



West Coast Council

PIEMAN RIVER FLOOD EVACUATION PLAN

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Pieman Flood Evacuation Plan - Quick Reference Guide

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Document information

Title	Pieman River Flood Evacuation Plan
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Client contact	West Coast Council Municipal Emergency Management Coordinator
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Project manager	Keith Vander Schoor / Nick West
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Revision 3.0

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1 User information

1.1 Purpose of plan

The Pieman River Flood Evacuation Plan describes a process and provides supporting information for the evacuation of the population at risk due to natural and rare dam break floods in the Pieman River and affected areas.

The objectives of the Plan are to:

- describe the flood hazard, the community and infrastructure at risk of flooding, and the consequences from flooding;
- describe the strategies and procedures for evacuating the population at risk;
- describe the flood response management; and
- describe the public awareness strategies for flood risks in the Pieman River area.

The Plan applies to all occupied residences, roads and bridges at risk in and downstream of the Pieman River area that may be subject to inundation during the following flooding conditions:

- Natural floods of annual exceedence probability (AEP) 1:50, 1:100 and 1:200 on the Pieman River; and
- Dambreak floods for all dams from dam crest flood with dambreak (DCF+DB).

The Pieman River Flood Evacuation Plan fulfils the requirement for a Special Emergency Management Plan under section 35 of the *Emergency Management Act 2006*. It applies to a particular risk or emergency associated with natural and dam break induced floods within the Pieman River system only.

1.2 Background

Pieman River in the north west of Tasmania flows along the townships of Tullah and Rosebery before reaching the sea at Pieman Heads. There are four major dams associated with the Pieman River system. A pictorial view and a layout diagram of the Pieman River system are shown in Figure 1.1 and Figure 1.2 on the following pages respectively.

Lake Mackintosh is the principal storage of Hydro Tasmania's Pieman River Power Scheme and has a catchment area of 512 km². Flow in the Murchison River, the main tributary of the Pieman River, is diverted from Murchison Dam through Sophia Tunnel into Lake Mackintosh.

The Mackintosh River flows directly into Lake Mackintosh which is formed by two dams, Mackintosh Dam across the main river channel and Tullabardine Dam across a low saddle.

Bastyan Dam, forming Lake Rosebery on the Pieman River in conjunction with Bastyan Levee, is located 13 km downstream of Mackintosh Dam. Reece Dam, retaining Lake Pieman, is sited 50 km downstream of Bastyan Dam.

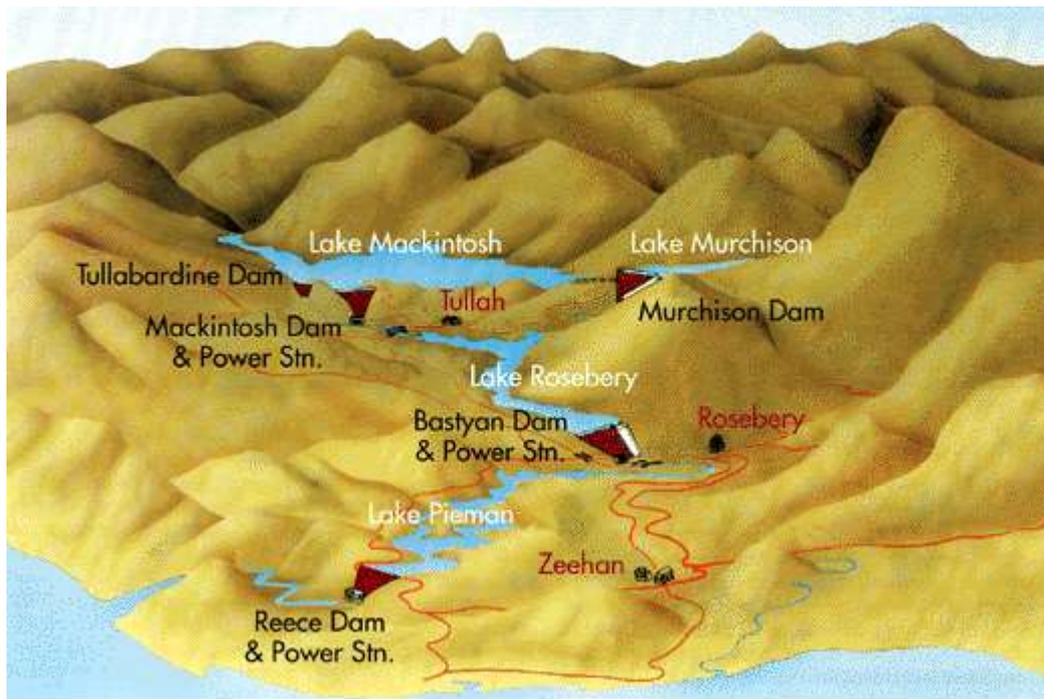


Figure 1.1: Pictorial view of Pieman River system

Communities located adjacent to rivers may be subject to the risk of flooding from natural flood events. Dams, when located above such communities, can perform an important flood mitigation function. However, in extreme circumstances, dams can also contribute to flood risk by releasing floodwaters in a controlled manner (i.e. via spillway gates or outlets) or in an uncontrolled manner when exposed to loads outside their design limits (i.e. dam failure).

The impact of natural and dambreak floods on communities can be greatly reduced if the communities have recognised the risk beforehand and put in place emergency plans and other appropriate mitigating measures.

This flood evacuation plan has been prepared by Entura in conjunction with the West Coast Emergency Management Committee (WCEMC). The WCEMC includes representatives from West Coast Council (WCC), Tasmania Police, Hydro Tasmania (HT), Tasmanian Health Organisation NW, and the State Emergency Service (SES). During the development of the plan, two stakeholder's meetings at the West Coast Council office were organised and additional communications were made by phone and email when and where required.

