

Section III – Items for the Information of the Board

TO: Chair and Members of the Authority
Meeting #5/18, Friday, June 22, 2018

FROM: Nick Saccone, Senior Director, Restoration and Infrastructure

RE: **G. ROSS LORD DAM EMERGENCY PREPAREDNESS PLAN**
Emergency Preparedness Plan for Flooding Caused By Operations or Failure at
G. Ross Lord Dam

KEY ISSUE

Overview of the G. Ross Lord Dam Emergency Preparedness Plan, which will be used to assist the City of Toronto in responding to flood emergencies caused by operations or failure of the dam.

RECOMMENDATION

IT IS RECOMMENDED THAT Toronto and Region Conservation Authority's (TRCA) Emergency Preparedness Plan for G. Ross Lord Dam be received.

BACKGROUND

G. Ross Lord Dam is owned and operated by Toronto and Region Conservation Authority. The dam is located at 700 Finch Avenue West near Dufferin Street in Toronto. It was built in 1973 to control flooding on the West Don River and is the largest dam owned by TRCA. The dam is 20 metres high and 350 metres long. The dam consists of an earthen embankment with two concrete spillways to control flow. The dam reservoir's normal elevation is 172.3 metres above sea level (MASL) which corresponds to a storage capacity of approximately 400,000 cubic metres of water. The maximum operating level of the reservoir is approximately 5,500,000 cubic metres of water. The dam was designed to store water during rain events. After the rain event has passed and river levels have returned to normal, the gates at the dam are opened to bring the reservoir back down 172.3 MASL to create storage for the next storm. The dam has an operator on-call 24/7 to open the gates when required.

Dams in Ontario are subject to the Lakes and Rivers Improvement Act (LRIA) that is managed by the Ministry of Natural Resources and Forestry (MNRF). The LRIA stipulates that all dams must undergo a Dam Safety Review (DSR) to ensure they meet all requirements for structural stability, geotechnical stability, hydraulic capacity, public safety and other parameters. A key component of the DSR process is the Hazard Potential Classification analysis which determines the level of risk the dam poses to the public if the dam failed. Dams with the highest risk to the public must meet the most stringent criteria regulations for safety. G. Ross Lord Dam underwent a DSR in 2013 and the Hazard Potential Classification was determined to be Very High. If G. Ross Lord Dam failed during an extreme flood event there would be approximately 3,000 persons at risk and \$1,050,000,000 in property damage.

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The potential extreme consequences of G. Ross Lord Dam necessitates that an emergency management plan be in place to mitigate the risks from flooding caused by gate operations and dam failure. The LRIA does not specify requirements for emergency management systems. Emergency management guidelines for dams are prescribed by the Canadian Dam Association (CDA). CDA is a group of dam owners, operators, regulators and engineers who share the goal of advancing knowledge and practices related to dams including emergency management. The 2007 CDA Dam Safety Guidelines states that:

1. An effective emergency management process shall be in place for the dam.
2. The emergency management process shall include emergency response procedures to guide the dam operator and site staff through the process of responding to an emergency at a dam.
3. The emergency management process shall ensure that effective emergency preparedness procedures are in place for use by external response agencies with responsibilities for public safety within the floodplain.

As such, TRCA has maintained emergency management plans for G. Ross Lord Dam since 2008. In 2015, CDA realized that the emergency management component of the 2007 Dam Safety Guidelines required an update to better reflect modern emergency management systems. The objective of this update is to develop a technical bulletin to provide dam owners with detailed criteria for an appropriate emergency management plan. CDA has hosted two workshops with dam owners to discuss the contents of this technical bulletin with the objective of releasing the final document at the CDA Conference in the fall of 2018. TRCA has attended both workshops and is familiar with the proposed content of the technical bulletin. As such, TRCA began the process of updating G. Ross Lord Dam's emergency management plans in the fall of 2015 to meet the proposed 2018 emergency management technical bulletin.

RATIONALE

The CDA recommends developing an Emergency Preparedness Plan (EPP) for external stakeholders, such as municipal emergency management offices, police, fire, utilities and other agencies, that would play a role in responding to dam emergencies. Developing the G. Ross Lord Dam EPP required the following:

1. Development of inundation maps.
2. Identification and engagement of external stakeholders.
3. Development of EPP content.
4. Public engagement.

TRCA's G. Ross Lord Dam Flood and Dam Breach Emergency Preparedness Plan can be obtained using this [link](#).

