

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

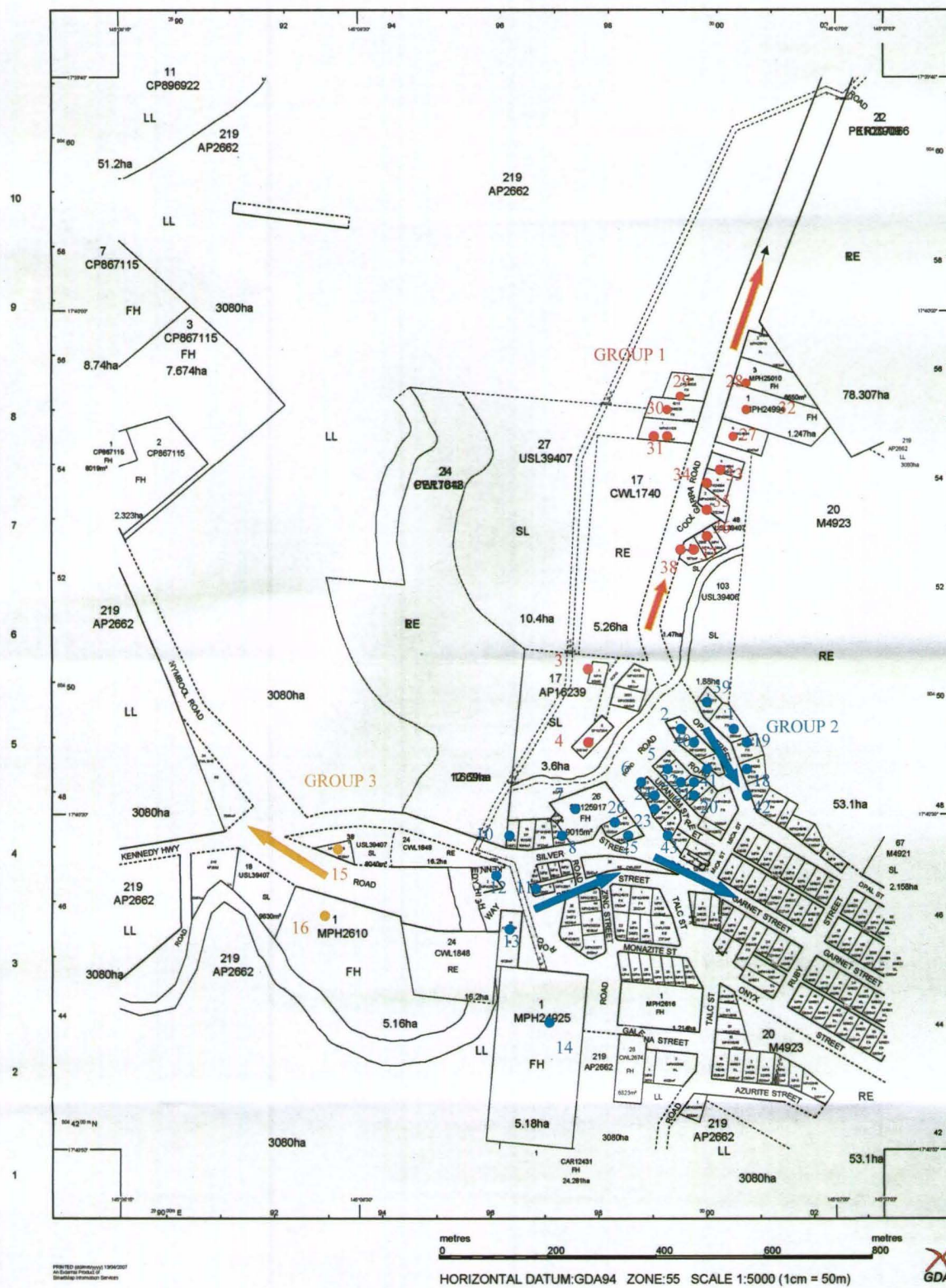
**PROPERTIES WITHIN INUNDATION AREA
AS IDENTIFIED IN 1 in 2500 AEP, 1 in 20,000 AEP and PMP FLOOD EVENTS and GROUND INVESTIGATION**

| Property Number | Lot & Plan | Postal Address | Group No |
|-----------------|------------|----------------|----------|
| 1 | | | 1 |
| 2 | | | 2 |
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| 31 | | | 1 |
| 32 | | | 1 |
| 33 | | | 1 |
| 34 | | | 1 |
| 35 | | | 1 |
| 36 | | | 1 |
| 37 (No house) | | | 1 |
| 38 | | | 1 |
| 39 | | | 2 |
| 40 | | | 2 |

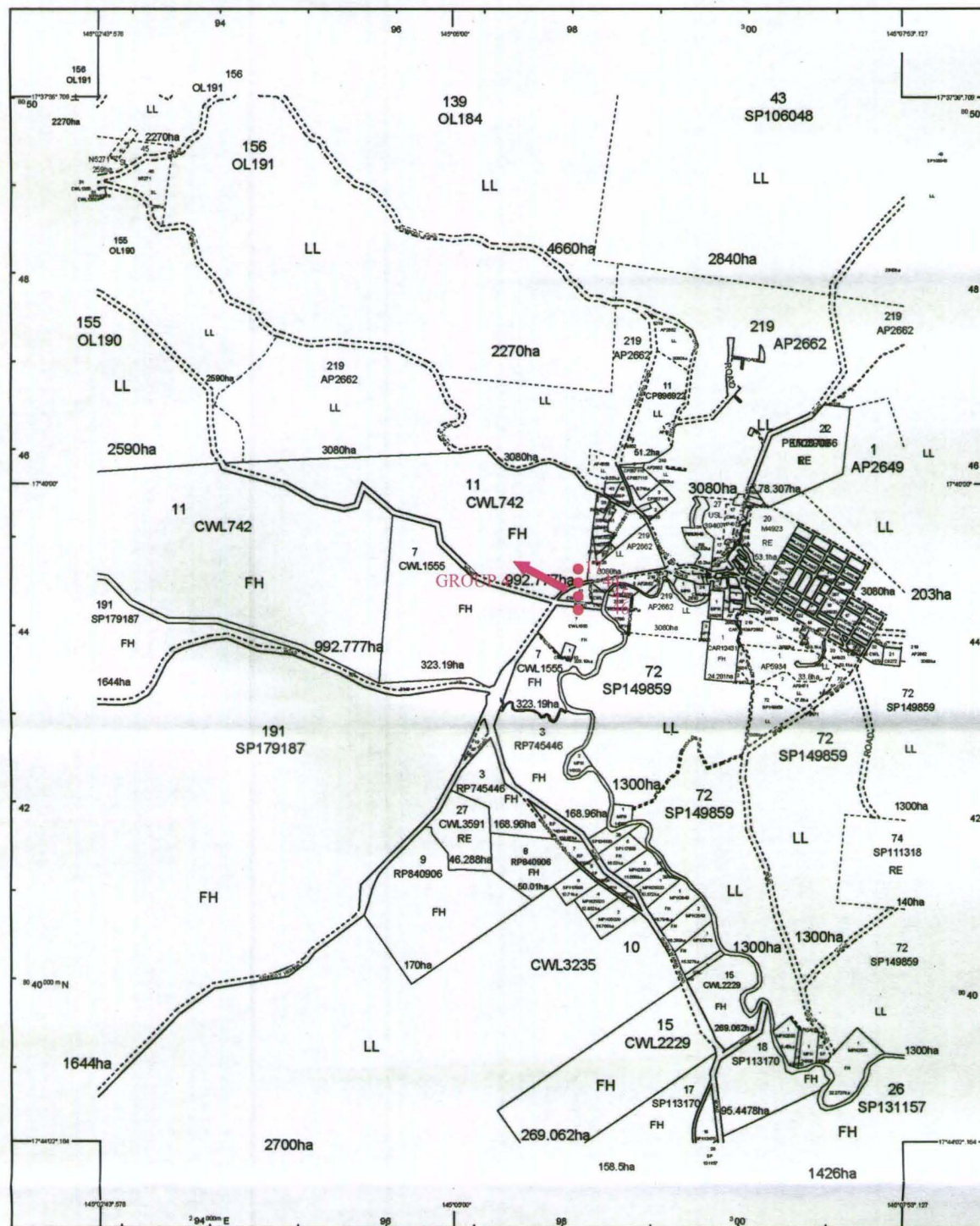
EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

| | | |
|----|--|---|
| 41 | | 2 |
| 42 | | 2 |
| 43 | | 2 |
| 17 | | 4 |
| 44 | | 4 |
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| 47 | | 5 |
| 48 | | 5 |

EMERGENCY ACTION PLAN – CROOK DAM and WYNDHAM DAM



EMERGENCY ACTION PLAN – CROOK DAM and WYNNDHAM DAM



STANDARD MAP NUMBER
7962-43132



SUBJECT PARCEL DESCRIPTION

DCOB
Lodged
Area/Volume
Tenure
Local Government
Locality
Parish
County
Parcel/Segment

7CWL1555
322.19ha
FREEHOLD
HERBERTON SHIRE
MOUNT GARRET
MULLANDURRA
CARDWELL
14/29414

CLIENT SERVICE STANDARDS

PRINTED (ddmmyyyy) 16/04/2007

DCOB 1304/2007 (Lots with an area less than 1 000ha are not shown)

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SmartMap

An External Product of
Geospatial Information Services
Based upon an extraction from the
Digital Cadastral Data Base

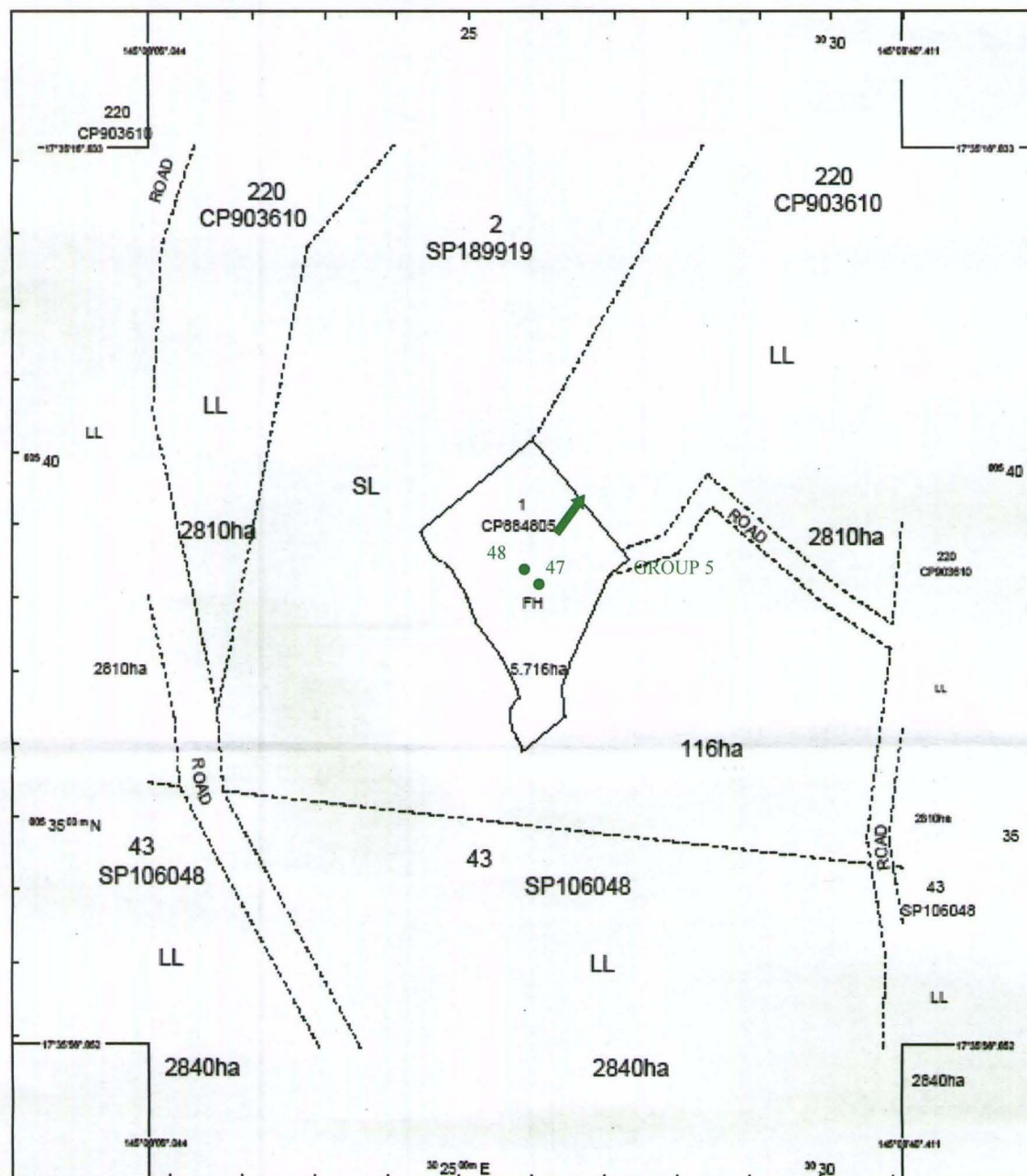


Queensland
Government

Natural Resources
and Water

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Natural Resources and Water, 2007.

EMERGENCY ACTION PLAN – CROOK DAM and WYNHAM DAM



STANDARD MAP NUMBER
7962-41343

MAP WINDOW POSITION &
NEAREST LOCATION

MAPSHEET 12
17°35'59\"/>



SUBJECT PARCEL DESCRIPTION

DCDB
Lot/Plan
Area/Volume
Tenure
Local Government
Locality
Parish
County
Parcel/Segment

1CP884805
5.716ha
FREEHOLD
HERBERTON SHIRE
MOUNT GARNET
COOLGARRA
CARDWELL
24/59436

CLIENT SERVICE STANDARDS

PRINTED (dd/mm/yyyy) 24/04/2007

DCDB 2364/2007

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Government**

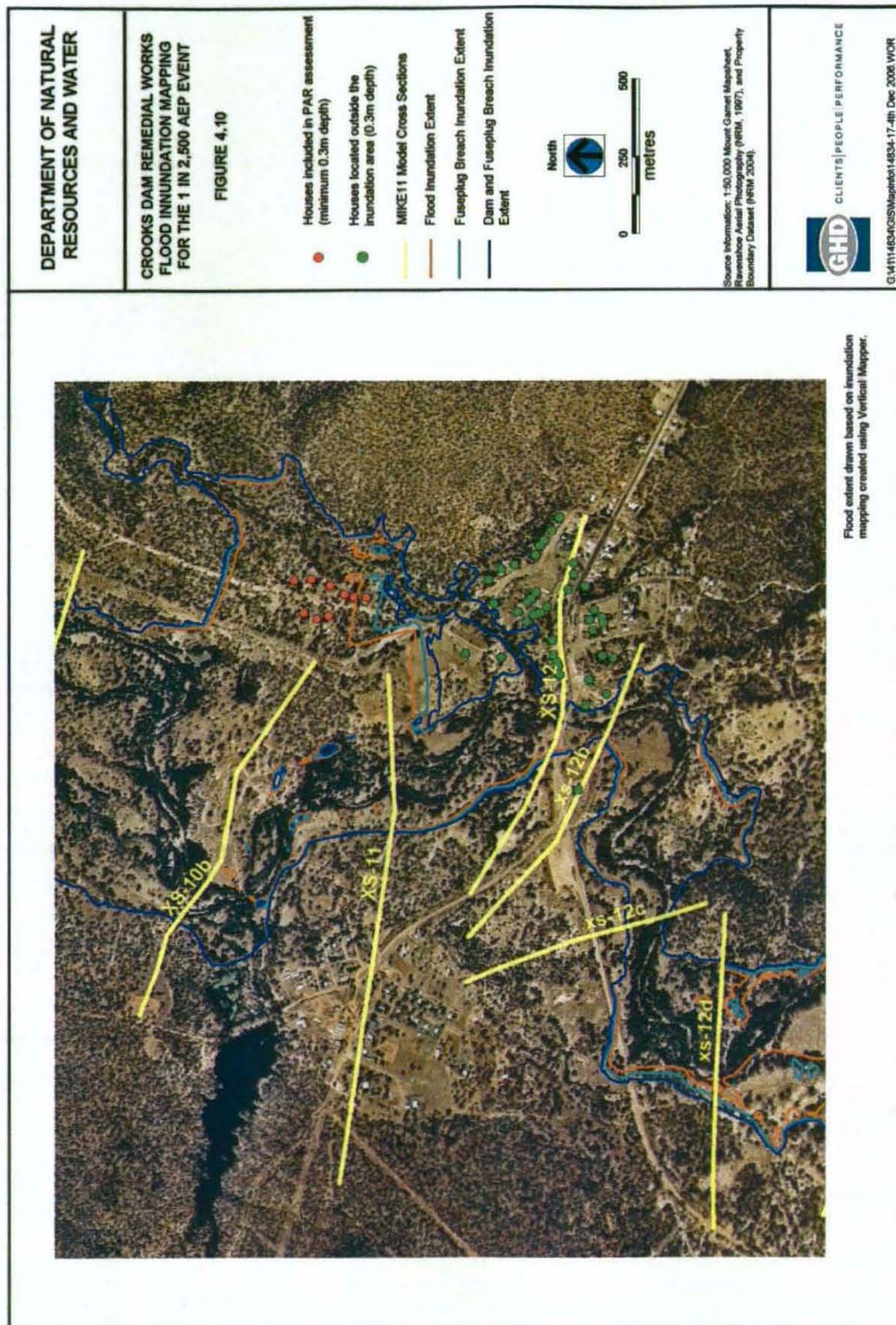
**Natural Resources
and Water**

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EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

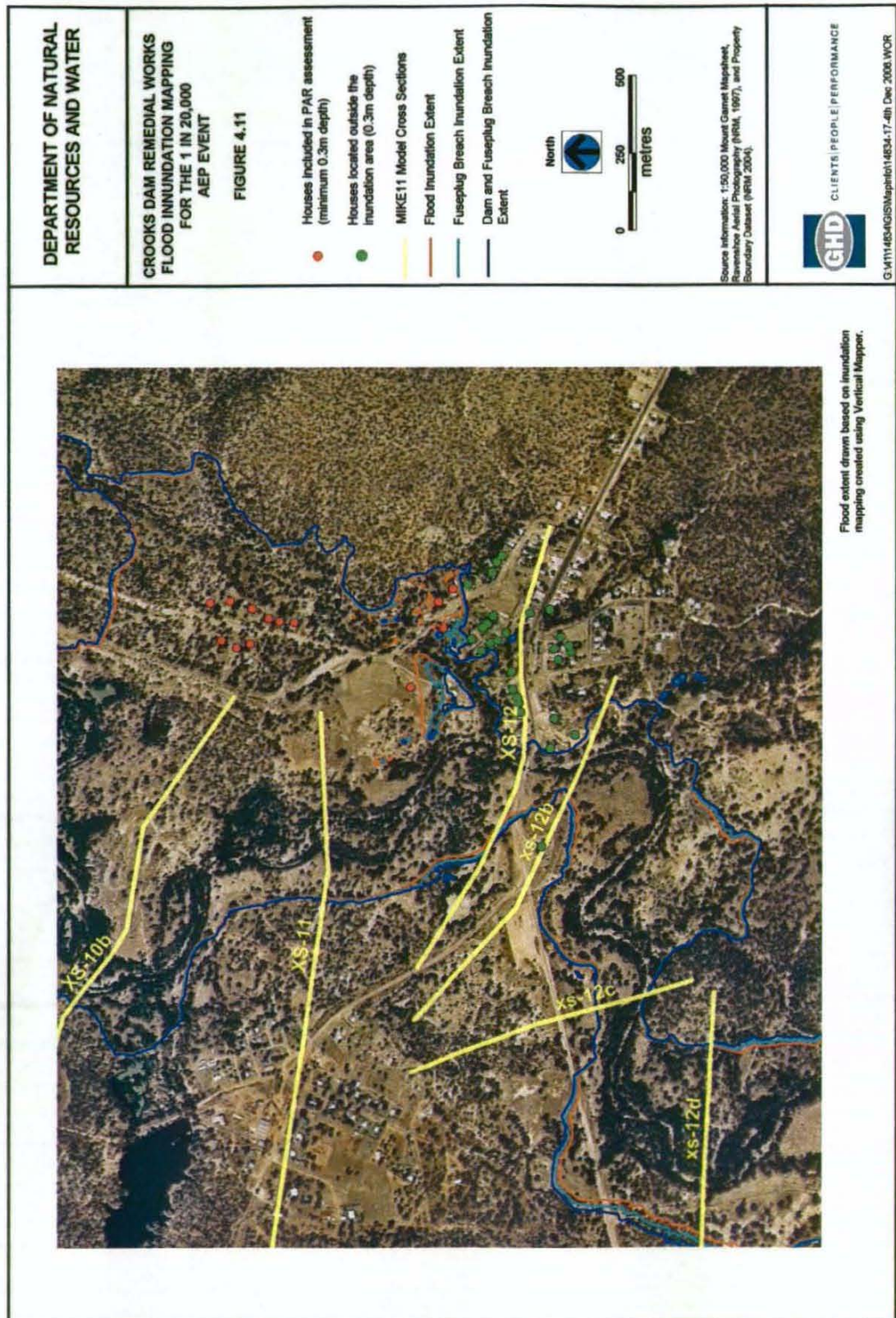
INUNDATION MAPPING - 1:2,500 AEP EVENT

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

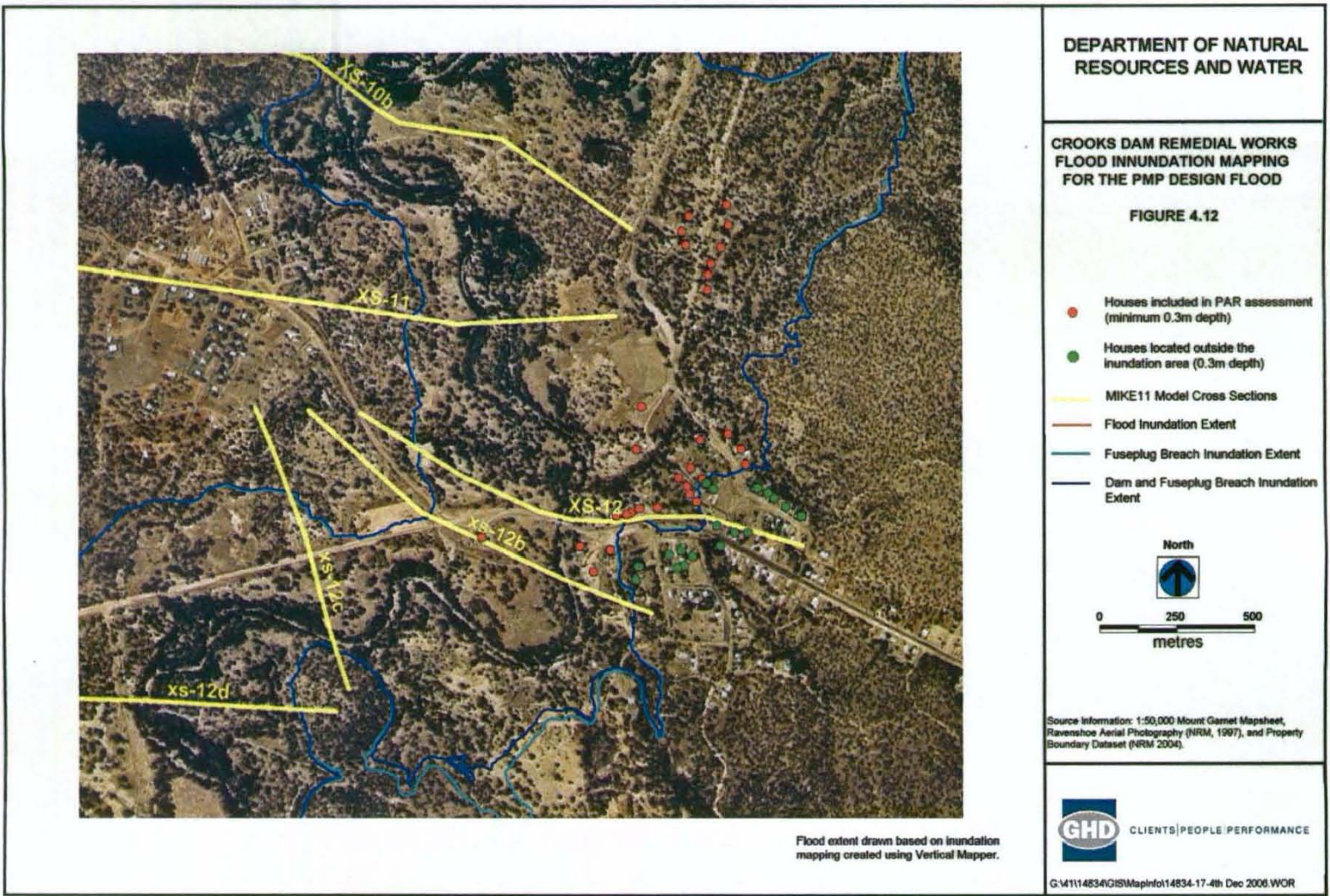


INUNDATION MAPPING - 1:20,000AEP EVENT

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM



INUNDATION MAPPING - PMP DESIGN FLOOD



EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 7

RAINFALL/DURATION CURVES

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

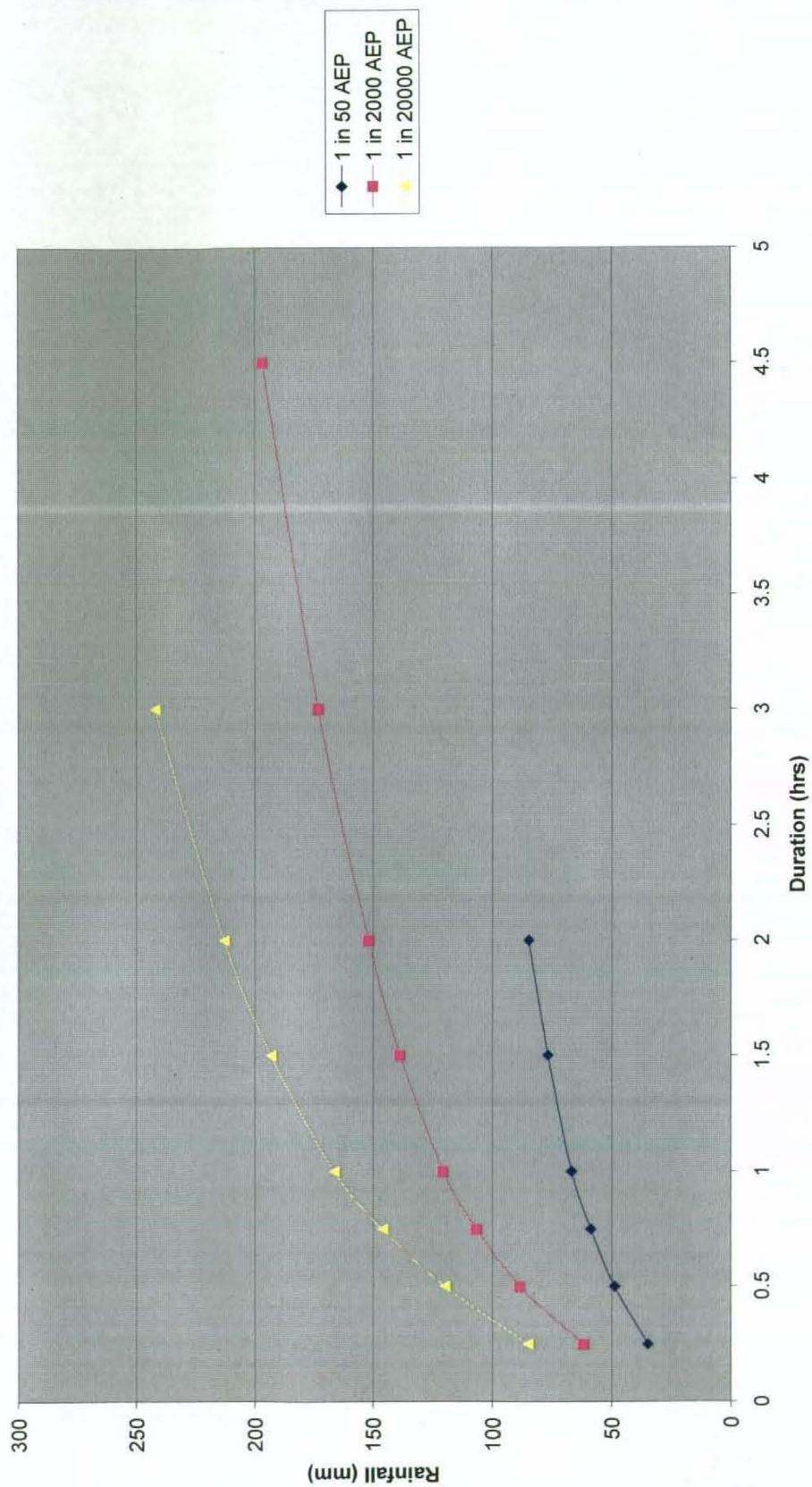
The Bureau of Meteorology update their website hourly from 9am. Thus, during an event the website shall be accessed hourly. The site is www.bom.gov.au. The closest Bureau rain gauges are at Herberton and Mt Garnet. The Cairns radar image covers Mt Garnet area.

