

Ross River Dam Emergency Action Plan 2023

Dam ID: 344

Dam Owner: Townsville City Council

Rural no.: Lot 230 Parish of Ross, County of Elphinstone, City of Townsville

Location: Lat: 19.40983° S Lon.146.73744° E

Approved by the delegate of the Chief Executive,
Department of Regional Development, Manufacturing
and Water until 1 October 2025.

Note: The Incident Coordinator (IC) is responsible for the decision to activate the EAP. Should the IC be unavailable, the Dam Duty Officer (DDO) is responsible for the decision.

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Authorised by: General Manager WRR N00636

Townsville City Council

RD0032 Ross River Dam Emergency Action Plan

Effective Date: 3/11/2023

Emergency Activation Quick Reference – Dam and Other Hazards

Table 1: Emergency Activation Quick Reference

| | Alert | Lean Forward | Stand Up | Stand Down |
|---|---|---|--|---|
| | • Locally managed (DDO) | • Locally managed (DDO and IC) | • Locally managed (DDO and IC) with advice from DSTDM | • Locally managed (DDO and IC) with advice from DSTDM |
| Dam Hazards | Dam Hazard Activation Triggers | | | |
| Flood Operations Refer section 5 | • EL 38.45m and rising (0.1m below FSL) | • Storage EL 38.65m (gate opening trigger level) | • Storage above EL 40.75m | • Storage FSL 38.55m and falling |
| Chemical Spill/Toxic Conditions Refer section 6 | • Reports of contamination or potential contamination in the catchment area of storage | • Not applicable | • Confirmation of or highly likely probability of a large amount of chemical spill/toxic conditions found in the storage/catchment | • Risk assessment that risk has reduced • Confirmation that significant contamination has not occurred • All clear WQ test result |
| Piping: Embankment, Foundation, or Abutments Refer section 7 | • Increasing leakage through an embankment, the foundations, or abutments | • Increasing leakage through an embankment, the foundations, or abutments with cloudy water | • Piping condition has been established | • Risk assessment has determined that failure risk has reduced |
| Earthquake Refer section 8 | • Earthquake reported or felt at the dam or in the Townsville area, AND • Intensity less than 5 Modified Mercalli (MM) | • Earthquake reported or felt at the dam or in the Townsville area, AND • Intensity greater than or equal to 5MM, OR • Intensity less than 5MM and change detected during surveillance inspection | • Earthquake reported or felt in the area, AND • A possible failure path has been identified | • Risk assessment has determined that failure risk has reduced |
| Terrorist Threat/Activity or High Energy Impact Refer section 9 | • Not applicable | • Not applicable | • Possible terrorist activity noticed at dam or threat received • Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) • Failure in progress or likely due to impact or explosion • Sufficient water in storage to create a dam failure | • Risk assessment has determined that failure risk has reduced |
| Gate Function Issues See section 10 | • Move immediately to Stand-Up Activation | • Move immediately to Stand-Up Activation | • Gate function issue | • Risk assessment that risk has reduced • Confirmation that all gates are functioning correctly |
| Overtopping or Sliding of Spillway Refer section 11 | • Indications of movement of spillway noted such as cracking, increased seepage, spilling | • Storage at flood of record, EL 40.73m, OR • Increase in movement or seepage | • Obvious displacement of one or more spillway, OR • Evidence of scouring at or near toe of stilling basin area | • Risk Assessment has determined that sliding or over turning risk has reduced |
| Communication Failure Refer section 12 | • Move immediately to Stand-Up Activation | • Move immediately to Stand-Up Activation | • Communication service faults | • Confirmation that all communication services are functioning correctly |

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Revision History

Complete version history information is stored within Townsville City Councils electronic document management system Paradigm.

| Rev No. | Doc No. | Revision Description | Approved for Issue | Date |
|---------|---------|---|--------------------|-----------------|
| 1.0 | RD0030 | Interim 2019-2020 Version | | |
| 1.0 | RD0031 | Initial issue | | |
| 1.1 | RD0031 | Updates following DNRME review | | August, 2020 |
| 1.2 | RD0031 | Updates following DDMG review | | September, 2020 |
| 1.3 | RD0031 | Annual Review and IC / LEC role combined | | September, 2021 |
| 1.4 | RD0032 | Update contacts details. Update section 5 for new SCADA system. Correct errors section 11. New catchment map in appendix B4. | | September 2022 |
| 1.5 | RD0032 | Changed flood STAND UP levels to coincide with required downstream warning levels, EA polygons and new AWS messaging. Included AWS compliant messaging. Updated flood classification levels. Update contacts details and position titles. Update PAR numbers. | | October 2023 |

1. References, Abbreviations and Definitions

1.1 References/Associated Documents

| Ref. | Document title | Reference |
|------|--|--|
| A | Townsville City Council Emergency Action Plan | TCC EAP (Current Year) |
| B | Ross River Dam Detailed Operation and Maintenance Manual for Control Systems | DOMMS-004 Supervisory Control and Data Acquisition System |
| C | Ross River Dam Standard Operating Procedures | Electronic Document Management System |
| D | Ross River Dam Operation and Maintenance Manuals | Electronic Document Management System |
| E | Community Information and Warnings Sub Plan | TCC Website |
| F | Queensland Disaster Management Guidelines | www.disaster.qld.gov.au |
| G | Queensland Rainfall and River Conditions (Flood Warning) | www.bom.gov.au/qld/flood/index.shtm |
| H | TCC Incident and Near Miss Alert Form (Alert Notification) | Inspire (TCC Intranet) |
| I | Water Supply (Safety and Reliability) Act 2008 (Qld) | Business.qld.gov.au |
| J | Qld Dam Safety Management Guidelines | Business.qld.gov.au |
| K | Emergency Action Plan for Referable Dam Guidelines, June 2021 | Department of Regional Development, Manufacturing and Water (DRDMW) |

1.2 Abbreviations and Acronyms

| | | | |
|---------|---|---------|---|
| AHD | Australian Height Datum | PAR | Population at Risk |
| ANCOLD | Australian National Committee on Large Dams | PMF | Probable Maximum Flood |
| BGA | Blue Green Algae | PLL | Possible Loss of Life |
| BOM | Bureau of Meteorology | PMP | Probable Maximum Precipitation |
| CEO | Chief Executive Officer | QDSMG | Queensland Dam Safety Management Guideline |
| CRA | Comprehensive Risk Assessment | QFES | Queensland Fire & Emergency Services |
| D/S | Downstream | QPS | Queensland Police Service |
| DCF | Dam Crest Flood | RB | Right Bank |
| DCL | Dam Crest Level | RRD | Ross River Dam |
| DMG | Disaster Management Group | SDE | Senior Dam Engineer |
| DDC | District Disaster Coordinator | SFCE | Senior Floodplain and Coastal Engineer |
| DDMG | District Disaster Management Group | SSE | Senior Stormwater Engineer |
| DDO | Dam Duty Officer | SDCC | State Disaster Coordination Centre |
| DDS | Director Dam Safety | SDMG | State Disaster Management Group |
| DRDMW | Department of Regional Development, Manufacturing and Water (DRDMW) | SDF | Sunny Day Failure |
| DOMM | Detailed Operation and Maintenance Manual | SES | State Emergency Service |
| DSR | Dam Safety Regulator | SHD | State Height Datum |
| DSTDM | Dam Safety Technical Decision Maker | SMS | Short Message Service |
| DIO | Director Infrastructure & Operations | SOP | Standard Operating Procedure |
| EA | Emergency Alert | SWL | Storage Water Level |
| EAP | Emergency Action Plan | TCC | Townsville City Council |
| EER | Emergency Event Report | TM WRDS | Team Manager Water Resources and Dam Safety |
| EL | Elevation Level | U/S | Upstream |
| FIR | Flood Impact Rating | WQ | Water Quality |
| FODM | Flood Operations Decision Maker | | |
| FSL | Full Supply Level | | |
| GIS | Geographic Information System | | |
| GM WRR | General Manager Water and Resource Recovery | | |
| GS | Gauging Station | | |
| HMI | Human Machine Interface | | |
| IC | Incident Coordinator | | |
| LB | Left Bank | | |
| LDMG | Local Disaster Management Group | | |
| Max. OL | Maximum Operating Level | | |
| MM | Modified Mercalli | | |
| O&M | Operation & Maintenance | | |
| OB | Observation Bore | | |

1.3 Business Terms and Definitions

| Term | Definition |
|---|---|
| Terms set out in section 352A of the <i>Water Supply (Safety and Reliability) Act 2008 (Qld)</i> - Amended | |
| Dam Hazard | Means a reasonably foreseeable situation or condition that may: <ul style="list-style-type: none"> • cause or contribute to the failure of the dam, if the failure may cause harm to persons or property, OR • require an automatic or controlled release of water from the dam, if the release of the water may cause harm to persons or property. |
| Dam Hazard Event | Means an event arising from a <i>dam hazard</i> if: <ul style="list-style-type: none"> • persons or property may be harmed because of the event, AND • a coordinated response, involving 2 or more of the following <i>relevant entities</i>, is unlikely to be required; each <i>local group</i> and <i>district group</i> for the EAP, each local government whose area may be affected, the chief executive, another entity the owner of the dam considers appropriate, AND • the event is not an <i>emergency event</i>. |
| Disaster Management Plan | Of a <i>district group</i> or local government, means the group's or local government's disaster management plan under the Disaster Management Act. |
| District Group (District Disaster Management Plan) | For an emergency action plan (EAP), means a district group established under the Disaster Management Act, section 22 whose disaster district under that Act could, under the plan, be affected by a <i>dam hazard</i> . |
| Emergency Event | Means an event arising from a <i>dam hazard</i> if: <ul style="list-style-type: none"> • persons or property may be harmed because of the event, AND • any of the following apply: <ul style="list-style-type: none"> – a coordinated response, involving 2 or more of the following relevant entities, is likely to be required; each local group and district group for the EAP, each local government whose area may be affected, the chief executive, another entity the owner of the dam considers appropriate, OR – the event may arise because of a disaster situation declared under the Disaster Management Act, OR – an entity performing functions under the State disaster management plan may, under that plan, require the owner of the dam to give the entity information about the event. |
| Local group (Local Disaster Management Group) | For an EAP, means a local group established under the Disaster Management Act, section 29 whose local government area could, under the plan, be affected by a <i>dam hazard</i> . |
| Notice Response | A dam owner's written response to a notice following an assessment of an EAP by a local government or <i>district group</i> . |

| Term | Definition |
|-------------------|---|
| Referable Dam | <p>A dam, or a proposed dam after its construction, will be a referable dam if:</p> <ul style="list-style-type: none"> • a failure impact assessment of the dam, or the proposed dam, is carried out under the Act, AND • the assessment states the dam has, or the proposed dam after its construction will have, a category 1 or category 2 failure impact rating, AND • the chief executive has, under section 349 of the Act, accepted the assessment. <p>Also, a dam is a referable dam if:</p> <ul style="list-style-type: none"> • under section 342B of the Act, the owner of a dam is given a referable dam notice and, before the effective day for the notice, does not give the chief executive a failure impact assessment for the dam, AND • the chief executive has not, under section 349 of the Act, accepted a failure impact assessment of the dam. |
| Relevant Entity | <p>Means each of the following under the EAP for the dam:</p> <ul style="list-style-type: none"> • the persons who may be affected, or whose property may be affected, if a <i>dam hazard event</i> or <i>emergency event</i> were to happen for the dam, e.g. the owners of parcels of farm land adjacent to the dam or residents of a township • each local group and district group for the EAP • each local government whose local government area may be affected if a dam hazard event or emergency event were to happen • the chief executive • another entity the owner of the dam considers appropriate, e.g. the QPS. |
| Activation Levels | <p>The four levels of EAP activation are:</p> <ul style="list-style-type: none"> • Alert: A heightened level of vigilance due to the possibility of an event occurring. No further action may be required; however, the situation should be monitored by someone capable of assessing the potential of the threat. Moving to an Alert level indicates the dam owner is getting ready to activate the Lean Forward level of the EAP if the situation deteriorates. (Note: for Flood Operations, resources are mobilised, personnel are activated, and operational activities commenced at alert level when the dam level is rising). • Lean Forward: An operational state characterised by a heightened level of situational awareness of an impending disaster event and a state of operational readiness. Disaster coordination centres are on standby and prepared but not activated. • Stand Up: The operational state where resources are mobilised, personnel are activated, and operational activities commenced. Disaster coordination centres are activated. The dam owner needs to provide an Emergency Event Report (EER) in accordance with the provision of the Act. • Stand Down: Transition from responding to an event back to normal core business and/or continuance of recovery operations. There is no longer a requirement to respond to the event and the threat is no longer present. <p>The movement through these levels of activation is not necessarily sequential. It should be applied with flexibility and adaptability and be tailored to the location and event. Triggering one of these levels of activation may not necessarily mean a similar activation of LDMGs or DDMGs.</p> |

| Term | Definition |
|---|---|
| Bureau of Meteorology Flood Level Classifications | <p>The three levels of flooding are:</p> <ul style="list-style-type: none"> • Minor flooding: This causes inconvenience such as closing of minor roads and the submergence of low-level bridges and makes the removal of pumps located adjacent to the river necessary. • Moderate flooding: This causes the inundation of low-lying areas requiring the removal of stock and/or the evacuation of some houses. Main traffic bridges may be closed by flood waters. • Major flooding: This causes inundation of large areas, isolating towns and cities. Major disruptions occur to road and rail links. Evacuation of many houses and business premises may be required. In rural areas widespread flooding of farmland is likely. |
| Chemical Spill/Toxic Condition | The contamination of water in the storage of the dam that could create a dam hazard. |
| Concurrent Flooding | Flood flows downstream of a dam that are not a result of dam outflows, for instance those from adjacent catchments or from the sea, and which occur in the same period as downstream releases or flooding from the dam. |
| Dam Crest Failure | <p>Dam crest flood is when failure occurs during a flood event with the water level at the crest of the non-overflow section of the dam embankment:</p> <ul style="list-style-type: none"> • for an embankment dam, is the lowest point of the embankment crest • for a concrete dam, is the level of the non-overflow section of the dam, excluding handrails and parapets if they do not store water against them • for a concrete faced rockfill dam, is the lowest point of the crest structure. |
| Dam Failure | Dam failure is the physical collapse of all or part of a dam or the uncontrolled release of any of its contents. |
| Downstream Releases | Downstream releases are outflows from the dam made through appurtenant structures such as spillways or outlet works that are in accordance with the design of the dam. |
| Earthquake | <p>A sudden release of energy in the Earth's crust or upper mantle, usually caused by movement along a fault plane or by volcanic activity, resulting in the generation of seismic waves that can be destructive. The potential consequences of an earthquake include:</p> <ul style="list-style-type: none"> • settlement, sliding, or overturning of spillway in the dam wall • initiation of seepage lines in the foundations or abutments that could lead to piping damage and potential inoperability of appurtenant works. |
| Flood Release | A flood release from a dam occurs when catchment inflows raise the storage level above the Full Supply Level (FSL) resulting in a discharge from the spillway of the dam. |
| Piping | Internal scour caused by the water flow and seepage that occurs through earth dams, dam foundations, or dam abutments. The internal scour can lead to the formation of a pipe, which can lead to a failure of the dam. |
| Plane Strike or Other Impact | The impact of a plane, meteorite, or other high-energy item on or in close vicinity of a dam that could damage the dam structure or create a wave that could overtop the dam. |

| Term | Definition |
|---|---|
| Probable maximum flood | Probable maximum flood is the flood resulting from probable maximum precipitation coupled with the worst catchment conditions that can be realistically expected. |
| Probable Maximum Precipitation | Probable maximum precipitation is the theoretical greatest depth of precipitation physically possible based on generalised methods. |
| Probable Maximum Precipitation Design Flood | Probable maximum precipitation design flood is the flood resulting from probable maximum precipitation coupled with standard catchment conditions that can be expected. |
| 'Sunny Day' Failure | 'Sunny day' dam failure is where the failure occurs at the full supply level and there is no concurrent rain associated flooding. |
| Terrorist Activity | A deliberate attempt to damage or fail a dam. |

2. Introduction

2.1 Context

Under the *Water Supply (Safety and Reliability) Act 2008* (the Act), the owner of a referable dam must have an approved EAP for the dam. Referable dams, by definition, would put lives at risk if they were to fail.

This EAP has been prepared in accordance with Chapter 4 of the Act. The content requirements for EAPs are contained in section 352H of the Act.

Summary of legal requirements – Section 352H

Section 352H(1) of the Act requires that the EAP must identify each dam hazard for the dam; and for each of these dam hazard types (e.g., flood operations, or chemical spill/toxic conditions):

1. identify the area likely to be affected by a dam hazard event or emergency event arising from the dam hazard; and
2. identify each circumstance that indicates a material increase in the likelihood of the dam hazard event or emergency event happening; and
3. state when and how the owner of the dam plans to warn persons who may be harmed, or whose property may be harmed by an event caused by the dam hazard, if one happens, and/or there is a material increase in the likelihood of an occurrence, including the order of priority in which the persons or categories of persons are to be warned; and
4. state when and how the owner plans to notify the relevant entities for the dam, if a dam hazard event or emergency event happens or, there is a material increase in the likelihood of such an occurrence, including the order of priority in which the relevant entities are to be notified; and
5. state the actions the owner of the dam plans to take in response to a dam hazard event or emergency event.

In accordance with section 352H(2) of the Act, the EAP may provide for the dam owner to make arrangements with a relevant entity for warnings to be given by the relevant entity on behalf of the dam owner in appropriate circumstances.

Section 352HA of the Act states that before giving the chief executive an EAP, the owner of the dam must give a copy of the plan to each local government whose area may be affected by a dam hazard identified in the plan; and each district group for the plan.

Section 352HB of the Act states that the local government must assess the EAP for consistency with its disaster management plan. In its assessment, the local government must consult with the local district group for the plan.

Within 30 business days of receiving the EAP, the local government must give the owner of the dam a notice, which states whether it considers the plan is consistent with its disaster management plan; and if not, give reason why it considers the EAP is not consistent. The EAP must include any such notices, provided to the owner of the dam by a local government (or district group); and any responses which the owner gives to these notices. Section 352H(1) further stipulates that an EAP must include any other relevant matter prescribed by regulation.

The local government whose area may be affected by a dam hazard for Ross River Dam has been assessed as **Townsville City Council (TCC)**.

Section 352HC of the Act states that a district group may review the EAP for consistency with its disaster management plan. The district group for Ross River Dam is **Townsville District Disaster Management Group (DDMG)**. TCC has provided the DDMG with a copy of the EAP for review.

2.2 Purpose

The purpose of this EAP is to:

- Manage the risk of harm to persons or property if a dam hazard event or emergency event for the dam happens.
- Identify dam hazards that could occur at Ross River Dam and the area likely to be affected for each hazard.
- Prescribe emergency actions taken and responding to dam hazards and notifying relevant entities.

