in place;
- All sediment laden water pumped from behind the cofferdam must be directed through a sediment trap or other suitable control measure prior to re-entering the stream;
- Stranded aquatic life, including fish, crayfish, amphibians, etc. should be removed by a qualified biologist as water is being pumped. Aquatic species should be transferred live in a container of clean water to upstream areas away from the work area. A fish collection permit will be required from MNR;
- Cofferdams must be removed carefully to minimize disturbance of bottom sediment. The disturbed area must be stabilized and restored immediately; and,
- No fuel or other hazardous materials should be stored behind a cofferdam. If high flows

are expected all equipment must be removed from behind the cofferdam and placed well back from the stream.

Figure illustrating coffer dams from Keeping Soil on Construction sites (HRCA & HCA, 1994).



TEMPORARY STREAM BY-PASS OR FULL DIVERSION

DEFINITION & APPLICATION

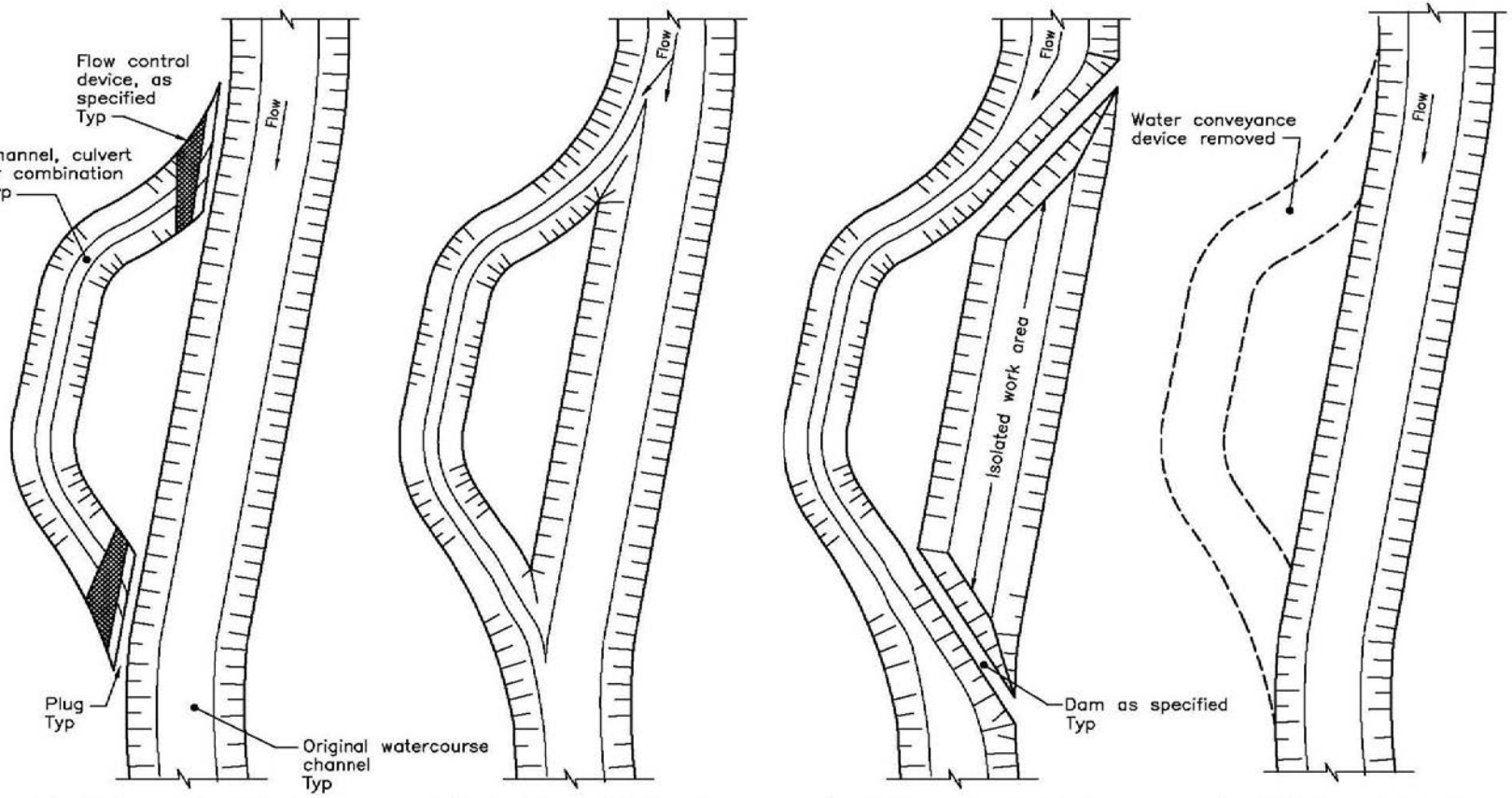
A stream diversion relocates an existing channel temporarily and conveys water around construction activities. This can significantly reduce sediment movement downstream during construction.

DESIGN CONSIDERATIONS

- Stream diversions should be utilized only when absolutely necessary and limited to as short a section as possible to minimize the impact on the natural environment;
- A temporary diversion should be sized to convey the same flow as the existing channel or structure. As a minimum the diversion must be sized to convey the 2 Year storm; and,
- Diversions must be protected from erosion with suitably sized riprap stone, erosion netting/blankets/matting, or established vegetation prior to receiving flows.
- Refer to OPSD 221.030 for Temporary Channel or Culvert Outside Watercourse. A copy of OPSD 221.030 is located below.

INSTALLATION & MAINTENANCE CONSIDERATIONS

- Construction of a stream diversion must be sequenced to begin at the downstream point and work progressively upstream;
- Any soil removed to construct the diversion must be stored or disposed of away from the creek with proper sediment control measures in place such as sediment control fencing as a minimum;
- Diversions should be inspected weekly and after every rainfall and significant snowmelt event. Any localized slope failures or erosion control failures must be repaired within 48 hours of inspection;
- Decommissioning of a stream diversion must be sequenced to begin at the downstream point and work upstream; and,
- If water diversion pumping is to continue after normal working hours, a technician should be assigned to monitor and ensure that the system is functioning properly at all times.



PLAN VIEWS

NOTES:

A Representative stages only.
B Schematic only.
C Temporary channel lining as specified

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TEMPORARY WATER PASSAGE SYSTEM

TEMPORARY CHANNEL OR CULVERT OUTSIDE WATERCOURSE

OPSD – 221.030

SITE DE-WATERING AND WATER DIVERSIONS

DEFINITION & APPLICATION

In the case that construction activities require that work be carried out within the watercourse (e.g. culvert or bridge crossing construction, retaining wall construction, erosion protection works), the work area must be dewatered to provide for construction in dry conditions. The sediment laden water pumped from the work area must be discharged to an appropriate sediment control measure for treatment before re-release to the stream. In addition, projects that dam and block flow across an entire channel section require that flows be pumped from upstream to downstream of the work area with minimum disruption to normal water levels and water quality.

DESIGN CONSIDERATIONS

SITE DEWATERING:

- Refer to the figure below for dewatering details;
- The inlet pump head must be wrapped in filter fabric, situated on a bed of rip-rap within the watercourse. As an alterative to screening, a pile of clear stone may be placed over the pump to completely cover the pump head. Pumps must not entrain fish or other aquatic species;
- Outlet pump must discharge to a sediment bag or sediment trap/basin;
- Discharge from the sediment bag is to be released at a vegetated location. If unavailable, the sediment bag is to be placed over a flow dissipating structure;
- Sediment trap or basin should be protected with sediment fence installed around its perimeter; and,
- Dewatering to a well vegetated, grassed area may be permitted provided that the pump outlet head is located at least 15 meters from the receiving water body.

WATER DIVERSIONS:

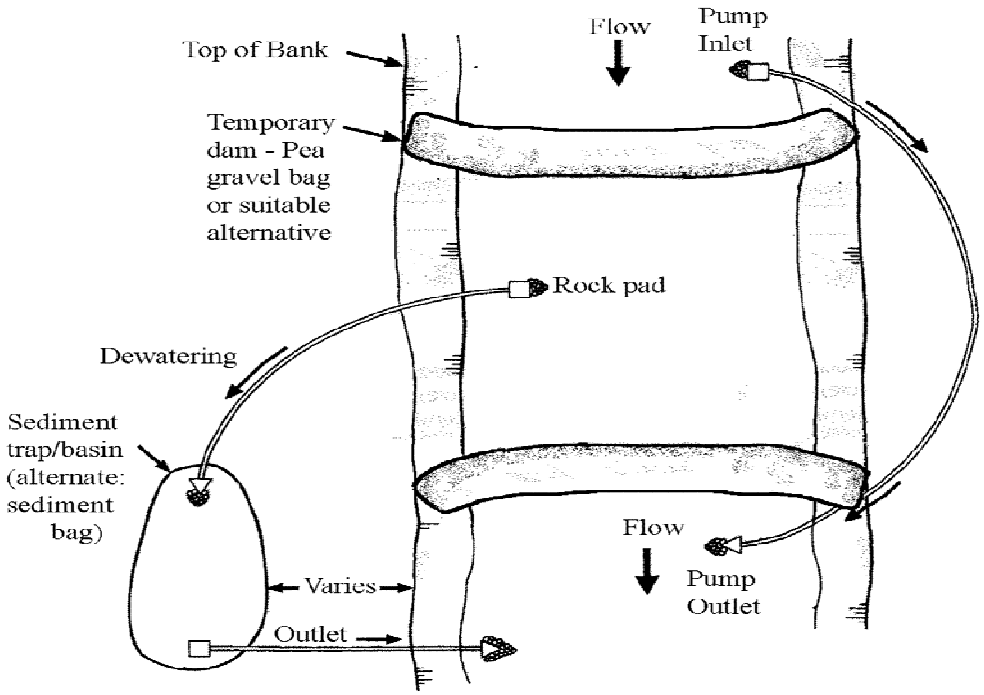
- Refer to the figure below for water diversion details;
- Inlet pump head must be wrapped in filter fabric, covered with a small gauge screen (i.e. small size opening), and situated on a bed of rip-rap. As an alterative to screening, a pile of clear stone may be placed completely cover the pump; and,
- Outlet pump head to be situated on the downstream side of the area either directly within the channel or a minimum of 15 meters away from the watercourse either on a rock pad or in a well vegetated area.

INSTALLATION & MAINTENANCE

- Regular inspection and cleaning of sediment controls such as sediment removal and/or filter bag replacement;
- For water diversions, a back up pump must be kept on site at all times during pumping activities;

- Water diversions/dewatering discharge must be monitored continuously for effectiveness;
- Water released to creek bank areas should be monitored for signs of erosion (i.e. sediment content of receiving stream); and,
- If water diversion pumping is to continue after normal working hours, a technician should be assigned to monitor and ensure that the system is functioning properly at all times.

Figures illustrating site dewatering and water diversions from Keeping Soil on Construction Sites (HRCA & HCA, 1994).