- Left Click - Queensland area of the map of Australia.
- Scroll down to Flood Warning, Rainfall and River Information. Left click - Queensland Flood Warning Centre.
- Scroll down to "Zoom in to:"
- Left Click – Daintree to Townsville.
- Scroll Down to table under map and go to column displaying "Latest Rainfall Data"
- Left Click – 1hr for Herbert River – Read rainfall data for Herbert at Herberton and Mt Garnett AL.
- Move to top tool bar and Left Click – Back arrow
- Left Click – 3hr for stations as above – read rainfall data.
- Move to top tool bar and Left Click – Back arrow
- Left Click – 24 hr for stations as above – read rainfall data.
- Move to top tool bar and Left Click – Back arrow
- Scroll down to table under map and go to column displaying "Radar"
- Left Click Cairns and read radar data for Herberton and Mt Garnet at "128 km Cairns Radar" site.

All data received by EAP Officer is to be recorded in the storage log book.

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

Crooks Dam Rainfall Duration Curves



APPENDIX 8

RATING TABLES

(NOT USED IN THIS
DOCUMENT)

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 9

SOP 14 Small to Medium Spillway Overflows

Department of Environment and Resource Management

Crooks Dam

Standing Operating Procedures **for** **Small to Medium Spillway Overflows**

SOP - 14

Distribution

| Copy Number | Position | Location |
|-------------|---|------------|
| 1 | RoadTek Works Manager, Asset Services North | Cairns |
| 2 | Regional Manager, Water Services, North Region; DERM | Cairns |
| 3 | Director, Dam Safety, DERM | Brisbane |
| 4 | RoadTek Engineer | Cairns |
| 5 | RoadTek Officer (EAP) | Mt. Garnet |
| 6 | RoadTek Officer (Inspections) | Mt. Garnet |

Approved:

Date: _____

Principal Engineer, Non-Commercial Assets, DERM

Revision Status

[illegible]

| Table of Contents | Page |
|---|------|
| 1 Purpose | 5 |
| 2 Scope | 5 |
| 3 Personnel Affected and Responsibilities | 5 |
| 4 Actions | 5 |
| 5 References | 6 |

Appendices

Appendix A –Inspecting for Deficiencies

1 Purpose

The Crooks Dam is managed by DERM. In terms of an MOU with DERM, the RoadTek Works Manager, Asset Services North, Cairns, manages the operation and maintenance of the Crooks Dam, including routine dam safety inspections.

Part of the dam safety management program is to inspect the Dam immediately before the spillway starts to overflow. A secondary objective is to advise tourists or campers to that access and egress to the area may be cut off due to local stream rises.

2 Scope

This Procedure applies to spillway overflow events that are less than the historical maximum event with a storage level of EL 692.0m. The personnel are the Emergency Action Plan (EAP) Officers listed in the EAP for Crooks Dam.

3 Personnel Affected and Responsibilities

| Officer | Responsibility |
|---|--|
| RoadTek Engineer | A Registered Professional Engineer, Queensland, responsible for carrying out monthly inspections at the dam. |
| Emergency Action Plan Officers (EAP Officers) | The Officer based at Mt. Garnet and at or near Crooks Dam responsible for carrying out EAP procedures for the Dam and this Standing Operating Procedure. |
| Principal Engineer, Non-Commercial Assets | The person responsible for approving the Standing Operating Procedures, the Operation and Maintenance Manual and the persons undertaking the role of EAP Officers and, for managing, receiving, storing and checking data for the Crooks Dam, reviewing and authorising documentation produced by the RoadTek Officer and consultants on the dam and initiating investigations into abnormal behaviour of the dam. |
| | Manages the Distribution, Approval and Revision Control relating to this Procedure. |
| Regional Manager, Water Services, Central West Region, DERM | The person responsible for approving the Emergency Action Plan. |

4 Actions

The EAP Officer should be aware of the storage height and rainfall conditions, and be able to estimate when the spillway is likely to overflow. Details for obtaining information on rainfall, storage and river gauge heights from the Bureau of Meteorology website is given in Appendix 7 of the EAP.

- Two hours before the spillway is estimated to overflow, The EAP officer shall visit the dam if

safe access is possible, and visually inspect the Dam for any deficiencies.

- Check for new cracking or increased crack widths in the spillway face and main wall. Appendix B gives a guide for inspecting the Dam for deficiencies.
- Advise campers at the dam that they should consider leaving the site immediately, while access and egress to the site is open. If they are unable to leave the site because of local stream rises or other reasons they should seek higher ground and await evacuation by police and emergency services.
- Read the storage height gauge and rain gauge at the WAP Officer's residence at one-hour intervals.
- Notify the Police in Cairns, and the Executive Officer, Local Disaster Management Group, Tablelands Regional Council that a spillway discharge is likely. Also provide information of parties that are at the dam site and maybe unable to leave safely.
- At a reasonable time, notify the Principal Engineer, Non-Commercial Assets of storage height and that a spillway discharge is likely. Regularly update Principal Engineer, Non - Commercial Assets during the rainfall event. At least daily or as directed by the Principal Engineer, Non -Commercial Assets.
- If the storage level is predicted to reach EL 692.0m, the EAP Officer is to implement the Major Overflow Event in the EAP.
- When the preceding twelve-hour rainfall is less than 50mm and the storage height gauge is less than EL691.5m and falling, and local stream rises have fallen sufficiently to allow access to and egress from the site, the EAP Officer is to make an inspection of the Dam and advise the Principal Engineer, Non-Commercial Assets.
- Once given permission by the Principal Engineer, Non -Commercial Assets the dam site can be opened to the public. The site maybe closed for extended periods following an event due to flood waters on the access road.
- EAP Officer advises the Police in Cairns, and the Executive Officer, Local Disaster Management Group, Tablelands Regional Council that the site has been opened to the public and stands down.

5 References

- Emergency Action Plan, Crooks Dam

Appendix B

INSPECTING FOR DEFICIENCIES: SUMMARY

| TYPE OF DEFICIENCY | LOOK FOR |
|----------------------|--|
| SEEPAGE | <p>A water flow or sand boil on the lower portion of the downstream slope or toe area, especially at the groins.</p> <p>Leakage around conveyance structures such as outlet works.</p> <p>Wet areas or areas where the vegetation appears greener or more lush on the embankment slope or toe area.</p> <p>Blocked toe drains.</p> <p>An increase in the amount of water being released from toe drains. (Remember to take into account changes in the reservoir level.)</p> <p>Turbidity or cloudiness of the seepage.</p> |
| CRACKING | <p>Desiccation Cracking: A random honeycomb pattern of cracks usually found on the crest and the downstream slope.</p> <p>Transverse Cracking: Cracks that are perpendicular to the length of the dam usually found on the crest.</p> <p>Longitudinal Cracking: Cracks that are parallel to the length of the dam. Longitudinal cracks may be associated with stability problems in the slopes.</p> |
| INSTABILITY | <p>Slides on the upstream or downstream slopes.</p> <p>Bulging, especially at the toe of the dam.</p> |
| DEPRESSIONS | <p>Misalignment in the crest and embankment slopes found by sighting along fixed points.</p> <p>Sinkholes found by checking and probing each depression.</p> <p>Remember, sinkholes have steep, bucket like sides while minor depressions have gently sloping, bowl like sides.</p> |
| MAINTENANCE CONCERNS | <p>Inadequate Slope Protection: Check for bald areas or areas where the protection is sparse or damaged.</p> <p>Surface Runoff Erosion: Check for gullies or other signs of erosion. Make sure to check the low points along the upstream and downstream shoulders and groins since surface runoff can collect in these areas.</p> <p>Inappropriate Vegetative Growth: Check for excessive and deep rooted vegetative growth.</p> <p>Debris: Check for debris on and around the dam, especially near outlet works or spillway inlets.</p> <p>Animal Burrows: Check for damage caused by burrowing animals.</p> |

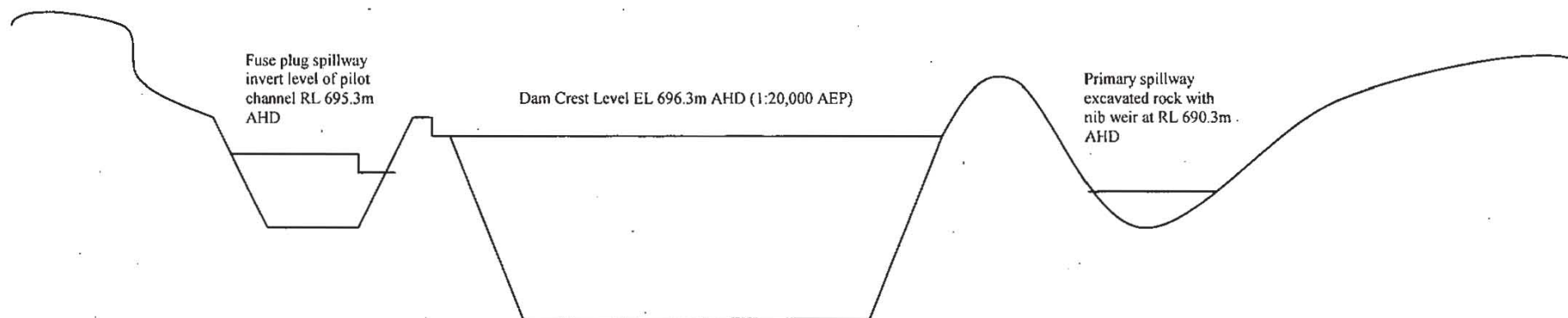
Note: This tabulation taken from Dam Safety Surveillance Field Manual-August 2005

WHEN TO GET FURTHER ASSISTANCE

Several of the deficiencies covered above are very serious. If you observe any of the following deficiencies, you should consult with the Principal Engineer, Non –Commercial Assets:

- Sand boils or turbid seepage.
- Seepage that has increased since the last inspection (taking the reservoir level into consideration).
- Cracking that extends below the reservoir level or potential reservoir level.
- Transverse and longitudinal cracking.
- Deep seated slides or bulging associated with slides.
- Sinkholes or other large depressions.
- Deep rooted vegetation that might need to be removed.

If you are unsure whether or not a condition poses a threat to the safety of the dam, you should discuss your findings with the Principal Engineer, Non –Commercial Assets.

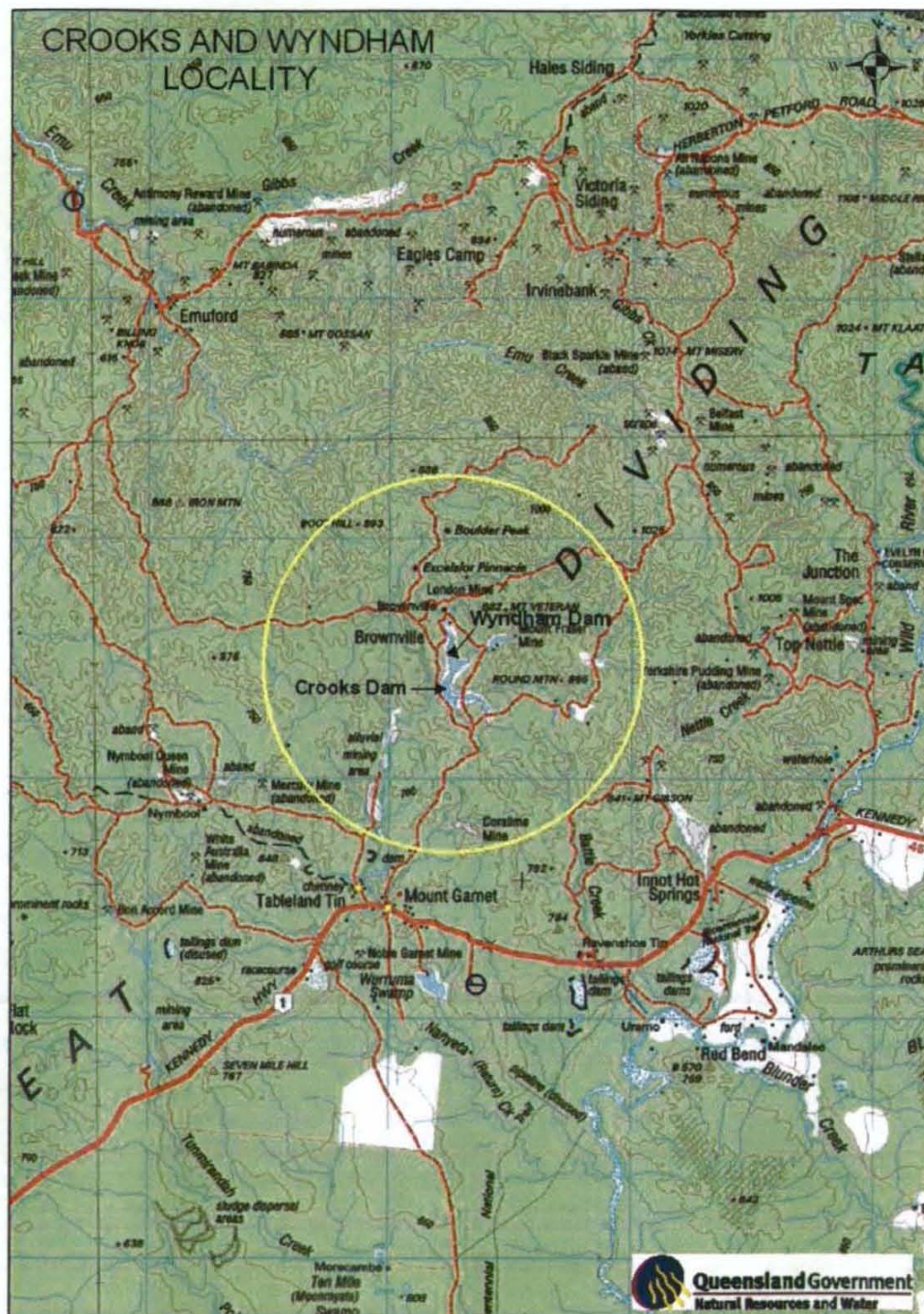


EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 1

LOCALITY PLAN

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

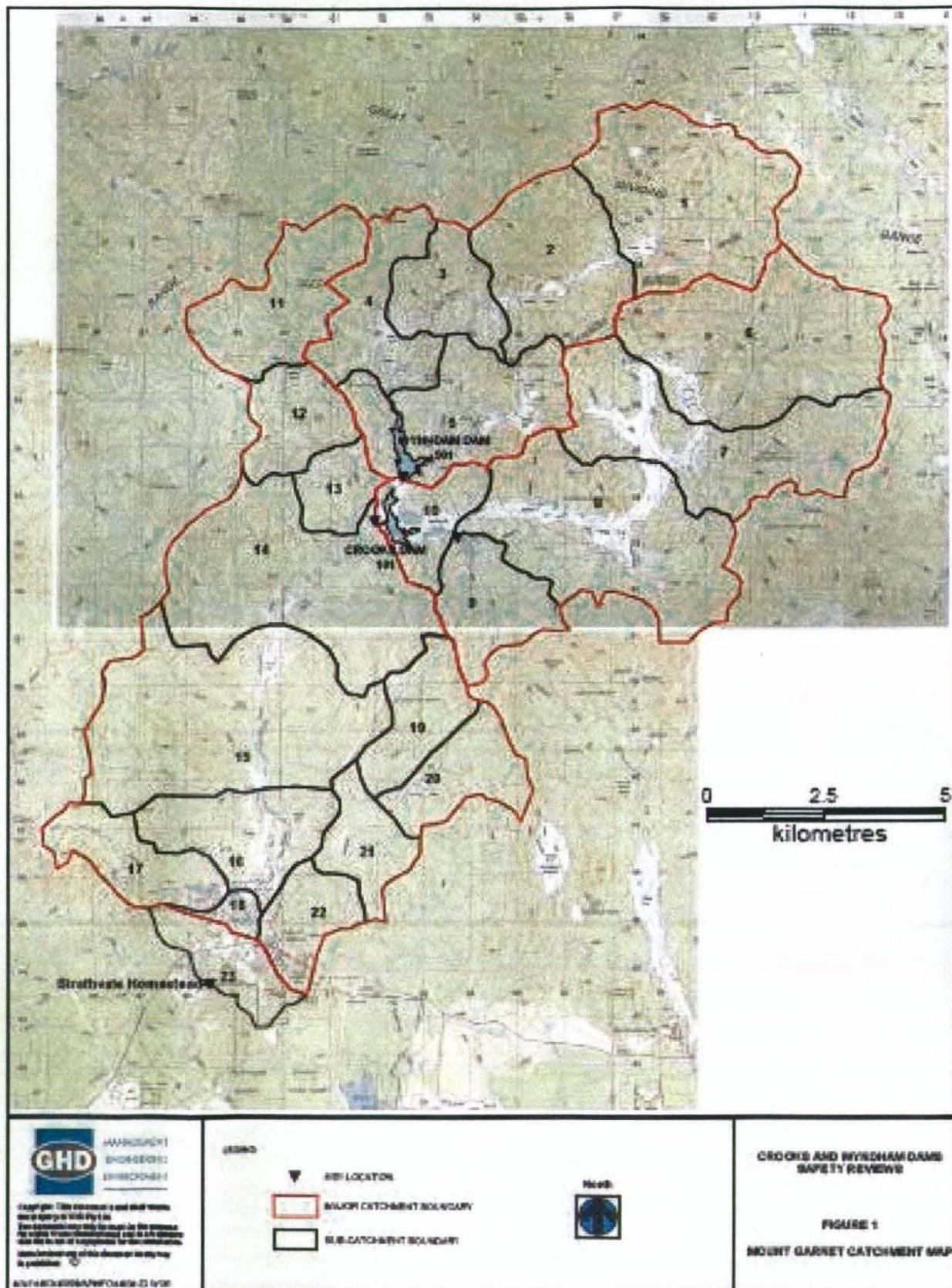


EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 2

CATCHMENT BOUNDARY

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM



EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 3

INSPECTION SAFETY PROTOCOL

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 3 INSPECTION SAFETY PROTOCOL

All Emergency Action Plan (EAP) officers who visit the dam site are to observe this protocol.

- (1) A hand held satellite phone with backup battery to be available at all inspections.
- (2) Officers on site to have UHF Radio available at all times.
- (3) More than one person to be on site at all times.
- (4) Inspections are to be carried out only when conditions are deemed to be safe as per inspection and risk assessment/s.
- (5) During an emergency event access to dam embankments and spillways is not to be made by boat.
- (7) All personnel likely to be involved are to be informed of the above, and to be made aware that they are mandatory requirements.

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 4

POTENTIAL PROBLEM IDENTIFICATION

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

INSPECTION OF EMBANKMENT DAMS

INSPECTING FOR DEFICIENCIES: SUMMARY

| TYPE OF DEFICIENCY | LOOK FOR |
|----------------------|--|
| SEEPAGE | <p>A water flow or sand boil on the lower portion of the downstream slope or toe area, especially at the groins.</p> <p>Wet areas or areas where the vegetation appears greener or lusher on the embankment slope or toe area.</p> <p>An increase in the amount of water being released from toe drains and relief wells. (Remember to take into account changes in the reservoir level.)</p> <p>Turbidity or cloudiness of the seepage.</p> |
| CRACKING | <p>Desiccation Cracking: A random honeycomb pattern of cracks usually found on the crest and the downstream slope.</p> <p>Transverse Cracking: Cracks that are perpendicular to the length of the dam usually found on the crest.</p> <p>Longitudinal Cracking: Cracks that are parallel to the length of the dam. Longitudinal cracks may be associated with stability problems in the slopes.</p> |
| INSTABILITY | <p>Slides on the upstream or downstream slopes.</p> <p>Bulging, especially at the toe of the dam.</p> |
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| MAINTENANCE CONCERNS | <p>Inadequate Slope Protection: Check for bald areas or areas where the protection is sparse or damaged.</p> <p>Surface Runoff Erosion: Check for gullies or other signs of erosion. Make sure to check the low points along the upstream and downstream shoulders and groins since surface runoff can collect in these areas.</p> <p>Inappropriate Vegetative Growth: Check for excessive and deep rooted vegetative growth.</p> <p>Debris: Check for debris on and around the dam, especially near the spillways.</p> <p>Animal Burrows: Check for damage caused by burrowing animals.</p> |

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

WHEN TO GET FURTHER ASSISTANCE

Several of the deficiencies covered in this unit are very serious. If you observe any of the following deficiencies, you may need to consult with an experienced and qualified engineer:

- Sand boils or turbid seepage.
- Seepage that has increased since the last inspection (taking the reservoir level into consideration).
- Cracking that extends below the reservoir level or potential reservoir level.
- Transverse and longitudinal cracking.
- Deep seated slides or bulging associated with slides.
- Sinkholes or other large depressions.
- Deep rooted vegetation that might need to be removed.

Remember, whenever you are unsure whether or not a condition poses a threat to the safety of the dam, you should discuss your findings with an experienced and qualified engineer, Principal Engineer, Non- Commercial Assets.

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 5

Emergency Event Phone Numbers

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 7 EMERGENCY EVENT PHONE NUMBERS

Event Phone Numbers for EAP Officer

All Emergency Events

Police in Mareeba

Phone 07 4030 3370, A/H [REDACTED]

EAP Backup 1

Roya Poulson, Phone [REDACTED]

EAP Backup 2

Doug McAuley, Phone [REDACTED]

Executive Officer, Disaster Management, Tablelands Regional Council

Bob McLagan, Phone [REDACTED], A/H [REDACTED]

Principal Engineering, Non-Commercial Assets

William Steen, Phone [REDACTED], A/H [REDACTED], Mobile [REDACTED]

if unable to contact then:

Regional Manager, Water Services, Central West Region

Ed Donohue, Phone [REDACTED], A/H [REDACTED], Mobile [REDACTED]

Event Phone Numbers for Principal Engineering, Non-Commercial Assets

All Emergency Events

EAP Officer

Gary Haydon, Phone [REDACTED], Sat Phone [REDACTED]

Director Dam Safety

Peter Allen, Phone [REDACTED], A/H [REDACTED], Mobile [REDACTED]

Regional Manager, Water Services Central West Region

Ed Donohue, Phone [REDACTED], A/H [REDACTED], Mobile [REDACTED]

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 6
PROPERTIES WITHIN
INUNDATION AREA
1 in 2,500 AEP, 1 in 20,000 AEP
and PMP FLOODS

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

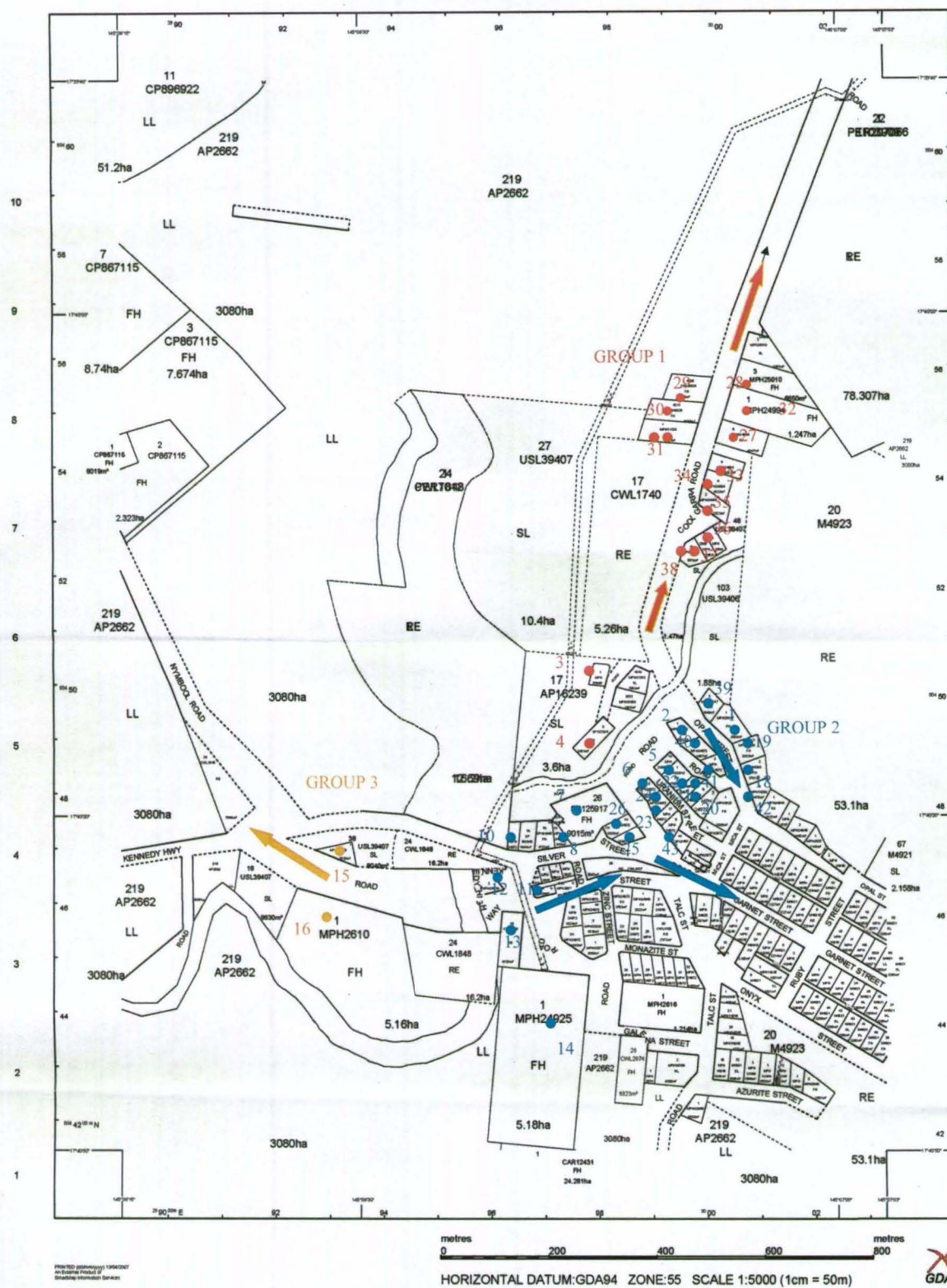
**PROPERTIES WITHIN INUNDATION AREA
AS IDENTIFIED IN 1 in 2500 AEP, 1 in 20,000 AEP and PMP FLOOD EVENTS and GROUND INVESTIGATION**

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| 26 | | | 2 |
| 27 | | | 1 |
| 28 | | | 1 |
| 29 | | | 1 |
| 30 | | | 1 |
| 31 | | | 1 |
| 32 | | | 1 |
| 33 | | | 1 |
| 34 | | | 1 |
| 35 | | | 1 |
| 36 | | | 1 |
| 37 (No house) | | | 1 |
| 38 | | | 1 |
| 39 | | | 2 |
| 40 | | | 2 |

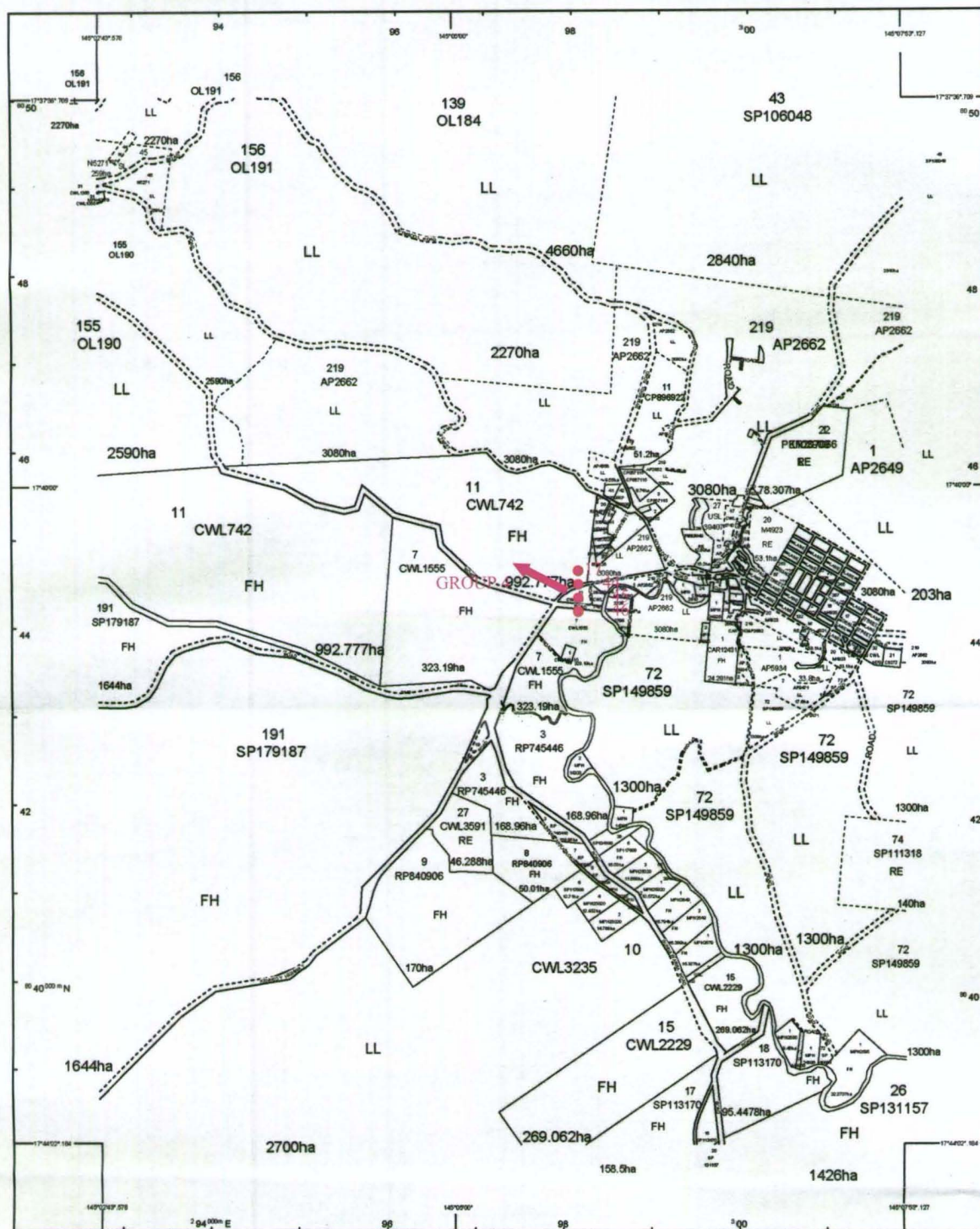
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EMERGENCY ACTION PLAN – CROOK DAM and WYNDHAM DAM