It is possible for more than one dam hazard to exist at Ross River Dam at the one time. In such a circumstance, it may be necessary to act on the procedures within separate sections simultaneously.

2.3 Scope

The Ross River Dam EAP covers:

- Dam hazards evaluated within TCC Dam Safety Management Program
- Details about the dam that are relevant to a dam hazard
- Identification of circumstances that indicates a material increase in the likelihood of a dam hazard
- Triggers for activation of a tiered response to dam hazards
- Roles and responsibilities in responding to a dam hazard
- Notification, warning, and communication protocols
- Inspection, monitoring, and reporting protocols during emergencies
- Other relevant information that may assist with identifying the area affected by a dam hazard, and the management of such hazards.

2.4 Training

- TCC is committed to ensuring all staff have the necessary knowledge and training to perform their duties safely and competently. Specific pre wet season training is undertaken annually in November and staff with responsibilities under this EAP shall undergo training at various times throughout the year.
- During July to September each year, RRD staff carry out checks on stores, supplies of fuel, and currency of EAP information i.e. contact details for individuals.
- Annual EAP training that is carried out on site shall include DDO, DSTDM, and other appropriate TCC staff as required. This training includes walkthroughs of new changes, scenario (role play) and Q & A to check the knowledge and competency of all those who attended.
- Annual disaster exercises are conducted in the LDCC with the IC, FODM
- New RRD employees shall also be familiarized with the EAP and any responsibilities under the EAP upon commencement with TCC.
- Additional competency requirements and managed in accordance with TWW GP0088 – Training and Competency Procedure.

2.5 Dam Emergency Organisation

The Ross River Dam emergency management framework utilises the Townsville City Council (TCC) management hierarchy in liaison with the Local Disaster Management Group (LDMG) and other specialized dam safety expert input as illustrated in Figure 1 below.

Decisions / Accountability and Ownership

TCC / WRR Ross River Dam Emergency Response Structure

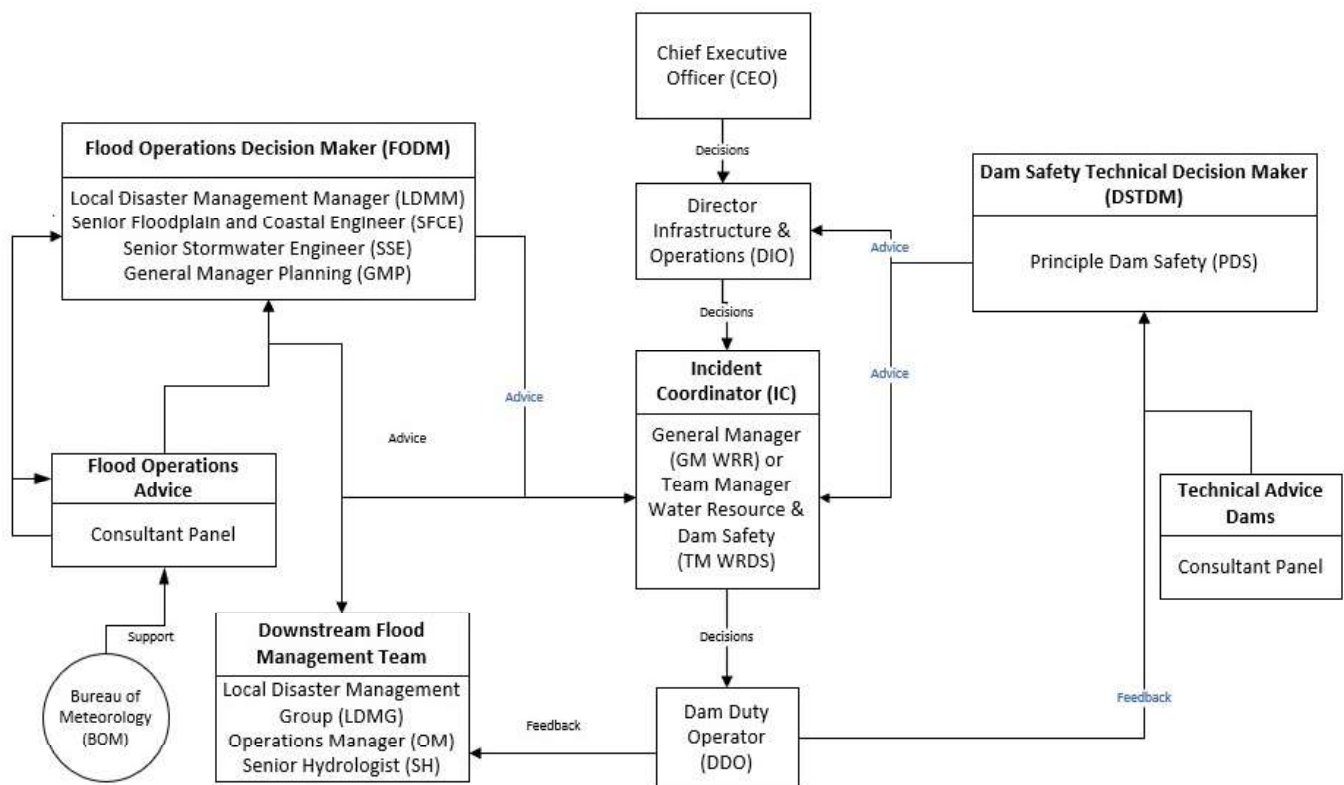


Figure 1 - RRD TCC Emergency Response Organisation

Key aspects of the emergency management framework include:

- Central to the above framework is the role of Incident Coordinator (IC), for any dam hazard at a dam. The IC will maintain overall responsibility for managing the dam hazard.
- The IC is responsible for the decision to activate the EAP. Should the IC be unavailable, the Dam Duty Officer (DDO) is responsible for the decision. If the IC loses all communications during a dam hazard, then as a fail-safe position, the DDO will assume the duties and responsibility of the IC. However, loss of communications could result in some communication processes defined in this EAP not being carried out.
- In-house and external engineering and technical specialists will provide advice to the IC, and DDO on an as needs basis.
- The Flood Operations Decision Maker (FODM) and Dam Safety Technical Decision Maker (DSTDM) will provide flood and dam engineering advice respectively during a dam hazard. Such advice will be provided within an established framework of Standing Operating Procedures (SOPs), models, standards, and manuals. This is an advisory role only and does not diminish the decision responsibility of the IC, or DDO.
- If circumstances develop during a dam hazard that exceeds the established framework, it will be necessary to escalate to either the FODM or DSTDM.
- In some circumstances these decision-making roles may need to direct those in the direct chain of command. These decision-making roles are providing direct engineering supervision to the advisors through the established framework of SOPs, models, standards, and manuals or through direct supervision.

2.6 Community Information

- TCC hosts “Get Ready Townsville” an annual disaster community event in November every year. As part of this event a specific Dam and Flooding stall is run with staff to discuss the role of the EAP and how water releases will impact the downstream residents. An emergency event information sheet is made available to the public showing flood maps for Ross River and location of evacuation centres.
- A copy of the Ross River approved EAP is available to the public on the Townsville City Council website along with answered FAQ and historical dam information.

2.7 Stages of Escalation

This EAP is activated using an escalation model based on the following levels:

| | |
|---------------------|--|
| Alert | <ul style="list-style-type: none"> • A heightened level of vigilance due to the possibility of an event occurring. It will tend to require increased monitoring with the frequency of monitoring being dependent upon the rate of development of the potential failure condition. • During the ALERT level of EAP activation, the need for, and the frequency of situational reports should be discussed with the relevant Disaster Management Group. • During Flood Operations, resources are mobilised, personnel are activated, and operational activities commenced at alert level when the dam level is rising. • No further action may be required; however, the situation may need to be monitored by someone capable of assessing the potential of the threat. |
| Lean Forward | <ul style="list-style-type: none"> • An operational state characterised by a heightened level of situational awareness and a state of operational readiness. The disaster management group and dam operational staff are placed in a state of operational readiness to move to the “Stand-Up” level of activation in the event of an emergency event occurring or to mitigate the consequences of such an event. • It will require increased monitoring with the frequency of monitoring being dependent upon the rate of development of the emergency condition. Situational reports to the relevant DMG should continue as previously arranged or otherwise requested. Personnel at the Dam should be on standby, ready to move to the Stand-Up level of activation in the event of an emergency event occurring or to mitigate the consequences of such an event. |
| Stand Up | <ul style="list-style-type: none"> • An operational state where resources are mobilised, personnel are activated, and operational activities are commenced as part of the EAP activation in response to an emergency event occurring or the need to mitigate the consequences of such an event occurring. • Any works that may become necessary at the dam site to minimise the risk of dam failure or minimise the consequences of failure should be undertaken. • Situational reports should be provided to the relevant DMG and Dam Safety Regulator (DSR) according to agreed timelines. Activation of this level of response will trigger the requirement to develop and Emergency Event Report (EER) in accordance with the provisions of the Act. |
| Stand Down | <ul style="list-style-type: none"> • Transition from responding to event back to normal core business and/or continuance of emergency recovery operations. • The movement through these levels of activation is not necessarily sequential and should be applied with flexibility and adaptability and be tailored to the location and event. • Triggering of one of these levels of activation may not necessarily mean a similar activation of relevant DMG’s however the provision of information to relevant group members regarding the risks associated with a pending hazard impact should still occur. • There is no longer a requirement to respond to the event and the threat is decreasing. |

Movement through these levels of activation is not necessarily sequential and should be applied with flexibility and adaptability and be tailored to the location and event.

3. Dam Details

3.1 General Dam Information

Location: Ross River Dam is located approximately 19km south-southwest of the city of Townsville.

Purpose: Ross River Dam provides water supply to the City of Townsville.

Catchment: 761km² (approx.)

Storage Capacity: The storage capacity at FSL is 233,187ML.

Dam Description: The Dam consists of an 8400m long earth and rock-fill embankment.

Construction: Ross River Dam was constructed by Leighton Holdings by between 1971 and 1974. The Dam was upgraded in 1987 and 2007 when the 3 spillway gates were installed.

Specification: The table below lists general specifications of Ross River dam.

Table 2: Ross River Dam Specifications

| Description | Specification |
|---------------------------------|---|
| Dam type | Earth core rock-fill |
| Full Supply Level (FSL) | EL 38.55m AHD |
| Dam Crest Level (DCL) | EL 48.00m AHD |
| Dam height (m) | 34.4m AHD (from stripped foundation) |
| Total embankment length (m) | 8400m (Crest length) |
| Historical recorded max storage | 43.03m AHD |
| Crest Width | 7.9m Type 1 embankment (Drawing ref. 236551) |
| Crest Width | 6.1m Type 2 embankment (Drawing ref. 236555) |
| Storage | |
| Catchment area | 761km ² |
| Full Supply Level (FSL) | EL 38.55m AHD |
| Storage capacity at FSL | 233,187ML |
| Surface area (at FSL) | 5690Ha |
| Normal Operating range | EL23.7m – 38.55m AHD |
| Minimum Draw Down Level | EL 23.7m AHD |
| Spillway | Mass Concrete post tensioned Gravity Structure with 3 hydraulically operated steel radial gates, concrete piers and concrete service bridge |
| Spillway crest level | EL 34.656m AHD (fixed crest level) |
| Gate Operating Trigger Level | EL 38.65m AHD |
| Spillway gates | Width – Gates 1 & 3 x 11.79m, Gate 2 x 13.00m Height (face length) – 5.35m Height (vertical in closed position) – 4.80m <i>Operated by hydraulic rams</i> |

| Description | Specification |
|--|---|
| Spillway crest length | 36.6m (2x11.8 m, 1x13m, with 2x1.5m piers) |
| Spillway design capacity (at EL 47.50m – overtopping imminent PMF Inflow Peak) | 3,655m ³ /s |
| PMF Inflow Peak | 15,800m ³ /s |
| PMF Outflow Peak | 3,880m ³ /s |
| Outlet works | |
| Outlet capacity (max) | 2 x cone valves – 13.6m ³ /s |
| Type of Intake | Dry well in Left Bank Monolith LH5 |
| Control | Electrical hydraulic operation with manual override |
| Provision for Selective Withdrawal | 7x1.5m Dia Butterfly Valves at Selective Levels |
| Outlet Conduit | 1524 mm Dia Cement Lined MS Pipe |
| Length of Outlet Conduit | 47.5m |
| Outlet Guard Valves | 2x1067 mm Dia Butterfly Valves |
| Regulator Valves | 2x840 mm Dia Fixed Cone Dispersion Valves |
| Valve House | R.C. Structure on Left bank Monolith LH9 |
| Main to Ross Pump Station | 1524mm |

All levels are to Australian Height Datum (AHD).

Conversion for Dam is AHD = ((State Datum in feet x 0.3048) + 0.303)m

3.2 Population at Risk

Ross River Dam is classified as 'Extreme' for both the 'Sunny Day' and the Incremental Flood Hazard categories (Population at Risk, PAR > 1000) in accordance with Guidelines on the Consequence Categories for Dams (ANCOLD, 2012). It is classified as a Category 2 dam under the QLD Dam Safety Management Guidelines February 2002, with a PAR exceeding 100. (1)

The estimated PAR for flood peak and Sunny Day Failure scenarios is listed in Table 3:

Table 3: Failure Scenarios and anticipated PAR

| Scenario | Weighted PAR |
|---|--------------|
| 48.1 mAHD Flood Overtopping Failure Chainage 500m | 134,070 |
| 43 mAHD Flood Induced Piping Failure Chainage 500m | 117,104 |
| Sunny Day Breach Reservoir Level RL 38.55 Chainage 500m | 79,481 |

3.3 Spillway Adequacy

The spillway is capable of passing routed floods in such a manner that any damage that occurs to the crest, chute or stilling basin will not threaten the safety of the spillway structure. Under extreme floods some damage is acceptable provided it does not threaten the safety of the dam.

Hydraulic studies for the spillway considered flows controlled by the spillway gates and free overflow discharges up to a dam crest flood (DCF) level of 47.5 m. Flow conditions up to a dam crest level of 48.5m were also considered to allow for a potential raising of the dam crest to accommodate inflows up to the PMF. (2)

Notes: 1. Ross River Dam Risk Assessment Review, GHD 122553842-REP-0, 8 February 2023

2. NQ Water, Ross River Dam Upgrade, Stages 2 to 5, Spillway and Stilling Basin Design Report, September 2005.



3.4 General Arrangement

Figure 2 - Ross River Dam - Spillway General Arrangement

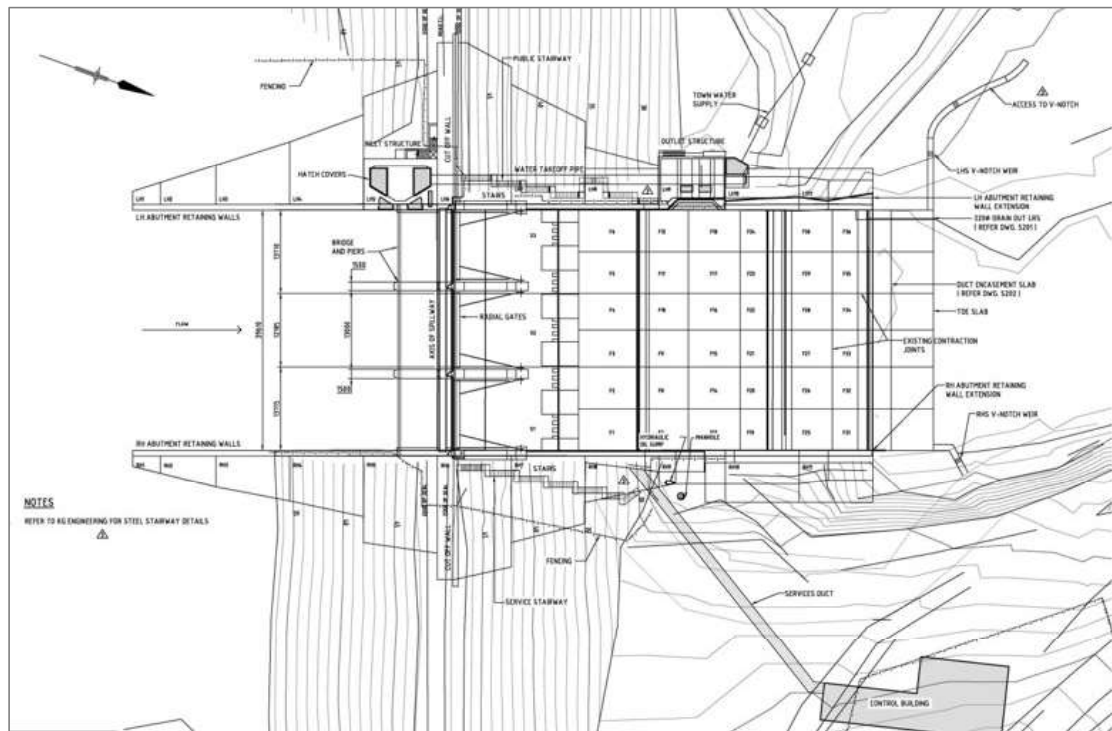


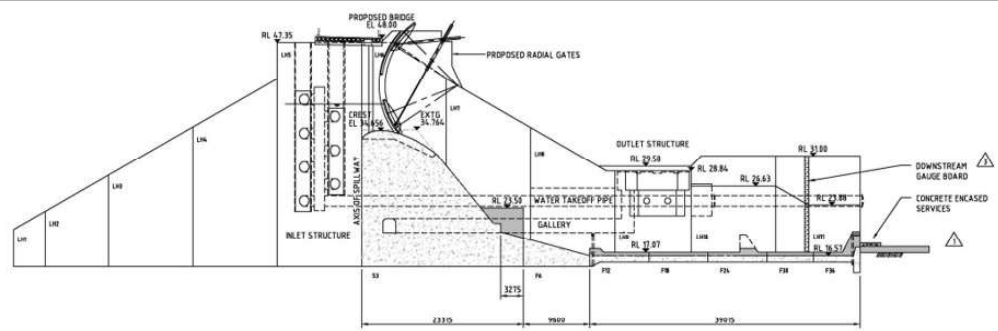
Figure 3 - Ross River Dam - Sectional Elevations, LH & RH Abutments – Spillway General Arrangement



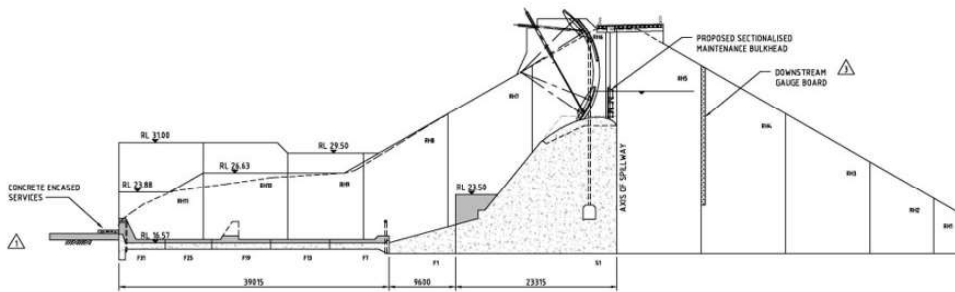
Authorised by: General Manager WRR N00636

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SECTIONAL ELEVATION LEFTHAND ABUTMENT
SCALE 1: 250



SECTIONAL ELEVATION RIFTHAND ABUTMENT
SCALE 1: 250

3.5 Emergency Inspections and Monitoring

The Ross River Dam has been designed to conform to modern design standards, so that its failure is highly unlikely. In order to maintain the dam in a safe condition and promptly detect any dam hazards, the following is applicable to Ross River Dam.

