

# Technical Bulletin

## ALTERATIONS, IMPROVEMENTS AND REPAIRS TO EXISTING DAMS



**Ministry of Natural Resources and Forestry  
2016**

The Lakes and Rivers Improvement Act (LRIA) provides the Minister of Natural Resources and Forestry with the legislative authority to govern the design, construction, operation, maintenance and safety of dams in Ontario. The Lakes and Rivers Improvement Act Administrative Guide and supporting technical bulletins have been prepared to provide direction to Ministry of Natural Resources and Forestry staff responsible for application review and approval and guidance to applicants who are seeking approval under Section 14, 16 and 17.2 of the LRIA. All technical bulletins in this series must be read in conjunction with the overarching Lakes and Rivers Improvement Act Administrative Guide (2011).

Cette publication hautement spécialisée Lakes and Rivers Improvement Act Alterations, Improvements and Repairs to Existing Dams Technical Bulletin n'est disponible qu'en anglais conformément au Règlement 671/92, selon lequel il n'est pas obligatoire de la traduire en vertu de la Loi sur les services en français. Pour obtenir des renseignements en français, veuillez communiquer avec le ministère des Richesses naturelles et des Forêts au 1-800-667-1940.

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## **1.0 Introduction**

### **1.1 Purpose**

This Technical Bulletin provides direction on the administration of Section 16 of the Lakes and Rivers Improvement Act (LRIA) for existing dams, including the control structure and other structures and equipment on the dam site, and any temporary dams for the purpose of controlling water during construction. This Technical Bulletin also provides examples of common alteration, improvement and repair work which do not require LRIA Section 16 approval.

This Technical Bulletin does not apply to other works subject to LRIA approval such as: water crossings; channelizations; enclosures; pipelines; and cables.

### **1.2 LRIA Section 16 – Alterations, Improvements and Repairs**

The Ministry of Natural Resources and Forestry has responsibility for the administration of the LRIA. LRIA Section 16 states that no person shall alter, improve or repair any part of a dam in the circumstances prescribed by the regulations, unless the plans and specifications for whatever is to be done have been approved.

Under Section 2(1)(b) of Ontario Regulation 454/96, Ministry approval is required to make alterations, improvements or repairs to a dam that holds back water in a river, lake, pond or stream to raise the water level, create a reservoir to control flooding or divert the flow of water, if the alterations, improvements or repairs may affect the dam's safety, structural integrity, the waters or natural resources. In addition, Section 2(2) of Ontario Regulation 454/96 specifies that LRIA Section 16 approval is required before a person operates a dam in a manner different from that contemplated by previously approved plans and specifications.

The LRIA Administrative Guide (MNR 2011) provides an overview of the LRIA, its application and the process for seeking approval. This Bulletin must be read in conjunction with the LRIA Administrative Guide. Where there is an overlap in policy requirements between the LRIA Administrative Guide and this Bulletin, the provisions of this Bulletin shall prevail.

### **1.3 Aboriginal and Treaty Rights**

The Ministry respects the existing Aboriginal and treaty rights recognized and affirmed by Section 35 of the Constitution Act, 1982 and is committed to meeting its constitutional and other legal obligations in respect of these rights, including the Crown's duty to consult and, where appropriate, accommodate. The duty to consult is triggered when the Crown has knowledge, real or constructive, of the

existence or potential existence of an Aboriginal or treaty right and contemplates conduct that might adversely affect that right.

Approvals under the LRIA may trigger the Crown's duty to consult, and in some situations, the Crown may delegate procedural aspects of its duty to consult to LRIA applicants. Proponents are encouraged to work closely with the Ministry when seeking LRIA approvals.

## 2.0 Works Requiring Approval

### 2.1 Works Subject to Section 16 Approval

The purposes of the LRIA will be a relevant factor in determining whether a proposed work is subject to LRIA Section 16 approval. Works subject to Section 16 approval include alterations, improvements or repairs that may affect the structural integrity or safety of the dam, or that may affect the waters or natural resources.

Proponents are responsible for complying with the requirements of the LRIA and obtaining any necessary legal authority required to alter, improve or repair a dam.