EMERGENCY ACTION PLAN – CROOK DAM and WYNDHAM DAM



STANDARD MAP NUMBER
7962-43132

MAP WINDOW POSITION &
NEAREST LOCATION



SUBJECT PARCEL DESCRIPTION

| | |
|-------------------|-----------------|
| DOC | CWL1555 |
| Lot/Plan | 223.19ha |
| Tenure | FREEDHOLD |
| Local Government | HERBERTON SHIRE |
| Locality | MOUNT GARDNET |
| Parish | MULLABURRA |
| County | CARDWELL |
| Planning District | 162844 |

CLIENT SERVICE STANDARDS

PRINTED (mm/yyyy) 16/04/2007

DOC 1304/2007 (Lots with an area less than 1.000ha are not shown)

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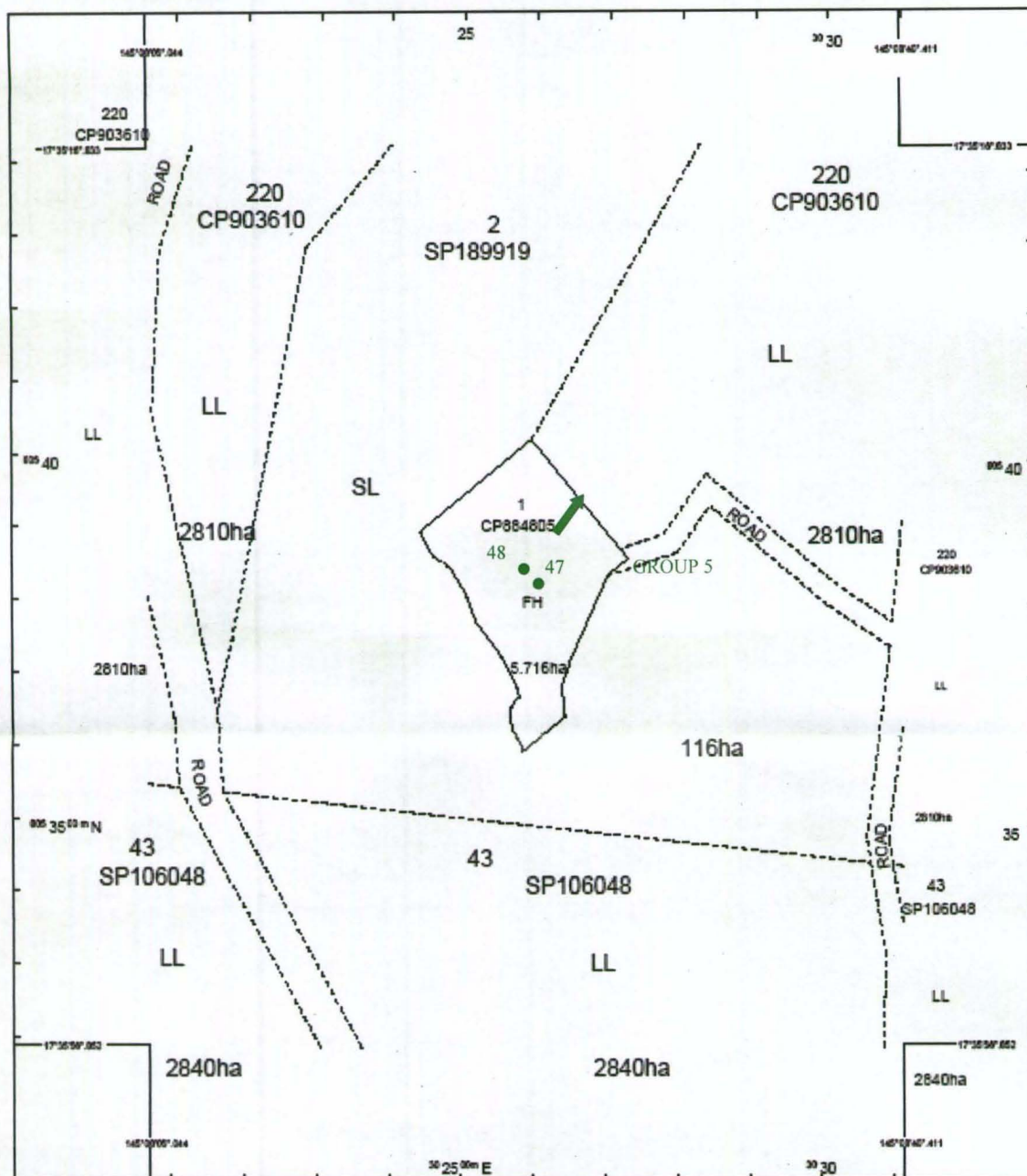
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STANDARD MAP NUMBER
7962-41343

HORIZONTAL DATUM: GDA 2000 SCALE 1:7500

MAP WINDOW POSITION &
NEAREST LOCATION



SUBJECT PARCEL DESCRIPTION

DCDB
Lot/Plan
Area/Volume
Tenure
Local Government
Locality
Parish
County
Parcel Segment

1CP884805
5.716ha
FREEHOLD
HERBERTON SHIRE
MOUNT GARNET
COOLGARRA
CARDWELL
2429430

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Based upon an extraction from the
Digital Cadastral Data Base



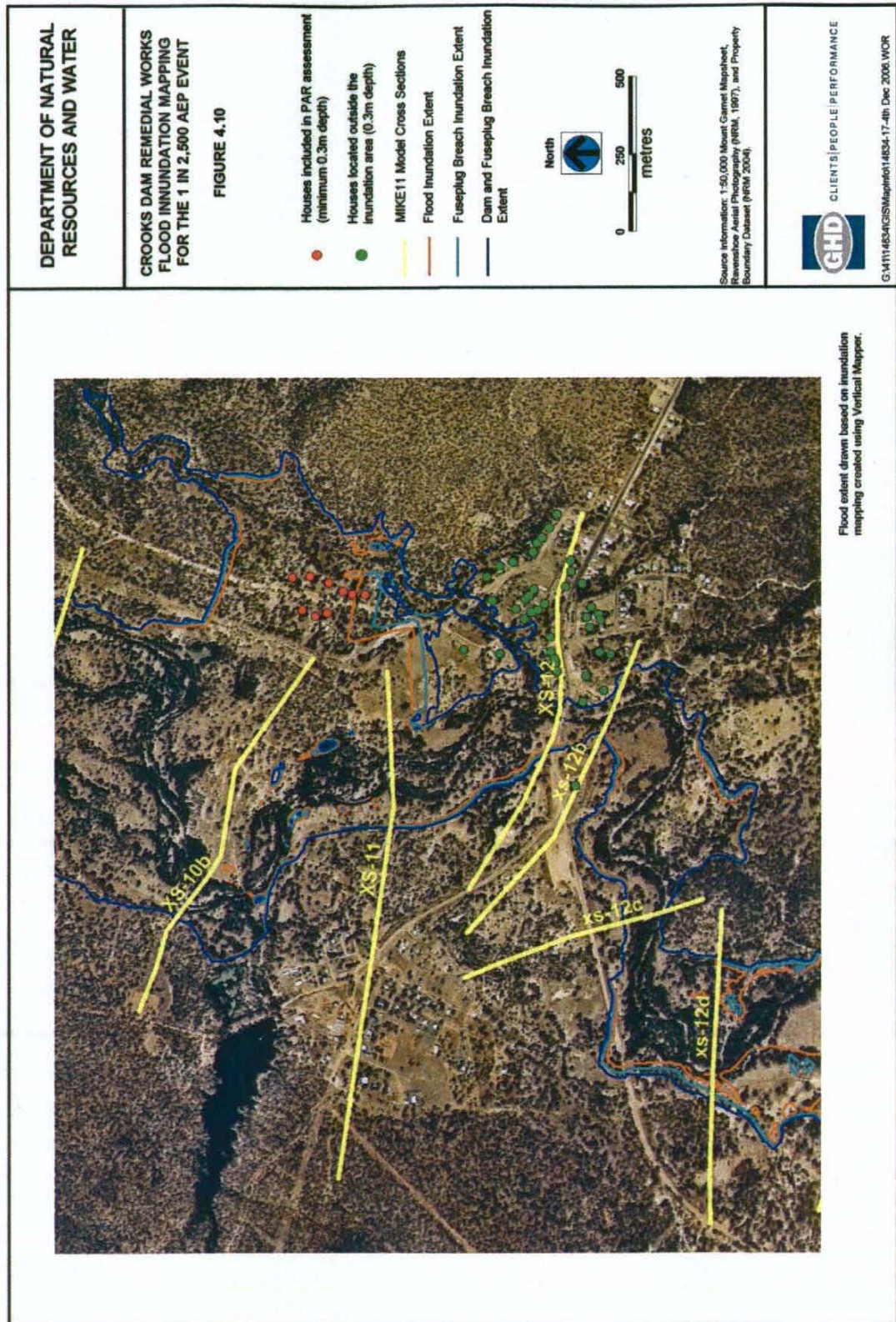
Queensland
Government
Natural Resources
and Water

© The State of Queensland,
Natural Resources and Water, 2007.

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

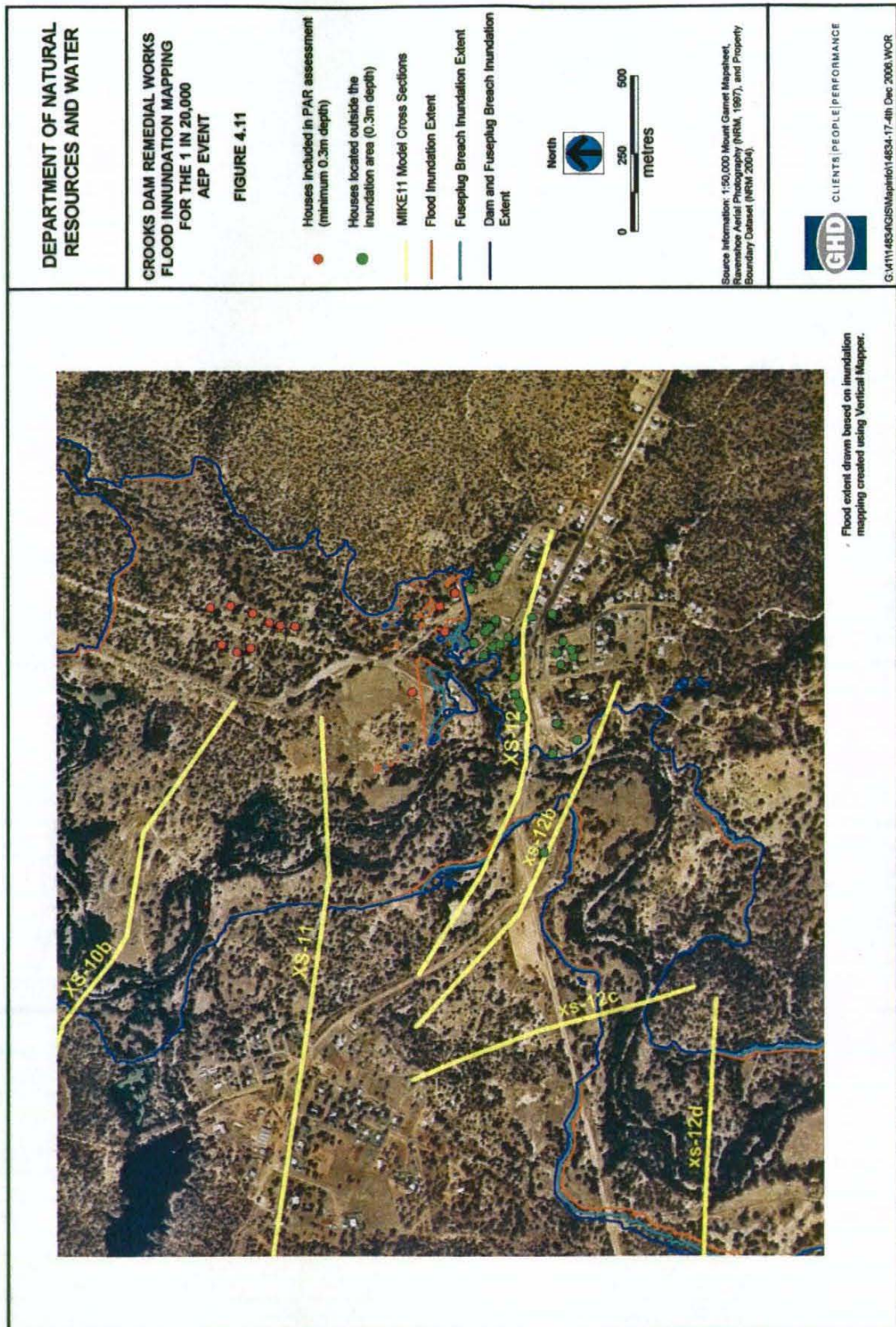
INUNDATION MAPPING - 1:2,500 AEP EVENT

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

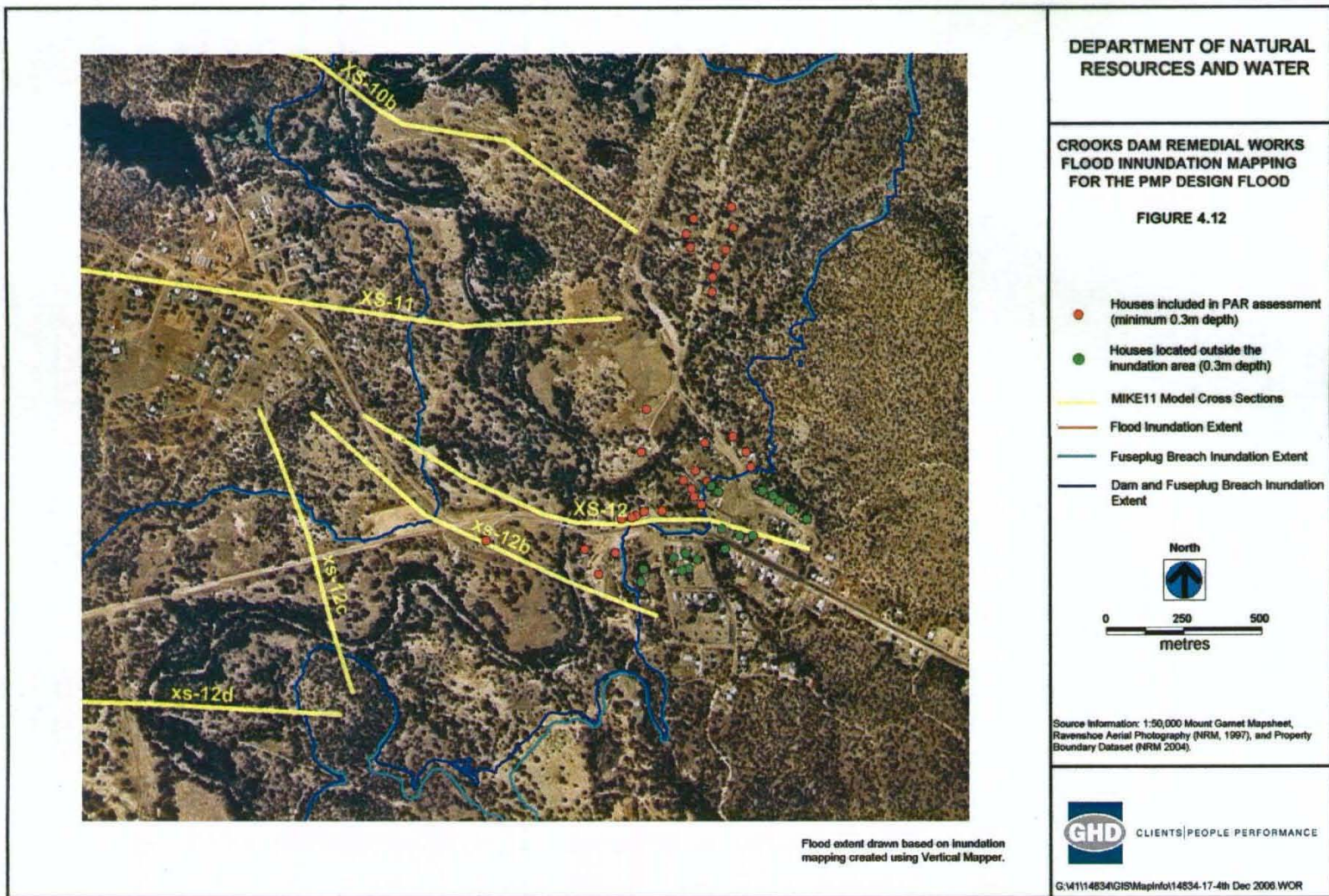


INUNDATION MAPPING - 1:20,000AEP EVENT

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM



INUNDATION MAPPING - PMP DESIGN FLOOD



EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 7

RAINFALL/DURATION CURVES

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

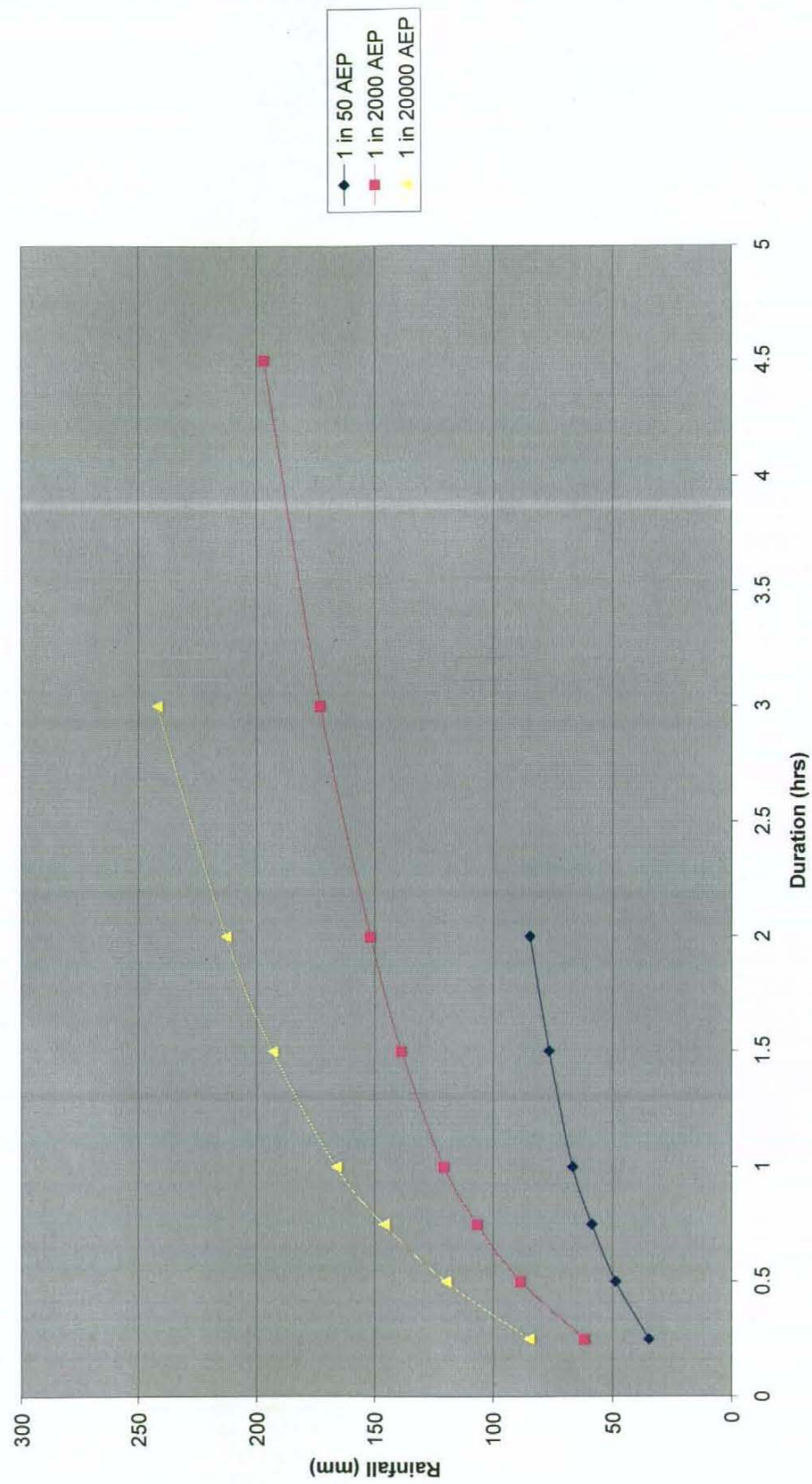
The Bureau of Meteorology update their website hourly from 9am. Thus, during an event the website shall be accessed hourly. The site is www.bom.gov.au. The closest Bureau rain gauges are at Herberton and Mt Garnet. The Cairns radar image covers Mt Garnet area.

- Left Click - Queensland area of the map of Australia.
- Scroll down to Flood Warning, Rainfall and River Information. Left click - Queensland Flood Warning Centre.
- Scroll down to "Zoom in to:"
- Left Click – Daintree to Townsville.
- Scroll Down to table under map and go to column displaying "Latest Rainfall Data"
- Left Click – 1hr for Herbert River – Read rainfall data for Herbert at Herberton and Mt Garnett AL.
- Move to top tool bar and Left Click – Back arrow
- Left Click – 3hr for stations as above – read rainfall data.
- Move to top tool bar and Left Click – Back arrow
- Left Click – 24 hr for stations as above – read rainfall data.
- Move to top tool bar and Left Click – Back arrow
- Scroll down to table under map and go to column displaying "Radar"
- Left Click Cairns and read radar data for Herberton and Mt Garnet at "128 km Cairns Radar" site.

All data received by EAP Officer is to be recorded in the storage log book.

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

Crooks Dam Rainfall Duration Curves



APPENDIX 8

RATING TABLES

(NOT USED IN THIS DOCUMENT)

EMERGENCY ACTION PLAN – CROOKS DAM and WYNDHAM DAM

APPENDIX 9

SOP 14 Small to Medium Spillway Overflows

Department of Environment and Resource Management

Crooks Dam

Standing Operating Procedures

for

Small to Medium Spillway Overflows

SOP - 14

Distribution

| Copy Number | Position | Location |
|-------------|--|------------|
| 1 | RoadTek Works Manager, Asset Services North | Cairns |
| 2 | Regional Manager, Water Services, North Region, DERM | Cairns |
| 3 | Director, Dam Safety, DERM | Brisbane |
| 4 | RoadTek Engineer | Cairns |
| 5 | RoadTek Officer (EAP) | Mt. Garnet |
| 6 | RoadTek Officer (Inspections) | Mt. Garnet |

Approved:

Date: _____

Principal Engineer, Non-Commercial Assets, DERM

Revision Status

[illegible]

| Table of Contents | Page |
|---|------|
| 1 Purpose | 5 |
| 2 Scope | 5 |
| 3 Personnel Affected and Responsibilities | 5 |
| 4 Actions | 5 |
| 5 References | 6 |

Appendices

Appendix A –Inspecting for Deficiencies

1 Purpose

The Crooks Dam is managed by DERM. In terms of an MOU with DERM, the RoadTek Works Manager, Asset Services North, Cairns, manages the operation and maintenance of the Crooks Dam, including routine dam safety inspections.

Part of the dam safety management program is to inspect the Dam immediately before the spillway starts to overflow. A secondary objective is to advise tourists or campers to that access and egress to the area may be cut off due to local stream rises.

2 Scope

This Procedure applies to spillway overflow events that are less than the historical maximum event with a storage level of EL 692.0m. The personnel are the Emergency Action Plan (EAP) Officers listed in the EAP for Crooks Dam.

3 Personnel Affected and Responsibilities

| Officer | Responsibility |
|---|--|
| RoadTek Engineer | A Registered Professional Engineer, Queensland, responsible for carrying out monthly inspections at the dam. |
| Emergency Action Plan Officers (EAP Officers) | The Officer based at Mt. Garnet and at or near Crooks Dam responsible for carrying out EAP procedures for the Dam and this Standing Operating Procedure. |
| Principal Engineer, Non-Commercial Assets | The person responsible for approving the Standing Operating Procedures, the Operation and Maintenance Manual and the persons undertaking the role of EAP Officers and, for managing, receiving, storing and checking data for the Crooks Dam, reviewing and authorising documentation produced by the RoadTek Officer and consultants on the dam and initiating investigations into abnormal behaviour of the dam. |
| | Manages the Distribution, Approval and Revision Control relating to this Procedure. |
| Regional Manager, Water Services, Central West Region, DERM | The person responsible for approving the Emergency Action Plan. |

4 Actions

The EAP Officer should be aware of the storage height and rainfall conditions, and be able to estimate when the spillway is likely to overflow. Details for obtaining information on rainfall, storage and river gauge heights from the Bureau of Meteorology website is given in Appendix 7 of the EAP.

- Two hours before the spillway is estimated to overflow, The EAP officer shall visit the dam if

safe access is possible, and visually inspect the Dam for any deficiencies.

- Check for new cracking or increased crack widths in the spillway face and main wall. Appendix B gives a guide for inspecting the Dam for deficiencies.
- Advise campers at the dam that they should consider leaving the site immediately, while access and egress to the site is open. If they are unable to leave the site because of local stream rises or other reasons they should seek higher ground and await evacuation by police and emergency services.
- Read the storage height gauge and rain gauge at the WAP Officer's residence at one-hour intervals.
- Notify the Police in Cairns, and the Executive Officer, Local Disaster Management Group, Tablelands Regional Council that a spillway discharge is likely. Also provide information of parties that are at the dam site and maybe unable to leave safely.
- At a reasonable time, notify the Principal Engineer, Non-Commercial Assets of storage height and that a spillway discharge is likely. Regularly update Principal Engineer, Non - Commercial Assets during the rainfall event. At least daily or as directed by the Principal Engineer, Non -Commercial Assets.
- If the storage level is predicted to reach EL 692.0m, the EAP Officer is to implement the Major Overflow Event in the EAP.
- When the preceding twelve-hour rainfall is less than 50mm and the storage height gauge is less than EL691.5m and falling, and local stream rises have fallen sufficiently to allow access to and egress from the site, the EAP Officer is to make an inspection of the Dam and advise the Principal Engineer, Non-Commercial Assets.
- Once given permission by the Principal Engineer, Non -Commercial Assets the dam site can be opened to the public. The site maybe closed for extended periods following an event due to flood waters on the access road.
- EAP Officer advises the Police in Cairns, and the Executive Officer, Local Disaster Management Group, Tablelands Regional Council that the site has been opened to the public and stands down.

