
APPENDIX A

CRITERIA AND IMPLEMENTATION PROCEDURES FOR VALLEY AND STREAM CORRIDOR REGENERATION AND REMEDIAL WORKS PROJECTS

5.0 POLICIES AND CRITERIA FOR MTRCA VALLEY AND STREAM CORRIDOR REGENERATION PROJECTS

The Authority's goal, principles, and objectives for protection of life and property and the rehabilitation of valley and stream corridors can also be achieved through active remedial works and resource management projects. Projects to reduce and eliminate existing flood, erosion and slope stability hazards and to rehabilitate valley and stream corridors are undertaken by the Authority on private and public lands, as well as Authority owned lands.

The Authority's remedial works shall be designed using a Corridor Reach Planning approach (Section 6.3). They will be planned and implemented in accordance with the requirements of the Environmental Assessment Act and addressed in the "Class Environmental Assessment for Remedial Flood and Erosion Control Projects" as required, and will require site screening and investigations consistent with requirements of the Ontario Heritage Act and other provincial and federal legislation. The Authority will promote active partnerships in implementing its projects.

Valley and stream corridor regeneration projects are also carried out by others. The Authority will encourage these projects to be designed and implemented in accordance with the Valley and Stream Corridor Management Program.

Many of the local municipalities and a number of other agencies own and maintain water control structures and will be encouraged by the Authority to carry out regular maintenance in accordance with the goals and principles of the Valley and Stream Corridor Management Program. Where municipalities or other agencies are considering major maintenance, the Authority will request that they carry out a corridor management plan.

The policies and criteria for MTRCA valley and stream corridor regeneration projects are presented within the context of:

- Flood Control Remedial Works;
- Erosion Control and Slope Stability Remedial Works;
- Maintenance and Operation of Authority owned Flood and Erosion Control Structures;
- Corridor Rehabilitation Projects.

5.1 FLOOD CONTROL REMEDIAL WORKS

These projects deal with the reduction or elimination of risk to life and property through the construction of remedial works. An extensive inventory of flood susceptible areas on those sections of watercourses in the Authority's jurisdiction which drain 1,300 ha and greater, where mapping exists, has been developed. Many of the sites inventoried consist of a single affected structure or group of structures affected by flooding. In other cases, substantial development is affected by flooding and may be considered under the Two Zone Approach and/or Special Policy Area policies of the Provincial Flood Plain Planning Policy Statement.

5.1 FLOOD CONTROL REMEDIAL WORKS (Cont'd)

5.1.1 Design Criteria

In general, there are three tools available for flood protection, which may be used singly or in combination:

- Acquisition;
- Remedial works; and
- Flood warning and forecasting.

In view of the number of sites requiring flood protection throughout the Metropolitan Toronto Region and in order to fairly assess which sites should be considered for work in a given year, the Authority carries out remedial works on a priority basis. Priorities are based on an evaluation of potential risk to life and property.

In evaluating and assigning priorities for flood control protective measures the following factors are considered:

- Reduction in the average annual risk exposure;
- Warning time available;
- Flood frequency, depth and velocity;
- Land use; and
- Benefit/cost.

Flood control remedial works are designed to provide protection that will reduce the risk of flooding to less than 50% over the assumed life (100 years) of the affected structure(s). Protection to a higher level will be provided if economically and/or socially justified. Where appropriate or feasible, the design will improve or enhance the aquatic and terrestrial habitats, through natural channel designs, and other means. The level of flood protection may be reduced in consideration of environmental concerns. Works will be carried out in accordance with the Environmental Assessment Act and addressed in the Class Environmental Assessment for Remedial Flood and Erosion Control Projects.

The principal funding sources for remedial works will be grants from the Province of Ontario and levies from the designated benefiting municipalities. The levy is assigned to the regional municipality where the works are located except where significant downstream benefits are involved.

5.1.1 Design Criteria

The design criteria governing flood control remedial works are as follows:

- A) Works should be undertaken based on a Corridor Management Plan. These corridors shall be of a size to be environmentally responsible, and technically and economically feasible.
- B) Flood protection will be implemented on a priority basis related to public safety and property damage within the limitations of funding, approvals, access and property requirements. Priorities shall generally be based on the technical criteria described above.
- C) Where flood control remedial works are proposed on private lands, title to the land or an easement, where applicable, will be required.

- 5.1 FLOOD CONTROL REMEDIAL WORKS
 - 5.1.1 Design Criteria (Cont'd)
 - 5.2 EROSION CONTROL & SLOPE STABILITY REMEDIAL WORKS
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- D) Flood control remedial works will be analyzed on the basis of financial and environmental cost/benefit and acquisition will be considered as a viable alternative to remedial works where the proposed works exceed the value of the property or would not be compatible with this Program.