Examples of works that may require approval include, but are not limited to:

- a) changes to the size of a dam;
- b) changes to the size of spillways or other appurtenant discharge facilities to the dam;
- c) changes in the hydraulic capacity of the dam;
- d) reconstruction or partial reconstruction of a dam, spillway or other appurtenant discharge facility to the dam, which may include retrofitting an existing dam to produce waterpower;
- e) installation of a cofferdam, if the installation is not within existing service or emergency repair gains (i.e. upstream of operational stoplog gains);
- f) operation of a dam in a manner different from that contemplated by plans and specifications previously approved under LRIA Sections 14 or 16, including a permanent or temporary deviation from an approved Dam Operating Plan or from a previously approved dam operating requirement, and a revision to the rule curve (note: changes to dam operations approved through LRIA Section 23.1 will continue to be approved through LRIA Section 23.1); and
- g) decommissioning a dam. For information regarding decommissioning, refer to the LRIA Dam Decommissioning and Removal Technical Bulletin (2011).

A list of common works at dams that do not require LRIA Section 16 approval is detailed in Section 4 of this Bulletin.

If proponents are uncertain if LRIA approval is required, proponents should contact the Ministry to seek clarification as required. This clarification should be sought well in advance of proposed construction, to avoid unnecessary delays. The Ministry shall determine if proposed works require LRIA consideration and will provide written clarification to the proponent.

LRIA Section 16 approval does not relieve the proponent from compliance with the provisions of any other applicable federal, provincial, municipal, conservation authority or other agency's regulatory requirements and does not provide proponents with any guarantee that other required permits and approvals will be obtained in order to proceed with the proposed project. Proponents should not assume that undertaking works in accordance with conditions established by the Ministry through LRIA Section 16 approvals will address the regulatory interests of other agencies.

## **2.2 Emergency Repairs**

Emergency repairs to a dam may sometimes be required to address an imminent threat to life and property or to prevent significant environmental impacts. The Ministry recognizes that emergency situations are a priority and will respond to the dam owner's request accordingly.

## 3.0 Application Requirements and Review Process

### 3.1 Applicable Standards

The majority of works submitted for LRIA approval require supporting calculations and drawings to be completed by a Professional Engineer licensed to practice in Ontario. Accordingly, all final drawings, specifications, plans and reports are required to be signed, sealed and dated by a Professional Engineer licensed to practice in Ontario. Section 1.3.5 of the LRIA Administrative Guide (MNR, 2011) provides additional information regarding this requirement.

Ministry standards for dam safety in Ontario are outlined in the LRIA Administrative Guide (MNR 2011) and associated technical bulletins (hereafter referred to as Ministry Standards).

LRIA approval may be issued if the proposed alteration, improvement or repair to a dam meets the standards established in LRIA technical bulletins. Proposed works that vary from Ministry standards may be approved by the Ministry, if the variance does not represent a marked departure from Ministry standards, or it can be demonstrated that the proposed work does not adversely affect the purposes of the LRIA.

Insofar as Ministry standards may not represent current engineering practice or address all design requirements, the proponent's design engineer may comply with the most applicable standards or codes. In these circumstances, the design engineer should document the rationale for applying the relevant or alternative standards or codes.

The proponent should contact the Ministry in advance of submitting an application, to assess the need to include additional information to support the application, where the use of alternative standards is being proposed that vary from Ministry standards.

### 3.2 Submission Requirements

The proponent's design engineer must provide complete information to the Ministry such that the application for the proposed works can be reviewed in detail. Information submitted for Ministry review should be well organized and clearly presented. The following is a general list of submission requirements:

- report describing:
  - proposed work and rationale, existing site conditions, and supporting analyses, calculations, assumptions, interpretations and



- dam operation requirements used in determining the design of the proposed works;
- documentation and rationale of any deviation or departure from Ministry standards;
- design details of the components of the dam that are physically attached or logically connected to the proposed works as applicable;
- plans (design drawings) showing the design and construction details of the proposed works;
- material and technical specifications;
- sediment control and water handling/de-watering plan;
- construction schedule indicating start and completion dates for all proposed work, including any construction timing restrictions; and
- detailed analysis with supporting information of risks where phasing of work is proposed.