APPENDIX F

EROSION AND SEDIMENT CONTROL
INSPECTION REPORT
(SAMPLE)

Erosion and Sediment Control Inspection Report
(SAMPLE)

Project:
Project No./Contract No.:
Permit No.:

Prime Contractor:

Inspector:
Inspector Qualifications:
Verbal/Written Notification given to:

Stage of Construction:

Construction Activities on Site:
Heavy Equipment on Site:

Site Area (ha.):
Receiving Water (i.e. creek, lake):

Inspection:
Date:

Time:
Duration (hours):
Reason for Inspection: **Weekly**
Rainfall Event
Snowmelt Event

Date of Last Inspection:

Current Weather Conditions:
Previous Weather Conditions for site:
Rainfall amount (mm):
Rainfall duration (hours):
Snowmelt amount (mm):

No. of Days Lost due to Inclement Weather:

Erosion and Sediment Control Measu (list measures that appear/should appear on ESC Plan)	**ESC Measure Effective**			**Maintenance of ESC Measure(s) required**			**Recommended Time for Clean-up of Measure**	**Inspector's Comments** (include location of ESC measure to be repaired)	**Action(s) Required**
	Yes	**No**	**N/A**	**Yes**	**No**	**N/A**			
Erosion Prevention Practices:									
Vegetative Filter Strip									
Seeding									
Hydro-seeding									
Terra-seeding									
Top soiling									
Sodding									
Mulching									
Re-vegetative Systems									
Tree and Shrub Plantings									
Erosion Control Matting/Blanket/Net									
Buffer/Riparian Zone Preservation									
Scarification									
Sediment Control Practices - Perimeter Controls:									
Sediment/Silt Fence							Sediment accumulation reaches 50% of geotextile height.		
Interceptor Swale/Dyke									

Erosion and Sediment Control Measu (list measures that appear/should appear on ESC Plan)	ESC Measure Effective			Maintenance of ESC Measure(s) required			Recommended Time for Clean-up of Measure	Inspector's Comments (include location of ESC measure to be repaired)	Action(s) Required
	Yes	No	N/A	Yes	No	N/A			
Silt Soxx with Compost Material							Sediment accumulation reaches 50% of Soxx height.		
Mud Mat									
Vehicle Wheel washer									
Storm Drain Outfall Protection									
Sediment Control Practices - Sediment Controls:									
Ditch/Swale Sediment Traps							Sediment accumulation reaches 50% of the sediment trap height.		
Sediment Traps							Sediment accumulation reaches 50% of the sediment trap height.		
Rock Check Dams							Sediment accumulation reaches 50% of the rock check dam height.		
Sediment Control Ponds/Basins							Sediment accumulation reaches 50% of the forebay design volume.		
Bulkhead within Storm Sewers									
Sediment Control Practices - Filtration Controls:									
Drain Inlet Protection							Refer to manufacturer's instructions to confirm clean-up time.		
Sediment Bag							Refer to manufacturer's instructions to confirm clean-up time.		
In-Stream Controls:									
Auguring and Directional Drilling									
Sediment/Turbidity Curtains									
nporary Stream Crossings via Culvert(s)									
Dry Flume									
Cofferdam									
By-pass or Full Diversion									
Dewatering									

Erosion and Sediment Control Measu (list measures that appear/should appear on ESC Plan)	ESC Measure Effective			Maintenance of ESC Measure(s) required			Recommended Time for Clean-up of Measure	Inspector's Comments (include location of ESC measure to be repaired)	Action(s) Required
	Yes	No	N/A	Yes	No	N/A			
General Concerns:									
Are offsite/downstream properties/waterways protected?									
Have all deficiencies been repaired immediately after being reported?									
Does ESC Plan require revision?									
Photo inventory provided?									

Inspector's Signature: _____

Appendix O – Large Fill Procedural Guideline

A Procedural Guideline for Receiving & Processing Applications for Large Scale Fill Placement within Areas Regulated under Ontario Regulation 182/06 (Regulation of Development, Interference with Wetlands and Alterations to Shoreline and Watercourses), effective February 1st, 2012 and revised February, 22nd, 2012.

The provisions of this protocol only apply to those lands that are situated within the regulatory jurisdiction of Kawartha Region Conservation Authority (KRCA), as specified within the Conservation Authorities Act (CA Act) and Ontario Regulation (O. Reg. 182/06). The guideline outlines the requirements necessary to ensure that the placement of fill will not negatively affect the control of flooding, erosion, pollution or the conservation of land and to ensure that there are clear and consistent information requirements.

Large-scale fill placement are classified by the Authority as those that meet the definition of development under S. 28 of the CA Act and involve the importation of fill associated with infrastructure projects, commercial, industrial or multiple residential developments. This procedural guideline will always apply to any project involving a fill volume greater than 500 cubic metres. However, some or all aspects of this procedural guideline may apply to lesser volumes depending on the location of the fill site and where there are equivalent respective municipal standards/requirements (e.g. municipal site-alteration by-laws).

In general, large-scale fill operations shall be directed away from KRCA regulated areas (i.e., areas subject to O. Reg. 182/06) except where provided for in the KRCA Plan Review and Regulation Policies manual (in prep).

Pre-Consultation

Prior to submitting an application for large scale fill placement, the property owner is encouraged to consult with KRCA and the appropriate municipality to determine who has jurisdictional control.

Prior to submitting an application for permission to KRCA, the property owner is required to attend a pre-consultation meeting with staff from the Authority, the municipality, and, provincial and federal agencies that may have an interest in the fill application. The meeting will be coordinated by the Authority. The purpose of the meeting is to identify issues, outline review and approval requirements of various government bodies, determine the permit process, review this procedural guideline and establish contacts for the applicant.

Application Information Requirements

1) Upon receipt of an application submitted under O. Reg. 182/06 for development activities associated with a large-scale fill operation, KRCA staff will ensure that the application is complete and all necessary supporting documentation has been submitted. Supporting documentation will include:

    - An application in writing may be provided by the property owner or an authorized agent acting on behalf of the property owner provided that the authorized agent has been granted permission in writing by the property owner (copy of permission shall be provided with application). The permit will not be issued until it is signed by the registered property owner(s) and/or principle of the numbered company.

    - Four copies of a plan of survey of the subject property prepared by a certified Ontario Land Surveyor illustrating a minimum of the following:

        i. Location of subject property including property lines, north arrow and nearest roadways/intersections;
        ii. Location, dimensions and use of existing and proposed buildings or structures;
        iii. Topography – existing and proposed elevations (in 0.5 metre contours) within and adjacent to the area where development is being proposed. The plan must show the locations of each fill envelope being proposed on the property;
        iv. Cross sections through each fill envelope;
        v. Location and dimensions of all temporary fill stockpiles, staging areas and access routes;
        vi. A total fill quantity must be shown on the plans in cubic metres. No filled slopes are to exceed a gradient of 3 (horizontal): 1 (vertical);

vii. Sediment and erosion control measures – the type and location of all measures and sequencing if applicable;
viii. Drainage patterns pre and post development that verifies the fill will not alter drainage patterns and volume in such a way to have an adverse affect on upstream, downstream and adjacent properties;
ix. Location of all environmentally sensitive features that may include, but not be limited to the following: watercourses, wetlands, valleylands (including extent of associated floodplain and/or erosion hazard), unstable soil or unstable bedrock, areas of natural and scientific interest, significant woodlands, significant wildlife habitat, threatened or endangered species habitat, sensitive hydrogeological features (e.g., aquifers, intake protection zones, springs, seeps, etc);
x. The Authority's regulatory limit as prescribed by O. Reg. 182/06;
xi. The regulatory flood plain of any watercourse;
xii. Other known site features and structures such as access roads, culverts, utilities, poles, pavement, curbs, etc.; and,
xiii. Restoration details (i.e., detail of site stabilization measures such as topsoil, seed, sod, hydroseed and associated timing, monitoring etc.).

- Completion in full of an application form including Schedule A, and a "Large Fill Site Contamination Screening Questionnaire", copy attached, to provide a description of the origin(s) of the fill and its history, past and present uses of the land including any processes involved in its generation to identify if there are any potential concerns with fill quality and possible contamination.

- Prior to the placement of any fill, KRCA requires background baseline information that describes the existing soil and water conditions (surface and subsurface) at the receiving site that is of sufficient quality to determine if the control of pollution is being affected by the proposed activities.

- Description of the address(s) and property owner(s) of the origin(s) of all fill material.

- If there is any indication of a past or current use on the originating site(s) that may have had the potential to cause contamination or the owner cannot verify the fill material is inert or KRCA staff has the reason to believe that there is potential for contamination or pollution of the fill material, the applicant must also submit a soil report prepared by a qualified environmental/geotechnical engineer and/or Professional Geoscientist for each originating location where fill is being imported from. The soil report(s) shall verify that the fill material is inert based on distributed samples across the site with a focus in areas of highest risk. A detailed description of the sampling procedure and rationale shall be provided. Upon receipt of such a report, the KRCA reserves the right to retain a qualified peer consultant, at the applicant's expense, to review the report to determine if it satisfactorily ensures that the fill material is inert. Inert is defined as: meeting either Table 1 Site Condition Standards referenced in the EPA or, if it can be demonstrated by the applicant that the existing ambient soil quality of the receiving site does not meet Table 1 standards, the applicable Table 2 Standard representative of the existing use of the receiving site. In some circumstances KRCA may require additional on-site soil testing of imported fill material prior to fill placement (e.g., temporary stockpile testing) to ensure standards as described above.

- Where site specific conditions/concerns are warranted, KRCA may require submission of studies and reports as deemed necessary to ensure that the proposed fill site will not result in an adverse impact on the control of flooding, erosion, pollution or the conservation of land. These may include Environmental Impact Study (EIS), hydrogeological study, geotechnical study, hydraulic analysis, and/or stormwater management report. Once an application is submitted by the authorized agent/owner, KRCA staff will confirm study/report requirements as necessary. It will be the sole responsibility of the authorized agent/owner to pay for and complete the study/report. Site specific issues may include, but not be limited to, proximity to or presence of one or more of the following:
  i. River or stream valley
  ii. Wetland
  iii. Watercourse
  iv. Features identified by the Clean Water Act (2006) (i.e., intake protection zones, wellhead protection areas, significant groundwater recharge areas, and the highly vulnerable aquifers)
  v. High water tables

vi. Other hydrogeologically (i.e., significant discharge areas, springs, seeps etc.) and/or environmentally sensitive features

- KRCA will require a plan outlining how the site will be supervised and controlled to ensure the origin and quality of the fill material arriving is acceptable. In some cases, e.g. multiple suppliers/origin of the fill, where site supervision and control cannot be assured it may be necessary, at the applicant's expense to acquire the services of a qualified third party.

Application Administration

2) **An application will not be deemed complete until all information has been submitted in support of the application.** If information is missing from the application submission, it will be the responsibility of the owner and/or authorized agent to ensure that the information is provided. The fee based on the fee schedule for large fill placement is payable to KRCA once the application is deemed complete. As the fee payable is based on the estimated fill volume, the applicant will be required to reconcile the fill volume at the completion of fill placement and make a final fee payment if necessary for fill **placement in addition** to that initially estimated.

   If it is determined that a soil report (s) is required as part of a complete application, a deposit of $3,000 (*amount TBC through fee schedule review*) will also be required for the costs of the peer review. The deposit will be required before the application is deemed complete.

3) Applicants are required to consult with respective municipality and other government agencies as may be identified during pre-consultation. It is the responsibility of the authorized agent/owner to provide written authorization/consent from the respective municipality in which the proposed fill site is located (i.e., City of Kawartha Lakes, Township of Scugog, Township of Brock, Municipality of Clarington, Township of Galway-Cavendish & Harvey, Township of Cavan-Monaghan) and/or provincial/federal agencies where required, prior to permit issuance. Municipalities and agencies may be concerned with issues such as the following:
   i. Oak Ridges Moraine Conservation Plan, Greenbelt Plan, Lake Simcoe Protection Plan, Official Plan and Zoning
   ii. Condition and damage of roadways/highways and access point(s)
   iii. Haul route and truck traffic volumes from fill removal location to proposed fill site location
   iv. Mud and dust control measures at the fill site, at fill removal locations and on haul routes and at access points
   v. Sanitary facilities on site
   vi. Noise
   vii. Origin and quality of fill

4) Where proposed fill site locations are subject to O. Reg. 182/06 and municipal fill by-laws under the Municipal Act., the proponent shall prepare comprehensive plans/reports for both KRCA and the respective municipality.

5) Only one active KRCA permit per municipal address can exist at any one time.

6) Term of written permission from the KRCA consenting to a large fill operation may vary in length up to the maximum provided for in O. Reg. 182/06.

7) In accordance with the CA Act and O. Reg. 182/06, there will be no extensions.

