



seqwater
WATER FOR LIFE

WIVENHOE DAM

STANDING OPERATION PROCEDURES

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1	Seqwater	Principal Engineer Dam Safety	Karalee
2	Seqwater	Operations Coordinator	Wivenhoe Dam
3	Seqwater	Storage Supervisor	Wivenhoe Dam
4	NRW	Director Dam Safety	Brisbane

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(Dam Safety)

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1. INTRODUCTION

On 1 July 2008, the ownership of Wivenhoe Dam was transferred to Queensland Bulk Water Supply Authority, trading as Seqwater. This document contains the dam safety operating criteria for Wivenhoe Dam and also defines responsibilities for actions by Seqwater staff that are critical to the safety of the dam.

The procedures contained in this document must be followed by Seqwater staff when undertaking any activity impacting on dam safety at Wivenhoe Dam. Technical data and plans relating to Wivenhoe Dam are contained in the appendices of this document.

2. ORGANISATIONAL STRUCTURE AND RESPONSIBILITIES

PURPOSE

This procedure is used to ensure that Seqwater personnel involved in the management of Dam Safety at Wivenhoe Dam understand their responsibilities and authorities.

SCOPE

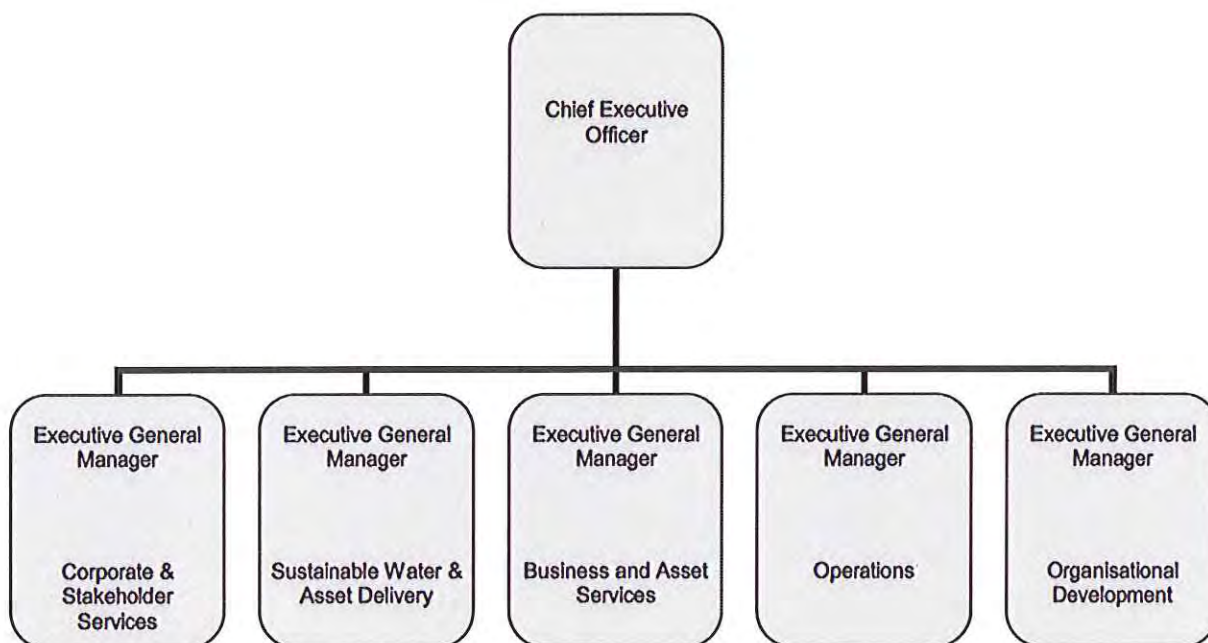
This procedure applies to the Dam Safety Management Program and associated operation and maintenance activities at Wivenhoe Dam.

REFERENCES

- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule

BACKGROUND

The Queensland Bulk Water Supply Authority, trading as Seqwater, began operation on 1 July 2008 as the new water service provider for the South East Queensland. The organisational structure of Seqwater is as shown below.



The Business Groups with responsibilities associated with Dam Safety Management are Operations; Business and Asset Services; and Sustainable Water and Asset Delivery. A description of the responsibilities of these Business Groups, as they relate to Dam Safety Management across Seqwater, is as follows:

- The Operations Group is responsible for the operations and management of all operational assets, including major dams. The Group is also responsible for Dam Safety Management and Flood Management within Seqwater.
- The Business and Asset Services Group has responsibilities for the development and delivery of civil, electrical and mechanical maintenance programs and activities for all operational assets including major dams. This Group is also responsible for strategic maintenance planning, the development of asset renewal and replacement strategies and the delivery of asset renewal and replacement works.
- The Sustainable Water and Asset Delivery Group is responsible for delivering major engineering studies associated with dam safety management and is also responsible for delivering major works associated with asset renewal and replacement.

ACTIONS

The key personnel responsible for Dam Safety Management at Wivenhoe Dam are shown in the following table. These personnel will use services from within Seqwater's Business Groups to meet their responsibilities.

POSITION	PERSON	LOCATION	CONTACT PHONE
Storage Supervisor	Doug Grigg	Wivenhoe Dam	
Operations Coordinator	Jayam Tennakoon	Wivenhoe Office	
Principal Engineer (Dam Safety)	John Tibaldi	Karalee Office	
Dam Safety and Source Operations Manager	Rob Drury	Brisbane Office	

The specific responsibilities of the key personnel in relation to dam safety at Wivenhoe Dam are summarised in the following diagram.

DAM STANDING OPERATING PROCEDURES

DAM EMERGENCIES

EMERGENCY ACTION PLANNING AND REPORTING

- The Principal Engineer (Dam Safety) is responsible for Emergency Action Planning and associated regulatory reporting at Wivenhoe Dam.

LOSS OF COMMUNICATION DURING AN EMERGENCY EVENT

- The Storage Supervisor is responsible for emergency response at Wivenhoe Dam if communications with the Emergency Event Controller are lost during an emergency event.

DAM SECURITY & RESTRICTED AREAS

- The Storage Supervisor is responsible for dam security and maintenance of restricted areas at Wivenhoe Dam.

DAM SAFETY SURVEILLANCE

DAM ATTENDANCE

- The Operations Coordinator is responsible for rostering personnel to meet dam attendance requirements at Wivenhoe Dam.

DAM OPERATING LOG

- The Storage Supervisor is responsible for maintaining the Dam Logbook at Wivenhoe Dam.

ROUTINE DAM SURVEILLANCE

- The Storage Supervisor is responsible for routine dam surveillance, inspections and reporting at Wivenhoe Dam.
- The Principal Engineer (Dam Safety) is responsible for taking appropriate action in response to routine dam surveillance reports at Wivenhoe Dam.

DAM INSTRUMENTATION MANAGEMENT

- The Storage Supervisor is responsible for dam instrumentation data collection and reporting at Wivenhoe Dam.
- The Principal Engineer (Dam Safety) is responsible for taking appropriate action in response to dam instrumentation reports and for maintaining the dam safety instrumentation at Wivenhoe Dam.

ANNUAL DAM INSPECTIONS

- The Principal Engineer (Dam Safety) is responsible for annual dam safety inspections at Wivenhoe Dam.

COMPREHENSIVE FIVE YEARLY INSPECTIONS

- The Principal Engineer (Dam Safety) is responsible for comprehensive five yearly dam safety inspections at Wivenhoe Dam.

UNSCHEDULED DAM INSPECTIONS

- The Principal Engineer (Dam Safety) is responsible for directing and undertaking unscheduled dam safety inspections at Wivenhoe Dam.

DAM OPERATIONS AND MAINTENANCE

ROUTINE DAM OPERATIONS & MAINTENANCE

- The Storage Supervisor is responsible for undertaking routine operations and maintenance at Wivenhoe Dam.
- The Principal Engineer (Dam Safety) is responsible for maintaining the Wivenhoe Dam - Operation and Maintenance Manual.

ROUTINE DAM SAFETY OPERATIONS

- The Storage Supervisor is responsible for undertaking dam safety operations at Wivenhoe Dam.
- The Principal Engineer (Dam Safety) is responsible for maintaining the Wivenhoe Dam - Standing Operating Procedures.

RENEWAL & REFURBISHMENT OF DAM INFRASTRUCTURE

- The Dam Safety and Source Operations Manager is responsible for ensuring that all required renewal and refurbishment work is undertaken at Wivenhoe Dam.

STORAGE INFLOW CONTROL

- The Storage Supervisor is responsible for managing the diversion of water into Wivenhoe Dam.

ROUTINE REGULATED WATER RELEASES

- The Storage Supervisor is responsible for undertaking and managing water releases from Wivenhoe Dam.

FLOOD OPERATIONS AND SPILLWAY WATER RELEASES

- The Principal Engineer (Dam Safety) is responsible for directing actions in response to spillway water releases at Wivenhoe Dam.

