TRANSMITTAL ADVICE

TO [redacted]

SunWater
PO Box 15536
CITY EAST QLD. 4002

DESCRIPTION

Emergency Action Plan – Callide Dam
Telephone Notification List – Revision 4

Attached is a revised insert for the Emergency Action Plan for Callide Dam Please:-

- Place the new pages into **Section 3** and discard the superseded pages.
- Sign the advice slip below and return to complete our records.

RECEIPT ADVICE

Received by [redacted]

Designation [redacted]

Return this Transmittal Advice to:

Business Services Officer- Maria Wiley
SunWater
PO Box 251,
BILOELA QLD 4715

Or Fax to [redacted]

QFCI

JM

Date: 27/05/11

Exhibit Number: 511

TRANSMITTAL ADVICE

Date: ..... [redacted]

TO: [redacted] **SunWater H/O (CC4)**

Attention: [redacted]

PO Box 15536
City East
Q 4002

DESCRIPTION

Emergency Action Plan – Callide Dam -
Telephone and Radio Notification List – Section 3;
Controlled Copy sheet Update – Section 1

Attached is a revised insert for the Emergency Action Plan for the above Dam.
Please:

- **Place the new pages into Sections 1 and 3 and discard the superseded pages**
- **Sign the receipt advice below and return same by mail or Fax**

RECEIPT ADVICE

Received by ....Date. [redacted]

Designation [redacted]

Return this Transmittal Advice to:

Principal Engineer Dam Safety,
Infrastructure Management
SunWater
PO Box 15536,
City East, Qld 4002

Or Fax to [redacted]

SECTION 1

TABLE OF CONTENTS

CONTROLLED COPY DISTRIBUTION

Copy Number	Position	Location
1	Storage Operator, Callide Dam	SunWater – Biloela Depot
2	Service Manager/ EEC	SunWater – Biloela Depot
3	Area Operations Manage r- Central (Bundaberg)	SunWater - Area Operations Centre – Central (Bundaberg)
4	Manager, Asset Management	SunWater, Brisbane
5	Director, Dam Safety (Water Supply), Water Industry Compliance	DERM (Dept of Environment and Resource Management), Brisbane
6	Counter Disaster Executive Officer	Banana Shire Council - Biloela
7	Officer in Charge - Biloela Police	Police, Biloela
8	District Disaster Coordinator (Gladstone)	Police, Gladstone
9	Director disaster Management Services, Emergency Management Queensland (EMQ)	State Disaster Coordination Centre – Department of Community Safety, Brisbane
Note: For Phone numbers and addresses of *'Controlled Copy Holders'* - See Section 3.		

DOCUMENT CONTROL SHEET

CONTROLLED COPY NUMBER: 4

AUTHORISATION:

Approved by: [redacted] **Date:** November 2010

REVISION STATUS:

Issue-Revision Number	Revision Description	Section	Revision Date
Issue 2-0	Significant changes of Callide Dam Emergency Action Plan to reflect SunWater Management Structure and other minor changes.		JANUARY 2008

Note: Future updates to the Notification and Emergency Communication List (Section 3) as required by the Regulator (See Dam Safety Condition Schedule – Section 10) shall be compiled by the relevant SunWater Area Operations Centres and saved in HB File 08-000388/001. Once updating has been finalised the Area Operations Manager/Service Manager shall notify the Senior Engineer Headworks (SEH) – Brisbane, and the SEH will approve and organise the printing and distribution of this updated information to the '*Controlled Copy Holders*' (see Section 3 for Phone numbers and addresses).

AMENDMENTS:

Amendment Number	Description Note: Any suggestion or comment should be forwarded to Principal Engineer Dam Safety, Brisbane.	Section	Amendment Date
Issue 2-1 2A	Amendments to Sections 1, 2, 3, 5, and 10 Controlled Copy Sheet updates	1,P2	November '10

SECTION 2

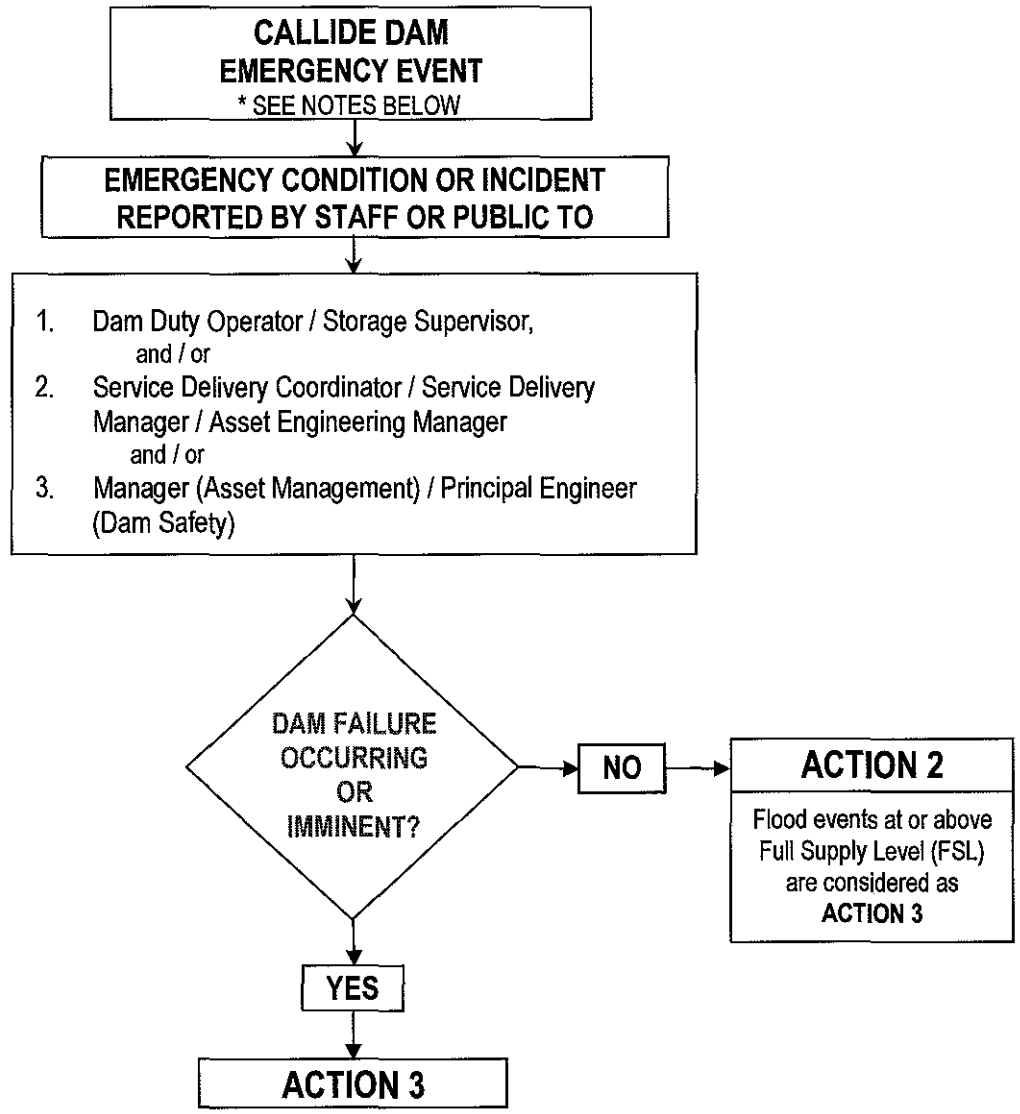
EMERGENCY EVALUATION PROCEDURES

Incident Level Description

ACTION 1	**Localised Incidents / Near Miss** Will generally not escalate to an emergency Incident managed by routine procedures and existing site resources.
ACTION 2	**Emergency** May or may not result in activation of Crisis management Plan Required a coordinated local response together with overview, advice and action from subject matter expert in the Brisbane Office.
ACTION 3	**Crisis** Critical / Catastrophic Consequences. Significant diversion of management attention, time, energy and resources away from normal operation.

EMERGENCY EVALUATION PROCEDURE

FIGURE 1

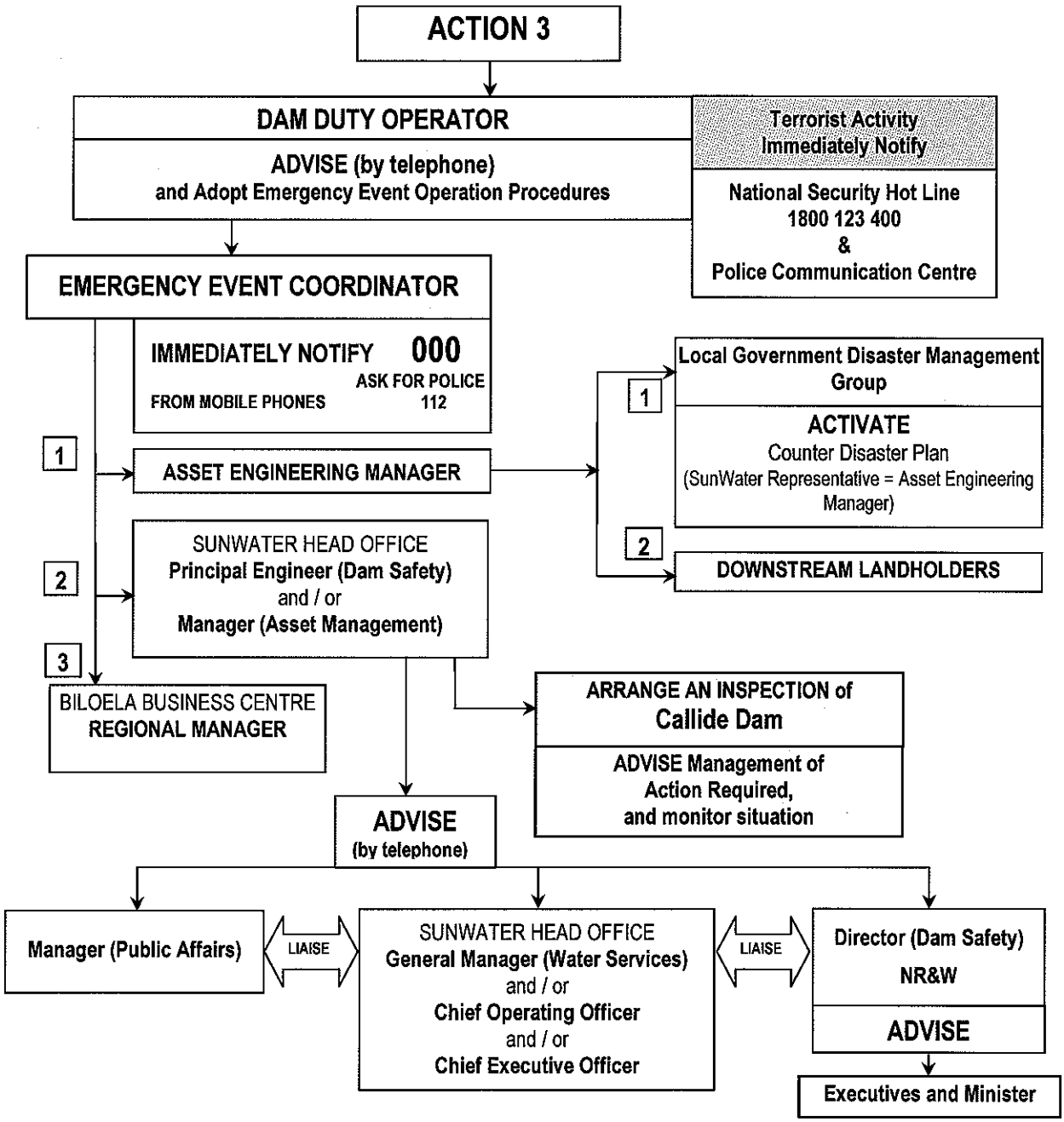


NOTES

1. **All communication (advise) to be conducted in person, or via telephone.**
2. **The Procedure is intended to cover short term Emergency or Dam Safety Incident.**
3. **The Procedure is not intended for activation as a result/outcome of an extended analytical safety review of the dam.**
4. **Telephone numbers are available in the Notification & Emergency Communication List in Section 3.**

EMERGENCY EVALUATION PROCEDURE

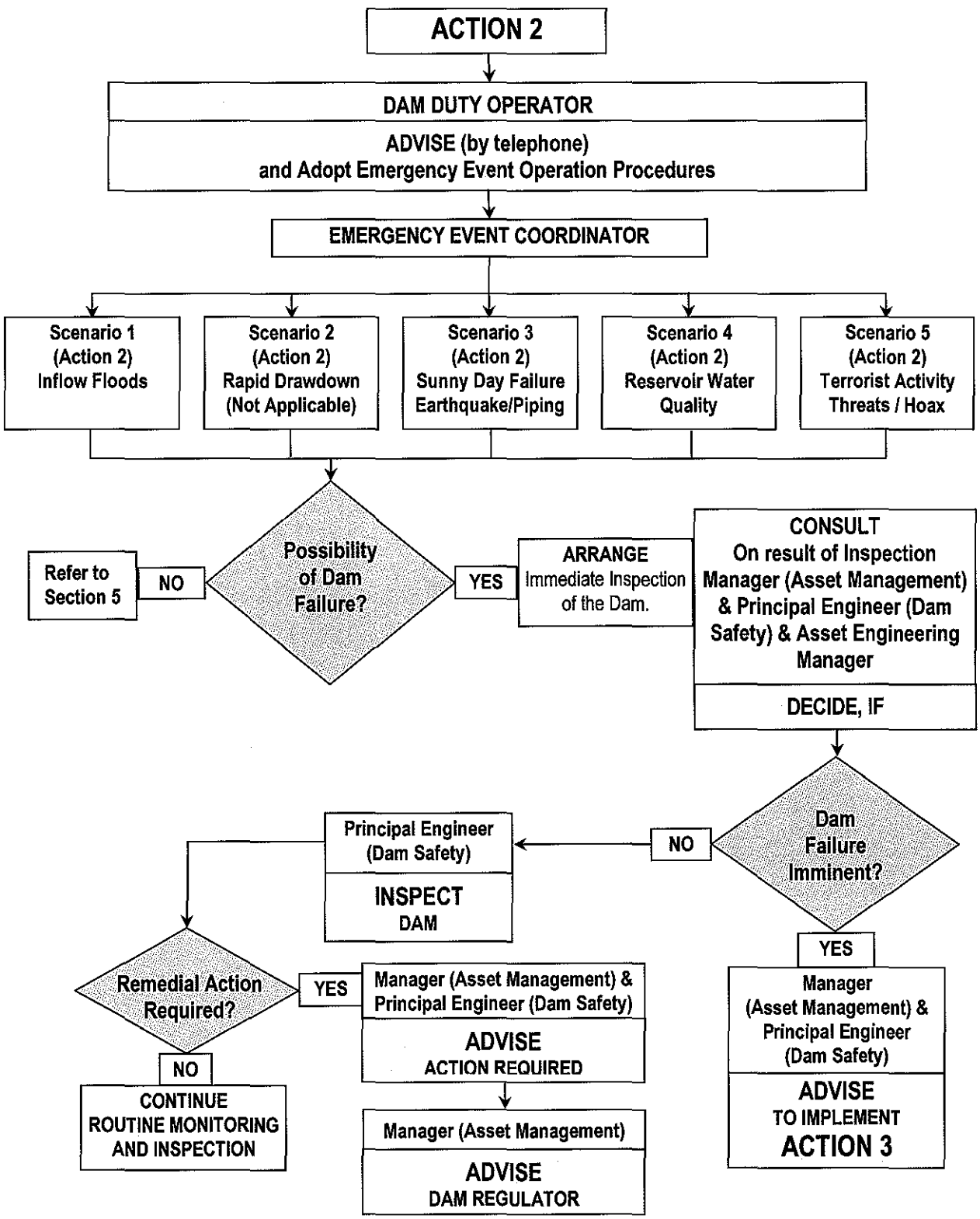
FIGURE 2



Note: Telephone numbers are available in the Telephone Notification List in Section 3.

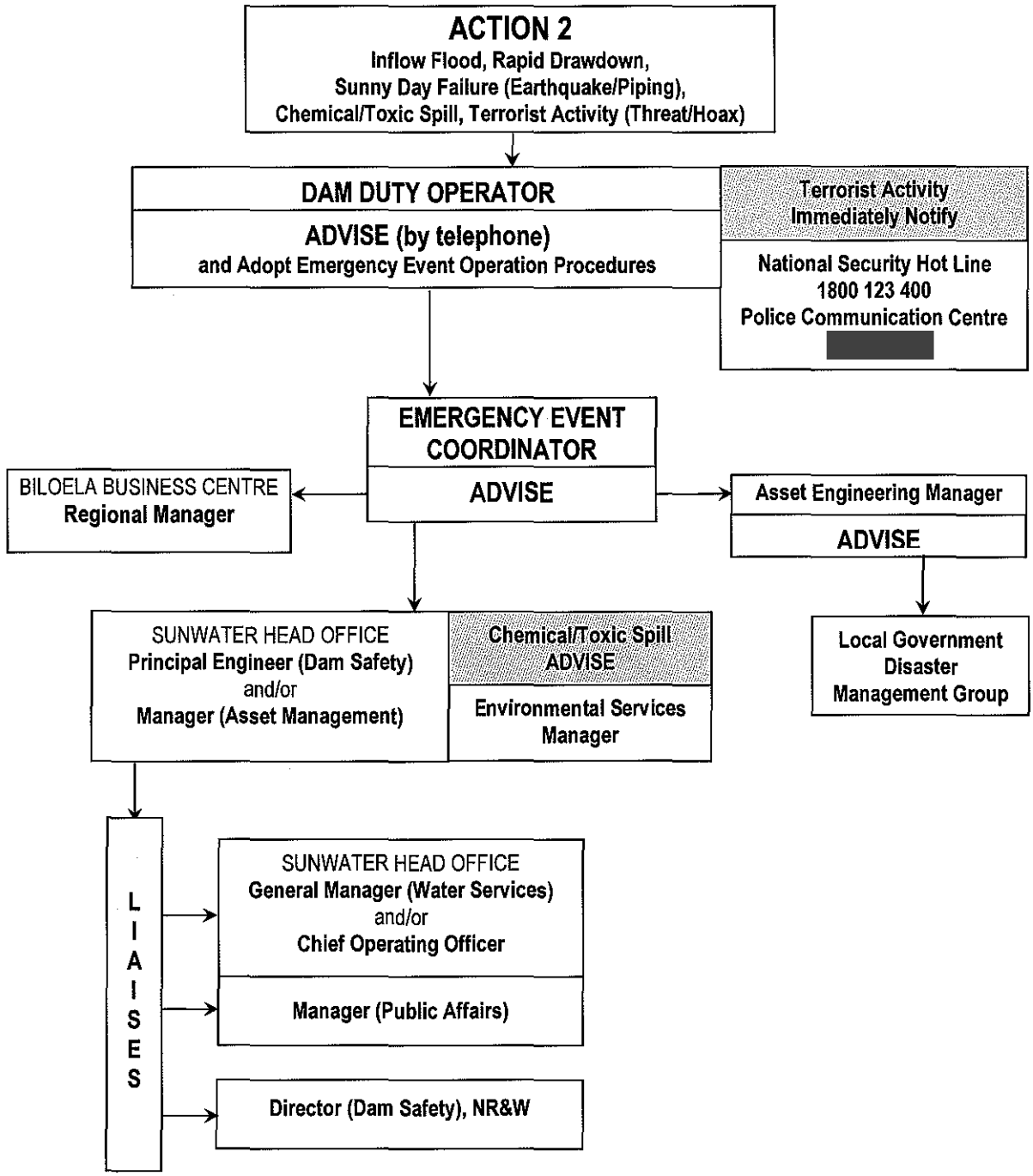
EMERGENCY EVALUATION PROCEDURE

FIGURE 3



EMERGENCY EVALUATION PROCEDURE

FIGURE 4



SECTION 3

NOTIFICATION & EMERGENCY COMMUNICATION LIST

Telephone and Radio Notification List and Emergency Communication List

and

List of Equipment available during an Emergency

(# 593449 in HB File 08-000388/001)

AUTHORISATION:

Approved by:	[redacted]	**Date:**	November 2010

AMENDMENT STATUS:

Amendment Number	Description	Amendment Date
5	Issue 2-4 Update Telephone & Radio Notification List	November 2010

TELEPHONE & RADIO NOTIFICATION LIST

Central Office Management (Brisbane)					
TITLE/NAME	Phone Business	Phone Mobile	Phone A/H	Fax	Controlled Copy Holder Addresses
[redacted]	[redacted]				

Controlled EAP Copy Holders shown numbered (e.g. **2**) and shaded grey

Note: All contacts required by the EAP are expected, in the first instance, to be by voice (phone) with email only used to confirm or provide additional details

Area Operations Centre - Central (Bundaberg) and Biloela Depot					
TITLE/NAME	Phone Business	Phone Mobile	Phone A/H	Fax	Controlled Copy Holder Addresses
[redacted]	[redacted]				[redacted]

Controlled EAP Copy Holders shown numbered (e.g. **2**) and shaded grey

Note: All contacts required by the EAP are expected, in the first instance, to be by voice (phone) with email only used to confirm or provide additional details

SunWater Electrical & Mechanical Standby Personnel					
TITLE/NAME	Phone Business	Phone Mobile	Phone A/H	Fax	Controlled Copy Holder Addresses
[redacted]	[redacted]				

Counter Disaster Groups					
TITLE/NAME	Phone Business	Phone Mobile	Phone A/H	Fax	Controlled Copy Holder Addresses
[redacted]	[redacted]				[redacted]
	000	[redacted]	000	-	
	[redacted]				[redacted]
	Department of Environment and Resource Management (DERM)				
	[redacted]		-	[redacted]	[redacted]
			-		

Controlled EAP Copy Holders shown numbered (e.g. **2**) and shaded grey

Note: All contacts required by the EAP are expected, in the first instance, to be by voice (phone) with email only used to confirm or provide additional details

Police					
Police Communication Centre [redacted]					
TITLE/NAME	Phone Business	Phone Mobile	Phone A/H	Fax	Controlled Copy Holder Addresses
[redacted]	[redacted]		[redacted]	[redacted]	[redacted]
	[redacted]			[redacted]	
National Security Hotline [redacted]					

Controlled EAP Copy Holders shown numbered (e.g. **2**) and shaded grey

Note: All contacts required by the EAP are expected, in the first instance, to be by voice (phone) with email only used to confirm or provide additional details

TITLE/NAME	Phone Number/Call Sign/Mobile #	Comment
Stream Gauging Stations		
Callide Dam Headwater	[redacted]	Storage Level Recorder
Stag Creek		
Callide Creek		
Flood Alert Contacts		
Group 1	[redacted]	
[redacted]		
Group 2	[redacted]	
[redacted]	[redacted]	[redacted]
		[redacted]

EMERGENCY CONTACTS

Please note: for a **chemical spill emergency** please phone (000) and ask for **Department of Community Safety**.
For general advice regarding chemical spills and hazardous waste please phone **31095099** (Dept of Community Safety)

Queensland Government
Department of Community Safety

PHONE: 000 for emergencies

Hazardous Industries & Chemicals Branch
For advice on large amounts of **chemicals stored**:
Chemical Hazards and Emergency Unit
http://www.deir.qld.gov.au/workplace/chem/index.htm

PHONE: 3109 0811

If you are not sure as to how to treat **poisons** contact Queensland Health

on

13 11 26

http://www.health.qld.gov.au/PoisonsInformationCentre/default.htm

http://www.dcs.qld.gov.au
Department of Community Safety

Emergency Management EMQ Queensland

Queensland Government
State Disaster Management Group

The **State Disaster Management Group** is the principal organisation for disaster management throughout the State. This group is responsible for disaster mitigation and disaster planning and preparation at a state level and for conducting whole of Government response and recovery operations prior to, during and after a disaster impact. This includes accessing interstate and/or Commonwealth assistance when Local and State resources are exhausted or not available.
Emergency Management Queensland (EMQ), a division of the Department of Community Safety, provides the core policy and support staffing for the State Group. This includes the provision of disaster management training, management of the State Disaster Coordination centre, maintenance of the State Disaster Plan as well as training and equipment support to local volunteer SES units.

EMQ has regional staff across the State who assist Local Governments and State agencies in their counter disaster responsibilities.

PHONE: 3247 8943 (State Disaster Coordination Centre – 24 hr number)
Use of this number is to be restricted to emergency use only.
OR **EMQ Regional Duty Officer (Areas and Contact Numbers** shown on the map on the following page).

State Duty Officer – Brisbane: PHONE: 3364 3512
Communications Branch
Level 5 Police Headquarters – 200 Roma St Brisbane 4000

SES FLOOD STORM EMERGENCY 132 500

Emergency Management EMQ Queensland

EMQ Boundaries

(and SunWater owned/ * managed infrastructure within the relevant boundary)

Tinaroo Falls Dam

Far Northern Region
Ph [redacted]

Julius Dam
Burdekin Falls Dam
* Ross River Dam

Northern Region
Ph [redacted]

Peter Faust Dam
Eungella Dam
Kinchant Dam
Teemburra Dam
Fairbairn Dam
Callide Dam
Kroombit Dam
Moura OSS

Central Region
Ph [redacted]

Beardmore Dam
Leslie Dam
Coolmunda Dam
* Glenlyon Dam

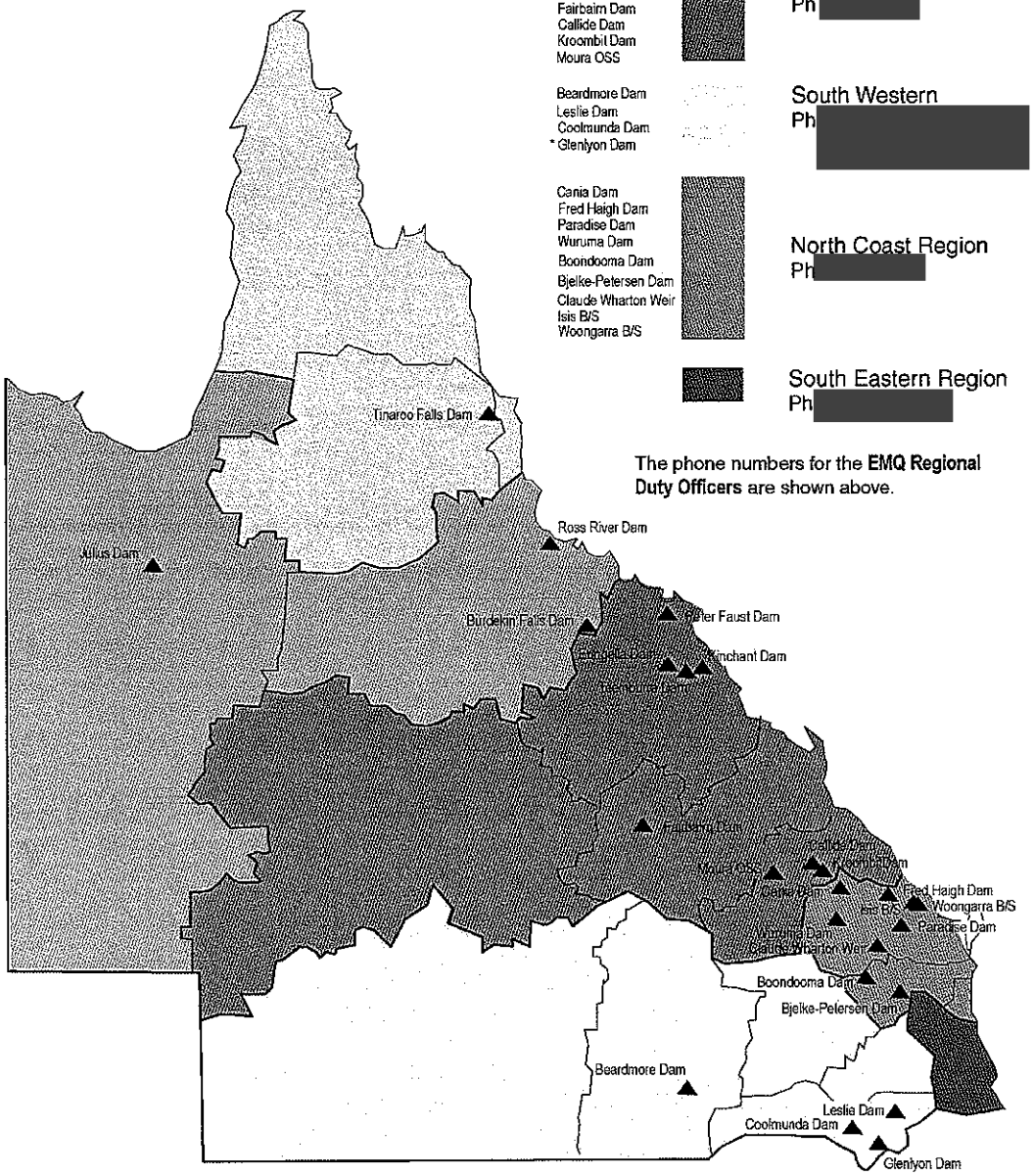
South Western
Ph [redacted]

Cania Dam
Fred Haigh Dam
Paradise Dam
Wuruma Dam
Boondooma Dam
Bjelke-Petersen Dam
Claude Wharton Weir
Isis B/S
Woongarra B/S

North Coast Region
Ph [redacted]

South Eastern Region
Ph [redacted]

The phone numbers for the **EMQ Regional Duty Officers** are shown above.



LIST OF EQUIPMENT AVAILABLE DURING AN EMERGENCY

Name of Equipment	No	Owner	Contact Name	Contact Number	Depot

SECTION 4

INTRODUCTION TO EAP & RESPONSIBILITIES

4.0 INTRODUCTION

4.1 Purpose

This Plan defines responsibilities and procedures designed to identify conditions, including those which may endanger Callide Dam, in time to take remedial action, and to notify the appropriate Authorities, Emergency Agencies and Public Officials of possible, impending, or actual failure of the dam. The location and description of the dam are provided in Section 7.

The main purpose of the Plan is to ensure that timely warning is provided to the appropriate authorities and emergency agencies in the event of a major incident impacting on the dam, and to provide relevant information for use in the emergency response to the situation.

The Plan identifies emergency conditions at the dam, and describes procedures to be followed by SunWater staff to investigate those conditions and provide warning to appropriate authorities and emergency agencies, so that they can implement measures for protection of the downstream communities and properties if necessary. The Plan also provides direction to operating staff for handling unsafe or emergency conditions, so that the dam can be returned to a safe operating condition with minimal delay.

4.2 Classification Category

According to Queensland Dam Safety Management Guidelines 2002, Callide Dam is classified with Category 2 Failure Impact Rating, having a population in excess of 100 people at risk.

4.3 Role of Emergency Event Coordinator (EEC)

Emergency Event Coordinator (EEC) is a role created in all SunWater Business Centres. The role will be activated during an emergency event (all hours) until the emergency is over. In the event of an emergency, the EEC will implement appropriate emergency procedures for which they have been trained.

Under normal operational conditions, the Asset Engineering Manager, Service Delivery Manager or Service Coordinator/Supervisor will perform this role. During an emergency condition any personnel trained for this role can serve as the Emergency Event Coordinator.

4.4 RESPONSIBILITIES

Organisation	Responsible Position / (s)	General Responsibilities	Emergency Responsibilities
SunWater Business Centre	Regional Manager	• Overall responsibility for water supply in the Business Centre.	➢ Liaison with SunWater Management
	Service Delivery Manager / Coordinator	• Dam Management and Supervision. • **Provide Training for EEC**	➢ Local Media Liaison in conjunction with Manager Public Affairs. ➢ Site management coordination.
	Emergency Event Coordinator (EEC)	• **See Section 4.3**	➢ **Liaison with the internal management of SunWater.**
	Asset Engineering Manager (AEM)	• Delivering of Dam Safety Program in the Business Centre. • **Provide Training for EEC**	➢ Liaison with MAM and PEDS in Brisbane. ➢ Liaison with Emergency Event Coordinator. ➢ Activation of Emergency Response.
	Dam Duty Operator (DDO)	• Dam Maintenance, Surveillance and Operation	➢ Identification & notification of unsafe condition. ➢ Implement preventive measures as directed by EEC or AEM.
Head Office	Manager, Asset Management (MAM)	• Overall responsibility for safe operation & maintenance of SunWater infrastructure in Queensland.	➢ Advice SunWater Management ➢ Advise Dam Regulator ➢ Advice Manager Public Affairs ➢ Liaison with Management & Regulator
	Principal Engineer, Dam Safety (PEDS)	• Formulation and implementation of Dam Safety Management Program & analysis of dam behaviour.	➢ Advise Business Centres on Dam Safety Issues ➢ Warning for dam failure and protective measures. ➢ Analysis of information & recommendations
	Manager, Public Affairs	• Responsible for media relations, communications and public relations activities.	➢ Liaison with Management ➢ Liaison with Regulator ➢ Liaison with Business Centre ➢ Liaison with media

4.3 RESPONSIBILITIES (Cont'd)

Organisation	Responsible Position / (s)	General Responsibilities	Emergency Responsibilities
Police	District Disaster Coordinator	• Preparation of disaster plans and conduct of emergency operations.	➢ Co-ordinate & support to SunWater during a declared emergency at the dam.
	Local Police	• Liaison with relevant organisations.	➢ Evacuation of persons, if required. ➢ Control of essential traffic. ➢ Security of specific area.
State Counter Disaster Organisation	Counter Disaster & Rescue Services	• Liaises in the preparation of disaster plans and conduct emergency operations.	➢ Point of contact for State Government response to emergency situations.
	District Disaster Coordinator	• Preparation of district disaster management plans and coordinates district response.	➢ To provide and coordinate whole-of-government support to disaster stricken communities
	Local Government Disaster Management Group	• Preparation of local disaster management plans and coordinates local response. • Decide what resources are needed, when they are needed and how best to apply such resources so as to minimise hardship and suffering.	➢ Provision and control of Council man-power and equipment as required. ➢ Provision of emergency accommodation.
	Counter Terrorism Liaison Officer	• Identifies area of concern during the preparation of disaster plans.	
Dam Safety, NR&W	Director, Dam Safety	• Oversight of Dam Safety practice at all referable dams in Queensland	➢ Liaison with relevant Minister on necessary actions.