8) A new application for development can be submitted prior to the expiry date specified on the permit. The new application will be subject to the requirements and stipulations of this procedural guideline including any updates and/or amendments and any additional requirements as may be deemed necessary by KRCA.

9) Following the issuance of a permit from the Authority, KRCA staff will conduct site inspections of large-scale fill operations in order to ensure compliance with permit conditions subsequent to this procedural guideline.

10) It will be the responsibility of the owner and/or authorized agent to ensure that a final inspection with KRCA staff is coordinated. A final site inspection and review of permit conditions shall be completed prior to the expiration date on the permit to ensure compliance with the terms of the permission. Within 30 days of the final inspection, the applicant shall submit a report to KRCA including but not limited to the following: an as-built survey completed by a certified

Ontario Land Surveyor, reconciliation of the final fill volume, status of erosion control measures, stabilization/restoration plans and recommendations for ongoing monitoring requirements.

11) Where the fill proposal does not conform to the policies contained in the Plan Review and Regulation Policies manual, KRCA staff shall prepare reports for the KRCA Board of Directors to review the application and:
    - Approve the application; or,
    - Indicate that KRCA staff do not support the application and schedule a date for a hearing (see KRCA Administrative By-Law #3 – Hearing Procedures available on KRCA's website (www.kawarthaconservation.com) or at the administrative office).

12) With the submission of the final report to KRCA, the applicant is responsible to reconcile outstanding fees and to make payment for additional fill placement.

Conditions of the Permit

13) The KRCA may apply conditions to the permit to ensure that there is no adverse effect on the control of flooding, erosion, pollution or the conservation or land. The conditions may include, but are not limited to, the following:
    i. The submission of a post development plan (as built) prepared by a certified Ontario Land Surveyor;
    ii. A specified limit on the volume of fill that is permitted and the applicable fill quality standards that apply;
    iii. The location of temporary fill stockpiles, access routes and landing areas;
    iv. A specified limit of the depth of fill material that is permitted and any grading and compaction requirements;
    v. Monitoring requirements for on-site testing of fill, surface and/or groundwater to ensure that the material is inert and meets specified contaminant quality standard (sampling procedures should be provided to KRCA for review and KRCA may retain a qualified peer review consultant at the permit holder's expense to review the sampling procedures and/or any testing results);
    vi. Access to the receiving site to KRCA staff and peer review consultants;
    vii. On a daily basis, the permit holder shall record the location on the site where filling activities will occur. The location of the loads shall be tracked and recorded on a daily basis through the development of a locational grid tracking system for the property. Records shall be retained and made available to KRCA on a monthly basis;

viii. A daily summary log shall be maintained for loads shipped to the site, including:
    1. Date
    2. Daily total number of trucks entering the site
    3. The location from where the fill was loaded into each truck
    4. For each origin location, the location where fill was placed on the locational tracking grid
ix. The site shall be gated and sign prohibiting access to unauthorized personal/trucks, and other such measures that may be necessary to ensure effective site supervision/control (e.g. independent third party);
x. Identify a 24 hour contact person who would be in a position of responsibility and could respond to public inquiries and complaints; and communicate the contact information through appropriate means;
xi. Measures related to the implementation of erosion and sedimentation controls applicable to the placement of the fill and/or temporary stockpiles (if necessary) including: type, location and timing;
xii. Measures related to site stabilization and/or revegetation at the conclusion of fill placement;
xiii. Requirements of a final report at the conclusion of fill placement including such items, for example, as a final as-built survey, a determination of final fill volume placement, recommendations for ongoing monitoring of the site etc.

Exceptions

In accordance with the CA Act:

(10) No regulation made under subsection (1),

(a) shall limit the use of water for domestic or livestock purposes;

(b) shall interfere with any rights or powers conferred upon a municipality in respect of the use of water for municipal purposes;

(c) shall interfere with any rights or powers of any board or commission that is performing its functions for or on behalf of the Government of Ontario; or

(d) shall interfere with any rights or powers under the *Electricity Act*, 1998 or the *Public Utilities Act*. 1998, c. 15, Sched. E, s. 3 (8); 1998, c. 18, Sched. I, s. 12.

(11) A requirement for permission of an authority in a regulation made under clause (1) (b) or (c) does not apply to an activity approved under the *Aggregate Resources Act* after the *Red Tape Reduction Act*, 1998 received Royal Assent. 1998, c. 18, Sched. I, s. 12.

Denial of Permit Application

- If, in the opinion of Authority staff the application would result in a negative and/or adverse impact on the control of flooding, erosion, pollution, or the conservation of land, the permit may not be supported by Authority staff.
- If the application is not supported by staff, the applicant will have the right to a hearing before the Authority Board. The Authority Board may refuse the permission; or grant the permission with or without conditions (see KRCA Administrative By-Law #3 – Hearing Procedures available on KRCA's website (www.kawarthaconservation.com) or at the administrative office).
- In accordance with the CA Act S.15, "A Person who has been refused permission or who objects to conditions imposed on a permission may, within 30 days of receiving the reasons under subsection (14), appeal to the Minister who may,
    i. Refuse the permission; or
    ii. Grant the permission, with or without conditions

Cancellation of Permission

- The Authority may cancel a permission, if it is of the opinion that the conditions of the permission have not been met.
- Before cancelling a permission, the Authority shall give a notice of intent to cancel to the holder of the permission indicating that the permission will be cancelled unless the holder shows cause at a hearing why the permission should not be cancelled.
- Following the giving of the notice, the Authority shall give the holder at least five days notice of the date of the hearing.

Fee for Large Fill Placement

The fee structure for large-scale fill placement associated with infrastructure projects, commercial, industrial or multiple residential developments is as follows:

Fill Volume(s)	**Fee Amount**
< 500 cubic metres (m^3)	(*TBC through fee schedule review*)
>500 cubic metres (m^3)	$1000 PLUS $0.75 per cubic metre ($m^3$)

KRCA may require the applicant to provide a letter of credit which could extend up to $500,000.00 depending on the circumstances of each individual application, to ensure the implementation of permit conditions. A letter of credit will NOT be required when the fill placement is part of a project subject to Planning Act approvals e.g. residential/commercial developments, or part of a project subject to site plan approval of a municipality, or part of a municipal or provincial government project.

Furthermore, where a peer review of soil testing report(s) is required, KRCA will require a deposit of $3,000 (*amount TBC through fee schedule review*).

Schedule "A"

Placement of Fill Over 500 meters/cubed (30 tandem truckloads)

Location where fill is being placed:

Owner: _____

Phone: _____

Address: _____

Lot: _____ Concession: _____ Municipality: _____

Watershed: _____

Attach a legal survey and a map showing location, lengths, widths and depths of proposed fill area in meters:
Length: _____ Width:_____ Depth: _____

Total volume of fill to be placed in area shown ***T=***_____ meters/cubed

Approximate number of tandem truckloads ***=T*** divided by 15 _____

Proposed start date: _____ Proposed Completion Date: _____

Proposed use of lands where fill placed: _____

If not for agriculture: type and date of re-vegetation:_____

Name of trucking company: _____

Contact Person: _____

Phone: _____

Approx. Number of trucks hauling: _____

Excavating company completing the final grading of fill: _____

Contact Person: _____

Phone: _____

Location where fill is coming from:

Owner: _____

Phone: _____

Address: _____

Lot: _____ Conc: _____ Municipality: _____

Watershed: _____

Attach a map showing location of fill being removed.

Comments:

_____

_____

Please Note: Any and all information provided in support of this application may be shared with local Municipalities, and/or Provincial/Federal Authorities for the purposes of review, in conjunction with any approvals required under their legislated/legal responsibilities for this project

LARGE FILL SITE CONTAMINATION SCREENING QUESTIONNAIRE

Kawartha Conservation
277 Kenrei Rd.
Lindsay, Ontario K9V 4R1
Telephone: 705.328.2271 Fax: 705.328.2286

This form must be completed for all large fill applications unless a geotechnical/ environmental site assessment is provided verifying that the fill material is suitable for placement on the subject lands, in accordance with the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. This form must be completed and signed by the application and property owner.

Location of Subject Lands:

Lot:	**Conc:**	**Municipality:**	**Former Township:**

Is the fill material coming from lands, or adjacent to lands, that was previously used for the following:

	Yes	**No**
Industrial use?		
Commercial uses where there is potential for site contamination (i.e. a garage, a bulk liquid dispensing facility, including a gasoline outlet or a dry-cleaning equipment operation		
Where filling has occurred?		
Underground storage tanks or buried waste on the property?		
Where chemical spills, or hazardous chemical uses, or where cyanide products may have been used as pesticides (i.e. an orchard)?		
A weapons firing range?		
Is the nearest boundary of the application within 500 meters (1,640 feet) of the fill area of an operation or former landfill or dump, or a waste transfer station or PCB storage site?		
If there are existing or previously existing buildings, are there any building materials remaining on the site which are potentially hazardous to public health (i.e. asbestos, PCBs, etc)?		
Is there any reason to believe that the lands may have been contaminated based on previous land use?		

If the answer to any of the questions was yes, a geotechnical/environmental site assessment must be provided verifying that the fill material is suitable for placement on the subject lands, in accordance with the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act.

Declaration

To the best of my knowledge, the information provided in this questionnaire is true, and I have no reason to believe that the fill material to be placed on the subject site contains contaminants that is NOT suitable for placement on the subject lands, in accordance with the "Soil, Ground Water and Sediment Standards for Use Part XV.1 of the Environmental Protection Act.

I am a qualified person with the required liability Insurance Stated in O. Reg. 153/04.
(Please Print)

Qualified Person:			***Property Owner or Authorized Officer:***		
Name:			***Name:***		
Name of Firm(if applicable)			***Name of Company(if applicable)***		
Address:			***Address:***		
Tel:	***Fax:***	***Cell:***	***Tel:***	***Fax:***	***Cell:***
Signature:			***Signature:***		
Date:			***Date:***		

Appendix P – Permit Application and Complete Application Checklist

Owner's Name: _____ Tel. (Bus): _____

Mailing Address: _____ Tel. (Home): _____

_____ Fax: _____

Postal Code: _____ E-mail: _____

Applicant's Name: _____ Tel. (Bus): _____

Mailing Address: _____ Tel. (Home): _____

_____ Fax: _____

Postal Code: _____ E-mail: _____

If the owner is not making this application, then a signed authorization from the owner is mandatory and must be included with the application.

Location of Subject Property:

Municipal Address: _____ Municipality: _____

Twp. Lot: _____ Concession: _____ Former Geographical Twp: _____ Registered Plan #: _____

Application is hereby made to: (check appropriate box)

☐ Construct a new building or structure ☐ Alter, add to or renovate an existing building or structure

☐ Place fill, excavate &/or modify grades (including any septic works) ☐ Construct pond, reservoir

☐ Alter an existing river, creek, stream or watercourse (including shoreline works) ☐ Other: _____

Proposed Start Date: _____ Proposed Completion Date: _____

Pre-consultation is available upon request and is encouraged for those projects with complex review requirements.
Pre-consultation schedule details can be found at: www.kawarthaconservation.com.

An application will be considered complete when the Standard Application Criteria (Part A) plus applicable Feature Specific Application Criteria (Part B) and/or Supporting Technical Requirements & Mitigation Measures (Part C) are submitted for consideration. Where applicable as determined by KRCA staff during pre-consultation and/or following submission, to ensure only the information required to make a decision is requested. Insufficient information may delay the processing of your application.

The permit fee shall be paid at the time of filing an application with KRCA. A non-refundable administration fee of $125.00 will be retained by KRCA in the event of an application withdrawal.

Please be advised that the customer service standards for Conservation Authorities are:

- Applicants should be notified within 21 days of receipt of an application as to whether or not the application has been deemed complete or that a pre-consultation meeting be attended.
- From the date that an application is deemed complete, a decision should be made within 30 days for a minor application and 90 days for a major application.