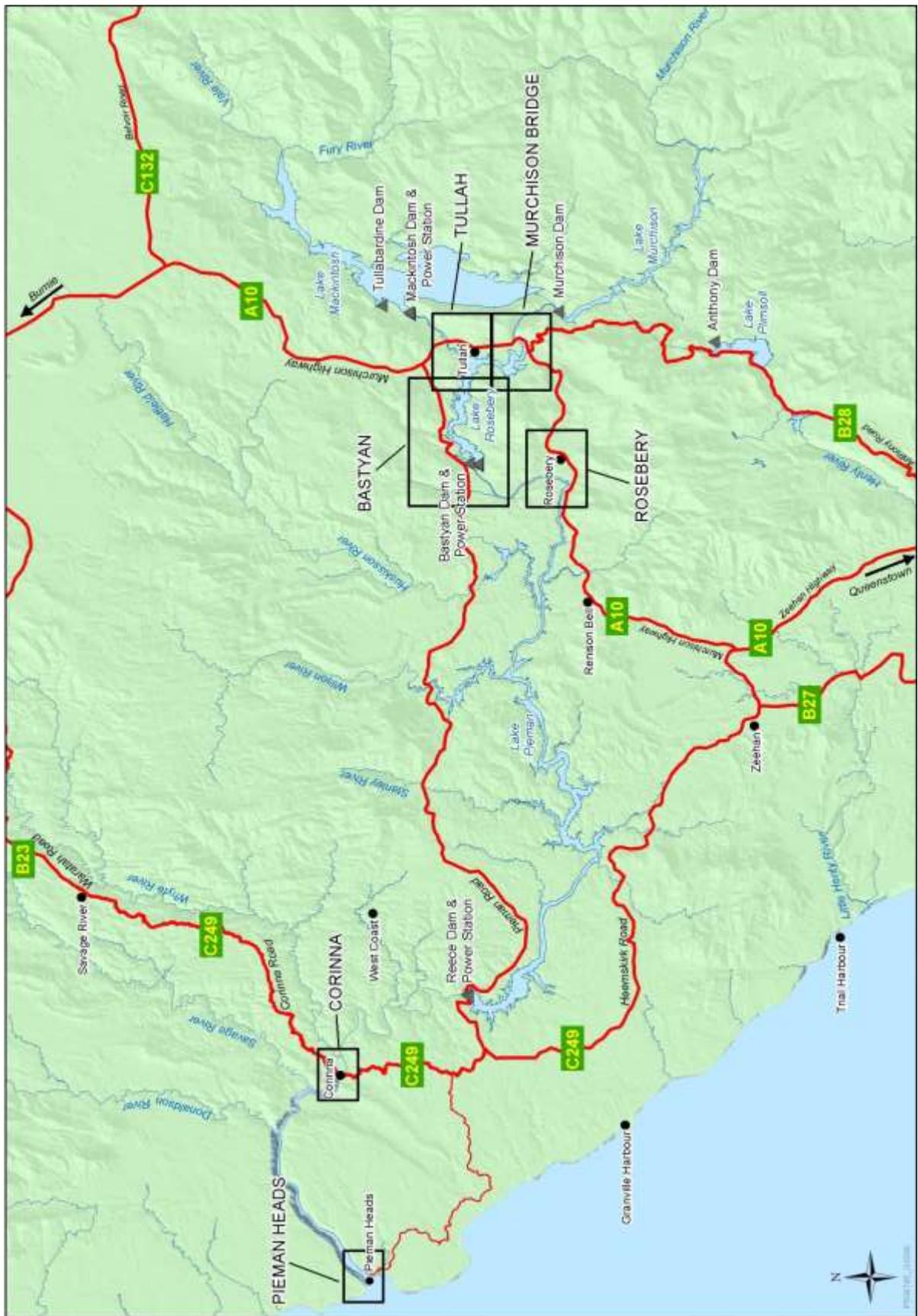


Figure 1.2: Layout diagram of Pieman River system

1.3 Format of plan

This plan is designed to provide a step by step procedure and flow charts which focus on how the relevant authorities should deal with a particular flood event. The plan is designed to be 'pulled off the shelf' and implemented in a simple and logical manner.

Flood inundation tables and maps are prepared for natural floods (1:50, 1:100 and 1:200 AEP) and dam crest flood with dambreak (DCF+DB). Additional flooding scenarios, dam crest flood without dambreak (DCF w/o DB) and sunny day failure (SDF), are modelled for better understanding of flooding around the major infrastructure location. Flood inundation table and maps are not prepared for these additional flooding scenarios.

1.4 Responsibilities and contact details

Most emergency situations occur with little or no warning. Flood emergencies within the Pieman River system can be predicted, and the information on the likely effects of the flood emergency on property and infrastructure is also known. If this information is widely known throughout the community at risk of flooding, then the risks to life and property can be reduced significantly.

The West Coast Council, in conjunction with the Tasmania Police/SES, have a duty to inform the population most at risk from flooding, so that they are aware of the threat to themselves and their properties, and understand what actions they may need to take to protect themselves. This includes knowing at what stage their property may be inundated, the appropriate evacuation routes and when these may become impassable, and the location of evacuation centres (Ref. *West Coast Municipal Emergency Management Plan, 2012*).

Those at risk should also be aware of who is responsible for managing the response to flood events, in particular the roles of:

- Bureau of Meteorology (BoM);
- Department of Health and Human Services (DHHS);
- Department of Infrastructure Energy and Resources (DIER).
- Hydro Tasmania (HT);
- State Emergency Service (SES);
- Tasmania Police; and
- West Coast Council (WCC).

Each of the above organisations will play a vital role in a flood evacuation process. Please note that the order listed is not hierarchical in level of responsibility.

Tasmania Police is the lead agency for flood events with the SES taking a lead role for natural flood events.

The **BoM** is responsible for:

- forecasting rainfall on the Pieman River catchment; and
- issuing forecasted rainfall in the catchment to Hydro Tasmania under a Memorandum of Understanding between HT and BoM.

It is noted that unlike some other catchments, no formal flood warning system exists from BoM.

Hydro Tasmania is responsible for:

- providing information to Tasmania Police/SES on historic high levels and forecast extreme flood levels predicted by the HT Flood Warning System; and
- alerting the Tasmania Police/SES of any abnormalities with any of its dams that could develop to failure.

Please note that Hydro Tasmania will not be issuing public warnings.

State Emergency Service (SES) is responsible for:

- regional emergency management coordination;
- maintaining regional emergency operation centre in Wilson Street, Burnie;
- assisting Tasmania Police in evacuations and road closures;
- co-operate with local government flood hazard analysis, flood plain mapping, property floor height studies and provide advice to local government on response to flood emergencies;
- co-operate with local government in the preparation of flood hazard analyses;
- ensure flood warnings are provided to the general public and local government in co-operation with the Bureau of Meteorology and Tasmania Police;
- co-ordinate the collection, interpretation and dissemination of flood intelligence during an event;
- provide assistance and co-ordinate additional resources to local government and other agencies during the event;
- co-ordinate the provision of Commonwealth support in a major flood;
- co-ordinate flood damage assessment; and
- ensure multi-organisational debriefs are conducted following flood response operations.

Tasmania Police is responsible for:

- safety of people and property;
- managing evacuations and road closures with the assistance of other organisations;
- issuing public warnings and media liaison.
- assisting SES in evacuations and road closures;
- evacuate persons likely to be in danger and co-ordinate other organisations involved;
- rescue persons in danger;
- secure evacuated areas;
- control traffic and provide advice to the public on hazards, closure of roads, bridges etc.;
- co-operate with other organisations in arranging shelter and relief for flood victims;
- search for missing persons or bodies; and
- collect detailed flood damage information.

West Coast Council (WCC) represents the community at risk and is responsible for:

- emergency management within the Council area;
- maintaining emergency operation centres;
- assisting Tasmania Police/SES in evacuations and road closures; and
- assisting the Department of Health and Human Services in providing for the welfare of evacuated and other affected people.

Department of Health and Human Services (DHHS) is responsible for assisting WCC in:

- establishing evacuation centres; and
- provision of the welfare of evacuees and other affected people.

Department of Infrastructure, Energy and Resources (DIER) is responsible for:

- monitoring roads and bridges;
- removal of obstructions to waterways at culverts and bridges caused by floating debris; and
- road closure and traffic diversion planning.

The contact details of these organisations and other relevant organisations are shown in Table 1.1

Table 1.1: Contact details of the concerned parties

Organisation	Emergency contact details	Administrative contact details
State Emergency Services (NW Regional Office)	(03) 6434 5333 (24hr) 132500 (Emergency)	88 Wilson Street, Burnie 7320 (03) 6434 5333 SES.North.West.Region@police.tas.gov.au
Tasmania Police (Queenstown)	000 131 444 (24hr)	2–6 Sticht Street, Queenstown 7467 (03) 6471 3020
West Coast Council	(03) 6471 4700 (Business hours) 0427 803 711 (Out of hours)	11 Sticht Street, Queenstown 7467 (03) 6471 4700 wcc@westcoast.tas.gov.au
Bureau of Meteorology	(03) 6221 2000	111 Macquarie Street, Hobart 7001 (03) 6221 2000 (24hr number)
Tasmanian Health Organisation NW (DHHS)	NW Regional Recovery Coordinator 0438 304 564	GPO Box 125, Hobart 7001
Marine and Safety Tasmania (MAST)		GPO Box 607, Hobart 7001 03 6235 8818 (Business hours only)
Department of Infrastructure, Energy and Resources (DIER)	Emergencies – Roads & Bridges 1800 005 282 (24hr)	GPO Box 936, Hobart 7001 1300 135 513
Cradle Mountain Water (CMW)	13 69 92	PO Box 3147DC, Ulverstone 7315 (03) 6471 5909
Tas Rail	1300 827 724 (Press 1 to report an emergency)	PO Box 335, Kings Meadows 7249 1300 827 724
Hydro Tasmania	(03) 6305 5569 (Out of hours only)	Gen Controllers 4 Elizabeth Street, Hobart 7000 1300 360 441 contactus@hydro.com.au

It is desirable to establish direct communication links between BoM, Hydro Tasmania, SES, Tasmania Police and the West Coast Council. At present there are no direct communication links between these organisations. During natural flooding, when disturbance to electricity and telecommunication infrastructure is less likely, the existing telecommunication system can be used as the direct communication link between the parties. But during large flood events, because of potential disruption to electricity supply and telecommunications, a radio communication or satellite phones are the preferred communication method.

Communication with the communities at risk of flooding is an important link that must be the subject of regular validation to ensure that the dissemination of flood warnings is timely and elicits the appropriate response.

1.5 Related documents

This Flood Evacuation Plan forms a part of an overall set of emergency management plans that are deployed by Tasmania Police, SES, West Coast Council, Hydro Tasmania, and BoM in the event of serious flooding to aid the community in the Pieman River area.

Other plans include:

- Hydro Tasmania Dam Safety Emergency Plan, August 2012 (Dam Safety Team, Technical and Operations, Hydro Tasmania), and subsequent updates.