DAM DESCRIPTION SHEET
(Data obtained from *Dam Safety Review, April 2000*)

Dam Type	Rock and Earthfill Dam
Full Supply Level (FSL)	EL 216.10 m
Storage Capacity (at FSL)	136,370 ML
Storage Area (at FSL)	1,240 ha
Dam Crest Level (DCL)	EL 219.24 m
Max. Height of Dam above Foundation	37 m (approx)
Length across Crest	2008 m
Spillway Type	Radial Gate controlled reinforced concrete ogee crest
Spillway Crest Level	EL 207.57 m
Spillway Crest Length	79.25 m
Spillway Capacity (at DCF)	5,888 m^3/sec 508,723 MLD
Radial Gates	3 pairs – 25.6 m wide x 9.14 m high
Top of Gates Elevation	EL 216.71 m
Outlet Works	2/1220 mm diameter pipes, within a reinforced concrete outlet conduit
Outlet Control	1/900 mm Butterfly Guard Valve and 1/600 mm Cone Dispersion Valve (left hand pipe), and 1/900 mm Butterfly Guard Valve (right hand pipe)

All levels are to Australian Height Datum, AHD.
Conversion from Callide Datum is AHD_m = State Datum + 0.305 m

Facsimile

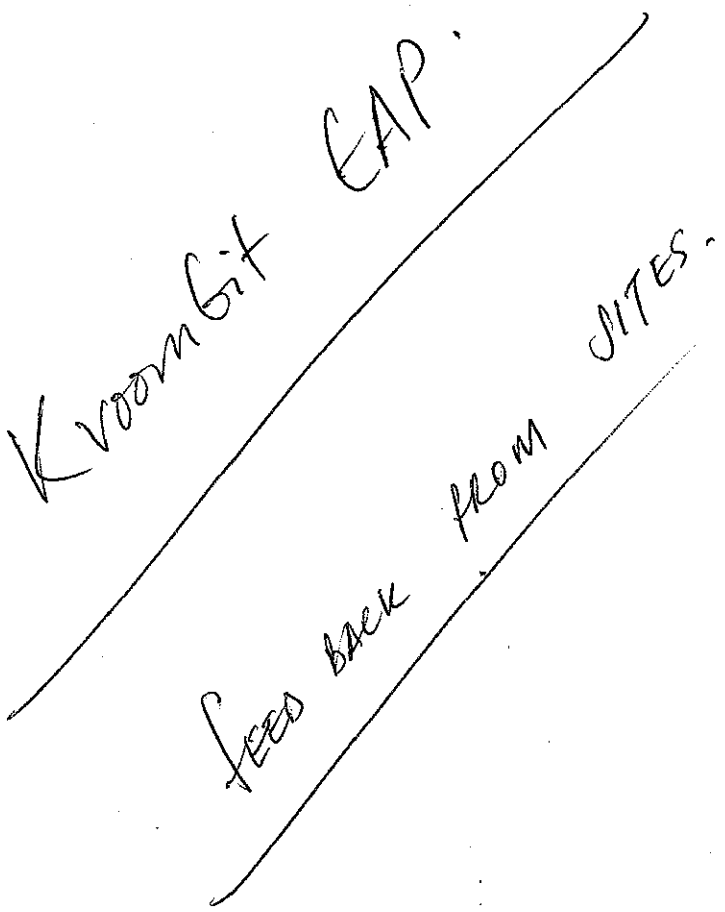
To:	Keith Ehm	Fax no.	[redacted]
From:	John Barber	Tel no:	[redacted]
Date:	10/02/2011	Pages:	12

Subject: **Enter Subject - Press F11**

SunWater Limited
ACN 131 034 985
Tel: [Insert tel no]
Fax: [Insert fax no]
[Insert address]
[Line 2]
[Line 3]
www.sunwater.com.au

MESSAGE: Hi Keith this is what we were looking at yesterday

Enter Text



MAKING WATER WORK

Scenario 1: Flood Operation [STAGE 2]

Stage/Alert Level	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)		Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
STAGE 2 Reservoir Level at FSL EL 216.10m and rising Gate 2 (centre gate) begins to discharge at EL 216.25m Spillway flow 500-2500 Cumecs	FOR RECORD: Use Sheets from Section 6 and 6A	• Monitor & record the Reservoir Level and Rainfall, at regular intervals • Monitor & record Gate 2 operation, to an opening of 1.m (at this point Gates 1 & 3 begin to open) • [redacted] • Inspect Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Notify Group 1 Businesses on Callide Creek • Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the flood operation sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Inform spillway discharge to all personnel listed in the table below • Record all communication	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)

Once Automatic Operation of the Gates has commenced, they shall be monitored on a 24-hour basis, to ensure the Control Wears function correctly (whether the Gates are opening or closing).

Table of Personnel to be notified

Notify as often as requested (DDO)	Notify as often as requested (EEC)	Notify as often as requested (AEM)
• Standby Officer • Emergency Event Coordinator	• Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	• Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Gladstone • Police, Biloela

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group, and Dam Duty Operator shall follow the instructions in SOP 25 (Spillway Gate Operations).

WHY DOES EEC AND AEM HAVE TO TELL THE DDO EXACTLY THE SAME ~~THING~~ THING

Scenario 1: Flood Operation [STAGE 3]

Stage/Alert Level	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
STAGE 3 Reservoir Level at EL 216.2m and rising Gates 1 & 3 begin to discharge at EL 216.47m	FOR RECORD: Use Sheets from Section 6 and 6A • Monitor & record Reservoir Level, Rainfall and Gate Operation • [redacted] • Inspect Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Operator of upstream river flows and direct spillway discharge rate • Fax the flood operation sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Inform spillway discharge to all personnel listed in the table below • Record all communication	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
	Table of Personnel to be notified			
	Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager, Asset Management • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Gladstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group, and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

Scenario 1: Flood Operation [STAGE 4]

Stage/Alert Level	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
[redacted]	FOR RECORD: Use Sheets from Section 6 and 6A • Monitor & record Reservoir Level, Rainfall and Gate Operation • [redacted] • Photograph the Gates, Spillway Chute and Tailwater zones • Inspect the Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Notify all Residents in Group 2 along Callide Creek, to the Dawson Highway crossing • Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the record sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from the Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Record all communication • Inform spillway discharge to all personnel listed in the table below	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
	Table of Personnel to be notified			
	Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Galdstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

• **IMPORTANT**
When the storage level peaks and begins to fall at a constant rate, the Asset Engineering Manager shall notify the Local Government Disaster Management Group and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

Scenario 1: Flood Operation [STAGE 5]

Stage/Alert Level	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
[redacted]	FOR RECORD: Use Sheets from Section 6 and 6A • Monitor & record Reservoir Level, Rainfall and Gate Operation • [redacted] • Photograph the Gates, Spillway Chute and Tailwater zones • Inspect the Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the record sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from the Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Record all communication • Inform spillway discharge to all personnel listed in the table below	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
	Table of Personnel to be notified			
	Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Galdstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

217.28 SHOULD BE UNDER STAGE 5
218.23 UNDER THAT

Scenario 1: Flood Operation [STAGE 6]

Stage/Alert Level	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
OVERTOPPING IMMINENT	FOR RECORD: Use Sheets from Section 6 and 6A • Monitor & record Reservoir Level, Rainfall and Gate Operation • [redacted] • Photograph the Gates, Spillway Chute and Tailwater zones • Inspect the Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the record sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from the Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Record all communication • Inform spillway discharge to all personnel listed in the table below	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
	Table of Personnel to be notified			
	Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Gladstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the Asset Engineering Manager shall notify the Local Government Disaster Management Group and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

NO BODY SHOULD BE ON DAM AT ALL
INTAKE SCREENS WILL BE UNDER
@ 2 OR 3 METERS OF WATER

Scenario 1: Flood Operation [STAGE 7]

Stage/Alert Level	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
OVERTOPPING OCCURRING Embankment Failure may occur	FOR RECORD: Use Sheets from Section 6 and 6A • Monitor & record Reservoir Level, Rainfall and Gate Operation • [redacted] • Photograph the Gates, Spillway Chute and Tailwater zones • Inspect the Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the record sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from the Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Record all communication • Inform spillway discharge to all personnel listed in the table below	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
	Table of Personnel to be notified			
	Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Galdstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

• **IMPORTANT**
When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

SAME AS LAST PAGE

Scenario 1: Flood Operation

Under normal conditions, the operation of the storage is controlled by the on-site Storage Supervisor (Dam Duty Operator) on advice from the Service Delivery Coordinator.

During flood events, the dam will be continuously manned and will be controlled from the Biloela Business Centre. The head office at Brisbane will transmit any information received from the Bureau of Meteorology to the Bundaberg Business Centre.

The Dam Duty Operator, Callide Dam, will keep the Emergency Event Coordinator informed of discharge through the spillway. The Emergency Event Coordinator will inform the Asset Engineering Manager, who will further keep the Local Government Disaster Management Group (LGDMG) informed of the discharge through the spillway. In particular, the following alerts will be sent to the District Disaster Coordinator and Counter Disaster & Rescue Services in Brisbane.

The flood emergency event will start after the storage level has reached Full Supply Level (EL 216.10 m). In all other cases, follow the Operation and Maintenance Manual, and Standing Operating Procedures.

Water Level at Callide Dam	AEP	Flood Alert Level Colour Code	Discharge volume (MLD)
Storage at Full Supply Level (EL 216.10 m)			N/A
Storage EL 216.50 m	1:50		Discharge = 139,104 MLD
Storage EL 217.10 m	1:2,000		Discharge = 339,552 MLD
Storage EL 219.18 m, approaching Dam Crest Level	1:100,000		Discharge = 514,944 MLD DCL = 219.24 m Storage at critical safety level

THIS IS NOT CORRECT

Scenario 1: Flood Operation [STAGE 2]

Stage/Alert Level	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
STAGE 2 Reservoir Level approaching EL 289.33 m Spillway discharge up to 76,300 ML/D (Flow up to 3.63 m above spillway) AEP up to 1:5,000	FOR RECORD: Use Sheets from Section 6 and 6A • Monitor & record the Reservoir Level - 2 hour intervals • Monitor and record river height at the Tailwater Guage - 2 hour intervals or as requested • Record Rainfall at dam - daily • [redacted] • Monitor Tailwater and Photograph any turbulent areas • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Operator of upstream river flows and direct spillway discharge rate • Fax the flood operation sheet to all personnel listed in the table below at 4 hourly intervals or as requested. • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Inform spillway discharge to all personnel listed in the table below. • Record all communication	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
	Table of Personnel to be notified			
	Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela • Affected Landholders	**Notify as often as requested** • Local Disaster Management Group, Banana Shire Council • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the Asset Engineering Manager shall notify the Local Government Disaster Management Group, and Dam Duty Operator

ON 10665 4 5 6 a 7

Table 4.1: Kroombit Dam Storage Evacuation Data

Evacuation Height Stage %	Evacuation Height (m AHD)	Live Storage Volume[1] (ML)	Drawdown Time (Modelled Days)	Drawdown Time (USBR Guidelines)
100	265.80	14570	0	0
75	261.50	5189	20	30 to 40
50	257.20	1182	30	50 to 60
25	252.90	100	34	80 to 100
15.7[2]	251.30	0	35	NA

Note
1. Live storage volume is 14,600 ML at FSL less dead storage 30ML
2. Effective cease to flow level EL 251.3m AHD
3. Based on dam height between FSL and bed level EL of 248.6m AHD

The Table indicates that Kroombit Dam conforms to the USBR Guidelines (1990) for Evacuating Storage Reservoirs using the current outlet works. Therefore, the current outlet is adequate for draining the storage in an emergency.

THIS RATING CURVE IS NOT CORRECT

[redacted]

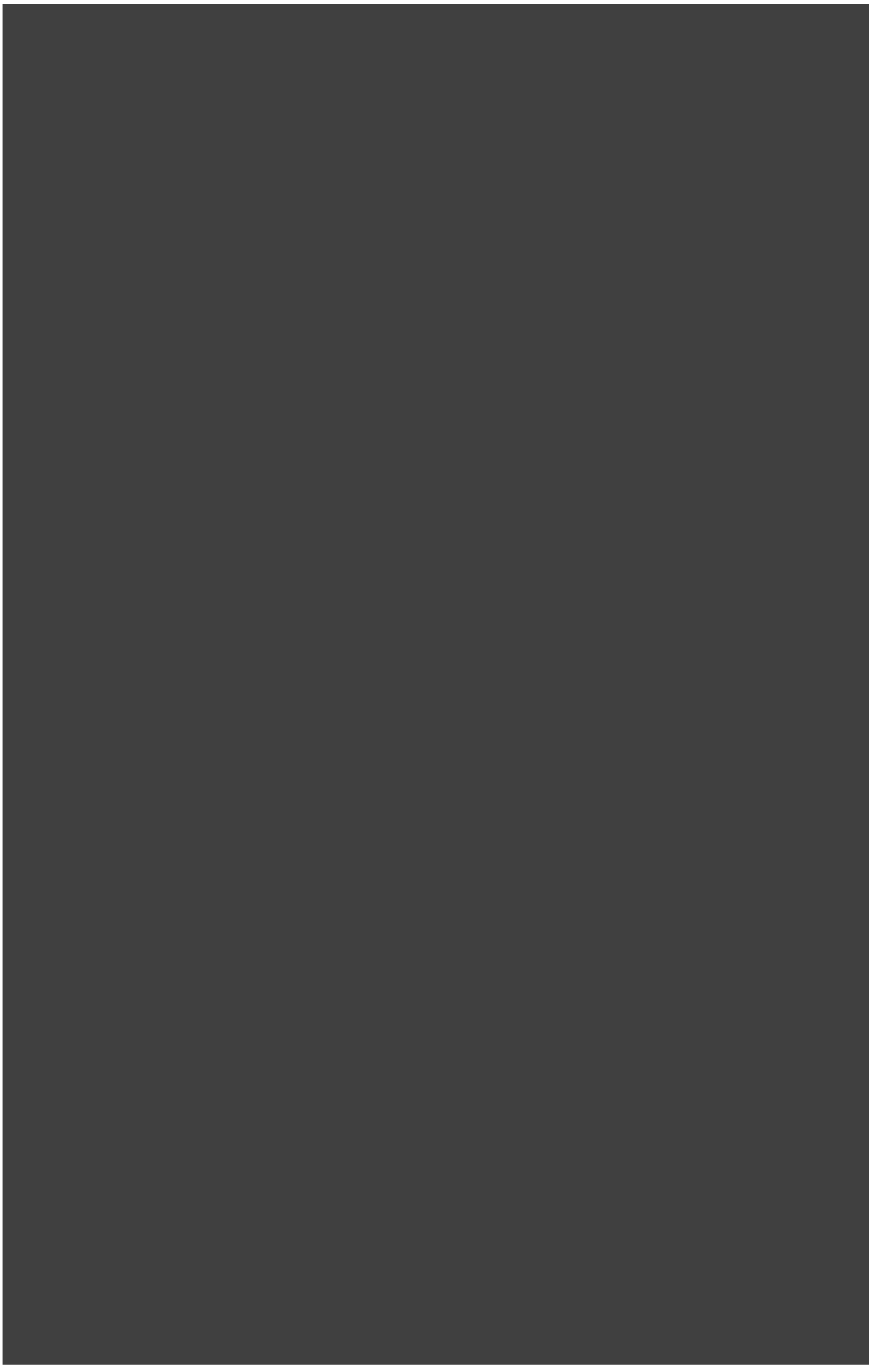
not like value.

⇒ Re-do [redacted]

& mark 4 pts 100%, 75%, 50%, 25%

09/01/2007 18:48 SUNWATER BILOELA PAGE 11/12

Check with John Barber.



SECTION 5

EMERGENCY IDENTIFICATION, EVALUATION AND ACTIONS

The dam has been designed to conform to the latest accepted design standards, so that its failure is highly unlikely. In order to maintain the dam in a safe condition and detect any emergency conditions, as soon as it begins to develop, or becomes apparent, the following is applicable to Callide Dam.

5.1 Inspections

The following inspections are conducted at Callide Dam:

- Routine Visual Inspection - Conducted Weekly
- Detailed Inspection - Conducted Annually
- Comprehensive Inspection - Conducted Five-yearly

5.2 Instrumentation and Monitoring

To confirm the structural behaviour and safety of the embankment the following Instrumentation was installed, and are monitored, at Callide Dam.

- **Pore pressure measurement**
  - 24 Hydraulic Piezometers - are located in two cross sections, approximately 100 m apart, in the deepest section of the embankment.
- **Seepage measurement**
  - 3 V- Notch Weirs – two are located on the right abutment and one on the left abutment.
  - 3 Conduit Leakage Points – two are located either side of conduit chamber (distance 70.52 m), and one in Outlet Structure Valve Chamber Sump.

The location of instrumentation and monitoring equipment are listed in Section 6C.

5.3 Emergency Identification

Five major possible emergencies have been identified at SunWater Dams, which are:

- Emergency Event due to extreme inflow floods overtopping the Dam.
- Emergency Event due to rapid drawdown of the reservoir.
- Emergency Event due to a rapidly deteriorating structural deficiency such as may be induced by an extreme earthquake or erosion of the foundations and abutments. (This is the so-called "**Sunny Day**" failure, i.e. not induced by an inflow flood).
- Emergency Event due to extreme changes in the chemical/toxic spill.
- Emergency Event due to a terrorist activity.

5.4 EVALUATION OF INCIDENTS

It is considered that **ACTION 1 – Localised Incident/Near Miss**, is to be locally contained, with a short-term impact (generally reported in the Monthly Dam Surveillance Report). Although each emergency condition will be evaluated and responded to individually, the action of most emergencies will be similar and follow procedures outlined below.

5.4.1 Flood Operation

All flood events, at or above Full Supply Level EL 216.10 m, will require the Dam Duty Operator to inform the Emergency Event Coordinator, who will further activate the following Emergency Evaluation Procedure **ACTION 2**

5.4.2 Imminent Dam Failure

At Callide Dam, if a staff member observes evidence of an imminent dam failure, such as water flowing through a breach in the dam, he/she will inform the Dam Duty Operator and/or Emergency Event Coordinator, who will activate the following Emergency Evaluation Procedure **ACTION 3**

5.4.3 Unsafe or Unusual Conditions

If during a routine inspection, or at any other time, an unsafe or unusual condition is detected, the Callide Dam staff will immediately notify the Dam Duty Operator and/or Service Delivery Coordinator, Biloela, who will advice the Principal Engineer (Dam Safety), and/or Manager (Asset Management), so that an evaluation of the situation can be carried out and a determination can be made on the condition of the dam.

If the Asset Engineering Manager, and/or Service Delivery Manager, following an inspection of the dam, and in consultation with Principal Engineer (Dam Safety), and/or Manager (Asset Management), determine that potential for the failure of the dam exists then he/she will activate the following Emergency Evaluation Procedure **ACTION 3**

If the unsafe or unusual condition will not lead to failure of the dam in the short term the Asset Engineering Manager, and/or Service Delivery Manager, will activate the following Emergency Evaluation Procedure **ACTION 2**

Scenario 1: Flood Operation

Under normal conditions, the operation of the storage is controlled by the on-site Storage Supervisor (Dam Duty Operator) on advice from the Service Delivery Coordinator.

During flood events, the dam will be continuously manned and will be controlled from the Biloela Business Centre. The head office at Brisbane will transmit any information received from the Bureau of Meteorology to the Bundaberg Business Centre.

The Dam Duty Operator, Callide Dam, will keep the Emergency Event Coordinator informed of discharge through the spillway. The Emergency Event Coordinator will inform the Asset Engineering Manager, who will further keep the Local Government Disaster Management Group (LGDMG) informed of the discharge through the spillway. In particular, the following alerts will be sent to the District Disaster Coordinator and Counter Disaster & Rescue Services in Brisbane.

The flood emergency event will start after the storage level has reached Full Supply Level (EL 216.10 m). In all other cases, follow the Operation and Maintenance Manual, and Standing Operating Procedures.

Water Level at Callide Dam	**AEP**	**Flood Alert Level Colour Code**	**Discharge volume (MLD)**
Storage at Full Supply Level (EL 216.10 m)			N/A
Storage EL 216.50 m	**1:50**		Discharge = 139,104 MLD
Storage EL 217.10 m	**1:2,000**		Discharge = 339,552 MLD
Storage EL 219.18 m, approaching Dam Crest Level	**1:100,000**		Discharge = 514,944 MLD DCL = 219.24 m Storage at critical safety level

Scenario 1: Flood Operation [STAGE 1]

Stage/Alert Level	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
[redacted]	FOR RECORD: Use Sheets from Section 6 and 6A • Notify the Standby Officer (who shall be available for duty for the duration of a flood or Emergency Event) • Arrange to hire a 10 tonne mobile crane, to be stationed on top of the Embankment adjacent to Spillway • Close off roadway giving access to top of Embankment and Spillway • Monitor & record the Reservoir Level and Rainfall, at regular intervals • [redacted] • Inspect Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Duty Operator of upstream river flows and direct the spillway discharge rate • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Inform spillway discharge to all personnel listed in the table below • Record all communication	
	The Automatic Operation of the Gates depends on the free flow of sufficient water through the Intake Screens			
	Table of Personnel to be notified			
	Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Service Delivery Manager, Ipswich	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**

When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group, and Dam Duty Operator shall follow the instructions in SOP 25 (Spillway Gate Operations).

Scenario 1: Flood Operation [STAGE 2]

Stage/Alert Level	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
STAGE 2 **Reservoir Level at FSL EL 216.10 m, and rising** **Gate 2 (centre pair) begins to discharge at EL 216.259 m** **Spillway flow 500 - 29,000 MLD**	FOR RECORD: Use Sheets from Section 6 and 6A • Monitor & record the Reservoir Level and Rainfall, at regular intervals • Monitor & record Gate 2 operation, to an opening of 1 m (at this point Gates 1 & 3 begin to open) • [redacted] • Inspect Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Notify Group 1 Businesses on Callide Creek • Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the flood operation sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Inform spillway discharge to all personnel listed in the table below • Record all communication	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
	Once Automatic Operation of the Gates has commenced, they shall be monitored on a 24-hour basis, to ensure the Control Weirs function correctly (whether the Gates are opening or closing)			
	Table of Personnel to be notified			
	Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Galdstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

• **IMPORTANT**
When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group, and Dam Duty Operator shall follow the instructions in SOP 25 (Spillway Gate Operations).

Scenario 1: Flood Operation [STAGE 3]

Stage/Alert Level	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)		Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
STAGE 3 **Reservoir Level at EL 216.26 m, and rising** **Gates 1 & 3 begin to discharge at EL 216.407 m**	**FOR RECORD: Use Sheets from Section 6 and 6A**	• Monitor & record Reservoir Level, Rainfall and Gate Operation • [redacted] • Inspect Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Operator of upstream river flows and direct spillway discharge rate • Fax the flood operation sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Inform spillway discharge to all personnel listed in the table below • Record all communication	**ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)**
		Table of Personnel to be notified			
		Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager, Asset Management • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Galdstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group, and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

Scenario 1: Flood Operation [STAGE 4]

Stage/Alert Level		ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
STAGE 4 **Reservoir Level at EL 217.20 m, and rising** (At this level, water flows over an Emergency Overflow Weir, in the Gate Control Chamber, to the Variable Counterweight Well, and the Gates are raised to MAXIMUM opening)	FOR RECORD: Use Sheets from Section 6 and 6A	• Monitor & record Reservoir Level, Rainfall and Gate Operation • [redacted] • Photograph the Gates, Spillway Chute and Tailwater zones • Inspect the Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Notify all Residents in Group 2 along Callide Creek, to the Dawson Highway crossing • Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the record sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from the Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Record all communication • Inform spillway discharge to all personnel listed in the table below	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
		Table of Personnel to be notified			
		Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Galdstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

Scenario 1: Flood Operation [STAGE 5]

Stage/Alert Level		ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
STAGE 5 **Reservoir Level at EL 218.23 m, and rising (1.0 m below DCL)** **ALL GATES FULLY OPEN at EL 217.281 m** (Bottom of Gates come in contact with rising Reservoir Level)	FOR RECORD: Use Sheets from Section 6 and 6A	• Monitor & record Reservoir Level, Rainfall and Gate Operation • [redacted] • Photograph the Gates, Spillway Chute and Tailwater zones • Inspect the Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the record sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from the Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Record all communication • Inform spillway discharge to all personnel listed in the table below	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
		Table of Personnel to be notified			
		Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Galdstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

Scenario 1: Flood Operation [STAGE 6]

Stage/Alert Level		ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
OVERTOPPING IMMINENT	FOR RECORD: Use Sheets from Section 6 and 6A	• Monitor & record Reservoir Level, Rainfall and Gate Operation • [redacted] • Photograph the Gates, Spillway Chute and Tailwater zones • Inspect the Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the record sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from the Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Record all communication • Inform spillway discharge to all personnel listed in the table below	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
		Table of Personnel to be notified			
		Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Galdstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

Scenario 1: Flood Operation [STAGE 7]

Stage/Alert Level		ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
OVERTOPPING OCCURRING Embankment Failure may occur	FOR RECORD: Use Sheets from Section 6 and 6A	• Monitor & record Reservoir Level, Rainfall and Gate Operation • [redacted] • Photograph the Gates, Spillway Chute and Tailwater zones • Inspect the Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the record sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from the Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Record all communication • Inform spillway discharge to all personnel listed in the table below	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
		Table of Personnel to be notified			
		Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Galdstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

Scenario 1: Flood Operation [EMERGENCY GATE CONTROL]

Stage/Alert Level	ACTION TO BE TAKEN BY			
		Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)
	FOR RECORD: Use Sheets from Section 6 and 6A	• [redacted] • Follow the Emergency Gate Opening Procedures, to manually control the opening • Inspect the Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the record sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from the Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Record all communication • Inform when Gate 2 is opened, and under Manual control, all personnel listed in the table below • Inform when Gates 1 & 3 are opened, all personnel listed in the table below
		If all Gates malfunction, and the rising reservoir overtops the Gates, INFORM all listed personnel		
		Table of Personnel to be notified		
		Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Galdstone • Police, Biloela
	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)			

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

Scenario 1: Flood Operation [EMERGENCY GATE CONTROL]

Stage/Alert Level	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
	FOR RECORD: Use Sheets from Section 6 and 6A			ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
	• [redacted] • Follow the Emergency Gate Opening Procedures, to manually control the opening • Inspect the Embankment • Record all communication • Log book entries as per SOP 12 & 22 • See note # below	• Advise the Dam Duty Operator of upstream river flows and direct spillway discharge rate • Fax the record sheet to all personnel listed in the table below • Record all communication • See note # below	• Advise the Dam Duty Operator of any inflow flood information obtained from the Bureau of Meteorology (Page 7, Section 10) *www.bom.gov.au • Record all communication	
	If all Gates malfunction, and the rising reservoir overtops the Gates, INFORM all listed personnel			
	Table of Personnel to be notified			
	Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as requested** • Asset Engineering Manager • Principal Engineer (Dam Safety) • Manager (Asset Management) • Service Delivery Manager, Biloela	**Notify as often as requested** • Executive Officer, Local Disaster Management Group, Banana Shire • District Disaster Coordinator, Galdstone • Police, Biloela	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group and Dam Duty Operator shall follow the instruction in SOP 25 (Spillway Gate Operations).

Scenario 3A: 'Sunny Day' Failure, due to Earthquake

(Event due to a rapidly deteriorating structural deficiency such as may be induced by an extreme earthquake)

Stages		ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)	
STAGE 1 **Earthquake felt in the area** **Intensity less than 5 MM** (refer to Section 10 for Modified Mercalli Scale) **Use Page 1, Section 6C**	FOR RECORD: Use Sheets from Section 6 and 6C	• Inspect the Embankment, Spillway Structure, and Abutments, and fax report to the EEC • Check for springs, deformation, erosion, and concrete damage		Arrange an inspection of the dam and assess its condition	ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)
		Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as required** • Asset Engineering Manager	**Notify as often as required** • Principal Engineer (Dam Safety) • Manager (Asset Management)	
STAGE 2 **Earthquake felt in the area** **Intensity greater than 5 MM** (refer to Section 10 for Modified Mercalli Scale) **Use Page 1, Section 6C**		• Immediately inspect the Embankment, Spillway Structure, and Abutments • Repeat the inspection every 12 hours	• If unstable condition is established, Implement **ACTION 2** (Page 3, Section 2)	• If unstable condition is established, advise the Dam Duty Operator to lower reservoir level	
		Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as required** • Asset Engineering Manager • Principal Engineer (Dam Safety)	**Notify as often as requested** • Executive Officer Local Disaster Management Group, Banana Shire	
STAGE 3 **DAM FAILURE IS IMMINENT** **Water Level at Full Supply Level 216.10 m** **Use Page 1, Section 6C**		• Lower reservoir level • Photograph the damage from a safe point • Vacate the immediate vicinity of the dam	• Implement **ACTION 3** (Page 2, Section 2,) • See note # below.	• Implement **ACTION 3** (Page 2, Section 2)	
		Notify as often as required • Standby Officer • Emergency Event Coordinator	**Notify as often as required** • All personnel listed in **ACTION 3** (Page 2, Section 2)	**Notify as often as required** • All personnel listed in **ACTION 3** (Page 2, Section 2)	

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group and Dam Duty Operator.

Scenario 3B: 'Sunny Day' Failure, due to Piping

(Event due to a rapidly deteriorating structural deficiency such as may be induced by piping through the embankment, foundation or abutments)

Stages	ACTION TO BE TAKEN BY: Dam Duty Operator (DDO)	Emergency Event Coordinator (EEC)	Asset Engineering Manager (AEM)
STAGE 1 **Increasing Leakage through the Embankment.** **Use Page 1, Section 6D**	• Monitor flows until a decreasing trend is observable or as directed by the EEC	• If rapidly increasing trend is observed initiate **ACTION 2** (Page 3, Section 2)	• Arrange an inspection of the dam and assess its condition
	Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as required** • Asset Engineering Manager	**Notify as often as required** • Principal Engineer (Dam Safety)
STAGE 2 **Large Increasing Flows through the Embankment with cloudy water** **Use Page 1, Section 6D**	• Monitor flows until a decreasing trend is observable or as directed by the EEC	• If piping condition is established, Implement **ACTION 2** (Page 3, Section 2)	• If piping condition is established, advise the Dam Duty Operator to lower reservoir level
	Notify as often as requested • Standby Officer • Emergency Event Coordinator	**Notify as often as required** • Principal Engineer (Dam Safety)	**Notify as often as requested** • Executive Officer Local Disaster Management Group, Banana Shire
STAGE 3 **DAM FAILURE IS IMMINENT DUE TO PIPING** **Water Level at Full Supply Level 216.10 m** **Use Page 1, Section 6D**	• Lower reservoir level. • Photograph the seepage and piping from a safe point • Vacate the immediate vicinity of the embankment and complete the event report	• Implement **ACTION 3** (Page 2, Section 2) • See note # below.	• Implement **ACTION 3** (Page 2, Section 2)
	Notify as often as required • Standby Officer • Emergency Event Coordinator	**Notify as often as required** • All personnel listed in **ACTION 3** (Page 2, Section 2)	**Notify as often as required** • All personnel listed in **ACTION 3** (Page 2, Section 2)

FOR RECORD: Use Sheets from Section 6 and 6D

ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

• **IMPORTANT**
When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group, and Dam Duty Operator.