DAM SAFETY ADMINISTRATION AND REGULATORY REQUIREMENTS

REPORTING

- The Storage Supervisor is responsible for routine reporting at Wivenhoe Dam.
- The Principal Engineer (Dam Safety) is responsible for regulatory reporting at Wivenhoe Dam.

DAM SAFETY DOCUMENTATION

- The Principal Engineer (Dam Safety) is responsible for maintaining all dam safety documentation associated with Wivenhoe Dam.

REGULATORY REQUIREMENTS & DAM SAFETY CONDITIONS

- The Principal Engineer (Dam Safety) is responsible for meeting regulatory requirements and dam safety conditions associated with dam safety management at Wivenhoe Dam.

TRAINING

- The Dam Safety and Source Operations Manager is responsible for ensuring that all employees working at Wivenhoe Dam have an appropriate job description and duty statement and understand their responsibilities.
- The Principal Engineer (Dam Safety) is responsible for providing appropriate dam safety training programs for all dam operations staff at Wivenhoe Dam.
- The Operations Coordinator is responsible for ensuring that all site personnel at Wivenhoe Dam are adequately resourced and trained for their assigned tasks.

3. DAM EMERGENCIES

3.1 EMERGENCY ACTION PLANNING AND REPORTING

PURPOSE

This procedure is used to ensure that dam safety emergencies at Wivenhoe Dam are properly managed.

SCOPE

This procedure applies to the management of dam safety emergencies at Wivenhoe Dam. (It should be noted that emergency response downstream is undertaken in accordance with the Queensland Disaster Management Act 2003 and is not the responsibility of Seqwater).

REFERENCES

- Wivenhoe Dam – Emergency Action Plan
- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule
- Seqwater– Emergency Response Plan

RESPONSIBILITIES

The **Principal Engineer (Dam Safety)** is responsible for Emergency Action Planning and associated regulatory reporting at Wivenhoe Dam.

ACTIONS

The **Principal Engineer (Dam Safety)** shall:

- Ensure all persons involved in emergency response at the dam are aware that emergency response actions are to be undertaken in accordance with the Wivenhoe Dam – Emergency Action Plan (EAP) and the Seqwater – Emergency Response Plan (ERP).
- Maintain the EAP in accordance with the requirements of the Queensland Dam Safety Management Guidelines.
- Maintain and annually review the EAP in accordance with the Wivenhoe Dam – Dam Safety Condition Schedule. Confirmation of emergency response contact details is key component of the annual review.

- Re-issue the controlled EAP documentation to all document holders listed in the EAP if the EAP is amended as a result of the annual review, or for any other reason
- In the event of an emergency, report to the regulator in accordance with the Wivenhoe Dam – Dam Safety Condition Schedule.
- Organise meetings with EAP stakeholders, including the Local Disaster Management Groups, the District Disaster Coordinator, Emergency Management Queensland and the Bureau of Meteorology at least annually.
- Undertake desktop exercises involving initiation of the EAP at least two yearly.
- Undertake comprehensive field exercises involving initiation of the EAP at least five yearly.

3.2 LOSS OF COMMUNICATION DURING AN EMERGENCY EVENT

PURPOSE

This procedure is used by Dam Operations staff when communications with the Emergency Event Controller fail during an emergency event.

SCOPE

This procedure applies when the Emergency Action Plan has been activated and communications between the operations staff at the dam and the Emergency Event Controller have failed.

REFERENCES

- Wivenhoe Dam – Emergency Action Plan

RESPONSIBILITIES

The **Storage Supervisor** is responsible for emergency response at Wivenhoe Dam if communications with the Emergency Event Controller are lost during an emergency event. The identity of Emergency Event Controller is defined in the Wivenhoe Dam – Emergency Action Plan (see Section 1) and is dependent on the type of emergency incident being managed.

ACTIONS

If communications with the Emergency Event Controller (as defined in the Wivenhoe Dam – Emergency Action Plan) are lost during an emergency event, the **Storage Supervisor** shall:

- Assume the responsibility for control of the emergency at the dam site
- Direct dam operations staff to repeatedly seek to restore communication with the Emergency Event Controller.
- Direct dam operations staff to continue operating the dam in accordance with the Wivenhoe Dam – Emergency Action Plan.

3.3 DAM SECURITY AND RESTRICTED AREAS

PURPOSE

This procedure is used by Dam Operations to control security and site access at the dam site.

SCOPE

This procedure applies to use of the site at Wivenhoe Dam.

REFERENCES

- Seqwater – Site Induction Procedures

RESPONSIBILITIES

The **Storage Supervisor** is responsible for dam security and maintenance of restricted areas at Wivenhoe Dam.

ACTIONS

The **Storage Supervisor** shall:

- Maintain a record of all visitors to the dam site and ensure that an appropriate site induction is provided to all visitors in accordance with Seqwater standards.
- Ensure all visitors to the dam are escorted and supported as considered appropriate to maintain site security and safety.
- Properly maintain all permanent fences and signs at the dam site that are owned by Seqwater.
- Ensure that gates into unattended fenced areas and doors into unattended buildings are kept locked at all times.
- Ensure that non-public and hazardous areas around the dam site are adequately sign posted and fenced. This includes placing appropriate signs and barricades around areas where access is to be restricted on a temporary basis.
- Maintain a register for the issue of keys to the dam site.
- Report any break-ins or vandalism to the Dam Safety and Source Operations Manager.

4. DAM SAFETY SURVEILLANCE

4.

4.1 DAM ATTENDANCE

PURPOSE

This procedure is used to ensure that there are adequate personnel at Wivenhoe Dam at all times, to meet dam safety requirements.

SCOPE

This procedure applies to the operation and maintenance of Wivenhoe Dam.

REFERENCES

- Wivenhoe Dam - Emergency Action Plan

RESPONSIBILITIES

The **Operations Coordinator** is responsible for rostering personnel to meet dam attendance requirements at Wivenhoe Dam.

ACTIONS

The **Operations Coordinator** shall:

- Ensure that staffing levels at Wivenhoe Dam are appropriate for the operational state of the dam with particular reference to the requirements of the Wivenhoe Dam - Emergency Action Plan.
- Direct additional personnel to attend the dam as needed. Personnel may be permanent Seqwater staff or contractors, but must be appropriately trained for the designated task.

4.2 DAM OPERATING LOG

PURPOSE

This procedure is used to ensure that a proper Logbook is kept at Wivenhoe Dam in accordance with regulatory requirements.

SCOPE

This procedure applies to the maintenance of a proper Logbook at Wivenhoe Dam.

REFERENCES

- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule
- Wivenhoe Dam - Emergency Action Plan

RESPONSIBILITIES

The **Storage Supervisor** is responsible for maintaining the Dam Logbook at Wivenhoe Dam.

ACTIONS

The **Storage Supervisor** shall:

- Keep a dam Logbook on site at the dam site and have the Logbook available for perusal during Dam Safety Inspections.
- Keep the dam logbook updated with at least the minimum entries as detailed below. The logbook entries should reflect the dates and details of the event.
 - Dam safety inspections
 - Accidents and incidents that impact on the safety of the dam or result in activation of the Wivenhoe Dam - Emergency Action Plan
 - Major maintenance works
 - Start, finish and maximum storage level associated with uncontrolled discharges from the dam, including flood discharges
 - Any other event that may become historically significant
- Generally maintain the dam logbook in a manner that does not duplicate information that is held within other Seqwater systems.

4.3 DAM SURVEILLANCE AND ROUTINE INSPECTIONS

PURPOSE

This procedure is used to ensure that routine dam safety inspections are carried out in accordance with regulatory requirements.

SCOPE

This procedure applies to routine dam safety inspections at Wivenhoe Dam as defined by the Queensland Dam Safety Management Guidelines.

REFERENCES

- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule

RESPONSIBILITIES

- The **Storage Supervisor** is responsible for routine dam safety surveillance, inspections and reporting at Wivenhoe Dam.
- The **Principal Engineer (Dam Safety)** is responsible for taking appropriate action in response to routine dam surveillance reports at Wivenhoe Dam.

ACTIONS

The **Storage Supervisor** shall:

- Ensure a regular inspection of the dam is undertaken on a daily basis in accordance with the requirements of the Queensland Dam Safety Management Guidelines and the template in Appendix E.
- Immediately advise the **Principal Engineer (Dam Safety)** of any inspection findings or observations that are of concern from a dam safety perspective.
- Send copies of all routine dam safety reports to the **Principal Engineer (Dam Safety)** and the **Dam Safety and Source Operations Manager** on a monthly basis. All original reports should be retained and stored on site.

The **Principal Engineer (Dam Safety)** shall:

- Take appropriate action in response to dam safety reports received by the **Storage Supervisor** and retain and store a copy of each report.

4.4 DAM INSTRUMENTATION DATA COLLECTION AND MANAGEMENT

PURPOSE

This procedure is used to ensure that dam safety instrumentation data is collected in accordance with regulatory requirements and that the dam safety instrumentation is properly maintained.

SCOPE

This procedure applies to the use and maintenance of the dam safety instrumentation at Wivenhoe Dam.