The above is not a complete list of all possible information that may be required to support an application. Additional or alternative application requirements may be identified through discussions with the Ministry.

Where the proposed work has the potential to cause either permanent or temporary flooding or erosion of land beyond existing conditions or to cause additional potential impacts that would conflict with the purposes of the LRIA, the Ministry will likely request additional information to support the Section 16 review. Proponents are responsible for determining where and what measures should be adopted to mitigate potential impacts related to the proposed work. Proponents should include an assessment of potential impacts and measures to mitigate identified impacts, as part of their application. Where the proposed work is subject to the Environmental Assessment Act, documentation prepared during the environmental assessment will be the Ministry's primary tool for identifying potential impacts associated with proposed work and measures to address those impacts.

The final plans and technical specifications shall be submitted and stamped "For Construction", signed and sealed by the design engineer. Should the proponent determine prior to or during the construction work that modifications to the approved design that may impact the dam's safety and/or structural integrity, the waters or natural resources are necessary, the design engineer shall identify those aspects of the work which were modified and meet the aforementioned conditions, and submit the design changes to the Ministry for approval.

### **3.2.1 Additional Information**

Where alterations, improvements or repairs to a dam may affect the safe operation of components that are physically attached or logically connected to

the proposed works, additional information may be required to support the Ministry's Section 16 review, specific to those components of the dam that are physically attached or logically connected. To facilitate timely Ministry review of applications, proponents are encouraged to proactively address any impacts of the proposed works on the safe operation of physically attached or logically connected components as part of the application.

In exceptional circumstances, the Ministry may give consideration to requesting work or studies (e.g. dam safety review) considered necessary to further the purposes of the Act, where there are significant concerns or uncertainty regarding the condition of the dam. In these situations, the Ministry will give due consideration to whether these matters should be considered as part of the Section 16 application, or whether the Ministry should exercise its authority through an order under LRIA Section 17.

In some instances where the Section 16 application for proposed work is for an existing dam, but LRIA Section 14 location approval has not been previously issued by the Ministry, additional information may be requested to ensure that the purposes of the Act are considered.

### **3.2.2 Consultation**

Depending on the scope and scale of the proposed work, the Ministry may require proponents to consult with individuals or communities who may be potentially affected by the proposed work prior, to the Ministry making a decision on the application.

Where proposed work is subject to the Environmental Assessment Act (EAA), the Ministry will rely on the EA process as the primary tool for the proponent to undertake consultation with potentially affected individuals or communities. The Ministry retains the right to direct or undertake additional consultation where necessary.

Where proposed work is not subject to the EAA, the Ministry will determine potential consultation requirements on a project specific basis. Consultation requirements will be determined in discussion with project proponents and will consider the scope of work and the potential level of public interest in the proposed works.

### **3.3 Scheduling of Works**

In certain circumstances, proposed works may be phased over a longer timeframe, where it is demonstrated that phasing is necessary. To support an application to phase the work over a longer timeframe, the proponent must provide documentation on the rationale and timing to complete all of the

proposed work. The documentation shall include a detailed description, drawings and schedules of the proposed work to be completed in each phase. Proponents must identify risks (e.g., winterization, flood events, scour and erosion) to undertaking proposed work over a longer term for each phase of the work, along with complete details of how the proponent will mitigate those risks until the proposed work is complete.

Where approval has been issued for works which will be phased over time, and if circumstances arise leading to changes in either the phasing or the scheduling, or if changes to project risks are identified, the Ministry may provide flexibility to revise the phasing or scheduling through an additional approval. The proponent shall provide the Ministry with written documentation requesting a revision to the phasing and/or schedule, clearly defining the proposed changes, supporting rationale, and any impacts to mitigation measures which may have, or have to be implemented. Changes to the schedule or phasing shall not be implemented by the proponent, until additional Section 16 approval has been issued by the Ministry.