Scenario 4: Chemical / Toxic Spill

<table>
<tr><th rowspan="2">Stages</th><th colspan="4">ACTION TO BE TAKEN BY</th></tr>
<tr><th colspan="2">Dam Duty Operator (DDO)</th><th>Emergency Event Coordinator (EEC)</th><th>Asset Engineering Manager (AEM)</th></tr>
<tr><td rowspan="2">STAGE 1
Large amount of Chemical / Toxic Spill found in the reservoir/catchment

Use Page 1, Section 6E</td><td rowspan="3">FOR RECORD: Use Sheets from Section 6 and 6E</td><td>• Sketch, measure, photograph and locate its position in the reservoir/catchment
• Forward event report to EEC</td><td></td><td></td></tr>
<tr><td>Notify as often as required
• Emergency Event Coordinator</td><td>Notify as often as required
• Asset Engineering Manager</td><td>Notify as often as required
• Environmental Services Manager
Who will then make an assessment on whether to notify the Health Department in accordance with the Hazardous Algal Bloom Response plan (Page 9, Section 10)</td></tr>
<tr><td>STAGE 2
Large amount of Chemical / Toxic Spill found in the reservoir/catchment

Use Page 1, Section 6E</td><td>• Sketch, measure, photograph and locate its position in the reservoir/catchment
• Close all outlet structures
• Forward event report to EEC (see note # below)</td><td colspan="2">• Inspect the reservoir and assess its water quality for water supply
• Coordinate with the Environmental Services Manager, and the Health Department</td></tr>
<tr><td colspan="4">Notify immediately
• Mobile Spill Response Unit of the State Government Chemical Hazards and Emergency Unit
• and if it is a very large spill then also notify the District Disaster Co-ordinator

Notify as often as requested
• Emergency Event Coordinator</td></tr>
</table>

ALL ACTION MUST BE TAKEN WHEN IT IS SAFE TO DO SO (e.g. taking photographs/video, dam inspections, instrument readings)

After the Event, an Emergency Event Report shall be jointly compiled by the Emergency Event Coordinator and Dam Duty Operator, and unedited copies to be forwarded to the Service Delivery Manager, and Manager (Asset Management), Brisbane.

- **IMPORTANT**
  When the storage level peaks and begins to fall at a constant rate, the **Asset Engineering Manager** shall notify the Local Government Disaster Management Group and Dam Duty Operator.

Scenario 5: Terrorist Activity

SECTION 6

EMERGENCY EVENT OPERATION RECORDING PROCEDURES

- **Emergency Event Recording Sheets**
  - Emergency Event Record ** (**Page 3, this Section**)
  - Record of Communication ** (**Page 4, this Section**)
  - Log of Events / Actions ** (**Page 5, this Section**)

** Note: These sheets must be completed for all Emergency Event Scenarios, and included in the Emergency Event Report.

- **Operating Procedure**
  - Flood Operation **(See Section 6A)**
- **Operating Procedure**
  - Rapid Drawdown (Not applicable at Callide Dam)
- **Operating Procedure**
  - Sunny Day Failure (Earthquake) **(See Section 6C)**
  - Sunny Day Failure (Excessive Seepage → Piping) **(See Section 6D)**
- **Operating Procedure**
  - Chemical / Toxic Spill **(See Section 6E)**
- **Operating Procedure**
  - Terrorist Activity **(See Section 6F)**

Emergency Event Recording Sheets

- Emergency Event Record sheet
- Record of Communication sheet
- Log of Events / Action sheet

Note: These sheets must be completed for all Emergency Event Scenarios and be included in the Emergency Event Report

EMERGENCY EVENT RECORD

COMPLETE THIS COVER SHEET AND ATTACH RELEVANT RECORDING SHEETS FROM SECTION 6.

1. **NATURE OF THE EVENT** (circle the event)

Spillway discharge **Earthquake** **Piping** **Water Quality** **Terrorist Activity**

Commencing: Time ___:___ am/pm; Date ___/___/_____ **Finishing:** Time ___:___ am/pm; Date ___/___/_____

2. **DESCRIPTION OF THE EVENT**

Attach relevant sheets from Section 6.

3. **STATISTICS**

Total inflow	Megalitres
Total discharge	Megalitres
Capacity of Storage prior to inflow	%
Volume prior to inflow	Megalitres
Maximum inflow	MLD
Maximum discharge	MLD

4. **EVENT PROGRESS**

Attach copies of the Spillway Level versus Time Graph, the Record of Communication, the Log of Events / Actions, and Rainfall during a Flood Event. (Section 6A)

5. **GENERAL COMMENTS**

Include in this section any observations or comments regarding the Event, such as Equipment malfunctions, improved Reporting, Safety issues, or any suggestions which may improve monitoring of the Event

6. **DAMAGE REPORT**

Detail any damage to the Embankment, Spillway, Abutments or Stream bank in the downstream area of the Dam. ***Attach photos.***

Name:.....Signed:.....Designation:.....Date...../...../.....

CALLIDE DAM - EMERGENCY ACTION PLAN
RECORD OF COMMUNICATION

DATE	TIME	CONTACT PERSON / TELEPHONE NO.	CALL IN / OUT	MESSAGE	RECORDED BY (INITIALS)

CALLIDE DAM - EMERGENCY ACTION PLAN
LOG OF EVENTS / ACTIONS

DATE	TIME	EVENT / ACTION DESCRIPTION	RECORDED BY (INITIALS)

CALLIDE DAM EAP — Flood Operation

Visual Inspection and Storage Report
Note: Refer to Page 2 for recording instructions **

Date: .....

	SUN	MON	TUE	WED	THU	FRI	SAT
Stored Water Level **FSL 216.10m**							
Tail Water Level (m)							
Daily Rainfall (mm) Morning 9am							
Evening 3pm							

NORMAL FLOOD OPERATION EL m	**STAGE 1 EL m**	**STAGE 2 EL m**	**STAGE 3 EL m**
	Morning — Tick if Gates are Closed		
	Evening — Tick if Gates are Closed		

Visual Inspection	First Inspection	Second Inspection (+6 hrs)	Third Inspection (+12 hrs)
(Walk OR Drive at 10 km/hour. Write 'W' for walk and 'D' for Drive)			
Spillway Channel			
Erosion, damage to concrete structure			
Irrigation Control Structure			
Cracks, concrete deterioration			
Embankments			
Cracks, subsidence in pavement			
Upstream Face (Use binoculars)			
Settlement			
Displacement of riprap material			
Downstream face			
Subsidence, slides, erosion			
Sign of seepage			
Area Downstream of Dam			
Seepage from any location apart from seepage point			
Seepage			
Seepage water - Clear or Turbid (Tick for clear)			
Condition of river outlet		Discharge..... MLD	

Details of significant changes. New occurrences and issues warranting further attention

.....

.....

.....

.....

Inspecting Officer's initials			
Fax to (tick if faxed)		Asset Engineering Manager / Service Delivery Manager [redacted]	
		Principal Engineer (Dam Safety) [redacted]	

** INSTRUCTIONS FOR COMPLETING SHEET - Flood Operation

VISUAL INSPECTION

Frequency of visual inspection required is indicated by

STAGE 1 ONCE A DAY	STAGE 2 TWICE A DAY	STAGE 3 THRICE A DAY

Additional Inspections should be made

- When specifically requested

Show results of inspections as follows:-

• New Seepage point.	NEW
• Significant increase (> 30%) or change in condition.	SG-INC
• Slight increase (> 10%) or change in condition.	INC
• NIL change of condition.	NIL
• Slight decrease (< 10%) or change in condition.	DEC

Significant Changes

Any changes which, in the opinion of the inspecting officer, are more than just slight changes must be advised to the Principal Engineer (Dam Safety). The degree of urgency of this advice varies with the nature of the issue.

[redacted]

TABLE 1

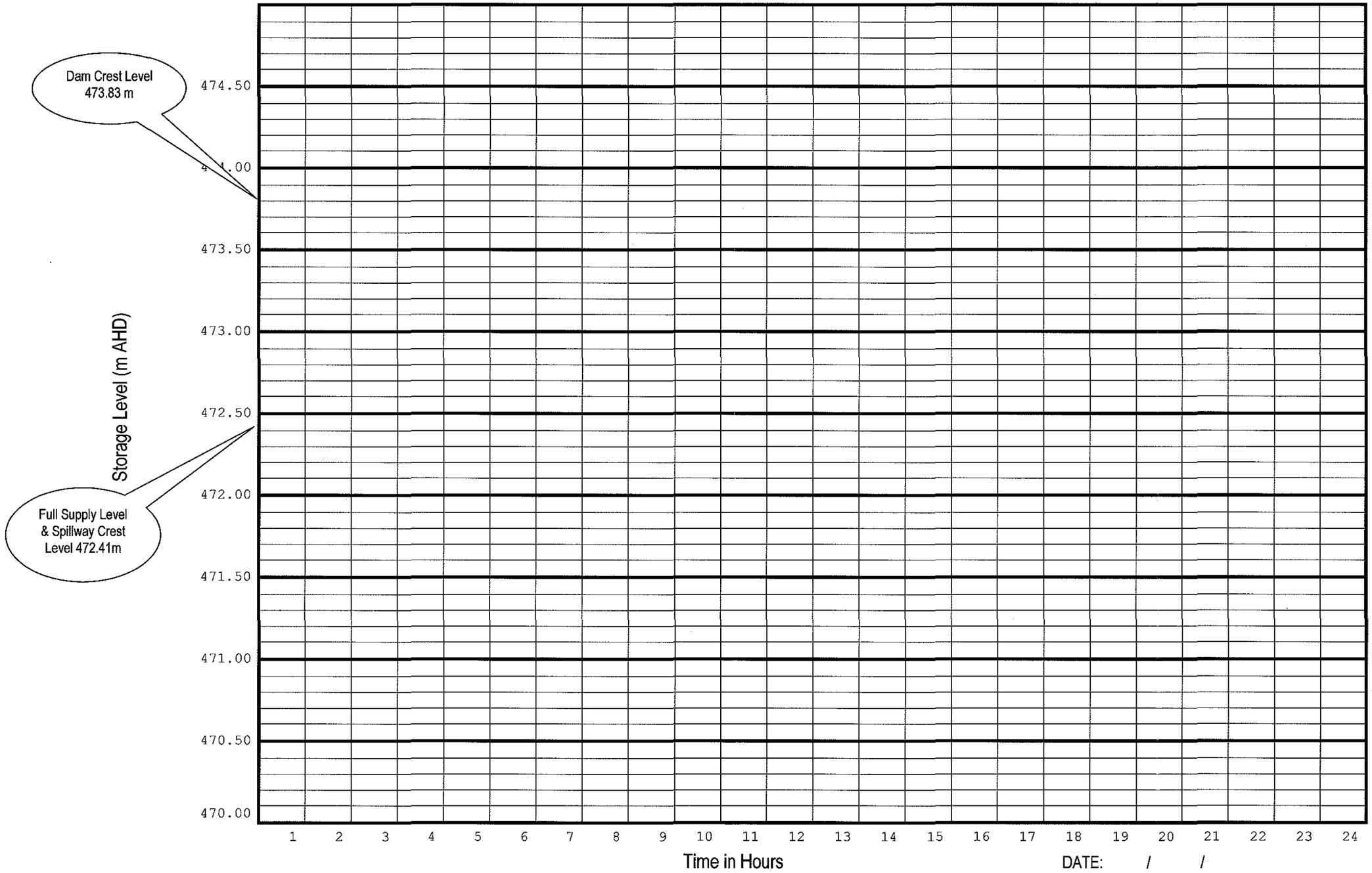
RECORD OF RAINFALL DURING A FLOOD COMMENCING AT ...../...../.....

Date	Time	Rainfall mm	Daily Total	Comments

TABLE 2

Date	Time	Storage Level	Storage Volume ML	Total Measured Inflow MLD	Gate Openings in metres							Total Release MLD	Tailwater gauge board height	Spillway Outlet Channel Performance
					1	2	3	4	5	6	7			

STORAGE LEVEL AT SPILLWAY VERSUS TIME



CALLIDE DAM EAP — Sunny Day Failure (Earthquake)

Visual Inspection and Storage Report
Note: Refer to Page 2 for recording instructions **

Date: .....

	SUN	MON	TUE	WED	THU	FRI	SAT
Stored Water Level **FSL 216.10m**							
Daily Rainfall (mm)							

Earthquake Intensity felt:.....MM **VISUAL INSPECTION**	First Inspection	Second Inspection (+12hrs)	Third Inspection (+24hrs)	Fourth Inspection (+36hrs)
Date				
Time				
(Walk OR Drive at 10 km/hour. Write 'W' for walk and 'D' for Drive)				
Embankment				
Crest				
Cracks, subsidence				
Upstream Face (Use binoculars or boat)				
Settlement or sink hole				
Downstream face				
Sloughing				
Subsidence, slides, erosion				
Area Downstream of Dam				
New Seepage				
Increase in Seepage:				
Outlet Works / Pump Station				
Deterioration of valves				
Spillway				
Channel Erosion				
Damage to concrete				
Irrigation Control Structure				
Cracks, concrete deterioration				

Details of significant changes. New occurrences and issues warranting further attention

.....

.....

.....

New Cracks or Movements: Sketch, measure, photograph, and locate if possible. Sketch on the Plan (see over)

Inspecting Officer's initials				

Fax to (tick if faxed)		Asset Engineering Manager / Service Delivery Manager [redacted]
		Principal Engineer (Dam Safety) [redacted]

** INSTRUCTIONS FOR COMPLETING SHEET - Sunny Day Failure (Earthquake)

VISUAL INSPECTION

Frequency of visual inspection required is indicated by

Earthquake Less than 5mm	Earthquake greater than 5mm
COMPLETE FIRST VISUAL INSPECTION ONLY	COMPLETE ALL VISUAL INSPECTIONS AND INSTRUMENTATION DATA AS WELL

Additional Inspections should be made, when:

- New cracks, settlements or sinkholes which requires further action
- When specifically requested

Show results of inspections as follow:-

• New Observation.	NEW
• Significant increase (> 30%) or change in condition.	SG-INC
• Slight increase (> 10%) or change in condition.	INC
• NIL change of condition.	NIL
• Slight decrease (< 10%) or change in condition.	DEC

Significant Changes

Any changes which, in the opinion of the inspecting officer, are more than just slight changes must be advised to the Principal Engineer (Dam Safety). The degree of urgency of this advice varies with the nature of the issue.

HYDRAULIC PIEZOMETERS (REQUIRED IF EARTHQUAKE IS GREATER THAN 5MM)				
	First Inspection	Second Inspection	Third Inspection	Fourth Inspection
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

CONDUIT LEAKAGE MEASUREMENT (REQUIRED IF EARTHQUAKE IS GREATER THAN 5MM)				
	First Inspection	Second Inspection	Third Inspection	Fourth Inspection
CSL mm				
CSR mm				
CST mm				

SEEPAGE MEASUREMENT (REQUIRED IF EARTHQUAKE IS GREATER THAN 5MM)				
	First Inspection	Second Inspection	Third Inspection	Fourth Inspection
VN Left Bank mm				
VN Right Bank 1 mm				
VN Right Bank 2 mm				

CALLIDE DAM EAP — Sunny Day Failure (Piping)

Visual Inspection and Storage Report
Note: Refer to Page 2 for recording instructions **

Date: .....

	SUN	MON	TUE	WED	THU	FRI	SAT
Stored Water Level **FSL 216.10m**							
Daily Rainfall (mm)							

VISUAL INSPECTION (Walk OR Drive at 10 km/hour. Write 'W' for walk and 'D' for Drive)	First Inspection	Second Inspection (+24hrs)	Third Inspection (+36hrs)	Fourth Inspection (+48hrs)
Date				
Time				
Location of Seepage				
Describe approximate location in words				
New Seepage point estimated flow				
Clear or Turbid (Tick for clear)				
Old Seepage point estimated flow				
Clear or Turbid (Tick for clear)				
Large increase of seepage (30% or more)				
Downstream face				
Subsidence, sloughing, erosion				
Embankment				
Signs of erosion, sand boils				
Seepage measurements				
Clear or Turbid (Tick for clear)				
VN 01 (mm)				
VN 02 (mm)				
VN 03 (mm)				
VN 04 (mm)				

Details of significant changes. New occurrences and issues warranting further attention, Source of seepage (if known)

.....

.....

.....

Sketch, locate, measure and photograph if possible. (sketch the problem area on the General Arrangement Plan)

Inspecting Officer's initials				

Fax to (tick if faxed)		Asset Engineering Manager / Service Delivery Manager [redacted]
		Principal Engineer (Dam Safety) [redacted]

** INSTRUCTIONS FOR COMPLETING SHEET - Sunny Day Failure (Piping)

VISUAL INSPECTION

Frequency of visual inspection required is indicated by

STAGE 1 ONCE A DAY	STAGE 2 TWICE A DAY	STAGE 3 AS DIRECTED

Additional Inspections should be made, when:

- New seepage which requires further action
- When specifically requested

Show results of inspections as follow:-

- New Seepage appeared. **NEW**
- Significant increase (> 30%) or change in condition. **SG-INC**
- Slight increase (> 10%) or change in condition. **INC**
- NIL change of condition. **NIL**
- Slight decrease (< 10%) or change in condition. **DEC**

Significant Changes

Any changes which, in the opinion of the inspecting officer, are more than just slight changes must be advised to the Principal Engineer (Dam Safety). The degree of urgency of this advice varies with the nature of the issue.

CALLIDE DAM EAP — Chemical / Toxic Spill

Visual Inspection and Storage Report
Note: Refer to Page 2 for recording instructions **

Date: .....

	SUN	MON	TUE	WED	THU	FRI	SAT
Stored Water Level **FSL 216.10 m**							
Outlet discharge MLD							
Daily Rainfall (mm)							

VISUAL INSPECTION	First Inspection	Second Inspection (+24hrs)	Third Inspection (+48hrs)
Date			
Time			

Reservoir
Location of the chemical/toxic spill (provide as much detail as possible of the extent of the spill, and note changes over time, and areas threatened by the emergency):

Condition of spill			
Description of the Chemical/Toxic Spill Approx distance from dam wall			

Location of Spill in the Reservoir/Catchment — OR DEFINE ITS LOCATION AS AN AMTD DISTANCE

Chemical Spill Management (tick if action taken)		DATE	TIME
1. Outlet structures closed			
2. Water Treatment facility closed			
3. Source of spill located & isolated (if safe and possible)?			
4. Area isolated from public/staff access (if possible)?			

Details of significant changes. New occurrences and issues warranting further attention, Source of seepage (if known)

.....

.....

.....

.....

.....

Sketch, measure, photograph and locate if possible. Locate the position of Algal Bloom / Spill on a Plan (if available)

Inspecting Officer's initials				
Fax to (tick if faxed)		Asset Engineering Manager / Service Delivery Manager [redacted]		
		Principal Engineer (Dam Safety) [redacted]		

** INSTRUCTIONS FOR COMPLETING SHEET - Chemical/Toxic Spill

VISUAL INSPECTION

Frequency of visual inspection required is indicated by **ONCE A DAY**

Additional Inspections should be made, when

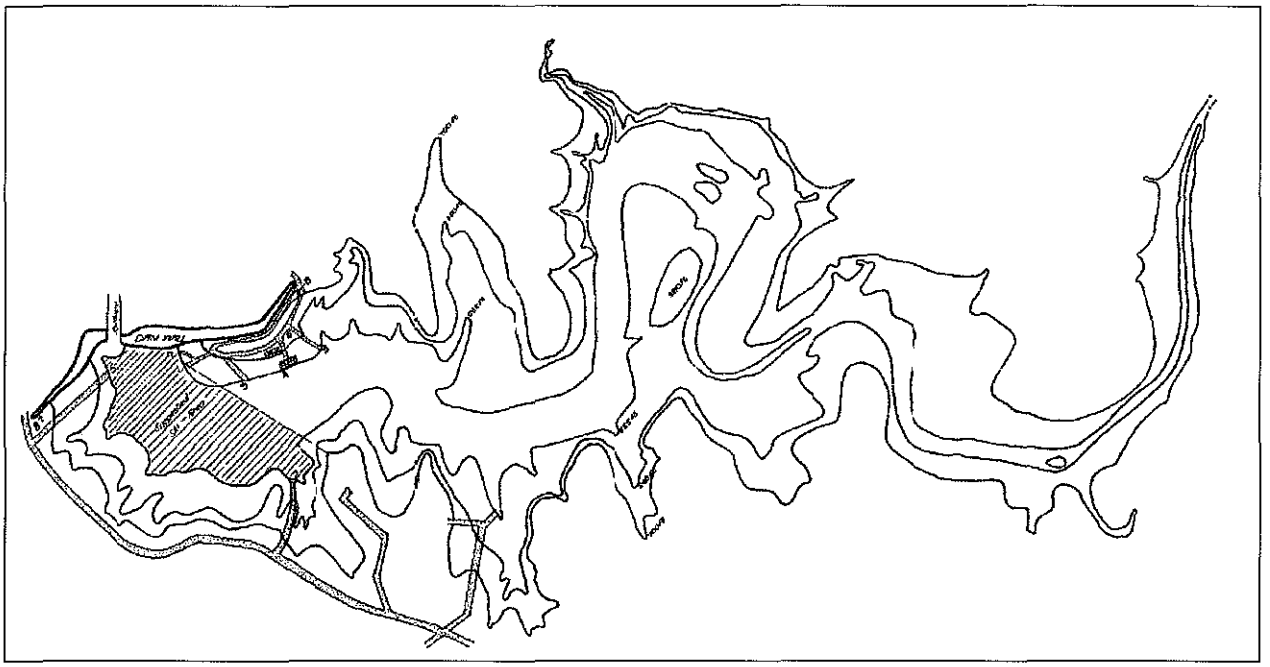
- Large developments of Algal Bloom are evident which require further action
- When specifically requested

Show results of inspections as follow:-

- New Seepage appeared **NEW**
- Significant increase (> 30%) or change in condition. **SG-INC**
- Slight increase (> 10%) or change in condition. **INC**
- NIL change of condition. **NIL**
- Slight decrease (< 10%) or change in condition. **DEC**

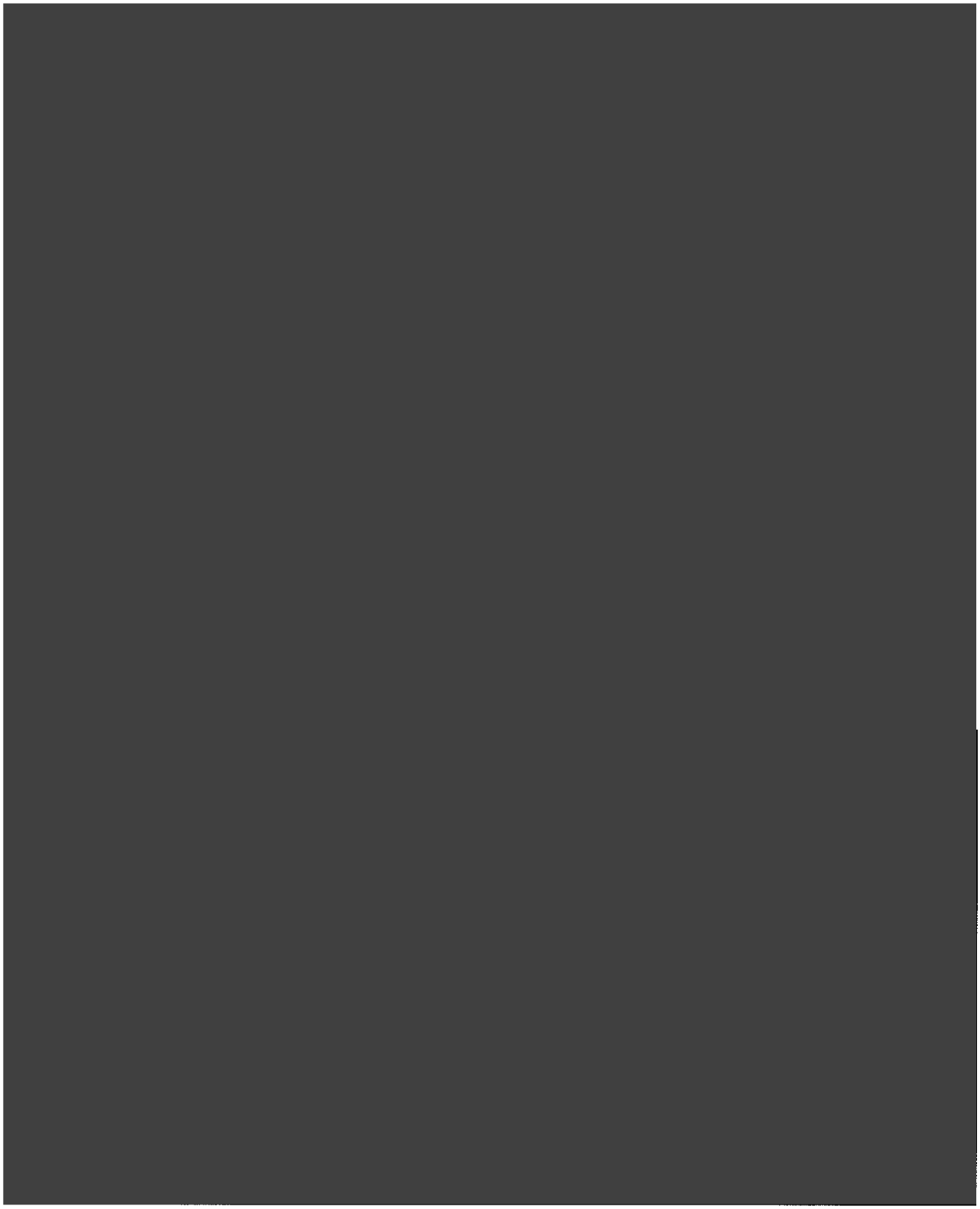
Significant Changes

Any changes which, in the opinion of the inspecting officer, are more than just slight changes must be advised to the Principal Engineer (Dam Safety). The degree of urgency of this advice varies with the nature of the issue.



[redacted]

** INSTRUCTIONS FOR COMPLETING SHEET - Terrorist Activity



SECTION 7

EMERGENCY ACCESS ROUTES & PREVENTATIVE ACTIONS

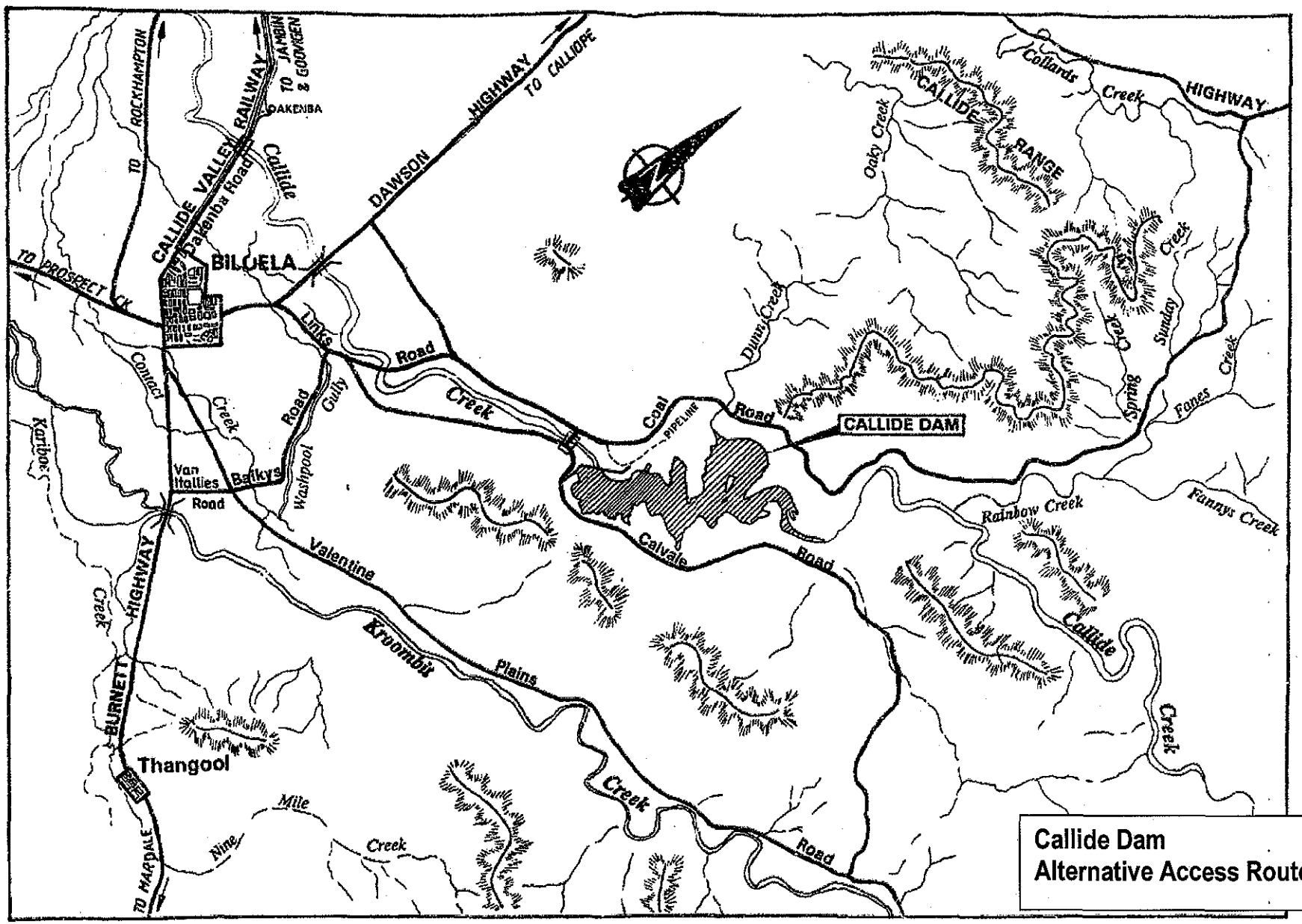
7. EMERGENCY ACCESS ROUTES

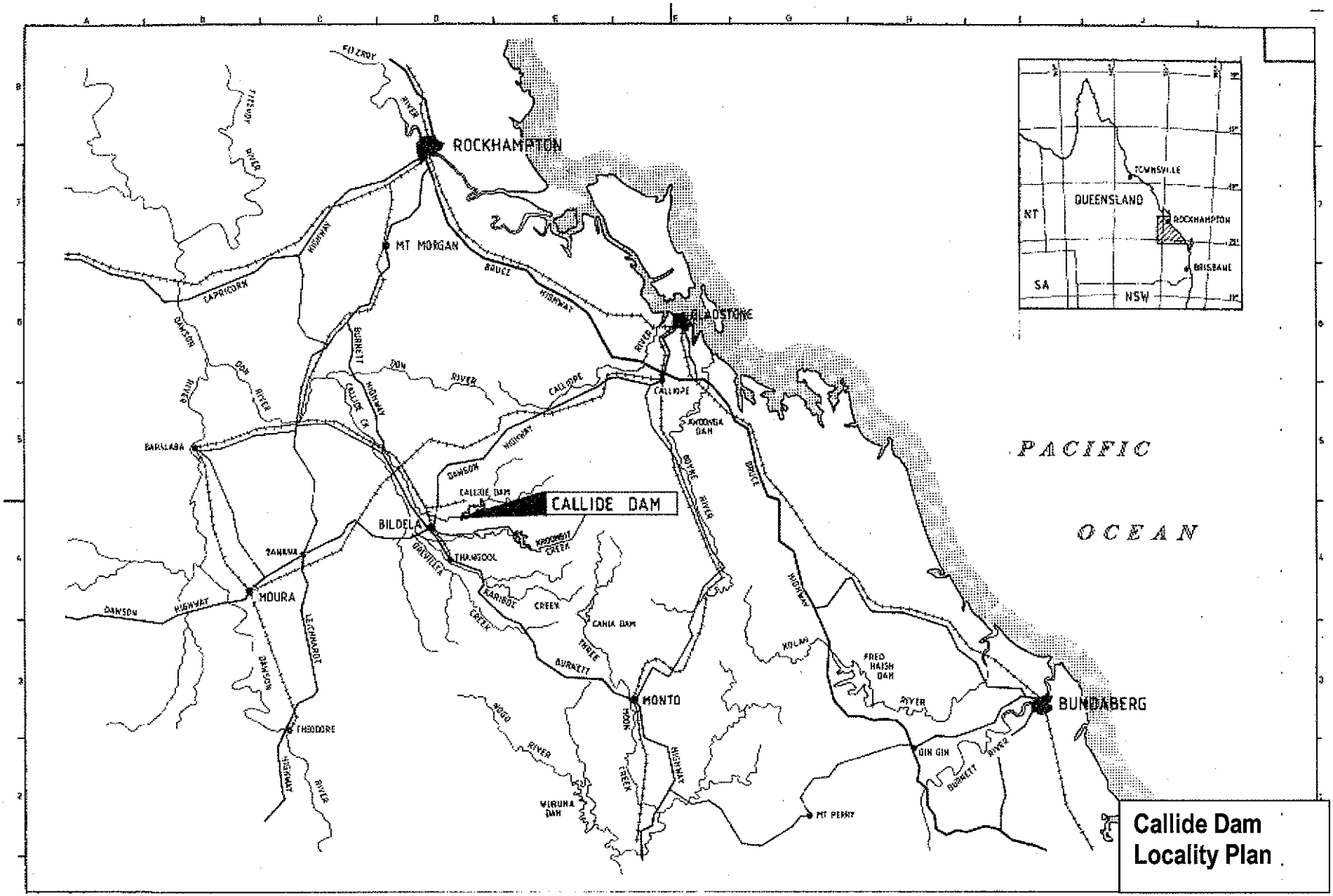
Alternative Access Routes and Locality Plan are shown on Pages 2 and 3 of this section.