KRCA will consider an application based upon the information provided. If the information provided is incorrect or untrue, KRCA reserves the right to withdraw any permission granted.

This application does not relieve the applicant of the obligation to secure any other necessary approvals.

"I acknowledge that this application and supporting documents will be considered as public documents and are available upon written request under the Municipal Freedom of Information and Protection of Privacy Act (the Act). I understand that any and all personal information gathered by the KRCA will be used only for the express purpose(s) of the application for which it has been provided, and will not be divulged to any third party, private or public, without prior written consent, as provided for in the Act."

"I acknowledge and agree that any permit issued pursuant to this application may be revoked if it is issued on the basis of false, inaccurate or misleading information."

I, _____ declare that the above information is correct to the best of my knowledge and I agree to abide by Ontario Regulation 182/06. By signing this application, I agree to allow KRCA staff to enter onto the subject property as part of the review and compliance process.

Print Name: _____

Signature: _____ Date: _____

Part A) Standard Application Criteria

We require the following information to help ensure a timely response to planning and permit applications. The information listed below will be required for all permit applications. The submission of additional information may be necessary (see Parts B and C).

	Checklist
1. A current legal survey of the property	☐
2. Location map showing nearest intersections	☐
3. Signed letter of authorization from owner to applicant (if applicable)	☐
4. Statement of agreement from any persons sharing right-of-ways, easements, etc. (if applicable)	☐
5. Detailed letter/report describing the proposal	☐
6. Volume and origin of any fill material *For fill exceeding 500 cubic metres, please review KRCA's Large Fill Procedural Guideline for requirements.*	☐
7. 3 sets of plans/drawings folded to 8.5" x 11"illustrating existing site conditions and proposed development and/or site alteration, including:	
- property boundaries	☐
- location and dimensions of existing and proposed buildings or structures (include building type), septic field(s), vehicular entrances, parking lots, and/or fill	☐
- location of watercourses, wetlands, valleylands, flooding and/or erosion hazards, unstable soil or bedrock (i.e., known features subject to O.Reg. 182/06) in relation to proposed works	☐
- cross-section(s) of proposed work(s)	☐
8. Sediment and erosion control proposal (if applicable)	
9. Reductions of the plans if larger than 11"x17"	☐

Note: If only one set of copies are submitted, copies may be made by our office on a cost recovery basis.

Part B) Feature Specific Application Criteria

Three particular features of interest are identified below with associated information requirements. We will require this feature specific information to be submitted with the permit application. These requirements can be confirmed by KRCA staff upon submission and/or during pre-consultation (formal/informal). Following the review of this information, we will advise if any additional items are necessary to complete our evaluation and render a decision (see Part C).

Checklist

Valleys associated with rivers, creek, stream, watercourses, and/or lakes

Excludes watercourse alterations–see below.

1. Topographic survey prepared by a qualified professional illustrating:
   - floodline, where known, and high water mark ☐
   - existing and proposed geodetic elevations ☐
   - location and dimensions of any existing and proposed buildings , structures and/or fill ☐
   - lowest opening and/or finished floor elevations of existing and proposed buildings or structures ☐
2. Slope determination for valley walls greater than 2 metres in height ☐
3. Brief description of the valley as it relates to your development proposal to assist in the review ☐

Adjacent to or within wetlands

1. Topographic survey or grading plan prepared by a qualified professional illustrating:
   - existing and proposed elevations ☐
   - location and dimensions of any existing and proposed buildings , structures and/or fill ☐
2. Brief description of your the wetland as it relates to your development proposal to assist in the review ☐

Watercourse alterations

Small scale

Applicable to: shoreline stabilization; in-water boathouses; docks; culvert replacements of the same length and diameter; bed-level crossings; and/or conservation activities:

- photographs of the work site ☐

Large scale

Applicable to: dredging; trenching; bridge installation; channel realignments; enclosing; infilling or regrading water features; dewatering; water diversions; damming and ponding; and/or in water aquatic habitat removals/alterations:

1. Topographic survey prepared by a qualified professional illustrating:
   - name of watercourse(s) or water body(ies) likely to be impacted by the proposed alteration ☐
   - floodline where known ☐
   - existing and proposed geodetic elevations ☐
   - location and dimensions of any existing and proposed building , structures and/or fill ☐
2. Existing and proposed representative cross-sections and profiles of the watercourse that is to be altered (include high-water mark and habitat features e.g. pools, riffles) ☐
3. Detailed work schedule, including proposed timing works, phasing of construction, and equipment and materials needed on site to conduct works ☐
4. Fish and fish habitat protection measures including but not limited to type and location of sediment and erosion control measures, and details to stabilize disturbed areas ☐
5. Brief description of the watercourse as it relates to your development proposal to assist in the review ☐

Note: Parks Canada approval is applicable for in-water works for Trent-Severn Waterway lakes and connecting rivers. Illustration of the Upper Controlled Navigation Limit on topographic survey will help to determine jurisdiction (KRCA vs. TSW).

Part C) Supporting Technical Requirements & Mitigation Measures

We will require only the following information identified as "Required" to further define the particular feature(s) of interest and/or identify appropriate mitigation measures in order to complete our evaluation and render a decision. Information requirements are to be determined by KRCA staff during pre-consultation and/or following submission of Standard Application Criteria (Part A) plus Feature Specific Application Criteria (Part B). If supporting technical requirements and/or mitigation measures are not required, the application has been deemed complete and submission of the following items will not be necessary.

	Checklist	KRCA Office Use	
		Required	Submitted
1. Erosion and sediment control plan	☐	☐	☐
2. Grading and drainage plan	☐	☐	☐
3. Landscaping plan/site rehabilitation plan	☐	☐	☐
4. Vegetation preservation plan	☐	☐	☐
5. Compliance monitoring plan	☐	☐	☐
6. Functional Servicing Plan	☐	☐	☐
7. Stormwater Management Report	☐	☐	☐
8. Field assessment requirements			
- survey of field verified natural feature(s), top of bank (valleylands), hazard limits, development limits, etc.	☐	☐	☐
9. Watercourse and/or valley wall stabilization plan	☐	☐	☐
10. Geotechnical Analysis (soil, slope stability, and/or erosion hazard assessment) and/or a coastal engineer's analysis	☐	☐	☐
11. Detailed description of aquatic environment:			
- components of the aquatic environment, mainly fish species present and their habitat at the proposed development site	☐	☐	☐
- information about the biophysical characteristics at the proposed development site (needed to determine how changing those elements, and characteristics may affect the various ecological functions of the aquatic ecosystem)	☐	☐	☐
12. Natural channel modification/design	☐	☐	☐
13. A fluvial geomorphological assessment to ensure the design of a stable channel based on natural channel design principles	☐	☐	☐
14. A hydraulic analysis. The analysis must address flood conveyance and storage, verifying that there will be no increase in flood levels to adjacent properties, no increase on-site flood risks and that stage storage-discharge relationships of the floodplain will be maintained. The assessment must be completed for the full range of rainfall events typically 2,5,10,25,50,100 year and regional storm.	☐	☐	☐
15. Engineering design (if building or structure within floodplain, as determined through topographic survey)	☐	☐	☐
16. Supporting architectural drawings	☐	☐	☐
17. An Environmental Impact Study (EIS) evaluating impacts on features/functions and identifying appropriate mitigation measures. It is strongly recommended that the applicant pre-consult with KRCA staff prior to the preparation of an EIS to ensure that it addresses the issues that need to be addressed in accordance with KRCA's guidelines for conduction an EIS.	☐	☐	☐
18. A hydrogeological assessment prepared by a qualified hydrogeologist	☐	☐	☐
19. Other _____	☐	☐	☐

Appendix Q – Stormwater Management Guidelines

(To be Created)

Appendix R – Drainage Act and Conservation Authorities Act Protocol

Drainage Act
and
Conservation Authorities Act
Protocol

Protocol for Municipalities and Conservation Authorities in Drain Maintenance and Repair Activities

September 2011

Preface

In 2008, the inter-agency *Drainage Act* & Section 28 Regulations Team (DART) was established by the Ministry of Natural Resources (MNR) and the Ministry of Agriculture, Food and Rural Affairs (OMAFRA) to explore the options and propose solutions to the legal liability issues for municipalities and conservation authorities arising from provisions in the *Drainage Act* and the *Conservation Authorities Act*. DART includes representatives from MNR, OMAFRA, Conservation Ontario (CO), conservation authorities, the Drainage Superintendents Association of Ontario, the Ontario Society of Professional Engineers (OSPE) Land Drainage Committee, Ontario Federation of Agriculture, Ontario Farm Environmental Coalition, and the Rural Ontario Municipal Association. The Team's goal was to develop a means for municipalities and conservation authorities to fulfill their responsibilities under the *Drainage Act* and *Conservation Authorities Act* respectively without compromising the intent of either statute. The *Drainage Act* and *Conservation Authorities Act* Protocol was produced by the Team and is intended for internal use by municipal and conservation authority staff.

Table of Contents

Introduction

Municipal drains have been a fixture of rural Ontario's infrastructure since the 19th century. Most municipal drains were constructed to improve the drainage of agricultural land by serving as the discharge point for private agricultural tile drainage systems. They are a vital component of the local infrastructure, and without them, many areas of the province would be subjected to regular flooding, reduced production from agricultural land and increased public health risks. Under the *Drainage Act*, municipalities are legislated to maintain and repair drains and to respond to petitions for new drainage systems. A comprehensive description of the *Drainage Act* and *Conservation Authorities Act* (*CA Act*) is presented in Appendix IV, and both acts are available online through e-Laws (www.e-laws.gov.on.ca).

Under Section 28 of the *CA Act*, conservation authorities (CAs) regulate development in areas related to or prone to water related natural hazards, including areas in and adjacent to watercourses, wetlands, shorelines of inland lakes and other hazard lands. A CA may grant permission for development where it deems that the control of flooding, erosion, dynamic beaches, pollution or the conservation of land is not affected. Conservation authorities also regulate activities that change or interfere with wetlands or with the existing channel of a watercourse. Municipal drains are generally watercourses as defined under the *CA Act* and are therefore regulated by conservation authorities.

Because of incongruent provisions between the two provincial Acts, there is potential for legal liability issues with regard to maintenance and repair of existing drains. If a municipality is unable to proceed with required drain maintenance or repair because of requirements for a *CA Act* S. 28 permit, the municipality could be held liable for any consequences. If drain repair and maintenance activities are carried out (with or without a *CA Act* S. 28 permit) and impact regulated areas with respect to the CA's regulatory responsibilities under the *CA Act*, the CA could be held liable for not undertaking or enforcing its regulatory responsibilities.

This protocol provides provincially-approved guidance to conservation authority staff and municipal representatives (e.g. drainage superintendents) regarding the most appropriate practices and permit requirements for municipal drain maintenance and repair activities.

Purpose and Scope

This protocol only addresses the maintenance and repair of drains as required by the *Drainage Act* and does not address issues around new drains and improvements to existing drains.

Included in the protocol are a set of Standard Compliance Requirements (SCRs) for regular repair and maintenance activities that, if followed, would serve as the written permission to progress with work under the *CA Act.* The SCRs documented in this protocol are to be implemented and adhered to by conservation authority staff and drainage superintendents. The Ministry of Natural Resources (MNR), which administers the *CA Act*, and the Ministry of Agriculture, Food and Rural Affairs (OMAFRA), which is responsible for the *Drainage Act*, have a legal responsibility to ensure their respective legislation is applied equally and fairly within the province. In order to assess the effectiveness of these standard compliance requirements, each ministry will periodically undertake a review of the implementation of this protocol.

This protocol also uses a 'Notification of Drain Maintenance or Repair' form (see Appendix II) which serves as a combined notification form for works requiring permissions under the federal *Fisheries Act* and the Ontario *Endangered Species Act* as well as the provincial *CA Act*. The 'Notification of Drain Maintenance or Repair' form is intended to simplify the application process for proponents. This protocol does not apply to permissions under the federal *Fisheries Act* or the Ontario *Endangered Species Act* in any other respects.