5.2 EROSION CONTROL AND SLOPE STABILITY REMEDIAL WORKS

The Authority currently maintains information on active erosion/slope instability sites on those watercourses draining generally in excess of 1,300 hectares.

The implementation of this program component relies on the continued monitoring and updating of the data base in order to keep abreast of changing site conditions. Because erosion and slope instability is dynamic, priorities must be continually updated not only to make the system equitable, but also to adjust annual funding requirements.

In evaluating and assigning priorities for erosion control/slope remediation works, two major factors are considered: risk to structure(s) and cause of erosion/slope instability hazard. The potential risk to existing structures is deemed the most important factor and accordingly is given more weight than the physical and geological condition associated with the cause of the hazard. Valley wall factors considered include the height, slope angle, vegetative cover, groundwater characteristics and the soil type and composition. River or river action, as a factor of risk, considers the present river alignment as well as the potential cutting action.

In all cases, the design of erosion control works will provide protection compatible with the Authority's Design Criteria and will improve or enhance the aquatic and terrestrial habitats through natural channel designs and other means to the extent possible. In the case of in-stream work, the natural pool/riffle systems will either be maintained or recreated. The deep channels which often occur on the outside bend will be simulated and, by creative positioning of the stone protection, shading and opportunities for riparian plantings will be provided. Riparian and slope plantings will generally consist of native plant material.

Works will be carried out in accordance with the Environmental Assessment Act as addressed by the Class Environmental Assessment for Remedial Flood and Erosion Control Projects.

The principal funding sources for the remedial works will be grant from the Province of Ontario and levies from the designated benefiting regional municipality. The regional municipality may, however, choose to pass on their share to the local municipality and the Authority will provide the necessary information should this occur. As a result, an erosion inventory and priority list has been developed and will be maintained for each of the regional municipalities.

5.2.1 Design Criteria

The design criteria governing erosion control and slope stability remedial works are as follows:

- A) Remedial works will be carried out on those watercourses which generally drain in excess of 1,300 hectares.
- B) Works should be undertaken based on a Corridor Management Plan. Corridor lengths shall be of a size to be technically and economically feasible and environmentally responsible.
- C) Works will be implemented on a priority basis related to the safety of property and structures within the limitations of funding, approvals, construction, access and property acquisitions. Priorities shall be based on technical criteria including, but not necessarily limited to the following:
 - i) distance from top of bank to structure
 - ii) rate of slope retreat
 - iii) extent of ground water seepage
 - iv) height and steepness of slope
 - v) evidence of previous movement
 - vi) condition of toe or slope
 - vii) existing habitat resources.
- D) Priorities for protection will be reviewed and approved by the Authority on an annual basis.
- E) Where erosion protection works are proposed on private land, the Authority shall require title to the land or an easement where applicable and/or require a suitable financial contribution from the benefiting owner(s).
- F) Erosion protection works will be analyzed on the basis of financial and environmental cost/benefit. Acquisition will be considered as a viable alternative to remedial works where the proposed works exceed the value of the property or are not in compliance with this Program.
- G) Design criteria for erosion protection works on the designated watercourses are dependent upon the nature of each specific problem. Generally, two types of problems exist. The first and less common type, involves bank or valley wall instability in which slumping or major rotational failure is involved due to inherent soil conditions or overloading of the slope. The more common type of problem is river bank erosion which can also be coincident with the valley wall. Wherever possible, erosion control work shall be designed to:
 - 1) accommodate the 100 year flood for coincident (slope/river) erosion protection;
 - 2) accommodate the low flow channel in all other cases as a minimum;

**POLICIES & CRITERIA FOR MTRCA VALLEY & STREAM CORRIDOR
REGENERATION PROJECTS**

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5.2 EROSION CONTROL & SLOPE STABILITY REMEDIAL WORKS

5.2.1 Design Criteria (Cont'd)

5.3 MAINTENANCE & OPERATION OF AUTHORITY OWNED FLOOD &
EROSION/SLOPE STABILITY CONTROL STRUCTURES

- 3) permit channel overtopping with minimal danger to the remedial work;
 - 4) decrease the velocity of the stream by flattening the hydraulic gradient and minimizing the flow energy by incorporating meanders and natural channel design;
 - 5) enhance aquatic habitat by incorporating natural channel design such as pool and riffle features, deep channels and overhangs on outside bends;
 - 6) enhance terrestrial habitat through the planting and establishment of riparian habitat (10m from river edge) and through the introduction of native plants on the valley slopes and other flood plain lands;
 - 7) minimize potential aggravation of upstream or downstream flooding and/or erosion;
 - 8) a non-structural approach to remedial works will be utilized wherever possible, in particular, with upper and middle valley slopes.
- H) In the design of all protection works, the Authority shall be cognizant of the natural features, functions and resources and will, where appropriate, enhance the aquatic and terrestrial habitats.