5 References

- Emergency Action Plan, Crooks Dam

Appendix B

INSPECTING FOR DEFICIENCIES: SUMMARY

Emergency Action Plan Crooks Dam and Wyndham Dam

| TYPE OF DEFICIENCY | LOOK FOR |
|----------------------|--|
| SEEPAGE | <p>A water flow or sand boil on the lower portion of the downstream slope or toe area, especially at the groins.</p> <p>Leakage around conveyance structures such as outlet works.</p> <p>Wet areas or areas where the vegetation appears greener or more lush on the embankment slope or toe area.</p> <p>Blocked toe drains.</p> <p>An increase in the amount of water being released from toe drains. (Remember to take into account changes in the reservoir level.)</p> <p>Turbidity or cloudiness of the seepage.</p> |
| CRACKING | <p>Desiccation Cracking: A random honeycomb pattern of cracks usually found on the crest and the downstream slope.</p> <p>Transverse Cracking: Cracks that are perpendicular to the length of the dam usually found on the crest.</p> <p>Longitudinal Cracking: Cracks that are parallel to the length of the dam. Longitudinal cracks may be associated with stability problems in the slopes.</p> |
| INSTABILITY | <p>Slides on the upstream or downstream slopes.</p> <p>Bulging, especially at the toe of the dam.</p> |
| DEPRESSIONS | <p>Misalignment in the crest and embankment slopes found by sighting along fixed points.</p> <p>Sinkholes found by checking and probing each depression.</p> <p>Remember, sinkholes have steep, bucket like sides while minor depressions have gently sloping, bowl like sides.</p> |
| MAINTENANCE CONCERNS | <p>Inadequate Slope Protection: Check for bald areas or areas where the protection is sparse or damaged.</p> <p>Surface Runoff Erosion: Check for gullies or other signs of erosion. Make sure to check the low points along the upstream and downstream shoulders and groins since surface runoff can collect in these areas.</p> <p>Inappropriate Vegetative Growth: Check for excessive and deep rooted vegetative growth.</p> <p>Debris: Check for debris on and around the dam, especially near outlet works or spillway inlets.</p> <p>Animal Burrows: Check for damage caused by burrowing animals.</p> |

Note: This tabulation taken from Dam Safety Surveillance Field Manual-August 2005

WHEN TO GET FURTHER ASSISTANCE

Several of the deficiencies covered above are very serious. If you observe any of the following deficiencies, you should consult with the Principal Engineer, Non –Commercial Assets:

- Sand boils or turbid seepage.
- Seepage that has increased since the last inspection (taking the reservoir level into consideration).
- Cracking that extends below the reservoir level or potential reservoir level.
- Transverse and longitudinal cracking.
- Deep seated slides or bulging associated with slides.
- Sinkholes or other large depressions.
- Deep rooted vegetation that might need to be removed.

If you are unsure whether or not a condition poses a threat to the safety of the dam, you should discuss your findings with the Principal Engineer, Non –Commercial Assets.

EMERGENCY ACTION PLAN – CROOKS AND WYNDHAM DAMS

APPENDIX 10

ENVIRONMENTAL INCIDENT ALERTS

EMERGENCY ACTION PLAN – CROOKS AND WYNDHAM DAMS

ENVIRONMENTAL INCIDENT ALERT

REGIONAL SERVICE DELIVERY DIVISION

DATE OF INCIDENT:**INCIDENT NOTIFIED BY:****TIME OF NOTIFICATION:****LOCATION OF INCIDENT:****SUMMARY OF INCIDENT AS NOTIFIED:**

-
- Provide a brief dot point summary of the situation based on the information available

POTENTIAL IMPACTS:

-
- (this information can be based on advice from the company or source of the incident)
- Likelihood of unlawful environmental harm
- Likelihood of potential risk to public health (if public health risk is identified notify Queensland Health and provide details in this alert)

DERM's PLANNED ACTIONS:

-
- What actions has DERM taken
- What actions are proposed to be taken and timeframe for doing these

NEXT UPDATE ON INCIDENT EXPECTED:

-
- Date/time estimate

COMMUNICATION:

-
- What communications have been made?
- What public notifications have been made?
- What public notifications are expected?

MAP OR PLAN OF SITE:

-
- Where possible attach a map or plan which identifies the site and key features

| | | |
|--------------------|-----------------|-------|
| Region: . | | |
| Briefing Officer: | Telephone: (07) | Date: |
| Approving Officer: | Telephone: (07) | Date: |

EMERGENCY ACTION PLAN – CROOKS AND WYNDHAM DAMS

From: Brown Damien

Sent: Wednesday, 24 February 2010 2:29 PM

To: Birchley Michael; Buckley Andrew; Hart Randall; Pappalardo Joe

Cc: Miles Rhonda

Subject: Environmental Incident Alert Process for Regional Service Delivery

Importance: High

Good afternoon

As you are aware, Minister Jones' office has requested to be informed immediately of any environmental incidents, the impacts of such and proposed actions by the department. Due to the volume and urgent nature of these alerts I have attached a template that we will use to ensure that consistent and timely responses are provided across Regional Service Delivery, a similar process to what is used for DLO responses.

The attached template is to be used to advise as soon as possible on environmental incidents, such as fish kills, mine discharges, potential environmental harm due to spills, etc. **All information is to be approved by the relevant RSD** and emailed to the following parties:

- John Bradley, Director General;
- Terry Wall, Associate Director General;
- Debbie Best, DDG
- Michael Dart, Senior Policy Advisor to Minister Kate Jones;
- Joshua Cooney, Ministerial Media Officer to Kate Jones;
- Paul Michaels, Director DERM Media unit;
- Damine Brown, ADG RSD
- Kim Harycki, PA RSD

The email is to be sent **by the RSD only**. The email heading is to read "(Minister Jones) Environmental Incident Alert - *subject*" and a brief description is to be provided in the body of the email.

This process is not intended to replace suitable briefing notes on issues when time avails or phone contact with people like me to alert on incidents in a timely way. It is intended only to provide a suitable early alert to a wide group of parties of an incident that we have been notified of. It is not intended to be an onerous process or to delay any action or response. The template should be completed as quickly as possible and if something is unknown, then write in "unknown", don't hold up providing the advice seeking further information, early is better.

I would appreciate you distributing this template to officers within your region for **immediate use**.

If you have any queries in relation to the use of this form, please contact Kim direct.

Regards

EMERGENCY ACTION PLAN – CROOKS AND WYNDHAM DAMS

Damien Brown

Assistant Director-General

Regional Service Delivery

Telephone: [REDACTED]

Mobile: [REDACTED]

Email: [REDACTED]

www.derm.qld.gov.au

Department of Environment and Resource Management

Level 13

400 George Street, Brisbane Q 4000

GPO Box 2454, Brisbane Q 4001

Relevant email addresses:-

[REDACTED]

[REDACTED]

Department of Environment
and Resource Management

MASTER COPY

EMERGENCY ACTION PLAN

Ibis Creek Dam

Revision 6 (*Re-Issue*)

December 2010



EMERGENCY ACTION PLAN – IBIS CREEK DAM

Prepared by:

Non-Commercial Assets

Department of Environment and Resource Management

© State of Queensland (Department of Environment and Resource Management)

December 2010

EMERGENCY ACTION PLAN – IBIS CREEK DAM

PREPARATION AND AUTHORISATION

This Emergency Action Plan was prepared by Principal Engineer, Non-Commercial Assets.

Preparation:

_____ Date: ____/____/____

Principal Engineer, Non-Commercial Assets

Approval:

_____ Date: ____/____/____

Regional Manager, Water Services, Central West Region

REVISION STATUS

| Revision No. | Date | Revision Description |
|--------------|----------------|--|
| 0 | October 2004 | Original Issue |
| 1 | November 2005 | Contact list updated and documentation revision |
| 2 | February 2007 | Contacts list updated and documentation revision |
| 3 | September 2007 | Contacts list updated |
| 4 | March 2008 | Contacts list updated |
| 5 | October 2009 | Contacts list updated and documentation revision |
| 6 | September 2010 | Contacts list updated and documentation revision |
| 6.1 | November 2010 | Documentation revised to include Evacuation Plan approved by LDMG |
| 6.2 | December 2010 | Documentation revised to accommodate new appendix 11 and EAP role change |

EMERGENCY ACTION PLAN – IBIS CREEK DAM

TABLE OF CONTENTS

| | |
|---|----|
| PREPARATION AND AUTHORISATION..... | 1 |
| 1.0 INTRODUCTION..... | 1 |
| 2.0 CONTROLLED COPY DISTRIBUTION LIST..... | 2 |
| 2.1 LIST OF CONTACTS..... | 3 |
| 3.0 EMERGENCY EVENTS AND ACTIONS | 6 |
| 3.1 EVENT 1 | 6 |
| Reservoir level approaching the Dam height gauge EL826.0m and heavy rainfall continuing in the catchment..... | 6 |
| 3.2 EVENT 2..... | 7 |
| Sunny Day Failure..... | 7 |
| 3.3 EVENT 3 | 8 |
| Increase in seepage or additional cracking or increased crack widths in dam wall. | 8 |
| 3.4 EVENT 4..... | 9 |
| Toxic spill within the Catchment/Storage..... | 9 |
| 4.0 ROLES AND RESPONSIBILITIES | 10 |
| 4.1 EAP Officer..... | 10 |
| 4.2 EAP Backup 1 and 2..... | 11 |
| 4.3 Principal Engineer, Non-Commercial Assets | 11 |
| 4.4 Regional Manager, Water Services, Central West Region..... | 12 |
| 4.5 Regional Manager, Environmental Services, North Region..... | 12 |
| 4.6 Regional Services Director, Central West Region..... | 12 |
| 4.7 Tablelands Local Disaster Management Group (LDMG) | 12 |
| 5.0 EVACUATION PROCEDURE | 14 |
| 5.1 GENERAL | 14 |
| 5.2 SUNNY DAY FAILURE..... | 14 |
| 5.3 FLOOD EVENTS..... | 14 |
| 5.4 POST EVACUATION | 15 |
| 5.5 POST EMERGENCY EVENT..... | 15 |
| 6.0 PREDICTED FLOOD LEVELS AND FLOOD TRAVEL TIMES..... | 16 |
| 6.1 PREDICTED DEPTH OF FLOODING | 16 |
| 6.2 FLOOD WAVE TRAVEL TIMES | 16 |
| 7.0 COMMUNICATIONS | 17 |
| 8.0 STORAGE LOG BOOK | 18 |
| 9.0 POTENTIAL PROBLEM IDENTIFICATION TO NOTE WHEN INSPECTING THE DAM..... | 19 |
| 9.1 INSPECTION SAFETY PROTOCOL..... | 19 |
| 9.2 POTENTIAL PROBLEM IDENTIFICATION..... | 19 |
| 9.3 DAM DETAILS | 19 |
| 10.0 EMERGENCY EVENT REPORT | 23 |
| 11.0 REVISION OF EVACUATION PLANS..... | 24 |
| 12.0 REFERENCES | 25 |

EMERGENCY ACTION PLAN – IBIS CREEK DAM

| | | |
|-------------|--|----|
| APPENDIX 1 | LOCALITY PLAN..... | 25 |
| APPENDIX 2 | CATCHMENT BOUNDARY..... | 27 |
| APPENDIX 3 | INSPECTION SAFETY PROTOCOL..... | 29 |
| APPENDIX 4 | POTENTIAL PROBLEM IDENTIFICATION..... | 31 |
| APPENDIX 5 | INUNDATION PLANS..... | 34 |
| APPENDIX 6 | EVACUATION PLANS..... | 40 |
| APPENDIX 7 | RAINFALL AND GAUGE HEIGHT INFORMATION..... | 66 |
| APPENDIX 8 | ESTIMATED FLOOD TRAVEL TIMES..... | 68 |
| APPENDIX 9 | STANDING OPERATING PROCEDURE FOR SPILLWAY OVERFLOWS..... | 70 |
| APPENDIX 10 | ENVIRONMENTAL INCIDENT ALERTS..... | 79 |
| APPENDIX 11 | AUTOMATED ALERT MESSAGES..... | 83 |
| | DATA..... | 85 |

EMERGENCY ACTION PLAN – IBIS CREEK DAM

1.0 INTRODUCTION

Ibis Creek Dam is a concrete-faced rockfill dam that was built in 1907. It is located on the Ibis Creek approximately 83 kilometres south-west of Cairns; the nearest town is Irvinebank, which is about 1.6 kilometres downstream of the dam.

The Dam is owned and operated by the Department of Environment and Resource Management (DERM). Non-potable water is supplied under agreement to the townspeople for their use. A 1.4 kilometre pipeline runs north-west from the dam to supply tanks located on a ridge and then is gravity fed in several directions to each property.

Ibis Dam has only been deemed with confidence to be capable of handling a flood event equivalent to 7% of Acceptable Flood Capacity (AFC). This is representative of flooding associated with Cyclone Larry in 2006, the largest known flood event to have passed through the Dam.

Up to 75 people could be inundated if there is a Sunny Day, Dam Crest Flood or Probable Maximum Flood Failure of the Dam (*refer FIA, SunWater, May 2008*). In the event of dam failure, as little as 5 minutes would be available to warn the people of Irvinebank.

The purpose of this Emergency Action Plan is to outline the necessary actions by DERM, the local counter disaster groups and affected persons in the event of an emergency condition or potential emergency condition associated with Ibis Dam.

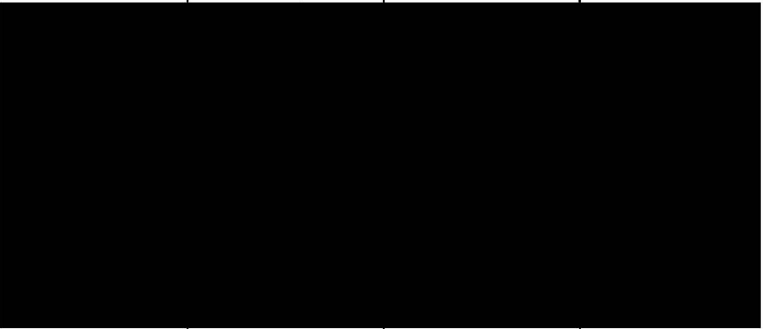
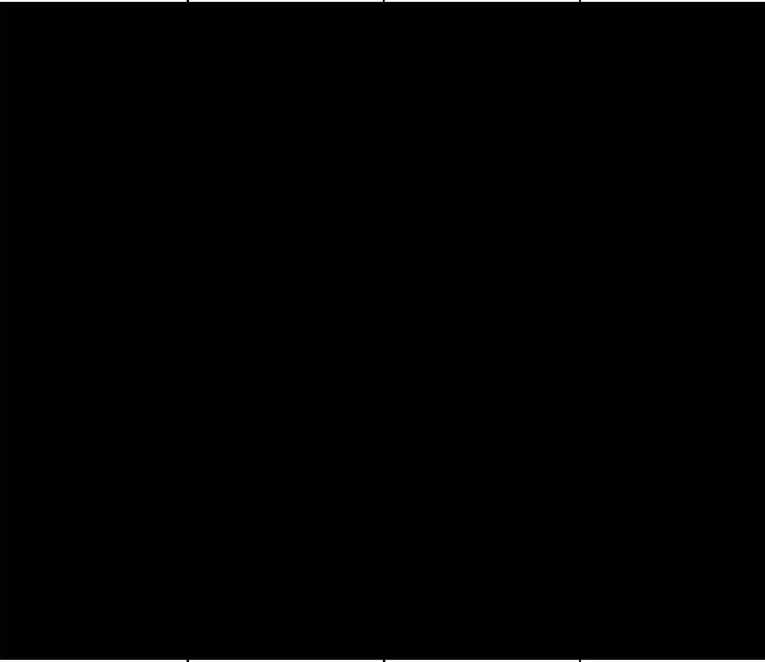

EMERGENCY ACTION PLAN – IBIS CREEK DAM

2.0 CONTROLLED COPY DISTRIBUTION LIST

| Copy Number | Position | Location | Document Type |
|--------------------|---|-----------------|-----------------------|
| 1 | Emergency Action Plan Engineer | Cairns | Bound copy |
| 2 | Emergency Action Plan Officer | Irvinebank | Red Binder (provided) |
| 3 | Emergency Action Plan Backup 1 | Irvinebank | Red Binder (provided) |
| 4 | Emergency Action Plan Backup 2 | Irvinebank | Red Binder (provided) |
| 5 | Principal Engineer, Non-Commercial Assets | Rockhampton | Bound copy |
| 6 | Regional Services Director, DERM, North Region | Townsville | Bound copy |
| 7 | Regional Manager, Water Services, North Region | Cairns | Bound copy |
| 8 | Regional Manager, Water Services, Central West Region | Rockhampton | Bound copy |
| 9 | Director, Dam Safety | Brisbane | Bound copy |
| 10 | Officer In Charge, Police | Herberton | Bound copy |
| 11 | Disaster District Coordinator | Mareeba | Bound copy |
| 12 | Local Disaster Coordinator Tablelands Local Disaster Management Group (LDMG) | Atherton | Bound copy |
| 13 | Director, Disaster Operations, Emergency Management Queensland | Brisbane | Bound copy |
| 14 | Regional Director, Far Northern Region, Emergency Management Queensland | Cairns | Bound copy |
| 15 | Officer In Charge, Police | Mareeba | Bound copy |
| 16 | Emergency Action Plan Backup 3 & 4 | Irvinebank | Red Binder (provided) |

EMERGENCY ACTION PLAN – IBIS CREEK DAM

2.1 LIST OF CONTACTS

| Title/Name | Phone Business | Phone A/H | Phone Mobile | Fax |
|--|--|------------------|---------------------|------------|
| EAP Officers | | | | |
| UHF radio channel 40 | | | | |
| EAP Officer (Peter Shimmin) |  | | | |
| EAP Backup 1 (Peter Richardson) | | | | |
| EAP Backup 2 (Brian Perkes) | | | | |
| EAP Backup 3&4 (Mark Evans & Janette Hodgkinson) | | | | |
| Regional Management | | | | |
| Regional Service Director Central West Region (Joe Pappalardo) |  | | | |
| Regional Manager, Water Services Central West Region (Ed Donohue) | | | | |
| Regional Manager, Water Services North Region (Nigel Kelly) | | | | |
| Regional Manager, Environmental Services North (Rob Lawrence) | | | | |
| Principal Engineer, Non-Commercial Assets (Bill Steen) | | | | |
| Dam Safety Group | | | | |
| Director Dam Safety (Peter Allen) |  | | | |
| Principal Engineer Dam Safety (Ron Guppy) | | | | |
| EAP Engineer (Andrew Schelberg) | | | | |

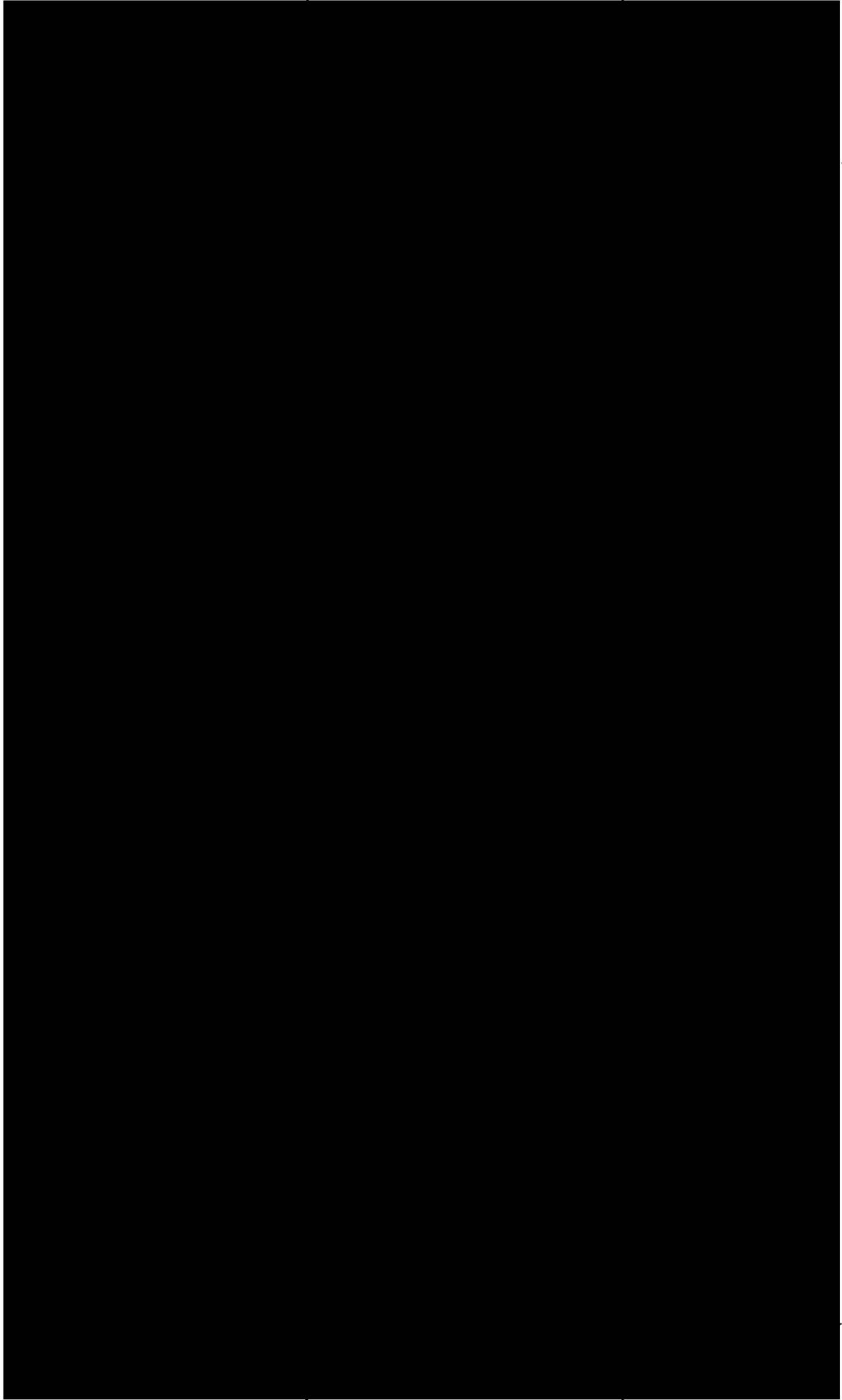
EMERGENCY ACTION PLAN – IBIS CREEK DAM

LIST OF CONTACTS (continued)

| TITLE/NAME | Phone Business | Phone A/H | Phone Mobile | Fax |
|--|-------------------|-----------|--------------|-----|
| Counter Disaster Groups | | | | |
| Regional Director, Far Northern Region, Emergency Management Queensland (Wayne Coutts) | | | | |
| Local Disaster Coordinator, Tablelands LDMG (Sarah Dean) Chair of LDMG / Deputy Mayor (Chris Adams) General Manager Planning & Development, Tablelands Regional Council (Steven Ripper) | | | | |
| Emergency Management Queensland Watch Desk Officer | | | | |
| Chemical Hazards Emergency Management Services Scientific Unit | | | | |
| Queensland Fire and Rescue Services Chemical Hazards Unit | | | | |
| Police | | | | |
| Police Herberton Officer In Charge (Sergeant Craig Roberts) (In an emergency 000) | | | | |
| Police Mareeba Officer In Charge (Snr Sergeant Richard Kroon) (In an emergency 000) | | | | |
| Disaster District Coordinator (District Inspector Rolf Stratamier) Police Communications Centre Mareeba | | | | |

EMERGENCY ACTION PLAN – IBIS CREEK DAM

LIST OF CONTACTS (continued)

| House Number | Name | Address | Phone |
|-------------------|---|---------|-------|
| Landowners | | | |
| 1 |  | | |
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3.0 EMERGENCY EVENTS AND ACTIONS

The maximum storage height on record is EL826.1m in March 2006 due to cyclone "Larry". The maximum depth of water over the deck of the bridge at the bottom of Jessie Street was reported as 850mm for the same event. Any overflow events that do not reach these levels are regarded as small to medium events. The procedures to be followed for these events are outlined in Standing Operating Procedures for Small to Medium Spillway Overflows (SOP 14). A copy of this procedure is included as Appendix 9.

The following events are defined as emergency events:

- Major Overflow Event - Reservoir level approaching EL 826.0m and heavy rainfall continuing in the catchment.
- Sunny Day Failure or Earthquake, Tremor or Landslide into the storage.
- Increase in seepage, not due to rise in storage level, and/or additional cracking or increased crack widths in dam wall.
- Toxic spill within storage/catchment.

The actions that are to be undertaken by the EAP Officer in each emergency event are described in the following sections of this chapter. The EAP Officer may assign EAP Backup 1 and/or 2 or other EAP officers to assist him undertake these actions.

The Dam is likely to be difficult to get to by road after rainfall because of local stream rises and slippery roads. The EAP Officer (has to live on the south-eastern side of Ibis Creek) is then reliant on accessing the dam in a 4WD vehicle in order to report on flooding. During a heavy rainfall event the height gauge at the dam and the rain gauge at the EAP Officers residence should be read at one-hour intervals until the storage height approaches EL 826.0m which is the maximum on record in 2006. The height gauge and the rain gauge should be read at half hourly intervals if the storage height increases.

3.1 EVENT 1

Reservoir level approaching the Dam height gauge EL826.0m and heavy rainfall continuing in the catchment.

The EAP Officer shall:

- If safe access to the Dam is possible, check for new cracking or increased crack widths in the dam wall. Appendix 4 - Potential Problem Identification gives a guide for inspecting the dam.
- Read storage height gauge and rain gauge at half-hour intervals. Measure the depth of water over the deck of the bridge at bottom of Jessie Street at half hour intervals.
- Notify the Principal Engineer, Non-Commercial Assets of the storage height gauge, rainfall, rate of rise of the storage, and the depth of water over the deck of the bridge. Regularly update Principal Engineer, Non-Commercial Assets during the event.
- Notify the Local Disaster Coordinator, Tablelands LDMG that a significant flood is in progress.
- If the storage height gauge reaches EL826.1m, notify the Local Disaster Coordinator, Tablelands LDMG that the dam is considered to be unsafe and that the evacuation

EMERGENCY ACTION PLAN – IBIS CREEK DAM

plans for the population at risk should be implemented. Notify the Principle Engineer, Non Commercial Assets. If the Local Disaster Coordinator, Tablelands LDMG is not able to be contacted, the EAP Officer is to advise the Police Communication Centre in Mareeba that the population at risk should be evacuated and then notify the population at risk that they should evacuate their homes.

- If access to the dam is deemed to be unsafe, continue to read rain gauge and depth of water over the bridge deck at half hourly intervals.
- If access to the dam is deemed to be unsafe and the depth of water over the bridge deck exceeds 850mm, notify the Local Disaster Coordinator, Tablelands LDMG that the dam is considered to be unsafe and that the evacuation plans for the population at risk should be implemented. Notify the Principle Engineer, Non Commercial Assets. If the Local Disaster Coordinator, Tablelands LDMG is not able to be contacted, the EAP Officer is to advise the Police Communication Centre in Mareeba that the population at risk should be evacuated and then notify the population at risk that they should evacuate their homes.

Automatic alerts will be sent from the DERM Hydstra System when the water level reaches EL 826.1m. See details in Appendix 11

- This Event ends when the preceding twelve-hour rainfall is less than 50mm and the storage height gauge is less than EL826.0m and falling. On authorisation from Principal Engineer, Non-Commercial Assets, EAP Officer makes a final inspection of the Dam and notifies EAP Backups, the Local Disaster Coordinator, Tablelands LDMG that the Emergency Event is at an end and reverts to Standing Operating Procedures for Small to Medium Spillway Overflows (SOP 14).
- After the event, compile an Emergency Event Report and forward unedited copies to Principal Engineer, Non-Commercial Assets.

Principal Engineer, Non-Commercial Assets shall:

- Provide an environmental incident alert to the Regional Manager, Water Services, Central West
- Provide a report to Director, Dam Safety within 30 days.

3.2 EVENT 2

Sunny Day Failure

The most likely event that may cause a Sunny Day Failure is an earth tremor or landslide into the dam.

If the EAP Officer notices an earth tremor or learns of one through the media, he shall:

- Mobilise EAP Officers Backup 1&2. Check the dam with EAP Backup 1 and send EAP Backup 2 to immediately advise residents and occupants at Irvinebank that an earth tremor may have occurred and the dam could experience a Sunny Day Failure and they may wish to implement their individual evacuation plans and then contact LDMG
- Read the storage height gauge at five-minute intervals for 15 minutes. If the height gauge falls by 100mm in any five-minute period a failure or partial failure of the dam may have occurred. The EAP Officer must then:-
 - Notify the Local Disaster Coordinator, Tablelands LDMG that the dam may have

EMERGENCY ACTION PLAN – IBIS CREEK DAM

- experienced a failure or partial failure and the evacuation plans for the population at risk should be implemented.
- Report the possible failure immediately to the Principal Engineer, Non-Commercial Assets, or if he cannot be contacted, the Regional Manager, Water Services Central West Region.
- If the height gauge does not fall, and safe access to the Dam is possible, immediately check the dam and spillway for cracking and leakage and if anything unusual is observed, report any damage immediately to the Principal Engineer, Non-Commercial Assets.
- After the event (usually within 24 hours), compile an Emergency Event Report and forward unedited copies to Principal Engineer, Non-Commercial Assets.

Principal Engineer, Non-Commercial Assets shall:

- If thought necessary, after considering EAP Officer verbal and written reports, arrange for inspection of the dam by an experienced Consulting Dam Safety Engineer.
- Report Dam Safety Engineers findings to Director Dam Safety and obtain clearance to end the event.
- Instruct EAP Officer to notify EAP Backup 1 and 2, the Local Disaster Coordinator, Tablelands LDMG that the emergency event is at an end.
- Provide an environmental incident alert to the Regional Manager, Water Services, Central West.
- Provide a report to Director, Dam Safety within 30 days.

3.3 EVENT 3

Increase in seepage or additional cracking or increased crack widths in dam wall.

If leakage rates rise for no corresponding rise in water level or if additional cracking or increased cracking in the concrete face is observed, the EAP Officer shall:

- Visually assess the increase in seepage.
- Inspect the upstream concrete face for any signs of new cracks, displacements across cracks or joints, or whirlpools that might indicate the source of new or increased seepage.
- Immediately notify Principal Engineer, Non-Commercial Assets (PE, NCA to notify Local Disaster Coordinator, Tablelands LDMG).
- Monitor and record and take photographs at regular intervals until advised otherwise by Principal Engineer, Non-Commercial Assets.
- This Event ends when advised by Principal Engineer, Non-Commercial Assets.
- After the event compile an Emergency Event Report and forward to Principal Engineer, Non-Commercial Assets.