REFERENCES

- Queensland Dam Safety Management Guidelines

RESPONSIBILITIES

- The **Storage Supervisor** is responsible for dam instrumentation data collection and reporting at Wivenhoe Dam.
- The **Principal Engineer (Dam Safety)** is responsible for taking appropriate action in response to dam instrumentation reports and for maintaining the dam safety instrumentation at Wivenhoe Dam.

ACTIONS

The **Storage Supervisor** shall:

- *Each working day:*
 - Record rainfall and storage level – and enter this information onto the monthly surveillance report to be forwarded to the **Principal Engineer (Dam Safety)** at the end of the month.
- *Daily:*
 - Read the V-Notch Weirs and seepage measurement points – and enter this data into the daily inspection report as contained in Appendix E.
- *Monthly:*
 - Read the plezometers and inspect the foundation drains – and enter this information onto the monthly surveillance report.
- *Annually:*
 - Assist the surveyor to undertake the dam deformation survey.

The **Principal Engineer (Dam Safety)** shall:

- Ensure that the dam safety instrumentation is properly serviced and maintained.
- Collate and preserve all instrumentation data received
- Analyse, trend, and interpret all instrumentation data received.
- Determine appropriate follow-up action based on an analysis of the instrumentation data received.

4.5 ANNUAL DAM INSPECTIONS

PURPOSE

This procedure is used to ensure that annual dam safety inspections are carried out in accordance with regulatory requirements.

SCOPE

This procedure applies to annual dam safety inspections at Wivenhoe Dam as defined by the Queensland Dam Safety Management Guidelines.

REFERENCES

- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule

RESPONSIBILITIES

The **Principal Engineer (Dam Safety)** is responsible for annual dam safety inspections at Wivenhoe Dam.

ACTIONS

The **Principal Engineer (Dam Safety)** shall:

- Undertake Annual Dam Inspections at Wivenhoe Dam in accordance with the requirements of the Wivenhoe Dam – Dam Safety Condition Schedule and the Queensland Dam Safety Management Guidelines.
- Review previous Annual and Five Yearly Comprehensive Inspection reports as part of the Annual Inspection, to ensure that the recommendations in these reports are proceeding as required.
- Within 30 days of completing the Annual Inspection, provide a written report, detailing the findings of the inspection to each of the following personnel:
 - Executive General Manager - Operations
 - Dam Safety and Source and Operations Manager
 - Operations Coordinator
 - Storage Supervisor
 - Dam Safety Regulator

4.6 COMPREHENSIVE FIVE YEARLY DAM SAFETY INSPECTIONS

PURPOSE

This procedure is used to ensure that comprehensive five yearly dam safety inspections are carried out in accordance with regulatory requirements.

SCOPE

This procedure applies to comprehensive five yearly dam safety inspections at Wivenhoe Dam as defined by the Queensland Dam Safety Management Guidelines.

REFERENCES

- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule

RESPONSIBILITIES

The **Principal Engineer (Dam Safety)** is responsible for comprehensive five yearly dam safety inspections at Wivenhoe Dam.

ACTIONS

The **Principal Engineer (Dam Safety)** shall:

- Undertake Comprehensive Five Yearly Dam Safety Inspections at Wivenhoe Dam in accordance with the requirements of the Wivenhoe Dam – Dam Safety Condition Schedule and the Queensland Dam Safety Management Guidelines.
- Review previous Annual and Five Yearly Comprehensive Inspection reports as part of the Comprehensive Five Yearly Dam Safety Inspection, to ensure that the recommendations in these reports are proceeding as required.
- Within 30 days of completing the Comprehensive Five Yearly Dam Safety Inspection, provide a written report, detailing the findings of the inspection to each of the following personnel:
 - Executive General Manager - Operations
 - Dam Safety and Source and Operations Manager
 - Operations Coordinator
 - Storage Supervisor
 - Dam Safety Regulator

4.7 UNSCHEDULED DAM INSPECTIONS

PURPOSE

This procedure is used to ensure that unscheduled dam safety inspections (also known as special inspections) are carried out in accordance with regulatory requirements.

SCOPE

This procedure applies to Special Inspections at Wivenhoe Dam as defined by the Queensland Dam Safety Management Guidelines.

REFERENCES

- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule

RESPONSIBILITIES

The **Principal Engineer (Dam Safety)** is responsible for undertaking unscheduled dam safety inspections at Wivenhoe Dam.

ACTIONS

The **Principal Engineer (Dam Safety)** shall:

- Undertake unscheduled Dam Inspections if directed by the regulator or if a particular feature of the dam has been identified as having a possible deficiency or if the dam has been subjected to abnormal loading conditions (e.g. a flood or earthquake event).
- Recruit suitable and appropriate resources to assist in the inspection.
- Undertake unscheduled Dam Inspections at Wivenhoe Dam in accordance with the requirements of the Queensland Dam Safety Management Guidelines.
- Within 10 days of completing an Unscheduled Inspection, provide a written report, detailing the findings of the inspection to each of the following personnel:
 - Executive General Manager - Operations
 - Dam Safety and Source and Operations Manager
 - Operations Coordinator
 - Storage Supervisor
 - Dam Safety Regulator

5. DAM OPERATION AND MAINTENANCE

5.

5.1 ROUTINE DAM OPERATIONS AND MAINTENANCE

PURPOSE

This procedure is used to ensure that all equipment critical to the operation of Wivenhoe Dam is properly operated and maintained.

SCOPE

This procedure applies to the operation and maintenance of all equipment critical to the operation of Wivenhoe Dam.

REFERENCES

- Wivenhoe Dam – Operation and Maintenance Manual
- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule

RESPONSIBILITIES

- The **Storage Supervisor** is responsible for undertaking routine operations and maintenance at Wivenhoe Dam.
- The **Principal Engineer (Dam Safety)** is responsible for maintaining the Wivenhoe Dam - Operation and Maintenance Manual.

ACTIONS

The **Storage Supervisor** shall:

- Ensure that all equipment at Wivenhoe Dam is operated and maintained in accordance with the Wivenhoe Dam – Operation and Maintenance Manual. Staff from Seqwater's Business and Asset Services Group will provide maintenance resources to assist with specialised maintenance tasks.
- Ensure that all dam operations staff are adequately trained and resourced for their tasks prior to undertaking routine operation and maintenance work at Wivenhoe Dam.
- Report any malfunction or breakdown of critical equipment at the dam, which cannot be resolved within 4 hours, to the **Principal Engineer (Dam Safety)** and the Operations Coordinator.

- Record all malfunctions and breakdowns of equipment at the dam in accordance with Seqwater's Maintenance management System procedures.
- Record all completed routine maintenance in accordance with Seqwater's Maintenance management System procedures.

The Principal Engineer (Dam Safety) shall:

- Maintain the Wivenhoe Dam – Operation and Maintenance Manual in accordance with the requirements of the Queensland Dam Safety Management Guidelines.
- Maintain and review the Wivenhoe Dam – Operation and Maintenance annually in accordance with the Wivenhoe Dam – Dam Safety Condition Schedule.
- Re-issue controlled copies of the Wivenhoe Dam – Operation and Maintenance Manual, if the manual is amended as a result of the annual review, or for any other reason.
- Provide a controlled copy of the Wivenhoe Dam – Operations and Maintenance Manual to Seqwater's Maintenance Group, to allow the routine maintenance required by the manual to be properly scheduled and completed in accordance with Seqwater's work management system.

5.2 ROUTINE DAM SAFETY OPERATIONS

PURPOSE

This procedure is used to ensure that all dam safety operations at Wivenhoe Dam are undertaken properly and in accordance with regulatory requirements.

SCOPE

This procedure applies to dam safety operations at Wivenhoe Dam.

REFERENCES

- Wivenhoe Dam – Standing Operating Procedures
- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule

RESPONSIBILITIES

- The **Storage Supervisor** is responsible for undertaking dam safety operations at Wivenhoe Dam.
- The **Principal Engineer (Dam Safety)** is responsible for maintaining the Wivenhoe Dam - Standing Operating Procedures.

ACTIONS

The **Storage Supervisor** shall:

- Ensure that all dam safety operations at Wivenhoe Dam are undertaken in accordance with the Wivenhoe Dam – Standing Operating Procedures.
- Ensure that all dam operations staff are adequately trained and resourced for their tasks prior to undertaking dam safety operations at Wivenhoe Dam.

The **Principal Engineer (Dam Safety)** shall:

- Maintain the Wivenhoe Dam – Standing Operating Procedures in accordance with the requirements of the Queensland Dam Safety Management Guidelines.
- Maintain and review the Wivenhoe Dam – Standing Operating Procedures annually in accordance with the Wivenhoe Dam – Dam Safety Condition Schedule.
- Re-issue controlled copies of the Wivenhoe Dam – Standing Operating Procedures Manual, if the manual is amended as a result of the annual review, or for any other reason.

5.3 RENEWAL AND REFURBISHMENT OF DAM INFRASTRUCTURE

PURPOSE

This procedure is used to ensure that infrastructure renewal and refurbishment work at Wivenhoe Dam is completed in accordance with Annual and Comprehensive Inspection recommendations.