7.1 PREVENTATIVE ACTIONS

In the event of a rapidly deteriorating structural deficiency which is likely to threaten the security of the dam (for example, due to internal erosion or following a major earthquake), the Dam Duty Operator or Standby Officer, having reported a potential emergency situation, should follow the preventive actions set out below:-

1. Ensure that a responsible person with portable communication is left in a safe position at the dam to monitor the emergency condition.
2. Restrict access to the dam area.
3. Liaise with Emergency Event Coordinator and Asset Engineering Manager who will liaise with Emergency Management Authorities.
4. If possible, document the emergency condition with photographs and or video camera.
5. Update Emergency Event Coordinator from time to time of any change in the emergency condition.
6. Do not take any unnecessary risks in undertaking the above actions.


TO ROCKHAMPTON
CALLIDE VALLEY RAILWAY
TO JAMBIN & GOONDIWINDI
OAKENBA
Callide
Dawson Highway
TO CALLIOPE
Collards Creek
HIGHWAY
CALLIDE RANGE
Oaky Creek
Dunn Creek
Cedar Creek
Sunday Creek
Spring Creek
Fanes Creek
Fannys Creek
Rainbow Creek
Callide Creek
Pakenba Road
BILOELA
TO PROSPECT CK
Links Road
Coal Pipeline
CALLIDE DAM
Road
Contact Creek
Gully
Waslpool
Karibon
Van Ittallies
Bailey's
Road
Valentine
Creek
HIGHWAY
Kroombit
Plains
Calvale
Road
BURNETT
Thangool
TO MARYDALE
Nine Mile
Creek
Callide Dam
Alternative Access Routes


ROCKHAMPTON
MT MORGAN
BARALABA
MOURA
THEODORE
BILOELA
CALLIDE DAM
CALLIDE
BANANA
THANGOOL
CANIA DAM
MONTO
GIN GIN
BUNDABERG
FRED HAIGH DAM
MIRUNA DAM
MT PERRY
PACIFIC
OCEAN
QUEENSLAND
NT
SA
NSW
TOWNSVILLE
BRISBANE
Callide Dam
Locality Plan

SECTION 8

LOWERING STORAGE LEVEL

8.0 LOWERING THE STORAGE LEVEL

It may become necessary during an emergency to lower the Callide Dam storage level to decrease seepage and/or loading on the structure to minimise the impact of any failure. This would only be an option when an emergency condition has been identified in its early stages.

8.1 Callide Dam Constraints

There are two constraints that need to be considered when evaluating lowering of the storage level. These are:

1. Maximum possible releases from Callide reservoir; and,

2. Flooding impacts downstream.

8.1.1 Maximum possible releases from Callide Dam

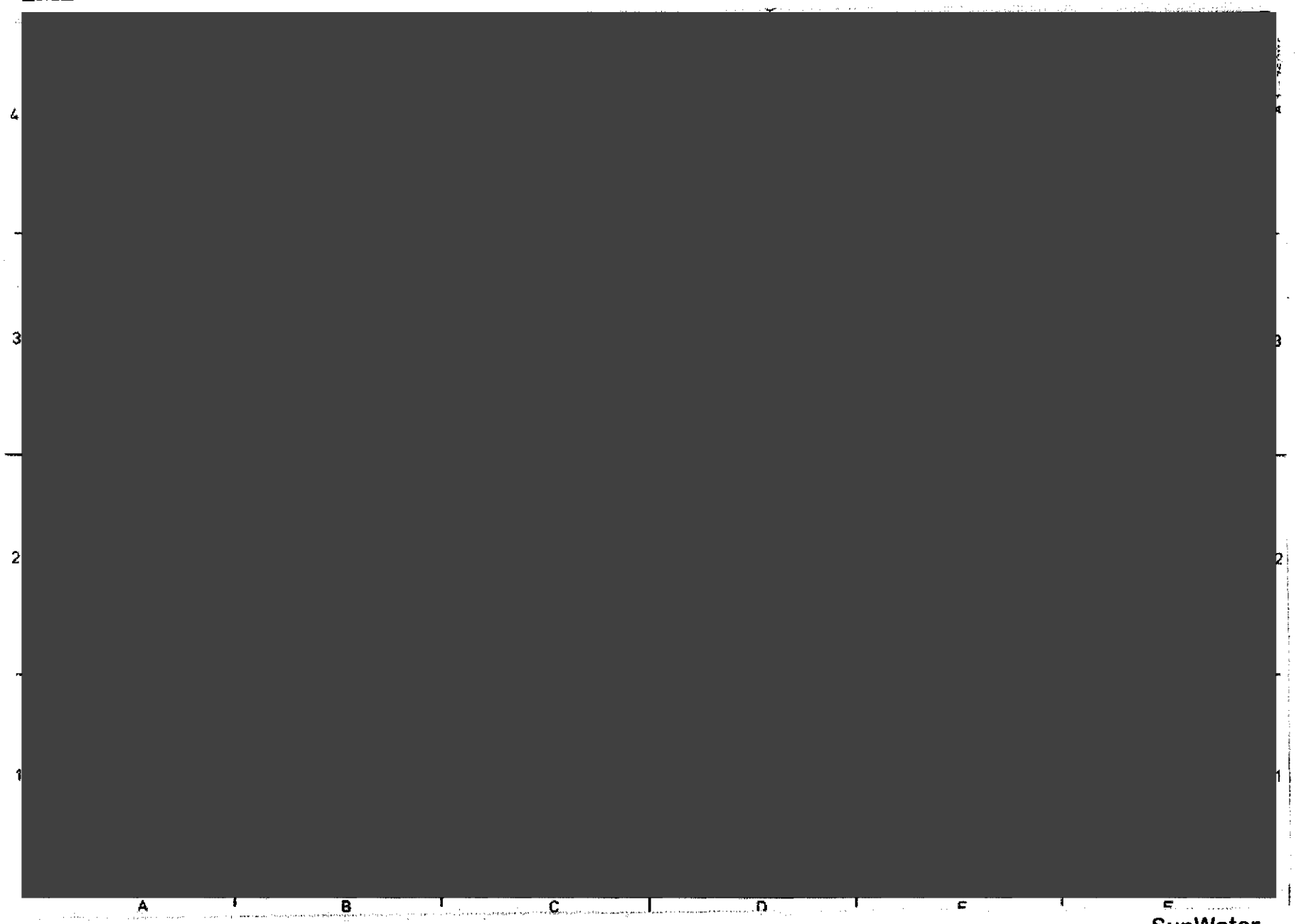
The release rate from the storage may be governed by the storage level at the time of drawdown. Callide Dam has two possible mechanisms, which can be operated simultaneously. They are:

1. Two Low level Outlet, 1220 mm, at Invert level EL 183.26 m.
2. Diversion Channel

The following table indicates the total number of days required to dewater Callide Dam from Full Supply Level using the available outlets. A spillway discharge curve is included on page 4.

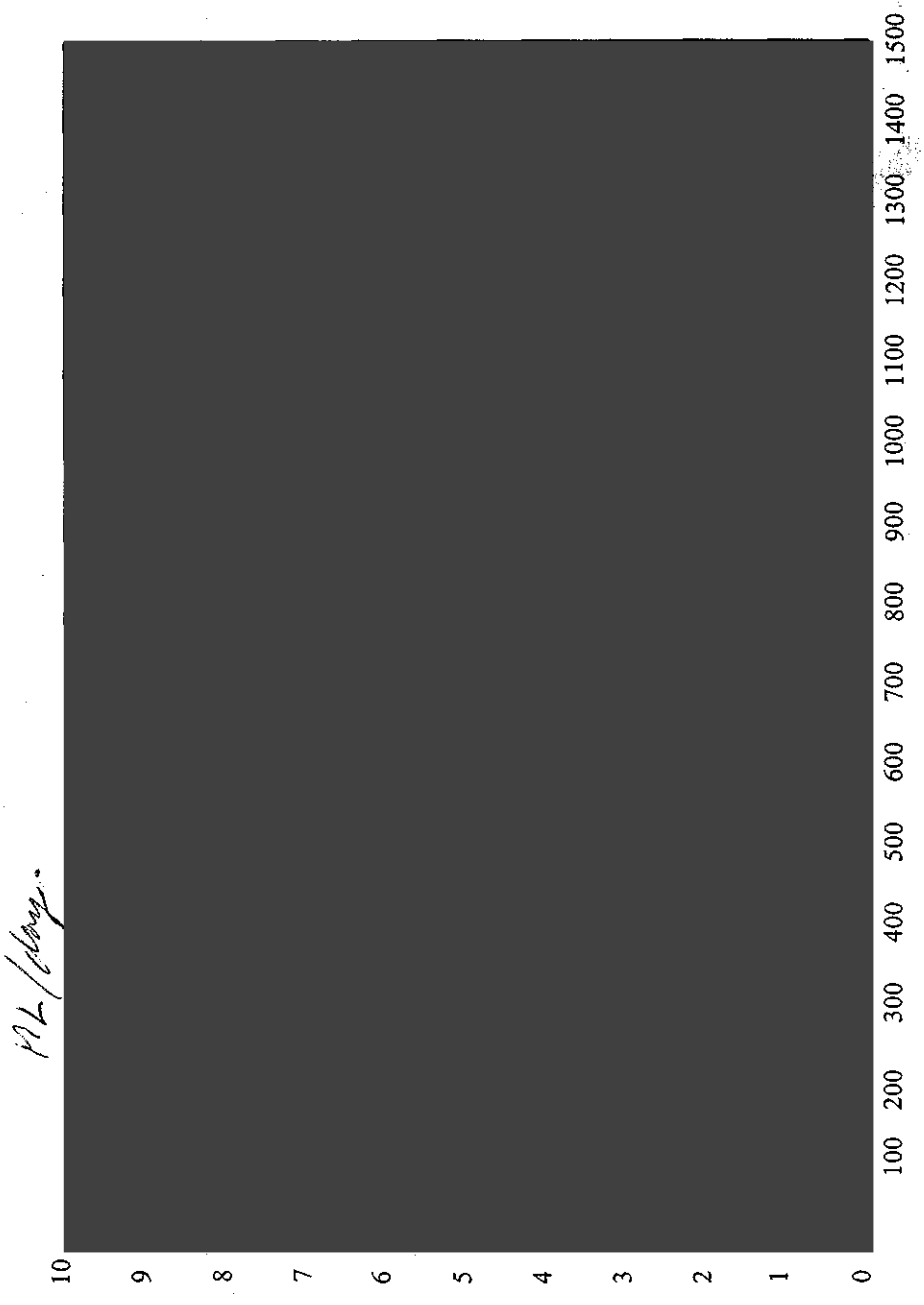
Dewatering Options	Inflow	Number of Days required to Lower the Reservoir level
Both 1220 mm outlets and diversion channel operational	No Inflow	To EL 183.26 m - 124 Day
	With Inflow	Not Possible

Spillway Discharge Rating Curve and Storage Capacity Curve

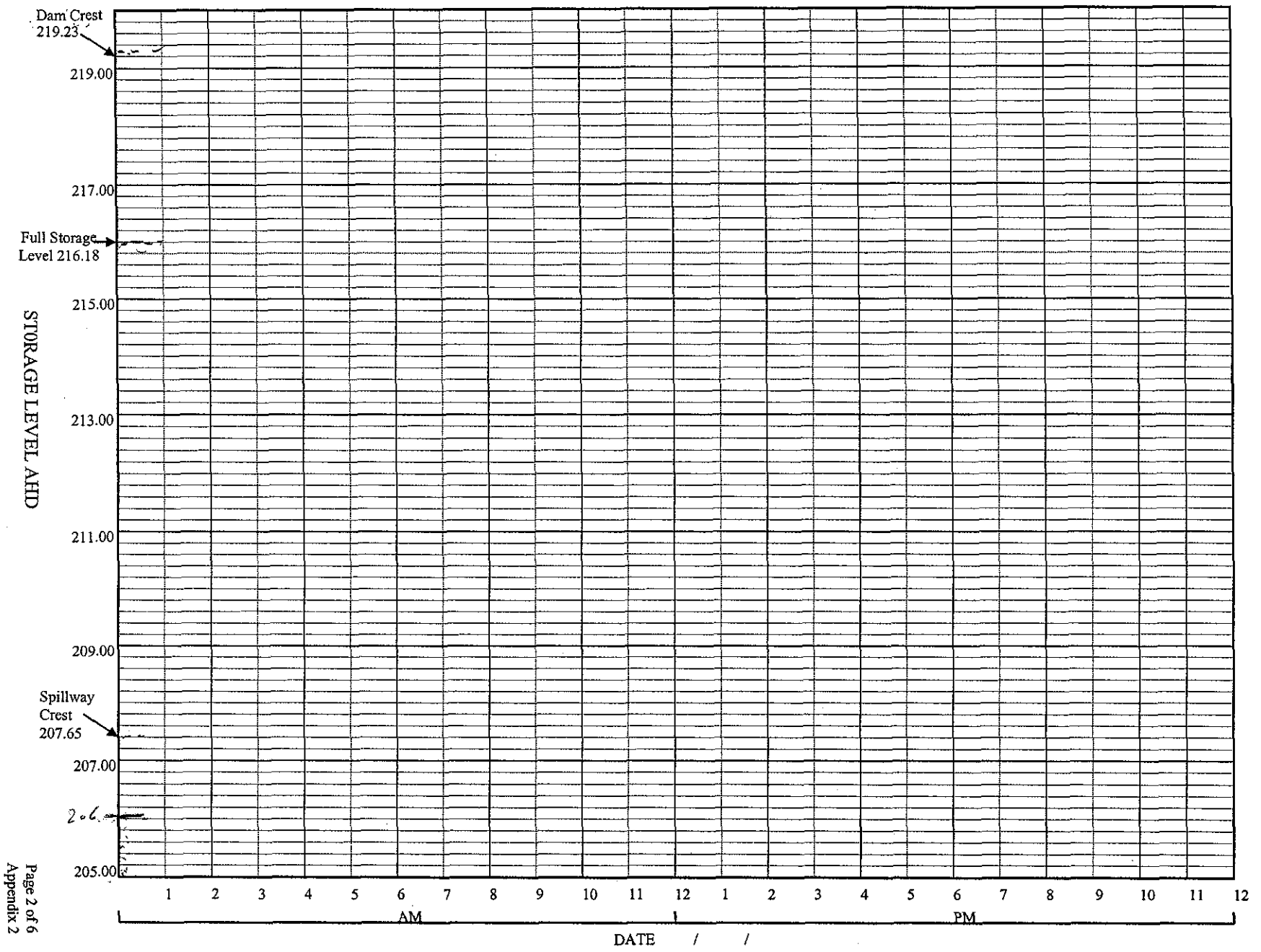

4
3
2
1
A
B
C
D
E

EMERGENCY ACTION PLAN - CALLIDE DAM

CALLIDE DAM
Gate opening / discharge relationship for one Gate Operation, starting at full supply level.



STORAGE LEVEL AT SPILLWAY VERSUS TIME



CALLIDE DAM EMERGENCY EVENT

RECORD OF COMMUNICATION

Date	Time	Phone Number	Contact Person	Message sent / received	Call sent / received by

CALLIDE DAM EMERGENCY ACTION PLAN

LOG OF EVENTS / ACTIONS

Date	Time	Event description / Action carried out	Record entered by

CALLIDE DAM

RECORD OF RAINFALL DURING A FLOOD

Date	Time	Rainfall	Daily Total	Comments

Rule across under each days total rainfall

CALLIDE DAM
EMERGENCY EVENT REPORT

NATURE OF THE EVENT

< Describe the Event, eg, Spillway discharge, Earthquake, Chemical spill, etc >
Commencing Time……Date……/……../……..
Finishing Time……Date……/……../……..

DESCRIPTION OF THE EVENT

< Describe in your own words the lead up to and progress of the Event, eg, a Spillway discharge.
Include such information as listed below >

- Weather conditions and rainfall in the Catchment
- The rate of rise of the Storage
- when the Spillway was overtopped
- When the first Gate opened (if applicable)
- Date and time of highest level
- Briefly describe any immediate downstream damage caused by the discharge
- Include any other information considered relevant

STATISTICS

- Total inflow ……Megalitres
- Total discharge ……Megalitres
- Capacity of Storage prior to inflow……%
- Volume prior to inflow……Megalitres
- Maximum inflow……Megalitres per day
- Maximum discharge……Megalitres per day

EVENT PROGRESS

< Briefly describe the daily rate of Storage rise, time to peak level, and weather conditions. Attach copies of the Spillway Level Versus Time Graph, the Communications Record Sheet, the Log of Events / Actions Sheet, and Rainfall during a Flood Sheet, (appendix 3 of the EAP) >

GENERAL COMMENTS

< Include in this section any observations or comments regarding the Event, such as Equipment malfunctions, improved Reporting, Safety issues, or any suggestions which may improve monitoring of the Event >

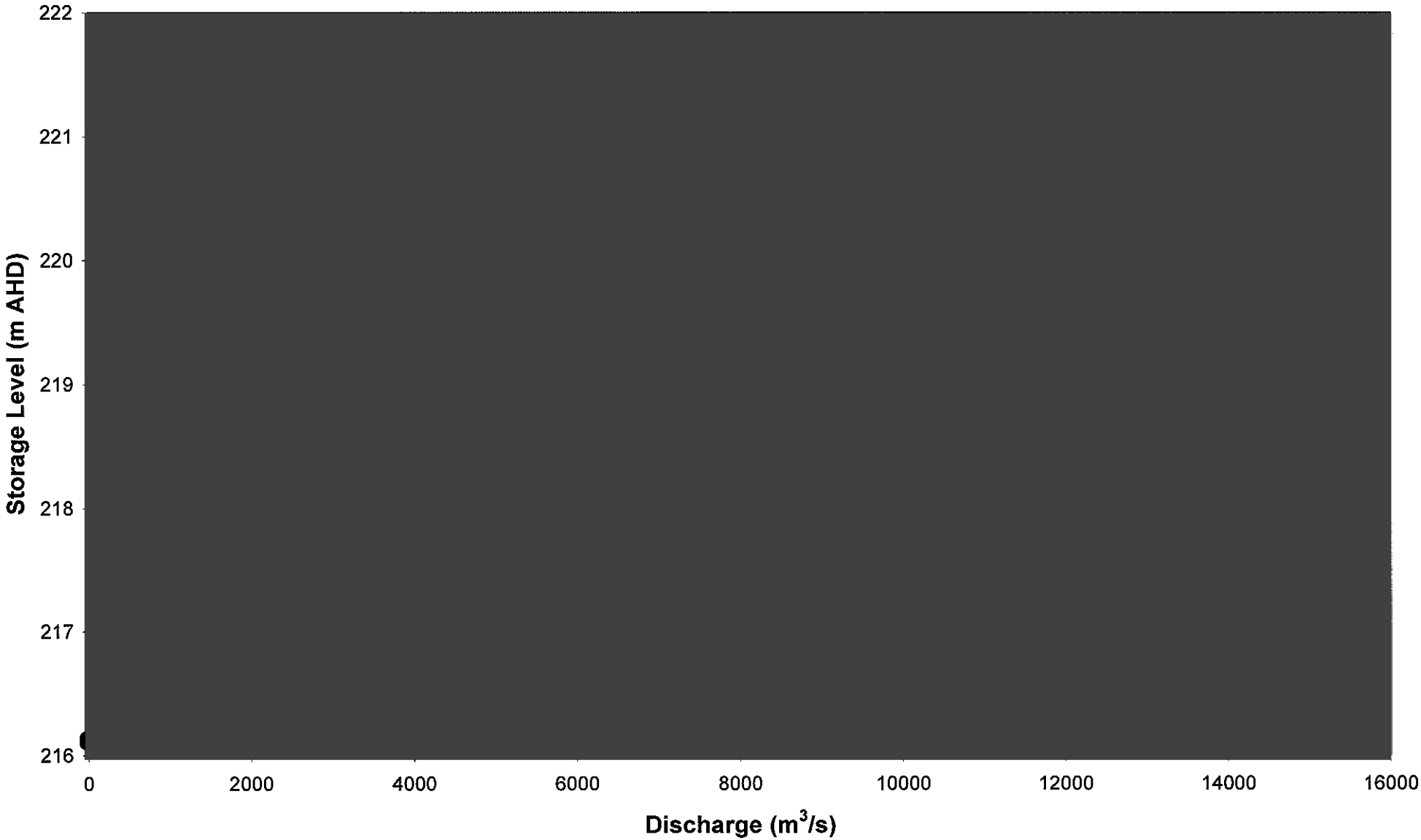
DAMAGE REPORT

< Detail any tail water damage to the Embankment or Stream bank damage in the immediate area of the Dam. Attach photos >

ATTACHMENTS

- Photos, video of the Event
- Spillway Level versus Time Graph
- Communications record sheet
- Log of Events / Action sheet
- Record of Gate opening (Gated Dams)

Signed……Designation……Date……/……/……


222
221
220
219
218
217
216
Storage Level (m AHD)
0
2000
4000
6000
8000
10000
12000
14000
16000
Discharge (m3/s)

SECTION 9

FLOOD IMPACT DOWNSTREAM & INUNDATION MAPS

Flooding impacts downstream

The flooding impact of Callide Dam releases may be assessed by the flooding effects at key locations along the Creek (Table 9.1). The Probable Maximum Precipitation with Dam Failure (PMPDF) scenario generates highest flood levels. Tables 9.1 to 9.9 below show the summarised information of the Dam Break Study conducted by SunWater in December 2002.

Table 9.1: Key Locations for the Callide Dam Break Analysis

NAME	STREAM	TYPE	DECK LEVEL
Crossing at Callide Dam	Callide Creek, AMTD 79.5 km	Causeway	185.50 m AHD [NB]
Links Rd. (East of Biloela)	Callide Creek, AMTD 73.3 km	RC Box culvert	184.50 m AHD [NB]
Dawson Highway (North of Biloela)	Callide Creek, AMTD 69.5 km	Seven-span bridge, Prestressed concrete deck units, RC piers & abutments	174.00 m AHD
Jambin-Dakenba Rd. (North of Biloela)	Callide Creek, AMTD 65.2 km	RC culvert	157.20 m AHD [NB]
Railway Bridge Callide Valley Railway (North of Biloela)	Callide Creek, AMTD 65.2 km	Multiple span timber bridge. Structure	
Burnett Highway (West of Koonkool)	Callide Creek, AMTD 44.9 km	Three-span composite bridge, Steel girders & RC deck	139.98 m AHD
Secondary Rd. (West of Koonkool, North of railway)	Callide Creek, AMTD 43.4 km	RC culvert	133.50 m AHD [NB]
Goovigen-Jambin Rd. (West of Jambin)	Callide Creek, AMTD 38.1 km	RC culvert	131.50 m AHD [NB]
Goovigen Connection Rd. (West of Goovigen)	Callide Creek, AMTD 26.9 km	Six-span timber bridge	119.00 m AHD [NB]
Harchs Rd. (West of Dakenba)	Kroombit Creek, AMTD 13.2 km	Causeway	150.00 m AHD [NB]
Secondary Rd. (West of Biloela)	Kroombit Creek, AMTD 17.1 km	Causeway	158.00 m AHD [NB]

[NB] *Approximate elevation assessed according to observations made during the October 2002 site visit.*

NAME	STREAM	TYPE	DECK LEVEL
Dawson Highway (Southwest of Biloela)	Kroombit Creek, AMTD 21.2 km	Two-span composite bridge, Steel girders & RC deck	166.04 m AHD
Burnett Highway (South of Biloela)	Kroombit Creek, AMTD 29.2 km	Five-span bridge, Prestressed concrete deck units, RC piers & abutments	185.00 m AHD
Secondary Rd. (West of Thangool)	Kariboe Creek, AMTD 13.2 km	RC Culvert	192.50 m AHD [NB]
Dawson Highway (Southwest of Biloela)	Grevillea Creek, AMTD 3.4 km	RC Culvert	167.50 m AHD [NB]
Drumburle Road (Southwest of Thangool)	Grevillea Creek, AMTD 16.0 km	RC Box culvert	187.00 m AHD [NB]
Secondary Rd. (West of Biloela)	Prospect Creek, AMTD 1.3 km	Causeway	154.5 m AHD [NB]
Burnett Highway (East of Goovigen)	Bell Creek, AMTD 3.3 km	Four-span bridge, Prestressed concrete deck units, RC piers & abutments	129.60 m AHD

NOTES

The crossings in the shaded cells were included in the hydraulic model.

[NB] *Approximate elevation assessed according to observations ma de during the October 2002 site visit.*

PEAK FLOOD LEVELS

The peak flood levels at key locations are summarised in table 9.2 and table 9.3 for the PMF and Sunny Day Failure conditions respectively

Table 9.2: Peak Flood, PMF

LOCATION & CROSS-SECTION	AMTD	PEAK FLOOD LEVEL		
		PMF – No Failure	*PMF – Embankment Breach*	*PMF – Radial Gate Failure*
Linkes Rd., SC07	73.3 km, Callide	182.04 m AHD	187.31 m AHD	182.52 m AHD
Dawson Hwy., SC10	69.4 km, Callide	175.28 m AHD	177.47 m AHD	175.47 m AHD
Paines Rd., SC14	64.8 km, Callide	168.61 m AHD	169.49 m AHD	168.68 m AHD
Burnett Hwy., SC29	44.9 km, Callide	143.38 m AHD	144.74 m AHD	143.54 m AHD
Jambin, SC34	38.1 km, Callide	135.41 m AHD	136.89 m AHD	135.62 m AHD
Goovigen, SC42	24.9 km, Callide	128.83 m AHD	130.13 m AHD	128.98 m AHD
Burnett Hwy., SK23	29.2 km, Kroombit	182.21 m AHD	183.27 m AHD	182.22 m AHD
Dawson Hwy., SK31	21.2 km, Kroombit	168.66 m AHD	169.29 m AHD	168.70 m AHD
Thangool, SKB01	13.3 km, Kariboe	196.29 m AHD	196.29 m AHD	196.29 m AHD
Dawson Hwy., SG13	3.4 km, Grevillea	168.62 m AHD	169.01 m AHD	168.63 m AHD
Burnett Hwy., SB04	3.3 km, Bell	130.47 m AHD	131.13 m AHD	130.58 m AHD

Table 9.3: Peak Flood Levels, Sunny Day Failure

LOCATION & CROSS-SECTION	AMTD	BED STREAM LEVEL	PEAK FLOOD LEVEL	
			Sunny Day – Embankment Breach	*Sunny Day – Radial Gate Failure*
Linkes Rd., SC07	73.3 km, Callide	171.00 m AHD	184.88 m AHD	177.09 m AHD
Dawson Hwy., SC10	69.4 km, Callide	162.21 m AHD	175.92 m AHD	171.13 m AHD
Paines Rd., SC14	64.8 km, Callide	155.65 m AHD	168.63 m AHD	167.15 m AHD
Burnett Hwy., SC29	44.9 km, Callide	135.25 m AHD	141.94 m AHD	140.68 m AHD

Jambin, SC34	38.1 km, Callide	127.60 m AHD	133.28 m AHD	132.06 m AHD
Goovigen, SC42	24.9 km, Callide	112.60 m AHD	124.09 m AHD	122.42 m AHD

PEAK FLOOD FLOWS

The peak flood levels at key locations are summarised in table 9.4 and table 9.5 for PMF and Sunny Day Failure conditions respectively.

Table 9.4: Peak Flows, PMF

LOCATION	AMTD	PEAK FLOOD LEVEL		
		PMF No Breach	*PMF – Embankment Breach*	*PMF – Radial Gate Failure*
Linkes Rd., SC07	73.3 km, Callide	9,880 m^3/s	32,260 m^3/s	10,930 m^3/s
Dawson Hwy., SC10	69.4 km, Callide	10,630 m^3/s	30,720 m^3/s	11,810 m^3/s
Paines Rd., SC14	64.8 km, Callide	11,580 m^3/s	30,960 m^3/s	12,830 m^3/s
Burnett Hwy., SC29	44.9 km, Callide	9,020 m^3/s	18,400 m^3/s	9,950 m^3/s
Jambin, SC34	38.1 km, Callide	12,670 m^3/s	25,240 m^3/s	14,080 m^3/s
Goovigen, SC42	24.9 km, Callide	7,430 m^3/s	12,740 m^3/s	7,980 m^3/s
Burnett Hwy., SK23	29.2 km, Kroombit	170 m^3/s	1,970 m^3/s	400 m^3/s
Dawson Hwy., SK31	21.2 km, Kroombit	1,270 m^3/s	2,430 m^3/s	1,350 m^3/s
Thangool, SKB01	13.3 km, Kariboe	3,940 m^3/s	3,940 m^3/s	850 m^3/s
Dawson Hwy., SG13	3.4 km, Grevillea	750 m^3/s	750 m^3/s	750 m^3/s
Burnett Hwy., SB04	3.3 km, Bell	5,290	5,610 m^3/s	5,910 m^3/s

Table 9.5: Peak Flows, Sunny Day Failure.

LOCATION	AMTD	PEAK FLOW	
		Sunny Day – Embankment Breach	*Sunny Day – Radial Gate Failure*
Linkes Rd., SC07	73.3 km, Callide	15,490 m^3/s	1,900 m^3/s
Dawson Hwy., SC10	69.4 km, Callide	15,080 m^3/s	1,810 m^3/s
Paines Rd., SC14	64.8 km, Callide	14,390 m^3/s	1,600 m^3/s

Burnett Hwy., SC29	44.9 km, Callide	2,730 m^3/s	580 m^3/s
Jambin, SC34	38.1 km, Callide	3,270 m^3/s	910 m^3/s
Goovigen, SC42	24.9 km, Callide	1830 m^3/s	690 m^3/s

TIME TO PEAK FLOOD LEVELS

Table 9.6 and Table 9.7 summarise the estimated time until the water level starts to rise (TFR) and the estimated time when the peak flood levels (TPL) are attained. The summarised data provides an indication of the available response time for each of the indicated sites

Table 9.6: Time to Flood Rise (TFR) and Time to Peak Level (TPL), PMF

LOCATION	AMTD	PMF, No Failure		PMF, Embankment Failure	
		TFR	TPL	TFR	TPL
Linkes Rd., SC07	73.3 km, Callide	0:40	6:40	0:40	7:50
Dawson Hwy., SC10	69.4 km, Callide	0:40	7:00	0:40	8:00
Paines Rd., SC14	64.8 km, Callide	1:10	7:20	1:10	8:30
Burnett Hwy., SC29	44.9 km, Callide	0:00	11:00	0:00	10:50
Jambin, SC34	38.1 km, Callide	1:00	12:10	1:00	11:50
Goovigen, SC42	24.9 km, Callide	0:30	19:30	0:30	16:10
Burnett Hwy., SK23	29.2 km, Kroombit	0:50	6:40	1:30	8:20
Dawson Hwy., SK31	21.2 km, Kroombit	0:50	7:00	1:00	8:30
Thangool, SKB01	13.3 km, Kariboe	0:40	2:30	0:40	2:30
Dawson Hwy., SG13	3.4 km, Grevillea	0:50	7:40	1:00	9:00
Burnett Hwy., SB04	3.3 km, Bell	0:00	13:50	0:00	12:30

Table 9.7: Time to Flood Rise (TFR) and Time to Peak Level (TPL), Sunny Day Failure

LOCATION	AMTD	Sunny Day – Embankment Failure.		Sunny Day – Radial Gate Failure	
		TFR	TPL	TFR	TPL
Linkes Rd., SC07	73.3 km, Callide	01:10	03:40	0:40	3:20
Dawson Hwy., SC10	69.4 km, Callide	02:00	03:50	1:30	3:50
Paines Rd., SC14	64.8 km, Callide	02:30	04:30	2:10	6:10
Burnett Hwy., SC29	44.9 km, Callide	06:30	10:30	7:00	22:40
Jambin, SC34	38.1 km, Callide	08:30	13:30	10:00	24:50
Goovigen, SC42	24.9 km, Callide	12:30	28:50	16:00	40:40

PEAK MEAN VELOCITIES

The peak mean velocity together with the depth of flooding provides an indication of the likely consequences of the flooding because it can affect the stability of pedestrians wading through flood-waters and motor vehicles traversing flooded roads.