Reference may also be made to:

- Tasmanian Emergency Management Plan, October 2012.
- North West Region Emergency Management Plan, July 2008; (Regional Emergency Management Controller).
- West Coast Emergency Management Plan, April 2012 (West Coast Council).

1.6 Glossary

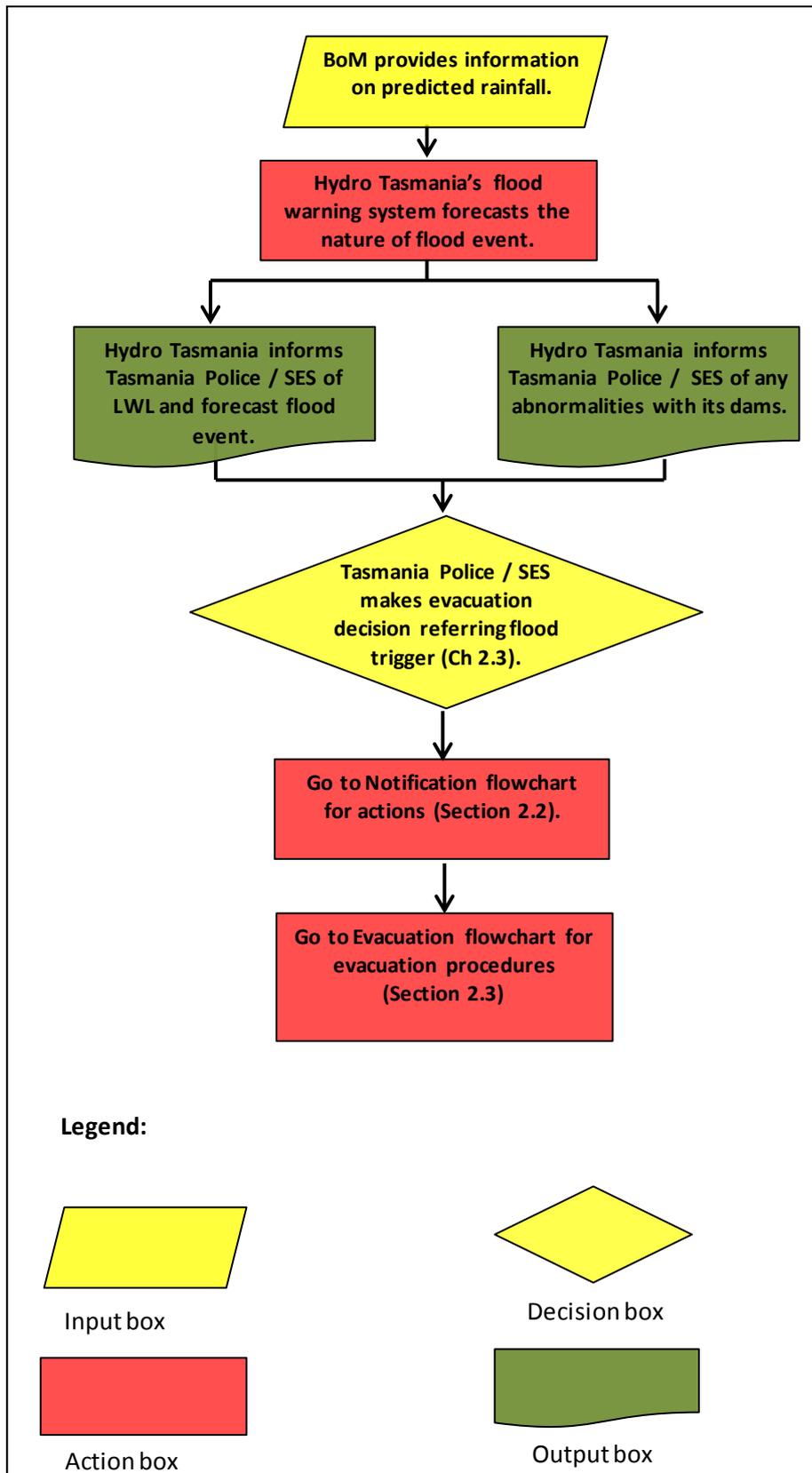
AEP	Annual exceedance probability - "A measure of the likelihood (expressed as a probability) of a flood reaching or exceeding a particular magnitude. A 1% (AEP) flood has a 1% (or 1:100) chance of occurring or being exceeded at a location in any year." <i>Emergency Management Australia (1995) Flood Warning: An Australian Guide, Canberra.</i>
BoM	Bureau of Meteorology.
CMW	Cradle Mountain Water.
Consequence	The effects of an action or event. In the case of a flood event, these may include adverse effects to life, health, property, the environment or business concerns.
DCF+DB	Dam crest flood with dambreak. A dam crest flood is a theoretical flood where the water level in the reservoir reaches the dam crest at the peak of the flood. In the subsequent hydraulic modelling (MIKE-11), the dam is simulated to fail at the point where the level in the reservoir reaches the dam crest.
DCF w/o DB	Dam crest flood without dambreak.
DHHS	Department of Health and Human Services.
DIER	Department of Infrastructure, Energy and Resources.
DSEP	Dam Safety Emergency Plan.
FEP	Flood Evacuation Plan.
Hazard	The threat or condition which may result from an external cause (e.g. flood, earthquake) with the potential for creating adverse consequences.
HT-FWS	Hydro Tasmania – Flood Warning System.
LWL	Lake Water Level.
MAST	Marine and Safety Tasmania.
m³/s	A unit of measurement equal to one cubic metre (1 m ³ = 1000 L) per second, used as a flow rate, or discharge rate, of water in rivers and creeks.
PAR	Population at risk.
Risk	A measure of the probability and severity of an adverse effect to life, health, property, the environment or business concerns.
SDF	Sunny Day Failure.
SES	State Emergency Service.
WCC	West Coast Council.
WCEMC	West Coast Emergency Management Committee.

2 Flowcharts

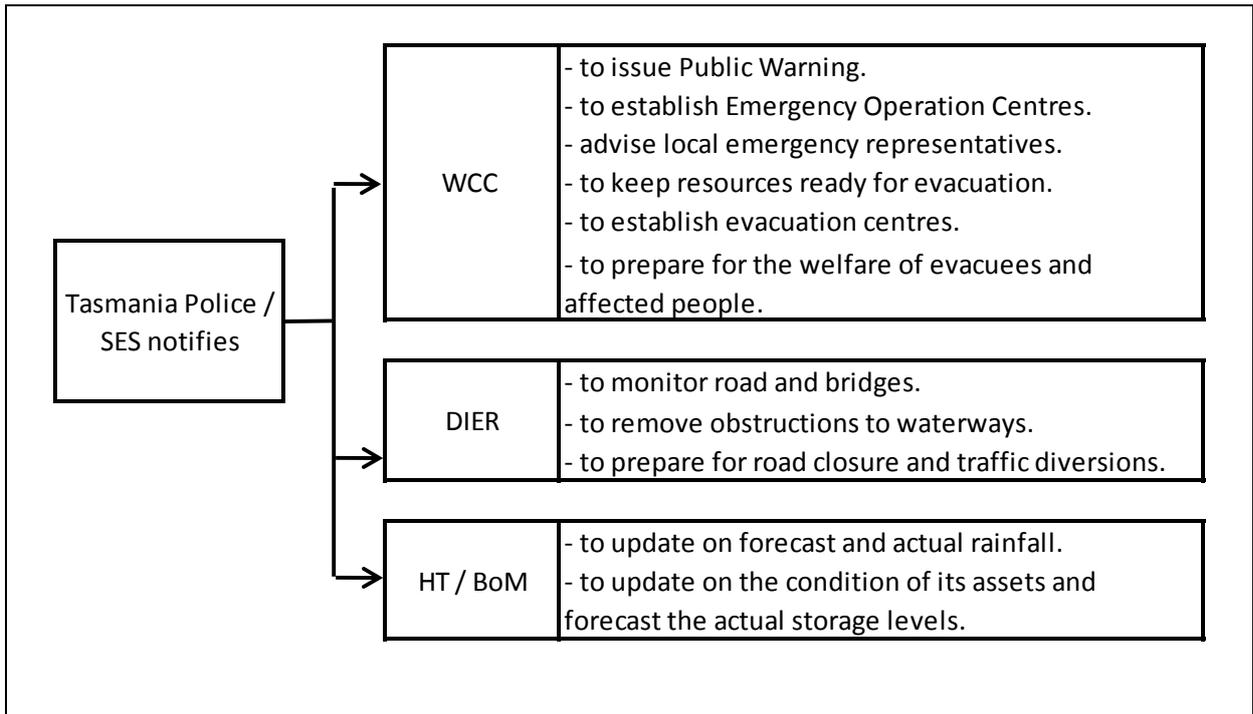
The following flowcharts detail the process and procedure in identifying and responding to a flood event and implementing the evacuation process:

- The decision making flowchart (Section 2.1) enables Tasmania Police/SES to decide on the most appropriate evacuation procedure based on BOM/HT's inputs.
- The notification flowchart (Section 2.2) enables Tasmania Police/SES to notify the respective organisations for various tasks before, during and after the evacuation procedure.
- The evacuation flowcharts (Section 2.3) provide Tasmania Police/SES with an evacuation process to follow for a particular flooding event.