Inundation Maps

Inundation maps depict the areas expected to be flooded during a dam break. The maps are used by first responders to identify areas that would need to be evacuated. The maps were created using modeled flow information from the estimated breach of the dam. Since G. Ross Lord Dam is located in an urban environment, potentially hundreds of buildings would be evacuated during a worst case scenario dam failure. The dam is located close to the communities it was designed to protect and so, during a dam failure, the flood wave from the breach would arrive very quickly and first responders would have limited time to evacuate the affected properties. To assist first responders in prioritizing areas for evacuation, TRCA developed three zones on the maps that depict different levels of flooding based on the conditions created by the dam failure. Each scenario is referred to as a "Zone" on the map. Zone

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descriptions are listed in Table 1. The maps are available in Appendix A in the [Emergency Preparedness Plan](#).

Zone	Colour	Description
Zone 1	Red	Zone 1 depicts the area expected to be flooded during a gate opening at the dam during a storm event. The flow used to delineate the inundated area is based on the August 19, 2005 storm event and is approximately 215m ³ /s..
Zone 2	Orange	Zone 2 is based on a dam failure if the dam's reservoir was full and the dam failed when the downstream river was at normal levels. The peak flow of this scenario is approximately 550m ³ /s.
Zone 3	Yellow	Zone 3 is the worst case scenario and inundates the largest number of buildings. The flow used to delineate Zone 3 is based on the Probable Maximum Flood (PMF) plus the failure of the dam. The PMF is the largest rain event that would be theoretically possible in southern Ontario. The additional flow from the dam failure is added to the PMF flow and then used to delineate the Zone 3 inundation area. Peak flow for this scenario is approximately 4200m ³ /s.

Table 1

TRCA's Flood Duty Officer (FDO) will direct City of Toronto's emergency services as to what Zone will be affected by the dam emergency depending on existing flood conditions and reservoir levels.

Identification and Engagement of External Stakeholders

The inundation maps were used to identify external stakeholders and include all entities that would respond to or be impacted by an emergency from G. Ross Lord Dam. TRCA identified the following stakeholders:

- Toronto Office of Emergency Management (OEM)
- Toronto Fire
- Toronto Police Service
- Toronto Water
- Toronto Transportation
- Toronto Transit Commission
- Toronto Hydro
- Toronto Parks, Forestry and Recreation

OEM is the facilitator for the City of Toronto's Emergency Management Working Group (EMWG), of which TRCA is a member, where all emergency management issues in Toronto are discussed. All stakeholders identified by TRCA are members of the EMWG. This allowed TRCA to directly engage with stakeholders through the EMWG. Input from the EMWG was used to develop the content of the EPP.

EPP Content

TRCA developed the G. Ross Lord Dam's EPP content so that users could quickly get information to assist in the timely response to a dam emergency. EPP contents include:

- Purpose of the EPP so users can quickly understand the nature of the emergency.
- TRCA's emergency contact numbers including radio contact information should cell service be unavailable.

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- Notification flow charts that demonstrate how a dam emergency situation is communicated through TRCA to City of Toronto's OEM, stakeholders and emergency services.
- A description of roles and responsibilities to clarify expected actions of TRCA and external stakeholders during an emergency.
- A description of inundation maps and how to interpret them.

The information was incorporated into the draft EPP. On June 13, 2017 TRCA presented the draft EPP to the Toronto Emergency Management Program Committee (TEMPC) which consists of City of Toronto divisional directors, Mayor's office, City Manager and other senior leaders from the City of Toronto. TRCA answered questions and received feedback for the EPP which was incorporated into the final document.

Public Engagement

For an EPP to be effective, it is critical that people within the area of risk be informed about the EPP and what would be expected of them during a dam break or flood emergency. TRCA, in collaboration with City of Toronto's OEM and Strategic Communications, organized a public open house to educate affected residents on the purpose of the EPP. In January 2018, invitation flyers were hand delivered to all buildings within the inundation areas. On February 5, 2018, an open house was held at the Agricola Lutheran Church at 25 Old York Mills Road. The public open house consisted of information panels, a presentation by TRCA and a question period. TRCA staff, along with OEM and Toronto Police Service, were available to answer questions from the public. Approximately 50 residents attended the open house.

FINANCIAL DETAILS

Operating accounts 108-01 (Flood Infrastructure Operation, Maintenance and Supervision) and 115-62 (Flood Risk Management and Communications) funded by City of Toronto were used for staff time to develop the G. Ross Lord Dam EPP.

Report prepared by: Craig Mitchell, 647 212-2410

Emails: cmitchell@trca.on.ca

For Information contact: Craig Mitchell, 647 212-2410

Emails: cmitchell@trca.on.ca

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