### **3.4 Application Review**

The following subsections describe the LRIA Section 16 application review and approval process (Figure 1).

#### **3.4.1 Scoping Meeting**

Prior to application submission, proponents should contact the Ministry to discuss the need or benefit of a scoping meeting with Ministry staff well in advance of any planned construction period. The purpose of the scoping meeting is to: determine LRIA approval requirements; discuss the application review and approval process; identify application information requirements; and discuss potential use of alternative standards or codes contemplated by the proponent.

The scoping meeting will facilitate a more efficient and effective application process by offering the Ministry an opportunity to learn more about the proposed work and project timelines, and offering proponents an opportunity to better understand the approval process and timelines associated with review and approval.

Proponents are also advised to engage other relevant agencies who may have regulatory requirements related to the proposed work. During the scoping meeting, the Ministry may identify to the proponent, other regulatory requirements that may apply.

#### **3.4.2 Application for Section 16 Approval**

The application review process commences with the submission of an application for LRIA Section 16 Plans and Specifications approval. It is the responsibility of the proponent to submit a complete application.

### **3.4.3 Review for Application Completeness**

The Ministry will acknowledge receipt of an application, review the application and advise the proponent within 30-60 days if the application is complete. If the application is incomplete, proponents will be notified in writing of additional information required. Depending on the scope of additional information required and the time frame to provide it, the Ministry may place the application on hold, or return the application to the proponent. This determination will be made by the Ministry through discussions with the proponent. Where an application is returned to the proponent, the 30-60 day review period for completeness will restart upon submission of the additional information requested.

### **3.4.4 Review of the Section 16 Application**

Once an application is deemed complete, the Ministry will complete a detailed review of the proposed work to determine whether it meets Ministry standards and provides for the purposes of the LRIA, and will advise the proponent in writing of its decision within 60 days. Where additional information is required to support the detailed review, the Ministry will identify in writing additional required information and the rationale. In such circumstances, the 60 day review timeline will be put on hold until the Ministry receives the requested information.

### **3.4.5 Issuance of Decision**

In issuing a decision under LRIA Section 16, the Ministry may:

- approve the application;
- approve the application subject to such conditions or with such changes considered advisable to further the purposes of the LRIA; or
- refuse the application.

Where the Ministry intends to approve the Section 16 application subject to conditions or changes, a Letter of Approval will be issued to the proponent outlining the conditions or changes which must be met by the proponent. Conditions or changes shall be within the scope of LRIA Section 16 and must relate to the proposed works being applied for, those components of the dam that are physically attached or logically connected to the proposed works that may be affected, or to potential negative impacts resulting from the proposed work that would conflict with the purposes of the LRIA (where applicable).

Where the Ministry refuses a LRIA Section 16 application, a Letter of Intent to Refuse Plans and Specifications Approval will be issued to the proponent identifying the supporting rationale and any additional measures the proponent can take to address any outstanding concerns. The Letter of Intent to Refuse Plans and Specifications Approval will notify the proponent that unless the Ministry receives a request within 15 business days from the proponent for an inquiry, the application will be refused.

Requests for an inquiry under the LRIA are referred by the Ministry to the Office of the Mining and Lands Commissioner. Additional information on appeals to the Office of the Mining and Lands Commissioner is referenced in the LRIA Administrative Guide (MNR, 2011).