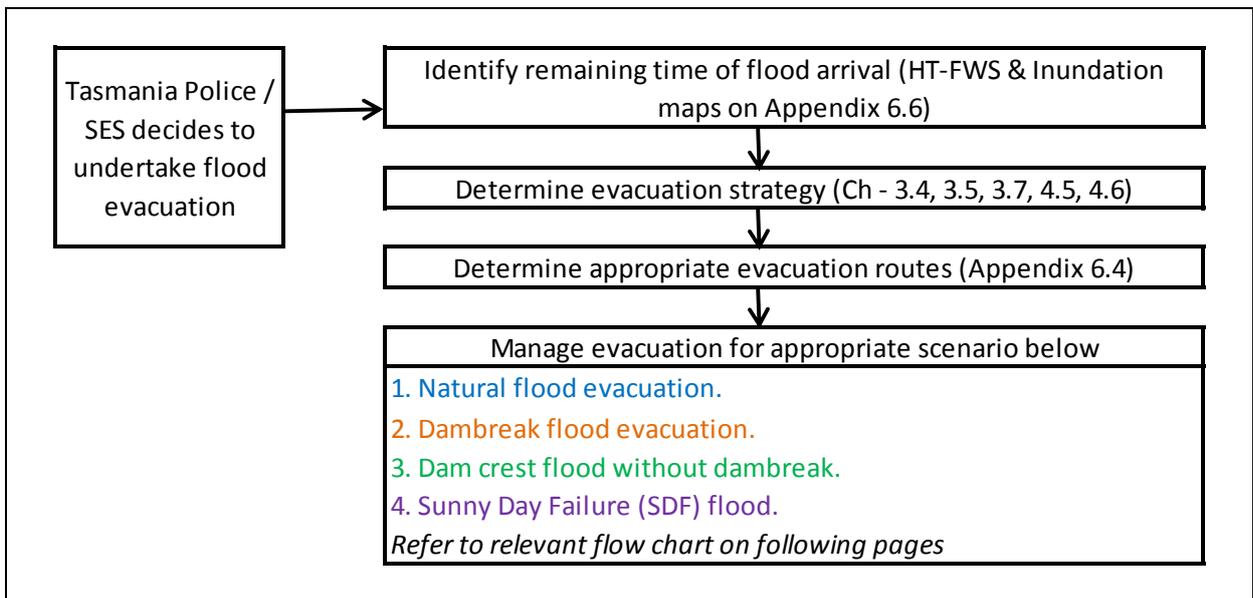
2.1 Decision making flowchart

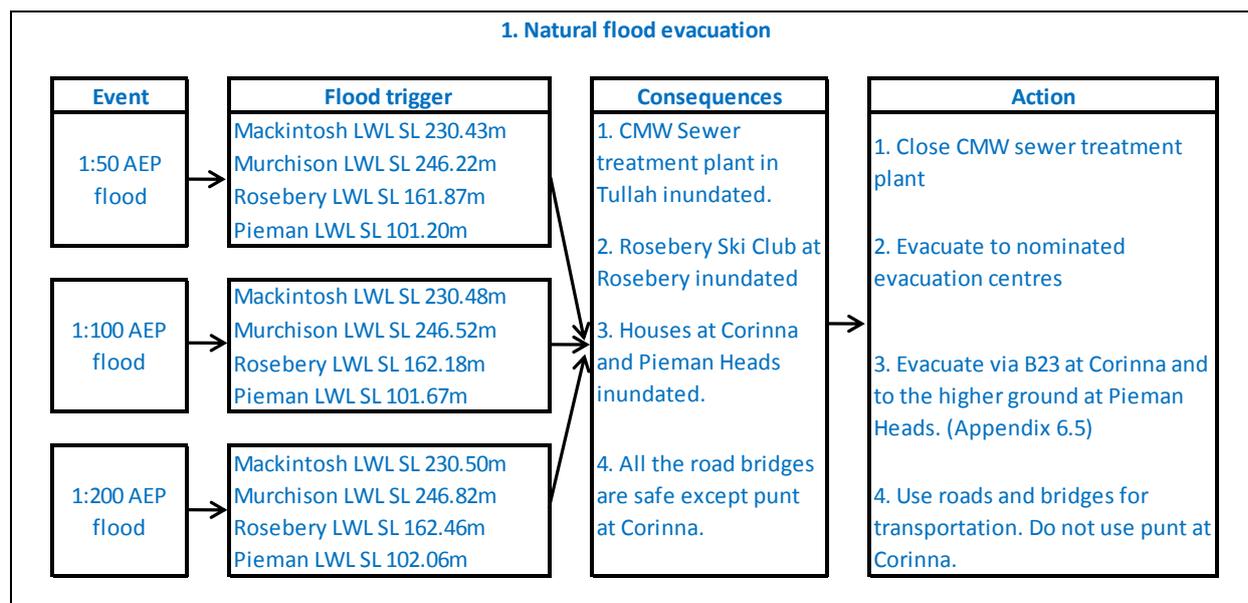


2.2 Notification flowchart



2.3 Evacuation flowchart

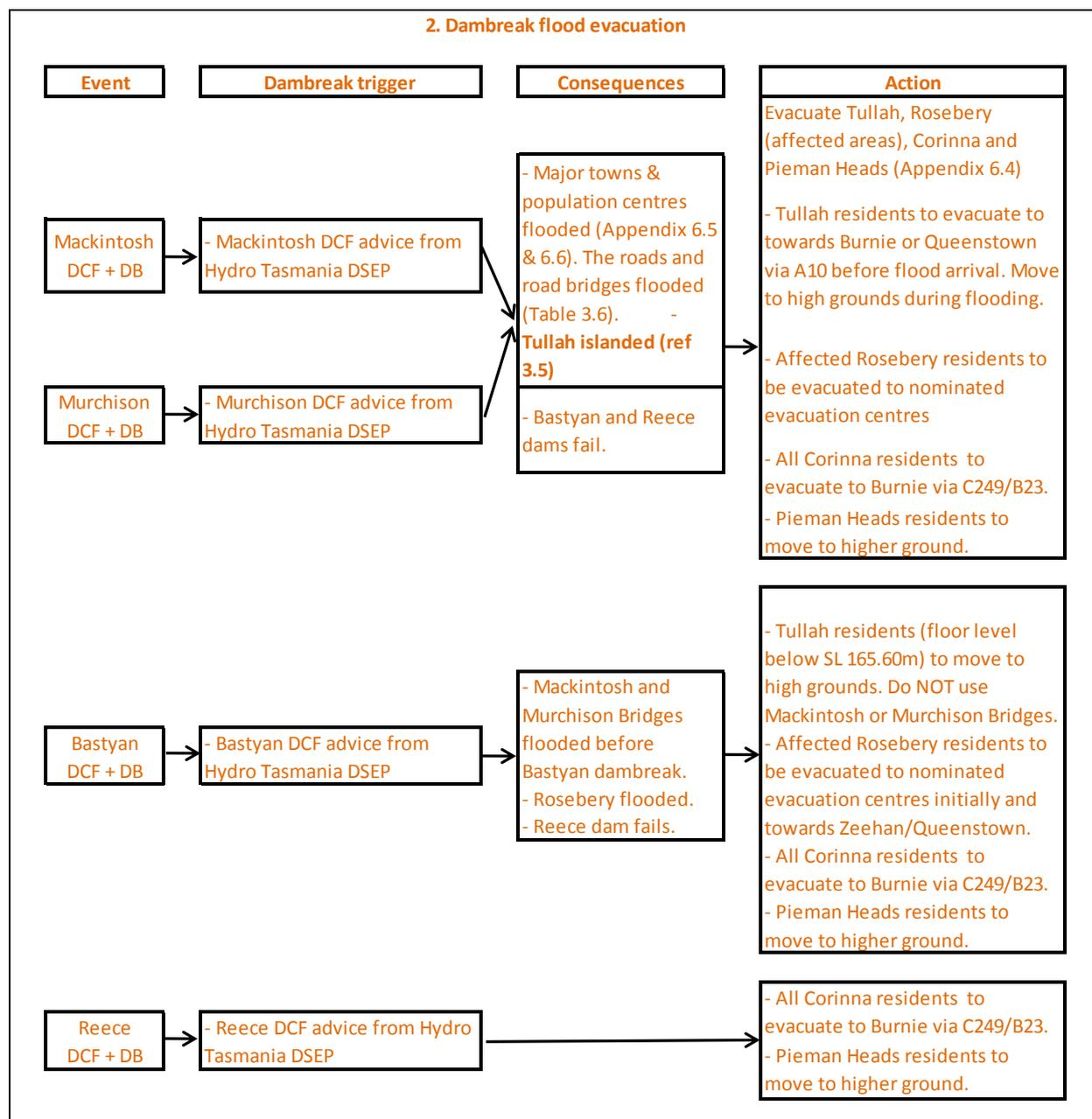




Potential evacuation centres

	Centre	Contact	Location
1	Queenstown Sports Stadium	WCC	Esplanade, Queenstown
2	Queenstown Memorial Hall	WCC	Orr Street, Queenstown
3	Strahan Rec Hall	WCC	Gaffney Street, Strahan
4	Zeehan Sports Stadium	WCC & Zeehan Primary School	Belstead Street, Zeehan
5	Zeehan Scout Hall	WCC & Queenstown Scout Group	Frederick Street, Zeehan
6	Rosebery Memorial Hall	WCC	Agnes Street, Rosebery