Table 9.8: Mean Velocities, PMF. (m/s)

LOCATION	AMTD	PEAK VELOCITY		
		PMF No Breach	*PMF – Embankment Breach*	*PMF – Radial Gate Failure*
Linkes Rd., SC07	73.3 km, Callide	5.3 m/s	5.6 m/s	5.5 m/s
Dawson Hwy., SC10	69.4 km, Callide	5.4 m/s	5.4 m/s	5.4 m/s
Paines Rd., SC14	64.8 km, Callide	2.4 m/s	2.9 m/s	2.4 m/s
Burnett Hwy., SC29	44.9 km, Callide	1.0 m/s	1.2 m/s	1.2 m/s
Jambin, SC34	38.1 km, Callide	1.1 m/s	1.4 m/s	1.1 m/s
Goovigen, SC42	24.9 km, Callide	0.9 m/s	0.9 m/s	0.9 m/s

Burnett Hwy., SK23	29.2 km, Kroombit	2.4 m/s	2.3 m/s	2.5 m/s
Dawson Hwy., SK31	21.2 km, Kroombit	3.3 m/s	3.5 m/s	3.4 m/s
Thangool, SKB01	13.3 km, Kariboe	2.1 m/s	2.1 m/s	2.1 m/s
Dawson Hwy., SG13	3.4 km, Grevillea	0.9 m/s	0.9 m/s	0.9 m/s
Burnett Hwy., SB04	3.3 km, Bell	1.9 m/s	1.6 m/s	1.8 m/s

Table 9.9: Peak Mean Velocities, Sunny Day Failure.

LOCATION	AMTD	PEAK VELOCITY	
		Sunny Day – Embankment Breach	***Sunny Day – Radial Gate Failure***
Linkes Rd., SC07	73.3 km, Callide	5.7 m/s	2.1 m/s
Dawson Hwy., SC10	69.4 km, Callide	5.3 m/s	3.2 m/s
Paines Rd., SC14	64.8 km, Callide	2.7 m/s	2.6 m/s
Burnett Hwy., SC29	44.9 km, Callide	1.4 m/s	1.2 m/s
Jambin, SC34	38.1 km, Callide	0.9 m/s	0.9 m/s
Goovigen, SC42	24.9 km, Callide	1.1 m/s	0.7 m/s

- Most crossings over Callide Creek are flooded under most considered scenarios.
- The road bridge on Dawson Highway, AMTD 69.4 km on Callide Creek (North of Biloela) would not be overtopped for the case of the "*Sunny Day*" failure of spillway gates. However, this bridge would be overtopped by 2.25 m and 3.8 m for the SDF and PMF embankment failure cases.
- Other major bridges would be overtopped by a minimum of 0.5 m for the "*Sunny Day*" gate failure scenario and up to 5 m for the "*Sunny Day*" embankment failure case.
- The PMF events would cause the overtopping of all crossings over Callide and its tributaries downstream of Callide Dam. Most bridges would be overtopped in this case by more than 3 m.

- For the Sunny Day Failure, it would take approximately 2 hours until the level of the water would begin to rise at Biloela. The time to water-rise increases up to 12 hours at locations further downstream.

- For the PMF failure, the time until the level of Callide Creek begins to rise significantly is 1 hour or less. The calculated time does not vary significantly along the main stream due to the flow contribution from tributaries.

- The time to peak flood levels along the main stream vary between approximately 4 hours to 29 hours for the Sunny Day Failure of the embankment and between 6.5 hours to 19.5 hours for the PMF cases.

- The time available for evacuation at Biloela is just under 4 hours. This does not provide sufficient warning time to evacuate the population at risk in Biloela.

- The time to peak flood levels is more than 12 hours at both Jambin and Goovigen. This is considered to provide sufficient time to evacuate.

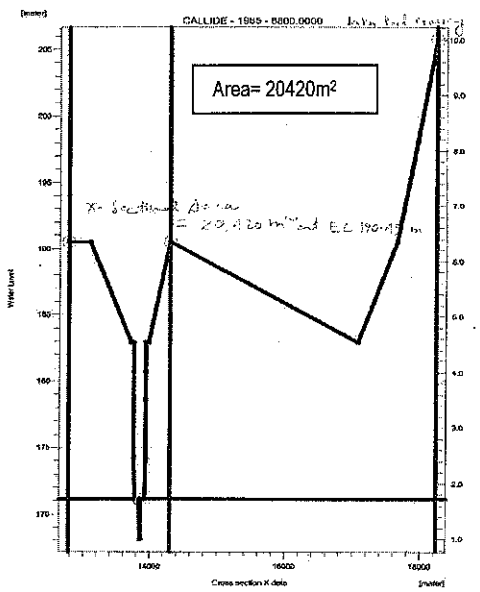
- According to the ANCOLD guidelines, the acceptable Flood Capacity fallback alternative for an "High A" IFHC Dam is the PMF.

RIVER CROSS-SECTIONS & INUNDATION MAPS

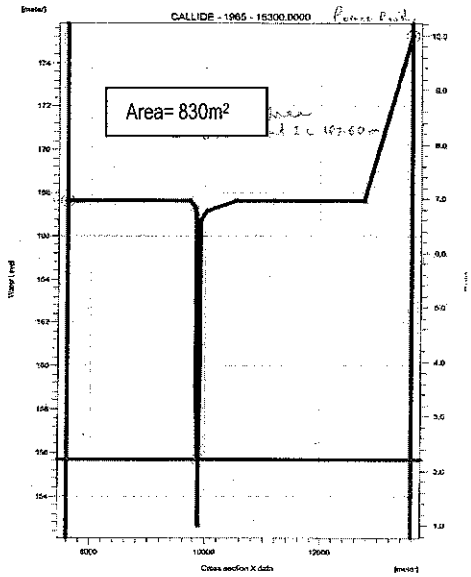
Comprehensive hydrologic and hydraulic modelling has simulated flood inundation that would occur for the following scenarios.

(i) **"Failure Due To Flood"**:- The inflow of an extreme flood into the storage causes overtopping leading to erosion failure of abutment or foundations.

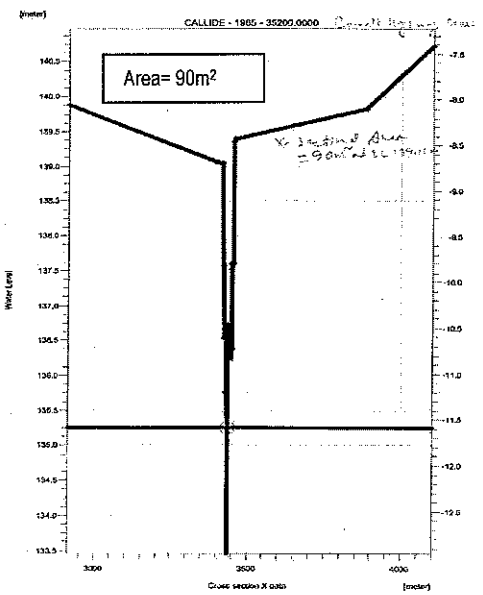
(ii) **"Sunny Dam Failure"**:- In which the dam fails under a normal inflow situation. Any flood inundation would result from water held in the storage.



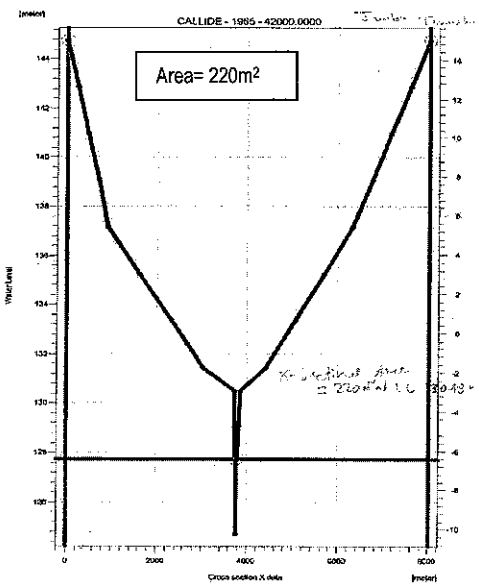
River x-section at Linkes Road Crossing



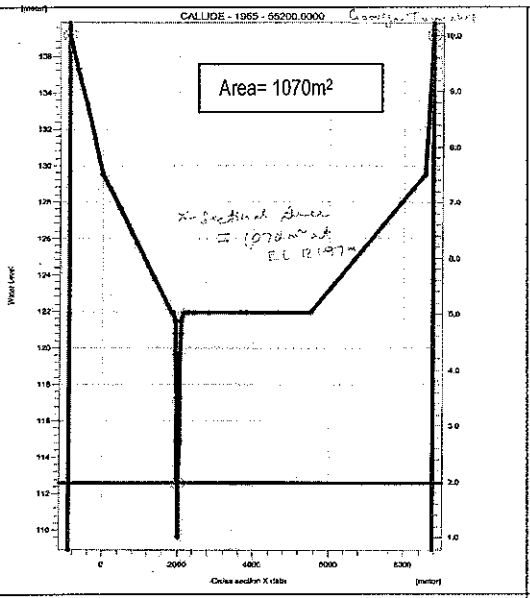
River x-section at Paines Road crossing



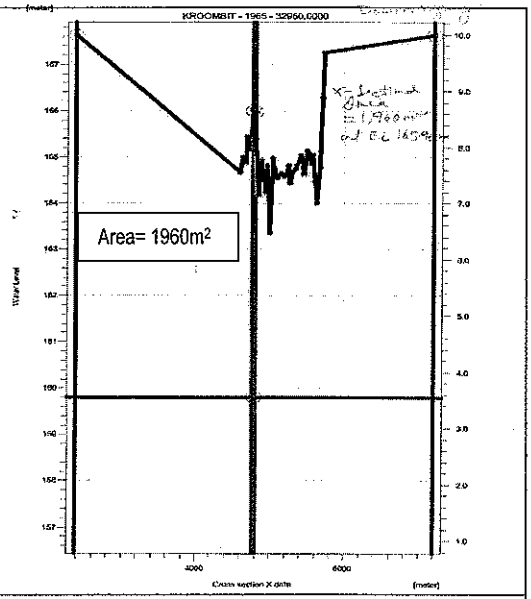
River x-section at Burnett Highway Crossing



River x-section at Jambin Township



River x-section at Goovigen Township



River x-section at Dawson Highway crossing

SECTION 10

DEFINITIONS & ANALYSIS

- Incident, Emergency Response, Crisis and Business Continuity Management Manual
- Flood Event Definitions and Abbreviations
- Earthquake Assessment (Modified Mercalli Scale)
- Queensland Disaster Management System
- Weather Information (Flood Warning)

INCIDENT, EMERGENCY RESPONSE, CRISIS AND BUSINESS CONTINUITY MANAGEMENT MANUAL

PURPOSE

The purpose of the Manual is to provide a description of the framework that SunWater applies in managing various levels of incidents, from locally managed incidents through to emergency, crisis and business continuity management. It includes:

- definitions for the terminology used in incident management
- a description of the documentation for the different levels of an Incident / Emergency / Crisis
- a roadmap of the different levels of incident within SunWater and how they are to be managed, including a description of the escalation process when an Emergency worsens to become a Crisis
- a description of the phases of management of the different levels of incident, and how these may interrelate.

The Incident/Near Miss Management Plan (IMP), Emergency Management Plan (EMP), Crisis Management Plan (CMP) and Business Continuity Plan (BCP) must be read in conjunction with the Manual.

FLOOD EVENT DEFINITIONS AND ABBREVIATIONS

FLOODING EVENT DEFINITIONS

- **"DCF"** or
  "Dam Crest Flood" (Formerly IFF or Impending Failure Flood)
  The flood Event which when routed through the Reservoir just threatens failure of the Dam. The Reservoir is assumed to be initially at Full Storage Level
- **"PMF"** or
  "Probable Maximum Flood"
  The flood resulting from the Probable Maximum Precipitation, coupled with the worst flood producing catchments conditions that can be realistically expected in the prevailing meteorological conditions
- **"PMP"** or
  "Probable Maximum Precipitation"
  The theoretical greatest depth of precipitation for a given duration that is physically possible over a particular drainage system.
- **"SUNNY DAY FAILURE"**
  Unexpected failure of a dam not associated with flooding or natural disaster.

State of Emergency

As defined by the State Emergency and Rescue Management Act (1989)
OR As defined by the Dams Safety Act (1978)

ABBREVIATIONS

ANCOLD	Australian National Committee on Large Dams
DEMO	District Emergency Management Officer
DEOCON	District Emergency Operations Controller
DFL	Design Flood Level
DLWC	Department of Land and Water Conservation, NSW
DSU	Dam Safety Unit, Department of Land & Water Conservation, NSW
FSL	Full Supply Level
LEOCON	Local Emergency Operations Controller
MDBC	Murray Darling Basin Commission
MLD	Megalitres per Day
MRMW	Manager, River Murray Works
OIC	Officer-In-Charge, Hume Dam
SES	State Emergency Service
UHF	Ultra High Frequency
VHF	Very High Frequency
EL	Elevation Level
AEP	Annual Exceedence Probability
DCL	Dam Crest Level

THE MODIFIED MERCALLI SCALE

MM 1 Not felt by humans, except in especially favourable circumstances, but birds and animals may be disturbed.
Reported mainly from the upper floors of buildings more than 10 storeys high.
Dizziness or nausea may be experienced.
Branches of trees, chandeliers, doors and other suspended systems of long natural period may be seen to move slowly.
Water in ponds, lakes reservoirs, etc. may be set into wave oscillation of short to long durations.

MM 2 Felt by a few persons at rest indoors, especially by those on upper floors or otherwise favourably placed.
The long-period effects listed under MM 1 may be more noticeable.

MM 3 Felt indoors, but not identified as an earthquake by everyone.
Vibration may be likened to passing of light traffic.
It may be possible to estimate the duration, but not the direction.
Hanging objects may swing slightly.
Standing motorcars may rock slightly.

MM 4 **Generally noticed indoors, but not outside.**
Very light sleepers may be wakened.
Vibration may be likened to the passing of heavy traffic, or to the jolt of a heavy object falling or striking the building.
Walls and frame of buildings are heard to creak.
Doors and windows rattle.
Glassware and crockery rattles.
Liquids in open vessels may be slightly disturbed.
Standing motorcars may rock, and the shock can be felt by their occupants.

MM 5 **Generally felt outside, and by almost everyone indoors.**
Most sleepers awakened. A few people frightened.
Direction of motion can be estimated.
Small unstable objects are displaced or upset.
Some glassware and crockery may be broken. Some windows cracked.
A few earthenware toilet fixtures cracked.
Hanging pictures move. Doors and shutters swing.
Pendulum clocks stop, start, or change rate.

MM 6 **Felt by all.**
People and animals alarmed.
Many run outside.
Difficulty experienced in walking steadily.
Some plaster cracks or falls. Isolated cases of chimney damage.
Windows, glassware, and crockery broken.
Objects fall from shelves, and pictures from walls.
Heavy furniture moved. Unstable furniture overturned.
Small church and school bells ring.
Trees and bushes shake, or are heard to rustle.
Loose material may dislodge from existing slips, talus slopes, or shingle slides.

MM 7 **General alarm.**
Difficulty experienced in standing.
Noticed by drivers of motorcars.
Trees and bushes strongly shaken. Large bells ring.
A few instances of damage to masonry.
Loose brickwork and tiles dislodged.
Un-braced parapets and architectural ornaments may fall.
Stone walls cracked. Weak chimneys broken, usually at the roof-line.
Domestic water tanks burst.
Concrete irrigation ditches damaged.
Waves seen on ponds and lakes.
Water made turbid by stirred-up mud.
Small slips, and caving-in of sand and gravel banks.

MM 8 **Alarm may approach panic.**
Steering of motorcars affected.
Masonry damaged, with partial collapse.
Chimneys, factory stacks, monuments, towers, and elevated tanks twisted or brought down.
Panel walls thrown out of frame structures.
Some brick veneers damaged.
Decayed wooden piles broken.
Frame houses not secured to the foundation may move.
Cracks appear on steep slopes and in wet ground.
Landslips in roadside cuttings and unsupported excavations.
Some branches may be broken off.
Changes in the flow or temperature of springs and wells may occur.
Small earthquake fountains.

MM 9 **General Panic.**
Masonry heavily damaged, sometimes collapsing completely.
Frame structures racked and distorted.
Damage to foundations general.
Frame houses not secured to the foundations shifted off.
Brick veneers fall and expose frames.
Cracking of the ground conspicuous.
Minor damage to paths and roadways.
Sand and mud ejected in alleviated areas, with the formation of earthquake fountains and sand craters.
Underground pipes broken.
Serious damage to reservoirs.

MM 10 **Most masonry structures destroyed, together with their foundations.**
Some well built wooden buildings and bridges seriously damaged.
Dams, dykes and embankments seriously damaged.
Railway lines slightly bent.
Concrete and asphalt roads and pavements badly cracked or thrown into waves.
Large landslides on river banks and steep coasts.
Sand and mud on beaches and flat land moved horizontally.
Large and spectacular sand and mud fountains.
Water from rivers, lakes, and canals thrown up on the banks.

THE QUEENSLAND DISASTER MANAGEMENT SYSTEM

The Queensland Disaster Management System operates on three distinct levels. These are:

- Local Government
- Disaster District
- State Government

A fourth level, The Commonwealth, is also included in our Disaster Management System recognising that Queensland may need to seek Commonwealth support in times of disaster.

Each of these levels within the Queensland Disaster Management System has as its basis a committee structure supported by a disaster coordination centre. These committees and coordination centres are activated when required to manage and coordinate support for disaster stricken communities. When not activated, these committees meet to prepare for and practice their role within the Disaster Management System.

Figure 1 depicts the Queensland Disaster Management System including the link to the Commonwealth for National-level support when required.

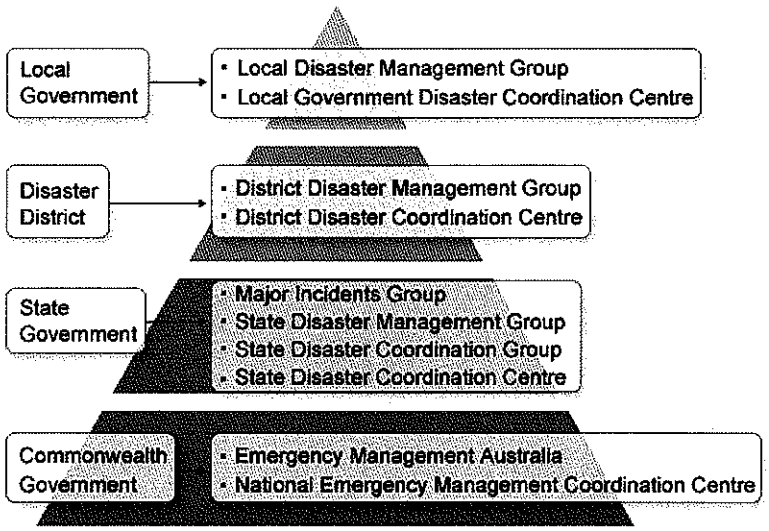


Figure 1 - The Queensland Disaster Management System

Description of the System

The Queensland Disaster Management System has three principal tiers that quickly provide both technical and tangible assistance to disaster stricken communities.

Management of a disaster at the community level is conducted by Local Government who are responsible for the implementation of their Local Disaster Management Plan. If Local Governments require additional resources to manage the event, they are able to request support from their Disaster District Coordinator. This allows for the rapid mobilisation of resources at a regional or district level. If Disaster Districts resources are inadequate or inappropriate, requests for assistance can be passed to State via the State Disaster Coordination Centre. Finally, when State resources are inadequate or inappropriate, support from the Commonwealth can be obtained via Emergency Management Australia (EMA).

Reference: http://www.disaster.qld.gov.au/about/

A brief summary of each of the key components of the Queensland Disaster Management System is set out below:

- **Local Disaster Management Group**. (Formerly called Local Government Counter Disaster Committee). Local Disaster Management Groups (local groups) coordinate the response to a disaster at a local level. The Committees are usually chaired by the Mayor and the Local Government Chief Executive Officer is usually the Executive Officer of the committee. Local Government Counter Disaster Committees develop and maintain Counter Disaster Plans for their Shire. These Local Government Committees are best placed to decide what resources are needed, when they are needed and how best to apply such resources so as to minimise hardship and suffering. They play a key role in the Queensland Disaster Management System.

- **District Disaster Management Group** (formerly called Disaster District Control Group). There are 23 Disaster Districts in Queensland which are based on the Police Districts. The senior Police Officer in each district is designated as the Disaster District Coordinator who Chairs a Disaster District Control Group. These Disaster District Control Groups comprise representatives from regionally-based Queensland Government departments who are able to provide and coordinate whole-of-government support to disaster stricken communities. The Disaster Districts perform a 'middle' management function within the Disaster Management System by providing coordinated State Government support when requested by Local Governments.

- **The State Disaster Coordination Group (SDCG)** is the working body of the State Disaster Management Group (State Group) at State-level. SDCG members are designated liaison officers from each of the Departments represented on the State Group. This Group is the primary mechanism through which coordinated whole-of-government State-level support is provided to disaster-stricken communities.

- **The State Disaster Management Group**. The State Disaster Management Group (State Group) is established as the principal organisation under the new Act for the purposes of disaster management throughout the State. It replaces the State Counter-Disaster Organisation and its executive, the Central Control Group. In particular, the State Group is responsible for disaster mitigation and disaster planning and preparation at a State level and for coordinating whole-of-Government response and recovery operations prior to, during and after a disaster impact. This includes accessing interstate and/or Commonwealth assistance when local and State resources are exhausted or not available.

  The State Group comprises Chief Executive Officers (CEO's) from all Queensland Government Departments. The CEO of the Department of the Premier and Cabinet is the Chair, while the Executive Director of Counter Disaster and Rescue Services is the Executive Officer.

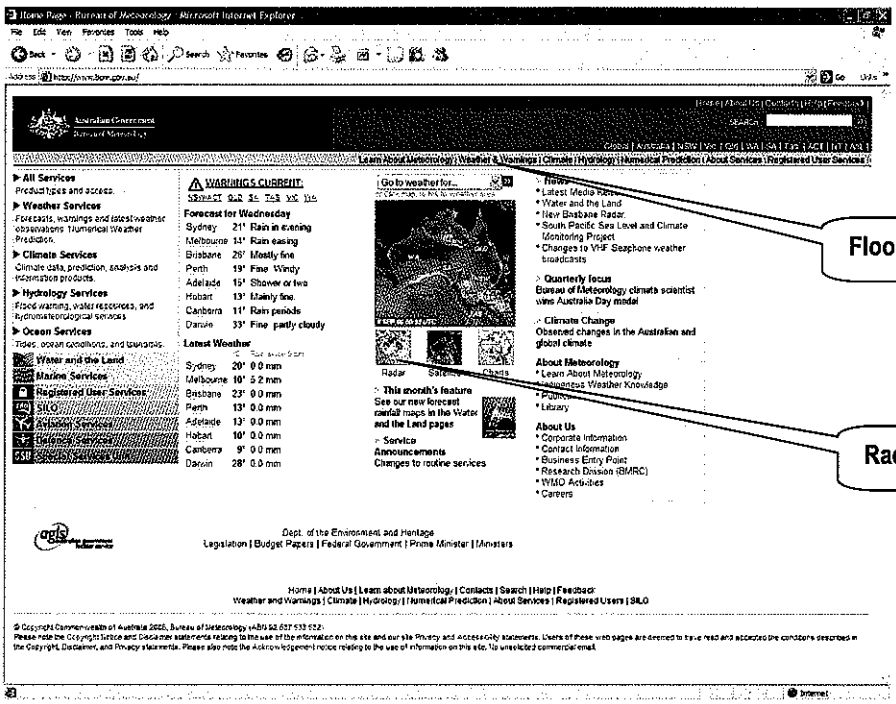
- **Major Incidents Group (MIG)**. The Queensland Government has established a MIG to provide high level Ministerial guidance and support in the event of a significant incident with major community consequences. Conceptually, membership of the MIG would be determined on an incident-by-incident basis and may include, but not be limited to:

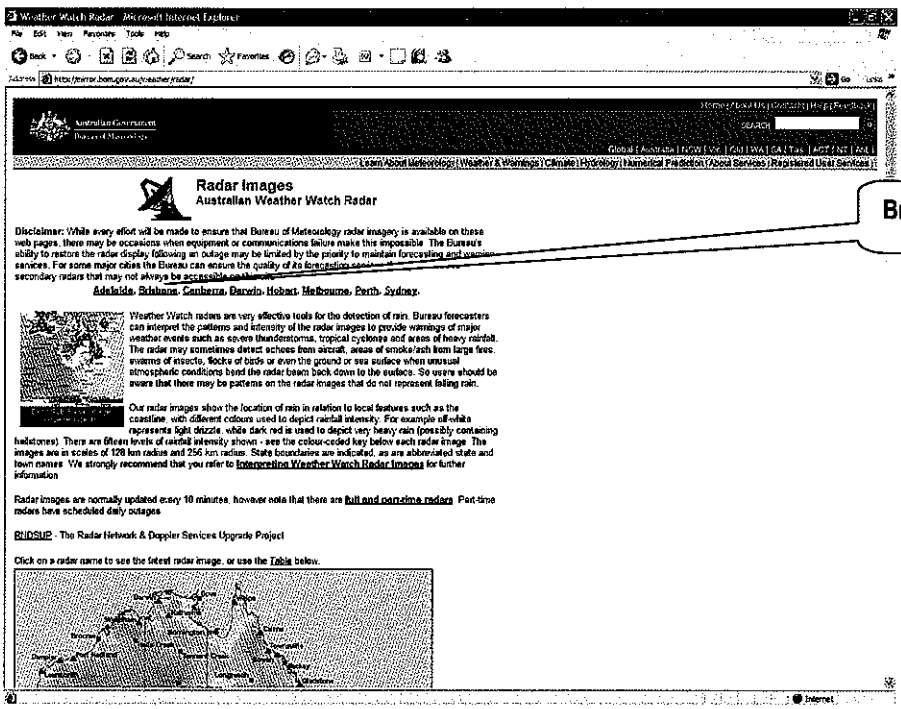
  - Premier (Chair)
  - Treasurer
  - Attorney-General
  - Minister for Police
  - Minister for Emergency Services
  - Minister for Health

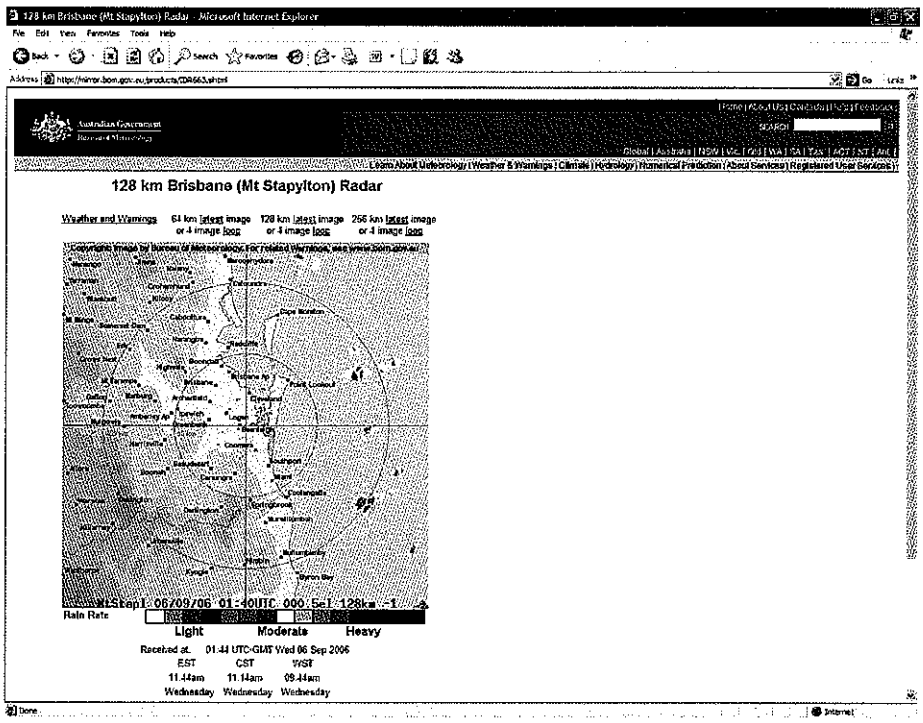
Reference: http://www.disaster.qld.gov.au/about/

WEATHER INFORMATION (FLOOD WARNING)

Using the Internet
http://www.bom.gov.au/



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Weather and Warnings
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Rain Rate
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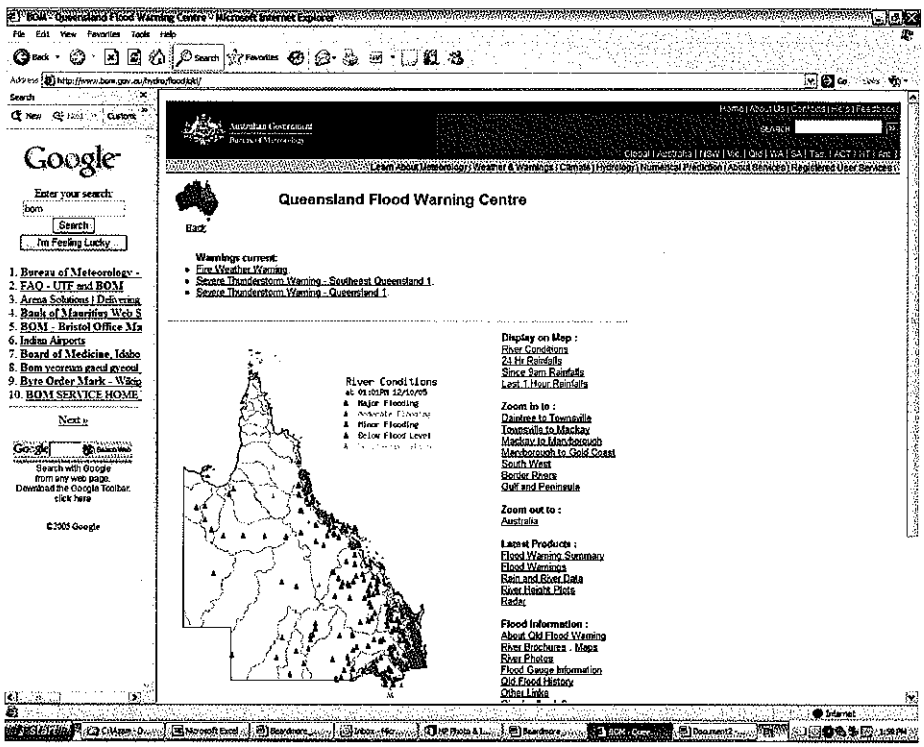
EST 11:44am Wednesday
CST 11:14am Wednesday
WST 09:44am Wednesday


Google
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Queensland Flood Warning Centre
Warnings current:
Fire Weather Warning
Severe Thunderstorm Warning - Southeast Queensland 1
Severe Thunderstorm Warning - Queensland 1
River Conditions
Major Flooding
River Flooding
Below Flood Level
Display on Map :
River Conditions
24 Hr Rainfalls
Since 9am Rainfalls
Last 1 Hour Rainfalls
Zoom in to :
Daintree to Townsville
Townsville to Mackay
Mackay to Maryborough
Maryborough to Gold Coast
South West
Border Rivers
Gulf and Peninsula
Zoom out to :
Australia
Latest Products :
Flood Warning Summary
Flood Warnings
Rain and River Data
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Radar
Flood Information :
About Qld Flood Warning
River Brochures - Maps
River Photos
Flood Gauge Information
Qld Flood History
Other Links

Dam Break Analysis

The contents of this Section (11)
have been taken from the Report

Callide Dam
Callide Creek AMTD 80.1km
Dam Break Analysis

by Water Resources – DPI October 1994

APPENDIX 6

5.0 HYDRAULIC ANALYSIS RESULTS

5.1 Accuracy of Results

The results given in this report are an estimate of the maximum flood levels that would result from a failure of Callide Dam.

The study does not intend to predict accurately the flood levels, flows and timing of the flood wave caused by failure of the dam but intends to given an indication of the maximum flood levels that would result from a probable worst case failure of the dams embankment.

Due to the inherent difficulties in attempting to predict the passage of the dam break flood wave and the accuracy of the cross section data, the predicted peak flood levels are approximate only. The uncertainties associated ith this type of analysis include:

1. Accurately predicting the dam breach outflow hydrograph.

2. Extrapolation of existing flood data to predict a much larger, deeper and faster flood. Also, the lack of calibration data that would more accurately predict water levels at the relevant cross sections.

3. Short-circuiting of the much higher flows at loops in the river resulting in shorter effective flow distance.

4. Selecting channel cross sections that adequately represent a relatively long length of channel.

5. Predicting the effects of storage in the creeks on the flood wave.

6. Use of unsurveyed cross sectional data obtained from topographic maps with 20 metre contour intervals. The accuracy of the contours is plus or minus half a contour interval ie. 10 metres. The plans used were over twenty years old, leading to further uncertainty in the sections extracted.