Good communication among all parties remains fundamental for these standard compliance requirements to be effective. Municipalities and conservation authorities should be in regular communication to understand one another's interests and be aware of changes and developments. Proponents of a drainage project should initiate contact about a particular project as early in the process as possible to ensure a common understanding on all sides and to address any potential issues before they become more serious.

Compliance Procedures for Drain Maintenance and Repair

Standard Compliance Requirements

Maintenance and Repair of Municipal Drains Constructed under the Drainage Act

This protocol includes SCRs for repair and maintenance activities that, if met, would satisfy the objectives of *a CA Act* S. 28 permit. Written permission under Section 28 of the *CA Act* can be achieved either by adhering to a Standard Compliance Requirement (SCR) or by obtaining a *CA Act* S. 28 permit. Each SCR contains activity-specific mitigation requirements, which apply only to that activity, and general mitigation requirements, which are standards that must be maintained on all drain maintenance and repair projects. Exceptions from the general mitigation requirements (emergency measures) should occur only in situations on a municipal drain that demand the immediate attention of the municipality. Examples include the structural failure or complete collapse of a crossing on a drain or the flooding of property caused by the blockage of a municipal drain. In situations where emergency measures are undertaken by the municipality, the Drainage Superintendent should notify the appropriate CA as soon as is practical.

Certain activities *within* regulated wetland limits have the potential to interfere with wetlands. Therefore, it is recommended that a *CA Act* S. 28 permit still be required for these activities. However, a CA can choose to use the SCRs outlined in this protocol to provide written permission rather than requiring a permit. Where permits are required for drain maintenance and repair, due to the municipality's duty to maintain drainage works under the *Drainage Act*, a CA and a municipality shall work cooperatively to maintain the drain with written permission with or without conditions.

Procedures

Timely, clear and open communication between all parties is required to mitigate the risk of projects not receiving the required CA sign-off within the desired timeframe. The municipality should communicate its annual workplan for maintenance and repair activities with the CA as early as possible. Should a CA have concerns that a maintenance or repair project may not meet the Standard Compliance Requirements for that particular type of activity, the authority will notify the municipality and communicate its concerns as soon as possible.

General works (not located in a regulated wetland limit):

- The municipality completes a Drain Maintenance or Repair Notification form (see Appendix II) for each drain maintenance or repair project, and submits it to the CA.
- The CA acknowledges receipt of the form to the municipality.

- The CA screens the work proposed in the notification form, and may request additional information if the notification form is incomplete.
- The CA sends a signed copy of the SCR for the specific activity being undertaken (e.g. spot clean-out) to the municipality. The CA will endeavour to provide the signed SCR to the municipality within 10 working days of receipt of a complete notification form.
- Should the CA have concerns that a maintenance or repair project may not meet the SCR for that particular type of activity, the CA will communicate its concerns to the municipality as soon as possible. The CA may require a full permit application, in which case the municipality will undertake the normal permit application procedures.
- By signing the SCR statement the CA is providing a written permission and acknowledges awareness of the work. The Drainage Superintendent and the CA will jointly monitor activities for adherence to the SCRs at their discretion.
- The municipality undertakes the work in accordance with the SCRs.

Should the municipality be unable to meet the SCRs listed, a full permit application and review process would be required. In the event of non-adherence by the municipality to the SCRs provided, CAs may issue a notice of violation under their *CA Act* S. 28 regulation and if necessary enter into legal proceedings.

Works Within Regulated Wetland Limits (See Glossary of Terms and Definitions)

- The municipality completes a Drain Maintenance or Repair Notification form (see Appendix II) for each drain maintenance or repair project and submits the form to the CA.
- The CA acknowledges receipt of the form to the municipality.
- The CA screens the work proposed in the notification form, and may request additional information if the notification form is incomplete.
- The CA may require the municipality to obtain a permit for the work, or the CA may determine that the relevant SCR would satisfy its requirements, in which case the process outlined above for works outside of regulated wetland limits would be followed.
- If the CA requires the municipality to obtain a permit, the municipality will undertake the normal permit application procedures.
- Timely, clear and open communication between all parties is encouraged.
- The municipality is encouraged to pre-consult with the CA as early as possible to identify, discuss, mitigate and resolve any potential issues or concerns by either party.
- The CA will make a permit decision and notify the municipality of this decision in writing in accordance with the process and timelines outlined in the Ministry of Natural Resources' *"Policies and Procedures for Conservation Authority Plan Review and Permitting Activities"* and the CA's internal administrative and service delivery policies.

- The CA may place conditions on a permit, but due to the municipality's duty to maintain drainage works under the *Drainage Act*, a CA and a municipality shall work cooperatively to maintain the drain with written permission, with or without conditions. If the CA does not feel it can approve the permit or the municipality disagrees with the conditions placed on the permit, and no agreement can be reached between the parties, the issue can be referred to the Drainage Issues Resolution Team (see Appendix I).
- The municipality undertakes the work in accordance with the permit.

For maintenance or repair activities that the conservation authority agrees fall within the scope of an SCR, the CA will endeavour to provide sign-off for the SCR statement within 10 working days upon receipt of the notification form.

If a dispute occurs over a permit (e.g., over permit conditions) to maintain or repair a drainage works, parties are encouraged to refer the issue to the Drainage Issues Resolution Team before taking their dispute to a legal appeal body. This mediation team, consisting of drainage sector and conservation authority representatives, will provide an independent assessment of the best means of addressing the requirements of both statutes. If no acceptable resolution can be found, standard statutory procedures remain available.

Table 1 outlines the repair and maintenance activities for which SCR statements are available to serve as a written permission in place of a permit for an activity under S. 28 of the *CA Act*, and those for which a permit is recommended. The Standard Compliance Requirements for these activities are documented in the following pages.

Table 1. Recommended use of Standard Compliance Requirements and permits for drain maintenance and repair activities

Activity	SCR statement recommended	Permit recommended
Brushing bank slope	✓	
Brushing top of bank	✓	
Debris Removal and Beaver Dam Removal	✓	
Spot Clean-out	✓	
Culvert Replacement	✓	
Bank Repair or Stabilization and Pipe Outlet Repair	✓	
Dyke Maintenance and Repair	✓	
Dam Maintenance and Repair	✓	
Pump Station Maintenance and Repair	✓	
Pipe, Junction Box or Catch Basin Maintenance and Repair	✓	

Activity	SCR statement recommended	Permit recommended
Bottom Only Cleanout *(outside of regulated wetland limits)*	✓	
Bottom Cleanout Plus One Bank Slope *(outside of regulated wetland limits)*	✓	
Full Cleanout *(outside of regulated wetland limits)*	✓	
Bottom Only Cleanout *(within regulated wetland limits)*		✓
Bottom Cleanout Plus One Bank Slope *(within regulated wetland limits)*		✓
Full Cleanout *(within regulated wetland limits)*		✓

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the *Drainage Act*

Brushing Bank Slope

Description of Typical Works

The removal of trees and other vegetation from the side slopes of a municipal drain.

Activity-Specific Mitigation Requirements

- To preserve slope stability, the vegetative root structure should be preserved. Brushing the bank slope should not disturb soil or remove the roots of any trees or shrubs.
- Engineer's Report to be examined to determine the municipality's working space. Where options exist, work from North or East side is preferred.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official Date:	

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act

Brushing Top of Bank

Description of Typical Works

The removal of trees and other vegetation from the top of a bank. This may be required for easement maintenance and site accessibility. In certain situations brushing the top of bank may require the removal of roots or the disturbance of soil.

Note that the *Conservation Authorities Act* does not apply to vegetation removal if roots are not disturbed; however, it may apply where the soil is disturbed.

Activity-Specific Mitigation Requirements

- Remove vegetation selectively; mature trees should be preserved where possible.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official	
Date	

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act

Debris Removal and Beaver Dam Removal

Description of Typical Works

Removal of log jams, garbage, beaver dams or other obstructions.

Activity-Specific Mitigation Requirements

- Brush or debris should be placed in a location where it cannot re-enter or block the channel.
- Debris removal including the disposal of the sediment should be conducted in a manner consistent with the Engineer's Report and authorizing by-law.
- Minimize flooding upstream and downstream by drawing the water down slowly.
- Avoid performing work when flow conditions are elevated due to recent rainfall to minimize sediment and debris movement and erosion.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities* Act for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official	
Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act

Spot Cleanout

Description of Typical Works

Cleanout of isolated sediment build-up that is significant enough to cause erosion or flow blockage/flooding concerns in the channel. This may include a sediment trap (dug below design grade) cleanout. If cleanout will be continuous along the drain, refer to bottom cleanout.

Activity-Specific Mitigation Requirements

- There should be no appreciable change in grade with the removal of sediment.
- Spot cleanouts including the disposal of the sediment should be conducted in a manner consistent with the Engineer's Report and authorizing by-law.
- Minimize flooding upstream and downstream.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official	
Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act

Culvert Replacement

Description of Typical Works

Replacement of a culvert in accordance with the Engineer's Report. Replacement culverts must be the diameter and length and installed at the location specified in the Engineer's Report.

Activity-Specific Mitigation Requirements

- Minimize disruption to the channel and bank slopes.
- Placement of material removed cannot impact flow.
- Culverts are to be embedded and appropriate erosion protection installed.
- Minimize flooding upstream and downstream.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official	
Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act

Bank Repair or Stabilization and Pipe Outlet Repair

Description of Typical Works

Includes restoration of bank slopes to the original design in the Engineer's Report and localized activities to prevent bank failure, such as the placement of rip rap, seeding the bank, and the use of geotextile materials.

Activity-Specific Mitigation Requirements

- Control the placement of stabilization works to minimize erosion and sediment travel impacts downstream.
- Minimize disruption to the channel.
- Perform work in no/low flow conditions to minimize sediment movement and erosion.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official	
Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act

Dyke Maintenance and Repair

Description of Typical Works

Replacement, repair of breaches, or bank restoration of dykes as set out in the original Engineer's Report.

Activity-Specific Mitigation Requirements

- Minimize flooding upstream and downstream.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official	
Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act

Dam Maintenance and Repair

Description of Typical Works

Structural maintenance, repair or replacement of a dam in accordance with the specifications under the Engineer's Report. Under this heading, "dams" could include weirs or water control structures.

Activity-Specific Mitigation Requirements

- Minimize flooding upstream and downstream.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official	
Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act

Pump Station Maintenance and Repair

Description of Typical Works

Structural repairs or replacing a pump station in accordance with the specifications under the Engineer's Report.

Activity-Specific Mitigation Requirements

- Minimize flooding upstream and downstream.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official	
Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act outside of Regulated Wetland Limits

Bottom Only Cleanout

Description of Typical Works

Removal of accumulated sediment in a drain, including spreading of the spoil, removal of vegetation in bottom of channel and access to the site.

Activity-Specific Mitigation Requirements

- There should be no appreciable change in grade with the removal of sediment.
- Bottom only cleanouts including the disposal of the sediment should be conducted in a manner consistent with the Engineer's Report and authorizing by-law
- Minimize flooding upstream and downstream.
- Perform work in no/low flow conditions to minimize sediment movement and erosion. Avoid work after recent precipitation or snowmelt.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official	
Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act outside of Regulated Wetland Limits

Bottom Cleanout Plus One Bank Slope

Description of Typical Works

Removal of accumulated sediment in a drain, including spreading of the spoil; the removal of vegetation in the bottom of the channel and removal of slope vegetation, including root removal; and access to the site.