5.3 MAINTENANCE AND OPERATION OF AUTHORITY OWNED FLOOD AND EROSION/SLOPE STABILITY CONTROL STRUCTURES

Maintenance and operation of Authority owned flood and erosion control slope stability structures will be carried out in accordance with the goal and principles outlined in the Valley and Stream Corridor Management Program. Maintenance and operation programs will be used to provide opportunities to regenerate/rehabilitate the valley and stream corridors.

Authority owned structures vary greatly in age, condition, level of engineering and level of maintenance required.

Generally, maintenance on Authority owned water control structures has been minimized. In a number of cases, for example where flow conveyance is not a critical factor or the channel lining is not affected and the community interests are still being addressed, maintenance has been completely eliminated and the channel reaches have been allowed to renaturalize. However, maintenance also provides opportunities to regenerate or rehabilitate the valley and stream corridors.

Maintenance and operations can be divided into two categories: regular/preventative maintenance and major maintenance.

- 5.3 MAINTENANCE & OPERATION OF AUTHORITY OWNED FLOOD &
EROSION/SLOPE STABILITY CONTROL STRUCTURES (Cont'd)
 - 5.4 CORRIDOR REHABILITATION PROJECTS
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Regular/preventative maintenance can be defined as those activities which are scheduled and/or are routine in nature, generally associated with appearance, upkeep, ensuring continued performance, preventing the deterioration of the super structure, and revegetation. The level and type of regular maintenance and opportunities for regeneration vary greatly from structure to structure, and may be better defined and modified through corridor management plans. The types of activities carried out through regular maintenance are listed, but not limited to the following:

- inspections
- debris removal
- clean out of channels (eg. sediment, vegetation)
- graffiti removal
- minor repairs to channel linings (eg. repairs to gabion basket cells, replacing displaced rip rap stone)
- plantings (eg. riparian and valley slope).

Major maintenance tends to be either unanticipated in nature (ie: maintenance required as a result of a major storm) or although anticipated over the long term, is not carried out frequently and requires funding beyond current operational budget levels. Major maintenance provides an opportunity to incorporate natural channel design principles into the repairs. This is particularly true with older structures, which typically were designed to address only the public safety aspects related to flooding and erosion and slope stability. Major maintenance may involve replacement of an entire structure; however, more often it involves repairs to a section or component and environmental gains may be achieved through the application of natural design principles.

The design of major maintenance should be carried out in the context of a corridor management plan which incorporates the following natural design principles and must be assessed with respect to the flood, erosion and/or slope stability public safety objectives and community issues:

- 1) Maintain and/or re-establish a functional corridor through linkages (terrestrial).
- 2) Maintain and/or re-establish a riparian zone.
- 3) Increase instream diversity and habitat.
- 4) Removal or modification of fish barriers (eg. weirs, drops and small dams).
- 5) Establish the ecological watercourse relationship with the flood plain.

5.4 CORRIDOR REHABILITATION PROJECTS

The Authority will carry out a broad range of projects to assist in the rehabilitation of valley and stream corridors and to achieve objectives specified in Section 2.2 of this document. To accomplish this, the Authority prefers to undertake corridor rehabilitation projects that are part of more comprehensive plans. This will ensure that ecological needs and opportunities are integrated with the needs of the public and other social and economic issues.

5.4 CORRIDOR REHABILITATION PROJECTS (Cont'd)

Corridor rehabilitation projects may be based on Subwatershed or Corridor Management Plans. Projects may also be based on resource management plans prepared for properties owned and directly managed by the Authority. In the absence of a comprehensive plan, the Authority may still implement individual small scale projects where an immediate need is identified. In these cases, preplanning will be undertaken including site inventory (upstream and downstream), evaluation of options and consultation.

To give effect to the Valley and Stream Corridor Management Program, the Authority will carry out projects associated with, but not necessarily limited to, the following activities:

A) Environmental Planning Services

The purpose of environmental planning services is to assist in short and long term resource planning activities to ensure effective and efficient management practices are implemented.

To accomplish this, the Authority will continue to emphasize its role and interest in watershed and community-based resource planning activities. For example, MTRCA will coordinate staff and consultants, and liaise with other agencies and groups in the development and implementation of watershed strategies. Similarly, the Authority will promote, assist and undertake, when appropriate, the development and implementation of Subwatershed Plans and Corridor Plans.