5.2 Sunny Day Failure – Sudden Opening/Spillway Gate Removal

Figures 2 and 3 present discharge and stage hydrographs of:

1. Outflow from the dam, and
2. Flow at key locations in the system
    - Dawson Highway Bridge Crossing
    - Burnett Highway Bridge Crossing
    - Jambin township and Rail Crossing

The townships of Biloela (AMTD 69.3km) and Callide (AMTD 54.4km) are located downstream of the dam. The peak water levels produced by a PMF over-topping dam failure fall almost 6 and 2.5 metres under the elevations required to flood Biloela and Callide respectively. It was therefore not necessary to report the flood levels at these locations in the following results.

There were no appreciable inflows for the sunny day failure scenario, other than that to maintain the base flow. The maximum discharge from the breach was 3255 m^3/s which occurred 9 minutes after failure was initiated. The reservoir was effectively emptied 35.0 hours after the beginning of discharge.

The peak flowrate at the Dawson Highway Bridge Crossing was 2277 m^3/s at time 4.0 hours. The maximum water surface elevation was 170.35 m AHD at time 4.3 hours, which would not cause over-topping of the bridge deck.

The peak flowrate at the Burnett Highway Crossing was 1567 m^3/s at time 15.3 hours. A maximum water surface level of 141.32 m at time 15.5 hours was 1.32 above the deck. The crossing was submerged for a period of 21.0 hours, commencing 12.5 hours after the start of failure initiation. Maximum velocity at this point was 0.62 m/s.

At the Jambin Rail Crossing the peak discharge was 1493 m^3/s at 18.2 hours. The maximum water surface level of 132.94 m at 18.6 hours was 0.49 m above the deck level. The crossing was submerged for about 9.2 hours, commencing 16.2 hours after the start of gate outflow. A maximum velocity of 0.57 m/s was recorded at this point.

Figure 4 shows a longitudinal section of the study reach showing the maximum flood levels for the gate removal SDF scenario.

5.3 Sunny Dam Failure – Dam Embankment

Figures 5 and 6 present stage and discharge hydrographs for the same locations as listed in 5.2 above.

There was no appreciable inflow for the dam embankment failure scenario. Other than that to maintain the base flow. The maximum discharge from the breach was 27 278 m^3/s which occurred 1.73 hours after failure was initiated. The reservoir was effectively emptied 7 hours after the beginning of discharge.

The peak flowrate at the Dawson Highway Bridge Crossing was 19 300 m^3/s at 2.6 hours. The maximum water surface elevation was 174.73 m AHD at time 2.9 hours, which would cause over-topping of the bridge deck by 0.73 m. The bridge was flooded for an estimated 0.9 hours, commencing 2.5 hours after the start of breach formation. Maximum velocity on the flood plain was approximately 1.42 m/s.

The peak flowrate at the Burnett Highway Crossing was 5738 m^3/s at 9.6 hours. A maximum water surface level of 143.31 m at time 9.9 hours was 3.31 metres above the deck level. The crossing was flooded for a period of 15 hours, commencing 8.0 hours after the start of breach formation. Maximum velocity at this point was 0.91 m/s.

At the Jambin Rail Crossing a peak discharge of 5052 m^3/s at 11.8 hours. The maximum water surface level of 134.28 m at time 12.3 hours, was 2.28 metres above the deck level. The crossing was submerged for about 11.3 hours, commencing 10.2 hours after the start of breach formation. A maximum velocity of 0.81 m/s was recorded at this point in the reach.

Figure 7 shows a longitudinal section of the study reach showing the maximum flood levels for the sunny day failure – dam embankment scenario.

5.4 Six Hour PMF – No Dam Failure

Figures 8 and 9 present stage and discharge hydrographs for the same locations as listed in 5.2 above.

The dam embankment was over-topped for a period of 3.6 hours commencing 8.3 hours after the arrival of the first inflow. The water level in the dam reached a peak of 219.79 m AHD which resulted in a maximum over-topping of 0.56 metres. An attenuation of 20.3% was achieved by the passage of the flood wave through the dam. The maximum inflow was 9720 m^3/s at a time of 8.2 hours was reduced to a maximum discharge of 7751 m^3/s at 9.8 hours.

The peak flowrate at the Dawson Highway Bridge Crossing was 7388 m^3/s at 11.5 hours. The maximum water surface elevation was 172.53 m AHD at time 11.8 hours, which would not cause over-topping of the bridge deck.

The peak flowrate at the Burnett Highway Crossing was 6227 m^3/s at 18.7 hours. A maximum water surface level of 143.51 m at time 19.4 hours was 3.51 metres above the deck level. The crossing was flooded for a period of 22.8 hours, commencing 14.8 hours after the start of inflow. Maximum velocity at this point was 0.88 m/s.

At the Jambin Rail Crossing the peak discharge was 6010 m^3/s at 20.7 hours. The maximum water surface level of 132.68 m at time 21.0 hours was 2.68 metres above the deck level. The crossing was submerged for a period of 17.6 hours, commencing 17.3 hours after the star of inflow. A maximum velocity of 0.78 m/s was found at this point.

Figure 10 shows a longitudinal section of the study reach showing the maximum flood levels for the six hour PMF, no dam failure scenario.

5.5 Six Hour PMF – Dam Failure

Figures 11 and 12 present stage and discharge hydrographs for the same locations as listed in 5.2 above.

The dam embankment was over-topped for a period of 2.1 hours commencing 8.4 hours after the arrival of the first inflow. The water level in the dam reached a peak of 219.79 m AHD which resulted in maximum over-topping of the dam embankment by 0.56 metres. The maximum inflow was 9720 m^3/s at a time of 8.2 hours. The maximum discharge from the breach was 40198 m^3/swhich occurred 12 hours after failure was initiated. The reservoir was effectively emptied 24 hours after the beginning of discharge.

The peak flowrate at the Dawson Highway Bridge Crossing was 32 212 m^3/s at 12.5 hours. The maximum water surface elevation was 176.50 m AHD at time 12.6 hours, which would cause over-topping of the bridge deck by 2.5 metres. The railway crossing was impassable for 2/1 hours, starting 11.7 hours after the first inflow.

The peak flowrate at the Burnett Highway Crossing was 15 225 m^3/s at 17.3 hours. A maximum water surface level of 145.60 m at time 17.5 hours was 5.60 metres above the deck. The crossing was submerged for a period of 20.1 hours, commencing 14.9 hours after the start of inflow. Maximum velocity at this point was 1.15 m/s.

At the Jambin Rail Crossing the peak discharge was 13 660 m^3/s at 18.9 hours. The maximum water surface level of 136.54 m at time 19.4 hours was 4.54 metres above the deck. The crossing was submerged for a period of 15.6 hours, commencing 16.9 hours after the start of inflow. A maximum velocity of 1.03 m/s was recorded at this point.

Figure 13 shows a longitudinal section of the study reach showing the maximum flood levels for the six hour PMF, dam embankment failure scenario.

5.6 Six Hour IFF – No Dam Failure

Figures 14 and 15 present stage and discharge hydrographs for the same locations as listed in 5.2 above.

An attenuation of 28.5% was achieved by the passage of the flood wave through the dam. The maximum inflow of 8359 m^3/s at a time of 8.2 hours was reduced to a maximum discharge of 5978 m^3/s at 10.4 hours.

The peak flowrate at the Dawson Highway Bridge Crossing was 5 913 m^3/s at 12.1 hours. The maximum water surface elevation was 172.1 m AHD at time 12.1 hours, which did not cause over-topping of the bridge deck.

The peak flowrate at the Burnett Highway Crossing was 5 367 m^3/s at 19 hours. A maximum water surface level of 143.22 m at time 19.4 hours was 3.22 metres above the deck. The crossing was submerged for a period of 22 hours, commencing 15.1 hours after the start of inflow. Maximum velocity at this point was about 0.85 m/s.

At the Jambin Rail Crossing the peak discharge was 5 189 m^3/s at 21.1 hours. The maximum water surface level of 134.39 m at 21.5 hours was 2.39 metres above the deck. The crossing was submerged for a period of 16.5 hours, commencing 17.8 hours after the start of inflow. A maximum velocity of 0.75 m/s was found at this point.

Figure 16 shows a longitudinal section of the study reach showing the maximum flood levels for the IFF, no dam failure scenario.

5.7 Summary of Hydraulic Analyses

Table 5.1: Summary of Hydraulic Analyses
Sunny Day failure Cases

	SDF Sudden Gate Opening	SDF Embankment Failure
Callide Dam		
Peak Outflow (m^3/s)	3255	27 278
Time Peak Outflow (h)	0.15	1.73
Dawson Highway (EL: 174.00 m AHD)		
Peak Flow (m^3/s)	2277	19 300
Peak Level (m AHD)	170.35	174.73
Time of Peak Level (h)	4.3	2.9
Time of Peak Flow (h)	4.0	2.6
Max Velocity (m/s)	0.73	1.42
Time Flooding Starts	-	2.5
Time Flooding Ceases	-	3.4
Burnett Highway (EL: 140.00 m AHD)		
Peak Flow (m^3/s)	1567	5738
Peak Level (m AHD)	141.32	143.31
Time of Peak Level (h)	15.5	9.9
Time of Peak Flow (h)	15.3	9.6
Max Velocity (m/s)	0.62	0.91
Time Flooding Starts	12.5	8.0
Time Flooding Ceases	33.5	23.0
Jambin (EL: 132.00 m AHD)		
Peak Flow (m^3/s)	1493	5052
Peak Level (m AHD)	132.49	134.28
Time of Peak Level (h)	18.6	12.3
Time of Peak Flow (h)	18.2	11.8
Max Velocity (m/s)	0.57	0.81
Time Flooding Starts	16.2	10.2
Time Flooding Ceases	25.4	21.5

Table 5.2 : Summary of Hydraulic Analyses
Probable Maximum Flood and Imminent Failure Cases

	PMF No Failure	PMF Dam Failure	IFF No Failure
Callide Dam			
Peak Inflow (m^3/s)	9720	9720	8359
Peak Outflow (m^3/s)	7751	40198	5978
Time Peak Inflow (h)	8.2	8.2	8.2
Time Peak Outflow (h)	9.8	12.0	10.4
Dawson Highway (EL : 174.00 m AHD)			
Peak Flow (m^3/s)	7388	32 212	5913
Peak Level (m AHD)	172.53	176.50	172.1
Time of Peak Level (h)	11.8	12.6	12.1
Time of Peak Flow (h)	11.5	12.5	12.1
Max Velocity (m/s)	0.91	1.56	0.91
Time Flooding Starts	-	11.7	-
Time Flooding Ceases	-	13.8	-
Burnett Highway (EL : 140.00 m AHD)			
Peak Flow (m^3/s)	6227	15 225	5367
Peak Level (m AHD)	143.51	145.60	143.22
Time of Peak Level (h)	19.4	17.5	19.4
Time of Peak Flow (h)	18.7	17.3	19.0
Max Velocity (m/s)	0.88	1.15	0.85
Time Flooding Starts	14.8	14.9	15.1
Time Flooding Ceases	37.6	35.0	37.1
Jambin (EL : 132.00 m AHD)			
Peak Flow (m^3/s)	6010	13 660	5189
Peak Level (m AHD)	134.68	136.54	134.39
Time of Peak Level (h)	21.0	19.4	21.5
Time of Peak Flow (h)	20.7	18.9	21.1
Max Velocity (m/s)	0.78	1.03	0.75
Time Flooding Starts	17.3	16.9	17.8
Time Flooding Ceases	34.9	32.5	34.3