Principal Engineer, Non-Commercial Assets shall:

- Determine possible cause for additional seepage.

EMERGENCY ACTION PLAN – IBIS CREEK DAM

- Investigate possible remedial action, such as reducing the water level in the storage by opening the outlet valve.
- Provide an environmental incident alert to the Regional Manager, Water Services, Central West
- Provide a report to Director, Dam Safety within 30 days.

3.4 EVENT 4**Toxic spill within the Catchment/Storage.**

Note: Under no circumstances shall EAP officers approach spills where the nature or toxicity of the substance is not known.

On detection or notification of a toxic or hazardous substance contaminating the catchment or storage the EAP Officer shall:

- Identify the hazardous substance or chemical, if possible.
- Seek advice from the Queensland Fire and Rescue Service by dialling the general emergency telephone number 000 and/or the Chemical Hazards and Emergency Management Unit, on the nature of the hazard.
- Notify landowners upstream and downstream of the dam and visitors to the dam site who may be affected.
- Isolate the Irvinebank pipeline by closing valves.
- Take reasonable steps to isolate the spill or containment from the dam by construction of a containment embankment, or prevent further contamination.
- Notify the Local Disaster Coordinator, Tablelands LDMG.
- Notify the Principal Engineer, Non-Commercial Assets who will assess the situation, advise on further action or advise the end of the Emergency Event.
- This Event ends when advice is received from the Chemical Hazards and Emergency Management Unit that the spill is no longer a toxic hazard. EAP Officer makes a final inspection of the Dam, advises Principal Engineer, Non-Commercial Assets, EAP Backups, the Local Disaster Coordinator, Tablelands LDMG, that the Emergency Event is at an end and stands down.
- Notify landowners upstream and downstream of the dam and visitors to the dam site that there are no longer any toxic hazards.
- Once given permission by the Principal Engineer, Non -Commercial Assets re-open the valves as directed.
- After the event, compile an Emergency Event Report and forward unedited copies to Principal Engineer, Non-Commercial Assets.

Principal Engineer, Non-Commercial Assets shall:

- Assess the situation and advise on further action.
- Direct reopen the valves.
- Advise the end of the Emergency Event.
- Provide an environmental incident alert to the Regional Manager, Water Services, Central West and the Director, Environmental Services, North Region
- Provide a report on the event to the Director, Dam Safety within 30 days.

EMERGENCY ACTION PLAN – IBIS CREEK DAM

4.0 ROLES AND RESPONSIBILITIES**4.1 EAP Officer**

EAP Officer shall:

- Monitor the dam for any potential emergency conditions.
- Follow the Emergency Action Plan in time of emergency.
- If requested by Local Disaster Coordinator, Tablelands LDMG, implement local evacuation procedure for population at risk.
- During an emergency event, report to and receive instructions from the Principal Engineer, Non-Commercial Assets or if he cannot be contacted, the Regional Manager, Water Services, Central West Region, or if he cannot be contacted, the Regional Manager, Water Services, North Region
- In an emergency event, take steps to ensure personal safety and the safety of other EAP Officers and the public.
- Record details of the Emergency Events as described in the Storage Log Book and take photographs. Details which should be recorded are time and date, water level readings, rain gauge readings, details of all phone calls, actions and directions from Principal Engineer, Non-Commercial Assets or his backup.
- Immediately fax or phone all recordings to the Principal Engineer, Non-Commercial Assets for evaluation during the emergency or if he cannot be contacted, the Regional Manager, Water Services, Central West Region or if he cannot be contacted, the Regional Manager, Water Services, North Region.
- During an emergency event, provide status reports to the Local Disaster Coordinator, Tablelands LDMG. These reports shall contain factual information such as water level and rainfall recordings. Projections or opinions based on past experience of similar events or specialist knowledge may be given. The EAP Officer should refer the media to the LDMG. If the Local Disaster Coordinator, Tablelands LDMG is not able to be contacted, the EAP Officer is to advise the population at risk that they should evacuate their homes.
- In the likelihood of adverse weather or stream flow conditions or at any other time that the EAP Officer is unable to fulfil the duties, advise EAP Backup 1 or 2 of any intended absence from the area and leave a point of contact.
- Immediately notify the EAP Backup officers when the Emergency Action Plan is being initiated.
- Make contact with telephone numbers and facsimile numbers of the Notification List of the Emergency Action Plan by 1st September each year.
- Notify the Principal Engineer, Non-Commercial Assets in writing of any changes to names and numbers on the Notification List of the Emergency Action Plan.
- Notify Principal Engineer, Non-Commercial Assets in writing of names and contact details of personnel undertaking and/or relieving the role of EAP Officer and EAP Backup 1 or 2.
- Keep the Emergency Action Plan in a clean, secure facility..
- Ensure Emergency events are recorded in the Storage Log Book as described in section 3.7.
- After an emergency event, prepare an Emergency Event Report as described in section 3.8. Immediately after the event this report shall be sent to Principal Engineer, Non-Commercial Assets.

EMERGENCY ACTION PLAN – IBIS CREEK DAM

4.2 EAP Backup 1 and 2

EAP Backup 1 and 2 shall:

- Assist the EAP Officer in times of emergency.
- Undertake the responsibilities of the EAP Officer should that person be unavailable.
- If, during adverse weather conditions, EAP Backup 1 and 2 have not been contacted by EAP Officer they shall:
 - Attempt to contact EAP Officer,
 - Enact the Emergency Action Plan if contact with the EAP Officer cannot be made.

4.3 Principal Engineer, Non-Commercial Assets

Principal Engineer, Non-Commercial Assets shall:

- Ensure this Emergency Action Plan is implemented.
- Approve the person undertaking and/or relieving in the role of EAP Officer and EAP Backup 1 and 2.
- Ensure the EAP Officer and EAP Backup 1 and 2 are conversant with the Emergency Action Plan.
- Review the Emergency Action Plan in consultation with Regional Manager, Water Services, Central West Region, by 1st September each year.
- Ensure the Emergency Action Plan is distributed according to the Distribution List and that the counter disaster organisations are conversant with the plan.
- Notify Director, Dam Safety and Regional Manager, Water Services, Central West Region, of any emergency event.
- Only on delegation from the Regional Manager, Water Services, Central West Region at the time of each event, act for and on behalf of the Regional Manager during the emergency.
- Monitor any emergency event.
- Evaluate situation on best available information.
- Advise Director, Dam Safety and Regional Manager, Water Services, Central West Region during an emergency event.
- Provide an environmental incident alert to the Regional Services Director, Central West. A template is provided in Appendix 10.
- Within thirty (30) days of an event, present an Emergency Event Report to Director, Dam Safety and Regional Manager, Water Services, Central West Region.

EMERGENCY ACTION PLAN – IBIS CREEK DAM

4.4 Regional Manager, Water Services, Central West Region

Regional Manager, Water Services, Central West Region, shall:

- Review the Emergency Action Plan in consultation with the Principal Engineer, Non-Commercial Assets by 1st September each year.
- Direct the actions of departmental personnel during an emergency to protect life and property to the maximum extent considered possible under the prevailing conditions and with the resources available.
- Delegate role of Regional Manager, Water Services, Central West, in his/her absence.
- Authorise this Emergency Action Plan.
- Review environmental incident alerts and forward to the Regional Services Director, Central West Region and the Regional Manager, Water Services, North Region. Forward a copy of any alert for toxic spills to the Regional Manager, Environmental Services, North Region.

4.5 Regional Manager, Environmental Services, North Region

- Review environmental incident alert and provide advice to the Regional Services Directors, North and Central West Regions.

4.6 Regional Services Director, Central West Region

Regional Services Director, Central West Region shall:-

- Review and approve environmental incident alerts and forward to Assistant Director-General, Regional Service Delivery.

4.7 Tablelands Local Disaster Management Group (LDMG)

The Tablelands LDMG shall:-

- If notified by the EAP Officer that the dam is considered to be unsafe and that the evacuation plans for the population at risk should be implemented, advise the Police Communication Centre in Mareeba that the population at risk should be evacuated.
- Coordinate the operational response of the Local Disaster Management Group (LDMG).
- Develop comprehensive Local Disaster Management Planning strategies.
- Design and maintain public education / awareness programs.
- Design, maintain and operate a Local Disaster Coordination Centre, including the training of sufficient personnel to operate the Centre.
- Coordinate support to response agencies.
- Carry out reconnaissance and impact assessments.
- Provide public information prior to, during and following disaster event impacts.
- Make recommendations regarding areas to be considered for authorised evacuation.
- Provide public advice re voluntary evacuation.

EMERGENCY ACTION PLAN – IBIS CREEK DAM

- Identify, resource, staff and operate Evacuation Centres.
- Provide locally based community support services.

5.0 EVACUATION PROCEDURE

5.1 GENERAL

EAP officers will provide evacuation advice only to the Local Disaster Coordinator, Tablelands LDMG. Advice on likely flood levels and times will be provided to the population at risk in order for them to make their own assessment of the need to evacuate.

Emergency events at Ibis Creek Dam may cause rapid flooding in houses at risk. Notice of flooding may not be possible and residents may need to make their own assessment of the need to evacuate. For this reason Individual Evacuation Plans have been prepared for each residence. They detail the route to follow to a safe point. Individual Evacuation Plans are found in APPENDIX 6. Residents have been consulted in the development of their evacuation plan and have been requested to position their evacuation plan in a prominent location in their house.

Because of the terrain, distances and possible flooded streams it may not be possible for residents at risk to assemble at one point. There are various evacuation assembly points if residents have adequate time to evacuate before local streams rise and cut access. Otherwise, they should move to the high ground indicated in their individual evacuation plans.

5.2 SUNNY DAY FAILURE

The time intervals between responsible EAP Officers or residents at risk becoming aware of an emergency event due to a Sunny Day Failure of the dam and the arrival of the flood peak at houses may be too short to allow implementation by Emergency Services Personnel of an Evacuation Procedure.

The EAP Officer at the site, immediately on becoming aware or suspecting that an emergency event has occurred which could result in a Sunny Day Failure, is to advise the Local Disaster Coordinator, Tablelands LDMG and the population at risk that they may wish to implement their Individual Evacuation Plan.

Individual Evacuation Plans have been prepared for and distributed to residents at risk. They have been advised implement their Evacuation Plan without further advice from EAP Officer, Local Disaster Coordinator, Tablelands LDMG if they become aware of or suspect that an emergency event has occurred.

5.3 FLOOD EVENTS

When emergency events occur where more time is available the EAP Officer on site is to advise the Local Disaster Coordinator, Tablelands LDMG that a flood event is occurring, which could result in an emergency event. Local Disaster Coordinator, Tablelands LDMG may then implement the emergency action he considers appropriate which may include the Individual Evacuation Plans. If the Local Disaster Coordinator, Tablelands LDMG is not able to be contacted, the EAP Officer is to advise the population at risk that they should evacuate their homes.

EMERGENCY ACTION PLAN – IBIS CREEK DAM

5.4 POST EVACUATION

After an emergency event has occurred during which this Evacuation Procedure has been implemented the Local Disaster Management Group are to control the return of people to buildings, which have been affected.

5.5 POST EMERGENCY EVENT

After an emergency event the Tablelands Regional Council are in charge of the area and this Emergency Action Plan has no further role in that event.

EMERGENCY ACTION PLAN – IBIS CREEK DAM

6.0 PREDICTED FLOOD LEVELS AND FLOOD TRAVEL TIMES

6.1 PREDICTED DEPTH OF FLOODING

| Scenario | MacDonald Creek Bridge | | |
|--|---|---|------------------------------------|
| | Inundation Depth above Bridge Deck (m) | Time to Peak (hrs) from start of Breach | Duration of Inundation (hrs) |
| Sunny Day Breach – | 3.0 | 0.4 | 0.5 |
| Acceptable Flood Capacity (for 287mm in 2hrs) | | | |
| - With breach | 6.0 | 6.0 | 4.0 |
| - Without breach | 4.0 | 4.0 | 4.0 |

Note: Gauge Board readings at this location are independent and have no relation to levels at other locations and are not related to AHD or GDA.

The deck level of McDonald Creek Bridge is EL 742.92m AHD.

6.2 FLOOD WAVE TRAVEL TIMES

Flood wave travel times within Ibis Creek have been modelled for the above Scenarios. The following observations should be used as a guide:

| Flow Scenario | Annual Exceedance Probability | Travel Time |
|-----------------------------------|-------------------------------------|----------------|
| | | minutes |
| Dam Crest Flood Failure | 1:9,300 | 14 |
| Acceptable Flood Capacity Failure | 1:72,000 | 11 |
| Probable Maximum Flood Failure | 1:10,000,000 | 5 |

There is considerable uncertainty in the values of flood travel times and thus prompt warning should be given to population at risk on being aware of a potential dam break event.

7.0 COMMUNICATIONS

During an emergency, an open line of communication shall be maintained between EAP Officer, Principal Engineer, Non-Commercial Assets and the Regional Manager, Water Services, Central West Region and the Senior Advisor Disaster Management, Tablelands Regional Council.

The primary means of communications shall be by telephone/mobile telephone.

The EAP Officer and EAP Backup 1 have been issued a satellite telephone and a UHF radio. Officers carrying out inspections of the dam during an emergency event shall have a satellite phone and a handheld UHF radio at all times. During the emergency event, UHF radio communication, channel 40, shall be the primary communication between one another. The satellite phone shall be used to communicate outside the Dam site should the normal landline fail to operate.

If there is a total communication failure, the EAP Officer shall take action that is reasonable under the circumstances and in accordance with the Workplace Health and Safety Act and this EAP. The details of this action and the reasons for it shall be recorded in the Storage Log Book. The Principal Engineer, Non-Commercial Assets shall, in consultation with Regional Manager, Water Services Central West Region, assess the situation and attempt to establish alternative means of communication.

8.0 STORAGE LOG BOOK

EAP Officer shall ensure that events and appropriate data are recorded in the Storage Log Book. All new entries are to be copied and forwarded to Principal Engineer, Non-Commercial Assets monthly.

Entries shall be a record of water levels, weather observations, inspections, actions that are carried out, telephone conversations that are related to the emergency event, and comments identifying problems and unusual events.

All entries shall be written legibly and be unedited and signed by the person making the entry. Errors made shall be struck out and initialled.

The Storage Log Book shall be kept permanently in the EAP Officer residence. It must be available on request and its location known to, EAP Backup Officers and Principal Engineer, Non-Commercial Assets.

EMERGENCY ACTION PLAN – IBIS CREEK DAM

9.0 POTENTIAL PROBLEM IDENTIFICATION TO NOTE WHEN INSPECTING THE DAM

9.1 INSPECTION SAFETY PROTOCOL

The EAP Officer must comply with the Inspection Safety protocol detailed in Appendix 3.

9.2 POTENTIAL PROBLEM IDENTIFICATION

EAP officers inspect the dam weekly and complete an inspection checklist. EAP Engineer also visits the dam monthly and completes a monthly inspection report. Both weekly and monthly inspection checklists are sent to Principal Engineer, Non-Commercial Assets who will check and evaluate these reports.

It is important that the dam is inspected during an emergency event or shortly thereafter by the EAP officer, providing it is safe to do so. Potential problems that can be identified during these inspections are discussed in APPENDIX 4-POTENTIAL PROBLEM IDENTIFICATION. Any abnormalities shall be immediately brought to the attention of Principal Engineer, Non-Commercial Assets.

9.3 DAM DETAILS

| | |
|----------------------------|--|
| Name and location | |
| Name of Dam | Ibis Creek Dam |
| Other Names | None |
| Location | Latitude 17° 26' 02" Longitude 145° 12' 59" |
| DERM Region | North |
| Shire | Tablelands Regional Council |
| Nearest Town | Irvinebank |
| Stream and AMTD | Ibis Creek 2.1 km |
| Licence No | N/A |
| Development Permit | April 13, 2006. Dam No 256. Notice applying safety conditions to Ibis Creek Dam |
| Current Owner | Queensland Government (managed by Department of Environment and Resource Management) |
| Designer (Date) - Original | Not Known (1907) |
| Stabilisation | Gutteridge Haskins and Davey Pty Ltd (1997) |

EMERGENCY ACTION PLAN – IBIS CREEK DAM

| | |
|------------------------------------|--|
| Construction Authority – Original | Not Known (1907) |
| Stabilisation | Gutteridge Haskins and Davey Pty Ltd (1997) |
| Construction Contractor - Original | Not Known (1907) |
| Stabilisation | QBridge (1997) |
| Safety review dates | 2010 (Sunwater) |
| Technical data | |
| Dam Type | Mass Concrete |
| Purpose | Water supply to Loudon Mill in Irvinebank and later non-potable water supply to Irvinebank township |
| Main Dam Height (above lowest toe) | 17.5m |
| Main Dam Length | 56m |
| Spillway Type | Uncontrolled Ogee Crest |
| Spillway Description | Service – Spillway width of 13m |
| Outlet Description | DN 300mm, DI Pipe DN 250mm, DI Pipe A 100mm water main connected to both outlets (above) supplying water to Irvinebank |
| Storage characteristics | |
| Full supply level (FSL) | EL 825.5 |
| Storage capacity | 225 ML |
| Surface area | 4Ha at FSL |
| Length of shoreline | Unknown |
| Main Spillway capacity | 580m ³ /s at EL 827.5 |
| Dam crest level (DCL) - Lower | EL 826 m |
| - Upper | EL 827.5m |
| Catchment area | 620 ha |
| Catchment description | Steep hills covered in medium vegetation |
| Design Rainfall Review | Design Flood Hydrology – Sunwater May 2008 |
| Methods | Frequent to large events based on Book II, Section I Australian Rainfall and Runoff (ARR) (IEAust 2003) and Volume 2, ARR (IEAust 1987) for AEPs of 1 in 50 and 1 in 100, for storm burst durations up to 120 hours. Large to rare events as per Book VI, ARR (IEAust 2003). The CRC-FORGE regional rainfall estimates prepared for storm burst durations between 24 and 120 hours for AEPs |

EMERGENCY ACTION PLAN – IBIS CREEK DAM

| | |
|------------------------------------|---|
| | of 1 in 50 to 1 in 2000. |
| | PMP estimates and rainfall temporal patterns as per the Revised Generalised Tropical Storm Method for storm durations between 24 hours and 120 hours. |
| | Extreme events as per Book VI of ARR (IEAust 2003) for the range of AEPs of 1 in 2000 up to the AEP of PMP. |
| Original Spillway Design Flood | Not Known |
| Maximum Level | EL 827.5m |
| Flood volume | 1345ML |
| Peak Discharge | 146.3 m ³ /s |
| AEP of Flood | 1 in 9,300 |
| Freeboard, original | 0.5 m |
| Probable Maximum Flood | Failure Impact Assessment - SunWater May 2008 |
| Maximum Level | EL 829.64m |
| Flood Volume | 4400ML |
| Peak Discharge | 577 m ³ /s |
| AEP of Flood | Probable Maximum Flood |
| Freeboard | None |
| Description of dam wall | |
| Wall Type-Main Wall | Mass concrete with rock core and central ogee spillway |
| Wall Height (above lowest D/S toe) | 17.5m |
| Crest Elevation | EL 825.5m |
| Wall Length | 56 m |
| Total Quantities | Unknown |
| Materials Description | Mixture of coarse and fine river gravel, natural river sand |
| Description of spillway | |
| Spillway Description | The spillway is a central uncontrolled ogee crest with broad crested weirs on either side |
| Spillway - Ogee Crest | EL 825.5m |
| Spillway - Broad Crest | EL 826.0m |
| Spillway Width - Ogee | 13 m |
| Energy Dissipation Method | Natural rock in the creek bed at the toe |
| Design Head | Unknown |

EMERGENCY ACTION PLAN – IBIS CREEK DAM

| | |
|------------------------------------|---|
| Control Description | Uncontrolled |
| Auxiliary spillway | N/A |
| Description of outlet works | |
| Reservoir Outlet Description | N/A |
| River Release | DN 300mm Outlet Pipe |
| Conduit Description | DN 250mm Outlet Pipe |
| Intake Works | The intake to the river release pipe is a floating intake valve |
| Regulator Description | The outlet flow regulator is a 300mm diameter dispersion valve |
| Mine Supply Conduit Description | N/A |

| Hydrologic Performance | | |
|------------------------|----------------------|----------------------|
| Year | Peak Reservoir level | Peak Discharge |
| 2006 | EL 826.0m | 146m ³ /s |

10.0 EMERGENCY EVENT REPORT

The EAP Officer shall prepare an Emergency Event Report after each emergency event and forward it to the Principal Engineer, NCA within 15 days of the event.

The report may be free format but shall contain at least:

- A description of the event summarised from the Storage Log Book.
- Description of any observed damage or other consequences.
- Photographs.
- A summary of data recorded during the event and the times of these recordings such as -
 - Rainfall;
 - Water level within the storage; and
 - Seepage flows and observations.
- Details of communication which took place during the emergency.
- Comment on the adequacy of the Emergency Action Plan.
- Any recommendations or suggested changes to the Emergency Action Plan.
- Any further comments considered necessary.

The Principal Engineer, NCA shall provide a report on the event to the Director, Dam Safety within 30 days of the event and forward a copy to Local Disaster Coordinator, Tablelands LDMG.

11.0 REVISION OF EVACUATION PLANS

Each year in September EAP Officer shall visit each house/structure at risk and revise the evacuation plan accordingly. The revised plan shall be forwarded to Principal Engineer, Non-Commercial Assets.

The Principal Engineer, Non-Commercial Assets shall post revised plans to each resident.

EMERGENCY ACTION PLAN – IBIS CREEK DAM

12.0 REFERENCES

Workplace Health and Safety Act 1995

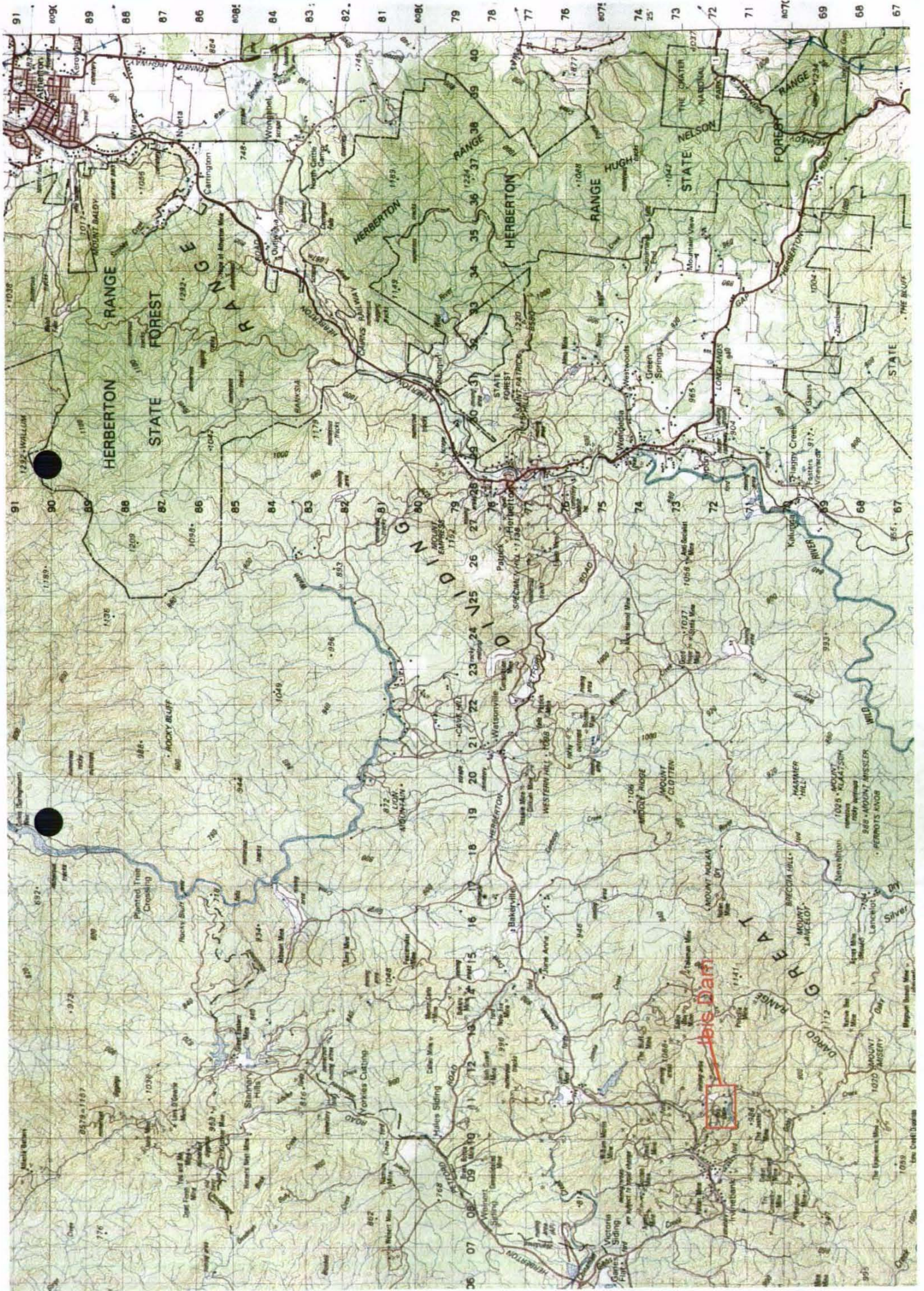
DERM-RoadTek Memorandum of Understanding (2009)

Ibis Creek Dam - Storage Log Book

Ibis Dam - Hydraulics and Hydrology Flood Study, SunWater, September 2006

Ibis Dam - Failure Impact Assessment, Sunwater May 2008.

APPENDIX 1 LOCALITY PLAN



APPENDIX 2 CATCHMENT BOUNDARY

EMERGENCY ACTION PLAN – IBIS DAM



APPENDIX 3 INSPECTION SAFETY PROTOCOL

APPENDIX 3 INSPECTION SAFETY PROTOCOL

All Emergency Action Plan (EAP) officers who visit the dam site are to observe this protocol.

- (1) A hand held satellite phone with backup battery and portable UHF radio to be available at all inspections.
- (2) More than one person to be at site at all times.
- (3) Inspections are to be carried out only when conditions are deemed to be safe as per inspection and risk assessment/s.
- (4) The holder of the after hour emergency phone is to be advised of any emergency inspection and subsequent completion. This person is to be contacted if any reasonable delay is anticipated. For other inspections the RoadTek Engineer is to be advised.
- (6) All personnel likely to be involved are to be informed of the above, and to be made aware that they are mandatory requirements.

APPENDIX 4 POTENTIAL PROBLEM IDENTIFICATION

EMERGENCY ACTION PLAN – IBIS DAM

INSPECTION OF CONCRETE AND MASONRY DAMS

INSPECTING FOR DEFICIENCIES: SUMMARY

| TYPE OF DEFICIENCY | LOOK FOR |
|----------------------|---|
| SURFACE DEFECTS | <p>Honeycomb: Voids around aggregate.</p> <p>Stratification: Non-uniform layers of aggregate in concrete.</p> <p>Form Slippage: Uneven joints and surfaces.</p> <p>Stains.</p> <p>Impact damage.</p> |
| DISACEMENT | <p>Displacement at joints between blocks.</p> <p>Volume change in concrete.</p> <p>Closing or opening of joints.</p> <p>Loss of joint filler.</p> <p>Cracking.</p> <p>Delamination of lift joints.</p> <p>Tilting, shearing, or shifting of hardware.</p> |
| LEAKAGE and SEEPAGE | <p>Significant new leakage on downstream face.</p> <p>Wetness in abutment or foundation adjacent to toe.</p> <p>Major changes in leakage/seepage pattern or flow.</p> <p>Water spurting or running out of joints or cracks.</p> <p>Turbidity of the seepage.</p> <p>Blocked drains.</p> |
| MAINTENANCE CONCERNS | <p>Vegetation in joints between concrete blocks.</p> <p>Large accumulations of debris.</p> <p>Missing or deteriorated joint filler.</p> <p>Quality and condition of previous repairs.</p> <p>Blockage of Spillway.</p> |

Note: This tabulation taken from Dam Safety Surveillance Field Manual-August 2005

EMERGENCY ACTION PLAN – IBIS DAM

WHEN TO GET FURTHER ASSISTANCE

Several of the deficiencies covered above are very serious. If you observe any of the following deficiencies, you should consult with the Principal Engineer, Non – Commercial Assets.

- Sand boils or turbid seepage.
- Seepage that has increased since the last inspection (taking the reservoir level into consideration).
- Cracking that extends below the reservoir level or potential reservoir level.
- Transverse and longitudinal cracking.
- Deep seated slides or bulging associated with slides.
- Sinkholes or other large depressions.
- Deep rooted vegetation that might need to be removed.

Remember, whenever you are unsure whether or not a condition poses a threat to the safety of the dam, you should discuss your findings with the Principal Engineer, Non –Commercial Assets.