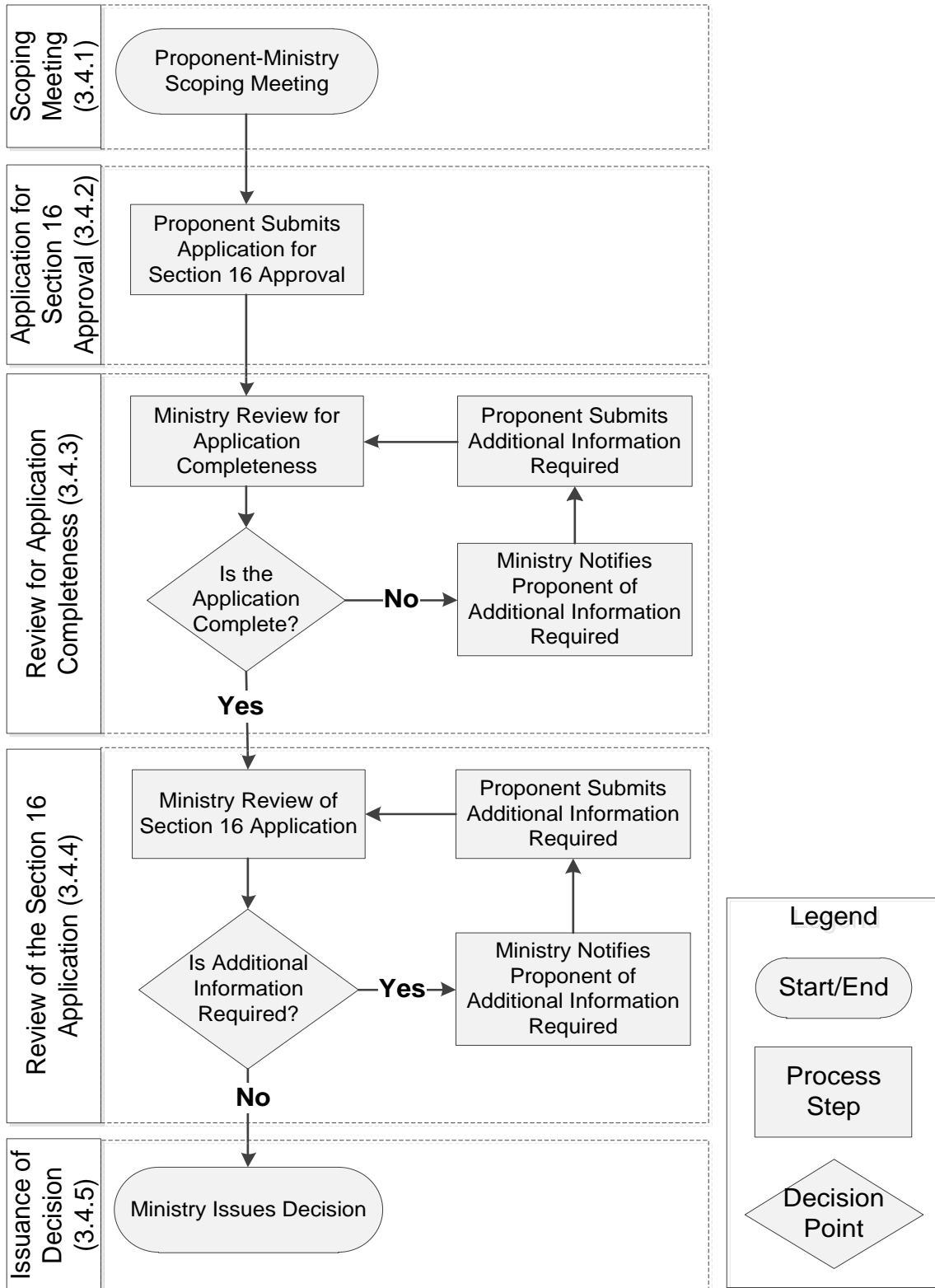


Figure 2: Lakes and Rivers Improvement Act Application Review Process

### **3.5 Expiration of Approval**

If construction completion dates stated in the Section 16 approval are expected to be exceeded, proponents should contact the Ministry as soon as it is apparent that completion dates may not be met. Section 16 approval is no longer valid where construction completion dates are exceeded.

### **3.6 Memorandum of Understanding**

The Ministry will give due consideration to the development of a memorandum of understanding (MOU) with dam owners who have:

- a portfolio of dams;
- extensive experience in the operation and maintenance of dams; and
- demonstrated successful design and implementation of similar proposed alteration, improvement or repair works at dams.

MOU's will be consistent with the purposes LRIA, and may establish specific commitments or procedures including, but not limited to, risk assessments, reporting and third party independent reviews.