7	Rosebery Sports Stadium	WCC & Rosebery District High School	Gepp Street, Rosebery
8	Tullah Sports Stadium	WCC & Tullah Progress Association	Farrell Street, Tullah

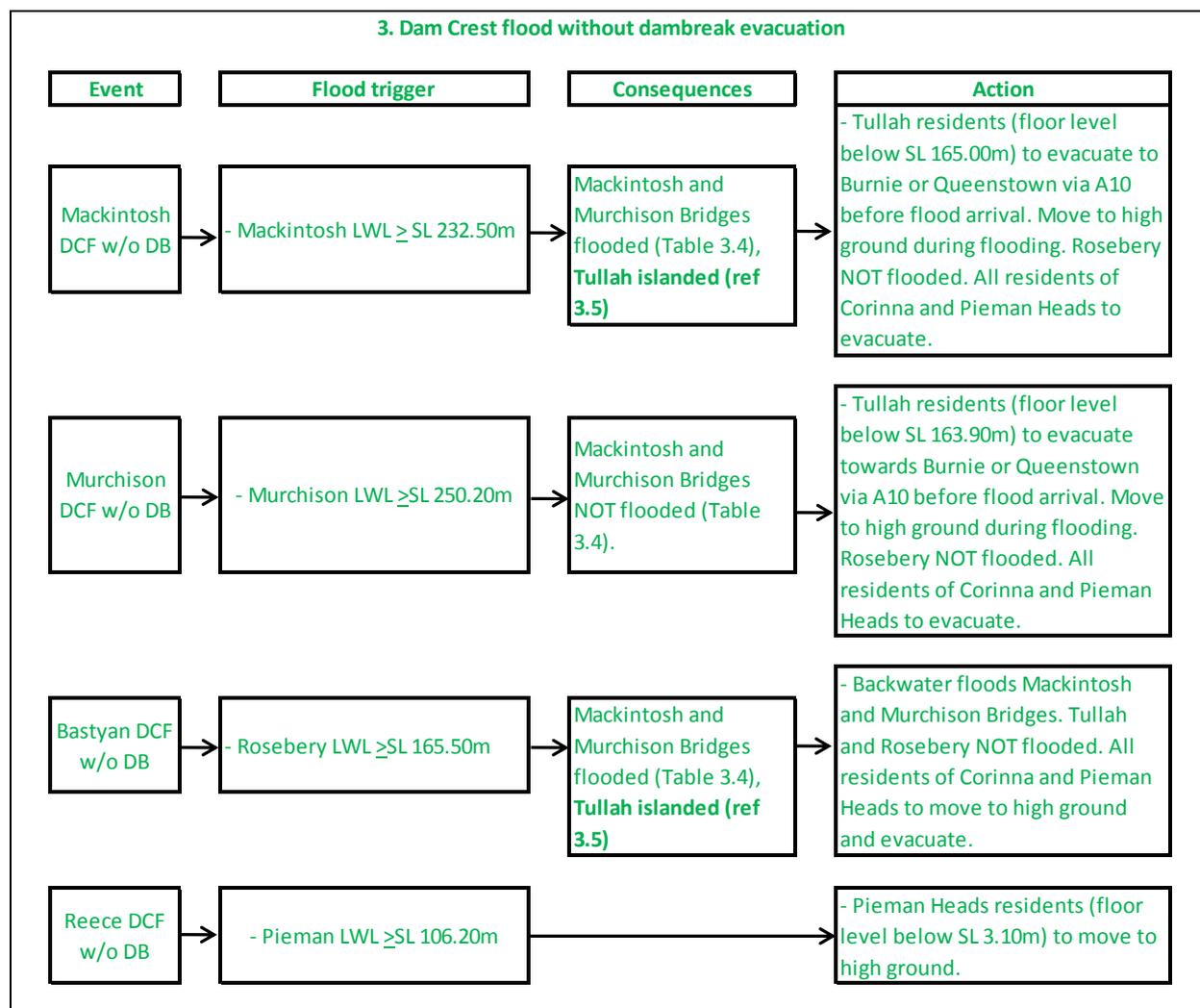
For more detail refer to West Coast Council Specialist Resource Contact List 2012



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4	Zeehan Sports Stadium	WCC & Zeehan Primary School	Belstead Street, Zeehan
5	Zeehan Scout Hall	WCC & Queenstown Scout Group	Frederick Street, Zeehan
6	Rosebery Memorial Hall	WCC	Agnes Street, Rosebery

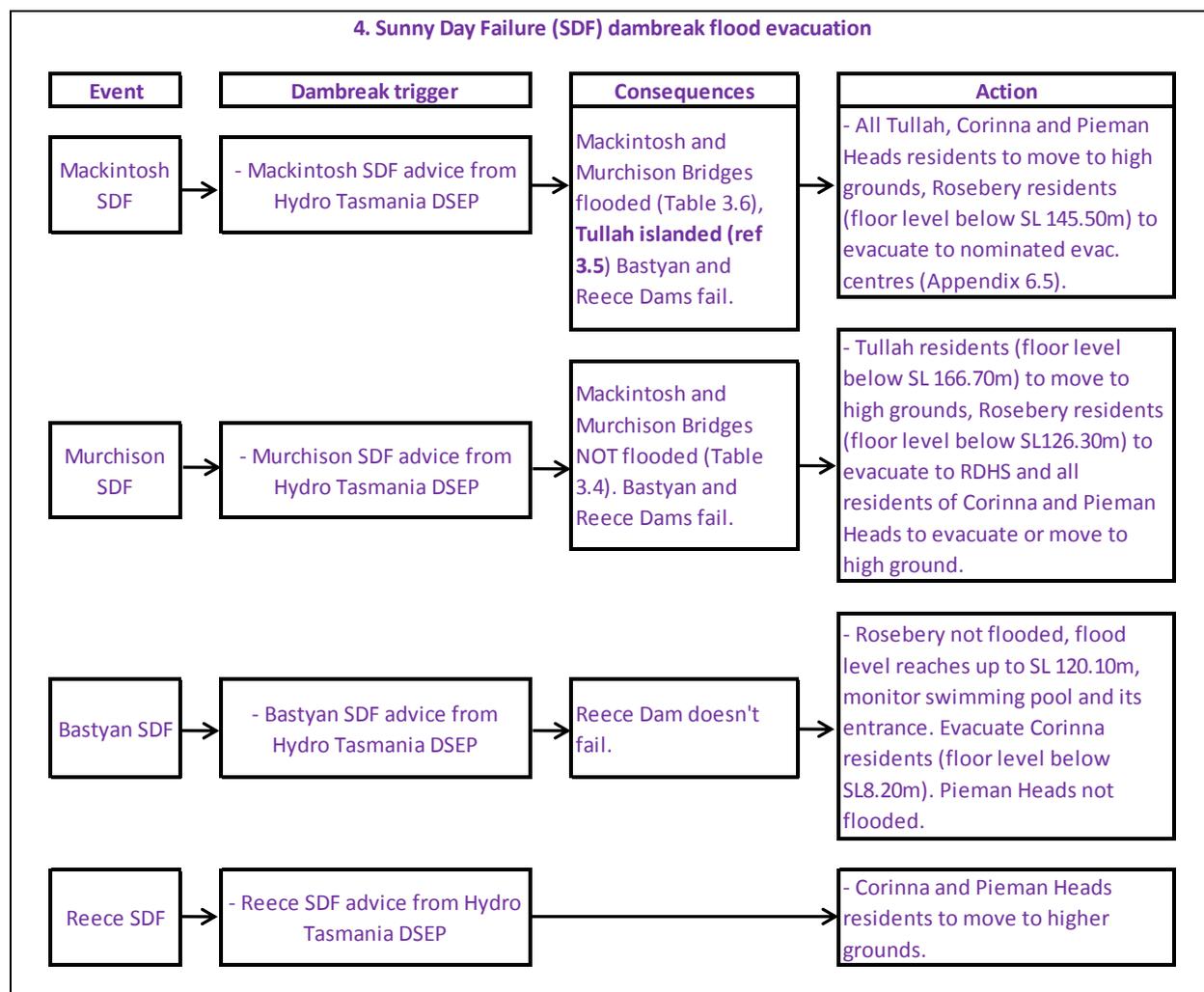
For more detail refer to West Coast Council Specialist Resource Contact List 2012