3.5.1 Inspections

- **Routine Visual Inspection:** Conducted daily as per the ANCOLD Guidelines or as directed by the DSTDM
- **Detailed Inspection:** Conducted annually
- **Comprehensive Inspection:** Conducted 5-yearly

3.5.2 Instrumentation and monitoring

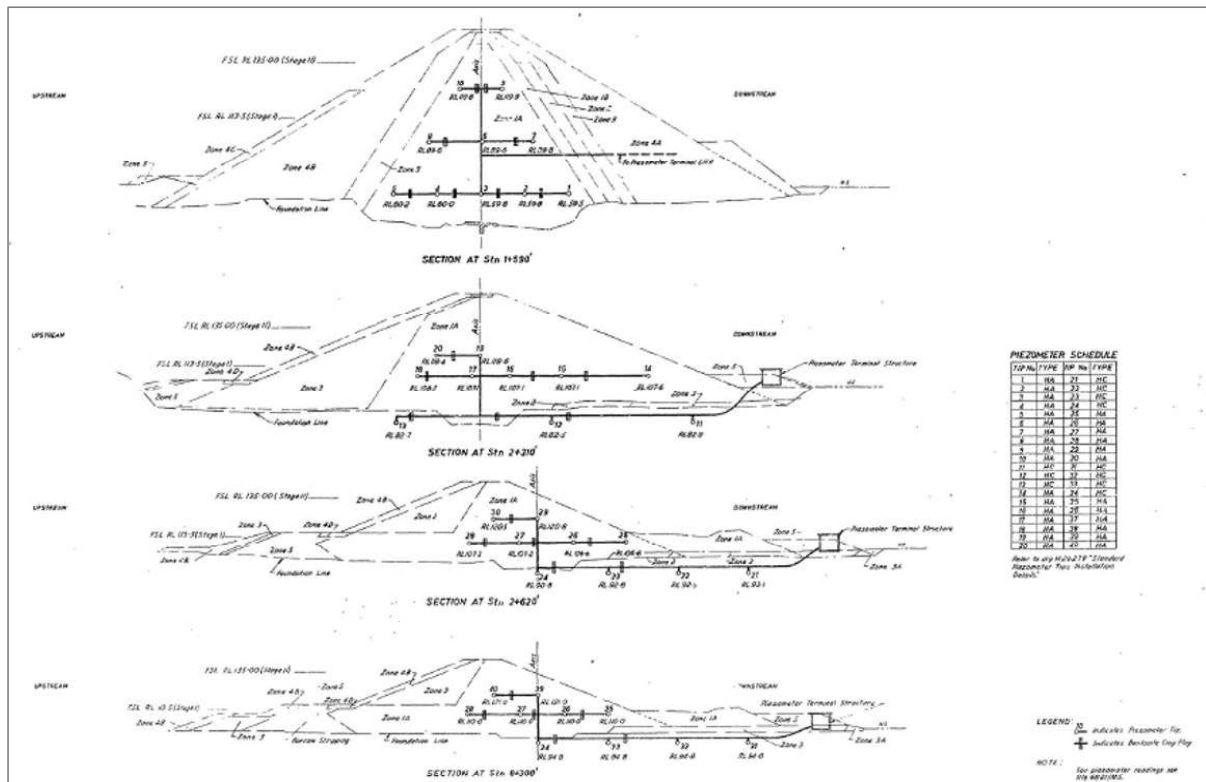
To confirm the structural behaviour and safety of the embankment, the following instrumentation was installed, and is monitored, at Ross River Dam.

| Main Dam | |
|------------------------|---|
| | 26 Surface Movement Stations |
| | 3 x V-Notch Weirs Left D/S Wall – manual measurement Right D/S Wall – manual measurement Gallery – manual measurement 3 x Rectangular-Notch Weirs Main Embankment Seepage, chainage 650m to 8300m – automated bubbler Carpark and Ramp, chainage 610m to 635m – automated bubbler Seepage pipe outlet – manual measurement |
| | |
| | 4 x Survey Control Stations |
| Observation Bores x 10 | |



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Figure 4 - Ross River Dam Piezometer Locations

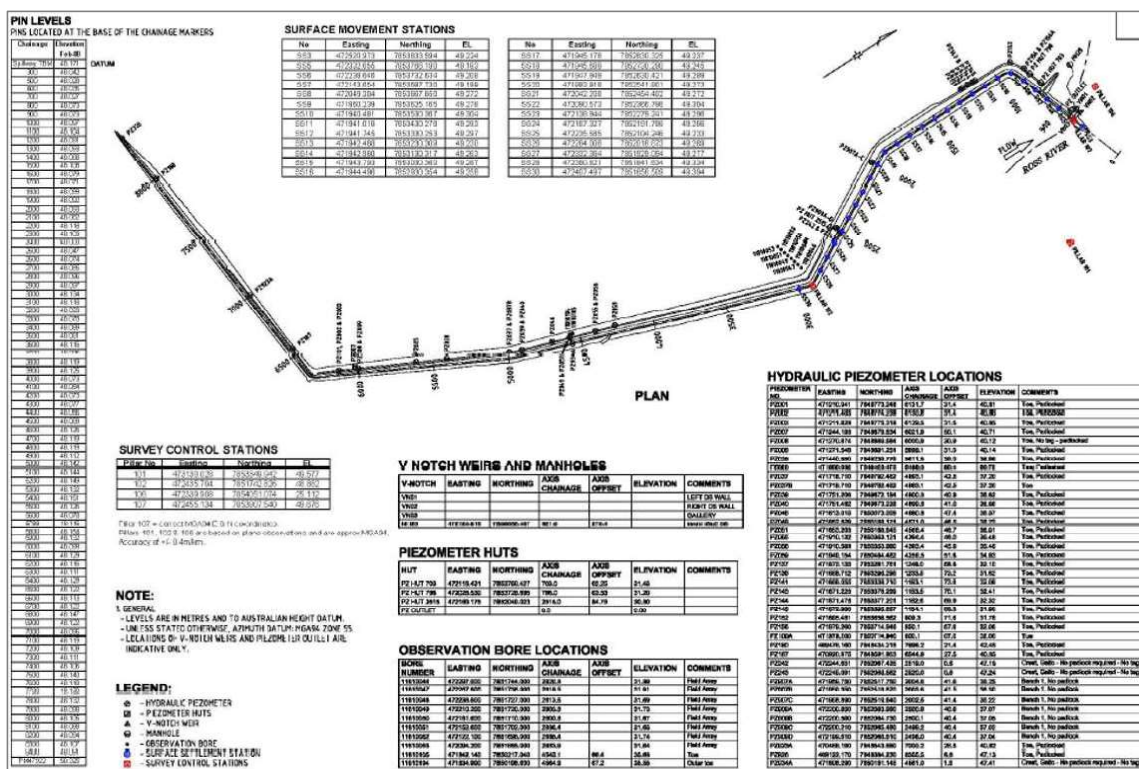




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Figure 5-Ross River Instrumentation Layout



4. Roles and Responsibilities

| Roles and Responsibilities | Position holder ¹ |
|--|------------------------------|
| <p>Principle Dam Safety (PDS)</p> <ul style="list-style-type: none"> • Authorise the issuing of EAPs, SOPs and O&M Manuals and amendments. • Facilitate Dam Safety Training Courses for Dam Operators and other staff as appropriate and ensure that all staff required to undertake Dam Safety work are trained and accredited. • Ensure that risks identified in Annual Inspections or other technical reports undertaken in relation to Dam Safety are Included in the EAP. • Ensure visual inspections and instrumentation monitoring frequencies conform to ANCOLD Guidelines. • Ensure all Dam Safety work orders, work instructions and lesson learned outcomes are fully implemented. • Ensure requirements of the Dam Safety Condition Schedule are met. • Ensure the work instructions are correct and the Logbooks, SOPs, Data Books, and EAP is reviewed annually as per the Dam Safety Condition Schedule • Undertake and prepare the 5 yearly Comprehensive Inspection Reports with suitably qualified personnel within the time specified in the Dam Safety Condition Schedule and ensure work orders are created for recommendations and work is undertaken as required. • Undertake Annual Inspections and prepare reports within the time frames specified in the Dam Safety Condition Schedule and ensure work orders are created for recommendations and work is undertaken as required. • Review the Dam Safety Instrumentation Database and evaluate data to verify the structural integrity of the dam on a regular basis and maintain a spread sheet for verification for audit and quality control. • Liaise with the Dam Safety Regulator. • Record communications, notifications and observations as required. | PDS |
| <p>Technical Advisor</p> <ul style="list-style-type: none"> • Analyse the situation and provide expert technical advice • Discuss issue with peers and other technical experts and make sound decisions to mitigate risk • Determine response to incidents and emerging issues • Record communications, notifications and observations as required. | Consultant |
| <p>Note 1: May be undertaken by one person, or jointly between the following personnel, depending on availability and/or dam hazard</p> | |

| Roles and Responsibilities | Position holder ¹ |
|--|--------------------------------------|
| <p>Dam Safety Technical Decision Maker (DSTDM)</p> <ul style="list-style-type: none"> Analyse the situation and provide expert technical advice in relation to Dam Safety Discuss Dam Hazard with peers and other technical experts and make sound decisions to mitigate risk. Determine response to incidents and emerging issues. Ensure the EAP is implemented appropriately and carry out the DSTDM role as required. Maintain current RPEQ accreditation. Liaise with Regulator as required. Provide a 24/7 contact. <p>Record communications, notifications and observations as required.</p> | PDS |
| <p>Flood Operations Decision Maker (FODM)</p> <ul style="list-style-type: none"> Provide hydrological advice in relation to predicted and actual dam outflows. Ensure model outputs are checked and approved. Ensure the EAP is implemented appropriately and carry out the FODM role as required. Record communications, notifications and observations as required. | Various personnel as per FODM roster |
| <p>Incident Coordinator (IC)</p> <ul style="list-style-type: none"> Activate the EAP Ensure the EAP is implemented appropriately. Liaise with the LDMG or proxy. Liaise with DSTDM and make any necessary decisions relating to dam operational matters during times when this document is triggered, including during the period in the lead up to events. Provide a 24/7 contact. Record communications, notifications and observations as required. | GM WRR or TMWRDS |
| <p>Dam Duty Officer (DDO)</p> <ul style="list-style-type: none"> Ensure the EAP is implemented appropriately and carry out the DDO role as required. Take direction from the DSTDM and IC as requested. Arrange immediate site inspection and make informed assessment of the situation. Escalate any issue not covered in the EAP or where actions are not clear. Record communications, notifications and observations as required. | Various personnel as per DDO roster |
| <p>Townsville City Council</p> <p>Council has legislated local government functions, as per Section 80 of the Qld Disaster Management Act (2003). These include:</p> <ul style="list-style-type: none"> Ensure it has a disaster response capability. Approve its local disaster management plan. Ensure information about an event or a disaster in its area is promptly given to the district disaster coordinator for the disaster district in which area it is situated. Perform other functions given to the local government under the Act. Must assess (in consultation with its LDMG) the EAP for consistency with the Local Disaster Management Plan. | TCC |

| Roles and responsibilities | Position holder ¹ |
|---|-------------------------------|
| <p>Disaster Management Groups/Personnel - (In addition to requirements outlined in the Qld. Disaster Mgmt. Act 2003). The agreement of the below is sought through the review and approval of this document.</p> <p>LDMG</p> <ul style="list-style-type: none"> Assist to ensure community education around messaging and impacts of EAP related events is undertaken and continually improves. Work with TCC to ensure the EAP is regularly exercised. Identify and coordinate the use of manpower and resources that may be required for an EAP event. Identify and provide advice to DDMG about support services required by the LDMG to manage an EAP event. Provide reports and make recommendations to the relevant DDMG about matters relating to EAP events and any support required. <p>QFES</p> <ul style="list-style-type: none"> Work with LDMG and TCC to ensure Emergency Alerts polygons are prepared, stored and tested. <p>DDMG</p> <ul style="list-style-type: none"> DDMG may review plan with consistency with the District Disaster Management Plan Ensure the communication provided under this EAP is consistent with the District Disaster Management Plan. | <p>LDMG DDMG QFES</p> |
| <p>Dam Safety Regulator (DSR)</p> <ul style="list-style-type: none"> Liaise with relevant Minister on necessary actions. Approve this document as required under legislation. Liaise with Chief Executive as required in administering (regulating) the Water Supply (Safety and Reliability) Act 2008. | <p>DSR</p> |

5. Dam Hazard - Flood Operations

5.1 Overview

The emergency action described in this section (dam hazard—flood operations) relates to:

- A dam hazard where natural catchment inflows fill Ross River Dam to FSL 38.55m and the rate of inflow exceeds the capacity of the outlet works. The spillway will then discharge water downstream into the Ross River. These flood flows can create a dam hazard event. Inflows will also cause the storage to temporarily rise to above the full supply level of the storage. Note:
 - The greater the rate of inflow, the higher the storage will rise and the greater dam hazard to residents.
 - The higher the storage level rises, the greater the loads on the dam structure.
 - Although unlikely, the greater the loading, the higher the likelihood of a dam failure.
 - Typically, the level of surveillance is increased during flood operations (refer tables in this section).
 - Spillway discharge from the dam where there have been no indications that a dam failure may be initiating or in progress.

The area likely to be affected by this emergency event is shown in Appendix B2, *Extent of Inundation for Spillway Flow* map for incremental discharges up to 4000m³/s.

Gate System Control during Mobilisation¹

When the DDO is required to mobilise to site, they shall perform the following:

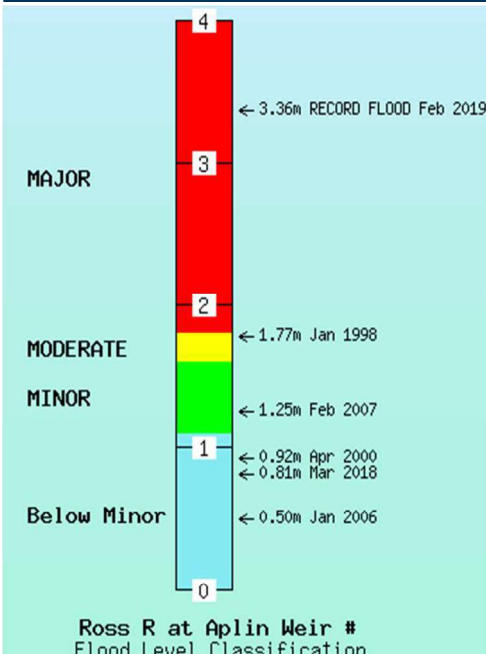
- Log in to SCADA system and confirm HMI communications by switching all gates to AUTO in accordance with SOP001;
- The gates and equipment shall remain in AUTO as per SOP016 and the operator will remain on site until relieved at the end of their 12-hour shift or the Stand Down emergency action is triggered by the IC.

The following steps shall be taken to ensure continuous monitoring of the Ross River Dam during mobilisation and relocation:

- The IC or DSTDM may log into the SCADA system and remotely monitor the dam until the DDO arrives on site.

Note: 1. Dam gate switches must be switched to auto at Dam before the above control can happen.

Table 4: Flood Classification Triggers

| | Flood Classification Level | Height at Aplins Weir (m) | Estimated corresponding discharge from RRD (m ³ /s) |
|--|----------------------------|---------------------------|--|
|  <p>MAJOR</p> <p>MODERATE</p> <p>MINOR</p> <p>Below Minor</p> <p>Ross R at Aplin Weir # Flood Level Classification</p> | Major | | 733 |
| | Moderate | 1.6 | 440 |
| | Minor | 1.1 | |

The following table shows historical floods experienced at Ross River Dam.

Table 5: Historical floods experienced at Ross River Dam (post Gate upgrade)

| Flood rank | Date | Peak Height EL (m) |
|------------|------------------|--------------------|
| 1 | 03 February 2019 | 43.03 |
| 2 | 21 March 2012 | 40.73 |
| 3 | 24 February 2009 | 40.54 |
| 4 | 12 February 2008 | 39.84 |
| 5 | 03 February 2011 | 39.60 |
| 6 | 31 January 2010 | 39.45 |
| 7 | 4 January 2023 | 38.96 |
| 8 | 23 March 2010 | 38.94 |
| 9 | 14 April 2014 | 38.69 |



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5.2 Emergency Actions

In the table below, each level of activation includes both its own actions and the actions of any lower level, unless those lower-level actions are superseded. Stand Up activation levels have been set to coincide with the required EA alerts for downstream residents. Refer to EA alert maps in Appendix A4

5.2.1 Activation Triggers

Table 6: Flood Emergency Activation Trigger Summary

| | | |
|---------------------|--|---|
| Alert | EL 38.45m and rising | 0.1m below FSL |
| Lean Forward | Storage EL 38.65m | Gate Opening trigger level Routine water releases minimal impact downstream |
| Stand Up 1 | Storage above EL 40.75m | Minor flooding for BLACK zones |
| Stand Up 2 | Storage EL 41.50m | Minor flooding for PINK zones Moderate flooding for BLACK zones |
| Stand Up 3 | Storage EL 42.25m | All gates fully open at EL 43 Major flooding BLACK & PINK zones |
| Stand Up 4 | Storage EL 45.50m | Dam begins to back flow through Toopan at EL 46.0m Prepare GREEN zones for Evacuation |
| Stand Up 5 | Dam failure extremely likely OR Storage EL 46.50m | Evacuation of GREEN zone required |
| Stand Down | Storage level FSL 38.55m and falling | |



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5.2.2 Assessment of circumstances (Indication of increase in the likelihood of flood operations)

The DDO will assess the weather and flood warnings daily in accordance with the relevant SOP. The DDO will escalate to the Incident Coordinator (IC) any warnings that have the potential to generate an inflow event in the catchment in the following 24 hours.

The IC will escalate to the FDOM any local intelligence on catchment conditions that could increase the probability of inflows to the dam.

The DDO will determine whether it is reasonably likely that the dam could reach EL 38.45m within the subsequent 24 hours. If so assessed, the IC will trigger the Alert status for flood operations.

5.2.3 Emergency Action Roles

Table 6 to Table 11 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)
- Flood Operations Decision Maker (FODM)

5.3 Manual Operation and Early Releases

Once the EAP has been activated to the lean forward level it is possible to operate in manual mode and open the gates and conduct an early release of up to 350m³/s of water without exceeding the capacity of the river and inundating properties. However, this early release of water was found to have minimal to no impact on the peak flood levels for a major flood.