FIG. 1 INFLOW HYDROGRAPHS FOR CALLIDE DAM

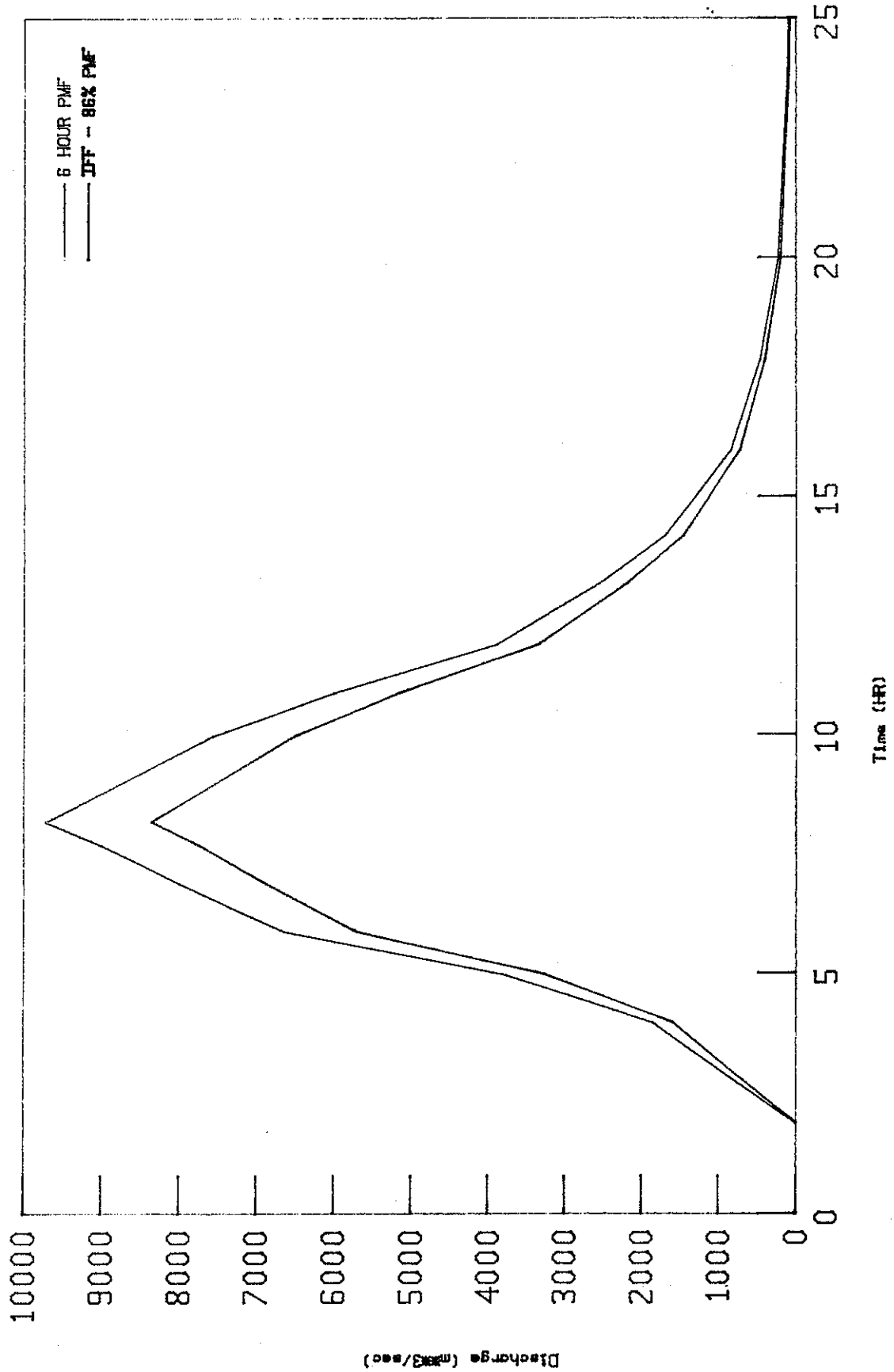


FIG. 2 DISCHARGE HYDROGRAPHS FOR SDF GATE REMOVAL

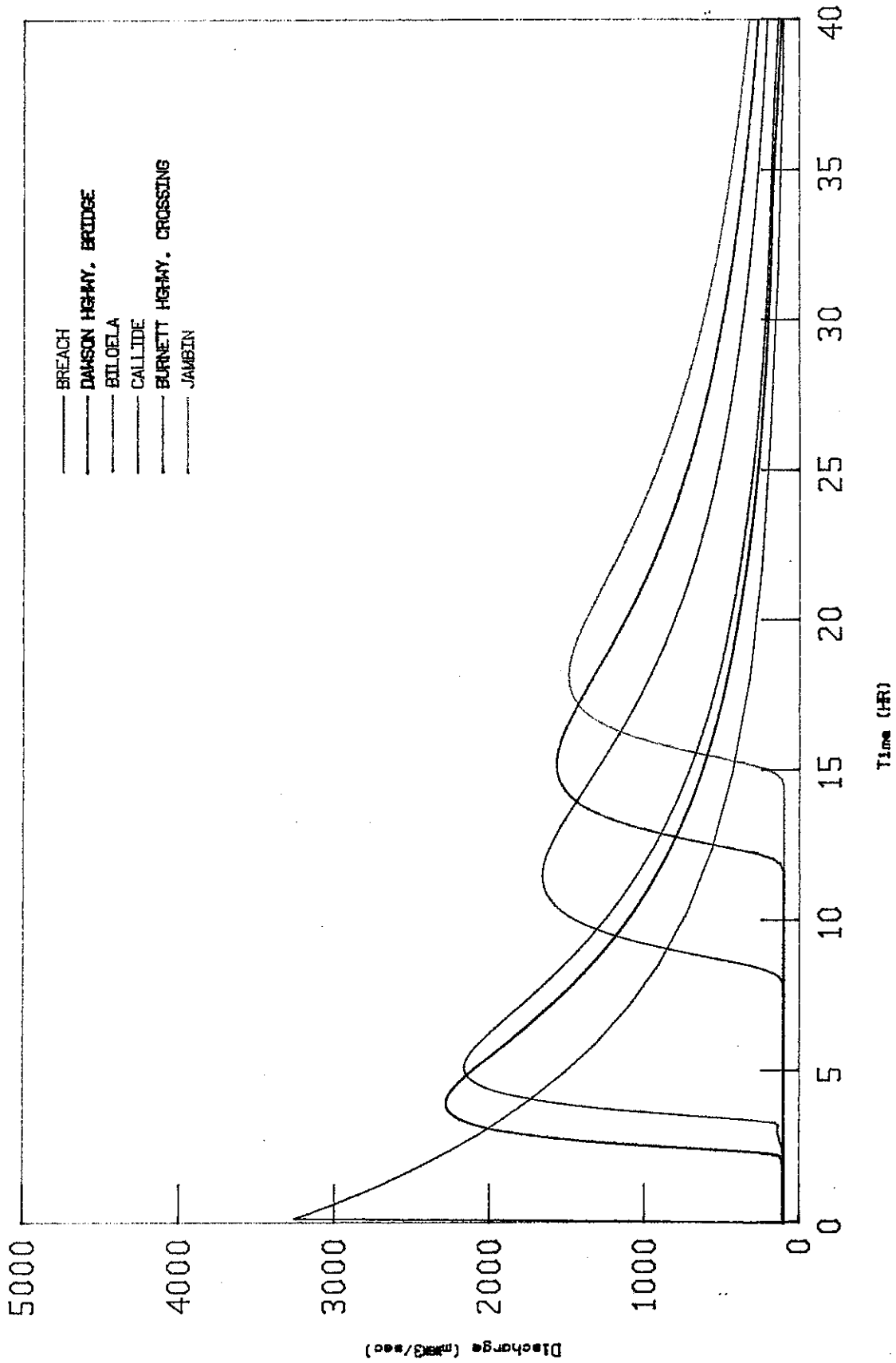


FIG. 3 STAGE HYDROGRAPHS FOR SDF GATE REMOVAL

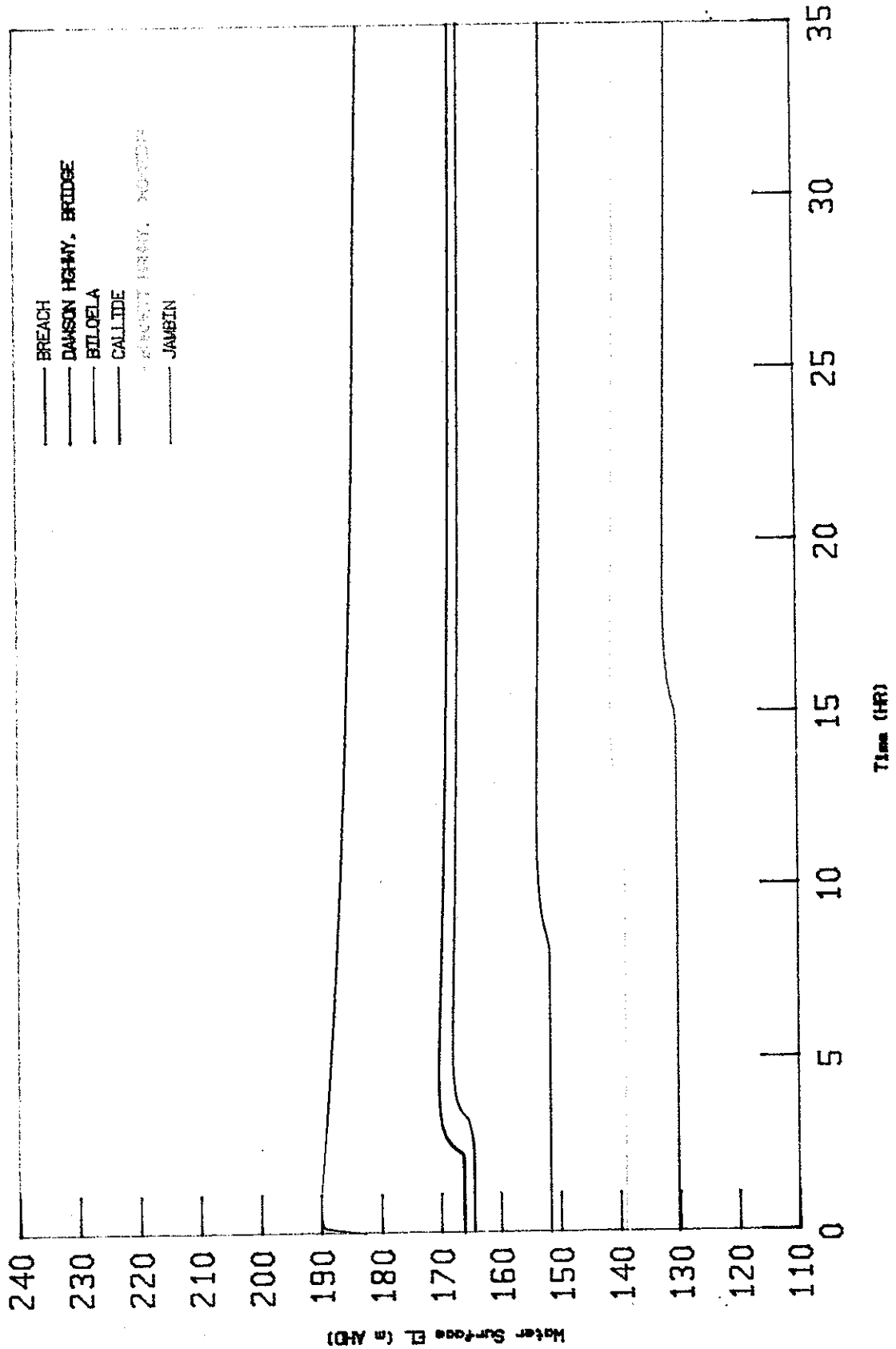


FIG. 4 LONGITUDINAL SECTION FOR SDF GATE REMOVAL

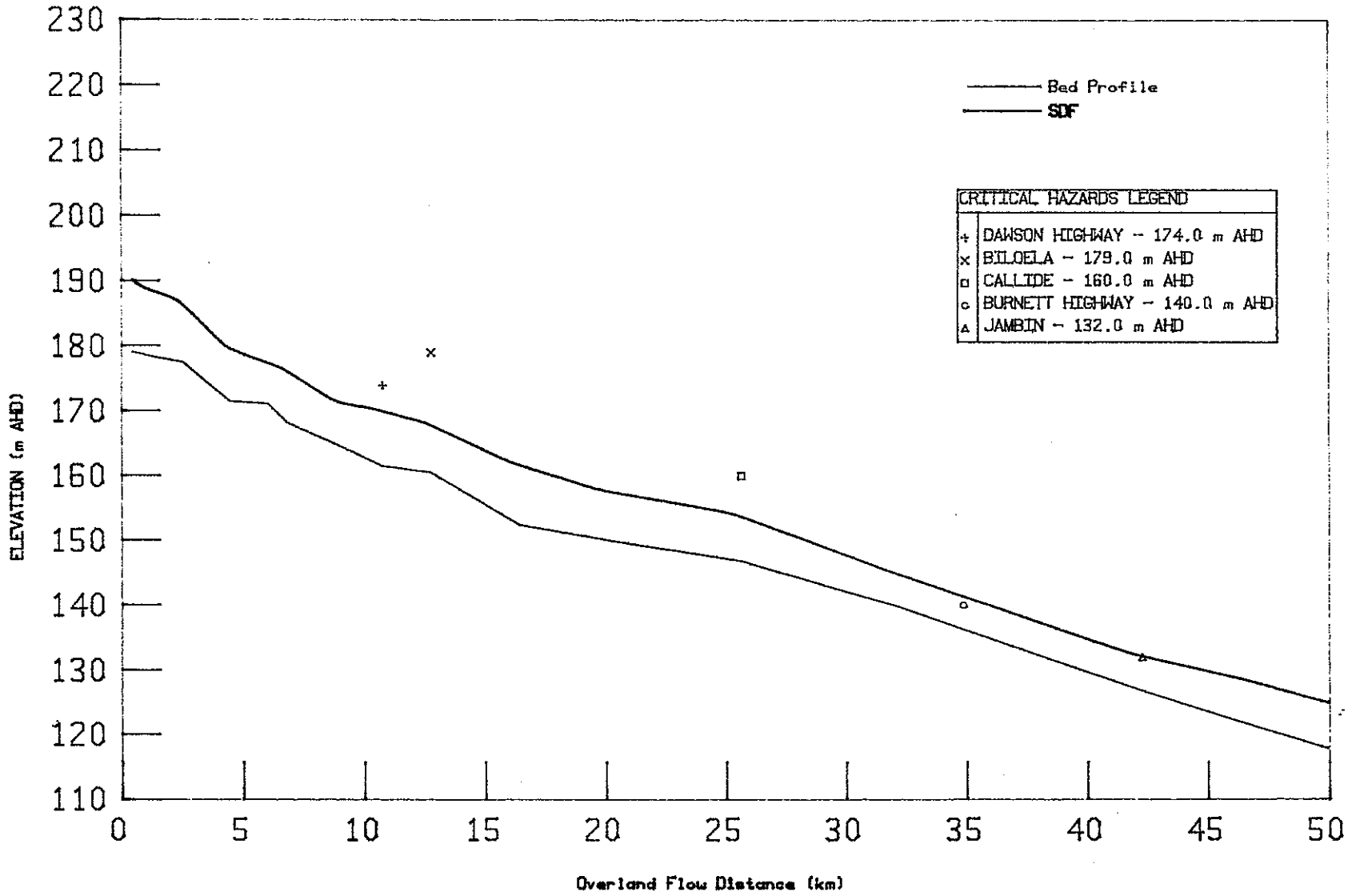


FIG. 5 DISCHARGE H/GRAPHS FOR SDI MAIN EMBANKMENT FAILURE

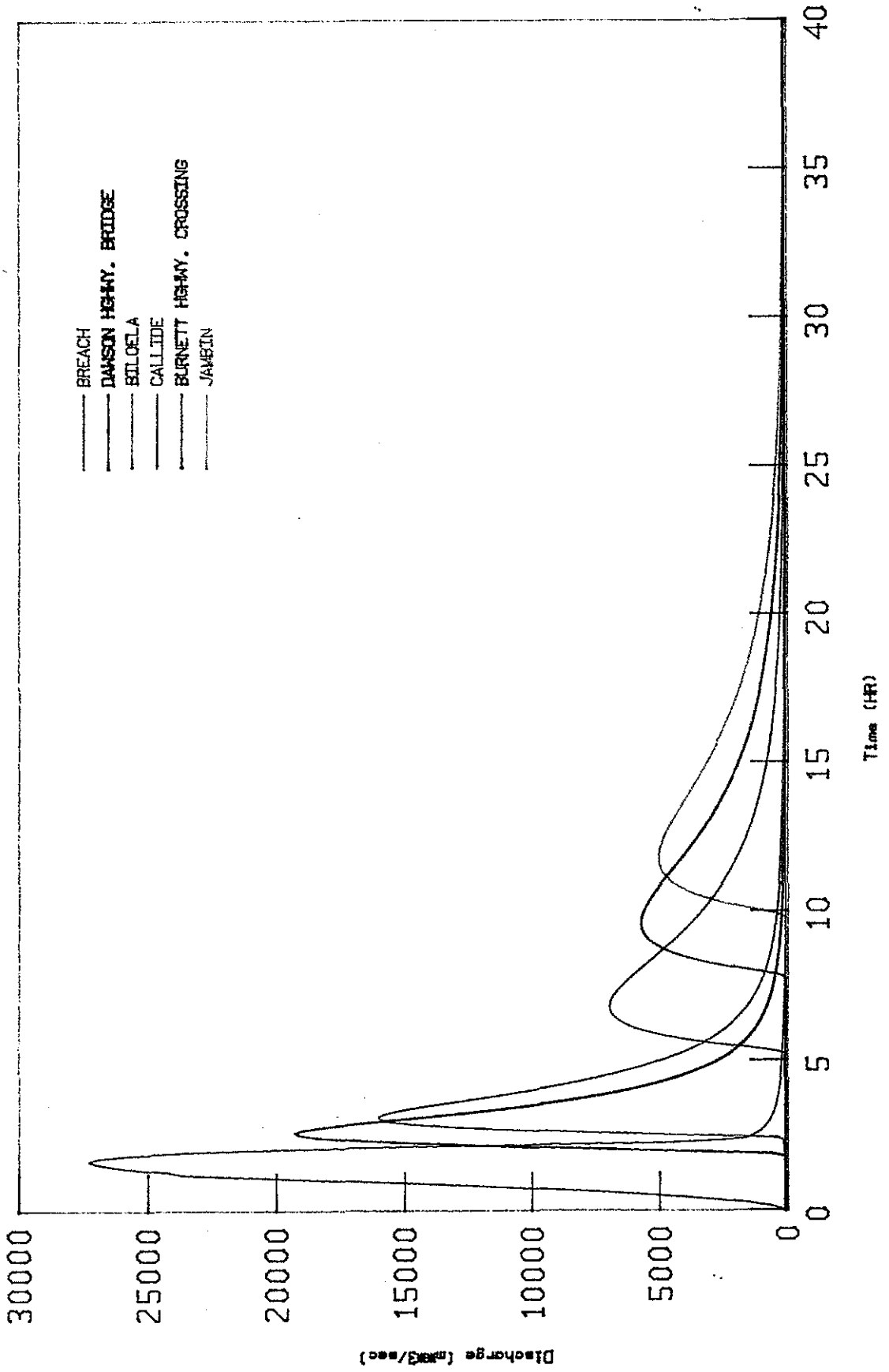


FIG. 6 STAGE HYDROGRAPHS FOR SDF MAIN EMBANKMENT FAILURE

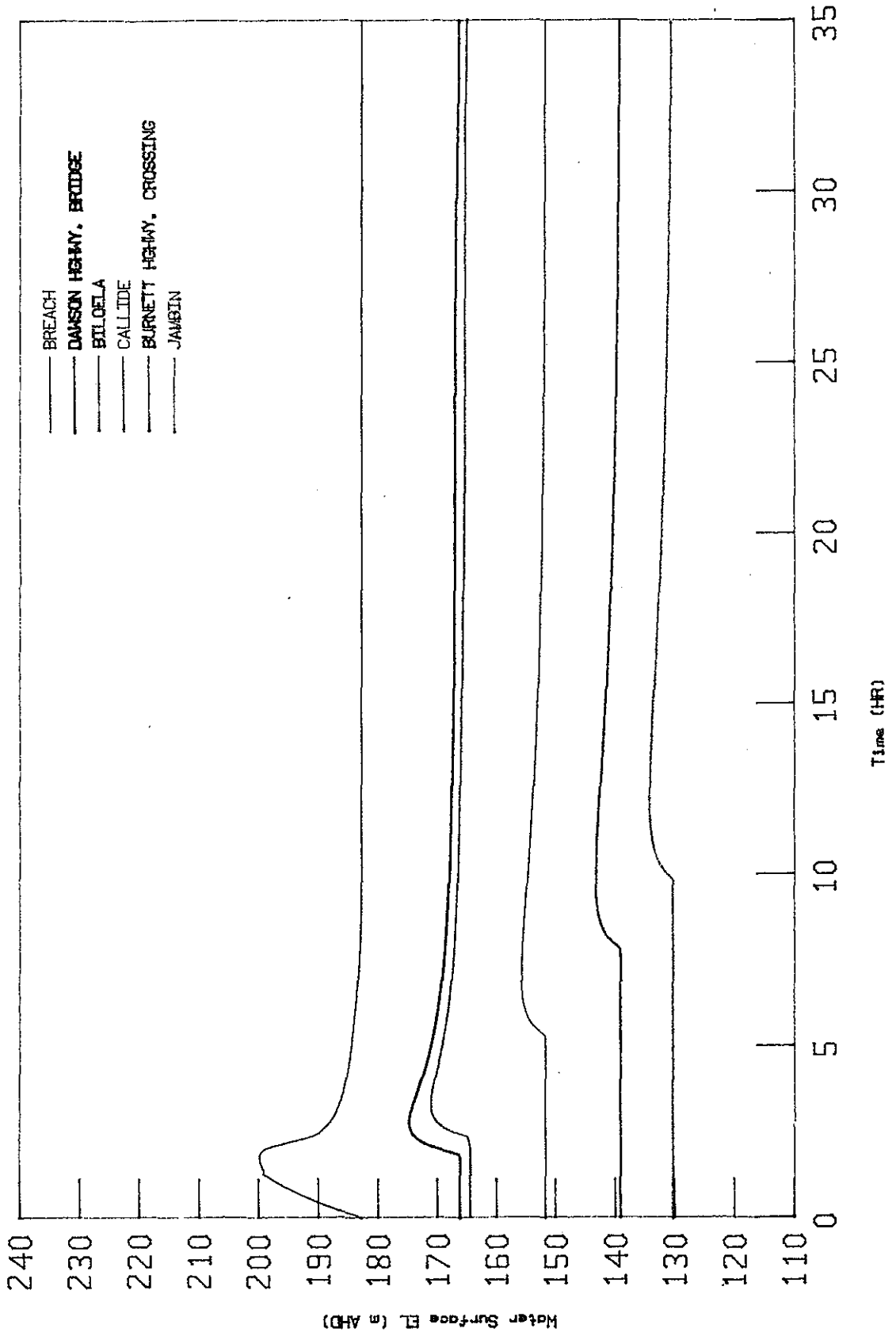


FIG. 7 LONGITUDINAL SECTION FOR SDF MAIN EMBANKMENT FAILUR

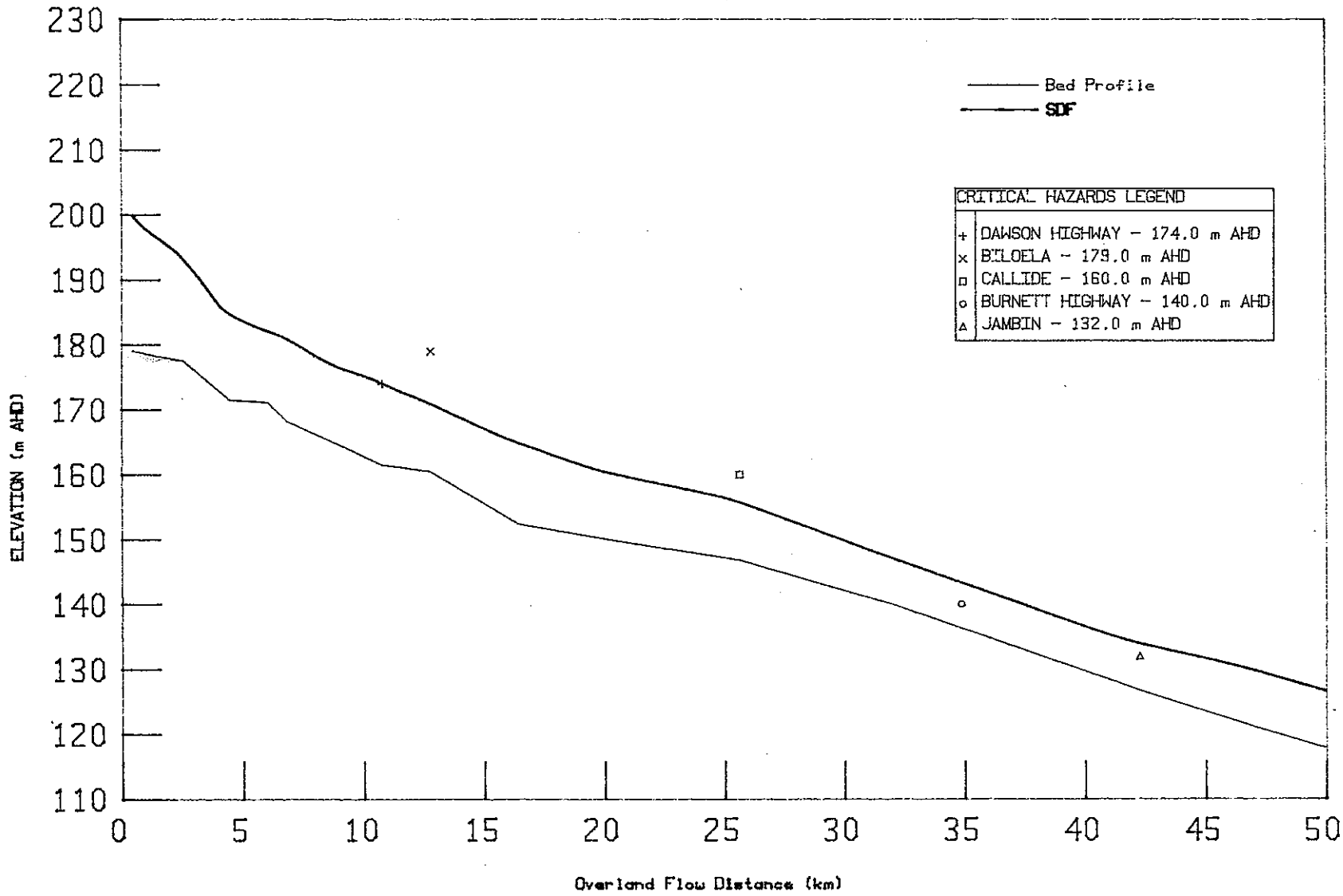
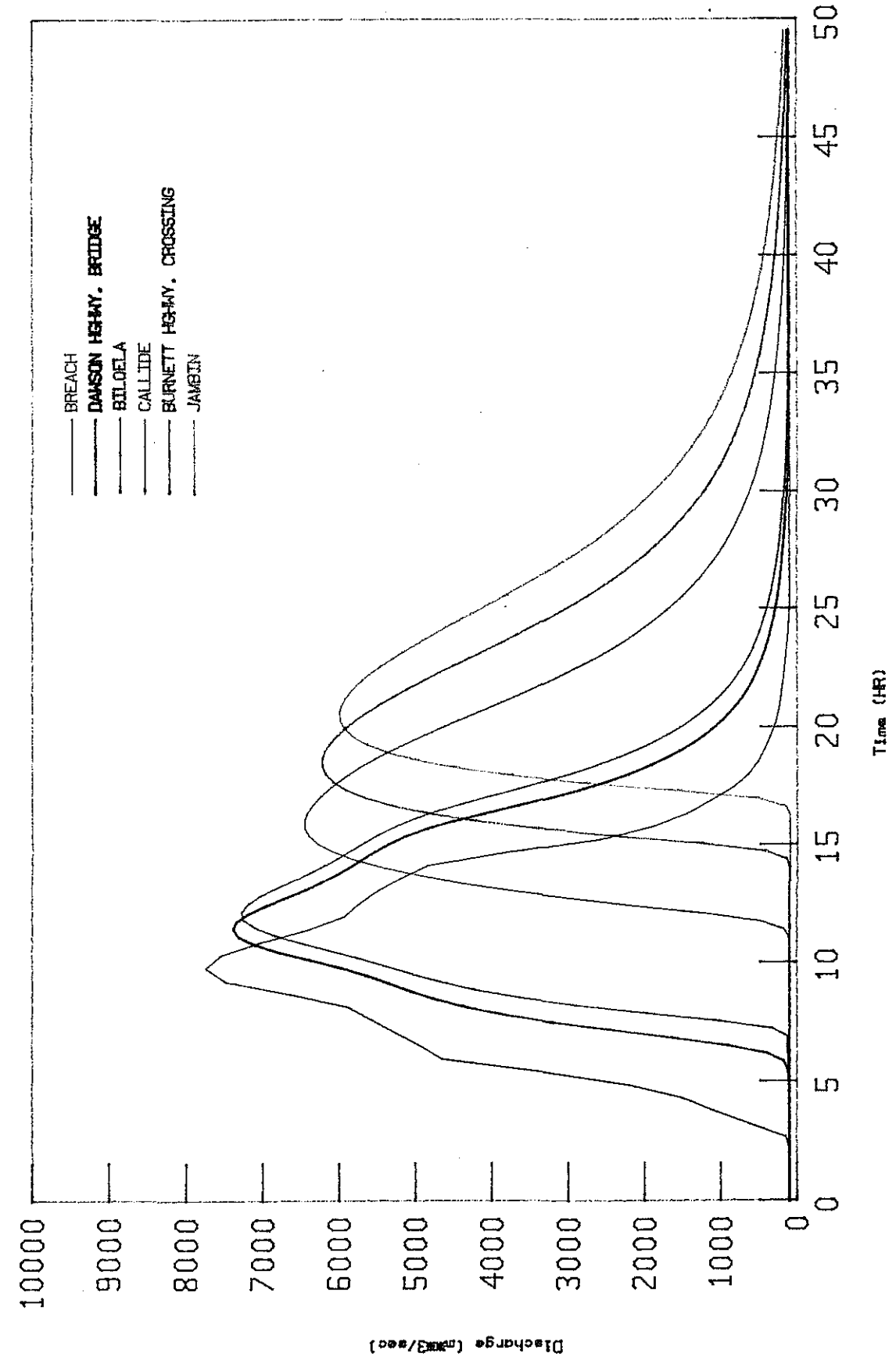