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6	Rosebery Memorial Hall	WCC	Agnes Street, Rosebery

For more detail refer to West Coast Council Specialist Resource Contact List 2012

3 Flood hazard and consequences

3.1 Historic maximum storage levels experienced in the power scheme

The historical maximum levels of lakes in the Pieman River power scheme are given in Table 3.1.

Table 3.1: Historical maximum lake levels in Pieman River power scheme

Lake	Associated dam(s)	Historical maximum level (SL m)	Date of historical maximum level	Dam crest level (SL m)	Flows (m ³ /s)
Mackintosh	Mackintosh Dam, Tullabardine Dam	230.31	28/05/1994	232.50	334
Murchison	Murchison Dam	245.31	10/08/2007	250.20	761
Rosebery	Bastyan Dam, Bastyan Levee	161.77	28/04/1994	165.50	1087
Pieman	Reece Dam	101.27	11/08/2007	106.20	1669

The spillways on Hydro Tasmania's dams have been designed to pass extremely rare flood events. If a flood event occurs which causes the water level of a lake to approach or exceed dam crest level, the structural integrity of the dam may be in danger. An improved understanding of flood hazards and associated consequences will lead to better public warnings and response strategies and opportunities to undertake preventative actions. Hydraulic dambreak modelling indicates that in the event of an upstream dam failure, the downstream dams in the cascade have a very high probability of failing.

3.2 Consequences of flooding

The likely consequences of flooding include:

- loss of life (less likely consequence for natural floods) due to:
 - being trapped inside dwellings due to rising flood-waters;
 - being swept into deep floodwaters whilst trying to cross a bridge or flooded road in a car or by foot;
 - falling into a river, stream or stormwater drain (more likely for children than adults);
 - electrocution from fallen electricity lines and shorted electricity circuits;
 - attempting to rescue stranded people, animals at risk, or retrieve property.
- potential death of animals, including livestock;
- destruction of houses and property;
- damage to bridges and roads made impassable by flood and debris;
- public health risks associated with the loss or contamination of water supply;
- failure of sewage treatment and disposal systems which may affect public hygiene;
- loss of electricity supply and telephone systems; and
- economic losses due to reduction in property values, damage to uninsured property, clean-up costs, and loss of income due to damage or closure of business premises.
- being isolated by flooded exit routes on temporary islands;
- debris, falling limbs of trees;
- time delays in accessing adequate ambulance and medical services;
- inability to contact emergency services through the loss of telephone communications, and
- failure of infrastructure.

During a large flood or dam failure event, there would be widespread community disruption. Damage would occur to private dwellings, business premises, community centres, roads and bridges and other property. In addition, vehicular passage on major roads in the vicinity would not be possible. This may result in the isolating of towns and communities or single dwellings.

With currently available hydrological information and hydraulic modelling, it is possible to make reasonable predictions for flood induced dambreaks. These predictions, when combined with dwelling floor height data, have been used to identify the properties likely to be inundated for a range of magnitude of flood events.

Bridges and low-level roads have also been surveyed to determine which evacuation routes may be available, or when evacuations should take place if predictions indicate that these routes will be blocked. Road closures for through traffic may also be necessary.

3.3 Community and infrastructure at risk of flooding

The population for a range of magnitude of flood events can be considered as located in six distinct zones: Tullah township, Murchison Bridge, Bastyan Dam, Rosebery township, Corinna and Pieman Heads. Details of these are given in the following appendices:

- The flood zones are shown in Appendix 6.3;
- The list of assets affected by flood inundation for various flood scenarios is presented in Appendix 6.5; and
- The flood inundation areas for various flood scenarios are shown in Appendix 6.6.

The itinerant Hydro Tasmania staff at power stations (i.e., Mackintosh, Bastyan and Reece power stations) also forms a part of the population at risk. When a flood event is predicted, HT will notify itinerant staff (if any) by the existing direct link between the control room and the power stations.

Table 3.2 shows distances from Mackintosh, Murchison, Bastyan and Reece dams to various landmarks along the Pieman River.

The infrastructure at risk from flooding includes:

- roads and bridges;
- railways;
- power stations and switchyards
- electricity distribution systems;
- telephone systems;
- water supply systems; and
- sewage disposal systems.

The location of infrastructure at risk of flooding and anticipated consequences of flooding are detailed in the sub-sections below.

Table 3.2: Distance from Mackintosh, Murchison, Bastyan and Reece dams to various landmarks downstream

Zone	Landmark	Easting (m)	Northing (m)	Distance from dam (km)			
				Mackintosh	Murchison	Bastyan	Reece
Tullah	Mackintosh Bridge	385379	5380135	3.7	12.3	-	-
Tullah	Tullah township	384287	5377872	5.1	8.8	-	-
Tullah	Murchison Bridge	385490	5375741	7.0	4.4	-	-
Bastyan	Farrell Switchyard	377788	5378484	13.8	17.5	-	-
Bastyan	Emu Bay Railway Bridge	377553	5378357	13.9	17.6	0.1	-
Rosebery	Rosebery township	377048	5374263	19.6	23.0	5.8	-
Corinna/ Pieman Heads	Corinna	340000	5387000	86.0	89.8	72.2	18.3
Corinna/ Pieman Heads	Pieman Heads	327000	5385000	103.6	106.6	89.8	35.9

Roads and bridges

All major roads and highways in the Pieman River areas (including the Murchison Highway and Pieman Road) may be inundated in a number of places for various dambreak flood events.

The punt at Corinna is expected to be washed out even during a natural flood event.

The roads and bridges are not flooded during natural flooding.

The following major road bridges are at risk under dambreak flood events and may be inundated at various heights:

- Mackintosh Bridge (Murchison Highway, Easting 385379m, Northing 5380135m);
- Murchison Bridge (Murchison Highway, Easting 385490m, Northing 5375741m);
- Sterling River Bridge (Murchison Highway, Easting 384324m, Northing 5374720m);
- Farm Creek Bridge (Pieman Road, Easting 382763m, Northing 5380967m);
- Stitt River Bridge (Murchison Highway, Easting 378602, Northing 5373211); and
- Emu Bay Rail Bridge (Downstream of Bastyan Dam, Easting 377553, Northing 5378357).

Railway

The railway operated and owned by TasRail may be inundated at a number of locations. Disruption to the rail system near Rosebery and Bastyan Dam area is expected due to inundation of railway line and bridge.

Power stations and switchyard

The power stations operated by Hydro Tasmania at Mackintosh, Bastyan and Reece and the associated switchyards may be inundated depending upon the flooding conditions.