The decision to operate in manual mode shall only be made by the IC after considering engineering and flooding advice from the DSTDM and FODM on the potential impacts to the dam and community. If operated in manual mode, only early releases will be permitted and all gate opening levels as required in table C3 shall be followed as the water rises to these set levels. The gates shall not be operated in manual mode with the intention of holding back water to minimise downstream flooding as this compromises Dam safety.

The operation of the gates in manual mode, and the release of water before the Dam has reached FSL level of 38.65 is outside the scope of this EAP and is considered an operational release by TCC for gate testing, environmental releases or other reasons.



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Table 7: Flood Operations—DDO Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Up 3 | Stand Up 4 | Stand Up 5 | Stand Down |
|---|--|---|---|--|---|--|--|---|
| Activation Trigger | <ul style="list-style-type: none"> EL 38.45m and rising (0.1m below FSL) | <ul style="list-style-type: none"> Storage EL 38.65m (gate opening trigger level) | <ul style="list-style-type: none"> Storage EL 40.75m | <ul style="list-style-type: none"> Storage EL 41.50m | <ul style="list-style-type: none"> Storage EL 42.25m | <ul style="list-style-type: none"> Storage EL 45.50m | <ul style="list-style-type: none"> Dam failure extremely likely. OR Storage EL 46.50m | <ul style="list-style-type: none"> Storage FSL 38.55m and falling |
| Actions | <ul style="list-style-type: none"> Initiate commencement of 24h roster. Ensure emergency power and other backup systems are checked Check gallery sump pumps to prevent build-up of water in gallery Monitor and record water levels and advise FODM as requested Arrange supplies – min 5 days for 2 people Confirm Sat phone charged and functional Mobilise to site Confirm HMI links operational as per SOP-001 Switch gates to auto control as per SOP016 Confirm FODM arrangements | <ul style="list-style-type: none"> As per previous activation level, AND Maintain situational awareness Seek advice from FODM Visually observe gates and spillway flow at hourly intervals or at any gate movements using form QAF0567 Visually check structure for leaks, movement at 4 hourly intervals using form QAF0544 Check and record seepage in gallery at 4 hourly intervals using form QAF0547; includes photos at marked locations When causeway inaccessible, route over top of dam should be used Undertake instrumentation readings as per SOP-008, or as directed by DSTDM Report unusual readings or observations to DSTDM and IC | <ul style="list-style-type: none"> As per previous activation level, AND Visually monitor reservoir level gauge boards and document hourly If storage level continues to rise at a rate 300mm/d or more, dam should be inspected with full visual surveillance at 4 hourly intervals using form QAF0544 Provide data to FODM as requested Consider adding resource requirements for surveillance | <ul style="list-style-type: none"> As per previous activation level | <ul style="list-style-type: none"> As per previous activation level, AND Visually monitor reservoir level and gates and notify FODM Inspect embankments & mass concrete in accordance with SOP-009 <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Gates fully open at EL 43.00m</p> </div> | <ul style="list-style-type: none"> As per previous activation level, AND | <ul style="list-style-type: none"> As per previous activation level Advise IC/FODM on reaching EL 46.5m & evacuate the vicinity of Dam | <ul style="list-style-type: none"> Return to routine surveillance activities and frequencies inspect dam for any damage identified Forward EER data to IC |
| <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>If loss of Communication with IC and LDMG. DDO to issue warnings in IC communications plan in accordance with Appendix A3, A4 and A5</p> </div> | | | | | | | | |
| | | | | | | <div style="border: 1px solid black; padding: 5px;"> <p>Note: Alert Actions Continued on Next Page</p> </div> | | |



City of
Townsville

Authorised by: General Manager WRR N00636

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Table 7 (continued): Flood Operations—DDO Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Up 3 | Stand Up 4 | Stand Up 5 | Stand Down |
|------------------------|---|--|--|--------------------------------|--|---------------------------------|--|---|
| Activation Trigger | • EL 38.45m and rising (0.1m below FSL) | • Storage EL 38.65m (gate opening trigger level) | • Storage EL 40.75m | Storage EL 41.50m | • Storage EL 42.25m | • Storage EL 45.50m, | • Dam failure extremely likely, OR Storage EL 46.50m | • Storage FSL 38.55m and falling |
| Actions | <ul style="list-style-type: none">Inspect dam daily (or as instructed by DSTDM) & photograph/video and record using approved forms in appendix D and send to IC and DSTDMLog book entries as per SOP-005Undertake site preparations if not already completedRecord all communication | Note: DDO must mobilise to site if any doubt, Dam must be manned. | DDO to work with IC to close access ramp, viewing stairs and platform to public. Coordinate with CMO Traffic Controllers and QPS | | Note: Gates fully open at EL 43.00m | | | |
| Internal Notifications | 1.IC 2.DSTDM | 1.As previous activation level | 1.As previous activation level | 1.As previous activation level | 1.As previous activation level | 1. As previous activation level | 1. As per previous activation level | 1.DSTDM (at end of event) 2.SMS date and details of event completion |
| External Notifications | 1.Not applicable | 1.As previous activation level | 1.As previous activation level | 1.As previous activation level | 1.As previous activation level | 1. As previous activation level | 1.As previous activation level | 1.As previous activation level |



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Table 8: Flood Operations—IC Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Up 3 | Stand Up 4 | Stand Up 5 | Stand Down |
|------------------------|--|--|--|---|---|--|--|---|
| Activation Trigger | • EL 38.45m and rising (0.1m below FSL) | • Storage EL 38.65m (gate opening trigger level) | • Storage EL 40.75m | • Storage EL 41.50m | • Storage EL 42.25m | • Storage EL 45.50m | • Dam failure extremely likely. OR Storage EL 46.50m | • Storage FSL 38.55m and falling |
| Actions | <ul style="list-style-type: none">• Liaise with DSTDM• Liaise with LDMG re: situation• Obtain catchment conditions from DDO/FODM• Advise DDO of anticipated rainfall/inflows• Issue incident alert (once only on activation of EAP)• Record all communication | <ul style="list-style-type: none">• As per previous activation level, AND• Ensure all abnormal observations or damage have been reported to IC and DSTDM• Monitor for storm surge forecast | <ul style="list-style-type: none">• As per previous activation level <div>IC to work with DDO to close access ramp, viewing stairs and platform to public. Coordinate with CMO Traffic Controllers and QPS</div> | <ul style="list-style-type: none">• As per previous activation level, AND | <ul style="list-style-type: none">• As per previous activation level <div>Note: Gates fully open at EL 43.00m</div> | <ul style="list-style-type: none">• As per previous activation level | <ul style="list-style-type: none">• As per previous activation level | <ul style="list-style-type: none">• Deactivate EAP• If required, compile EER and deliver to DSR• Complete Situation Report (final)• Return to routine activities |
| Internal Notifications | 1.DDO 2.LDMG 3.DSTDM 4.FODM | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level |
| External Notifications | 1.D/S Residents 2.DDMG | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level, AND | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level |



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Table 09: Flood Operations—IC Emergency Action

| Activation Level | Trigger for communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|------------------|--|--------------------|---|--|--------------------------|-----------------|
| Alert | • EL 38.45m and rising (preparedness) | 1. LDMG 2. DDMG | • Phone | Describe current situation with dam—What is the event? What is the status? Advise of current storage level | | |
| | | 3. D/S Residents | • None | None | | |
| Lean Forward | • Storage EL 38.65m (gate opening trigger level) | 1. LDMG 2. DDMG | • Phone | Describe current situation with dam—What is the event? What is the status? Advise of current storage level and any known forecasts | | |
| | • Storage EL 38.65m | 3. D/S Residents | • TV, Radio, Social Media, Disaster Dashboard, Roadside Signs | Community messaging will be in accordance with TLDMG Community Information and Warnings Sub Plan and the TLDMG Community Education and Marketing Sub Plan https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | | |
| | • Storage EL 40.25m | | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG | Advice EA 8.1 | BLACK |
| | • Storage EL 40.5m | | • SMS | Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Watch and Act EA 8.2 | BLACK |
| Stand Up 1 | • Storage EL 40.75m | 1. LDMG 2. DDMG | • Phone | Describe current situation with dam—What is the event? What is the status? (storage is greater than flood of record) Advise of current storage level and any known forecasts | | |
| | | 3. D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Emergency Warning EA 8.3 | BLACK |



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Table 9: (Continued) Flood Operations—IC Communication Plan

| Activation Level | Trigger for communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|------------------|----------------------------|--------------------|---------|---|-----------------------------|-----------------------------|
| Stand Up 2 | • Storage EL 41.50m | 1. LDMG 2. DDMG | • Phone | Describe current situation with dam—What is the event? What is the status? Advise of current storage level and any known forecasts | | |
| | Storage EL 41.50m | 3. D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Emergency Warning EA 8.3 | BLACK |
| | Storage EL 41.75m | | | | Advice EA 9.1 | PINK |
| | Storage EL 42.00m | | | | Watch and Act EA 9.2 | PINK |
| Stand Up 3 | 1.Storage EL 42.25m | 1. LDMG 2. DDMG | • Phone | Describe current situation with dam—What is the event? What is the status? Advise of current storage level and any known forecasts | | |
| | | 3. D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Emergency Warning EA 9.3 | BLACK PINK |



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Table 9: (Continued) Flood Operations—IC Communication Plan

| Activation Level | Trigger for communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|------------------|--|--------------------|---|---|------------------------------|---|
| Stand Up 4 | • Storage EL 45.50m | 1. LDMG 2. DDMG | • Phone | Describe current situation with dam—What is the event? What is the status? Advise of current storage level and any known forecasts | | |
| | | 3. D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Emergency Warning EA 9.3 | BLACK PINK |
| Stand Up 5 | • Dam failure extremely likely, OR • Storage EL 46.50m | 1. LDMG 2. DDMG | • Phone | Describe current situation with dam—What is the event? What is the status? Advise of current storage level and any known forecasts | | |
| | • Storage EL 46.50m | 3. D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Watch and Act EA 10.1 | BLACK PINK GREEN |
| | • Dam failure extremely likely | | | | Emergency Warning EA 10.2 | BLACK PINK GREEN |
| Stand Down | • Storage FSL 38.55m and falling | 1. LDMG 2. DDMG | • Phone | Describe current situation with dam—What is the event? What is the status? Advise of current storage level Advise EAP has been deactivated | | |
| | | 3. D/S Residents | • TV, Radio, Social Media, Disaster Dashboard, Roadside Signs | Community messaging will be in accordance with TLDMG Community Information and Warnings Sub Plan and the TLDMG Community Education and Marketing Sub Plan https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | | |



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Table 9: Flood Operations - DSTDM Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Up 3 | Stand Up 4 | Stand Up 5 | Stand Down |
|------------------------|---|--|------------------------------------|------------------------------------|--|------------------------------------|--|---|
| Activation Trigger | • EL 38.45m and rising (0.1m below FSL) | • Storage EL 38.65m (gate opening trigger level) | • Storage EL 40.75m | • Storage EL 41.50m | • Storage EL 42.25m | • Storage EL 45.50m, | • Dam failure extremely likely. OR Storage EL 46.50m | • Storage FSL 38.55m and falling |
| Actions | • Provide technical advice to DDO and IC on as need's basis • Review surveillance reports and determine if any additional responses are required • Record all communication | • As per previous activation level • Liaise with DDO and IC to provide updates. • Confirm level activation based on storm surge forecast | • As per previous activation level | • As per previous activation level | • As per previous activation level <div>Note: Gates fully open at EL 43.00m</div> | • As per previous activation level | • As per previous activation level | • Forward information for EER to IC • Return to routine activities |
| Internal Notifications | 1.DDO 2.IC | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level |
| External Notifications | 1.Not applicable | 1.Dam Safety Regulator | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level |

All communications to IC should be confirmed by email whenever practical



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Table 10: Flood Operations - FODM Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Up 3 | Stand Up 4 | Stand Up 5 | Stand Down |
|------------------------|---|---|------------------------------------|------------------------------------|--|------------------------------------|--|---|
| Activation Trigger | • EL 38.45m and rising (0.1m below FSL) | • Storage EL 38.65m (gate opening trigger level) | • Storage EL 40.75m | • Storage EL 41.50m | • Storage EL 42.25m | • Storage EL 45.50m, | • Dam failure extremely likely. OR Storage EL 46.50m | • Storage FSL 38.55m and falling |
| Actions | • Monitor situation • Extract data from available sources • Update flood models • Update and issue flood operations report • Record all communication | • As per previous activation level | • As per previous activation level | • As per previous activation level | • As per previous activation level <div>Note: Gates fully open at EL 43.00m</div> | • As per previous activation level | • As per previous activation level | • Forward information for EER to IC • Return to routine activities |
| Internal Notifications | 1.IC 2.DDO | 1.As per previous activation level and 2.DSTDM | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level |
| External Notifications | 1.Not applicable | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level |

All communications to IC should be confirmed by email whenever practical

6. Dam Hazard - Chemical Spill/Toxic Conditions

6.1 Overview

The emergency action described in this section relates to:

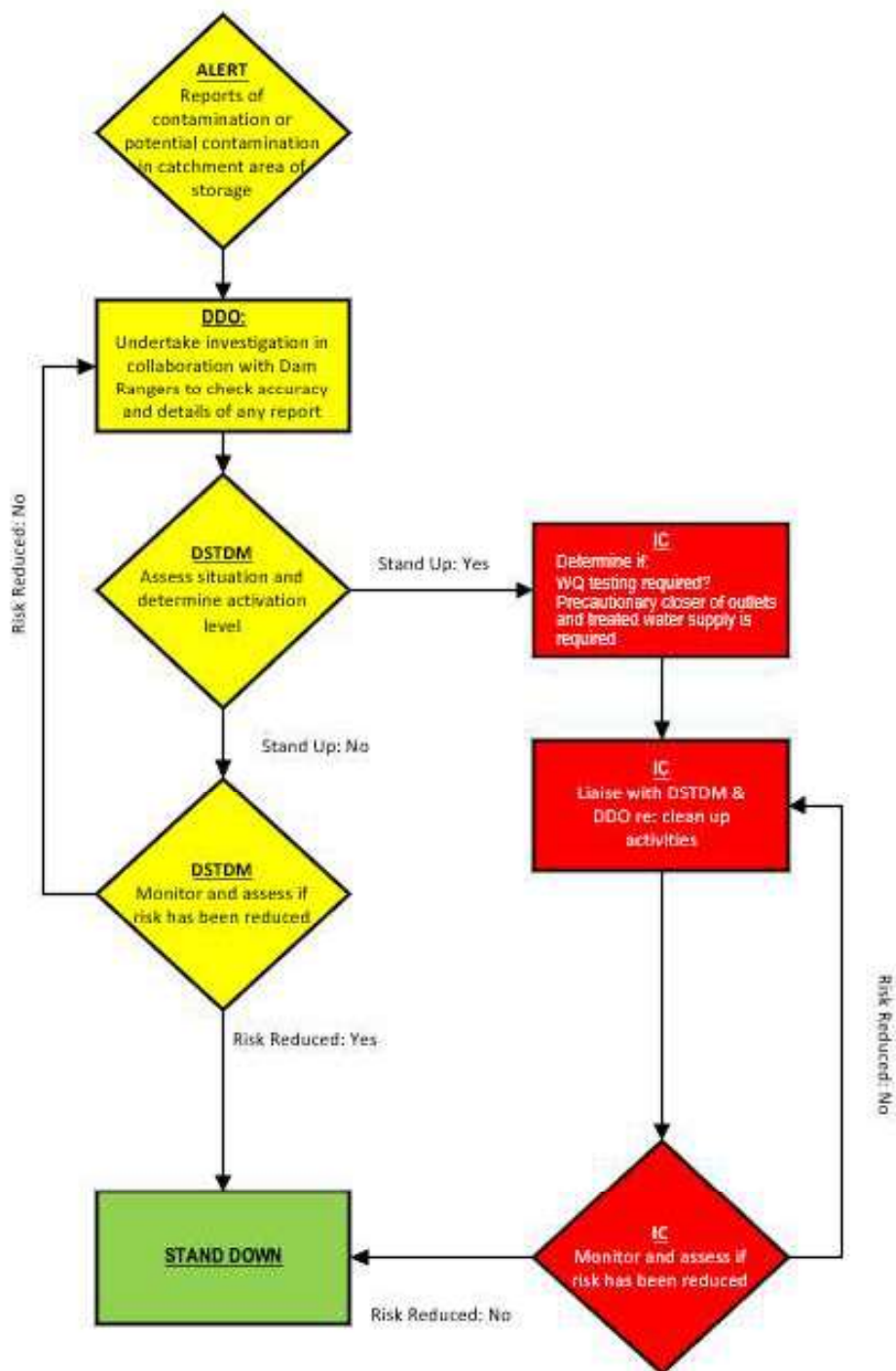
- Presence of substantial volumes of chemicals or other potentially toxic contaminants can create a dam hazard
- Dam hazards occurring due to a traffic or industrial accident, a flood event transporting chemical drums into the storage, or an activity on or near the storage
- Dam hazards impacting urban, domestic, or stock users of water either within or downstream of the storage, or on recreational users
- Maximum area affected by any spill will depend on whether the river is in flood and/or the spillway is discharging. The maximum affected area of any spill would be as indicated by the *PMP Water Levels* maps in Appendix B as an upper limit.