APPENDIX 5 INUNDATION PLANS

APPENDIX 5 INUNDATION PLANS

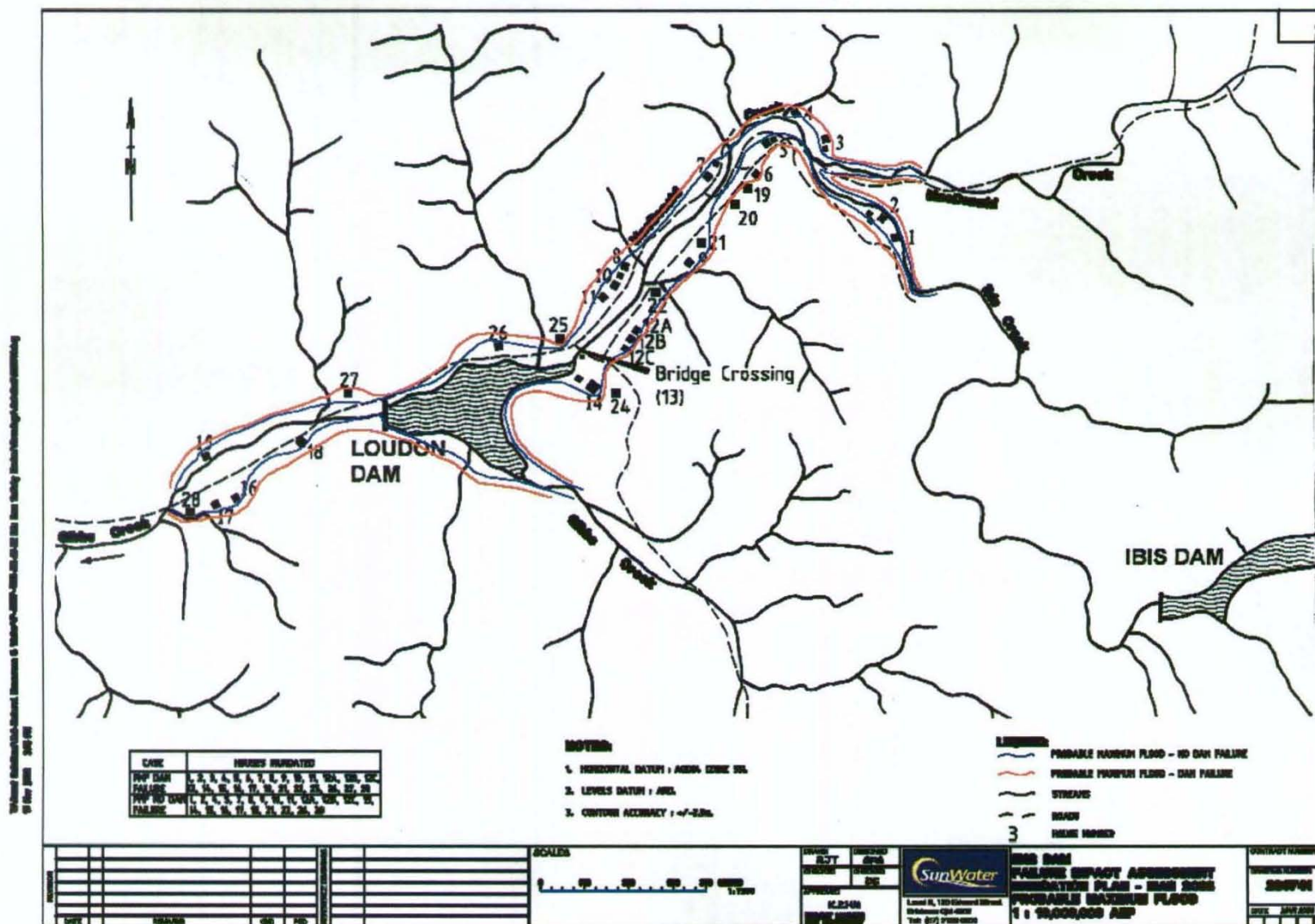
230741: IBIS DAM FAILURE IMPACT ASSESSMENT, INUNDATION PLAN – MAR 2008, PROBABLE MAXIMUM FLOOD 1:10,000,000 AEP

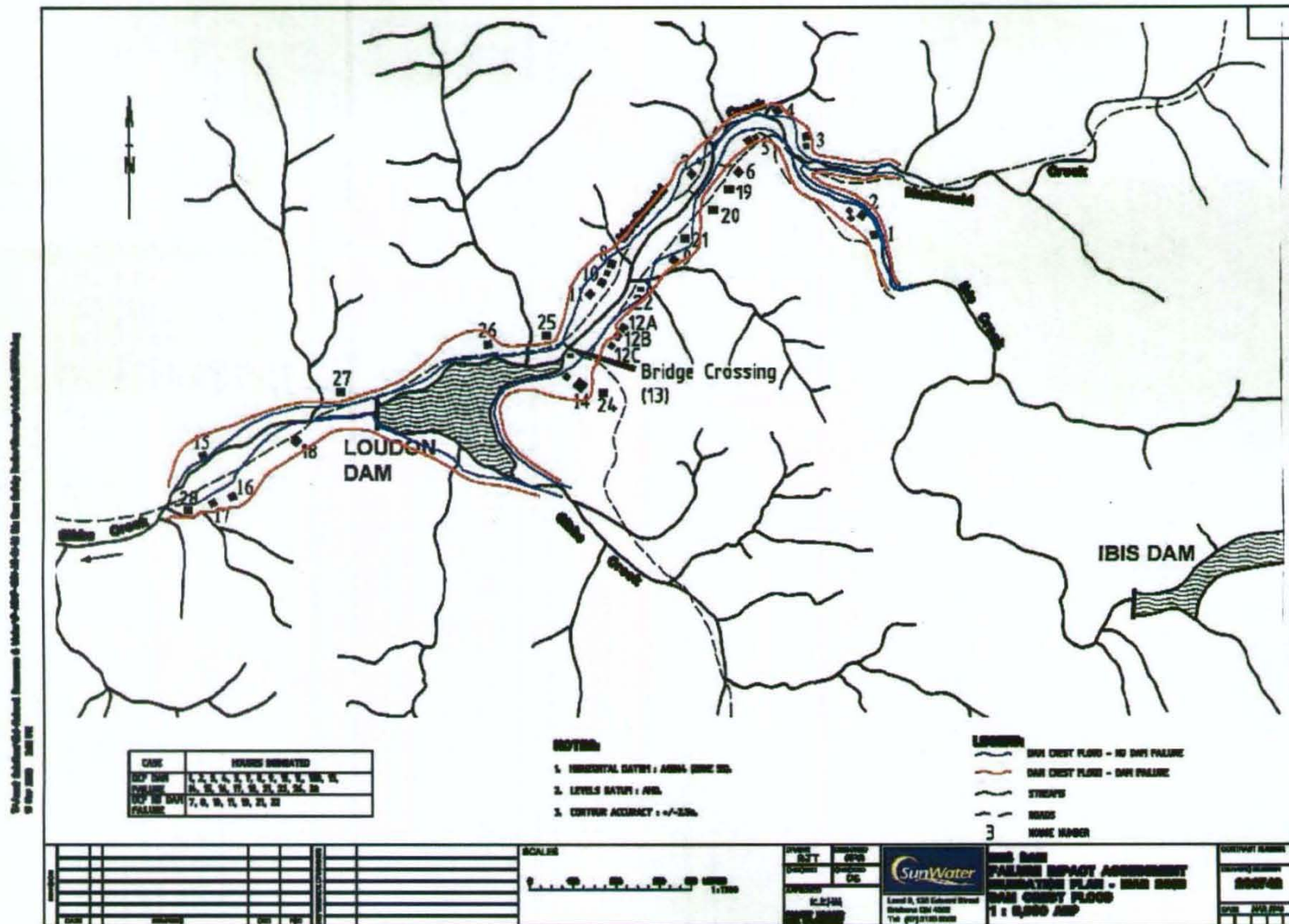
230742: IBIS DAM FAILURE IMPACT ASSESSMENT, INUNDATION PLAN – MAR 2008, DAM CREST FLOOD 1:9,300 AEP

230743: IBIS DAM FAILURE IMPACT ASSESSMENT, INUNDATION PLAN – MAR 2008, DESIGN ACCEPTABLE FLOOD CAPACITY 1:72,000 AEP

230760: IBIS DAM FAILURE IMPACT ASSESSMENT, INUNDATION PLAN – MAR 2008, SUNNY DAY FAILURE

EMERGENCY ACTION PLAN – IBIS DAM



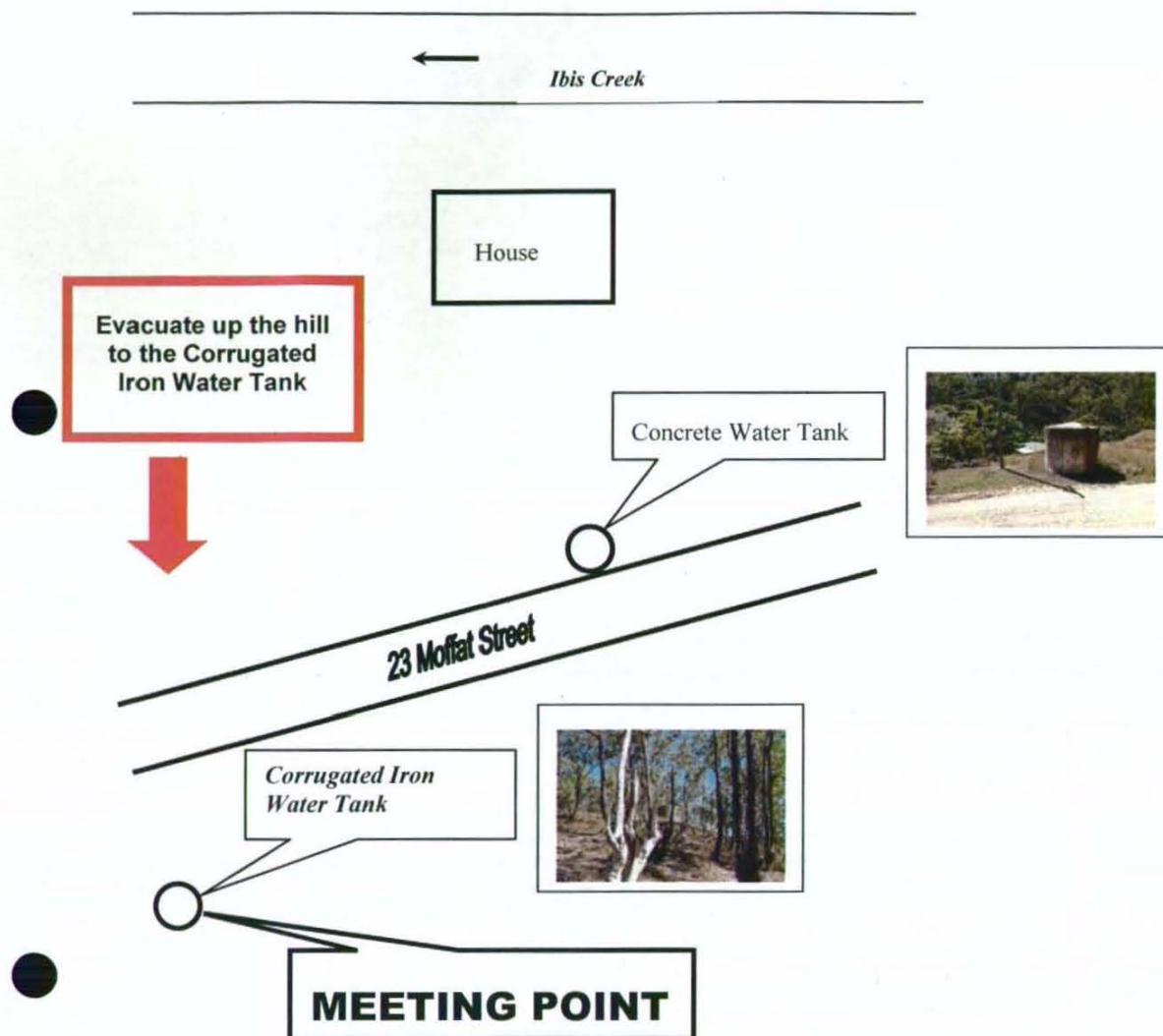






APPENDIX 6 EVACUATION PLANS

EVACUATION PLAN – HOUSE 1



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

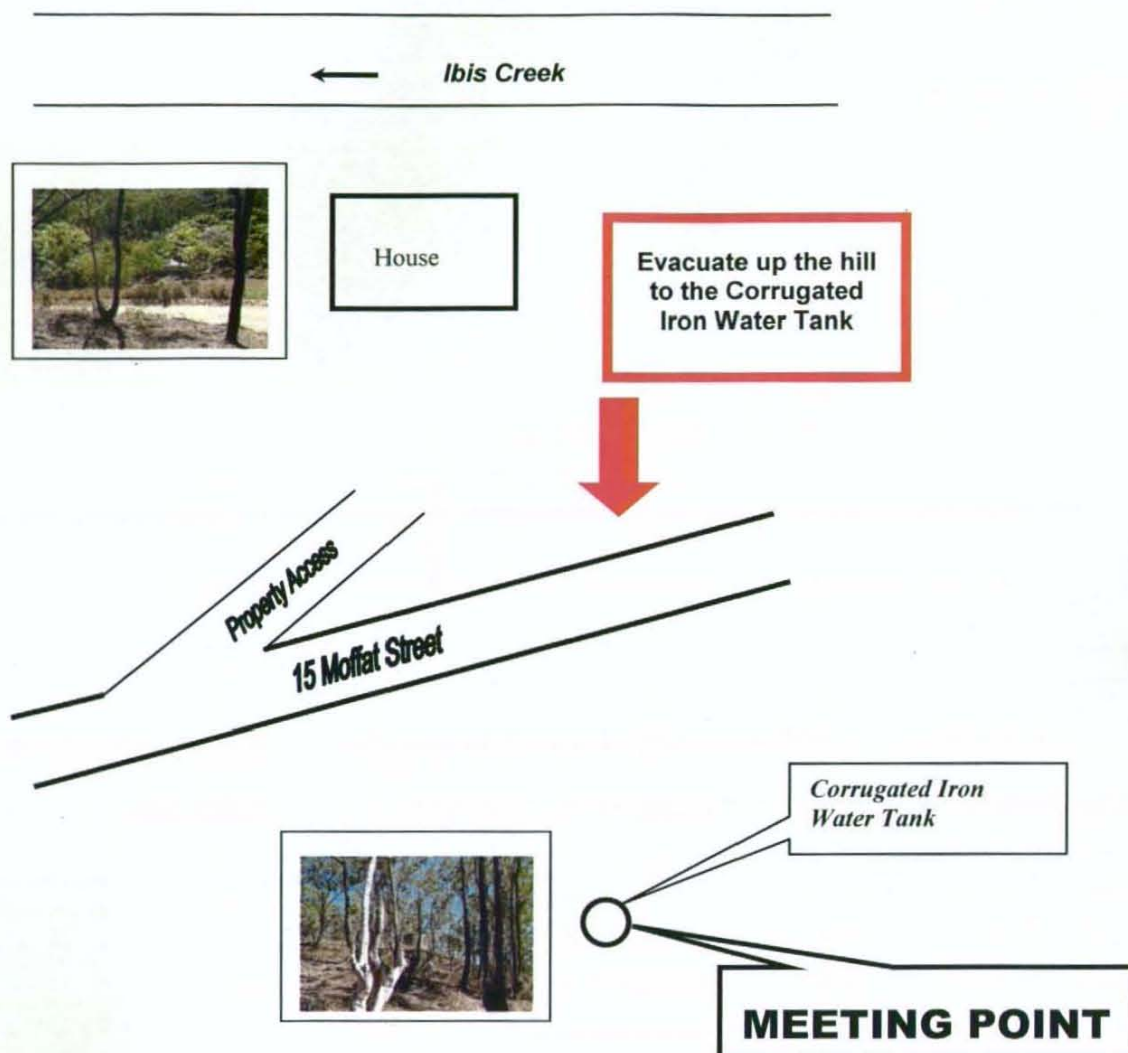
Emergency Evacuation Plan

For

Rural Street Address N^o. 23 Moffat Street

IRVINEBANK

EVACUATION PLAN – HOUSE 2



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

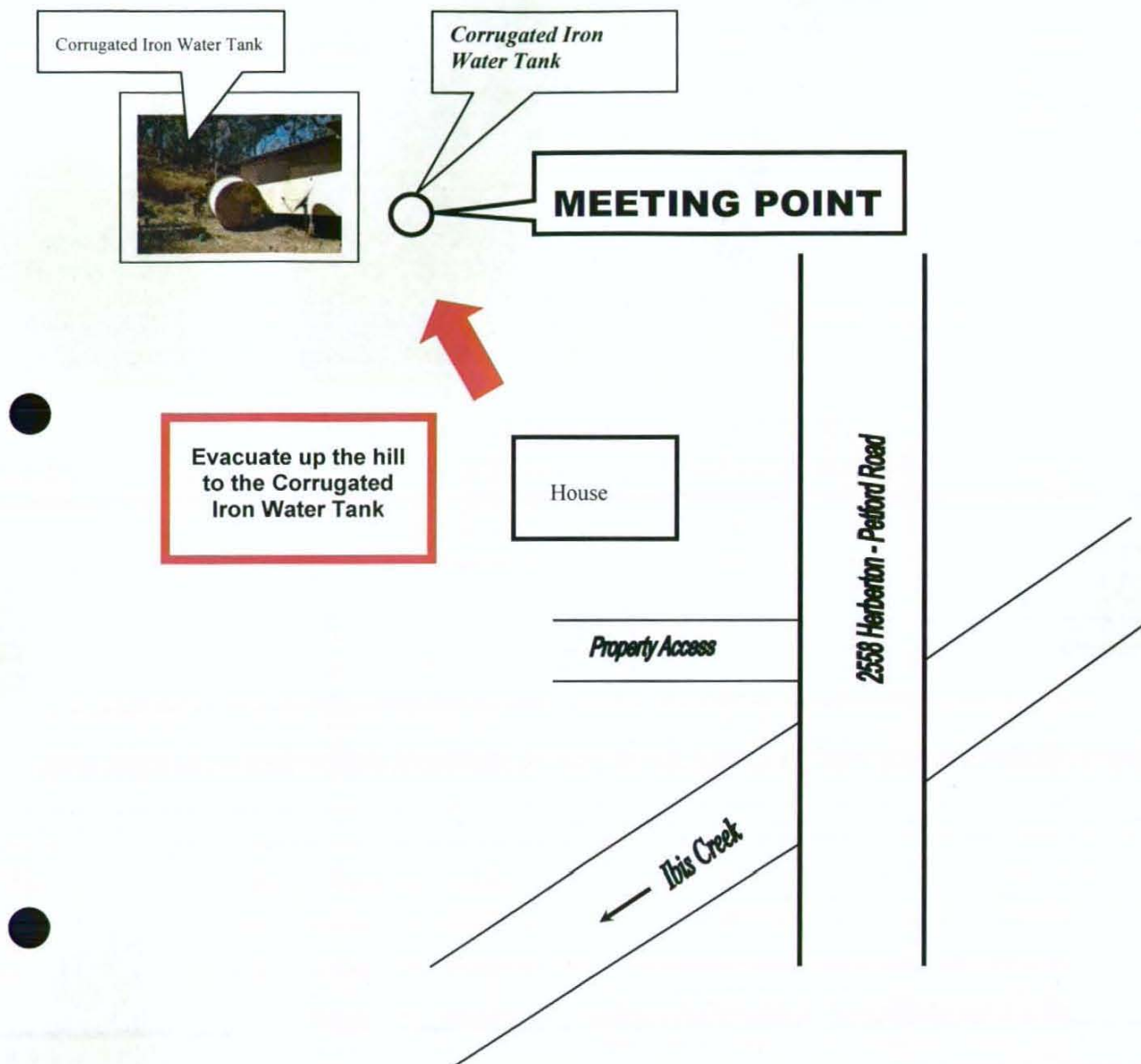
Emergency Evacuation Plan

For

Rural Street Address N^o 15 Moffat Street

IRVINEBANK

EVACUATION PLAN – HOUSE 3



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

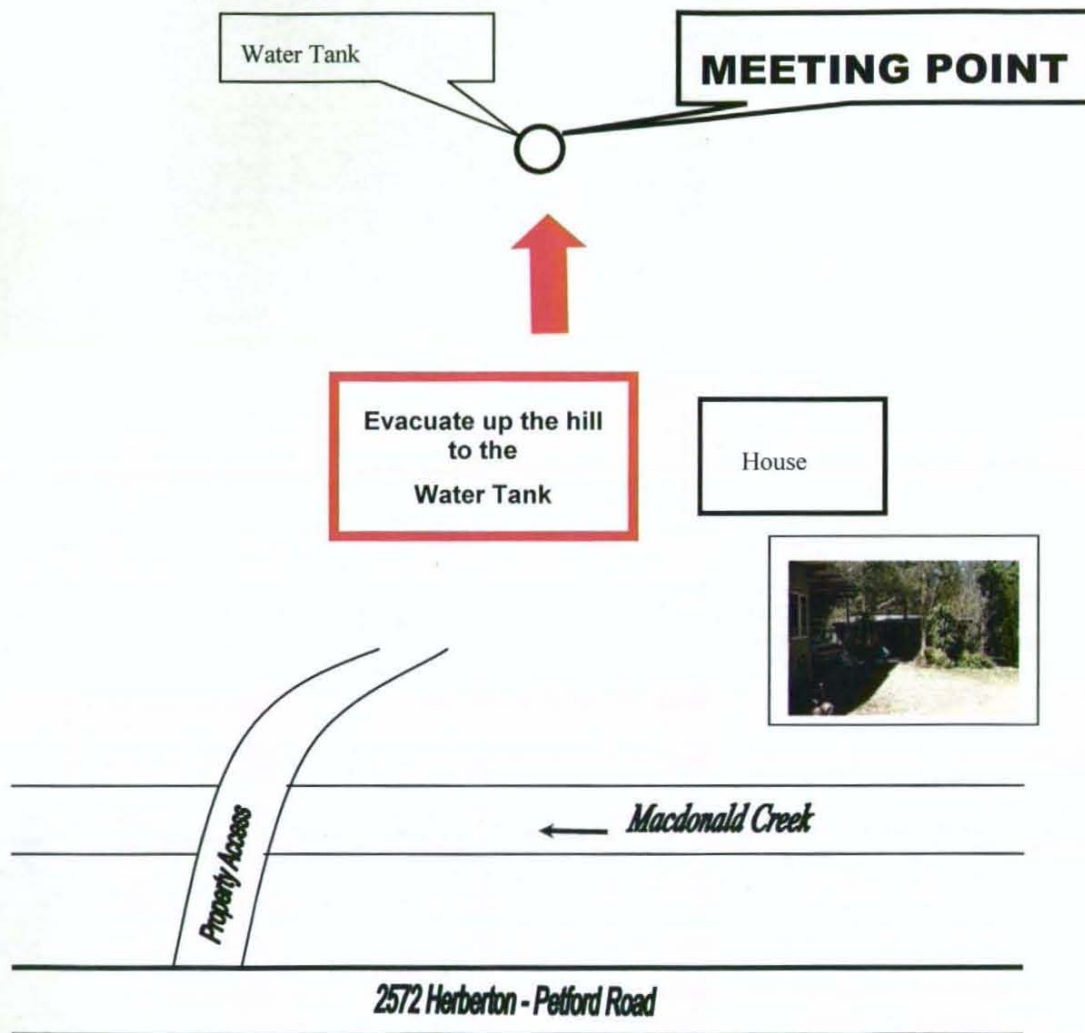
Emergency Evacuation Plan

For

Rural Street Address N^o. 2558 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN – HOUSE 4



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

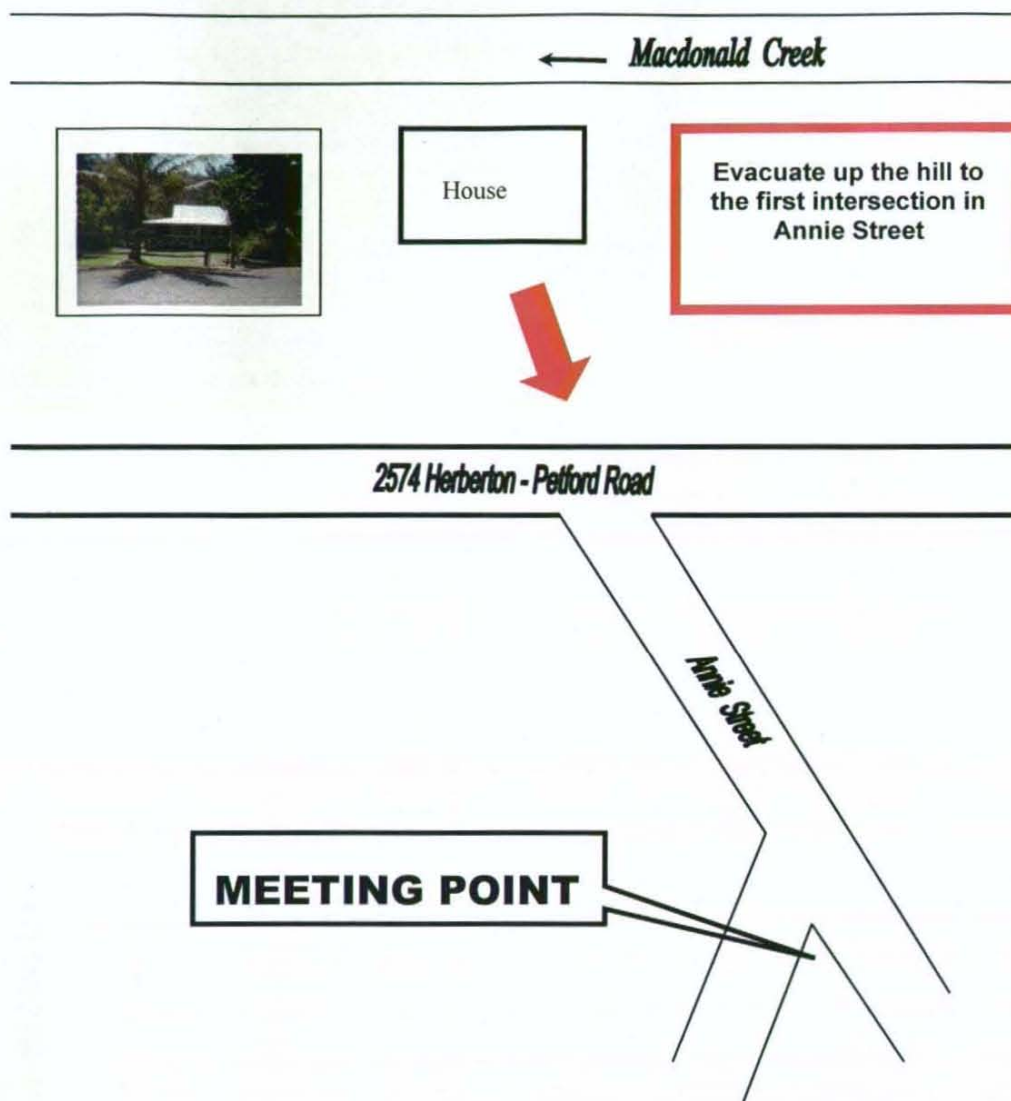
Emergency Evacuation Plan

For

Rural Street Address N^o 2572 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN – HOUSE 5



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

Emergency Evacuation Plan

For

Rural Street Address N^o. 2574 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN – HOUSE 6