SCOPE

This procedure applies to infrastructure renewal and refurbishment work at Wivenhoe Dam.

REFERENCES

- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule
- Wivenhoe Dam – Annual Inspection Reports
- Wivenhoe Dam – Comprehensive Five Yearly Inspection Reports
- Wivenhoe Dam – Dam Safety Reviews
- Wivenhoe Dam – Spillway Adequacy Assessments

RESPONSIBILITIES

The **Dam Safety and Source Operations Manager** is responsible for ensuring that all required infrastructure renewal and refurbishment work is undertaken at Wivenhoe Dam.

ACTIONS

The **Dam Safety and Source Operations Manager** shall:

- Ensure that all infrastructure renewal and refurbishment work arising from the following reports is undertaken in accordance with report recommendations and regulatory requirements:
 - Wivenhoe Dam – Annual Inspection Reports
 - Wivenhoe Dam – Comprehensive Five Yearly Inspection Reports
 - Wivenhoe Dam – Dam Safety Reviews
 - Wivenhoe Dam – Spillway Adequacy Assessments

Staff from Seqwater's Sustainable Water and Asset Delivery Group and Seqwater's Business and Asset Services Group will provide resources to assist in undertaking renewal and refurbishment at Wivenhoe Dam as required.

5.4 STORAGE INFLOW CONTROL

PURPOSE

To ensure that major inflows into Wivenhoe Dam are monitored.

SCOPE

This procedure applies to dam operations at Wivenhoe Dam.

REFERENCES

- The Resource Operating License issued by Department of Natural Resources and Water relevant to managing inflows into Wivenhoe Dam (ROL).
- Wivenhoe Dam – Operation and Maintenance Manual

RESPONSIBILITIES

The **Storage Supervisor** is responsible for overseeing the diversion of water into the dam.

BACKGROUND

The purpose of Wivenhoe Dam is to take surplus water from the Brisbane River and store it for later use by downstream water consumers. Inflow into the dam occurs from natural water flows in the Brisbane River.

ACTIONS

The **Storage Supervisor** shall:

- Oversee Storage Inflow in accordance with requirements of the Resource Operating License issued by Department of Natural Resources and Water relevant to managing inflows into Wivenhoe Dam (ROL).
- Take the following actions when aware of significant rain within the Brisbane River catchment:
 - Be aware of the operational status of all diversion infrastructure at the dam.
 - Monitor upstream and downstream river levels during the inflow event.

5.5 ROUTINE REGULATED WATER RELEASES

PURPOSE

This procedure is used to ensure that water is released from Wivenhoe Dam in a manner that does not compromise the dam safety requirements of the dam.

SCOPE

This procedure applies to the routine release of water from Wivenhoe Dam and does not include flood operations. For flood operations procedures (see Section 5.6).

REFERENCES

- The Resource Operating License issued by Department of Natural Resources and Water relevant to managing inflows into Wivenhoe Dam (ROL).
- Wivenhoe Dam – Operation and Maintenance Manual

RESPONSIBILITIES

The **Storage Supervisor** is responsible for undertaking and managing water releases from Wivenhoe Dam.

ACTIONS

The **Storage Supervisor** shall:

- Manage water releases from Wivenhoe Dam in accordance with instructions from the Operations Coordinator and the Resource Operating License issued by Department of Natural Resources and Water relevant to managing releases from Wivenhoe Dam (ROL).
- Record the details of all releases from the dam in accordance with ROL requirements.
- Control releases using the outlet valves and mini-hydro facility located in the outlet works.
- Verify the release rate by using the measuring weir downstream of the outlet works.

5.6 FLOOD OPERATIONS AND SPILLWAY WATER RELEASES

PURPOSE

This procedure is used to undertake flood operations and manage spillway water releases from Wivenhoe Dam.

SCOPE

This procedure applies to spillway water releases from Wivenhoe Dam.

REFERENCES

- Wivenhoe Dam – Emergency Action Plan
- Manual of Operational Procedures for Flood Releases from Somerset and Wivenhoe Dams

RESPONSIBILITIES

The **Principal Engineer (Dam Safety)** is responsible for directing actions in response to spillway water releases at Wivenhoe Dam

ACTIONS

The **Principal Engineer (Dam Safety)** shall:

- Use the Wivenhoe Dam – Emergency Action Plan to direct actions when spillway water releases are occurring from Wivenhoe Dam.
- Use the Manual of Operational Procedures for Flood Releases from Somerset and Wivenhoe Dams as the basis for operational decision making during flood events at Wivenhoe Dam.

6. DAM SAFETY ADMINISTRATION AND REGULATORY REQUIREMENTS

6.1 REPORTING

PURPOSE

This procedure is used to ensure that dam safety reporting at Wivenhoe Dam is being undertaken in accordance with regulatory requirements.

SCOPE

This procedure applies dam safety reporting at Wivenhoe Dam.

REFERENCES

- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule

RESPONSIBILITIES

- The **Storage Supervisor** is responsible for routine reporting at the dam.
- The **Principal Engineer (Dam Safety)** is responsible for regulatory reporting at the dam.

ACTIONS

- The **Storage Supervisor** shall undertake routine reporting in accordance with the following Standing Operating Procedures:
 - SOP 3.2 – Dam Operating Log
 - SOP 3.3 – Dam Surveillance and Routine Inspection
 - SOP 3.4 – Dam Instrumentation Data Collection and Management
 - SOP 4.1 – Routine Operations and Maintenance
- The **Principal Engineer (Dam Safety)** shall undertake regulatory reporting in accordance with the following Standing Operating Procedures:
 - SOP 2.1 – Emergency Action Planning and Reporting
 - SOP 3.5 – Annual Dam Inspections
 - SOP 3.6 – Comprehensive Five Yearly Dam Safety Inspections
 - SOP 3.7 – Unscheduled Dam Inspections
 - SOP 5.2 – Dam Safety Documentation

- SOP 5.3 – Regulatory Requirements and Dam Safety Conditions

6.2 DAM SAFETY DOCUMENTATION

PURPOSE

This procedure is used to ensure that dam safety documentation associated with Wivenhoe Dam is controlled in accordance with regulatory requirements.

SCOPE

This procedure applies to the following documents:

- Wivenhoe Dam – Emergency Action Plan
- Wivenhoe Dam – Standing Operating Procedures
- Wivenhoe Dam – Operation and Maintenance Manuals
- Wivenhoe Dam – Data Book
- Any document prepared in order to comply with the Wivenhoe Dam – Dam Safety Condition Schedule

REFERENCES

- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule

RESPONSIBILITIES

The **Principal Engineer (Dam Safety)** is responsible for maintaining all dam safety documentation associated with Wivenhoe Dam.

ACTIONS

The **Principal Engineer (Dam Safety)** shall:

- Prepare, review and update Dam Safety Controlled documents for Wivenhoe Dam in accordance with the Wivenhoe Dam – Dam Safety Condition Schedule and the Queensland Dam Safety Management Guidelines.
- Store all documents securely until such time as the dam is decommissioned.
- Make all documents available for inspection by the Chief Executive, Department of Natural Resources and Water, within seven (7) days of a written request for access being received.
- Annually review all Dam Safety controlled documents in accordance with the Wivenhoe Dam – Dam Safety Condition Schedule. Following this review, a written notification confirming the review must be signed by the dam owner and forwarded to

the regulator in accordance with the Wivenhoe Dam – Dam Safety Condition Schedule.

- If a controlled document is amended as a result of the annual review, or for any other reason; re-issue the controlled documentation to all document holders listed in the "Controlled Document – Document Issue Register" within 30 days. Additionally, uncontrolled electronic copies of the amended document must be provided to the Chief Executive Officer and General Manager – Operations within 7 days.

6.3 REGULATORY REQUIREMENTS AND DAM SAFETY CONDITIONS

PURPOSE

This procedure is used to ensure that all regulatory requirements and dam safety conditions associated with dam safety management at Wivenhoe Dam are met.

SCOPE

This procedure applies to dam safety management at Wivenhoe Dam.

REFERENCES

- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule

RESPONSIBILITIES

The **Principal Engineer (Dam Safety)** is responsible for meeting regulatory requirements and dam safety conditions associated with dam safety management at Wivenhoe Dam.

ACTIONS

The **Principal Engineer (Dam Safety)** shall:

- Ensure that all dam safety conditions contained in the Wivenhoe Dam – Dam Safety Condition Schedule must be met. In meeting condition requirements, consideration must be given to the Queensland Dam Safety Management Guidelines.
- Provide formal notification to the dam safety regulator, if any dam safety condition contained in the Wivenhoe Dam – Dam Safety Condition Schedule cannot be met.

6.4 TRAINING

PURPOSE

This procedure is used to ensure that personnel involved in dam safety management at Wivenhoe Dam are adequately trained.

SCOPE

This procedure applies to training of personnel involved in dam safety management at Wivenhoe Dam.