6.2 Emergency Action Roles

Table 12 to Table 16 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)

Figure 6 - Chemical Spill/ Toxic Conditions Flowchart





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Table 11: Chemical Spill/Toxic Conditions -DDO Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up | Stand Down |
|------------------------|--|--|--|--|
| Activation Trigger | <ul style="list-style-type: none">• Reports of contamination or potential contamination in catchment area of storage (excludes normal operating and monitoring of BGA)• Escalated BGA or toxic condition as required | <ul style="list-style-type: none">• Not applicable | <ul style="list-style-type: none">• Confirmation or high probability of a large amount of chemical spill/toxic conditions found in storage/catchment | <ul style="list-style-type: none">• Risk assessment that risk has reduced• Confirmation significant contamination has not occurred• All clear WQ test result |
| Actions | <ul style="list-style-type: none">• Undertake investigations to ascertain veracity and details of any reports• Sketch, measure, photograph, and locate spill's position in reservoir/catchment and record using approved forms in Appendix D and send to IC and DSTDM• Log Book entry as per SOP-005• Liaise with IC and DSTDM• Record all communication | <ul style="list-style-type: none">• Not applicable | <ul style="list-style-type: none">• As per Alert activation level, and• Update BGA warning signage, if relevant• Collect water samples, if directed• Close all outlet works, if directed• Shut off all treated water offtakes, if directed• Close storage to recreational use | <ul style="list-style-type: none">• Forward information for EER to IC• Log Book entry as per SOP-005• Return to routine activities |
| Internal Notifications | 1.IC 2.DSTDM | 1. Not applicable | 1.IC 2.DSTDM | 1.As per previous activation level |
| External Notifications | 1. Not applicable | 1. Not applicable | 1. Call 000/112 if emergency services are required | 1.As per previous activation level |



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Table 12: Chemical Spill/Toxic Conditions - IC Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up | Stand Down |
|------------------------|---|--|--|---|
| Activation Trigger | <ul style="list-style-type: none">• Reports of contamination or potential contamination in catchment area of storage (excludes normal operating and monitoring of BGA)• Escalated BGA or toxic condition as required | <ul style="list-style-type: none">• Not applicable | <ul style="list-style-type: none">• Confirmation or high probability of a large amount of chemical spill/toxic conditions found in storage/catchment | <ul style="list-style-type: none">• Risk assessment that risk has reduced• Confirmation significant contamination has not occurred• All clear WQ test result |
| Actions | <ul style="list-style-type: none">• Liaise with, DDO and DSTDM re: situation• Record all communication | <ul style="list-style-type: none">• Not applicable | <ul style="list-style-type: none">• Monitor situation and assess risks• Coordinate with the Water Quality Officer to determine need for WQ testing, shut down of treated water supplies, and precautionary closure of outlet works• Check support required to assist DDO in closure of storage to recreational usage• Complete situation report, unless otherwise directed• Complete Incident Report as required | <ul style="list-style-type: none">• Deactivate EAP• If required, compile EER and deliver to the DSR• Return to routine activities• Check WQ Plan for any close out processes• Complete situation report |
| Internal Notifications | 1.DDO 2.DSTDM | 1. Not applicable | 1.DDO 2.DSTDM | 1. Inform previous notifications of deactivation as required |
| External Notifications | 1. Not applicable | 1. Not applicable | 1. Treated Water Supply Users 2. Trility | 1. As per previous activation level |



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Table 13: Chemical Spill/Toxic Conditions —IC Communication Plan

| Activation Level | Trigger for Communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|---------------------|--|--|---|---|----------------|---|
| Alert | <ul style="list-style-type: none"> • Reports of contamination or potential contamination in catchment area of storage (excludes normal operating and monitoring of BGA) • Escalated BGA or toxic condition as notified | 1.LDMG | • Phone | Describe current situation with dam—What is the event? (Water Quality) What is the status? (Investigation underway) Advise of any issues you are aware of | | |
| Lean Forward | Lean Forward not applicable. | | | | | |
| Stand Up | <ul style="list-style-type: none"> • Confirmation or high probability of a large amount of chemical spill/toxic conditions found in storage/catchment | 1.LDMG 2.DDMG | • Phone | Describe current situation with dam— What is the event? (Water Quality) What is the status? (AVOID USE OR CONTACT WITH WATER) Advise of any issues you are aware of | Advice EA14 | BLACK PINK GREEN |
| | | 3.Treated Water Supply Users | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | | |
| Stand Down | <ul style="list-style-type: none"> • Risk assessment risk has reduced • Confirmation significant contamination has not occurred • All clear WQ testresult | 1.LDMG 2.DDMG (if Stand Down from Stand Up) | • Phone | Describe current situation with dam—What is the event? (Water Quality) What is the status? (Dam hazard Stood Down) Advise that significant contamination has not occurred and/or the WQ test results are all clear. Water is safe to use and EAP has been deactivated | | |
| | | 3.Treated Water Supply Users | • TV, Radio, Social Media, Disaster Dashboard, Roadside Signs | Community messaging will be in accordance with TLDMG Community Information and Warnings Sub Plan and the TLDMG Community Education and Marketing Sub Plan https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | | |



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Table 14: Chemical Spill/Toxic Conditions - DSTDM Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up | Stand Down |
|------------------------|--|--|--|--|
| Activation Trigger | <ul style="list-style-type: none">• Reports of contamination or potential contamination in catchment area of the storage (excludes normal operating and monitoring of BGA) | <ul style="list-style-type: none">• Not applicable | <ul style="list-style-type: none">• Confirmation or high probability of a large amount of chemical spill/toxic conditions found in the storage/catchment | <ul style="list-style-type: none">• Risk assessment that risk has reduced• Confirmation significant contamination has not occurred• All clear WQ test result |
| Action | <ul style="list-style-type: none">• Liaise with IC and DDO• Monitor situation and assess risks• Record all communication | <ul style="list-style-type: none">• Not applicable | <ul style="list-style-type: none">• As per Alert activation level and• Liaise with the IC and DDO | <ul style="list-style-type: none">• Forward information for EER to IC• Return to routine activities |
| Internal Notifications | 1.DDO 2.IC | 1.Not applicable | 1.DDO 2.IC | 1.As per previous activation level |
| External Notifications | 1.Not applicable | 1.Not applicable | 1.Not applicable | 1.As per previous activation level |

7. Dam Hazard—Piping: Embankment, Foundation, or Abutments

7.1 Overview

The emergency action described in this section relates to a potential dam hazard due to a piping condition through the embankment (Main Dam), foundations, or dam abutment. An early indicator of a piping condition can be an increase in seepage or a new area of seepage. If the seepage water is cloudy or has become cloudy, this may indicate that material is being transported and a pipe is being established.

If a pipe is established and progresses, then a dam failure may result. If a potential pipe is detected early, remedial repairs may be possible in the form of constructing a filter and weighting zone over the pipe exit if safe to do so.

The flood outlines in Appendix B are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by piping. The use of these flood outlines is prescribed below:

- Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to piping and no concurrent flooding or downstream releases are occurring or expected to occur, or
- Use the Probable Maximum Flood (PMF) outline when a dam failure is in progress or likely due to piping and concurrent flooding or downstream releases are occurring or expected to occur.

Note: Definitions for *Concurrent Flooding* and *Downstream Releases* are provided in Section 1.3.

7.1.1 Assessment of circumstances that indicates an increase in the likelihood of piping

An increase in seepage or a new area of seepage is a circumstance that could indicate an increase likelihood of piping. This circumstance is the trigger for the alert status for piping.

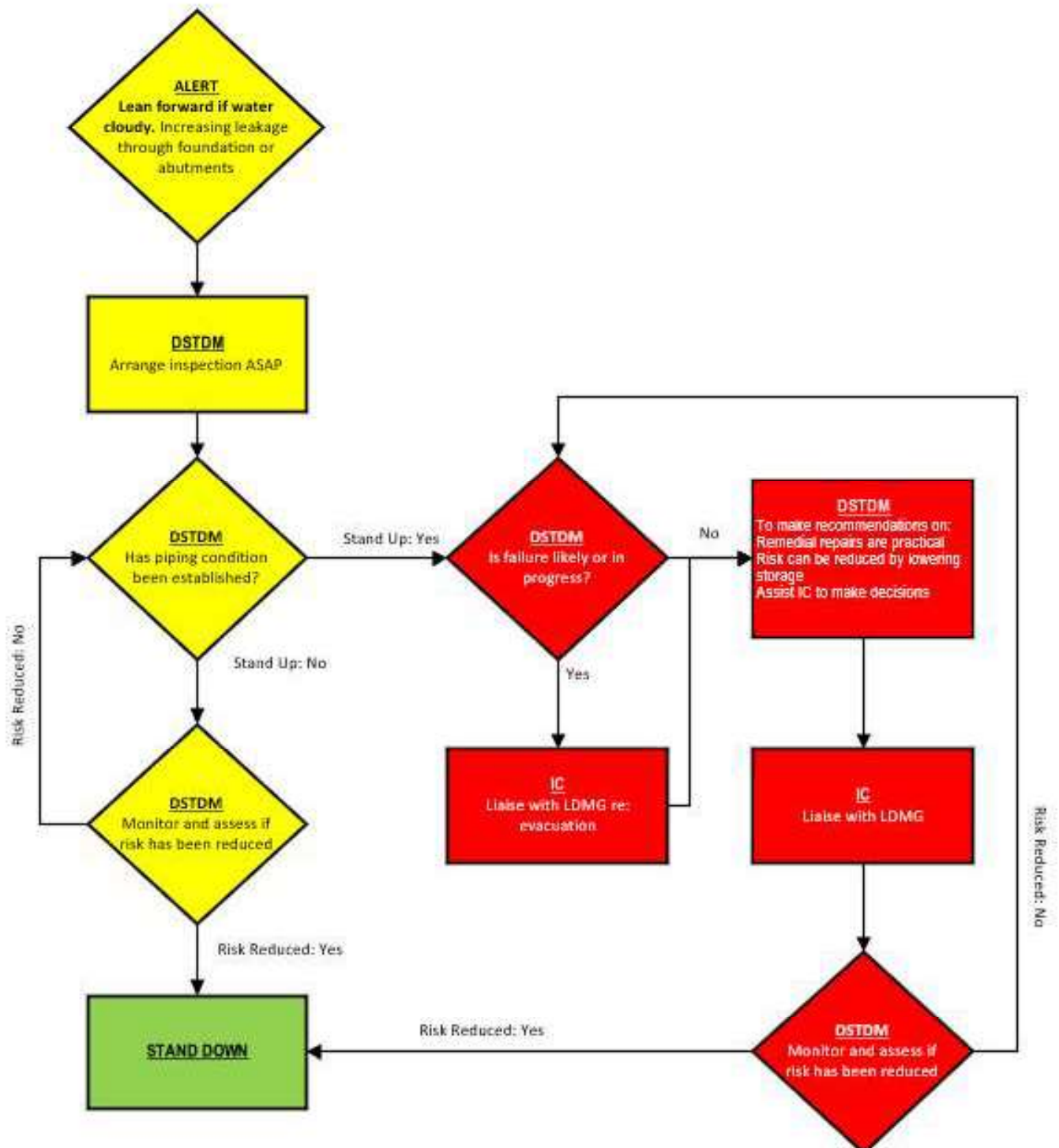
Cloudy seepage water is a circumstance that could indicate an increase likelihood of piping. This circumstance is the trigger for the lean forward status for piping.

7.2 Emergency Action Roles

Table 18 to Table 22 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)

Figure 7 - Piping: Embankment, Foundation, or Abutments Flowchart





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Table 15: Piping: Embankment, Foundation, or Abutments - DDO Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Down |
|------------------------|---|--|--|--|--|
| Activation Trigger | <ul style="list-style-type: none">New leakage through embankment, foundations, or abutments | <ul style="list-style-type: none">Increasing leakage through embankment, foundations, or abutments with cloudy water | <ul style="list-style-type: none">Piping condition has been established | <ul style="list-style-type: none">Failure in progress or likely due to piping, andSufficient water in storage to create a dam failure | <ul style="list-style-type: none">Risk assessment has determined that piping risk has reduced |
| Actions | <ul style="list-style-type: none">Monitor flows every 6 hours (or as otherwise instructed by DSTDM) until a decreasing trend is observable, or as directed by the DSTDMPhotograph/video piping from a safe point, (if safe to do so) and record using approved forms in Appendix D and send to IC & DSTDMLog Book entry as per SOP-005Record all communication | <ul style="list-style-type: none">As per previous activation level | <ul style="list-style-type: none">As per previous activation level, andSupport/supervise remedial works as requiredClose any affected roads if not already closed by othersMaintain surveillance of area immediately downstream of dam (if safe to do so) and move on any members of the publicLiaise with IC on road closuresLower the storage level if directed | <ul style="list-style-type: none">As per previous activation level, andVacate the immediate vicinity of the piping conditionClose roads as needed, for public safety | <ul style="list-style-type: none">Forward information for EER to ICReturn to routine activitiesLog Book entry as per SOP-005 |
| Internal Notifications | 1. IC 2. DSTDM | 1. As per previous activation level | 1. As per previous activation level | 1. As per previous activation level | 1. As per previous activation level |
| External Notifications | 1. Not applicable | 1. As per previous activation level | 1. As per previous activation level | 1. As per previous activation level | 1. As per previous activation level |

Note: If insufficient time to complete all activities, DELEGATE any necessary actions.



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Table 16: Piping: Embankment, Foundation, or Abutments —IC Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Down |
|-------------------------------|--|---|---|---|--|
| Activation Trigger | <ul style="list-style-type: none"> New leakage through embankment, foundations, or abutments | <ul style="list-style-type: none"> Increasing leakage through embankment, foundations, or abutments with cloudy water | <ul style="list-style-type: none"> Piping condition has been established | <ul style="list-style-type: none"> Failure in progress or likely due to piping, and Sufficient water in storage to create a dam failure | <ul style="list-style-type: none"> Risk assessment has determined that piping risk has reduced |
| Actions | <ul style="list-style-type: none"> Liaise with DDO, and DSTDM re: situation Complete Situation Report, unless otherwise directed Record all communication | <ul style="list-style-type: none"> As per previous activation level, and Investigate availability of machinery and materials (if insufficient stockpiles available) Place machinery operators on standby if directed by DSTDM Confirm with LDMG appropriate community information has been disseminated | <ul style="list-style-type: none"> As per previous activation level, and Mobilise resources to undertake remedial works if directed by DSTDM Liaise with relevant authorities re: road/bridge closures | <ul style="list-style-type: none"> As per previous activation level | <ul style="list-style-type: none"> Deactivate EAP If required, compile EER and deliver to the DSR Complete Situation Report (final) Return to routine activities |
| Internal Notifications | 1.DDO 2.DSTDM 3.LDMG | 1.As per previous activation level | 1.As per previous activation level, | 1.As per previous activation level | 1.Inform previous notifications of deactivation as required |
| External Notifications | 1.Not Applicable | 1.D/S Residents | 1.DDMG 2.D/S Residents | 1.As per previous activation level | 1.Inform previous notifications of deactivation as required |

Note: If insufficient time to complete all activities, DELEGATE any necessary actions.



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Table 17: Piping: Embankment, Foundation, or Abutments —IC Communication Plan

| Activation Level | Trigger for Communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|------------------|--|------------------|---|---|-----------------------|---|
| Alert | • New leakage through an embankment, foundations, or abutments | 1.LDMG DDMG | • Phone | Ross River Dam possible piping issue is not confirmed | | |
| Lean Forward | Increase in leakage through an embankment, foundations, or abutments with cloudy water | 1.LDMG DDMG | Phone | Describe current situation with dam—What is the event? (<i>Unconfirmed piping risk</i>) What is the status? (<i>Unconfirmed leakage—Investigation continues</i>) Advise LDMG of current storage level Advise any issues you are aware of LDMG to standby for further advices | | |
| | | D/S Residents | TV, Radio, Social Media, Disaster Dashboard, Roadside Signs | Community messaging will be in accordance with TLDMG Community Information and Warnings Sub Plan and the TLDMG Community Education and Marketing Sub Plan https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details | | |
| Stand Up 1 | • Piping condition has been established | 1.LDMG 2.DDMG | • Phone | Describe current situation with dam—What is the event? (<i>Confirmed piping risk</i>) What is the status? (<i>Confirmed piping/leakage</i>) Advise LDMG of current storage level Advise any issues you are aware of. Discuss any potential road/bridge closures LDMG to prepare for possible evacuations | | |
| | | 1.D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Watch and Act EA10 | BLACK PINK GREEN |



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Table 18: (Continued) Piping: Embankment, Foundation, or Abutments —IC Communication Plan

| Activation Level | Trigger for Communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|------------------|---|-------------------------------------|---|--|-----------------------------|---|
| Stand Up 2 | <ul style="list-style-type: none">Failure likely due to piping, andSufficient water in storage to create a dam failureDam failure in progress | 1.LDMG 2.DDMG | • Phone | Describe current situation with dam—What is the event? (Confirmed piping risk) What is the status? (Possible Dam Failure) Advise LDMG of current storage level LDMG to prepare coordinated evacuations | Emergency Warning EA10.1 | BLACK PINK GREEN |
| | | 3.D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | | |
| Stand Down | • Risk assessment has determined that piping risk has reduced | 1.LDMG 2.DDMG (if from Stand Up) | • Phone | Describe current situation with Dam—What is the event? (Dam Safety Risk—piping) What is the status? (Dam hazard Stood Down) Advise risk assessment has determined that piping risk has reduced and EAP has been deactivated | | |
| | | 3.D/S Residents | • TV, Radio, Social Media, Disaster Dashboard, Roadside Signs | Community messaging will be in accordance with TLDMG Community Information and Warnings Sub Plan and the TLDMG Community Education and Marketing Sub Plan https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | | |



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Table 18: Piping: Embankment, Foundation, or Abutments - DSTDM Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Down |
|-------------------------------|--|---|---|---|---|
| Activation Trigger | <ul style="list-style-type: none"> New leakage through embankment, foundations, or abutments | <ul style="list-style-type: none"> Increasing leakage through embankment, foundations or abutments with cloudy water | <ul style="list-style-type: none"> Piping condition has been established | <ul style="list-style-type: none"> Failure in progress or likely due to piping, and Sufficient water in storage to create a dam failure | <ul style="list-style-type: none"> Risk assessment has determined that piping risk has reduced |
| Action | <ul style="list-style-type: none"> Arrange an inspection of dam to assess its condition as soon as possible, when safe to do so Determine if piping condition has been established Monitor situation and assess risks Record all communication | <ul style="list-style-type: none"> As per previous activation level Liaise with IC | <ul style="list-style-type: none"> As per previous activation level, and Assess risk and determine if failure likely or in progress Liaise with the IC Determine if remedial repairs are practical (1) Determine if risks can be reduced by lowering storage (2) Make recommendations regarding (1) and (2) to IC. Supervise* remedial repairs (if applicable) | <ul style="list-style-type: none"> As per previous activation level, and Liaise with IC and advise on need to recommend evacuations | <ul style="list-style-type: none"> Forward information for EER to IC Return to routine activities |
| Internal Notifications | 1.DDO 2.IC | 1.As per previous activation level | 1.As per previous activation level, | 1.As per previous activation level | 1.Inform previous notifications of deactivation as required |
| External Notifications | 1.Not Applicable | 1.Dam Safety Regulator | 1.As per previous activation level | 1.As per previous activation level | 1.Inform previous notifications of deactivation as required |

* Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.

All communications to TDM should be confirmed by email whenever practical

8. Dam Hazard - Earthquake

8.1 Overview

The emergency action described in this section relates to a potential dam hazard due to an earthquake causing damage to the dam embankment (Main Dam), foundations, or dam abutment. Damage could take the form of cracking or slumping of the embankment, deformation or land slip, or increased seepage.

If damage does occur, then a dam failure may result. If damage is detected early, remedial repairs may be possible depending on the nature of the damage.

The flood outlines are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by earthquake. The use of these flood outlines is prescribed below:

- Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to earthquake and no concurrent flooding or downstream releases are occurring or expected to occur, or
- Use the Probable Maximum Flood (PMF) outline when a dam failure is in progress or likely due to earthquake and concurrent flooding or downstream releases are occurring or expected to occur.