Activity-Specific Mitigation Requirements

- There should be no appreciable change in grade with the removal of sediment.
- This work, including the disposal of the sediment, should be conducted in a manner consistent with the Engineer's Report and authorizing by-law
- Minimize flooding upstream and downstream.
- Perform work in no/low flow conditions to minimize sediment movement and erosion. Avoid work after recent precipitation or snowmelt.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official	
Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act outside of Regulated Wetland Limits

Full Cleanout

Description of Typical Works

Removal of accumulated sediment in a drain including spreading of the spoil; the removal of vegetation in the bottom of the channel and removal of slope vegetation, including root removal; the removal of trees and other vegetation from the top of a bank; and access to the site.

Activity-Specific Mitigation Requirements

- There should be no appreciable change in grade with the removal of sediment.
- This work, including the disposal of the sediment, should be conducted in a manner consistent with the Engineer's Report and authorizing by-law
- Minimize flooding upstream and downstream.
- Perform work in no/low flow conditions to minimize sediment movement and erosion. Avoid work after recent precipitation or snowmelt.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.

File Number: **Copy of Notification Form Attached:** ☒

Signature of Conservation Authority Official	
Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS: ACTIVITIES FOR WHICH PERMITS MAY BE REQUIRED
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act within Regulated Wetland Limits

Bottom Only Cleanout

Description of Typical Works

Removal of accumulated sediment in a drain, including spreading of the spoil, removal of vegetation in bottom of channel and access to the site.

General Permitting Information

Certain activities have the potential to cause interference with wetlands. Therefore, it is recommended that a permit be required for these activities. However, a conservation authority can choose to request that the standard compliance requirements outlined below be followed rather than issuing a permit. Additional consultation may be necessary for works within a wetland.

Where permits are required, a conservation authority may attach conditions to the permit, but due to the municipality's duty to maintain drainage works under the Drainage Act, a CA and a municipality shall work cooperatively to maintain the drain with written permission, with or without conditions.

If a dispute occurs over a permit (e.g., over permit conditions) to maintain or repair a drainage works, parties are encouraged to refer the issue to the Drainage Issues Resolution Team before taking their dispute to a legal appeal body. This mediation team, consisting of drainage sector and conservation authority representatives, will provide an independent assessment of the best means of addressing the requirements of both statutes. If no acceptable resolution can be found, standard statutory procedures remain available.

Mitigation Measures to be undertaken should Standard Compliance Requirements be Chosen

- There should be no appreciable change in grade with the removal of sediment.
- This work, including the disposal of the sediment, should be conducted in a manner consistent with the Engineer's Report and authorizing by-law.
- Minimize flooding upstream and downstream.
- Perform work in no/low flow conditions to minimize sediment movement and erosion. Avoid work after recent precipitation or snowmelt.
- The conservation authority, drainage superintendent and property owner should agree on access to the site where not specified in the Engineer's Report.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment

(e.g. frozen or dry soil conditions or the use of load distributing machines or mats).

- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.	
File Number:	**Copy of Notification Form Attached:** ☒
Signature of Conservation Authority Official Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS: ACTIVITIES FOR WHICH PERMITS MAY BE REQUIRED

Maintenance and Repair of Municipal Drains Constructed under the Drainage Act within Regulated Wetland Limits

Bottom Cleanout Plus One Bank Slope

Description of Typical Works

Removal of accumulated sediment in a drain, including spreading of the spoil; the removal of vegetation in the bottom of the channel and removal of slope vegetation, including root removal; and access to the site.

General Permitting Information

Certain activities within regulated wetland limits have the potential to cause interference with wetlands. Therefore, it is recommended that permit be required for these activities. However, a conservation authority can choose to request that the standard compliance requirements outlined below be followed rather than issuing a permit. Additional consultation may be necessary for works within a wetland.

Where permits are required, a conservation authority may attach conditions to the permit, but due to the municipality's duty to maintain drainage works under the Drainage Act, a CA and a municipality shall work cooperatively to maintain the drain with written permission, with or without conditions.

If a dispute occurs over a permit (e.g., over permit conditions) to maintain or repair a drainage works, parties are encouraged to refer the issue to the Drainage Issues Resolution Team before taking their dispute to a legal appeal body. This mediation team, consisting of drainage sector and conservation authority representatives, will provide an independent assessment of the best means of addressing the requirements of both statutes. If no acceptable resolution can be found, standard statutory procedures remain available.

Activity-Specific Mitigation Requirements

- There should be no appreciable change in grade with the removal of sediment.
- This work, including the disposal of the sediment, should be conducted in a manner consistent with the Engineer's Report and authorizing by-law
- Minimize flooding upstream and downstream.
- Perform work in no/low flow conditions to minimize sediment movement and erosion. Avoid work after recent precipitation or snowmelt.
- The conservation authority, drainage superintendent and property owner should agree on access to the site where not specified in the Engineer's Report.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment

(e.g. frozen or dry soil conditions or the use of load distributing machines or mats).

- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.	
File Number:	**Copy of Notification Form Attached:** ☒
Signature of Conservation Authority Official Date of Approval	

STANDARD COMPLIANCE REQUIREMENTS: ACTIVITIES FOR WHICH PERMITS MAY BE REQUIRED
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act within Regulated Wetland Limits
Full Cleanout

Description of Typical Works

A full cleanout includes bottom cleanout of a drain, including spreading of the spoil; the removal of vegetation in the bottom of the channel and removal of slope vegetation, including root removal; the removal of trees and other vegetation from the top of a bank; and access to the site.

General Permitting Information

Certain activities within wetlands have the potential to cause interference with wetlands. Therefore, it is recommended that a permit be required for these activities. However, a conservation authority can choose to request that the standard requirements outlined below be followed rather than issuing a permit. Additional consultation may be necessary for works within a wetland.

Where permits are required, a conservation authority may attach conditions to the permit, but due to the municipality's duty to maintain drainage works under the Drainage Act, a CA and a municipality shall work cooperatively to maintain the drain with written permission, with or without conditions.

If a dispute occurs over a permit (e.g., over permit conditions) to maintain or repair a drainage works, parties are encouraged to refer the issue to the Drainage Issues Resolution Team before taking their dispute to a legal appeal body. This mediation team, consisting of drainage sector and conservation authority representatives, will provide an independent assessment of the best means of addressing the requirements of both statutes. If no acceptable resolution can be found, standard statutory procedures remain available.

Activity-Specific Mitigation Requirements

- There should be no appreciable change in grade with the removal of sediment.
- This work, including the disposal of the sediment, should be conducted in a manner consistent with the Engineer's Report and authorizing by-law
- Minimize flooding upstream and downstream.
- Perform work in no/low flow conditions to minimize sediment movement and erosion. Avoid work after recent precipitation or snowmelt.
- The conservation authority, drainage superintendent and property owner should agree on access to the site where not specified in the Engineer's Report.

General Mitigation Requirements

General mitigation requirements are standards that must be maintained on all drain maintenance and repair projects.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

The _____ Conservation Authority grants permission under Section 28 of the *Conservation Authorities Act* for work to be conducted in the _____ drain in accordance with the notification form, provided maintenance and repair activities comply with all standards set out above.	
File Number:	**Copy of Notification Form Attached: ☒**
Signature of Conservation Authority Official Date of Approval	

STANDARD BEST PRACTICES
Maintenance and Repair of Municipal Drains Constructed under the Drainage Act

Pipe, Junction Box or Catch Basin Maintenance and Repair

Description of Typical Works

Drainage Infrastructure	Definition	Repair Activity
Pipe	A buried conduit used to convey water beneath the land surface	• Replacing a section of collapsed or broken pipe • Removing roots or other blockages
Junction Box	A structure buried in the ground that allows the connection of various pipes at entering at different elevations.	• Periodic removal of sediment from the junction box bottom; • Repair or replacement of the junction box structure.
Catchbasin	An inlet structure that allows surface water to drain into a pipe municipal drain	• Periodic removal of sediment from the catchbasin bottom; • Repair or replacement of the catchbasin structure.

There are no regulatory impacts typically associated with Pipe, Junction Box or Catch Basin repairs and no Standard Compliance Requirement statement is required. Drainage superintendents should still follow standard mitigation principles set out below as a matter of good practice while doing these repairs.

General Mitigation Requirements

The below general mitigation requirements are standards that should be maintained as a matter of good practice during these repairs.

- Choose conditions and equipment appropriate to minimize site disturbance by equipment (e.g. frozen or dry soil conditions or the use of load distributing machines or mats).
- Place brush and debris in such a location as to limit entry into the channel.
- Perform work in appropriate flow conditions to minimize debris movement and erosion.
- Limit soil movement and erosion; use control measures if necessary before work begins.
- Except on cultivated lands, any areas of disturbed or bare soil around the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

Typically *Conservation Authorities Act* S. 28 Regulation permissions are not required for pipe, junction box or catch basin repairs.

Glossary of Terms

For the purposes of this protocol, it is important to note that where definitions are provided in the *Conservation Authorities Act* or its regulations, these definitions (e.g. "development") prevail for the implementation of *Conservation Authorities Act* Section 28 'Development, Interference with Wetlands and Alterations to Shorelines and Watercourses' regulations, even if other legislation or relevant policy documents define these terms differently.

Development[1]:

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.

Drainage Superintendent[2]: A municipal position appointed by municipal council under the authority of the *Drainage Act.* The superintendent is responsible for the inspection, maintenance, repair and overall management of municipal drains on behalf of municipal council.

Dynamic Beach Hazard[3]: areas of inherently unstable accumulations of shoreline sediments along the Great Lakes – St. Lawrence River System and large inland lakes, as identified by provincial standards, as amended from time to time. The dynamic beach hazard limit consists of the flooding hazard limit plus a dynamic beach allowance.

Erosion Hazard[4]: the loss of land, due to human or natural processes, that poses a threat to life and property. The erosion hazard limit is determined using considerations that include the 100 year erosion rate (the average annual rate of recession extended over a one hundred year time span), and an allowance for slope stability.

[1] Conservation Authorities Act (1990).
[2] Definition written by Drainage Act and (S. 28) Regulation Team.
[3] Provincial Policy Statement, 2005.
[4] Technical Guide: River and Stream Systems Erosion Hazard Limit (Understanding Natural Hazards, 2001).

Flooding Hazard[5]**:** in Ontario, either storm-centred events, flood frequency based events, or an observed event may be used to determine the extent of the flooding hazard. These events are:

a. A **storm-centred event**, either Hurricane Hazel storm (1954) or Timmins storm (1961). A storm-centred event refers to a major storm of record which is used for land use planning purposes. The rainfall actually experienced during a major storm event can be transposed over another watershed and when combined with the local conditions, flooding hazard limit can be determined. This centring concept is considered acceptable where the evidence suggests that the storm event could have potentially occurred over other watershed in the general area.

b. **100 year flood** event is a frequency based flood event that is determined through analysis of precipitation, snow melt, or a combination thereof, having a return period (or a probability of occurrence) of once every 100 years on average (or having a 1% chance of occurring or being exceeded in any given year). The 100 year flood event is the minimum acceptable standard for defining the flooding hazard limit.

c. An **observed event**, which is a flood that is greater that the storm-centred events or greater that the 100 year flood and which was actually experienced in a particular watershed, or portion thereof, for example as a result of ice jams, and which has been approved as the standard for that specific area by the Minister of Natural Resources.

Hazardous Land[6]**:** land that could be unsafe for development because of naturally occurring processes associated with flooding, erosion, dynamic beaches or unstable soil or bedrock.

Hydrologic Function[7]**:** the functions of the hydrological cycle that include the occurrence, circulation, distribution and chemical and physical properties of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere, and water's interaction with the environment including its relation to living things.

Large Inland Lakes[8]**:** water bodies that have a surface area equal to or greater than 100 square kilometres where there is no measurable or predictable response to a single runoff event.

Maintenance[9]**:** the preservation of a drainage works.

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[5] Technical Guide: River and Stream Systems Flooding Hazard Limit (Understanding Natural Hazards, 2001).
[6] Conservation Authorities Act (1990).
[7] Provincial Policy Statement, 2005.
[8] Provincial Policy Statement, 2005.