← *Macdonald Creek*

2577 Herberton - Petford Road

House

Evacuate up the hill

MEETING POINT



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

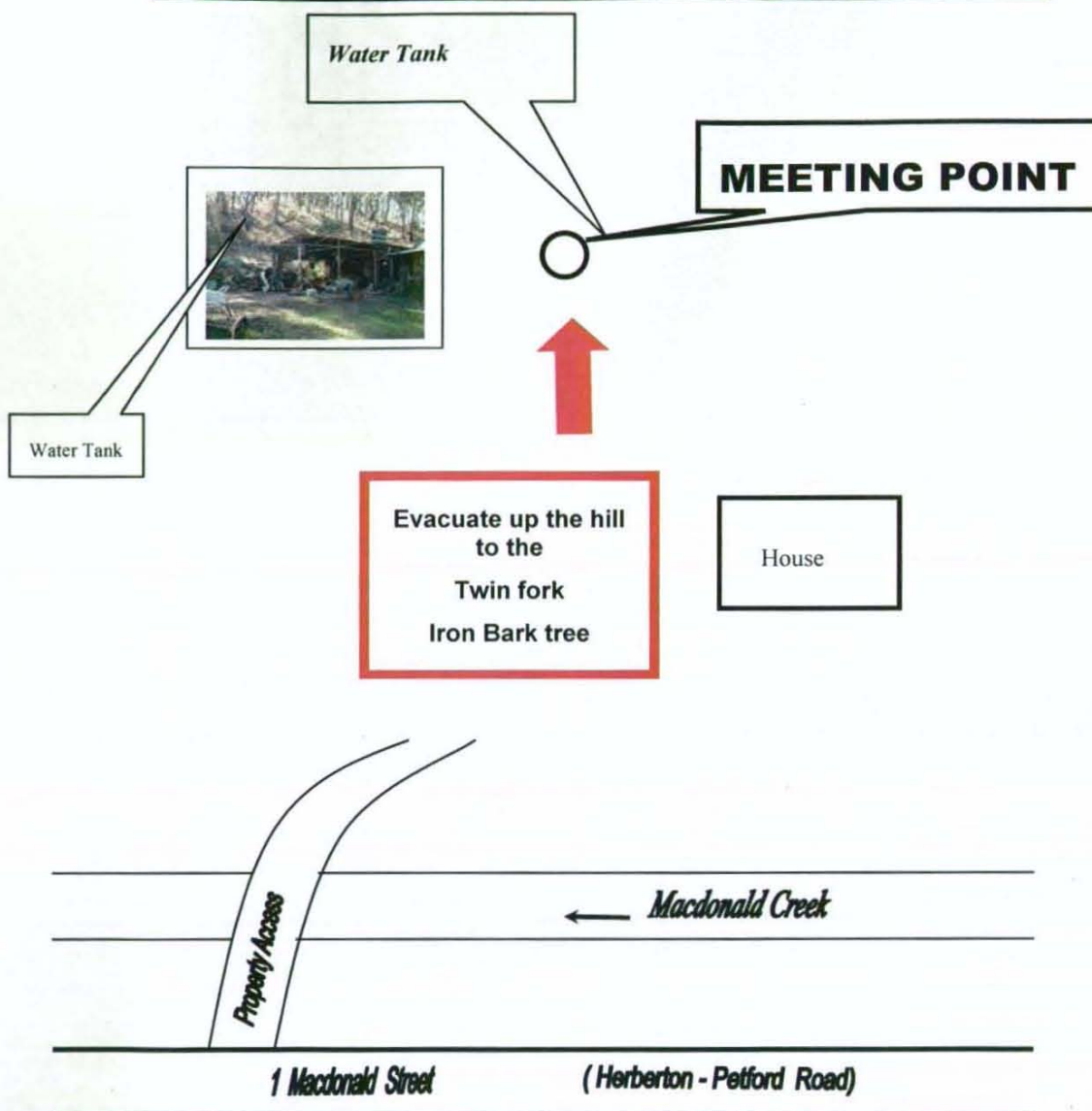
Emergency Evacuation Plan

For

Rural Street Address N^o. 2577 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN – HOUSE 7



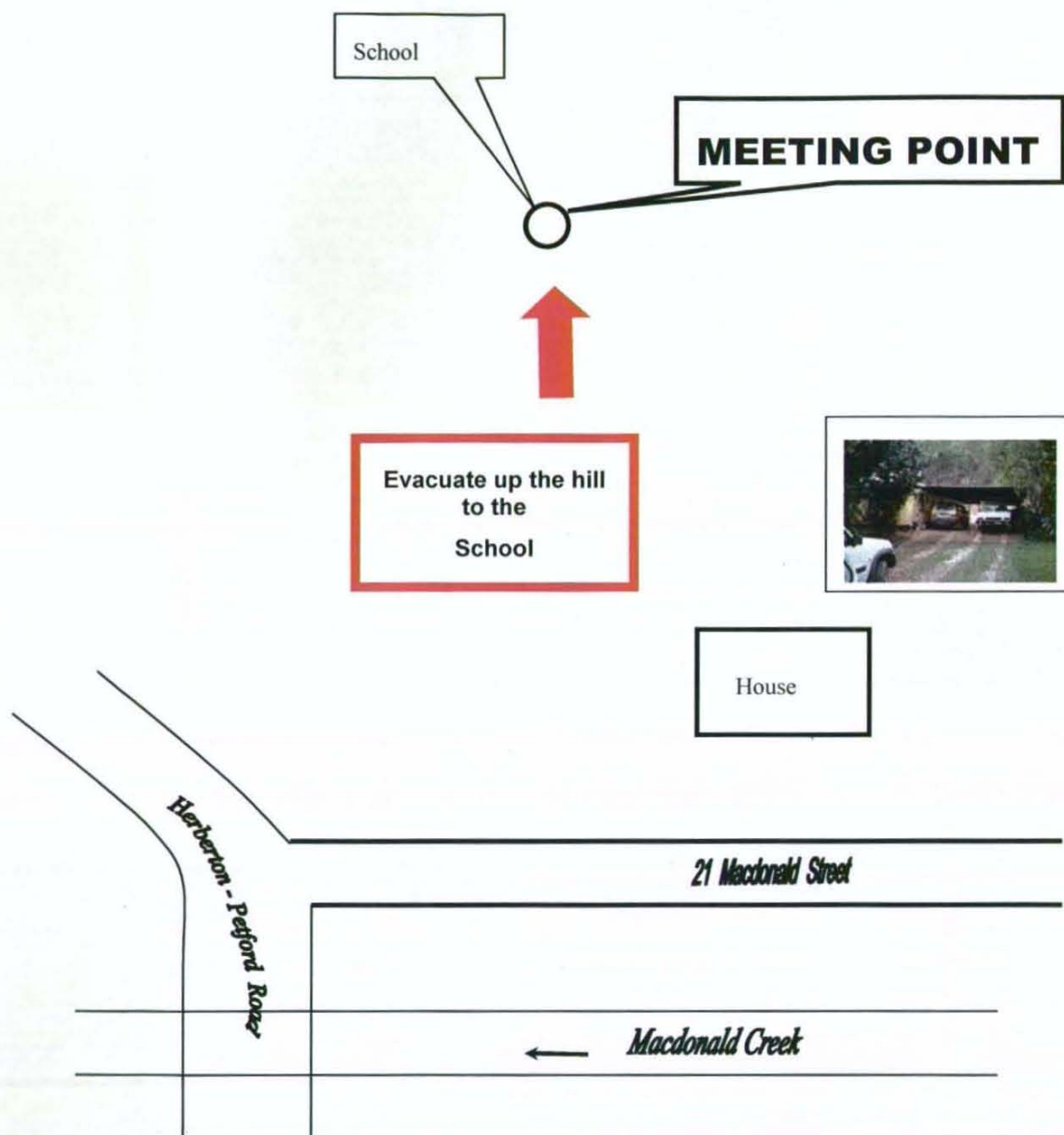
In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

Emergency Evacuation Plan

For

Rural Street Address N^o 1 Macdonald Street
IRVINEBANK

EVACUATION PLAN – HOUSE 8



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

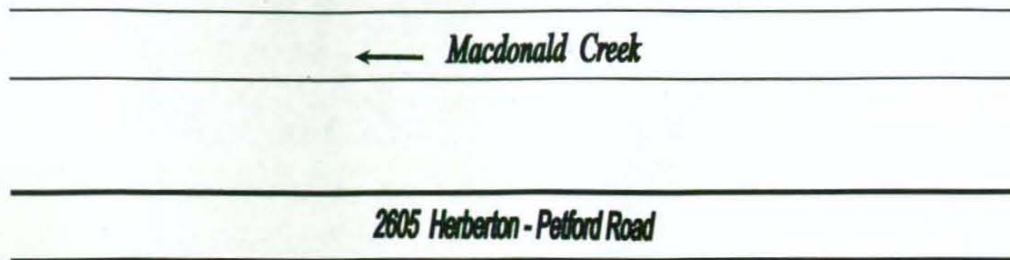
Emergency Evacuation Plan

For

Rural Street Address N^o. 21 Macdonald Street

IRVINEBANK

EVACUATION PLAN- HOUSE 9



House

Evacuate up the hill to
neighbouring house



MEETING POINT

House

In case of EXTREME FLOODING, or if
directed by Emergency Personnel then
EVACUATE to the MEETING POINT.

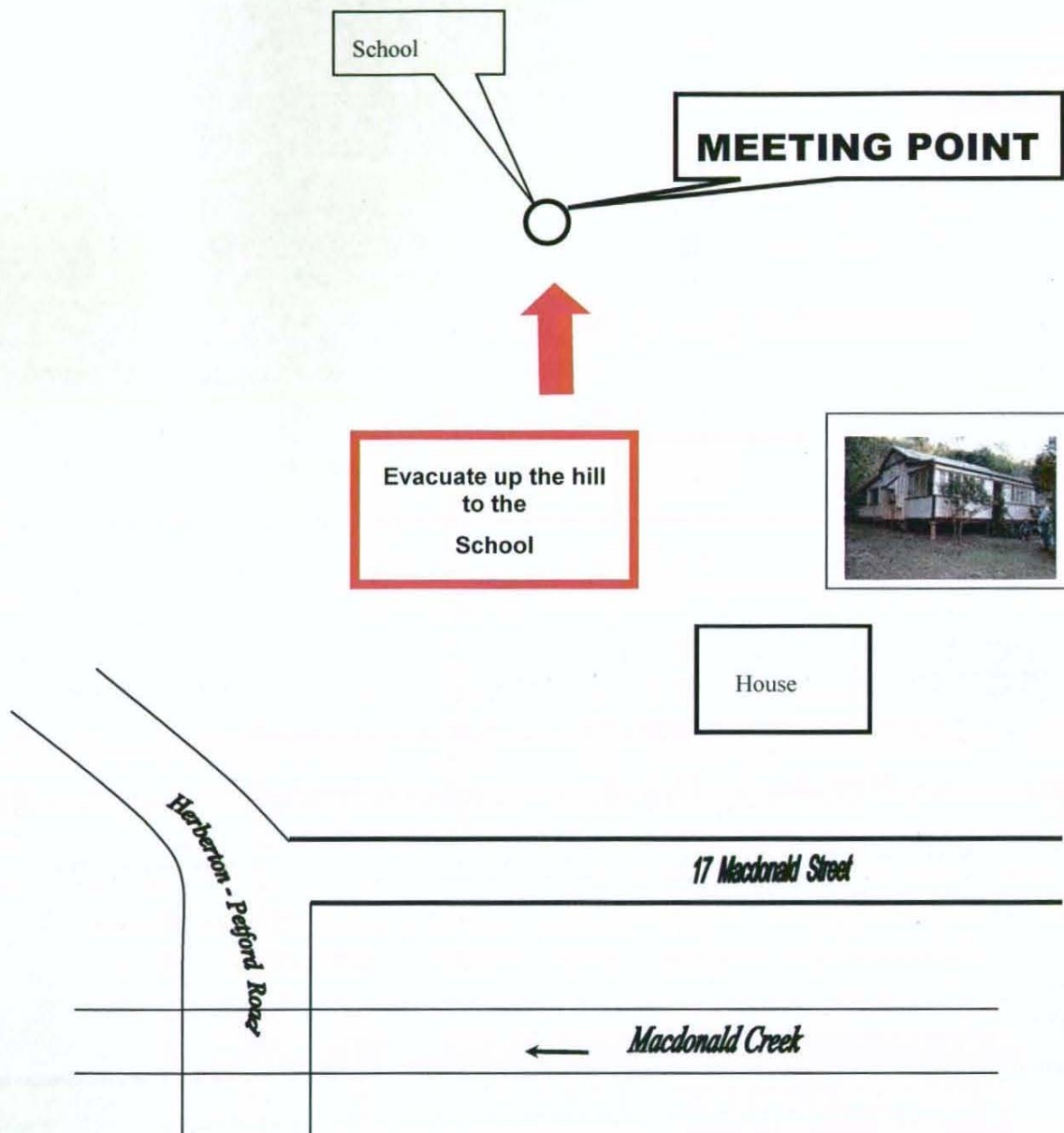
Emergency Evacuation Plan

For

Rural Street Address N^o 2605 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN- HOUSE 10



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

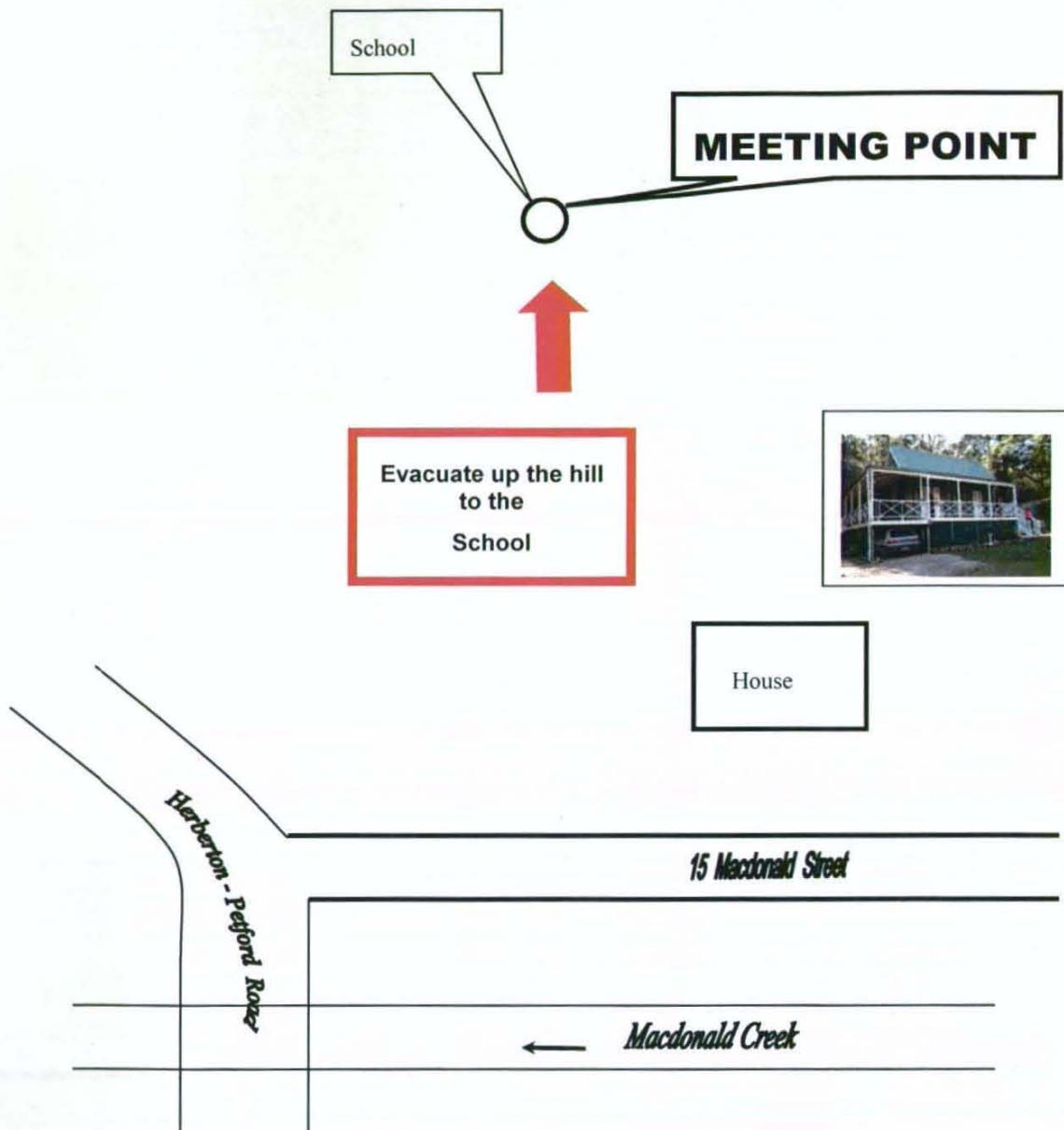
Emergency Evacuation Plan

For

Rural Street Address N^o. 17 Macdonald Street

IRVINEBANK

EVACUATION PLAN – HOUSE 11



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

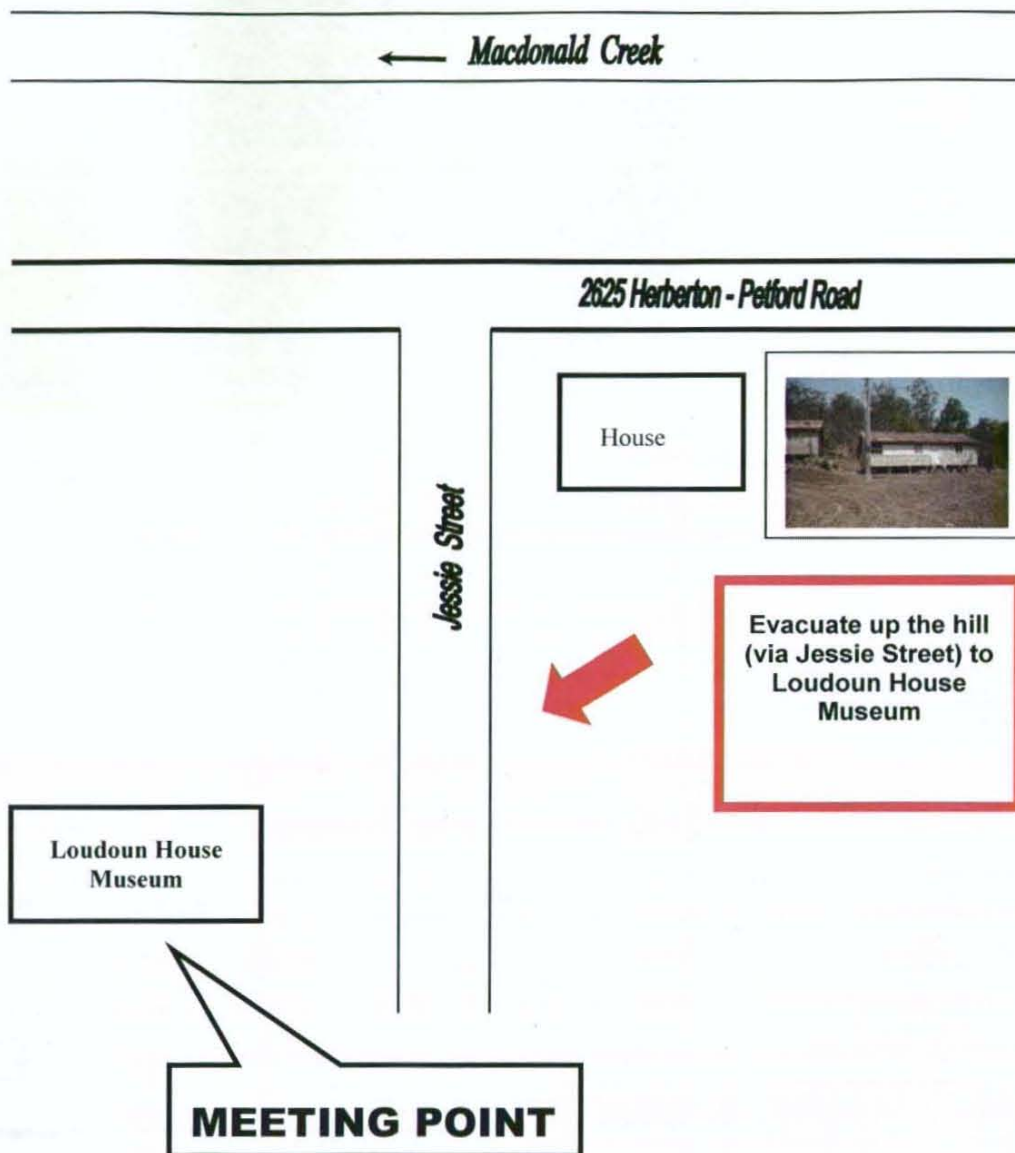
Emergency Evacuation Plan

For

Rural Street Address N^o 15 Macdonald Street

IRVINEBANK

EVACUATION PLAN – HOUSE 12b



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

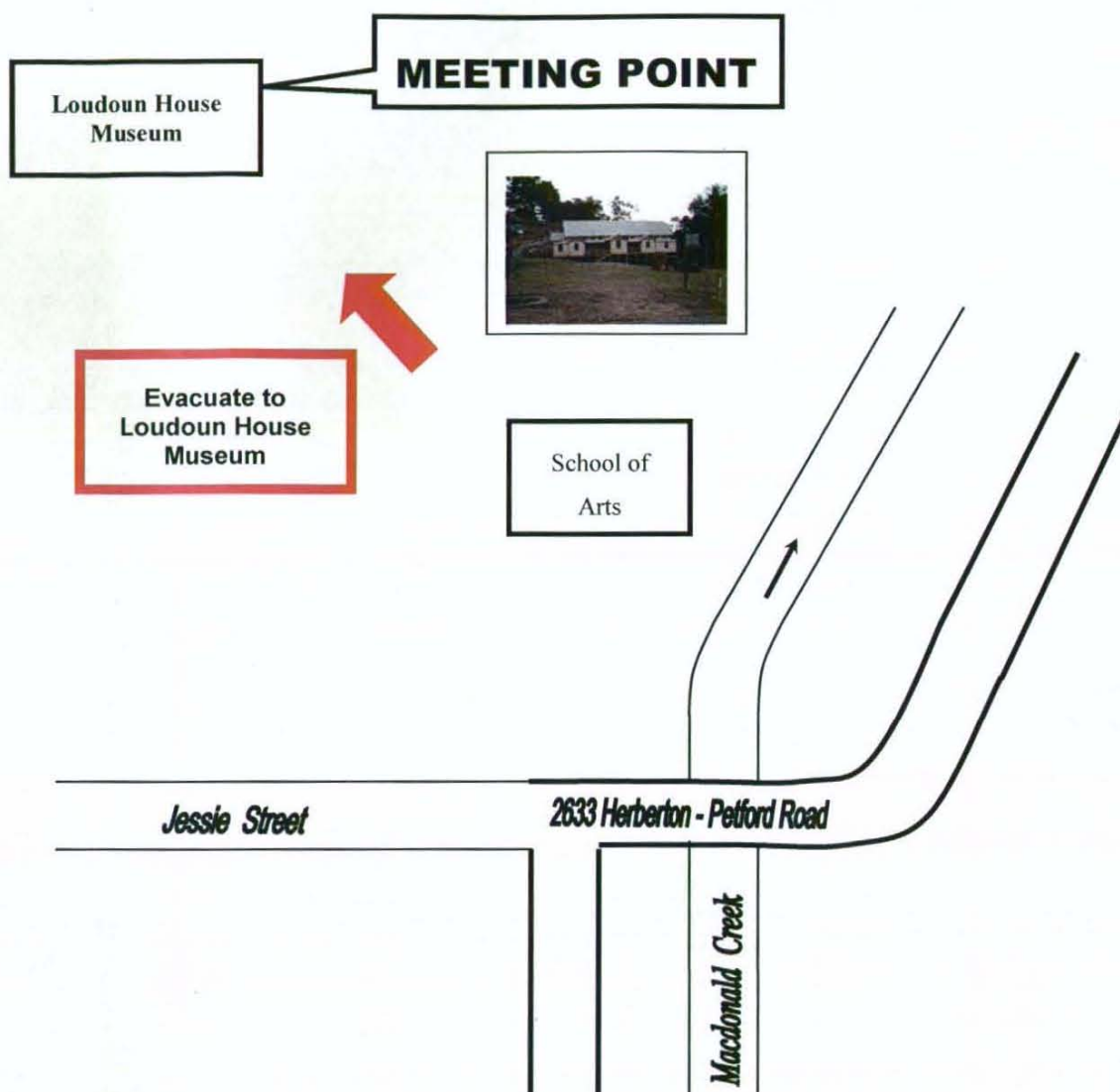
Emergency Evacuation Plan

For

Rural Street Address N^o. 2625 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN – HOUSE 14



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

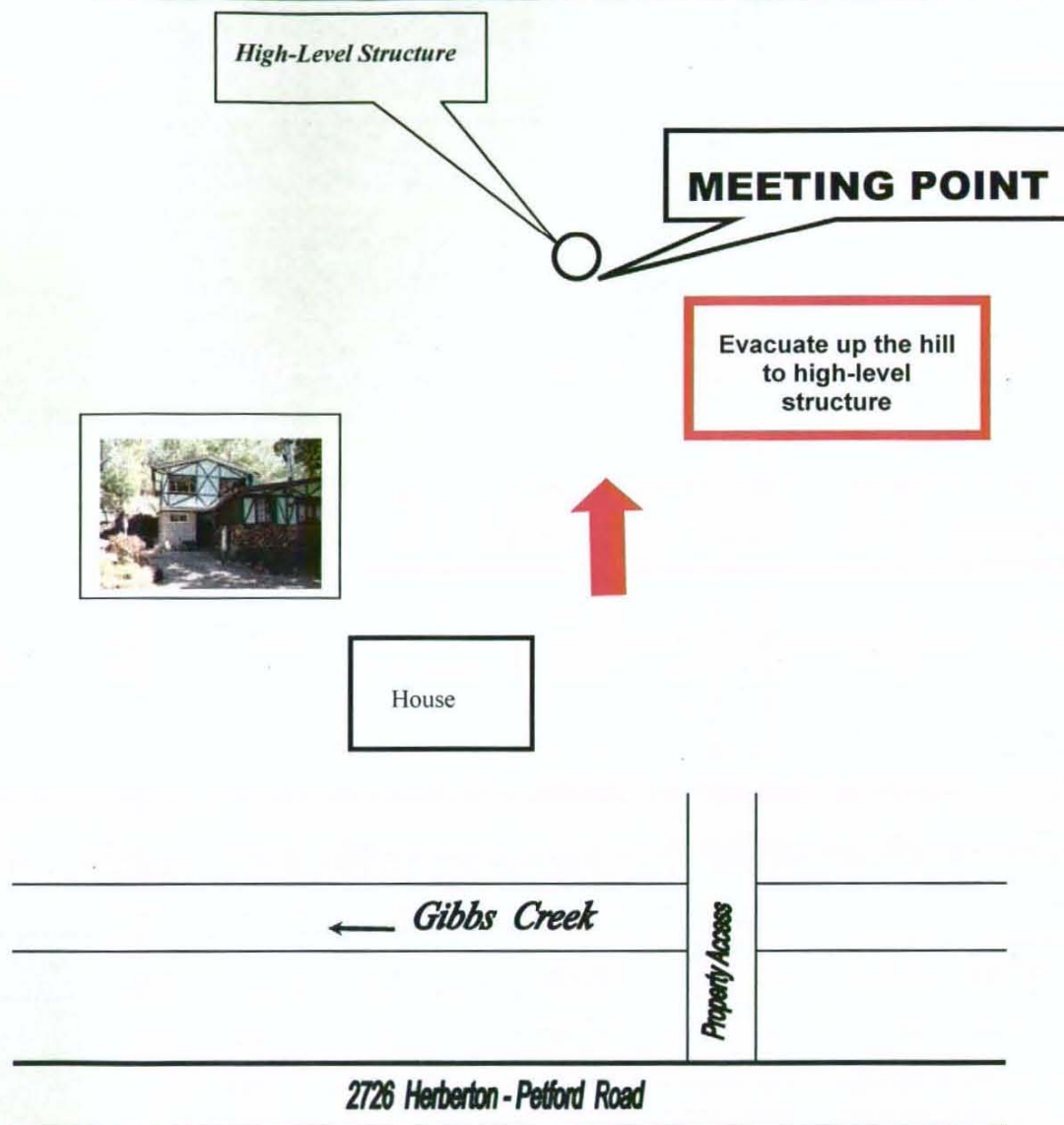
Emergency Evacuation Plan

For

Rural Street Address N^o. 2633 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN – HOUSE 15



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

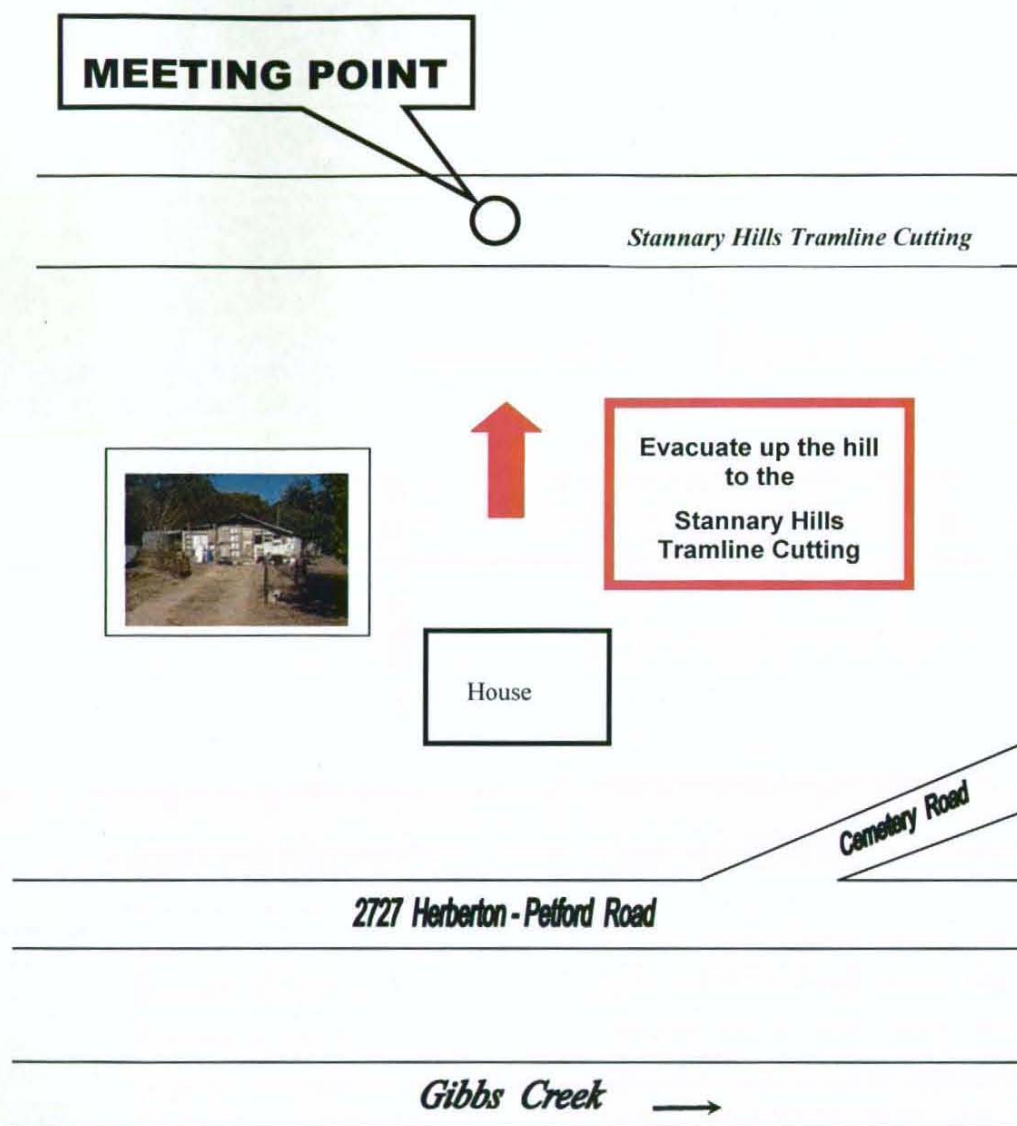
Emergency Evacuation Plan

For

Rural Street Address N^o. 2726 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN – HOUSE 16



In case of EXTREME FLOODING, or if
directed by Emergency Personnel then
EVACUATE to the MEETING POINT.