Electricity distribution

High voltage (22 kV) supplies will be disrupted with inundation of poles and lines during a flood. Inundation of residences will result in localised fuse breakages. Major transmission towers and lines, along with the Farrell switchyard at Bastyan Dam, would be affected.

Telephone system

It is likely that landline telephone systems in the area will be disrupted due to flood damage and telephone usage may either reach or exceed the system capacity. Mobile phone coverage is already limited in the region which will add to the issue.

Water supply systems

It is likely that the reticulated water supply systems will be disrupted in Tullah and Rosebery.

Sewage disposal systems

It is likely that sewage disposal facilities, including pump stations and septic tanks, may be out of service due to damage in Tullah and Rosebery. This may cause sanitation problems for properties connected to these facilities and located downstream of these facilities.

3.4 Natural flood events

1:50, 1:100 and 1:200 AEP flood events are the natural flood events that have been modelled to aid evacuation planning. Table 3.3 shows the estimated population at risk for natural floods. The houses/facilities which are to be monitored, sandbagged or evacuated are considered as the affected houses and average occupancy per household is assumed 2.2 persons ([Census 2011, West Coast](#)).

Table 3.3: Estimated households and PAR located within various flood zones due to natural floods

Flood zone	Natural floods		
	1:50	1:100	1:200
Tullah	0 (0)	0 (0)	0 (0)
Bastyan Power station	1 (>2)	1 (>2)	1 (>2)
Rosebery	1 (2)	1 (2)	1 (2)
Corinna	6 (13)	8 (18)	10 (22)
Pieman Heads	1 (2)	2 (4)	4 (9)
Total households (PAR)	9 (19)	12 (26)	16 (35)

Note: PAR values are shown in brackets ().

Details of houses subject to inundation from natural floods are presented in the flood report in Appendix 6.4.

The plots of flood inundation due to natural floods within the specified flood zones are presented in Appendix 6.6.

Natural floods do not inundate any of the major infrastructures such as road and bridges. The flood water level relative to the bridge deck levels at the key road bridge locations are shown in Table 3.4.

Table 3.4 also presents the result of hydraulic modelling of additional scenario of Dam Crest Flood without Dambreak (DCF w/o DB) at Mackintosh, Murchison and Bastyan Dams.

3.5 The 'islanding' of Tullah

Inundation of Mackintosh and Murchison Bridges is not predicted in events up to and including the dam crest flood event at Murchison Dam. These bridges will be inundated in the event of dam crest flood without dambreak at Mackintosh Dam. If either of the dams experience flood induced failure, then both of these bridges will be inundated (Table 3.6) and Tullah will be islanded due to blocked road access.

It is therefore strongly recommended that Tullah is evacuated as soon as possible after initial notification to allow sufficient time for evacuation to occur prior to both bridges being inundated.

Mackintosh and Murchison Bridges will be inundated when the water level in Lake Rosebery rises to SL 165.5m before overtopping the dam crest initiating Dam Crest Flood with or without dambreak (Table 3.4 and Table 3.6).

3.6 Venture Minerals mine sites

Venture Minerals are in the process of developing a number of mining sites along the Pieman Road. Once these have been developed there will be increased road and train activity associated with these mines including 24 hour truck access and 12 hour train access initially, extending to 24 hour. The operation of the mines will also increase the number of people living in the region and may include the development of a village to service the mines.

The potential inundation and any necessary evacuation required for these proposed sites has not been included in this plan as these mines are only currently in planning stage. However, in the event of an evacuation event it is recommended to consider the mines and the necessary access along the Pieman Road. It has also been noted under Section 5.6 that this needs to be considered in any further revisions of this plan.

For further details of the mine developments contact Venture Minerals on (08) 9381 4222 or visit their website - www.ventureminerals.com.au

Table 3.4: Flood water levels at selected road bridges due to natural floods

Flood event	Mackintosh Bridge (Deck Lvl. 164.87m)	Murchison Bridge (Deck Lvl. 164.70m)	Sterling River Bridge (Deck Lvl. 168.18m)	Farm Creek Bridge (Deck Lvl 168.73m)	Stitt River Bridge (Deck Lvl. 140.77m)	Emu Bay Rail Bridge (Deck Lvl. 152.75m)
1:50	161.87 (-2.92m)	161.87 (-2.83m)	161.87 (-6.31m)	161.87 (-6.86m)	101.2 (-39.57m)	112.39 (-40.36m)
1:100	162.18 (-2.69m)	162.18 (-2.52m)	162.18 (-6.00m)	162.18 (-6.55m)	101.68 (-39.09m)	112.99 (-39.76m)
1:200	162.47 (-2.40m)	162.47 (-2.23m)	162.47 (-5.71m)	162.46 (-6.27m)	102.06 (-38.71m)	113.56 (-39.19m)
Mackintosh DCF without Dambreak (1:100,000)	165.20 (0.33m)	165.00 (0.30m)	164.99 (-3.19m)	164.97 (-3.76m)	105.39 (-35.38m)	117.77 (-34.98m)
Murchison DCF without Dambreak (1:5,000)	163.88 (-0.99m)	164.1 (-0.60m)	163.94 (-4.24m)	163.87 (-4.86m)	105.99 (-34.78m)	116.18 (-36.57m)
Bastyan DCF without Dambreak (1:15,000)	165.97 (1.10m)	165.97 (1.27m)	165.96 (-2.22m)	165.95 (-2.78m)	107.41 (-33.36m)	119.66 (-33.09m)

Note:

Flood water depths above or below (-) the deck level are shown in brackets ().

Flood levels greater than bridge deck levels are shown in **BOLD**

3.7 Dambreak floods

Table 3.5 shows the estimated population at risk for DCF+DB flood events. The houses/facilities which are to be monitored, sandbagged or evacuated are considered as the affected houses and average occupancy per household is assumed 2.2 persons ([Census 2011, West Coast](#)).

Table 3.5: Estimated households and PAR at various flood due to dambreak floods

Zone	Dams experiencing DCF + DB events			
	Mackintosh	Murchison	Bastyan	Reece
Tullah	179 (394)	107 (235)	0	0
Rosebery	203 (447)	17 (37)	4 (9)	0
Corinna	23 (51)	23 (51)	23 (51)	23 (51)
Pieman Heads	19 (42)	17 (37)	17 (37)	17 (37)
Total households (PAR)	424 (934)	164 (360)	44 (97)	40 (88)

Details of houses subject to inundation from dambreak floods are presented in the flood report in Appendix 6.5.

The relative floodwater levels due to dambreak floods on selected road bridges are shown in Table 3.6.

Table 3.6: Flood water levels at selected road bridges due to dambreak floods

Flood event	Mackintosh Bridge (Deck Lvl. 164.87m)	Murchison Bridge (Deck Lvl. 164.70m)	Sterling River Bridge (Deck Lvl. 168.18m)	Farm Creek Bridge (Deck Lvl 168.73m)	Stitt River Bridge (Deck Lvl. 140.77m)	Emu Bay Rail Bridge (Deck Lvl. 152.75m)
Mackintosh SDF	202.86 (37.99m)	179.82 (15.12m)	179.80 (11.62m)	178.68 (9.95m)	144.61 (3.83m)	166.59 (13.84m)
Murchison SDF	166.66 (1.79m)	172.97 (8.27m)	168.46 (0.28m)	166.67 (-2.06m)	125.52 (-15.24m)	148.88 (-3.87m)
Bastyan SDF	x	x	159.40 (-8.77m)	159.40 (-9.32m)	119.30 (-21.47m)	143.41 (-9.34m)
Reece SDF	x	x	x	x	x	x
Mackintosh DCF + DB	203.80 (39.93m)	179.73 (15.03m)	179.69 (11.51m)	178.12 (9.40m)	146.53 (5.77m)	168.67 (15.92m)
Murchison DCF + DB	170.47 (5.60m)	178.52 (13.82m)	172.93 (4.75m)	170.10 (1.37m)	130.73 (-10.03m)	152.33 (-0.42m)
Bastyan DCF + DB	165.60 (0.73m)	165.60 (0.90m)	165.61 (-2.57m)	165.57 (-3.15m)	126.96 (-13.81m)	148.94 (-3.81m)
Reece DCF + DB	x	x	x	x	x	x

Note:

Flood water depths above or below the deck level are shown in brackets ().