## 4.0 Common Works Not Requiring LRIA Approval

This Section provides a list of alteration, improvement and repair works that do not require LRIA approval. The list must be read in conjunction with this Technical Bulletin to provide proper context in determining whether proposed works require LRIA approval. Even though the works may not require LRIA approval, proponents are responsible for complying with other statutes, regulations, standards, guidelines, codes, by-laws and the rules of other regulatory agencies associated with altering, improving or repairing an existing dam.

The list of works in Sections 4.1 to 4.9 have been predetermined to have minimal or no effect on the dam's structural integrity or safety, hydraulic capacity, public safety, the waters or natural resources. Proponents are responsible for ensuring that all work undertaken meets applicable Ministry standards and other professional guidelines and codes for the same type of work.

Proponents shall thoroughly document the rationale for proposed work that they assess does not require LRIA approval, as outlined in this Technical Bulletin and to keep this documentation on file.

The works identified herein are not intended to be a comprehensive list of all works that do not require LRIA approval. There may be additional proposed works that may not require approval.

If site conditions, methods of construction, or the extent and nature of the proposed work differ from the list below, the proponent shall contact the Ministry to determine if the proposed works require approval.

The Ministry will work with representatives of Ontario dam owners and their associations to monitor the effectiveness of this Technical Bulletin and in particular, the list of work that does not require LRIA Section 16 approval.

### 4.1 Concrete Structures

1. Minor concrete repair for gravity structures that meet Ministry standards involving a total weight reduction during the works not to exceed 2% of the mass of the component (including any voids that are to be filled) of the gravity dam structure under consideration or which will not affect the structural integrity of any element of the gravity dam or related discharge facility.
2. Minor Concrete Repair/ Spalling for non-gravity structures that meet Ministry standards - isolated repair area(s) less than 15m<sup>2</sup>, have a penetration depth not exceeding 75 mm, and involve exposure or



- replacement of reinforcing steel, and have a total area(s) not to be comprised of more than 15% of the total concrete surface area of the dam.
3. Maintenance of Steel Gains - including minor concrete repair as defined in Section 4.1(2) above.
  4. Replacement of Steel Gains in a like for like manner that will not affect the permanent discharge capacity of the spillway. Work may also include such items as associated concrete and doweling supporting the steel gains. Approval may still be required for any cofferdam (except as described in Section 4.8) or lowering of the head pond to replace the steel gains.
  5. Foundation Drain Cleaning where cleaning equipment or method will not damage the drain.
  6. Grouting of Joints/Cracks- isolated repair to be discontinuous and less than 25% of the component (e.g. pier nose, deck slab), and without chipping beyond that permitted for minor concrete repair as described in Sections 4.1(1) and 4.1(2) above. Approval may still be required for any cofferdam (except as described in Section 4.8) or lowering of the head pond.
  7. Replacement of Expansion Joints- replacement of sealants at original expansion and contraction joints, without chipping beyond that permitted for minor concrete repairs for Non Gravity Structures (Section 4.1(2)).

## **4.2 Decks**

1. Repair of Deck (concrete, steel or wood) - repair of concrete decks not to exceed that specified for concrete repair, repair of steel or wood decks and to be limited to repair of less than 15% of the members or area.
2. Removal or Replacement (like for like) of Deck that meets Ministry standards (concrete, steel or wood) - either temporary or permanent and does not:
  - a. impact on the stability of the structure; or
  - b. compromise the existing discharge capacity of a structure in a way which cannot be readily rectified when required or in an emergency condition
3. Repair, Replace, Upgrade or Install New - Handrail / Fall Arrestor Travel Restrict Systems.
4. Roadway Barrier – repair, replace or install new roadway barriers to dams that were originally designed for vehicle travel on deck surface.

### **4.3 Instrumentation**

1. Repair or Upgrade dam safety and water level Instrumentation.

### **4.4 Earth Fill Structures**

1. Foundation Drain Cleaning where cleaning equipment or method will not damage the drain.
2. Vegetation Removal and Control - work is associated with maintenance and the removal will not damage critical components of the dam.
3. Re-establishment of the crest surface, above the impervious core, to the most recent approved design grade and configuration and undertaken in accordance with the original design specifications.