REFERENCES

- Queensland Dam Safety Management Guidelines
- Wivenhoe Dam – Dam Safety Condition Schedule

RESPONSIBILITIES

- The **Dam Safety and Source Operations Manager** is responsible for ensuring that all employees working at Wivenhoe Dam have an appropriate job description and duty statement and understand their responsibilities.
- The **Principal Engineer (Dam Safety)** is responsible for providing appropriate dam safety training programs for all dam operations staff at Wivenhoe Dam.
- The **Operations Coordinator** is responsible for ensuring that all site personnel at Wivenhoe Dam are adequately resourced and trained for their assigned tasks.

ACTIONS

- The **Dam Safety and Source Operations Manager** shall:
 - Ensure that all employees have an appropriate Job description and duty statement and understand their responsibilities in relation to dam safety management at Wivenhoe Dam.
- The **Principal Engineer (Dam Safety)** shall:
 - Conduct regular reviews of the minimum standard of training required for dam operations personnel.
 - Develop and facilitate training courses for operations personnel, including a generic dam safety operations course and a site specific training and assessment course for Wivenhoe Dam.
 - Maintain a Dam Safety Training Register.

- **The Operations Coordinator shall:**
 - Ensure that all personnel undertaking dam safety related duties at Wivenhoe Dam are adequately trained to carry out these tasks.

APPENDIX A
TECHNICAL DATA AND CRITICAL FLOOD
LEVELS

WIVENHOE DAM		
POPULATION AT RISK	- Sunny Day Failure - Flood	244000 > 1000 (Not fully assessed)
Type of dam	Gated concrete spillway, earth and rockfill embankment with 2 saddle dams.	
Dam Owner	Seqwater	
Construction Completed	1984	
Watercourse	Located on the Brisbane River near Fernvale.	
Catchment Area	7,020 km ²	
Length of dam	2,300 m	
Maximum Height	50 m	
Clear length of spillway	60 m	
Number of radial spillway gates	5	
Size of each Radial Gate	12 m wide x 16.6 m high	
Full Supply level	EL 67.0 m	
Top of Closed Radial Gate	EL 73.0 m	
Dam Crest Level	- Embankment Level	EL 79.0 m
	- Concrete Parapet Wall	EL 80.1 m
Storage capacity at F.S.L.	1 150 000 ML	
Peak water level as a result of PMF	Dam overtopped	
Spillway Capacity (Including fuse plugs)	28,100 m ³ /s (EL 79.0 m)	
Maximum discharge as a result of PMF	37,400 m ³ /s	
AEP of Spillway Capacity (Including fuse plugs)	In 100, 000 (EL 79.0 m)	

The dam is overtopped for the PMF event, and is unlikely to withstand being overtopped.

Dam Critical Stability Levels

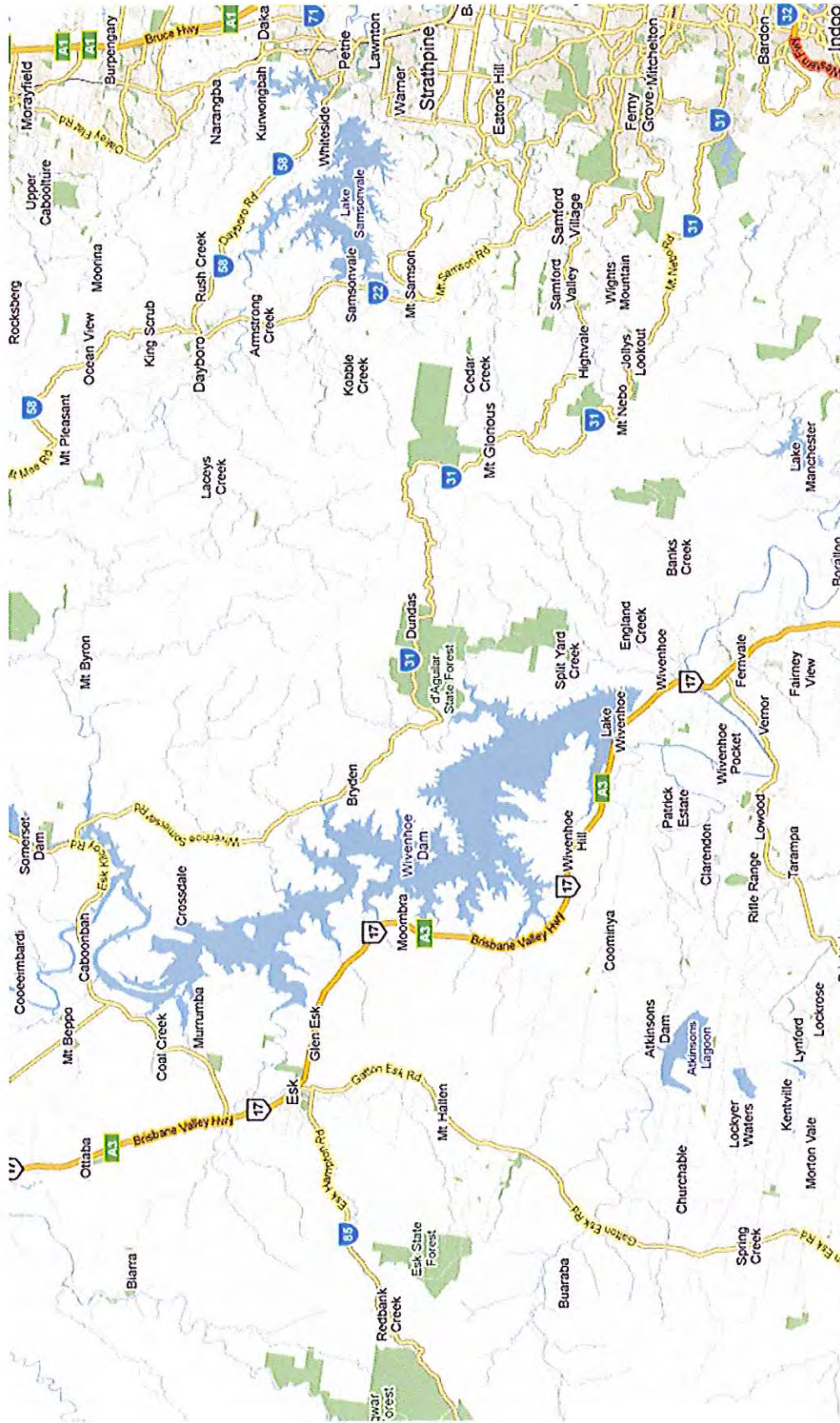
Description	Level (m AHD)
Full Supply level	67.00
Fuse Plugs Fixed Crest	67.00
Gate Operation Trigger Level	67.25
Top of Closed Radial Gates	73.00
Minimum Land Resumption Level	75.00
Centre Fuse Plug Crest	75.70
Right Fuse Plug Crest	76.20
Left Fuse Plug Crest	76.70
Evaluation Design Level	77.00
Main Embankment Crest	79.00
Top of Wave Wall	79.90
Saddle Dam Embankment Crest	80.00

The spillway rating curves were used to route the inflow floods through the reservoir for various flood exceedence probabilities as shown below:

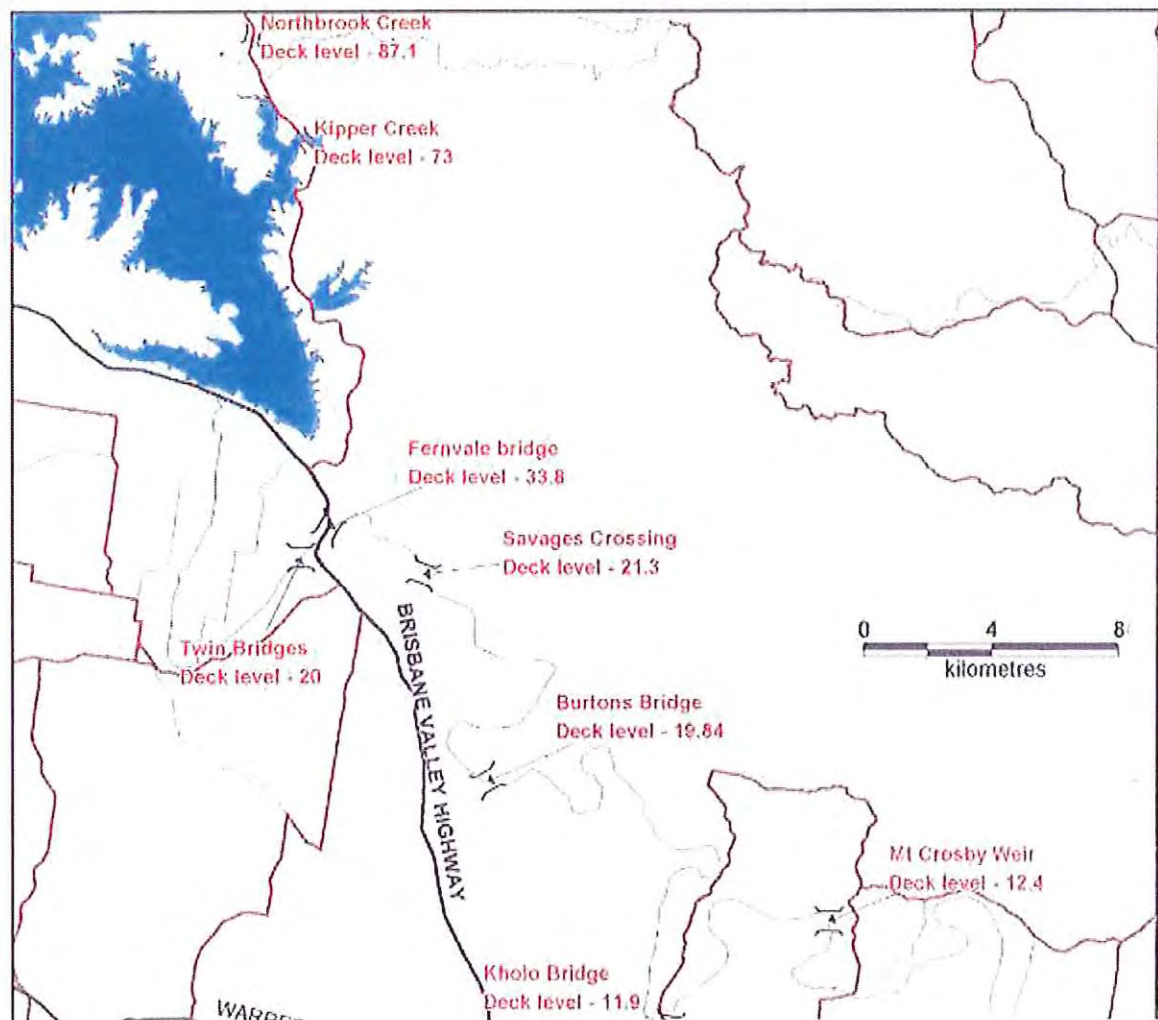
Dam Flood Routing Results

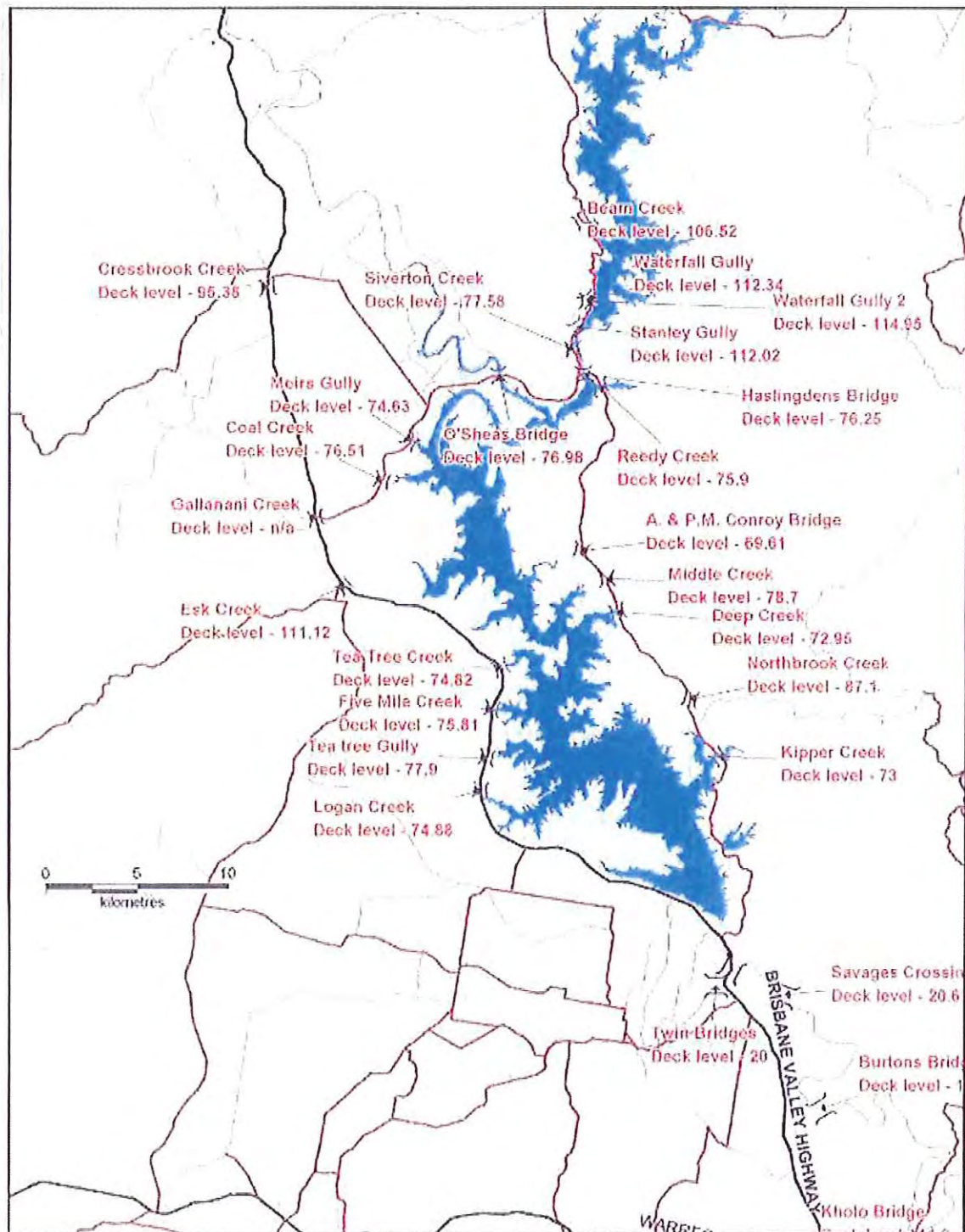
Event (AEP)	Peak Inflow (m ³ /s)	Peak Outflow (m ³ /s)	Peak Water Level (m)
1 in 200	83,00	2,800	73.0
1 in 6,000		12,250	75.8
1 in 22,500		21,800	76.9
1 in 65,000		32,850	78.4
1 in 100,000	43,300	35,000	79.0
PMF	49,000	37,500	> 79.0

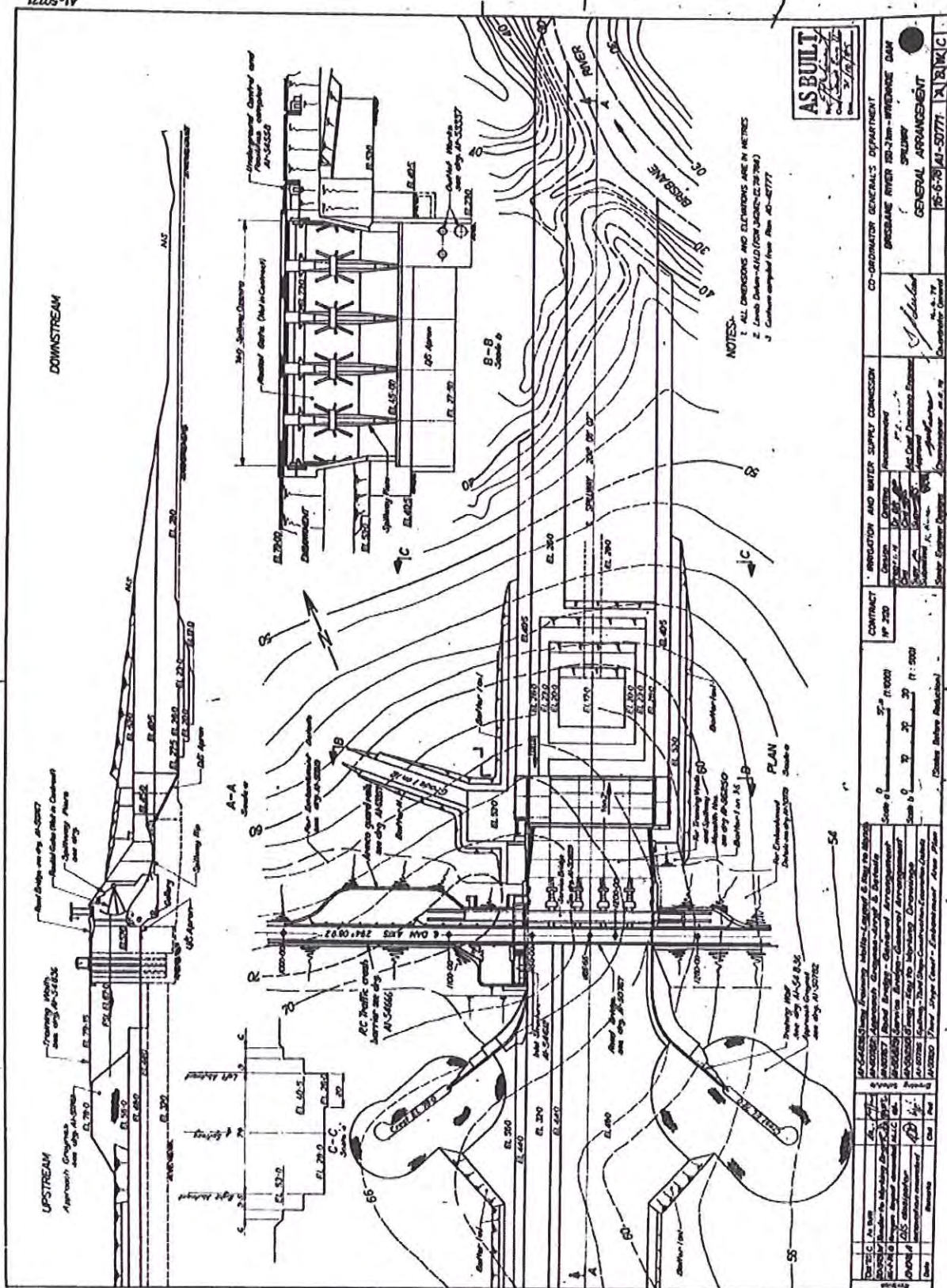
APPENDIX B
MAPS AND PLANS



(Reference: <http://maps.google.com.au/maps>)