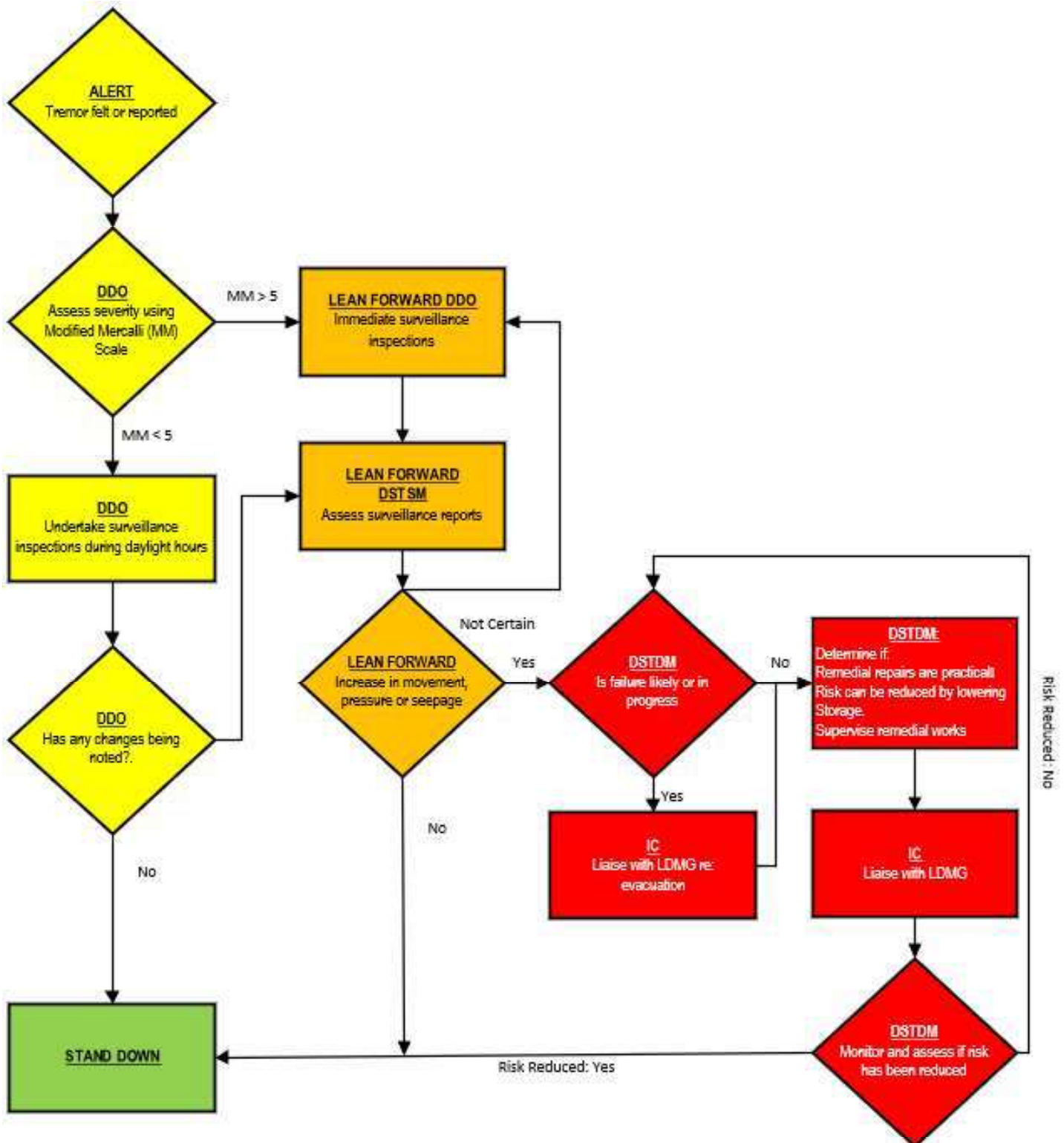
Note: Definitions for *Concurrent Flooding* and *Downstream Releases* are provided in Section 1.3.

8.2 Emergency Action Roles

Table 23 to Table 27 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)

Figure 8 - Earthquake Flowchart





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Table 19: Earthquake - DDO Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Down |
|-------------------------------|---|--|---|--|---|
| Activation Trigger | <ul style="list-style-type: none"> Earthquake reported or felt in the area and Intensity less than 5MM* | <ul style="list-style-type: none"> Earthquake reported or felt in the area and Intensity greater than or equal to 5MM*, OR Intensity less than 5MM and change detected during surveillance inspection | <ul style="list-style-type: none"> Earthquake reported or felt in the area and A possible failure path has been identified | <ul style="list-style-type: none"> Failure in progress or likely due to earthquake and Sufficient water in storage to create a dam failure | <ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced |
| Actions | <ul style="list-style-type: none"> Immediately inspect embankment, spillway structure, abutments in daylight hours (if safe to do so) and report to DSTDM and IC—photograph/video and record using forms in Appendix D and send to IC and DSTDM Check for leaks, deformation, scour, and concrete damage Record on inspection sheet Repeat inspection as directed Record all communication Read piezometers and other instruments as per SOPs Update Log Book as per SOP-005 | <ul style="list-style-type: none"> As per previous activation level and immediately inspect embankment, spillway structure, abutments (if safe to do so) and report to DSTDM and IC—photograph/video and record using forms in Appendix D and send to IC and DSTDM Repeat the inspection as directed | <ul style="list-style-type: none"> As per previous activation level and Support/supervise remedial work as required Close any affected roads, if not already closed by others Maintain surveillance of area immediately downstream of dam (if safe to do so) and move on any members of the public Record/photograph the damage from a safe point Vacate the immediate vicinity of the embankment | <ul style="list-style-type: none"> As per previous activation level | <ul style="list-style-type: none"> Forward information for EER to IC Update Log Book as per SOP-005 Return to routine activities |
| Internal Notifications | 1.IC 2.DSTDM | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level | 1.Inform previous notifications of deactivation as required |
| External Notifications | 1.Not Applicable | 1.Not Applicable | 1.Not Applicable | 1.Not Applicable | 1.Not Applicable |

* DDO to assess magnitude (MM scale) at dam location.



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Table 20: Earthquake—IC Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Down |
|-------------------------------|---|---|---|--|--|
| Activation Trigger | <ul style="list-style-type: none"> Earthquake reported or felt in area and Intensity less than 5MM | <ul style="list-style-type: none"> Earthquake reported or felt in area and Intensity greater than or equal to 5MM, OR Intensity less than 5MM and change detected during surveillance inspection | <ul style="list-style-type: none"> Earthquake reported or felt in the area and A possible failure path has been identified | <ul style="list-style-type: none"> Failure in progress or likely due to earthquake and Sufficient water in storage to create a dam failure | <ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced |
| Actions | <ul style="list-style-type: none"> Liaise with DDO and DSTDM re: situation Record all communication | <ul style="list-style-type: none"> As per previous activation level and Investigate availability of machinery and materials (if insufficient stockpiles available) Place machinery operators on standby if directed by DSTDM Complete Situation Report, unless otherwise directed | <ul style="list-style-type: none"> As per previous activation level and Mobilise resources to undertake remedial works if directed by DSTDM | <ul style="list-style-type: none"> As per previous activation level and Cease remedial works if directed by DSTDM and plant and personnel to be moved to a safe location | <ul style="list-style-type: none"> Deactivate EAP If required, compile EER and deliver to DSR Complete Situation Report (final) Return to routine activities |
| Internal Notifications | 1.DDO 2.LDMG 3.DSTDM | 1. As per previous activation level | 1. As per previous activation level and 2. Discuss with DSTDM need for Emergency alert: LDMG to advise content if required | 1. As per previous activation level | 1. Inform previous notifications of deactivation as required |
| External Notifications | 1. Not applicable | 1. D/S Residents | 1. As per previous activation level and 2. DDMG | 1. As per previous activation level | 1. Inform previous notifications of deactivation as required |

Table 21: Earthquake—IC Communication Plan

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| Activation Level | Trigger for Communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|------------------|--|----------------------|---|---|------------|-----------------|
| Alert | <ul style="list-style-type: none">Earthquake reported or felt in the area, ANDIntensity less than 5MM | ALERT NOT APPLICABLE | | | | |
| Lean Forward | | 1.LDMG | Phone | Des Describe current situation with dam—What is the event? (Dam Safety Risk—Earthquake damage) What is the status? (Under investigation) Advise of current storage level Stand by for further information | | |
| | | 2.D/S Residents | TV, Radio, Social Media, Disaster Dashboard, Roadside Signs | Community messaging will be in accordance with TLDMG Community Information and Warnings Sub Plan and the TLDMG Community Education and Marketing Sub Plan https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details | | |



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Table 22: (Continued) Earthquake—IC Communication Plan

| Activation Level | Trigger for Communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|------------------|--|------------------|---------|--|---|---|
| Stand Up 1 | <ul style="list-style-type: none"> Earthquake reported or felt in the area, AND A possible failure path has been identified | 1.LDMG 2.DDMG | • Phone | Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Earthquake felt or reported in area</i>) What is the status? (Possible earthquake damage to dam) Advise LDMG of current storage level. Discuss any potential road/bridge closures LDMG to activate emergency response | | |
| | | 3.D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG, order of priority based on suburbs at risk. Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Advice EA11 Watch and Act EA11.1 | BLACK PINK GREEN |
| Stand Up 2 | <ul style="list-style-type: none"> Failure in progress or likely due to earthquake, AND Sufficient water in storage to create a dam failure Dam failure in progress | 1.LDMG 2.DDMG | • Phone | Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Earthquake damage</i>) What is the status? (Dam Failure Likely) Advise LDMG of current storage level. Discuss any potential road/bridge closures (if not discussed at Stand Up—1) LDMG to prepare coordinated evacuation | | |
| | | 3.D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG, order of priority based on suburbs at risk. Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Emergency Warning EA11.2 | BLACK PINK GREEN |



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Table 22: (Continued) Earthquake—IC Communication Plan

| Activation Level | Trigger for Communications | Group to contact | Method | Message text |
|------------------|--|------------------|---|---|
| Stand Down | ● Risk assessment has determined that failure risk has reduced | 1.LDMG 2.DDMG | ● Phone | Describe current situation with dam—What is the event? (<i>Dam Safety Risk—Earthquake damage</i>) What is the status? (Dam hazard Stood Down) Advise risk assessment has been determined that failure risk has reduced and that EAP has been deactivated |
| | | 3.D/S Residents | ● TV, Radio, Social Media, Disaster Dashboard, Roadside Signs | Community messaging will be in accordance with TLDMG Community Information and Warnings Sub Plan and the TLDMG Community Education and Marketing Sub Plan https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details |

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Table 22: Earthquake - DSTDM Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Down |
|-------------------------------|---|---|---|---|---|
| Activation Trigger | <ul style="list-style-type: none"> Earthquake reported or felt in the area, AND Intensity less than 5MM | <ul style="list-style-type: none"> Earthquake reported or felt in the area, AND Intensity greater than or equal to 5MM, OR Intensity less than 5MM and change detected during surveillance inspection | <ul style="list-style-type: none"> Earthquake reported or felt in the area, AND A possible failure path has been identified | <ul style="list-style-type: none"> Failure in progress or likely due to earthquake, AND Sufficient water in storage to create a dam failure | <ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced |
| Action | <ul style="list-style-type: none"> Monitor situation and assess risks Liaise with DDO and IC Record all communication <p>NOTE: 'Reported' is defined as an alert received from Geoscience Australia or other source that advises an Earthquake >4.8ML (Richter Scale) has occurred within a 200km radius of the Dam.</p> | <ul style="list-style-type: none"> As per previous activation level and Review surveillance inspection of dam and assess its condition as soon as possible Determine any possible failure paths from reported damage Liaise with IC on any matters requiring advice | <ul style="list-style-type: none"> As per previous activation level and Arrange an inspection of dam and assess its condition as soon as possible, when safe to do so Assess risk and determine if failure likely or in progress Liaise with the IC AND Determine if remedial repairs are practical (1) Determine if risks can be reduced by lowering storage (2) Make recommendations regarding (1) and (2) to IC. Supervise* remedial repairs (if applicable) Monitor situation and assess risks | <ul style="list-style-type: none"> NOTE: If coming to Stand Up—2 from Alert Lean Forward stage, the following actions apply. If coming from Stand Up—1, no additional actions required. Arrange an inspection of the dam and assess its condition as soon as possible, when safe to do so Assess risk and determine if failure likely or in progress Liaise with the IC, AND Determine if remedial repairs are practical (1) Determine if risks can be reduced by lowering storage (2) Make recommendations regarding (1) and (2) to IC. Supervise* remedial repairs (if applicable) Monitor situation and assess risks | <ul style="list-style-type: none"> Forward information for EER to IC Return to routine activities |
| Internal Notifications | 1.DDO 2.IC | 1.As per previous activation level 2. | 1.As per previous activation level, | 1.As per previous activation level | 1.As per previous activation level |
| External Notifications | 1.Not Applicable | 2.Dam Safety Regulator | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level |

* Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.

All communications to IC should be confirmed by email whenever practical

9. Dam Hazard - Terrorist Threat/Activity or High Energy Impact

9.1 Overview

The emergency action described in this section relates to a potential dam hazard due to a terrorist threat or activity or a high energy impact on the dam such as a plane crash or meteorite.

The vulnerability of Ross River Dam to a terrorist attack is low.

The flood outlines in Appendix B are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by terrorist activity or a high energy impact. The use of these flood outlines is prescribed below:

- Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to a terrorist activity or a high energy impact and no concurrent flooding or downstream releases are occurring or expected to occur, or
- Use the Probable Maximum Flood (PMF) outline when a dam failure is in progress or likely due to a terrorist activity or a high energy impact and concurrent flooding or downstream releases are occurring or expected to occur.

Note: Definitions for *Concurrent Flooding* and *Downstream Releases* are provided in Section 1.3.

9.1.1 Assessment of circumstances indicating an increased likelihood of terrorist activity or high energy impact

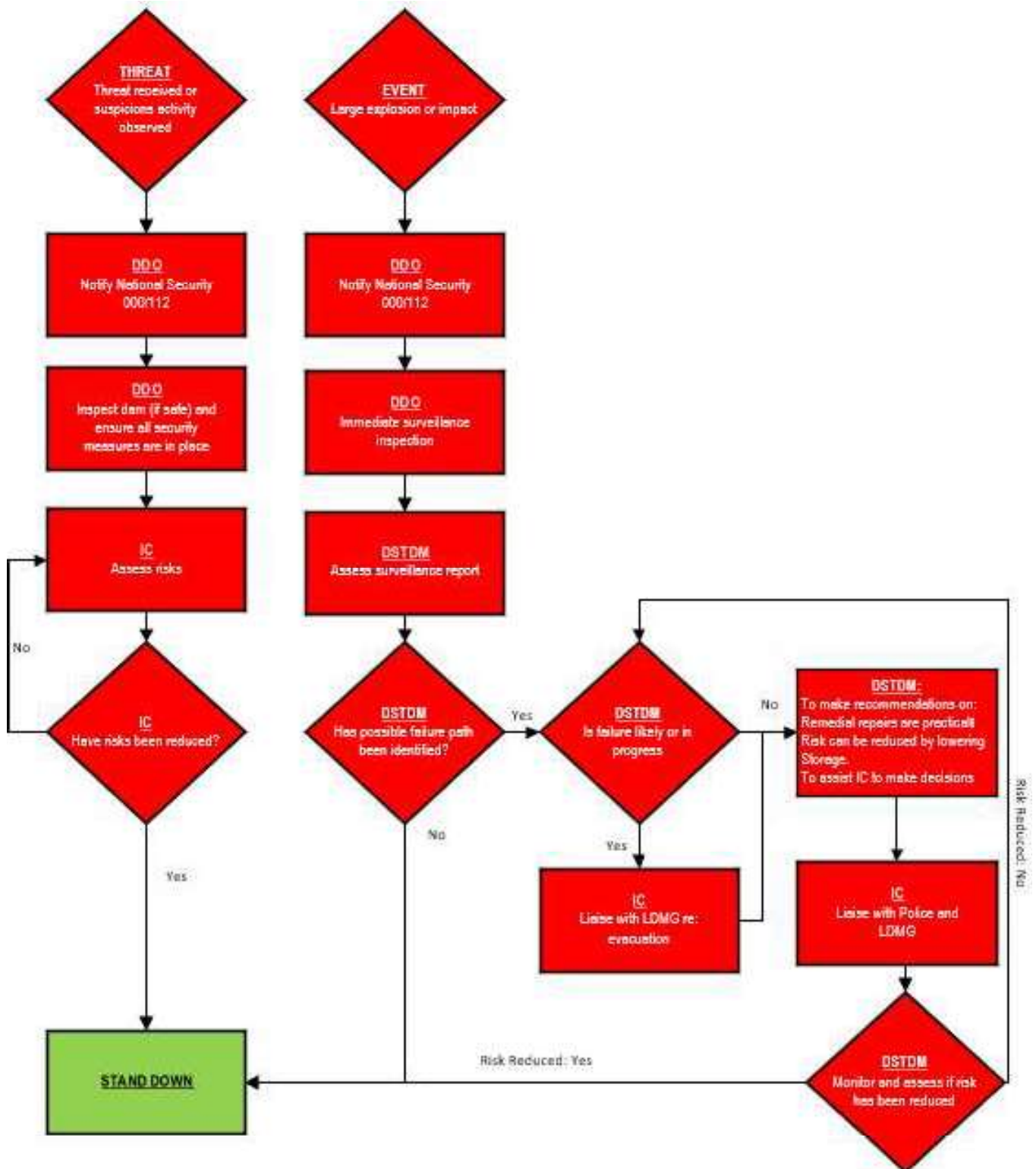
Advice from authorities of a specific risk to water infrastructure is a circumstance that could indicate increased likelihood a terrorist threat. If this were specific enough to name a dam, this circumstance would trigger Stand Up 1 activation level.