FIG 8 DISCHARGE HYDROGRAPHS FOR PMF NO DAM FAILURE



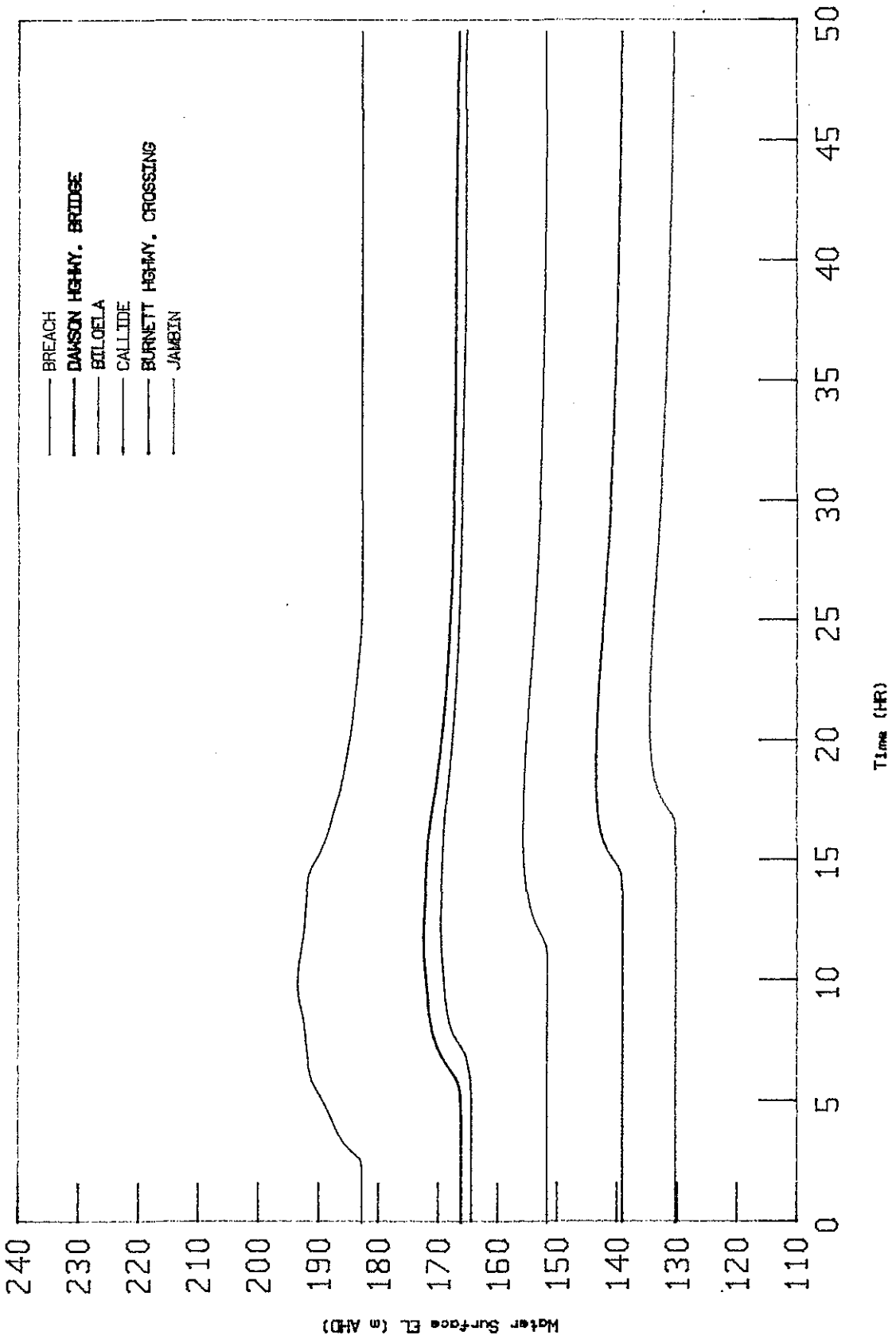


FIG. 9 STAGE HYDROGRAPHS FOR PMF NO DAM FAILURE

FIG. 10 LONGITUDINAL SECTION FOR PMF NO DAM FAILURE

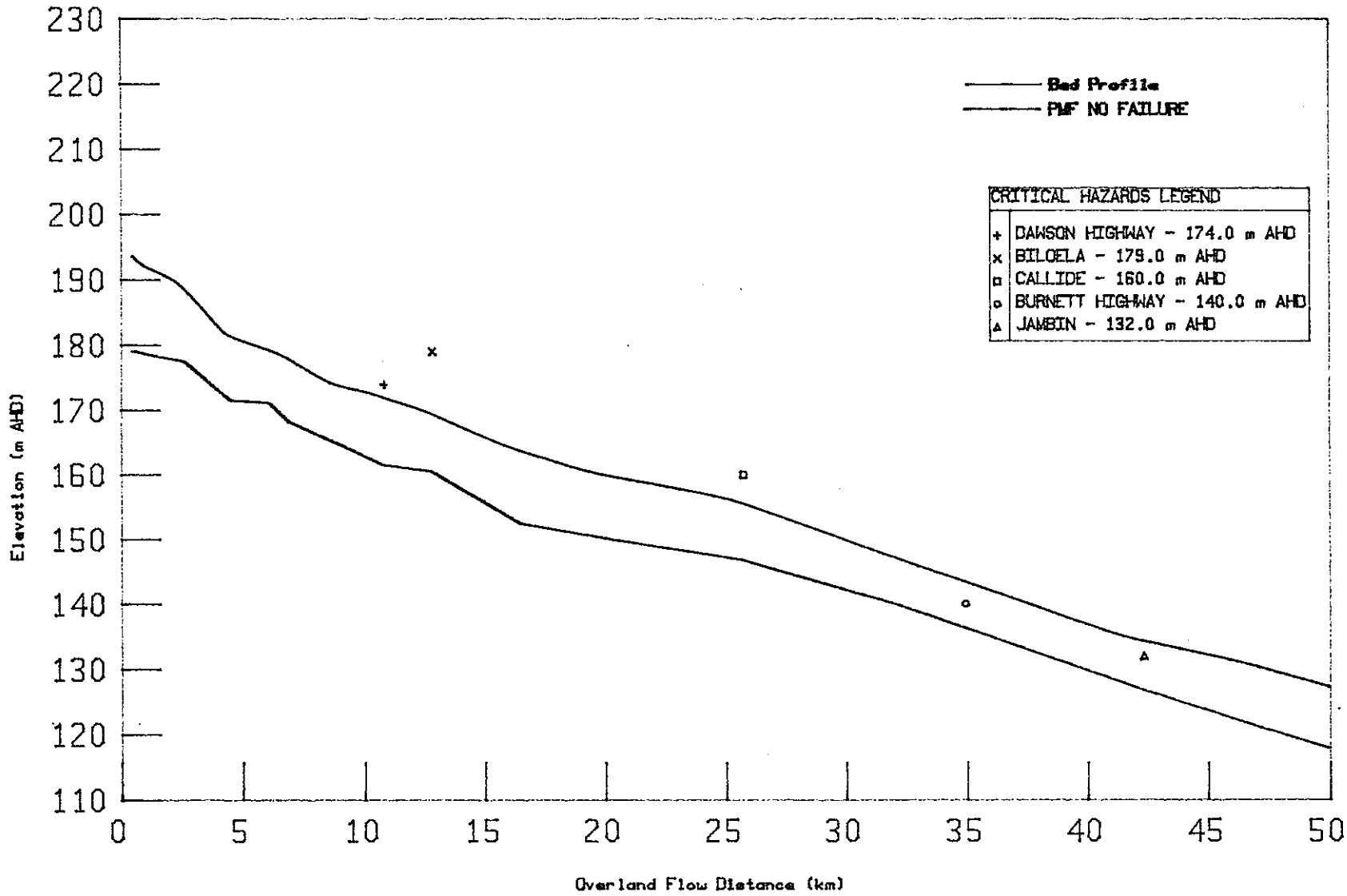


FIG. 11 DISCHARGE HYDROGRAPHS FOR PMF FAILURE

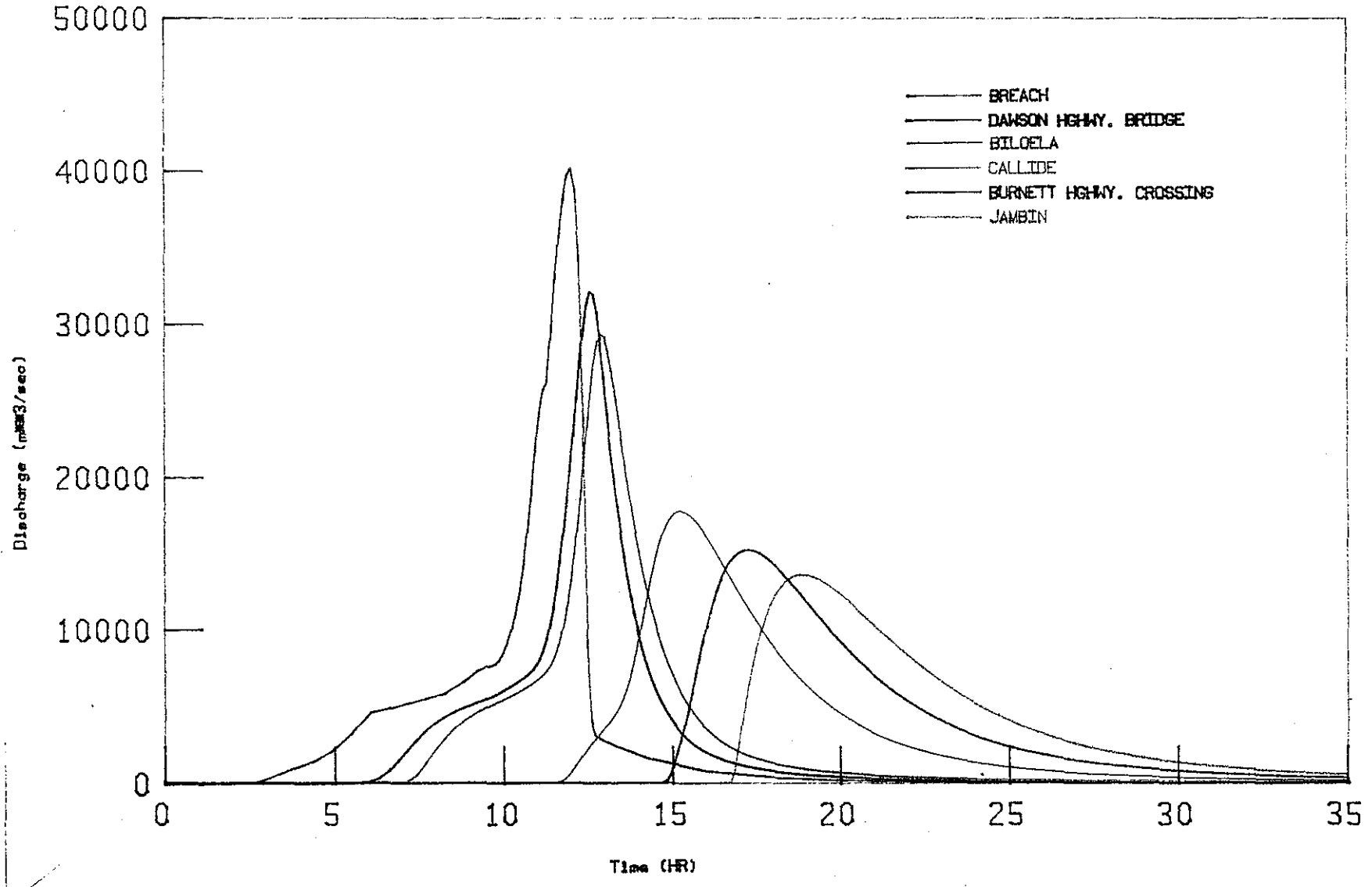


FIG. 12 STAGE HYDROGRAPHS FOR PMF FAILURE

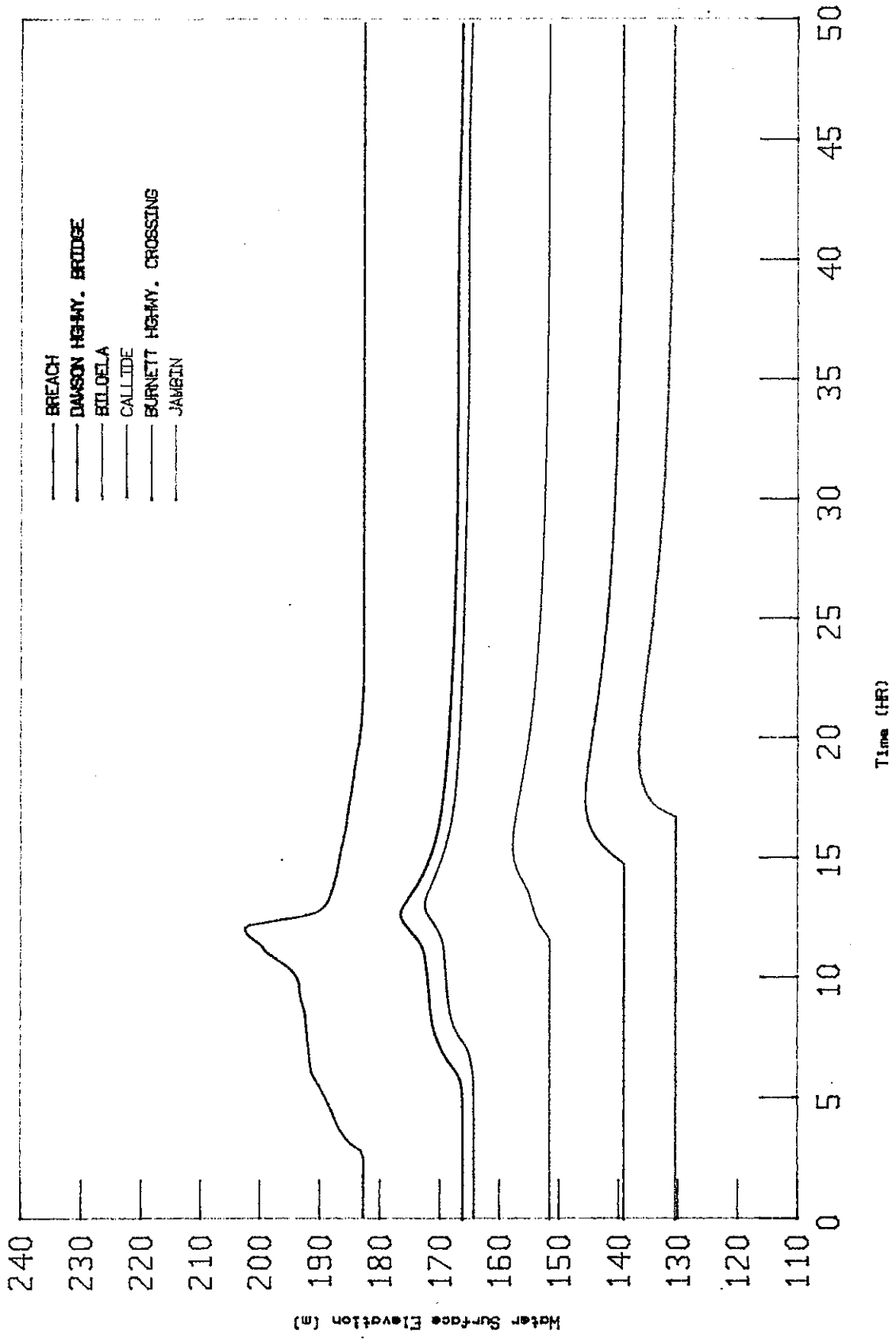


FIG. 13 LONGITUDINAL SECTION FOR PMF FAILURE

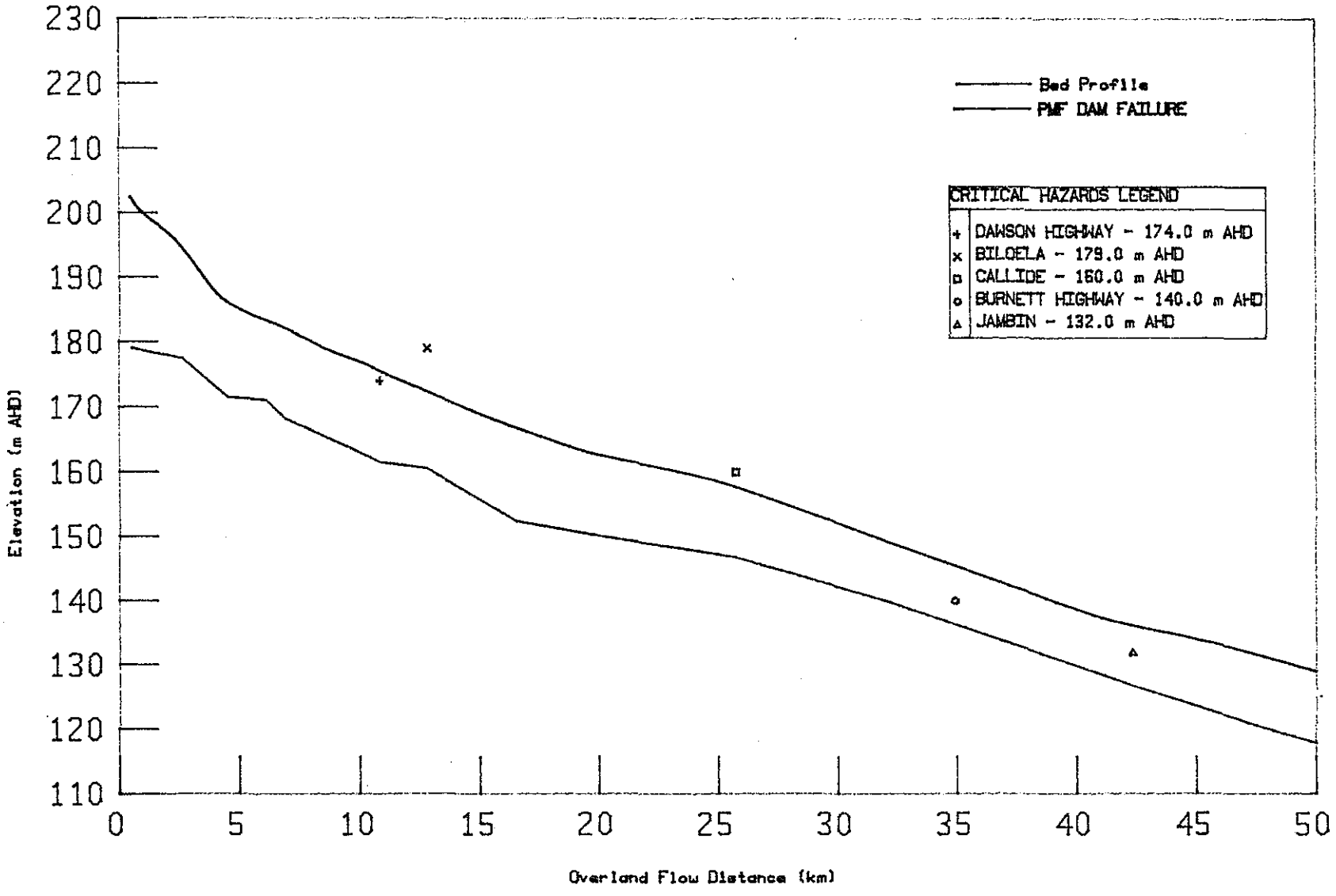


FIG. 14 DISCHARGE HYDROGRAPHS FOR IFF NO DAM FAILURE

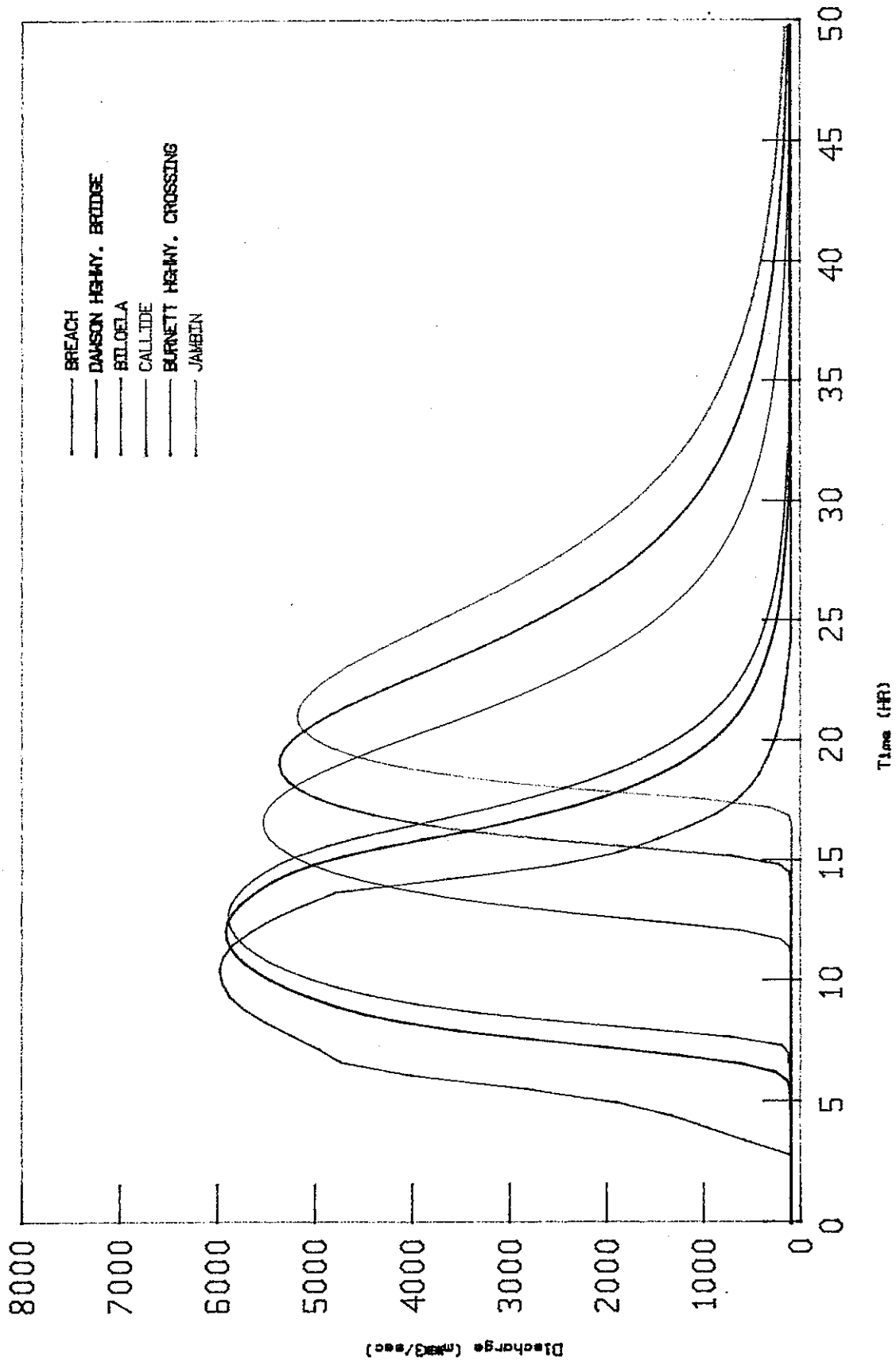


FIG. 15 STAGE HYDROGRAPHS FOR IFT NO DAM FAILURE

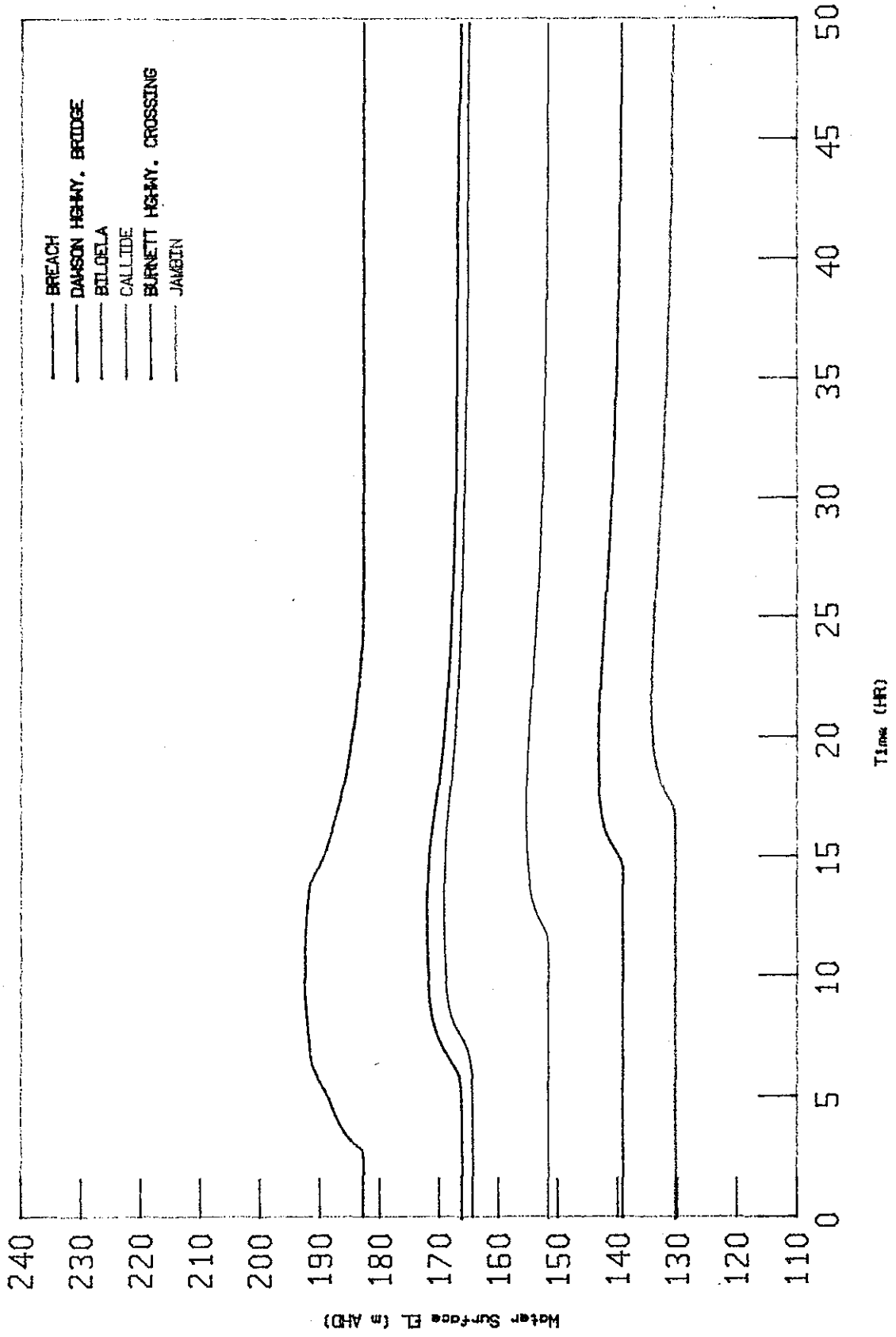


FIG. 16 LONGITUDINAL SECTION FOR IFF NO DAM FAILURE

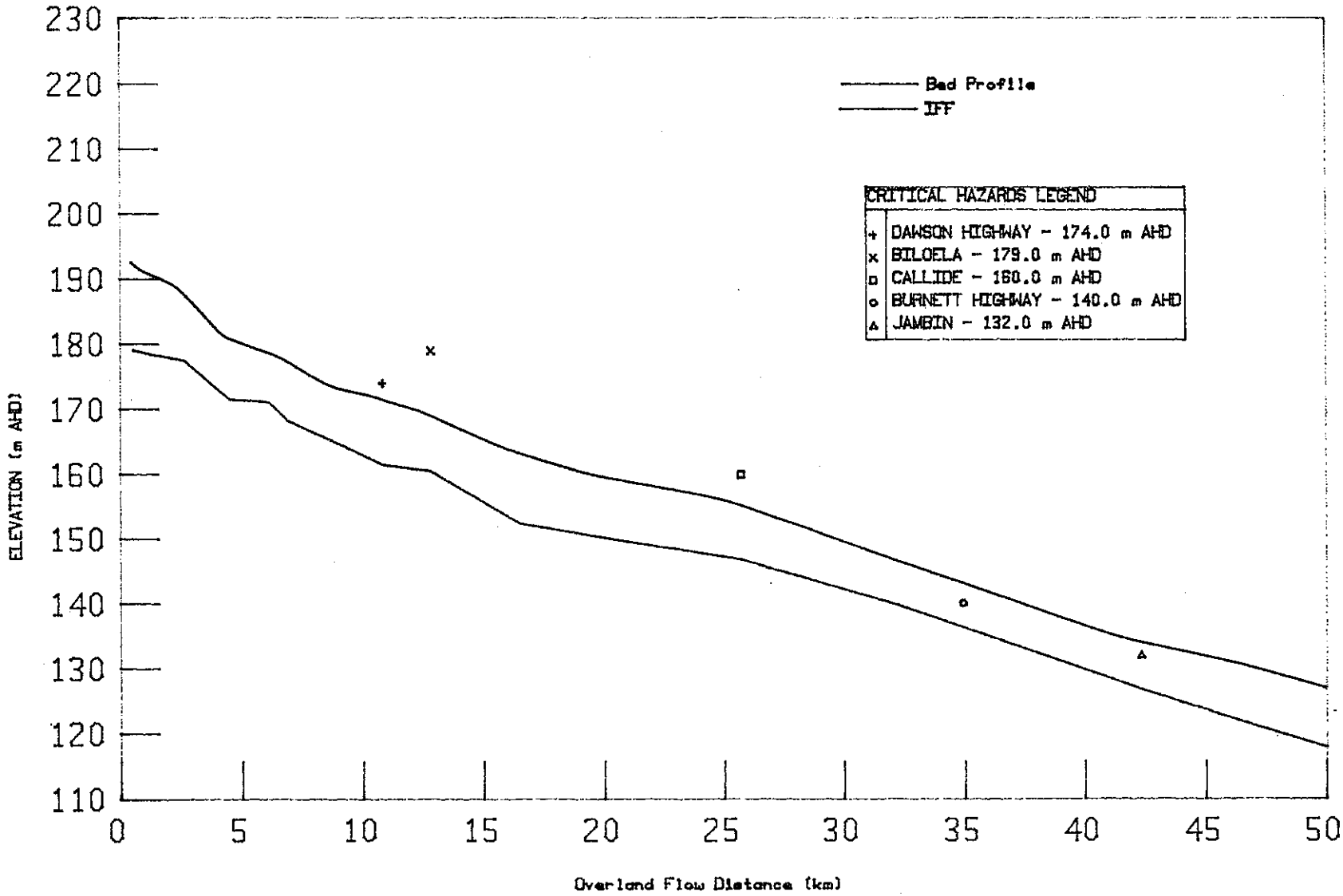
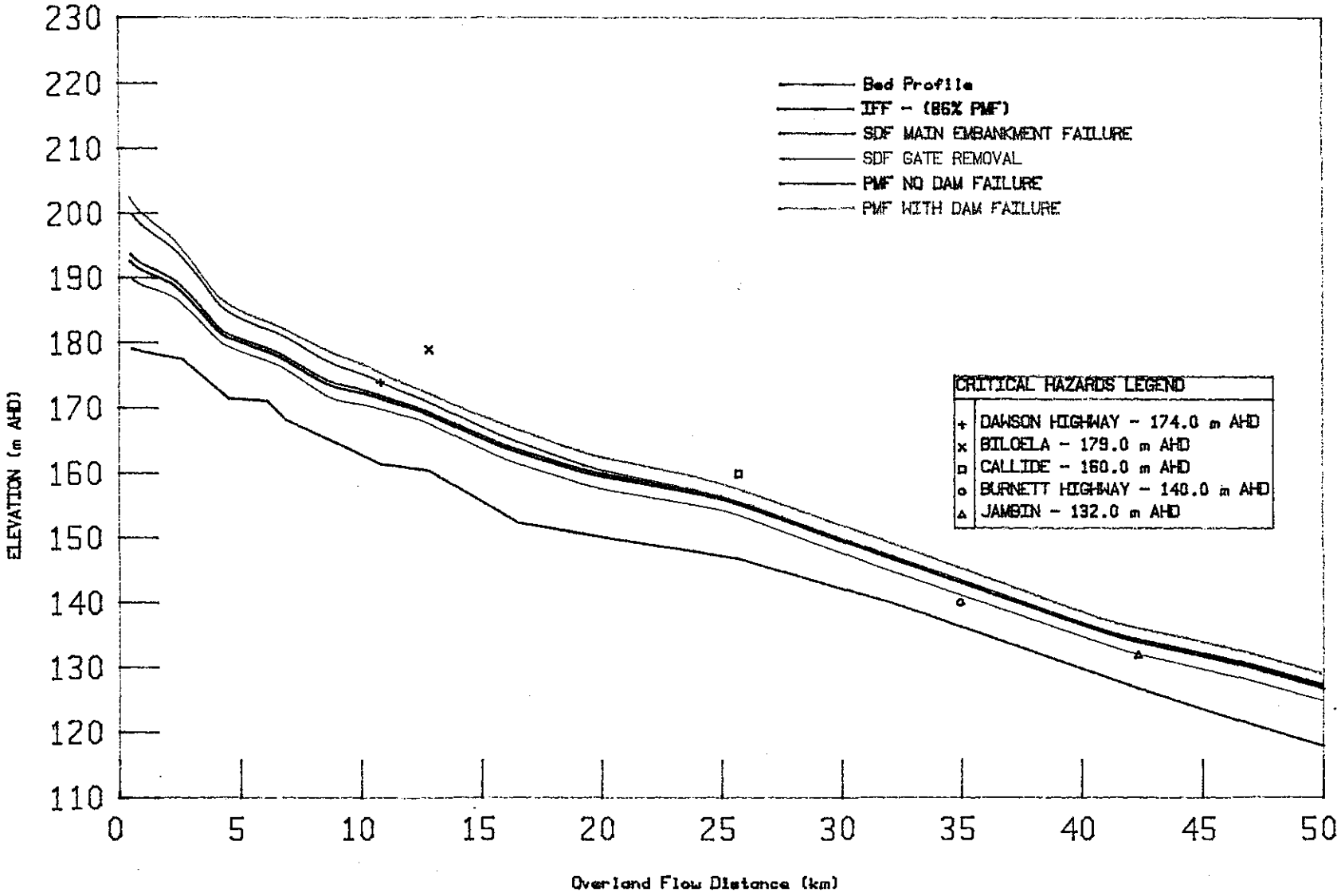


Fig. 17 LONGITUDINAL SECTION - COMPARISON OF SCENARIOS



Inundation Maps

- **Map A2 : Sunny Day Failure – Main Embankment**
- **Map A3 : PMF – No Dam failure**
- **Map A4 : PMF – Dam Embankment Failure**
- **Map A5 : IFF – No Dam Failure**

Inundation Maps

- **Map A2 : SDF - Dam Embankment Failure**
- **Map A3 : PMF - No Dam Failure**
- **Map A4 : PMF - Dam Embankment Failure**
- **Map A5 : IFF - No Dam Failure**

DS-001 PREPARATION AND USE OF AN EMERGENCY ACTION PLAN

DOCUMENT CONTROL

CONTROLLED COPY NUMBER:

REVISION STATUS:

Revision Number	Revision Description	Revision Date
1	Initial issue	15 Jun 92
2	Changed Divisional Name and Management Structure (All Pages)	16 Oct 92
3	Organisational Restructuring	Feb 93
4	Change to State Water Projects Structure	June 98
5	Change to SunWater structure	Oct 00

AUTHORISATION:

Approved by: ..... Date: .....
(Chief Executive Officer, SW)

Responsible Officer Director, Asset Management

CONTROLLED COPY DISTRIBUTION

Copy Number	Position	Location
1	Regional Business Manager, SW, North	Ayr
2	Regional Business Manager, SW, Central	Rockhampton
3	Regional Business Manager, SW, South	Toowoomba
4	Director, Asset Management	Central Office, SW
5	General Manager, O&M Services	Central Office, SW

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PROCEDURE

1.0 PURPOSE

To pre-plan the coordination of necessary actions by SunWater, in order to provide timely notification to Police, local Counter Disaster Groups and affected persons in the event of a Spillway discharge induced Flood, or of an Emergency condition developing at a SunWater Storage, or of a condition which could develop into an Emergency.

2.0 SCOPE

This Procedure applies to nominated Storage's controlled by SunWater, which could threaten life or property.

3.0 REFERENCES

Standing Operating Procedures
QS 001 - Issue and review of Controlled Documentation
Workplace Health and Safety Act 1995
QAX 001 - Preparation of Procedures

4.0 DEFINITIONS

Emergency:
An Emergency is an acute situation which endangers life or property.

Operations OiC, Storage:
An Officer appointed in charge of a particular Storage, whether that Officer is located at the Storage or some other place.

5.0 ABBREVIATIONS

OiC	Officer in Charge
OM	Operations Manager
DAM	Director, Asset Management
CEO	Chief Executive Officer, SunWater
SW	SunWater
WIC	Water Industry Compliance
DDC	Disaster District Coordinator
RBM	Regional Business Manager

6.0 PERSONNEL AFFECTED AND RESPONSIBILITIES

6.1 Operations Officer in Charge, Storage shall:

- Follow the Emergency Action Plan in times of flooding or Emergency
- Make contact with all telephone numbers, facsimile numbers, radio frequencies and call signs on the Notification List of the Emergency Action Plan before the 1st of May and the 1st of November each year
- Notify the Operations Manager in writing of any changes to names and numbers on the Notification List in the EAP

6.2 Standby Officers

- Evaluate conditions and implement the Emergency Action Plan as directed by Clause 7.3 of this Procedure DS 001

6.3 Operations Manager

- Nominate the Operations Officer in Charge, Storage
- Appoint a Relieving Officer during absence from duty of the Operations Officer in Charge, Storage
- Nominate the Standby Officers
- Ensure the Operations Officer in Charge, Storage, or Relieving Officer, and the Standby Officers are conversant with the Emergency Action Plan
- Notify the Director, Asset Management, and Regional Business Manager, of a Flood or Emergency situation. If the Director, Asset Management, cannot be contacted, notify the Chief Executive Officer, SunWater. Liaise with the Regional Adviser, Assets, as required
- Notify the Director, Asset Management, in writing of any changes to the Notification List in the EAP

6.4 Regional Adviser, Assets shall:

- Ensure the latest edition of a Controlled Copy of the Emergency Action Plan for each nominated Storage in the Region, is held by all persons listed on the Controlled Copy Distribution List
- Where necessary, ensure that Standby Officers who are not employees of SunWater, are signatories to a "Contract For Service"
- Review the Emergency Action Plan for each Storage in consultation with the Director, Asset Management, and relevant Operations Manager by November 1 of each year
- Liaise with the Operations Manager during a flood or Emergency Event

6.5 Director, Asset Management shall:

- Authorise the Emergency Action Plans for all Nominated Storage's controlled by SunWater
- Notify the Chief Executive Officer, SunWater, of an Emergency situation
- Liaise with the Chief Executive Officer, SunWater, during an Emergency Event
- On delegation from the Chief Executive Officer, SunWater, act for and on behalf of the Chief Executive Officer during an Emergency

6.6 Chief Executive Officer, SunWater:

- Shall authorise this Procedure
- Shall liaise with the Director, Asset Management, during an Emergency Event
- Shall direct the actions of SunWater Personnel during an Emergency Event, to protect life and property to the maximum extent considered possible under the prevailing conditions, and with the Resources available
- May delegate the authority to direct SunWater Personnel during an Event

7.0 ACTIONS

7.1 General

During an Emergency Event, the Operations Officer in Charge, Storage, shall report to and receive instructions from the Chief Executive Officer, SunWater, or the Chief Executive Officer's delegate, who may be either the Director, Asset Management, Regional Business Manager, Regional Adviser, Assets, or the Operations Manager. This delegation will be made by the Chief Executive Officer, SunWater, at the time of the Event and will apply only for the duration of that Event.

7.2 Safety of Personnel

In an Emergency Event, the Operations OiC Storage, shall take steps to ensure personal safety and the safety of other employees and the general public.

7.3 Standby Officers

The Operations Manager shall nominate at least one, but preferably two Standby Officers, one or both of whom shall stand in to assist the Operations OiC Storage, during an Emergency Event.

If circumstances demand, these Standby Officers shall implement the Emergency Action Plan in the absence, for whatever reason, of the Operations OiC Storage.

Standby Officers may be employees of SunWater, or a private Resident who lives nearby.

A Standby Officer who is not presently employed by SunWater will need to be engaged through a "Contract of Service".

In the likelihood of adverse weather or stream flow conditions, the Operations OiC Storage shall advise the Operations Manager and Standby Officers of an intended absence from the area and advise a point of contact.

The Operations OiC Storage, shall immediately notify the Operations Manager and Standby Officers when the Emergency Action Plan is being initiated.

If during adverse weather conditions the Standby officers have not been contacted by the Operations OiC Storage, they shall:

- Notify the Operations Manager
- Attempt to contact the Operations OiC Storage
- Initiate the Emergency Action Plan if neither the Operations Manager nor the Operations OiC Storage can be contacted

7.4 Storage Operators Logbook

The Storage Operators Logbook shall be a hard bound A4 ruled journal and shall be kept in a clean secure facility at the Dam.

Entries shall be written legibly, and be unedited. Errors shall be struck out and initialled. Entries should reflect the history of the Dam, and shall include records of:

- Maintenance of major items of the equipment used to operate the Dam
- Maintenance of Dam surveillance instrumentation and permanent survey marks and records
- All flood Events including a record of Communications and Actions
- All accidents and incidents involving Dam personnel and the Public
- Comments identifying problems and unusual events

7.5 Emergency Action Plan

At each nominated storage, the Operations OiC Storage and Standby Officers shall be in possession of a controlled copy of the Emergency Action Plan for that Storage.

Nominated Storage's are listed in Appendix I.

When an Emergency occurs or a potential problem is identified which could lead to an Emergency, the Operations OiC, Storage shall follow the Emergency Action Plan. In all cases, the Operations OiC, Storage shall notify the Operations Manager and Director, Asset Management, of the Emergency. If either cannot be contacted, notify the Chief Executive Officer, SunWater.

Typical Emergency or potential problem identification includes but is not limited to the examples given in Appendix II.

Each Emergency Action Plan shall be contained in a hard covered A4 sized folder, colour coded red.

The Director, Asset Management, shall ensure that when an Emergency Action Plan is being prepared, all tasks and communication paths identified on the Flow Chart (Page 9 of this Procedure), are addressed.

The Emergency Action Plan shall consist of:

- A distribution list of controlled copies, and a document control sheet
- Table of Contents
- Notification List
- An area map showing access routes to the Storage during fair and adverse weather conditions, identifying travel times and distances
- A drawing of the Storage Catchment Area

- An Emergency Events and Actions List
- A Dam Break Analysis, including inundation maps
- Any other charts, rating tables, considered by the Director, Asset Management, to be necessary

The Notification List shall include business and after hours telephone, mobile phone, and facsimile numbers for all Personnel (including contact names where possible) and Agencies included in the Emergency Action Plan. Where applicable, radio frequencies and call signs shall be shown.

The Emergency Events and Actions List shall be a table of possible situations which initiate Emergency action. It shall give examples of when actions are to be taken by the Operations OiC, Storage, for known scenarios. It shall include Flood Events.

Appendix III is an example of an Emergency Events and Actions List.

7.6 Update of Notification List

By May 1 and November 1 of each year, the OiC, Storage shall check all numbers on the Notification List by personally making contact with all Personnel and Agencies using the telephone, and radio where applicable. Notify the Operations Manager in writing of any changes.

7.7 Status Reports

During an Emergency, the Operations OiC, Storage, shall maintain records and take photographs as required by the Emergency Action Plan.

All recordings shall be immediately faxed or phoned to the Operations Manager, and Director, Asset Management, for evaluation during an Emergency.

Additionally, the Operations OiC, Storage, shall provide status reports to the Police, Disaster District Coordinator, and the Executive Officer of the local Counter Disaster Organisation. These reports shall contain factual information such as water level, rainfall, and conditions at the Dam. Projections or opinions based on past experience of similar events or specialist knowledge may be given.

Requests for Event information **should** be referred to the Counter Disaster Authorities.

The release of information is coordinated by the Counter Disaster Authorities.

7.8 Emergency Event Report

After an Emergency Event, the Operations OiC, Storage, shall prepare an Emergency Event Report and forward copies to the Operations Manager, and the Director, Asset Management.

The Report format is contained in the EAP

8.0 RECORDS

Emergency Event Report

The Operations OiC, Storage, shall forward a copy of the Report using the format in the EAP, to the Operations Manager, and to the Director, Asset Management, after an Emergency Event.

A debriefing shall be held after each major Flood or Emergency Event, and should include the local Police, Counter Disaster Authorities, and Dam Operations Personnel

Emergency Action Plan

The Emergency Action Plan shall be distributed as follows, except where one only Standby Officer is available, or where additional Supervisors are involved

Copy Number	Held By
1.	Officer in Charge, Storage
2.	Standby Officer
3.	Standby Officer
4.	Operations Manager
5.	Regional Business Manager
6.	Director, Asset Management
7.	Director, Dam Safety (Water Supply), Water Industry Compliance
8.	Additional copies for Police and Counter Disaster Groups as required

9.0 COMMUNICATIONS

During an Emergency, open lines of communication shall be maintained between the Operations Officer in Charge at the Storage, the Operations Manager, the Director, Asset Management, and the Chief Executive Officer, SunWater.

Emergency lines of communication override normal management reporting. However, the Operations Manager should liaise with the Regional Business Manager, and the Regional Adviser, Assets, during an Emergency Event.

The primary means of communication shall be by telephone.

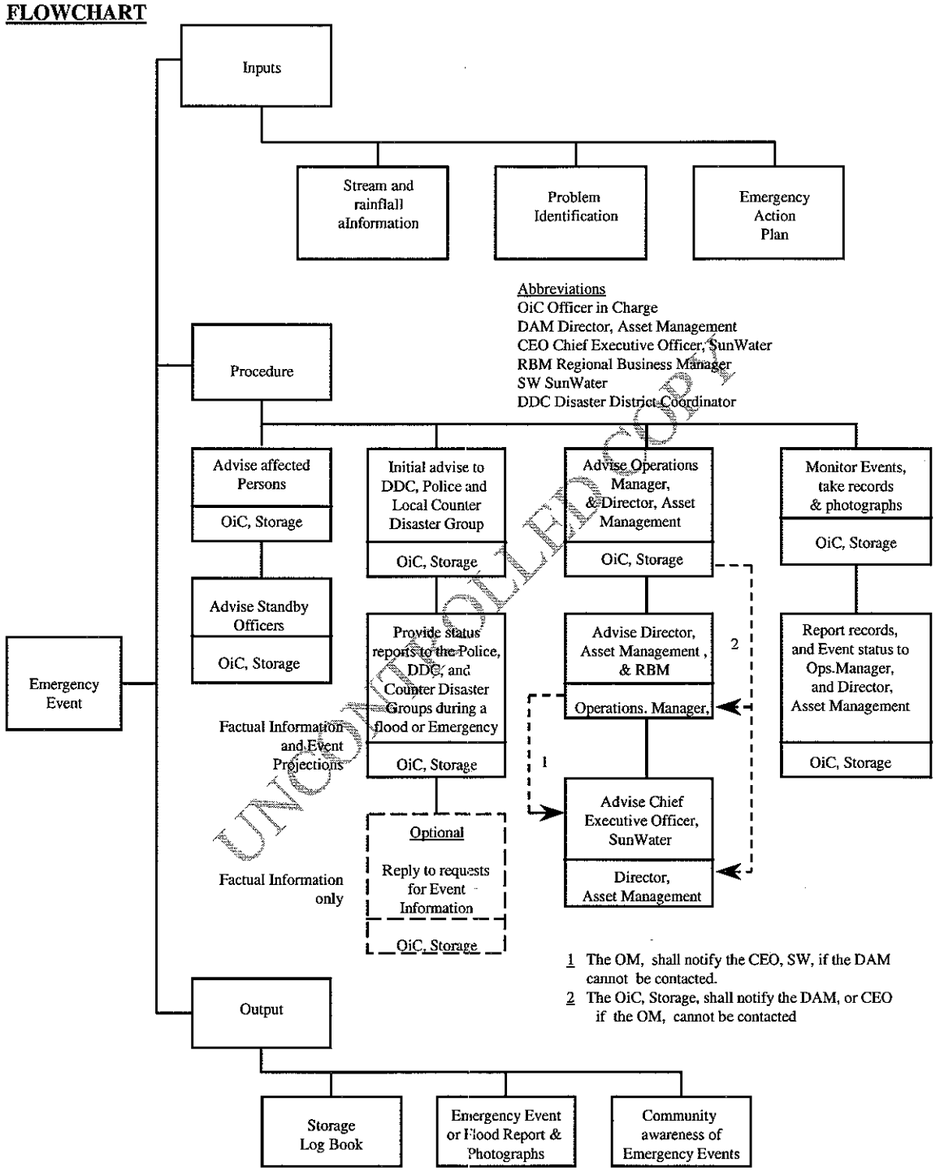
Mobile phone and or 2 way radio shall provide a back up line of communication.

If there is a total communication failure then:

- The OiC, Storage, shall follow the Emergency Action Plan and Standing Operating Procedures until communications are restored

- The Operations Manager shall assess the situation and establish alternative means of communication in consultation with the Regional Business Manager, the Regional Adviser, Asset Management, and the Director, Asset Management

FLOWCHART



STORAGES NOMINATED FOR EMERGENCY ACTION PLANS

Appendix I

REGIONS	DISTRICT	DAM NAME
North	Ayr	Burdekin Falls Dam
	Ayr	Julius Dam
	Ayr	Peter Faust Dam
	Mareeba	Tinaroo Falls Dam
	Mackay	Eungella Dam
	Mackay	Kinchant Dam
	Mackay	Teemburra Dam
Central	Biloela	Callide Dam
	Biloela	Kroombit Dam
	Emerald	Fairbairn Dam
South	Bundaberg	Fred Haigh Dam
	Goondiwindi	Coolmunda Dam
	Goondiwindi	Glenlyon Dam
	Goondiwindi	Leslie Dam
	Ipswich	Atkinson Dam
	Ipswich	Bill Gunn Dam
	Ipswich	Lake Clarendon Dam
	Ipswich	Maroon Dam
	Ipswich	Moogerah Dam
	Maryborough	Borumba Dam
	Maryborough	Cedar Pocket Dam
	North Burnett	Cania Dam
	North Burnett	Wuruma Dam
	South Burnett	Bjelke-Petersen Dam
	South Burnett	Boondooma Dam
	St George	Beardmore Dam

TYPICAL EMERGENCY OR POTENTIAL PROBLEM IDENTIFICATION

Appendix II

Common problems have been identified from experience gained both locally and overseas. Known problems and their characteristics are summarised below. The list is not exhaustive and other problems do occur.

Legend:

☹ PROBLEM

- General Characteristics

➢ When and What to Check

☹ **OVERTOPPING IMMINENT**

- Storage full and water level rising

➢ During periods of excessive rainfall, check water levels

☹ **WAVE EROSION**

- Beaching or notching of the upstream face of embankments by waves generated over long periods of strong wind

➢ During or after periods of strong wind, inspect upstream face of the embankment

☹ **TOE EROSION**

- Erosion of the embankment toe by spillway discharge or diversion flows

➢ During and after large flows, inspect the embankment toe

☹ **GULLYING**

- No armouring or vegetation cover on the embankment batter or poor drainage

➢ During routine inspection, check the embankment batters for damage to armouring or vegetation cover

☹ **LOSS OF STORAGE CONTENTS**

- Excessive loss from the storage and/or occasionally increased seepage or increased groundwater levels near the storage or contamination of ground water resources etc

➢ During routine monitoring, look for environmental changes such as vegetation kills, salt scalds etc

☹ **SEEPAGE EROSION OR PIPING**

- Progressive internal erosion of the embankment or foundation to form an open conduit or pipe

➢ During routine inspection or after unaccountable increases in seepage flows, look for an emission point

☹ **NEW SPRINGS, SEEPS OR BOGGY AREAS**

- Evidence of internal changes in seepage control. (Could be initial signs of piping failure).

➢ During routine inspection, look for "evergreen" spots, boggy ground, or pools of water

☹ **RAPID INCREASE OR CLOUDY APPEARANCE OF SEEPAGE**

- Seepage flow through the storage embankment is cloudy and increasing. (Piping failure has started).

➢ After detection of cloudy water at seepage monitoring points, look for the source of cloudy water

☹ **INCREASE IN GALLERY SEEPAGE**

- Increase in the normal rate of gallery seepage

➢ After detection, check for differential movement or cracking in concrete components

☹ **FOUNDATION FAILURE**

- Sliding, rotation, or settlement of the entire dam

➢ During routine inspection or immediately after earthquakes, inspect for evidence of foundation movement or displacement immediately adjacent to the dam

☹ **SLIDE IN DOWNSTREAM SLOPE**

- Slide in the downstream face

➢ During routine inspection, look for cracks or scarps near the crest and bulges at the toe

☹ **FLOW SLIDE**

- Collapse and flow of soil around the storage periphery

➢ During routine inspection and especially with sedimentary/colluvial soils, look for material displacement around the storage rim

☹ **LANDSLIDE**

- Mass movement of soil or rock from the slopes and valley walls around the storage

- ➢ During routine inspection, look for material displacement

☹ **MOVEMENT OR CRACKING IN STRUCTURAL CONCRETE WORK**

- ● Failure of mechanical components such as pipes, gates etc
- ➢ During routine inspection or when mechanical problems occur such as a burst pipe or a jammed gate, look for any movement or cracking of the structural concrete work, to determine the cause

☹ **FAILURE OF APPURTENANT STRUCTURES OR OPERATING EQUIPMENT**

- ● Loss of ability to supply water or discharge floods safely
- ➢ After detecting an operational anomaly, identify and investigate the cause

☹ **ABNORMAL INSTRUMENT READINGS**

- ● A sudden change in the values of instrument readings
- ➢ On detection, check for equipment malfunction and notify the Director, Asset Management, if there is a concern

☹ **ALGAL BLOOMS**

- ● Blue green opaque nature of near surface and shallow water
- ➢ During routine inspections, particularly in the summer months, look for a rapid colour change of the storage to a blue green opaque nature

☹ **CHEMICAL SPILLS**

- ● Dead fish and other aquatic life in the storage, or a strange odour or colouration
- ➢ On detection, identify and investigate the cause

EXAMPLE - EMERGENCY EVENTS AND ACTIONS

Appendix III

EVENT

☹ **DESCRIPTION OF SITUATIONS**

✓ **ACTION**

Storage at EL670.25m and rising. Heavy rainfall over the Catchment Area

The Foreman, Storage, shall:

- ✓ Notify Standby Officers (Standby Officers shall be available for the duration of a flood or Emergancy Event)
- ✓ Record the Storage level on Chart Appendix 3, at 4 hourly intervals
- ✓ Record the rainfall at the Dam daily or as requested at the time of the Event
- ✓ Record the River level at Picnic Crossing at 4 hourly intervals
- ✓ Notify the Operations Manager, Mareeba, of the situation at the Dam, daily, or as agreed at the time of the Event

☹ **Storage height between EL 670.35m and EL 672.35m and rising**

When the spillway begins to discharge

The Foreman, Storage, shall:

- ✓ Notify Standby Officers
- ✓ Notify the Property Owners, D & R Arthur, phone 07 4095 8288
- ✓ Notify the Police in Atherton and the Disaster District Coordinator in Mareeba
- ✓ Notify the Counter Disaster Executive Officers in Atherton and Mareeba Shires
- ✓ Notify the Operations Manager, Mareeba
- ✓ Notify the Director, Asset Management, SunWater, Central Office
- ✓ Notify the Regional Recreation Officer