Environmental policies and guidelines will be developed by MTRCA to assist staff and other landowners, groups and agencies in planning and implementing regeneration projects.

Planning and development applications will be reviewed and recommendations provided to ensure environmental features or conditions are recognized and proper protection, enhancement or rehabilitation measures are undertaken.

The Authority will provide assistance and advisory services to individual private landowners and non-government agencies involved in valley and stream corridors/regenerating projects.

Partnerships, education and public consultation will be encouraged in all planning and implementation activities.

B) Environmental Management Projects

The Authority will collaborate with the Ministry of Natural Resources, other agencies, groups and individuals to protect, enhance or rehabilitate habitats. Historic conditions, habitat potential and social/economic constraints will be considered in order to establish targets to achieve the highest sustainable conditions.

1) **Terrestrial Regeneration**

For terrestrial flora and fauna, appropriate management techniques will be used to:

- i) reduce off-stream erosion and sedimentation;

5.4 CORRIDOR REHABILITATION PROJECTS (Cont'd)

- ii) maintain diverse natural vegetation communities including grasslands, wetlands, woodlots, and other forested areas;
- iii) expand vegetative cover;
- iv) establish vegetation linkages to provide wildlife habitat and migration corridors;
- v) maximize the establishment of native plant species;
- vi) manage forests consistent with sound environmental practices to ensure healthy and vigorous sustainable growth;
- vii) reduce the loss of natural communities through the control of invasive, non-native species;
- viii) protect or actively manage Significant Areas as required;
- ix) manage wildlife populations to ensure their presence is compatible with other land uses.

2) **Aquatic Regeneration**

For aquatic flora and fauna, appropriate management techniques will be used to:

- i) reduce on-stream erosion and sedimentation;
- ii) improve water quality by eliminating or reducing sources of bacterial, nutrient and other kinds of pollutants;
- iii) establish and manage diverse riparian habitat;
- iv) link fragmented riparian habitat corridors;
- v) improve aesthetic qualities;
- vi) control public access within riparian zones;
- vii) renaturalize artificial stream channels using proper morphology, geometry and other physical characteristics;
- viii) alter or remove on-stream barriers to facilitate fish migration and reduce water temperatures;
- ix) protect or actively manage Significant Areas to increase the number, distribution or size of the significant populations or habitat;

5.4 CORRIDOR REHABILITATION PROJECTS (Cont'd)

- x) protect and enhance base flows;
- xi) improve instream cover for aquatic life.

3) **Operational Criteria**

The operational criteria governing for projects are as follows:

- i) projects may be carried out on private, public and Authority owned land within any valley or stream corridor;
- ii) for MTRCA properties that are managed by other agencies, the Authority will enter into formal agreements to plan and implement projects on their behalf. This includes the Authority carrying out Corridor Management Plans for its member municipalities on a cost recovery basis;
- iii) regeneration projects will be based on Corridor Management Plans where they exist;
- iv) in the absence of Subwatershed or Corridor Management Plans, the Authority will carry out small individual projects where net environmental gain and social benefits will result.

Preplanning for each project will include an environmental inventory and evaluation of sufficient study area (including upstream and downstream of the project site) to place the specific project within the extent of the surrounding ecosystem, yet remain economically feasible. Each preplanning document will be based on technical detail including, but not necessarily limited to the following:

- location description with maps and reference points;
 - vegetation communities: species, condition and significance;
 - wildlife communities: species and significance;
 - aquatic communities: physical, chemical and biological characteristics;
 - cultural resources;
 - project recommendations including access, remedial work and constraints;
 - contacts and approval received;
- v) projects will be initiated on a priority basis. Factors determining priority may include the following:
- type and scope of problem(s);
 - watershed and location of project within the watershed;
 - existence of Subwatershed and Corridor Management Plans;
 - partnerships with private landowners, non-government organizations and government agencies;

5.4 CORRIDOR REHABILITATION PROJECTS (Cont'd)

- funding sources;
 - approvals including landowners and other agencies;
 - cost/benefit factors;
 - construction timing guidelines;
- vi) regeneration projects will be reviewed and approved by technical staff, senior management, full Authority and Executive Committee as required;
- vii) where regeneration projects are carried out on private and municipally owned land, the Authority may require a pre-determined financial contribution by the owner(s).
- viii) projects will be monitored during implementation to ensure all procedures, terms and conditions of any approval are adhered to. When applicable, post construction monitoring and evaluation will be conducted;
- ix) consultation with individual landowners, the general public, organizations and other agencies will be undertaken as required prior to implementing projects. The need and level of consultation will be determined by Authority staff based on the type, size, location, legislative requirements and potential impacts of the projects.