9.2 Emergency Action Roles

Table 28 to Table 32 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)

Figure 9 - Terrorist Threat/Activity or High Energy Impact Flowchart





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Table 23: Terrorist Threat/Activity or High Energy Impact - DDO Emergency Action

| Activation Level | Alert/Lean Forward | Stand Up 1 | Stand Up 2 | Stand Up 3 | Stand Down |
|------------------------|--|---|---|--|---|
| Activation Trigger | <ul style="list-style-type: none">Not applicable | THREAT <ul style="list-style-type: none">Possible terrorist activity/suspicious behaviour noticed at the damThreat received | EVENT <ul style="list-style-type: none">Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) | RESPONSE <ul style="list-style-type: none">Failure in progress or likely due to impact or explosion andSufficient water in storage to create a dam failure | <ul style="list-style-type: none">Risk Assessment has determined that failure risk has reduced. |
| Actions | 1. Not applicable | <ul style="list-style-type: none">NOTE: If any suspicious behaviour noticed, contact DSTDM for advice. If instructed by DSTDM, or if threat received, complete the following:Notify National Security or 000/112Inspect dam (if safe) and ensure all security measures are in place (locked gates, etc.)Photograph/video the damage from a safe point, if safe to do so, and record using the approved forms in Appendix D and send to IC and DSTDMClose any affected roads, if not already closed by othersUpdate Log Book as per SOP-005If Police appoint incident manager, support and follow instructionsRecord all communication | <ul style="list-style-type: none">As per previous activation level andVacate immediate vicinity of affected area | <ul style="list-style-type: none">As per previous activation level | <ul style="list-style-type: none">Forward information for EER to ICUpdate Log Book as per SOP-005Return to routine activities |
| Internal Notifications | 1. Not applicable | 1. DSTDM 2. IC | 1. As per previous activation level | 1. As per previous activation level | 1. Not applicable |
| External Notifications | 1. Not applicable | 1. Notify immediately the National Security Line or 000/112 | 1. As per previous activation level | 1. As per previous activation level | 1. Not applicable |



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Table 24: Terrorist Threat/Activity or High Energy Impact - IC Emergency Action

| Activation Level | Alert/Lean Forward | Stand Up 1 | Stand Up 2 | Stand Up 3 | Stand Down |
|------------------------|--|--|---|---|---|
| Activation Trigger | <ul style="list-style-type: none">Not applicable | THREAT <ul style="list-style-type: none">Possible terrorist activity/suspicious behaviour noticed at damThreat received | EVENT <ul style="list-style-type: none">Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) | RESPONSE <ul style="list-style-type: none">Failure in progress or likely due to impact or explosion, ANDSufficient water in storage to create a dam failure | <ul style="list-style-type: none">Risk assessment has determined that failure risk has reduced |
| Actions | <ul style="list-style-type: none">Not applicable | <ul style="list-style-type: none">Liaise with DDO, DSTDM and LDMG re: situationIf Police appoint incident manager support and follow instructionsMonitor situation and assess risksLiaise with DDO regarding possible road/bridge closuresConfirm with LDMG appropriate community information has been disseminatedMonitor situation and assess risksRecord all communicationIncident and Near Miss Alert | <ul style="list-style-type: none">As per previous activation level | <ul style="list-style-type: none">As per previous activation level andLiaise with DDO, DSTDM re: potential for evacuationsMobilise resources to undertake remedial works if directed by DSTDM | <ul style="list-style-type: none">Deactivate EAP eventIf required, compile EER and deliver to DSRComplete Situation Report (final)Return to routine activities |
| Internal Notifications | 1. Not applicable | 1.DDO 2.DSTDM 3.LDMG 4.Media Team | 1.As per previous activation level | 1.As per previous activation level | 1.Inform previous notifications of deactivation as required |
| External Notifications | 1.Not applicable | 1.D/S Residents 2.DDMG 3.National Security Hotline (if not completed by DDO) | 1.As per previous activation level and 2.SDCC Watch Desk 3.National Security Hotline (if not completed by DDO, or at Stand Up 1) | 1.As per previous activation level | 1.As per previous activation level |



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Table 25: Terrorist Threat/Activity or High Energy Impact - IC Communication Plan

| Activation Level | Trigger for Communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|------------------|---|--|---------|--|-------------------------|---|
| Alert | ALERT NOT APPLICABLE | | | | | |
| Lean Forward | LEAN FORWARD NOT APPLICABLE | | | | | |
| Stand Up 1 | THREAT <ul style="list-style-type: none">Possible terrorist activity /suspicious behaviour notice at damThreat received | 1.LDMG 2.DDMG 3.National Security Hotline (if not completed by DDO) | • Phone | Describe current situation with dam—What is the event? (Dam Safety Risk—Security threat/ impact/explosion, etc.) What is the status? (Received/noted terrorist threat) Discuss any potential road/bridge closures Activate emergency response | | |
| | | 4.D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG, order of priority based on suburbs at risk. Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Advice EA11 | BLACK PINK GREEN |
| Stand Up 2 | EVENT <ul style="list-style-type: none">Large explosion heard /observed at dam (e.g., bomb explosion, aircraft hit) | 1.LDMG 2.DDMG 3.National Security Hotline (if not completed by DDO or at Stand Up—1) | • Phone | Describe current situation with dam—What is the event? (Dam Safety Risk—Security threat/ impact/explosion, etc.) What is the status? (Under Investigation) Discuss any potential road/bridge closures (if not discussed at Stand Up—1) LDMG to prepare coordinated evacuation | | |
| | | 4.D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG, order of priority based on suburbs at risk. Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Watch and Act EA11.1 | BLACK PINK GREEN |



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Table 26: (Continued) Terrorist Threat/Activity or High Energy Impact - IC Communication Plan

| Activation Level | Trigger for Communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|------------------|--|------------------|--|--|-----------------------------|---|
| Stand Up 3 | RESPONSE <ul style="list-style-type: none">Failure in progress or likely due to impact or explosion andSufficient water in storage to create a dam failure | 1.LDMG 2.DDMG | • Phone | Describe current situation with dam—What is the event? (Dam Safety Risk—Security threat/impact/explosion, etc.) What is the status? (Dam Failure Likely/In Progress) LDMG to initiate evacuations | | |
| | | 3.D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG, order of priority based on suburbs at risk. Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Emergency Warning EA11.2 | BLACK PINK GREEN |
| Stand Down | • Risk assessment has determined that failure risk has reduced | 1.LDMG 2.DDMG | • Phone | Describe current situation with dam—What is the event? (Dam Safety Risk—Security threat/ impact/explosion, etc.) What is the status? (Dam hazard Stood Down) Advise that failure risk has been reduced and EAP has been deactivated | | |
| | | 3.D/S Residents | • TV, Radio, Social Media, Disaster Dashboard , Roadside Signs | Community messaging will be in accordance with TLDMG Community Information and Warnings Sub Plan and the TLDMG Community Education and Marketing Sub Plan https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details | | |



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Table 26: Terrorist Threat/Activity or High Energy Impact - DSTDM Emergency Action

| Activation Level | Alert/Lean Forward | Stand Up 1 | Stand Up 2 | Stand Up 3 | Stand Down |
|-------------------------------|--|--|---|--|---|
| Activation Trigger | <ul style="list-style-type: none"> Not applicable | THREAT <ul style="list-style-type: none"> Possible terrorist activity/suspicious behaviour noticed at dam Threat received | EVENT <ul style="list-style-type: none"> Large explosion heard/observed at dam (e.g., bomb explosion, aircraft hit) | RESPONSE <ul style="list-style-type: none"> Failure in progress or likely due to impact or explosion, AND Sufficient water in storage to create a dam failure | <ul style="list-style-type: none"> Risk assessment has determined that failure risk has reduced |
| Actions | <ul style="list-style-type: none"> Not applicable | <ul style="list-style-type: none"> Liaise with IC, DDO Record all communication | <ul style="list-style-type: none"> As per previous activation level, and Arrange an inspection of dam and assess its condition as soon as possible, when safe to do so Assess risk and determine if failure likely or in progress Determine if remedial repairs are practical (1) Determine if risks can be reduced by lowering storage (2) Make recommendations regarding (1) and (2) to IC. IIC to make decision Supervise* remedial repairs (if applicable) Monitor situation and assess risks | <ul style="list-style-type: none"> As per previous activation level, AND Liaise with the IC and advise on need to recommend evacuations | <ul style="list-style-type: none"> Forward information for EER to IC Return to routine activities |
| Internal Notifications | 1. Not applicable | 1. DDO 2. IC 3. | 1. As per previous activation level | 1. As per previous activation level | 1. As per previous activation level |
| External Notifications | 1. Not applicable | 1. Dam Safety Regulator | 1. As per previous activation level | 1. As per previous activation level | 1. As per previous activation level |

* Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.

All communications to IC should be confirmed by email whenever practical

10. Dam Hazard - Gate Function Issues

10.1 Overview

The emergency action described in this section relates to gate function issues and provides advice on actions for any of the six gate function issues identified. It is not an escalation-based section. Any triggers under this section will activate a Stand-Up condition.

It should be noted that gate function issues are unlikely to result in an emergency event unless they occur simultaneously with another hazard.

Note: Definitions for *Concurrent Flooding* and *Downstream Releases* are provided in Section 1.3.

10.1.1 Assessment of circumstances indicating increase in likelihood of gates malfunctioning

A flood event or terrorist threat advice could indicate increased likelihood of gate function issues.

10.2 Emergency Action Roles

Table 33 to Table 37 specifies emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)



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Table 27: Gate Function Issues—DDO Emergency Action

| If above or approaching Fixed Crest Level the following scenarios will activate a STAND UP condition | | | | | |
|---|---|--|--|---|--|
| Abnormal Gate Operation | Premature Opening or Closing of One or More Gates | Loss of Control of One or All Gates in a Dry Weather Event | Loss of Control of One or All Gates in a Flood Event | Loss of HMI Data Links | Control System Security Breach |
| Activation trigger <ul style="list-style-type: none"> Unable to confirm HMI control of gates | Activation trigger <ul style="list-style-type: none"> Controls are not correctly set or unable to rectify | Activation trigger <ul style="list-style-type: none"> Controls are not correctly set or unable to rectify | Activation trigger <ul style="list-style-type: none"> Controls are not correctly set or unable to rectify | Activation trigger <ul style="list-style-type: none"> Unable to control gates remotely | Activation trigger <ul style="list-style-type: none"> Unable to control gates remotely |
| Actions <ul style="list-style-type: none"> Each day, as described in SOP- 001 Communications and SOP- 016 Setting of Normal Operation Criteria, the DDO shall test data links into the RRD Control System HMI and confirm controls are correctly set. | Actions <ul style="list-style-type: none"> DDO shall immediately attempt to log-on to the RRD Control System (SOP-001) and determine if controls are correctly set (SOP-016). If controls are correctly set, DDO shall attempt to operate gate (or gates) as described in DOMM-001 If controls are not correctly set, DDO shall immediately mobilise to RRD site, and shall operate gate (or gates) as described in DOMM-001 | Actions <ul style="list-style-type: none"> DDO shall immediately attempt to log-on to RRD Control System (SOP-001) and determine if controls are correctly set (SOP-016). If controls are correctly set, DDO shall attempt to operate gate (or gates) as described in DOMM-001 If controls are not correctly set DDO shall immediately mobilise to RRD site, and shall operate gate (or gates) as described in DOMM-001 | Actions <ul style="list-style-type: none"> DDO shall immediately attempt to log-on to the RRD Control System (SOP-001) and determine if controls are correctly set (SOP-016). If controls are correctly set, DDO shall attempt to operate gate (or gates) as described in DOMM-001 If HMI cannot control gates in automatic mode, DDO shall operate gate (or gates) Note: DDO should already be mobilised and on site at RRD before a Spillway Flow Event occurs. | Actions <ul style="list-style-type: none"> DDO shall mobilise to RRD site and shall operate gates as described in DOMM-001. Although a loss of data links can occur when lake is below FSL, EAP shall still be triggered. In this situation, if gate operation is subsequently required due to increase in level, DDO shall mobilise to the RRD site and shall operate gates as described in DOMM-001 | Actions <ul style="list-style-type: none"> DDO shall mobilise to RRD site, shall immediately switch the spillway gate controls to Manual at the Gate HPU Room – Local Control Panel and shall operate gates if required at this location as described in DOMM-001 |
| Internal Notifications <ol style="list-style-type: none"> IC DSTDM | Internal Notifications <ol style="list-style-type: none"> IC DSTDM | Internal Notifications <ol style="list-style-type: none"> IC DSTDM | Internal Notifications <ol style="list-style-type: none"> IC DSTDM | Internal Notifications <ol style="list-style-type: none"> IC DSTDM | Internal Notifications <ol style="list-style-type: none"> IC DSTDM |
| External Notifications <ol style="list-style-type: none"> As required | External Notifications <ol style="list-style-type: none"> As required | External Notifications <ol style="list-style-type: none"> As required | External Notifications <ol style="list-style-type: none"> As required | External Notifications <ol style="list-style-type: none"> As required | External Notifications <ol style="list-style-type: none"> As required, AND DDMG |



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Table 28: Gate Function Issues —IC Emergency Action

| If above or approaching Fixed Crest Level the following scenarios will activate a STAND UP condition | | | | | |
|--|---|---|---|--|--|
| Abnormal Gate operation | Premature Opening or Closing of One or More Gates | Loss of Control of One or All Gates in a Dry Weather Event | Loss of Control of One or All Gates in a Flood Event | Loss of HMI Data Links | Control System Security Breach |
| Activation trigger <ul style="list-style-type: none">• Unable to control gates remotely | Activation trigger <ul style="list-style-type: none">• Controls are not correctly set or unable to rectify | Activation trigger <ul style="list-style-type: none">• Controls are not correctly set or unable to rectify | Activation trigger <ul style="list-style-type: none">• Controls are not correctly set or unable to rectify | Activation trigger <ul style="list-style-type: none">• Unable to control gates remotely | Activation trigger <ul style="list-style-type: none">• Unable to control gates remotely |
| Actions <ul style="list-style-type: none">• Situation Report is required. | Actions <ul style="list-style-type: none">• Situation Report is required. | Actions <ul style="list-style-type: none">• Situation Report is required. | Actions <ul style="list-style-type: none">• Situation Report is required. | Actions <ul style="list-style-type: none">• Situation Report is required. | Actions <ul style="list-style-type: none">• Situation Report is required. |
| Internal Notifications 1,DDO 2,DSTDM | Internal Notifications 1,DDO 2,DSTDM | Internal Notifications 1,DDO 2,DSTDM | Internal Notifications 1,DDO 2,DSTDM | Internal Notifications 1,DDO 2,DSTDM | Internal Notifications 1,DDO 2,DSTDM |
| External Notifications 1,As required | External Notifications 1,As required | External Notifications 1,As required | External Notifications 1,As required | External Notifications 1,As required | External Notifications 1,DDMG |



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Table 29: Gate Function Issues —IC Communication Plan

| Activation Level | Trigger for Communications | Group to contact | Method | Message Text |
|------------------|---|------------------|---------|---|
| Alert | ALERT NOT APPLICABLE | | | |
| Lean Forward | LEAN FORWARD NOT APPLICABLE | | | |
| Stand Up 1 | • Gate function issue | 1.LDMG | • Phone | Describe current situation with dam—What is the event? (<i>Dam Safety Risk—?</i>) What is the status? (Under Investigation) |
| Stand Down | • Risk assessment has determined that failure risk has reduced • Confirmation that all gates are functioning correctly | 1.LDMG | • Phone | Describe current situation with dam—What is the event? What is the status? (Dam hazard Stood Down) Advise that failure risk has been reduced and EAP has been deactivated |

Note: Any release of water will also trigger Flood Operations Section 5



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Table 30: Gate Function Issues -DSTDM Emergency Action

| If above or approaching Fixed Crest Level the following scenarios will activate a STAND UP condition | | | | | |
|---|---|---|---|--|--|
| Abnormal Gate Operation | Premature Opening or Closing of One or More Gates | Loss of Control of One or All Gates in a Dry Weather Event | Loss of Control of One or All Gates in a Flood Event | Loss of HMI Data Links | Control System Security Breach |
| Activation trigger <ul style="list-style-type: none">Unable to control gates remotely | Activation trigger <ul style="list-style-type: none">Controls are not correctly set or unable to rectify | Activation trigger <ul style="list-style-type: none">Controls are not correctly set or unable to rectify | Activation trigger <ul style="list-style-type: none">Controls are not correctly set or unable to rectify | Activation trigger <ul style="list-style-type: none">Unable to control gates remotely | Activation trigger <ul style="list-style-type: none">Unable to control gates remotely |
| Actions <ul style="list-style-type: none">Liaise with IC to confirm if engineering support is required to mobilise to siteLiaise with DSTDM on any matters requiring advice | Actions <ul style="list-style-type: none">Liaise with IC to confirm if engineering support is required to mobilise to siteLiaise with DSTDM on any matters requiring advice | Actions <ul style="list-style-type: none">Liaise with IC to confirm if engineering support is required to mobilise to siteLiaise with DSTDM on any matters requiring advice | Actions <ul style="list-style-type: none">Liaise with IC to confirm if engineering support is required to mobilise to siteLiaise with DSTDM on any matters requiring advice | Actions <ul style="list-style-type: none">Liaise with IC to confirm if engineering support required to mobilise to siteLiaise with DSTDM on any matters requiring advice | Actions <ul style="list-style-type: none">Liaise with IC to confirm if engineering support required to mobilise to siteLiaise with DSTDM on any matters requiring advice |
| Internal Notifications 1.DDO 2.IC | Internal Notifications 1.DDO 2.IC | Internal Notifications 1.DDO 2.IC | Internal Notifications 1.DDO 2.IC | Internal Notifications 1.DDO 2.IC | Internal Notifications 1.DDO 2.IC |
| External Notifications 1.Dam Safety Regulator | External Notifications 1.Dam Safety Regulator | External Notifications 1.Dam Safety Regulator | External Notifications 1.Dam Safety Regulator | External Notifications 1.Dam Safety Regulator | External Notifications 1.Dam Safety Regulator |

All communications to IC should be confirmed by email whenever practical

11. Dam Hazard—Scouring, Overturning and Sliding of Spillway

11.1 Overview

The emergency action described in this section relates to a potential emergency event due to significant scour under and around the concrete spillway abutment walls, which may cause sliding and overturning of the spillway. If scour and movement is detected early, remedial action may be possible depending on the nature of the damage.

The stability of the dam in its current configuration has been evaluated and the findings summarised as follows¹:

- Under usual load conditions there is no tension on the dam faces, and sliding stability is satisfactory.
- Under the Usual Load plus Maximum Design Earthquake (MDE) load case the dam stresses remain in compression and sliding stability is satisfactory. The post-earthquake condition is equivalent to the usual load condition.
- Under the Dam Crest Flood (DCF) load condition the stresses in the dam remain compressive and the sliding FOS is satisfactory.
- Under the Probably Maximum Flood (PMF) load condition satisfactory stability is obtained with the cable's working load being in the range of 60% to 65% of their Maximum Breaking Load (MBL). If spillway block 2 is acting as a single monolith then base cracking can occur but does not extend to the line of the foundation drains.

Overturning or sliding of the spillway should not occur under normal conditions. During a large flood event however, it is possible that significant scour may occur at the toe of the stilling basin and in the natural rock behind spillway outer abutment walls. This scour can cause instabilities in the concrete blade walls supporting the dam gates or spillway ogee and must be assessed by the DSTDM.

If the DSTDM forms the view that significant scouring is occurring which will compromise the integrity of the concrete spillway or abutment walls, then the need for evacuations should be considered by disaster management authorities.

The flood outlines in Appendix B are there to provide indicative outlines of the maximum potentially affected area of a dam hazard caused by overturning or sliding of the concrete spillway. The use of these flood outlines is prescribed below:

- Use the Sunny Day Failure (SDF) outline when a dam failure is in progress or likely due to overturning or sliding and no concurrent flooding or downstream releases are occurring or expected to occur, or
- Use the Probable Maximum Flood (PMF) outline when a dam failure is in progress or likely due to overturning or sliding and concurrent flooding or downstream releases are occurring or expected to occur.

Note: Definitions for *Concurrent Flooding* and *Downstream Releases* are provided in Section 1.3.