APPENDIX C
DAM SAFETY CONDITION SCHEDULE
(EXTRACT)

Wivenhoe Dam

Dam Safety Condition Schedule

Condition DS 1 - Documentation

1. Any documentation prepared to comply with these conditions must be stored securely until such time as the dam is decommissioned.
2. The documentation must be made available for inspection by the Chief Executive, Department of Natural Resources and Mines, within 7 days of a written request for access being received by the dam owner.
3. On change of ownership of the dam, all documentation prepared in compliance with these conditions must be transferred to the new owner.

Condition DS 2 - Incidents and Failures

1. The dam owner must report in writing all incidents and failures (as defined in the *Queensland Dam Safety Management Guidelines – February 2002*) to the Chief Executive, Department of Natural Resources and Mines, within 7 days of becoming aware of the incident or failure.
2. The dam owner must advise the Chief Executive, Department of Natural Resources and Mines of any proposed remedial actions in writing within one month of the incident or failure.

Condition DS 3 - Design Reports

1. The current Design Report for the dam is "Wivenhoe Dam Design Report Volume 1 Text - September 1995". Prepared by Department of Primary Industries - Water Commercial

Condition DS 4 - Design and Construction

1. Any remedial works or reconstruction of the dam must be carried out in accordance with current engineering practice and ensure that the dam remains generally in accordance with the following documentation:
 - Coordinator - General's Department - Brisbane River 150.2 km Wivenhoe Dam - Third Stage Construction Embankment Area Plan - A1 50820 (B) As Built
 - Co-Coordinator - General's Department - Brisbane River 150.2 km Wivenhoe Dam - Embankment Typical Cross Sections - A1 49868 (B) As Built
 - Co-Coordinator - General's Department - Brisbane River 150.2 km Wivenhoe Dam - Spillway General Arrangement - A1 50771 (C) As Built
 - Co-Coordinator - General's Department - Brisbane River 150.2 km Wivenhoe Dam - Radial Gates Arrangement - A1 – 61555 (D)

Condition DS 5 - Data Book

1. The data book for the dam must be updated in accordance with the *Queensland Dam Safety Management Guidelines – February 2002*.
2. The data book for this dam as at April 2002 consisted of the documentation cited in Attachment A.

Condition DS 6 - As Constructed Documentation

NOT APPLICABLE

Condition DS 7 - Standing Operating Procedures

1. The dam must be operated in accordance with the following existing Standing Operating Procedures that are contained in South East Queensland Water Corporation Limited "STANDING OPERATING PROCEDURES – Wivenhoe Dam"
2. The dam owner must ensure the Standing Operating Procedures are reviewed annually, by 1 October.
3. The Standing Operating Procedures, if changed, must remain in accordance with the requirements of the *Queensland Dam Safety Management Guidelines – February 2002*.
4. The dam owner must submit copies of any changed SOPs to the Chief Executive, Department of Natural Resources and Mines within three (3) months after 1 October.

Condition DS 8 - Detailed Operating and Maintenance Manuals

1. The dam must be operated and maintained in accordance with the detailed Operating and Maintenance Manuals as described in the attached Appendix B.
2. The dam owner must ensure the Detailed Operating and Maintenance Manuals are reviewed annually by 1 October, and remain in accordance with the *Queensland Dam Safety Management Guideline – February 2002*.

Condition DS 9 - Special Inspections

1. When directed by the Chief Executive, Department of Natural Resources and Mines a Special Inspection must be carried out at the cost of the dam owner and a report must be prepared in accordance with the *Queensland Dam Safety Management Guidelines - February 2002*. The dam owner must provide one copy of the Special Inspection Report to the Chief Executive, Department of Natural Resources and Mines within 1 month of completing the inspection.

Condition DS 10 - Annual Periodic Inspections

1. The dam owner must undertake an annual (periodic) inspection of the dam in accordance with the *Queensland Dam Safety Management Guideline – February 2002* on or before 1 October.
2. The owner must produce a written record of these annual inspections.

Condition DS 11 - Comprehensive Inspections

1. The dam owner must carry out a comprehensive inspection of the dam in accordance with the *Queensland Dam Safety Management Guidelines – February 2002*, on or before 1 October 2005 and on or before every fifth anniversary thereafter. The comprehensive inspection must include a review of the annual inspection records preceding the comprehensive inspection.
2. A Comprehensive Inspection Report detailing the findings of the comprehensive inspection in accordance with the *Queensland Dam Safety Management Guidelines – February 2002* must be submitted to Chief Executive, Department of Natural Resources and Mines, within three months after completion of the comprehensive inspection.

Condition DS 12 - Safety Review

1. By 1 October 2017 the dam owner must carry out a Safety Review in accordance with the *Queensland Dam Safety Management Guidelines – February 2002*.
2. The dam owner must prepare a Safety Review Report and provide one copy of the Safety Review Report to the Chief Executive, Department of Natural Resources and Mines within 3 months of completing the review. Further Safety Reviews are to be carried out at 20 year intervals.

Condition DS 13 - Emergency Action Plans and Event Reports

1. The Emergency Action Plan for the dam is the South East Queensland Water Corporation "Emergency Action Plan Wivenhoe Dam and Somerset Dam".
2. The Emergency Action Plan is to be maintained in accordance with the requirements of the *Queensland Dam Safety Management Guidelines – February 2002*.
3. The contact details contained in the Emergency Action Plan must be reviewed prior to 1 October each year.
4. The Emergency Action Plan must be reviewed at least every five years from 1 October 2002.
5. If the Emergency Action Plan is changed, the dam owner must provide one copy of the changed Emergency Action Plan to the Chief Executive, Department of Natural Resources and Mines within 30 days of the changes being made.

6. The dam owner must ensure that in addition to any copy or amended copy of the EAP provided to the Chief Executive, Department of Natural Resources and Water in compliance with this condition (DS13), current versions of the EAP are also provided to all parties with responsibilities under the Emergency Action Plan.
7. In all emergencies, the dam owner must respond in accordance with the Emergency Action Plan.
8. In the event of an emergency, the dam owner must notify the Chief Executive, Department of Natural Resources and Mines within 48 hours. The notification shall include a brief description of the event and the time of activation of the Emergency Action Plan.
9. Within 28 days of the event the dam owner must prepare an Emergency Event Report and provide a copy of the report to the Chief Executive, Department of Natural Resources and Mines.
10. The Emergency Event Report must contain:
 - a. A description of the event
 - b. Instrumentation readings and water levels (where appropriate)
 - c. Description of any observed damage
 - d. Photographs
 - e. Details of communication which took place during the emergency
 - f. Details of communication and actions which took place during the emergency
 - g. Comment on the adequacy of the EAP and any changes proposed

Condition DS 14 - Decommissioning

1. The dam must not be taken out of service (decommissioned) except in accordance with a Decommissioning Plan accepted by the Chief Executive, Department of Natural Resources and Mines.
2. The Decommissioning Plan must indicate how the dam is to be rendered safe in the long term and how the contents are to be drained in a controlled and safe manner.