### **4.5 Timber Crib Structures**

1. Repair or Replacement of up-stream or sluiceway sheathing.

### **4.6 Penstocks and Turbines, Flash Boards, Stop Logs**

1. Replacing wood stop logs with concrete or steel stop logs, but do not result in permanent or temporary changes to flows and levels and/or does not include or require the use of a cofferdam (except as described in Section 4.8).
2. Repair of Flashboards - repair or replacement of previously approved (like for like dimensions and elevation).
3. Repair or Replacement of Spillway Gates (like for like dimensions, elevations and type) provided all flow and level obligations continue to be met and no cofferdam (except as described in Section 4.8) and/or concrete repair work is required.
4. Localized Repairs of Penstock - (wood stave, steel, concrete) repair or replacement of saddle or support, but does not include work on or around thimble (minor repairs and only localized exposure of rebar).
5. Like for like replacement of turbine runner that does not serve to affect the ability to provide for low flow augmentation or discharge capacity.

#### **4.7 Log Handling Equipment**

1. Repair, modifications or replacement of in-kind Log Handling Equipment, as long as there remains an alternate capability to remove stoplogs or the dam has excess spill capacity to handle flows at all times and the work is not undertaken during expected high water periods.

#### **4.8 Cofferdams**

1. Installation of cofferdam, if installation is within existing service or emergency repair gains (i.e. upstream of operational stoplog gains).

#### **4.9 Others**

1. Installation of trash removal system, cleaning or repair of trash racks and trash removal equipment, including spillway cleaning and removal of debris from or in front of spillway.
2. Booms, Buoys, Signage - install, repair or replace booms, buoys or signage
3. Buildings – maintenance, repair or like for like replacement (footprint and loading) of shelter housings located on a dam (i.e. sheds for instrumentation or water level gauging, flow control equipment housing), that do not:
  - a. involve the use of heavy equipment on the dam that would exceed the load bearing capacity of the dam; and
  - b. impact the structural integrity of any component of the dam (e.g. deck).
4. Buildings - installation of new shelter housings located on a dam (i.e. sheds for instrumentation or water level gauging, flow control equipment housing) that does not:
  - c. involve the use of heavy equipment on the dam that would exceed the load bearing capacity of the dam;
  - d. impact the structural integrity of any component of the dam (e.g. deck); and
  - e. interfere with water management operations under normal or emergency conditions.
5. Maintenance of existing shoreline protection works within the same footprint which will not impact the structural integrity and hydraulic capacity of any component of a dam, and does not include work on the dam itself. Other approvals (e.g. Public Lands Act) may still be required.

6. Maintenance of existing riprap to return it to the original configuration by adding appropriate supplemental material, but not including the removal and replacement of material. Other approvals (e.g. Public Lands Act) may still be required.

## Glossary of Terms

**Appurtenant facilities:** means structures and equipment on a dam site including, but not limited to: intake and outlet structures; powerhouse structures; tunnels; canals; penstocks; surge tanks and towers; gate hoist mechanisms and their supporting structures; spillways; mechanical and electrical equipment; water control and release facilities.

**Dam:** a structure that is constructed which holds back water in a river, lake, pond, or stream to raise the water level, create a reservoir to control flooding, or divert the flow of water.

**Logically connected:** means those components of a dam that are not physically attached to the proposed alteration, improvement or repair, but are required to resist loads and forces in order to safely forward, hold back or divert water (e.g. control dams and block dams, fish-ways, water power generating facilities on the same reservoir, mechanical gates and remotely operated control systems).

**Physically attached:** means those components of a dam that are structurally connected to the proposed alteration, improvement or repair and work together to resist loads and forces to safely forward, hold back or divert water.

**Ministry standards:** dam safety standards as detailed in the Lakes and Rivers Improvement Act Administrative Guide and Technical Bulletins including:

1. Classification and Inflow Design Flood Criteria
2. Dam Decommissioning and Removal
3. Seismic Hazard Criteria, Assessment and Consideration
4. Structural Design and Factors of Safety
5. Spillways and Flood Control Structures
6. Geotechnical Design and Factors of Safety