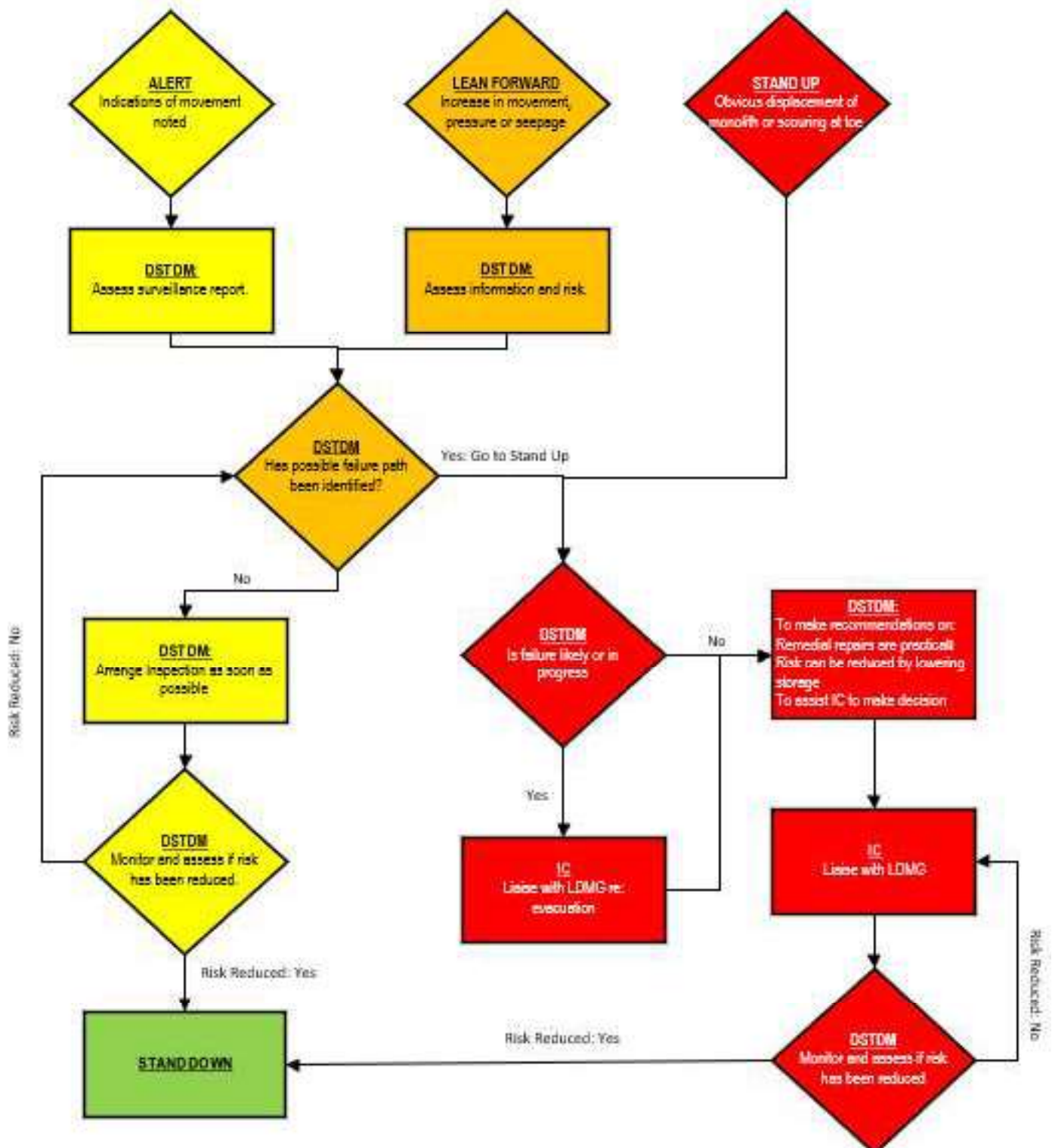
11.2 Emergency Action Roles

Table 38 to Table 42 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)

Note: 1. NQ Water, Ross River Dam Upgrade, Stages 2 to 5, Spillway and Stilling Basin Design Report, September 2005,

Figure 10 - Overturning or Sliding of Spillway Flowchart





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Table 31: Overturning or Sliding of Spillway—DDO Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Down |
|-------------------------------|--|--|--|--|--|
| Activation Trigger | <ul style="list-style-type: none">Indications of movement of spillway noted such as cracking, increased seepage, spilling | <ul style="list-style-type: none">Storage at, EL 40.73m, orIncrease in movement, pressures or seepage | <ul style="list-style-type: none">Obvious displacement of spillway or abutment walls, orEvidence of scouring at or near toe of stilling basin area | <ul style="list-style-type: none">Failure in progress or likely due to sliding or overturning | <ul style="list-style-type: none">Risk Assessment has determined that sliding or over turning risk has reduced |
| Actions | <ul style="list-style-type: none">Monitor dam every 6 hours (or as otherwise instructed by DSTDM) until a decreasing trend is observable or as directed by the ICPhotograph/video the dam from a safe point and record using the approved forms in Appendix D and send to IC & DSTDMRecord details in Log Book entry as per SOP-005Record all communication | <ul style="list-style-type: none">As per previous activation level | <ul style="list-style-type: none">As per previous activation level, plusClose road access to dam if not already closed by othersMaintain surveillance of area immediately downstream of dam spillway and 'move on' any members of the public | <ul style="list-style-type: none">As per previous activation level, plusVacate the immediate vicinity of the dam spillway | <ul style="list-style-type: none">Forward information for EER to ICLog Book entry as per SOP-005Return to routine activities |
| Internal Notifications | 1. IC 2. DSTDM | 1. As per previous activation level | 1. As per previous activation level | 1. As per previous activation level | 1. As per previous activation level |
| External Notifications | 1. Not Applicable | 1. As per previous activation level | 1. As per previous activation level | 1. As per previous activation level | 1. As per previous activation level |



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Table 32: Overturning or sliding of Spillway—IC emergency action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Down |
|-------------------------------|---|---|--|--|--|
| Activation Trigger | <ul style="list-style-type: none"> Indications of movement of spillway noted such as cracking, increased seepage, or spilling | <ul style="list-style-type: none"> Storage Level at, EL 40.73m, or Increase in movement, pressures, or seepage | <ul style="list-style-type: none"> Obvious displacement of spillway or abutment walls or Evidence of scouring at or near toe of stilling basin area | <ul style="list-style-type: none"> Failure in progress or likely due to sliding or overturning | <ul style="list-style-type: none"> Risk assessment has determined that sliding or overturning risk has reduced |
| Actions | <ul style="list-style-type: none"> Liaise with DDO, LDMG and DSTDM re: situation Complete Situation Report, unless otherwise directed Record all communication | <ul style="list-style-type: none"> Liaise with LDMG re: situation Confirm with LDMG appropriate community information has been disseminated Place machinery operators on standby if directed by DSTDM | <ul style="list-style-type: none"> As per previous activation level and Mobilise resources to undertake remedial works if directed by DSTDM Liaise with DDO and relevant authorities regarding potential road/bridge closures | <ul style="list-style-type: none"> As per previous activation level and Liaise with DDO and DSTDM, re: potential for evacuations | <ul style="list-style-type: none"> Deactivate EAP If required, compile EER and deliver to the DSR Complete Situation Report (final) Return to routine activities |
| Internal Notifications | 1. DO 2. LDMG 3. DSTDM | 1. As per previous activation level and | 1. As per previous activation level and | 1. As per previous activation level | 1. Inform previous notifications of deactivation as required |
| External Notifications | 1. Not Applicable | 1. D/S Residents | 1. As per previous activation level, AND 2. DDMG | 1. As per previous activation level | 1. As per previous activation level |



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Table 33: Overturning or Sliding of Spillway—IC Communication Plan

| Activation level | Trigger for communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|---------------------|--|----------------------------------|---|--|-----------------------|---|
| Alert | <ul style="list-style-type: none"> Indications of movement of spillway noted such as cracking, increased seepage, or spilling | N/A—Internal Communications only | | | | |
| Lean Forward | <ul style="list-style-type: none"> Increase in movement, pressures, or seepage | 1.LDMG | • Phone | Describe current situation with dam—What is the event? (unconfirmed instability of dam) What is the status? (under investigation) Advise of current storage level Advise of any forecasts you are aware of Confirm EAP has been activated | | |
| | | 2.D/S Residents | TV, Radio, Social Media, Disaster Dashboard, Roadside Signs | Community messaging will be in accordance with TLDMG Community Information and Warnings Sub Plan and the TLDMG Community Education and Marketing Sub Plan https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details | | |
| Stand Up 1 | <ul style="list-style-type: none"> Obvious displacement of spillway or abutment walls, OR Evidence of scouring at or near toe of stilling basin area | 4.LDMG 5.DDMG | • Phone | Describe current situation with Dam—What is the event? (confirmed instability of dam) What is the status? (prepare for possible evacuations) Advise of current storage level Advise of any forecasts you are aware of Discuss any potential road/ bridge closures Prepare for possible evacuations | | |
| | | 6.D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG, order of priority based on suburbs at risk. Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Watch and Act EA10 | BLACK PINK GREEN |



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Table 34: (Continued) Overturning or Sliding of Spillway—IC Communication Plan

| Activation level | Trigger for communications | Group to contact | Method | Message | AWS and EA | Evacuation Zone |
|------------------|---|--------------------|---|--|-----------------------------|---|
| Stand Up 2 | <ul style="list-style-type: none">Failure in progress or likely due to sliding or overturningDam failure in progress | 1. LDMG 2. DDMG | • Phone | Describe current situation with dam—What is the event? (<i>possible dam failure</i>) What is the status? (prepare coordinated evacuation) Advise of current storage level Advise of any forecasts you are aware of | | |
| | | 1. D/S Residents | • SMS | Emergency Alerts (EA) will be sent to residents through the LDMG, order of priority based on suburbs at risk. Messages will be in accordance with TLDMG Community Information and Warnings Sub Plan or appendix A3, A4, A5 of this EAP https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details. | Emergency Warning EA10.1 | BLACK PINK GREEN |
| Stand Down | <ul style="list-style-type: none">Risk assessment has determined that sliding or overturning risk has reduced | 1. LDMG 2. DDMG | • Phone | Describe current situation with dam—What is the event? What is the status? Advise of current storage level Advise EAP has been deactivated | | |
| | | 3. D/S Residents | TV, Radio, Social Media, Disaster Dashboard, Roadside Signs | Community messaging will be in accordance with TLDMG Community Information and Warnings Sub Plan and the TLDMG Community Education and Marketing Sub Plan https://www.townsville.qld.gov.au/community-support/community-safety/disaster-management for more details | | |

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Table 34: Overturning or Sliding of Spillways - DSTDM Emergency Action

| Activation Level | Alert | Lean Forward | Stand Up 1 | Stand Up 2 | Stand Down |
|------------------------|---|---|--|---|--|
| Activation Trigger | <ul style="list-style-type: none">Indications of movement of spillway noted such as cracking, increased seepage, or spilling | <ul style="list-style-type: none">Storage EL 40.73m, ORIncrease in movement, pressures, or seepage | <ul style="list-style-type: none">Obvious displacement of one or more spillway, OREvidence of scouring at or near toe of stilling basin area | <ul style="list-style-type: none">Failure in progress or likely due to sliding or over turning | <ul style="list-style-type: none">Risk assessment has determined that sliding or overturning |
| Actions | <ul style="list-style-type: none">Review surveillance inspection of the dam and assess its condition as soon as possibleDetermine if there are possible failure paths from reported damageArrange an inspection of the dam and assess its condition as soon as possible, when safe to do soMonitor situation and assess risksRecord all communication | <ul style="list-style-type: none">As per previous activation level andLiaise with IC | <ul style="list-style-type: none">As per previous activation level andAssess risk and determine if failure likely or in progressLiaise with the ICDetermine if remedial repairs are practical (1)Determine if risks can be reduced by lowering storage (2)Make recommendations regarding (1) and (2) to IC.Supervise* remedial repairs (if applicable) | <ul style="list-style-type: none">As per previous activation level andLiaise with the IC and advise on need to recommend evacuations | <ul style="list-style-type: none">Forward information for EER to ICReturn to routine activities |
| Internal Notifications | 1.DDO 2.IC | 1.As per previous activation level 2. | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level |
| External Notifications | 1.Not Applicable | 1.Dam Safety Regulator | 1.As per previous activation level | 1.As per previous activation level | 1.As per previous activation level |

* Supervision means provide technical oversight to the work. It does not necessarily mean on-site supervision.

All communications to IC should be confirmed by email whenever practical

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12. Other Emergency Situation - Communications Failure

12.1 Overview

The emergency action described in this section relates to either:

- An emergency situation where all means of communication at the Dam site have been lost
- An emergency situation where all means of communication with the Local area have been lost.

This section specifies actions and provides guidance for the two situations.

12.2 Emergency Actions

Due to the large number of different possible scenarios, the table below only covers the most common or likely conditions.

12.2.1 Activation Triggers

Table 35: Communications Failure Emergency Activation Trigger Summary

| | |
|-----------------------------------|---|
| Comms Failure – Site | <ul style="list-style-type: none"> • Unable to communicate to or from Dam site (usually affects DDO) |
| Comms Failure – Local area | <ul style="list-style-type: none"> • Unable to communicate to or from Local Area (likely to affect IC, DSTDM and FODM) |

12.2.2 Assessment of circumstances indicating likelihood of communications failure escalating activation level of a current Dam Hazard

The IC will escalate to the FODM any local intelligence on conditions that could increase the probability of a significant communications failure.

The FODM will determine whether it is reasonably likely that there will be a significant communications failure within the subsequent 24 hours and assess the likely effect on current Dam Hazards. If required, the FODM will instruct the IC to escalate the activation level of any current Dam Hazards. 12

12.2.3 Emergency Action Roles

Table 44 to Table 49 specify emergency actions for the following roles:

- Dam Duty Officer (DDO)
- Incident Coordinator (IC)
- Dam Safety Technical Decision Maker (DSTDM)
- Flood Operations Decision Maker (FODM)



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Table 36: Communications Failure - DDO Emergency Action

| Activation Level | Comms Failure Dam Site | Comms Failure Local |
|------------------------|--|--|
| Activation Trigger | <ul style="list-style-type: none">Unable to communicate to Local Area including IC | <ul style="list-style-type: none">Unable to communicate with IC, DSTDM or FODM |
| Actions | <ul style="list-style-type: none">Continue tasks in accordance with any other current Emergency ActionEvery hour attempt communications by any and all means noting the following:<ul style="list-style-type: none">Mobile phone-try texting instead of voice, much higher probability of successSatellite Phone-needs to access open sky unless external antenna fittedSocial Media-e.g. Facebook (Internet may be available via landline)Record all communication and attempts via Dam Log Book entries as per SOP-005 | <ul style="list-style-type: none">Continue tasks in accordance with any other current Emergency ActionEvery hour attempt communications by any and all means noting the following:<ul style="list-style-type: none">Mobile phone-try texting instead of voice, much higher probability of successSatellite Phone-needs to access open sky unless external antenna fittedSocial Media-e.g. Facebook (Internet may be available via landline)Record all communication and attempts via Dam Log Book entries as per SOP-005 |
| Internal Notifications | 1.IC | 1.IC |
| External Notifications | 1.As required | 1.As required |



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Table 37: Communications Failure—IC Emergency Action

| Activation Level | Comms Failure Dam Site | Comms Failure Local Area |
|------------------------|---|--|
| Activation Trigger | <ul style="list-style-type: none">Unable to communicate to Damsite | <ul style="list-style-type: none">Unable to communicate to Local Area i |
| Actions | <ul style="list-style-type: none">Issue incidentAlertEvery hour attempt communications by any and all means noting the following:<ul style="list-style-type: none">Mobile phone-try texting instead of voice, much higher probability of successSatellite Phone-needs to access open sky unless external antenna fittedSocial Media-e.g. Facebook (Internet may be available via landline)Record all communication and attemptsLiaise with DSTDMAs much as is practicable continue other tasks associated with the role in accordance with any another current Emergency Action | <ul style="list-style-type: none">Issue incidentAlertEvery hour attempt communications by any and all means noting the following:<ul style="list-style-type: none">Mobile phone-try texting instead of voice, much higher probability of successSatellite Phone-needs to access open sky unless external antenna fittedSocial Media-e.g. Facebook (Internet may be available via landline)Record all communication and attemptsAs much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action |
| Internal Notifications | 1.DSTDM 2.LDMG | 1. DDO (if available) 2. DSTDM 3. LDMG (if available) |
| External Notifications | 1.DDMG | 1. DDMG (if available) |



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Table 37: Communications Failure— IC Communication Plan

| Activation Level | Trigger for communications | Group to contact | Method | Message text |
|--------------------------|---|---|---|---|
| Comms Failure Site | <ul style="list-style-type: none">• Unable to communicate to or from Dam site, AND• DDO is at Dam site | 1. DSTDM 2. LDMG 3. DDMG | <ul style="list-style-type: none">• Phone | Describe current situation with dam communications. What is the status – estimated time to restore communications? |
| Comms Failure Local Area | <ul style="list-style-type: none">• Unable to communicate to or from Local Area | 1. DDO (if available) 2. DSTDM 3. LDMG (if available) 4. DDMG (if available) | <ul style="list-style-type: none">• Phone | Describe current situation with dam communications. What is the status – estimated time to restore communications? |



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Table 38: Communications Failure - DSTDM Emergency Action

| Activation Level | Comms Failure Site | Comms Failure Local Area |
|------------------------|---|---|
| Activation Trigger | <ul style="list-style-type: none">Unable to communicate to Dam site | <ul style="list-style-type: none">Unable to communicate to Local Area including IC |
| Actions | <ul style="list-style-type: none">Provide technical advice to IC on as needs basisRecord all communicationAs much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action | <ul style="list-style-type: none">Provide technical advice to IC on as needs basisRecord all communicationAssume that the DDO is assisting ICAs much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action |
| Internal Notifications | 1.IC 2.GM TWW | 1.IC 2.DDO (if available) 3.GM TWW |
| External Notifications | 1.Dam Safety Regulator (if applicable) | 1. Dam Safety Regulator (if applicable) |



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Table 39: Communications Failure - FODM Emergency Action

| Activation Level | Comms Failure Site | Comms Failure Local Area |
|------------------------|---|---|
| Activation Trigger | <ul style="list-style-type: none">Unable to communicate to Dam site, | <ul style="list-style-type: none">Unable to communicate to Local Area including |
| Actions | <ul style="list-style-type: none">Liaise with ICRecord all communicationAs much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action | <ul style="list-style-type: none">Liaise with ICRecord all communicationAssume that the DDO is assisting ICAs much as is practicable continue other tasks associated with the role in accordance with any other current Emergency Action |
| Internal Notifications | <ol style="list-style-type: none">ICDSTDM | <ol style="list-style-type: none">ICDDO (if available)DSTDM |
| External Notifications | <ol style="list-style-type: none">Not applicable | <ol style="list-style-type: none">Not applicable |