Municipal Drain[10]: A "drainage works" as defined under the *Drainage Act*. Under the *Act*, a drainage works is defined as a drain constructed by any means, including the improving of a natural watercourse, and includes works necessary to regulate the water table or water level within or on any lands or to regulate the level of the waters of a drain, reservoir, lake or pond, and includes a dam, embankment, wall, protective works or any combination thereof. To be a municipal drain, there must be a municipal by-law that adopts an engineer's report that defines the drainage system and states how the cost of the system is to be shared among property owners.

Pollution[11]**:** any deleterious physical substance or other contaminant that has the potential to be generated by development in an area to which a regulation made under clause 28 (1) (c) in the *CA Act* applies.

Repair[12]**:** the restoration of a drainage works to its original condition.

Regulated wetland limit[13]**:** The regulated wetland limit comprises wetlands and 'other areas' regulated by conservation authorities, as approved by the Minister of Natural Resources under Section 28(5) of the *CA Act*, that are related to wetlands. Though Section 28 regulations for each CA vary, for most CAs, these 'other areas' are areas where development could interfere with the hydrologic function of a wetland, including areas within 120 metres of all provincially significant wetlands and wetlands greater than 2 hectares in size, and areas within 30 metres of wetlands less than 2 hectares in size. The individual CA regulation should be consulted to determine the extent of the "other areas".

Sedimentation[14]**:** the deposition of detached soil particles.

Significant Wetland[15]**:** an area identified as provincially significant by the Ontario Ministry of Natural Resources using evaluation procedures established by the Province, as amended from time to time.

Watercourse[16]**:** an identifiable depression in the ground in which a flow of water regularly or continuously occurs.

Watershed[17]**:** an area that is drained by a river and its tributaries.

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[9] Drainage Act (1990)
[10] Definition written by Drainage Act and (S. 28) Regulation Team.
[11] Conservation Authorities Act (1990)
[12] Drainage Act (1990)
[13] Definition written by Drainage Act and (S. 28) Regulation Team.
[14] Definition written by Drainage Act and (S. 28) Regulation Team.
[15] Provincial Policy Statement, 2005.
[16] Conservation Authorities Act (1990).
[17] Conservation Authorities Act (1990)

Wetland[18]**:** 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).

[18] Conservation Authorities Act (1990)

Appendix I: Drainage Issues Resolution Team Terms of Reference

The* Drainage Act *and* Conservation Authorities Act *Protocol outlines provisions for a Drainage Issues Resolution Team in the event that the guidelines are not sufficient to resolve concerns.

Municipalities and conservation authorities from time to time may have difficulty in resolving drainage and permitting issues surrounding maintenance or repair works within municipal drains. The protocol is intended to provide a framework to resolve many issues that may arise between these two parties. When a situation between the two parties cannot be resolved, to the point where mediation is necessary, then either party may request assistance from the Ministries of Natural Resources and of Agriculture, Food and Rural Affairs to establish a Drainage Issues Resolution Team.

Common Goal:

Members of a Drainage Issues Resolution Team will recognize and respect the need and responsibility for drainage in Ontario, as provided through the *Drainage Act*, and the protection of watersheds and public safety as provided for under the *CA Act*.

It is the goal of a Drainage Issues Resolution Team to focus on practical solutions that facilitate good working relationships while meeting *Drainage Act* and *CA Act* legislative requirements. A Drainage Issues Resolution Team will mediate discussions among the parties to ensure a consistent approach and provide technical direction on resolving the issues, while considering all interests in order to achieve a balance of societal values.

Purpose of the Drainage Issues Resolution Team:

A Drainage Issues Resolution Team shall:

- Listen to the concerns presented by both parties
- Discuss alternatives and opportunities
- Provide solutions which can balance the goals of all parties

Representation:

A Drainage Issues Resolution Team will include representatives from the Drainage Superintendents Association of Ontario and/or Drainage Engineers and from conservation authorities. A list of volunteers from these groups will be created and maintained by the Ministries of Agriculture, Food and Rural Affairs and of Natural Resources. Representatives will be appointed from this list by the Ministries as needed.

Suggested representatives will include:

- Two representatives from the drainage sector
- Two representatives from conservation authorities

Process:

Where the parties have been unable to come to a solution using the Protocol and need assistance to resolve conflict:

- One or both parties may contact a designated representative from the MNR or OMAFRA. Each party must submit their concerns in writing to their respective Ministry representative.
- The Ministry representatives will then appoint representatives from a list of volunteers from each group to assist in resolving the issues.
- The group of 4 representatives will try to mediate, and may suggest or present new ideas to resolve the issues at hand.
- A brief written report outlining the details of the issue and proposed solution(s), drafted by a Drainage Issues Resolution Team, will be presented to the parties involved.
- The Team will meet within a reasonable time frame acceptable to all parties, and if a date cannot be set within a reasonable time, the initiating parties may request alternative representatives.

Meetings:

- MNR and OMAFRA will develop a list of volunteers across the province for Drainage Issues Resolution Teams. The volunteers appointed to resolve a given issue will determine meeting dates and locations as necessary for the situation. Volunteers will be responsible for any costs incurred from participation on a team (e.g., travel costs).
- Decision-making will be conducted on a consensus basis. If consensus cannot be achieved, multiple solutions may be offered.
- If no acceptable resolution can be found, standard statutory procedures remain available.

Decision Making*:*

- After all information has been collected by the two parties, and after any field investigation completed by the Drainage Issues Resolution Team, a decision from the team should be rendered within thirty days.

Appendix II: Notification

The Drain Maintenance or Repair Notification Form is available from the Drainage Superintendents Association of Ontario.

For each drain maintenance or repair project, the municipality completes a Drain Maintenance or Repair Notification form and submits it to the agencies from which permissions for the project may be required.

These agencies may include conservation authorities, Fisheries and Oceans Canada, and the Ministry of Natural Resources. The agency acknowledges receipt of the form to the municipality, and screens the work proposed.

For projects requiring permission from the CA, where a proposed maintenance or repair activity is able to meet the Standard Compliance Requirements (SCR) outlined in this document, and if the CA agrees that the work proposed meets the SCR, the CA will send a signed copy of the accompanying SCR statement to the municipality. The signed copy of the SCR statement will constitute written permission to proceed with the activity. The conservation authority and drainage superintendent will then monitor the project for adherence to the SCR.

Appendix III: Agency Roles and Responsibilities

Ministry of Natural Resources (MNR)

The Ministry of Natural Resources is responsible for natural hazard prevention and management in Ontario. The *Conservation Authorities Act* is administered by MNR through its Conservation Authorities Program in the Integration Branch and Biodiversity Branch at MNR.

Where CAs exist, they have been delegated responsibility for delivering natural hazard management programs on behalf of their participating municipalities and the province, including flood and erosion control, flood forecasting and warning, ice management, and natural hazard prevention through municipal plan input and regulating development in natural hazard areas. MNR provides the overall direction, guidance and technical standards with respect to natural hazard management.

Ministry of Agriculture, Foods and Rural Affairs (OMAFRA)

The Environmental Management Branch of the Ministry of Agriculture, Food and Rural Affairs (OMAFRA) is responsible for the administration of the *Drainage Act*, the *Tile Drainage Act* and the *Agricultural Tile Drainage Installation Act*. OMAFRA staff provide guidance, direction and training in the use of these statutes.

Municipalities

Municipalities have the legislative responsibility, under Section 74 of the *Drainage Act*, to repair and maintain municipal drains which are a critical part of the municipal infrastructure in Ontario. Municipal Councils, by by-law, may appoint a drainage superintendent to initiate, supervise and assist in the maintenance, repair and improvements of municipal drains.

Under the *Conservation Authorities Act*, the CA's Board of Directors is comprised of representatives appointed by participating municipalities in proportional numbers. According to the *CA Act*; most of these appointees are elected municipal councilors. The provincial programs undertaken by conservation authorities in natural hazard prevention and management under the *CA Act* are jointly funded by the province and participating municipalities. The participating municipalities may also direct and fund conservation authorities in additional programs of local resource management interest such as stewardship.

Municipalities therefore have responsibilities connected with both the *Drainage Act* and the *Conservation Authorities Act*.

Conservation Authorities

Through the *Conservation Authorities Act*, 36 conservation authorities have been established in Ontario. Conservation authorities are local resource management agencies organized on a watershed basis that deliver programs for municipalities and the province.

Under the *Conservation Authorities Act* Section 28 "Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses" Regulations, CAs regulate development and other activities within their jurisdictions in natural hazard areas (river and stream valleys, Great Lakes and large inland lake shorelines, hazardous lands, watercourses and wetlands). Permission from the CA is required for changing or interfering in any way with the existing channel of a watercourse, or for changing or interfering in any way with a wetland. Permission may be denied, granted, or granted with conditions.

Appendix IV: Relevant Legislation

1. The *Drainage Act*

2. The *Conservation Authorities Act*

Drainage Act

The *Drainage Act* defines a process whereby property owners can petition their local municipality to develop communal solutions to solve drainage problems. On several occasions, the *Act* has been reviewed and refined to the point that the procedure now provides affected property owners with numerous opportunities to express their needs, desires, concerns and opinions in the development of a proposed drainage project.

The *Drainage Act* is primarily used in rural Ontario but is occasionally used to resolve drainage issues in urban areas. It has also been used to develop a legal outlet for storm and surface water generated from urban areas. Regardless of where the *Drainage Act* is used, the end result of using the procedures in the *Act* is the construction of a “municipal drain”. Municipal drains are communal drainage systems that are designed to accommodate water flowing from the properties located within the watershed. They are as vital to rural Ontario as storm sewers are to urban areas.

<u>New Drain Construction (Section 4)</u>

The *Drainage Act* provides a procedure that allows landowners to petition their local municipality to construct a "drainage works" to resolve their drainage problems. The *Act* defines “drainage works” as:

> *a drain constructed by any means, including the improving of a natural watercourse, and includes works necessary to regulate the water table or water level within or on any lands or to regulate the level of the waters of a drain, reservoir, lake or pond, and includes a dam, embankment, wall, protective works or any combination thereof*

Physically, a municipal drain is simply a drainage system. Most municipal drains are either ditches or closed systems such as pipes or tiles buried in the ground. They can also include structures such as dykes or berms, pumping stations, buffer strips, grassed waterways, storm water management ponds, water control structures, culverts and bridges. Even some creeks and small rivers are now considered to be municipal drains. To minimize negative impacts, sometimes a right of way along a watercourse or through a wetland is identified as a municipal drain strictly for the purpose of removing beaver dams and other obstructions without the need for channelization work.

When a petition for drainage is filed at the municipal office, the municipality must notify the conservation authority or, where there is no conservation authority, the District office of the Ministry of Natural Resources, who have an opportunity to comment on the proposed project and to request an environmental appraisal. Thirty days after the notice has been sent out, the municipality retains an engineer. The engineer holds an "on-site meeting" with the affected landowners, agencies and other interested parties invited. One of the purposes of this meeting is to determine what the landowners want to achieve with this drainage system and to also determine the various factors that could influence the design of the system. Some examples of the factors that influence drain design is the presence of buried public utilities, poor soil conditions, the need for an outlet for tile drainage, current land use, possible future land use changes, the presence of fish habitat, or compliance with other applicable laws.

The municipal council can instruct the appointed engineer to prepare a preliminary report. This process allows the engineer to explore different options (e.g. form of drain or drain routes) that could be used to address the problem and the associated costs. After a meeting to consider this preliminary report, a preferred alternative is selected and the engineer is instructed to prepare the final report.

The engineer will then perform the detailed survey and site examination of the area and develop plans, profiles and specifications for the proposed drain design. Since most drains are located primarily on private land, the engineer also develops recommended "allowances" to be paid to affected landowners for land lost or damages that will occur during the construction of the drainage system and this becomes part of the cost of the drain. Since a key element of every *Drainage Act* project is cost recovery, the engineer will also include "assessment schedules" in the report that assesses a share of the cost to all the landowners in the watershed of the drain. Finally, the engineer must also ensure that the proposed project complies with all applicable law.