Emergency Evacuation Plan

For

Rural Street Address N^o. 2727 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN – HOUSE 17

MEETING POINT



Stannary Hills Tramline Cutting



Evacuate up the hill
to the
Stannary Hills
Tramline Cutting

House

5 Cemetery Road

Herberton - Petford Road

Gibbs Creek →

In case of EXTREME FLOODING, or if
directed by Emergency Personnel then
EVACUATE to the MEETING POINT.

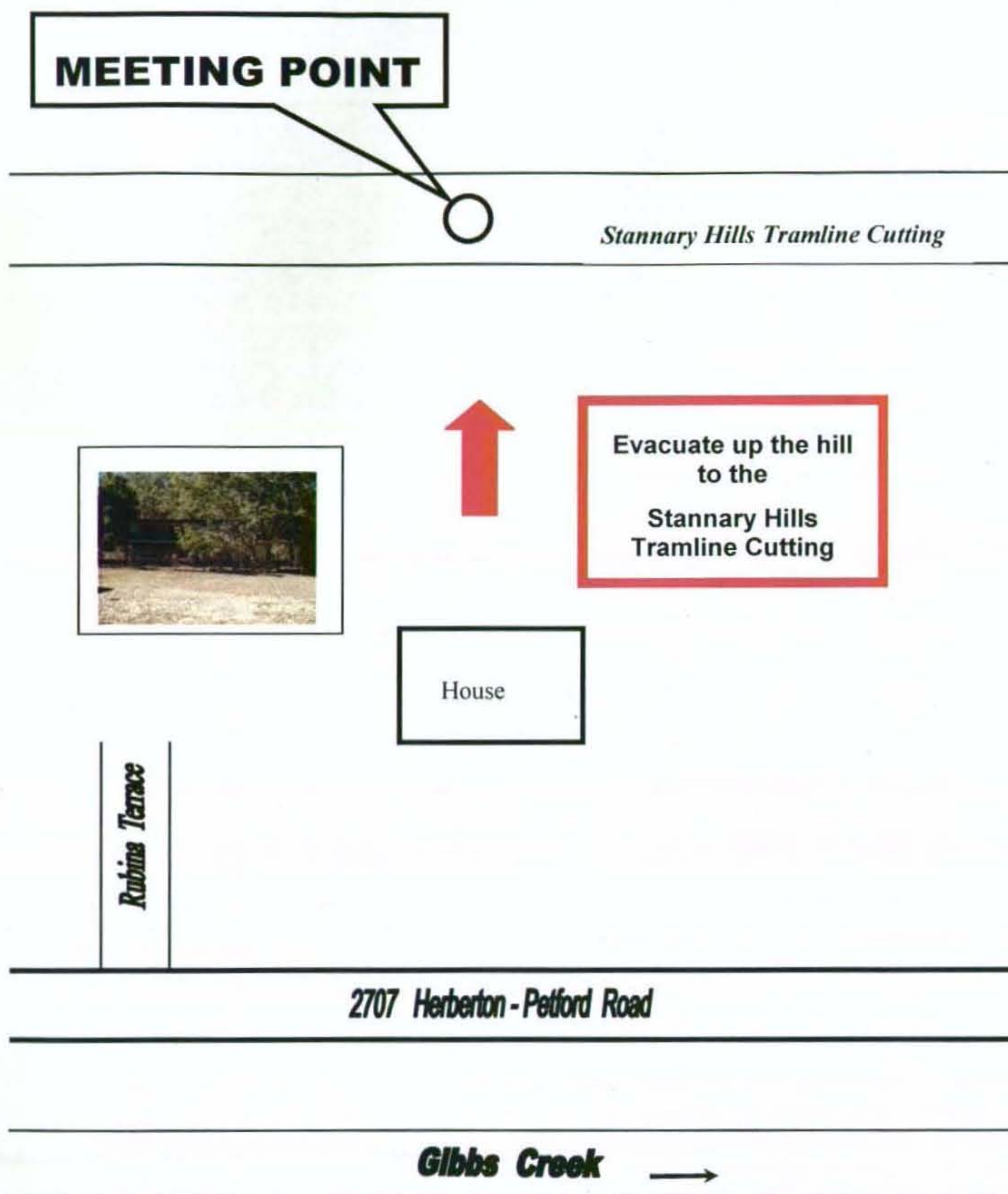
Emergency Evacuation Plan

For

Rural Street Address N^o 5 Cemetery Road

IRVINEBANK

EVACUATION PLAN – HOUSE 18



In case of EXTREME FLOODING, or if
directed by Emergency Personnel then
EVACUATE to the MEETING POINT.

Emergency Evacuation Plan

For

Rural Street Address N^o 2707 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN – HOUSE 21

MEETING POINT



Evacuate up the hill
to the
Large gum tree



House

2597 Herberton - Petford Road

MacDonald Creek

In case of EXTREME FLOODING, or if
directed by Emergency Personnel then
EVACUATE to the MEETING POINT.

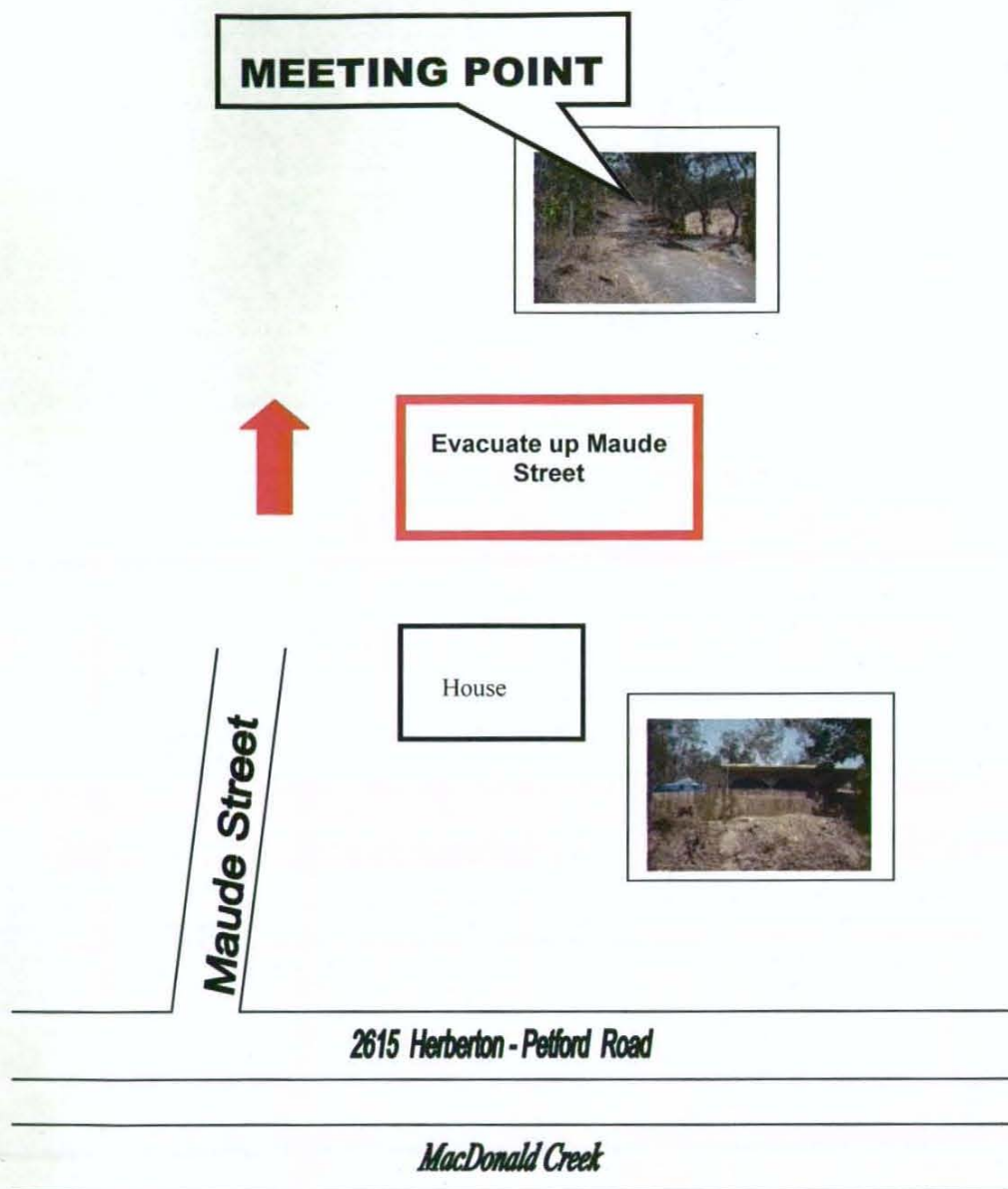
Emergency Evacuation Plan

For Mango Cottage

Rural Street Address 2597 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN – HOUSE 22



In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

Emergency Evacuation Plan

For

**Rural Street Address 2615 Herberton – Petford Road
IRVINEBANK**

EVACUATION PLAN – HOUSE 23

MEETING POINT

Evacuate up Jessie Street



House

Jessie Street

Herberton - Petford Road

MacDonald Creek

In case of EXTREME FLOODING, or if directed by Emergency Personnel then EVACUATE to the MEETING POINT.

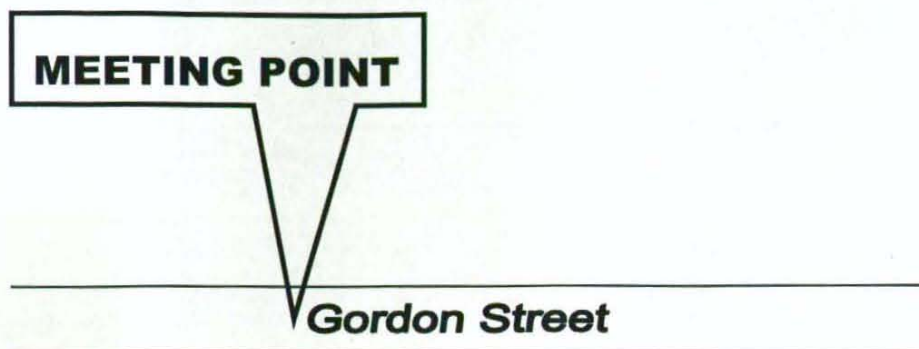
Emergency Evacuation Plan

For

**Rural Street Address Cnr Jessie Street and Herberton –
Petford Road**

IRVINEBANK

EVACUATION PLAN – HOUSE 26



**Evacuate up to
Gordon Street**



Irvinebank
Tavern

2656 Herberton - Petford Road

MacDonald Creek

**In case of EXTREME FLOODING, or if
directed by Emergency Personnel then
EVACUATE to the MEETING POINT.**

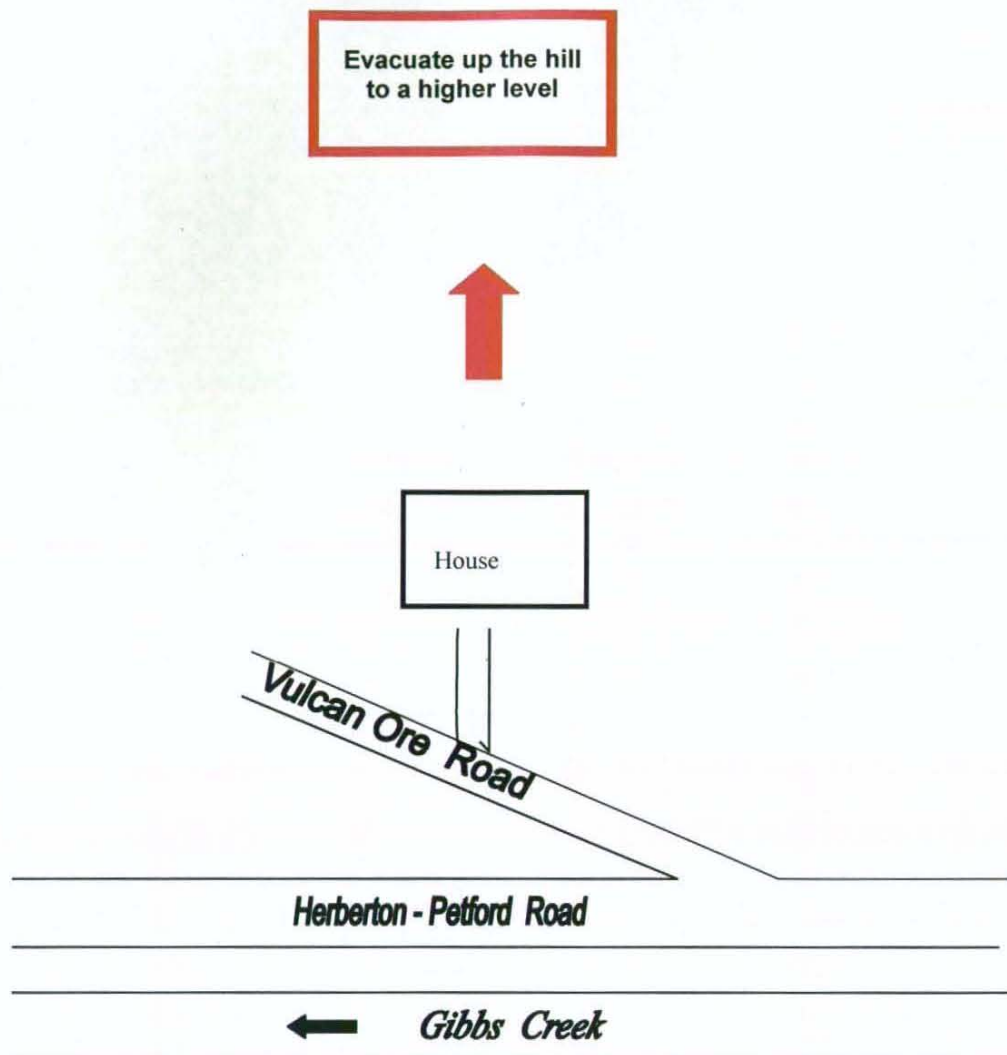
Emergency Evacuation Plan

For Irvinebank Tavern

Rural Street Address 2656 Herberton – Petford Road

IRVINEBANK

EVACUATION PLAN – HOUSE 27



**In case of EXTREME FLOODING, or if
directed by Emergency Personnel then
EVACUATE to the MEETING POINT.**

Emergency Evacuation Plan

For

Rural Street Address N^o. 8 Vulcan Ore Road

IRVINEBANK

EVACUATION PLAN – HOUSE 28

MEETING POINT



Stannary Hills Tramline Cutting



Evacuate up the hill
to the
Stannary Hills
Tramline Cutting

House

9 Cemetery Road

Herberton - Pettford Road

Gibbs Creek →

In case of EXTREME FLOODING, or if
directed by Emergency Personnel then
EVACUATE to the MEETING POINT.

Emergency Evacuation Plan

For

Rural Street Address N^o 9 Cemetery Road

IRVINEBANK

APPENDIX 7 RAINFALL AND GAUGE HEIGHT INFORMATION

EMERGENCY ACTION PLAN – IBIS DAM

A gauging station has been set-up on Ibis Dam specifically for monitoring rainfall and storage height.

Information is available from the following website:-

www.hydsupp.com.au

Login details are as follow:-

Login:

Password:

Click on Home

Click on Satellite IP Stations

Click on Ibis Creek @ Ibis Creek Dam

The site will transmit every 2 hours during the day and every 4 hours at night. Hourly data is transmitted at the following times:

4am 8am 10am Noon 2pm 4pm 8pm Midnight

Additional transmissions will be attempted at 30 minute intervals if either of these conditions occur:

- a) the height rises by more than 50mm in the previous hour
- b) there is more than 10mm of rain in the previous one hour

Actual transmissions times will depend on satellite availability.

The site has been registered as

APPENDIX 8 ESTIMATED FLOOD TRAVEL TIMES

EMERGENCY ACTION PLAN – IBIS DAM

IBIS DAM:
ESTIMATED FLOOD TRAVEL TIMES
for
DIFFERENT EVENTS

| Flow Scenario | Annual Exceedance Probability | Travel Time |
|-----------------------------------|-------------------------------|-------------|
| | | minutes |
| Dam Crest Flood Failure | 1:9,300 | 14 |
| Acceptable Flood Capacity Failure | 1:72,000 | 11 |
| Probable Maximum Flood Failure | 1:10,000,000 | 5 |

Travel times are based on information provided in "Dam Safety Review" documentation by SunWater, January 2009.

Travel time is estimated to the first house inundated in Irvinebank.

W.E. Steen

4-Sep-09.

APPENDIX 9 STANDING OPERATING PROCEDURE FOR SMALL TO MEDIUM SPILLWAY DISCHARGES – SOP 14

EMERGENCY ACTION PLAN – IBIS DAM

Department of Environment and Resource Management

Ibis Dam

Standing Operating Procedures for Small to Medium Spillway Overflows

SOP - 14

EMERGENCY ACTION PLAN – IBIS DAM

Distribution, Approval and Revision Control

Distribution

| Copy Number | Position | Location |
|-------------|--|------------|
| 1 | RoadTek Works Manager, Asset Services North | Cairns |
| 2 | Regional Manager, Water Services, North Region, DERM | Cairns |
| 3 | Director, Dam Safety, DERM | Brisbane |
| 4 | RoadTek Engineer | Cairns |
| 5 | RoadTek Officer (EAP) | Irvinebank |
| 6 | RoadTek Officer (Inspections) | Irvinebank |

Authorisation

Approved:

_____ Date: _____

Principal Engineer, Non-Commercial Assets, DERM

Revision Status

| Revision No. | Date | Revision Description |
|--------------|-----------|----------------------|
| 0 | July 2010 | Original Issue |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

EMERGENCY ACTION PLAN – IBIS DAM

| Table of Contents | Page |
|---|------|
| Purpose | 73 |
| Scope | 73 |
| Personnel Affected and Responsibilities | 73 |
| Actions | 74 |
| References | 74 |

Appendices

Appendix A –Inspecting for Deficiencies

EMERGENCY ACTION PLAN – IBIS DAM

Purpose

The Ibis Dam is managed by DERM. In terms of an MOU with DERM, the RoadTek Works Manager, Asset Services North, Cairns, manages the operation and maintenance of the Ibis Dam, including routine dam safety inspections.

Part of the dam safety management program is to inspect the Dam immediately before the spillway starts to overflow.

Scope

This Procedure applies to spillway overflow events that are less than the historical maximum event with a storage level of EL 826.0m. The personnel are the Emergency Action Plan (EAP) Officers listed in the EAP for Ibis Dam.

Personnel Affected and Responsibilities

| Officer | Responsibility |
|---|--|
| RoadTek Engineer | A Registered Professional Engineer, Queensland, responsible for carrying out monthly inspections at the dam. |
| Emergency Action Plan Officers (EAP Officers) | The Officer based at Irvinebank and at or near Ibis Dam responsible for carrying out EAP procedures for the Dam and this Standing Operating Procedure. |
| Principal Engineer, Non-Commercial Assets | The person responsible for approving the Standing Operating Procedures, the Operation and Maintenance Manual and the persons undertaking the role of EAP Officers and, for managing, receiving, storing and checking data for the Ibis Dam, reviewing and authorising documentation produced by the RoadTek Officer and consultants on the dam and initiating investigations into abnormal behaviour of the dam. |
| | Manages the Distribution, Approval and Revision Control relating to this Procedure. |
| Regional Manager, Water Services, Central West Region, DERM | The person responsible for approving the Emergency Action Plan. |

EMERGENCY ACTION PLAN – IBIS DAM

Actions

The EAP Officer should be aware of the storage height and rainfall conditions, and be able to estimate when the spillway is likely to overflow.

- Two hours before the spillway is estimated to overflow, The EAP officer shall visit the dam if safe access is possible, and visually inspect the Dam for any deficiencies.
- Check for new cracking or increased crack widths in the spillway face. Appendix B gives a guide for inspecting the Dam for deficiencies.
- Read the storage height gauge and rain gauge at the WAP Officer's residence at one-hour intervals.
- Notify the Senior Advisor, Local Disaster Management Group, Tablelands Regional Council that a spillway discharge is likely.
- Notify the Principal Engineer, Non-Commercial Assets of storage height and that a spillway discharge is likely. Regularly update Principal Engineer, Non - Commercial Assets during the rainfall event. At least daily or as directed by the Principal Engineer, Non -Commercial Assets.
- Notify property owners and residents in Irvinebank that a spillway discharge is likely.
- If the storage level is predicted to reach EL 826.0m, the EAP Officer is to implement the Major Overflow Event in the EAP.
- When the preceding twelve-hour rainfall is less than 50mm and the storage height gauge is less than EL 825.75m and falling, and local stream rises have fallen sufficiently to allow access to and egress from the site, the EAP Officer is to make an inspection of the Dam and advise the Principal Engineer, Non-Commercial Assets.
- EAP Officer advises the Senior Advisor, Local Disaster Management Group, Tablelands Regional Council that there is no longer the possibility of a major overflow event and stands down.

References

- Emergency Action Plan, Ibis Dam

Appendix A

INSPECTING FOR DEFICIENCIES: SUMMARY

EMERGENCY ACTION PLAN – IBIS DAM

| TYPE OF DEFICIENCY | LOOK FOR |
|----------------------|--|
| SEEPAGE | <p>A water flow or sand boil on the lower portion of the downstream slope or toe area, especially at the groins.</p> <p>Leakage around conveyance structures such as outlet works.</p> <p>Wet areas or areas where the vegetation appears greener or more lush on the embankment slope or toe area.</p> <p>Blocked toe drains.</p> <p>An increase in the amount of water being released from toe drains. (Remember to take into account changes in the reservoir level.)</p> <p>Turbidity or cloudiness of the seepage.</p> |
| CRACKING | <p>Desiccation Cracking: A random honeycomb pattern of cracks usually found on the crest and the downstream slope.</p> <p>Transverse Cracking: Cracks that are perpendicular to the length of the dam usually found on the crest.</p> <p>Longitudinal Cracking: Cracks that are parallel to the length of the dam. Longitudinal cracks may be associated with stability problems in the slopes.</p> |
| INSTABILITY | <p>Slides on the upstream or downstream slopes.</p> <p>Bulging, especially at the toe of the dam.</p> |
| DEPRESSIONS | <p>Misalignment in the crest and embankment slopes found by sighting along fixed points.</p> <p>Sinkholes found by checking and probing each depression.</p> <p>Remember, sinkholes have steep, bucket like sides while minor depressions have gently sloping, bowl like sides.</p> |
| MAINTENANCE CONCERNS | <p>Inadequate Slope Protection: Check for bald areas or areas where the protection is sparse or damaged.</p> <p>Surface Runoff Erosion: Check for gullies or other signs of erosion. Make sure to check the low points along the upstream and downstream shoulders and groins since surface runoff can collect in these areas.</p> <p>Inappropriate Vegetative Growth: Check for excessive and deep rooted vegetative growth.</p> <p>Debris: Check for debris on and around the dam, especially near outlet works or spillway inlets.</p> <p>Animal Burrows: Check for damage caused by burrowing animals.</p> |

Note: This tabulation taken from Dam Safety Surveillance Field Manual-August 2005

EMERGENCY ACTION PLAN – IBIS DAM

WHEN TO GET FURTHER ASSISTANCE

Several of the deficiencies covered above are very serious. If you observe any of the following deficiencies, you should consult with the Principal Engineer, Non – Commercial Assets:

- Sand boils or turbid seepage.
- Seepage that has increased since the last inspection (taking the reservoir level into consideration).
- Cracking that extends below the reservoir level or potential reservoir level.
- Transverse and longitudinal cracking.
- Deep seated slides or bulging associated with slides.
- Sinkholes or other large depressions.
- Deep rooted vegetation that might need to be removed.

If you are unsure whether or not a condition poses a threat to the safety of the dam, you should discuss your findings with the Principal Engineer, Non –Commercial Assets.

APPENDIX 10 ENVIRONMENTAL INCIDENT ALERTS

ENVIRONMENTAL INCIDENT ALERT

REGIONAL SERVICE DELIVERY DIVISION

DATE OF INCIDENT:

INCIDENT NOTIFIED BY:

TIME OF NOTIFICATION:

LOCATION OF INCIDENT:

SUMMARY OF INCIDENT AS NOTIFIED:

- Provide a brief dot point summary of the situation based on the information available

POTENTIAL IMPACTS:

- (this information can be based on advice from the company or source of the incident)
- Likelihood of unlawful environmental harm
- Likelihood of potential risk to public health (if public health risk is identified notify Queensland Health and provide details in this alert)

DERM's PLANNED ACTIONS:

- What actions has DERM taken
- What actions are proposed to be taken and timeframe for doing these

NEXT UPDATE ON INCIDENT EXPECTED:

- Date/time estimate

COMMUNICATION:

- What communications have been made?
- What public notifications have been made?
- What public notifications are expected?

MAP OR PLAN OF SITE:

- Where possible attach a map or plan which identifies the site and key features

| | | |
|--------------------|-----------------|-------|
| Region: | | |
| Briefing Officer: | Telephone: (07) | Date: |
| Approving Officer: | Telephone: (07) | Date: |

EMERGENCY ACTION PLAN – IBIS DAM

From: Brown Damien

Sent: Wednesday, 24 February 2010 2:29 PM

To: Birchley Michael; Buckley Andrew; Hart Randall; Pappalardo Joe

Cc: Miles Rhonda

Subject: Environmental Incident Alert Process for Regional Service Delivery

Importance: High

Good afternoon

As you are aware, Minister Jones' office has requested to be informed immediately of any environmental incidents, the impacts of such and proposed actions by the department. Due to the volume and urgent nature of these alerts I have attached a template that we will use to ensure that consistent and timely responses are provided across Regional Service Delivery, a similar process to what is used for DLO responses.

The attached template is to be used to advise as soon as possible on environmental incidents, such as fish kills, mine discharges, potential environmental harm due to spills, etc. **All information is to be approved by the relevant RSD** and emailed to the following parties:

- John Bradley, Director General;
- Terry Wall, Associate Director General;
- Debbie Best, DDG
- Michael Dart, Senior Policy Advisor to Minister Kate Jones;
- Joshua Cooney, Ministerial Media Officer to Kate Jones;
- Paul Michaels, Director DERM Media unit;
- Damine Brown, ADG RSD
- Kim Harycki, PA RSD

The email is to be sent **by the RSD only**. The email heading is to read "(Minister Jones) Environmental Incident Alert - *subject*" and a brief description is to be provided in the body of the email.

This process is not intended to replace suitable briefing notes on issues when time avails or phone contact with people like me to alert on incidents in a timely way. It is intended only to provide a suitable early alert to a wide group of parties of an incident that we have been notified of. It is not intended to be an onerous process or to delay any action or response. The template should be completed as quickly as possible and if something is unknown, then write in "unknown", don't hold up providing the advice seeking further information, early is better.

I would appreciate you distributing this template to officers within your region for **immediate use**.

If you have any queries in relation to the use of this form, please contact Kim direct.

Regards

Damien Brown

Assistant Director-General

Regional Service Delivery

Telephone: [REDACTED]

Mobile: [REDACTED]

Email: [REDACTED]

www.derm.qld.gov.au

Department of Environment and Resource Management

Level 13

400 George Street, Brisbane Q 4000

GPO Box 2454, Brisbane Q 4001

Relevant email addresses:-

[REDACTED]

[REDACTED]

APPENDIX 11

AUTOMATED ALERT MESSAGES