Condition DS 15 - Spillway Investigation

1. The dam owner is to comply with the following investigation strategy with regard to spillway adequacy and investigation of spillway adequacy.
2. That strategy requires the following be carried out:
 - Before January 2003 the dam owner is to prepare a revised Probable Maximum Flood estimate based on the latest Probable Maximum Precipitation
 - Before January 2003 the dam owner is to prepare an updated estimate of the existing spillway capacity based on the latest methodology
 - A revised strategy relating to required spillway capacities will be determined by NR&M before the end of 2003 based on data from the above determinations of existing spillway capacity
 - Owners are to be guided by existing engineering standards in undertaking investigations prior to that strategy being determined

Attachment A

CONTENTS OF FILE DRAWER No 9 – WIVENHOE DAM, SOMERSET DAM, and MISCELLANEOUS

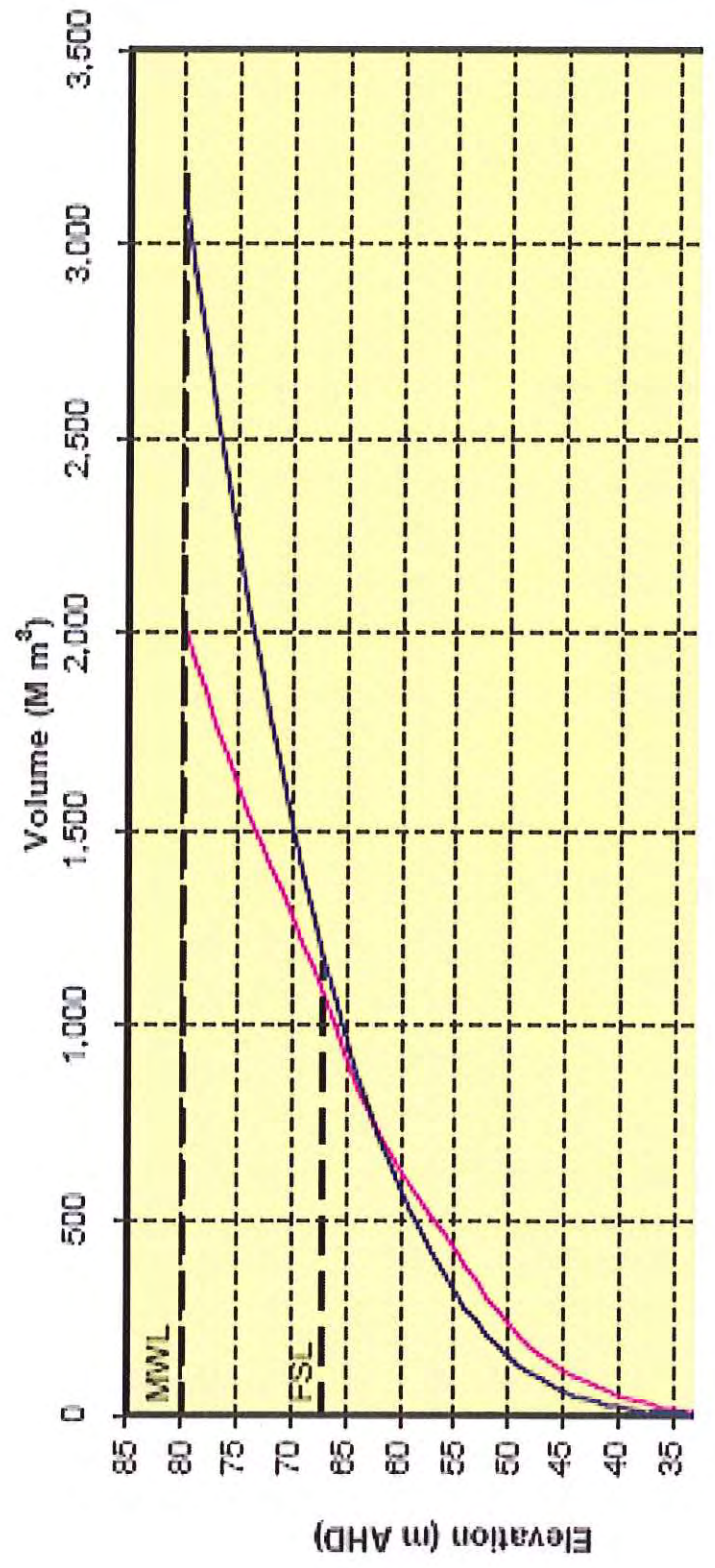
- Flood Procedure Manual (Version 2, 21/12/1995)
- Brisbane River Flood Investigations, Final Report (Snowy Mountains Engineering Corporation, November 1975)
- Manual of Operational Procedures for Flood Releases from Wivenhoe Dam and Somerset Dam (TAC reviewed draft 10 September 1992)
- Working Manual for Gate Operations – Wivenhoe and Somerset Dams (15/05/1995)
- Detailed stability check of the Spillway Retaining Wall Monolith at Wivenhoe Dam – FINAL REPORT, SunWater , September 2001
- Review of record testing of Zone 1A material during construction of Wivenhoe Dam –FINAL REPORT, SunWater, October 2001

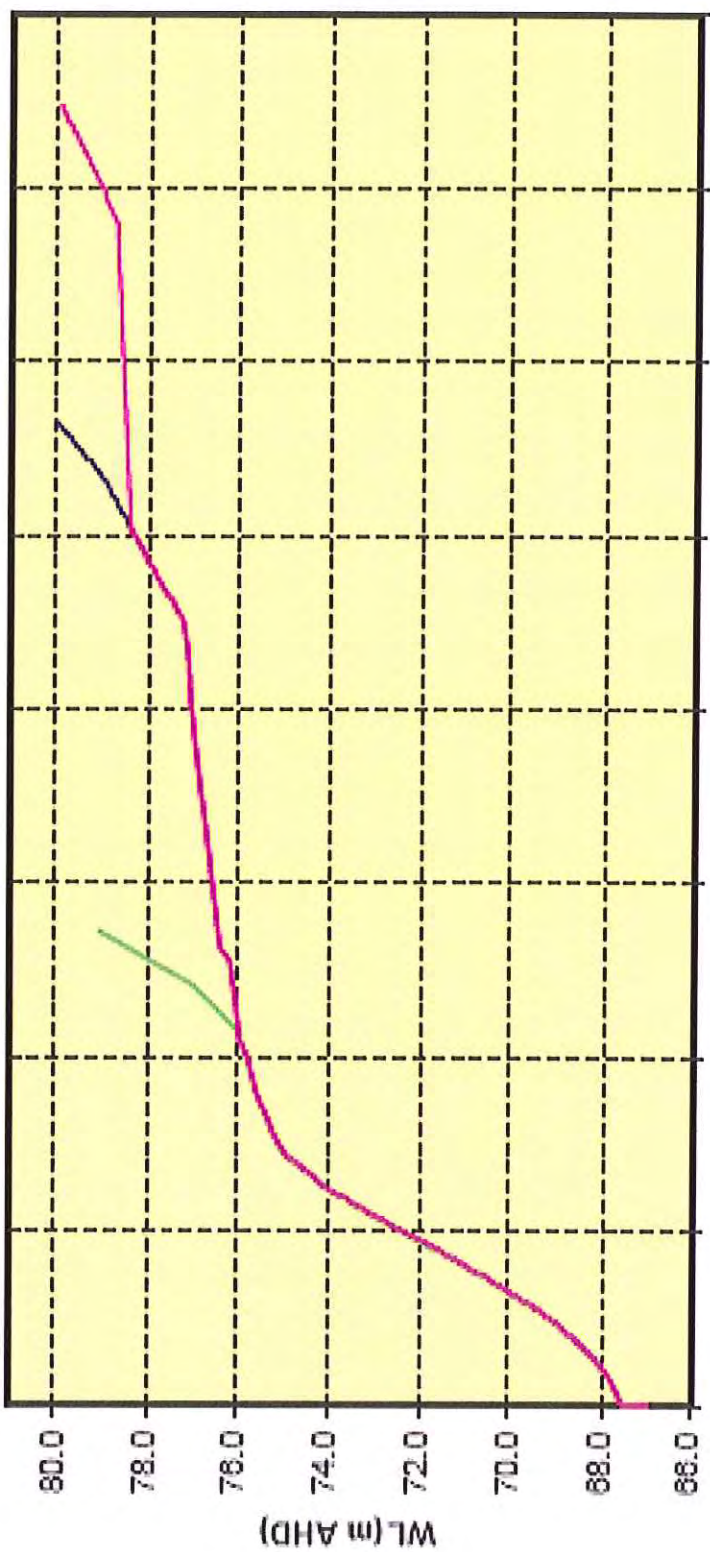
Attachment B

INDEX OF OPERATION AND MAINTENANCE MANUALS WIVENHOE DAM

- VOLUME 1 GENERAL
- VOLUME 2 SPILLWAY GATES
- VOLUME 3 SPILLWAY BULKHEAD
- VOLUME 4 SPILLWAY GATES – STANDBY DIESEL OPERATION
- VOLUME 5 DISCHARGE REGULATOR VALVES
- VOLUME 6 PENSTOCK GATE
- VOLUME 7 TRASH RACKS
- VOLUME 8 INTAKE STRUCTURE BAULK
- VOLUME 9 79 TONNE GANTRY CRANE
- VOLUME 10 3.2 TONNE GANTRY CRANE
- VOLUME 11 OUTLET WORKS MONORAIL HOIST
- VOLUME 12 DIESEL GENERATOR UNIT
- VOLUME 13 SUMP PUMPS
- VOLUME 14 TOWN WATER PUMPS
- VOLUME 15 MISCELLANEOUS MECHANICAL EQUIPMENT DATA SHEETS
- VOLUME 16 MISCELLANEOUS ELECTRICAL EQUIPMENT DATA SHEETS
- VOLUME 17 CIVIL WORKS AND SECURITY

APPENDIX D
DISCHARGE AND STORAGE CURVES





APPENDIX E
ROUTINE INSPECTION REPORT TEMPLATE