Once the report is prepared, the engineer sends it to the municipal council who invites all the landowners, agencies and other affected parties to a "meeting to consider the report" where they can express concerns about the proposed project. After this meeting, council can either refer the report back to the engineer for modifications or they can proceed to the next step in the process by adopting the engineer's report by provisional by-law.

At this stage, landowners, agencies and other affected parties have the right to appeal the engineer's report to three different appeal bodies:

1) The Court of Revision is a municipally appointed appeal body. Property owners who feel they are assessed unfairly for the cost of the project can appeal their assessment to this appeal body. Hearings are held locally.

2) The Drainage Tribunal is a provincially appointed appeal body that hears appeals from property owners, agencies and other affected parties on technical issues about the proposed project. They can also hear appeals from the decision of the Court of Revision. Hearings are held locally.
3) The Drainage Referee is a provincially appointed appeal body that hears appeals on the legality of a project or the procedural application of the *Drainage Act*. Hearings are held in the local courthouse.

After all appeals have been dealt with, the council gives final passage of the by-law adopting the engineer's report, thereby authorizing construction of the drainage system. After the drain is constructed, the total cost of the project is determined and the costs are prorated to the property owners in the watershed of the drain in proportion with the amounts in the assessment schedule in the engineer's report.

In summary, a municipal drain:

1) Is a community project — through the public process with numerous meetings and various appeal rights, landowners, agencies and other affected parties have the right to question, comment on and challenge virtually every aspect of the proposed project.
2) Has legal status — the communally accepted standards for the project are contained in the engineer's report and are adopted by municipal by-law. This by-law gives the municipality the authority to enter onto land to construct the drain and levy the cost of the project to the landowners.
3) Is municipal infrastructure — once a municipal drain has been constructed under the authority of a by-law, it becomes part of that municipality's infrastructure. The local municipality is responsible for repairing and maintaining the municipal drain in accordance with the engineer's report. In certain circumstances, the municipality can be held liable for damages for not maintaining these drains.

Improvement of Existing Drains (Section 78)

A municipality can only manage a drain to the standard of the current engineer's report. Sometimes, because of changes in agricultural practices, land use, or the need for environmental enhancements, the existing drain standard is no longer suitable. When this occurs, new communally accepted standards need to be developed for the drain. Therefore, the local municipality appoints an engineer to prepare a new report for the improvement of the drain. No petition is required, but many municipalities ask a landowner to submit a written request for the work. Once an engineer has been appointed, similar procedures are followed as for a new drain.

This ability to make improvements to a drain is essential, not only from a water-carrying perspective, but also to allow environmental enhancements to be included in the drain that were never considered when the drain was initially

constructed. For example, "Wetland Drain Restoration Projects" would be authorized through the improvement section of the *Drainage Act*.

Maintenance and Repair of Existing Drains (Section 74)

The *Drainage Act* clearly assigns the responsibility for the maintenance and repair of municipal drains to the **local municipality**. The cost of performing this work is levied to the upstream landowners in the watershed of the drain. If the municipality does not perform these responsibilities, it can be held liable for damages that occur to landowners along the drain. A municipal council therefore maintains drains as part of its regular infrastructure maintenance, but also has a responsibility to act when it receives a request for maintenance or repair from a landowner affected by the condition of a municipal drain.

The activities of maintenance and repair are both performed on behalf of council by their appointed drainage superintendent. Once appointed by by-law, the drainage superintendent has the authority to enter onto land to perform these duties. The cost of maintenance and repair work is assessed to the upstream landowners in the watershed of the drain in accordance with the current accepted assessment schedule. For these reasons, it is common to combine both activities into the single term of 'maintenance'.

The terms "maintenance" and "repair" are often used interchangeably, but the difference is notable. Section 1 of the *Drainage Act* states that:

- Maintenance means the preservation of a drainage works;
- Repair means the restoration of a drainage works to its original condition.

This means that repairs must be done in accordance with the communally accepted standards for that drain as detailed in the plans, profiles and specifications in the engineer's report. Since repair involves the restoration of a drainage works to its original condition, the superintendent should have the plans, profiles and specifications of that drain in order to ascertain what the original condition actually was. Therefore, sediment removal from an open ditch municipal drain, repair or replacement of a tile municipal drain, repair or replacement of a culvert or bridge and many more activities are all considered as repairs. However, deepening or widening a drain beyond its original design or relocating a drain are not repair activities. If a municipality undertook these types of activities without developing new communal standards (new engineer's report), the assessed landowners would be able to legally challenge the municipality's actions.

However, maintenance is not bound by the plans, profiles, and specifications in the engineer's report, provided the work is for the "preservation" or "well-being" of that drain. Therefore, maintenance quite clearly includes activities such as the removal of brush, controlling vegetation growth and seeding disturbed bank slopes. Maintenance would also include the video inspection of a tile municipal

drain. The removal of beavers from a municipal drain, performed in compliance with the *Fish and Wildlife Conservation Act*, would also be considered maintenance. Finally, maintenance would also include the installation of silt fences and sediment traps to avoid sediment being deposited in lower reaches of a municipal drain.

In summary, a municipality has no authority to undertake repair work on a municipal drain that deviates from the communally accepted standards for the drain as defined in the engineer's report. Maintenance activities that reduce the need for future repair work can be undertaken.

Enforcement

Once a drainage system has been constructed under the *Drainage Act*, the municipality has a responsibility to manage the system on behalf of the community of landowners in the watershed of the drain. If someone has blocked a municipal drain, the *Drainage Act* provides the municipality the authority to order the removal of that blockage and, if the work is not completed within the time allowed, to remove the blockage and place the costs on the tax roll of the property owner. The *Act* also provides the municipality with the right to take legal action against anyone who damages a municipal drain.

There are also broad enforcement powers granted to the Drainage Referee, the legal appeal body under the *Drainage Act*. The Referee has the authority to determine claims and disputes, including claims for damages. The Referee also has the authority to hear applications for orders to do or to restrain activities under the *Drainage Act.*

The Drainage Superintendent (Section 93)

The drainage superintendent, employed by the municipality, has a central function in *Drainage Act* activities. The superintendent is essentially the local "municipal drain manager" whose responsibilities include inspecting drains, maintaining drains, and liaising with landowners, council, contractors, environmental approval agencies, etc. The cost of employing the drainage superintendent is charged to the general funds of the municipality.

Conservation Authorities Act

The *Conservation Authorities Act* is administered by the MNR and provides for municipalities within a common watershed to enter into partnership with the Province to establish a conservation authority for local resource management work. There are currently 36 CAs in Ontario. The objects of a CA under the *Conservation Authorities Act* are to establish and undertake, in the area over

which it has jurisdiction, a program designed to further the conservation, restoration, development and management of natural resources other than gas, oil, coal and minerals.

The *Conservation Authorities Act* was created in 1946 in response to erosion and drought concerns, recognizing that these and other natural resource initiatives are best managed on a watershed basis. In 1956, in response to the severe economic and human losses associated with Hurricane Hazel (1954), amendments to the *Conservation Authorities Act* first empowered conservation authorities to make regulations to prohibit filling in floodplains. These regulations were broadened in 1960 to prohibit or regulate the placing or dumping of fill in defined areas where, in the opinion of the conservation authority, the control of flooding, pollution or the conservation of land may be affected. In 1968, amendments to the *Conservation Authorities Act* further extended the regulations to prohibit or control construction and alteration to waterways, in addition to filling.

In 1998, the *Conservation Authorities Act* was amended to ensure that regulations under the *Act* were consistent across the province and complementary to provincial policies. Significant revisions were made to Section 28, which led to the replacement of the previous "Fill, Construction and Alteration to Waterways" Regulation with the current individual *Conservation Authorities Act* S. 28 "Development, Interference with Wetlands and Alterations to Shorelines and Watercourses" Regulations. These individual *Conservation Authorities Act* S. 28 regulations were approved by the Minister of Natural Resources in 2006, and are consistent with Ontario Regulation 97/04, which outlines the content that the individual regulations should contain. Through these regulations conservation authorities regulate development and activities in or adjacent to river or stream valleys, Great Lakes and large inland lakes shorelines, watercourses, hazardous lands and wetlands.[19] It should be noted that it is not necessary to map a feature before it can be regulated. While individual *Conservation Authorities Act* S. 28 regulations refer to maps, which approximate regulation limits (and may be subject to revision), the text of the regulation prevails. The provincially approved *Guidelines for Developing Schedules of Regulated Areas* (2005) identify the requirements for the preparation of maps and/or revisions to existing maps. Detailed studies requested at the time of an application may further refine or delineate the regulated features based on these guidelines (e.g. hazardous lands).

To receive permission for development under the *Conservation Authorities Act*, it must be demonstrated in an application to the satisfaction of the CA that the control of flooding, erosion, pollution, dynamic beaches or the conservation of land will not be affected. The control of dynamic beaches is generally applicable to the Great Lakes shorelines and large inland lakes regulated areas.

[19] Link to *CA Act*; Link to O.Reg 97/04

To support permit applications, the submission of technical studies may be necessary. These technical studies must be carried out by a qualified professional with recognized expertise in the appropriate discipline and must be prepared using established procedures and recognized methodologies to the satisfaction of the conservation authority. These established procedures should be in keeping with MNR's Technical Guides for Natural Hazards (MNR, 2002a; MNR, 2002b; MNR, 1996a; MNR, 1996b; and MNR 1996c), other Provincial guidelines and/or guidelines approved by the Conservation Authority Board. Expertise for reviewing technical studies varies among conservation authorities. Where expertise within the conservation authorities is not available, the authority may request that the study be peer-reviewed by a qualified professional at the expense of the applicant. In conjunction with MNR approved policy and guidelines such as the Natural Hazard Technical Guides, CA board-approved policies provide a decision making framework for the review of applications under the *Conservation Authorities Act* S. 28 individual regulations. CA Board-approved policies shall ensure a consistent, timely and fair approach to the review of applications, staff recommendations and Board decisions.

CAs issue permissions in writing. A CA may issue a permit, issue a permit with conditions, or refuse a permit. Should a proponent violate a permission, including conditions on a permit, or undertake works without a permission, the CA may issue a notice of violation and if necessary enter into legal proceedings.

For an application to be refused or where the applicant objects to the conditions of approval, the *Conservation Authorities Act* requires that the applicant be given the opportunity to a hearing by the Conservation Authority Board or Executive Committee (sitting as a Hearing Board). The provincially approved Section 28 (3) Hearing Guidelines (2005) provides a step-by-step process for conducting hearings required under Section 28 (12), (13), (14) of the *Conservation Authorities Act.* Conservation authorities should conduct a hearing under their individual Regulation in a manner consistent with these guidelines. The Hearing Board is empowered by law to make a decision, governed by the *Statutory Powers Procedures Act*. It is the purpose of the Hearing Board to evaluate the information presented at the hearing by both the authority staff and the applicant and to decide whether the application will be approved with or without conditions or refused. Should a municipality violate the permit, including conditions on a permit, the CA may issue a notice of violation and if necessary enter into legal proceedings.

An applicant who has been refused permission or objects to conditions imposed on a permission may, within 30 days of receiving the written notice of the hearing decision, appeal to the Minister of Natural Resources, who may refuse the permission or grant permission, with or without conditions. The Mining and Lands Commissioner has been assigned the authority, duties and powers of the Minister of Natural Resources by regulation under the *Ministry of Natural Resources Act* to hear appeals from the permit decisions of conservation authorities made under the *Conservation Authorities Act.* The Commissioner's

decision is final and binding. There are no further appeal procedures with the exception of a "judicial review" based on a decision where there is a perceived "error in law."

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