Flood levels greater than bridge deck levels are shown in **BOLD**

The flood water levels at major infrastructures and road intersection are presented in Table 3.7.

Table 3.7: Flood water depth at major infrastructure locations due to dambreak floods

Infrastructure description	Easting (m)	Northing (m)	Surface level (SL m)	Flood water level (depth)		
				Mackintosh DCF+DB	Murchison DCF+DB	Bastyan DCF+DB
Murchison Highway at Anthony Road Intersection	385068.47	5375206.01	174.70	179.70 (5.01m)	173.21 (-1.48m)	165.61 (-9.09m)
Murchison Highway at Mackintosh Dam Intersection	385627.45	5379303.44	183.75	183.56 (-0.19m)	170.44 (-13.30m)	165.59 (-18.16m)
Murchison Highway at Murchison Dam Intersection	385276.59	5376589.20	177.50	179.67 (2.17m)	172.12 (-5.37m)	165.60 (-11.89m)
Road Intersection - Farrell St and Murchison Hwy at Tullah	385140.75	5378450.96	168.69	180.16 (11.47m)	170.80 (2.11m)	165.59 (-3.10m)
Road Intersection - Romulus St and Murchison Hwy at Tullah	385143.91	5377983.10	169.96	179.66 (9.70m)	171.06 (1.10m)	165.59 (-4.36m)
Emu Bay Railway at Road Crossing Ballieu St at Rosebery	377778.94	5374134.39	147.28	146.53 (-0.74m)	130.73 (-16.55m)	126.96 (-20.31m)
Emu Bay Railway at Road Crossing Max Fitzallen Dr at Rosebery	377992.87	5373222.78	137.22	146.30 (9.08m)	130.68 (-6.53m)	126.95 (-10.27m)
Central Ave at Sewerage Pump Station at Tullah	384905.52	5377950.66	167.25	179.66 (12.41m)	171.04 (3.80m)	165.59 (-1.65m)

Note:

Flood water depths above or below the surface level are shown in brackets ().

Flood levels greater than surface levels are shown in **BOLD**.

The plots of flood inundation due to dambreak floods within the specified flood zones are presented in Appendix 6.6.

Table 3.8 shows the flood travel time to the townships and affected infrastructure for various flood induced dambreak events. The travel time is the time from the initiation of the dam breach to the arrival of the flood front (i.e. when the water level starts to significantly rise at that location).

Table 3.8: Flood arrival times (hh:mm) of flood induced dambreak events

Town/Zone/Location	Mackintosh DCF+DB	Murchison DCF+DB	Bastyan DCF+DB	Reece DCF+DB
Mackintosh Bridge	00:12	00:19	-	-
Murchison Bridge	00:27	00:11	-	-
Tullah	00:25	00:17	-	-
Emu Bay Railway Bridge	00:38	00:28	00:04	-
Rosebery	01:05	00:57	00:20	-
Corinna	02:50	02:53	02:55	00:40
Pieman Heads	03:35	03:41	03:25	01:25

4 Evacuation management

4.1 Warning, alerting and activation

There will be a significant lead time from the prediction of large to extreme rainfall events and the arrival of the flood peak at the sites of interest. The BoM will provide HT Flood Warning System (FWS) with input rainfall estimates up to seven days prior to the event, provided their systems remain operational.

This does not mean that a full seven day warning will be provided with precision but it does mean that a 'heads-up' alert could be provided between two and seven days prior to the event. If the alert is actioned according to this plan, there will be sufficient time to implement an appropriate response. It is expected that a large flood event will be known at least 24 hours in advance. The Hydro Tasmania flood warning system alarm notifies of forecast 1:20 AEP storage levels and storage levels approaching historic highs.

The warning lead time for dambreak floods from the onset of dam failure in the Pieman River power scheme is very short. For example, only about 15 minutes warning time is available between the flood induced breach of Mackintosh Dam and the flood wave reaching Tullah township.

Consequently, evacuation must be actioned on the predicted outputs of the flood warning system twenty four hours prior to the predicted peak and the advice given by Hydro Tasmania on the performance of their assets during the flood conditions.

The warning and alerting sequence is a part of the decision making process detailed in the flowchart in Section 2.1. A comprehensive flood warning system has a number of essential components as detailed below.

Predictions - A capacity to predict flood severity including the time of arrival of the flood. A prediction is expressed in terms of a flood level at a fixed water level (such as Lake Mackintosh at the dam, Lake Rosebery at Tullah or Lake Pieman at Rosebery) and includes the time at which the expected flood peak will occur. Rainfall forecasts are made by the BoM, and are based on observations within the catchment and the predictions of meteorological models. Hydro Tasmania's Pieman River flood warning system uses this information to model natural inflows which are then routed through each storage in accordance with a set of rules that govern the operation of the Pieman River power scheme. This information is used to provide early warning of flood conditions at one or more of the dams, where the dam is forecasted to reach or exceed the historic high.

Interpretations - An interpretation of the prediction is required to indicate the spread of water and what it will affect. This means translating the predicted flood levels into descriptive terms relevant to the flood consequence studies.

Hydraulic modelling of the Pieman River has identified flood levels at many locations for a range of possible flood events. The studies are based on a one-dimensional hydraulic model of the Pieman River power scheme which extends downstream of Reece Dam to Pieman Heads.

The hydraulic model predicts flow conditions particularly the water level, at a number of river cross sections based on an assessment of current surface conditions. Surface conditions such as the type and density of vegetation can vary with season and over time and these can alter predicted flood levels. Floor level surveys have been undertaken of residences and other buildings at risk of flooding. Given the

flood levels predicted by the hydraulic model, the floor levels are used to determine the depth of inundation for each of the modelled flood scenarios.

Warning messages - Warning messages provide advice on:

- what is happening and where it is happening;
- what the flood predictions will mean for the community; and
- what the community needs to do to respond; i.e. await further advice, be ready to evacuate, means of evacuation and evacuation routes.

A sample warning message is shown in Appendix 6.1.

Communication to the public and warnings should be facilitated through:

- SEWS standard emergency warning system;
- emergency alert (EA);
- websites – coordinated by the lead agent with other organisations needing to liaise with them before public announcements; and
- radio – ABC Local Radio and 7XS.

Communication - The transfer of flood messages to those at risk should be timely and designed to promote the appropriate response. Flood prediction capabilities have improved considerably but this will be of little use if warning messages are not delivered in a way that ensures that they will be heard, understood and acted upon by all persons that are considered to be at risk from a flood event. There will need to be more than one method of conveying messages to the community (e.g. radio, TV, phone and personal contact).

The community will be provided with all available information on floods, so that when a severe flood is predicted, members of the public will have confidence in the messages they receive and take the appropriate actions.

Transmission of the warning via the media is not a reliable mechanism of ensuring that all property owners are advised and should therefore not be used as the only form of distribution. Other forms of distributing warning messages include telephone calls, SMS, email, doorknocking, fax or community briefings. Emergency management personnel should note, however, that in dambreak flood events there is limited time for direct contact with property owners by Tasmania Police, SES and Council staff.

4.2 Flood triggers and actions

Triggers are predicted flood levels for specific scenarios. The triggers for issuing warnings and taking actions are based on predicted water levels at the upstream reservoirs for specific scenarios. Table 4.1 shows the trigger levels for different AEP natural floods and dambreak scenarios at various reservoirs.

Table 4.1: Lake Level triggers for floods within the Pieman River system

Flood event \ Reservoir		Lake Mackintosh	Lake Murchison	Lake Rosebery	Lake Pieman
1:50 AEP	LWL (SL m)	230.43	246.22	161.87	101.20
1:100 AEP	LWL (SL m)	230.48	246.52	162.18	101.67
1:200 AEP	LWL (SL m)	230.50	246.82	162.46	102.06
DCF with and without Dambreak	LWL (SL m)	232.50	250.20	165.50	106.20
Flooding zones		Tullah, Rosebery, Corinna and Pieman Heads	Tullah, Rosebery, Corinna and Pieman Heads	Tullah, Rosebery, Corinna and Pieman Heads	Corinna/ Pieman Heads

Actions for the affected community should be separated into what to do before a flood, during a flood and after a flood. This information should be communicated through an education program which is discussed further in Section 5.4 of this plan.

Actions in the event of a flood event may include any or all of the following:

- issue of public warnings through various media;
- road closure;
- self-evacuation to a safe refuge to local high ground until the flood waters abate; and
- evacuation out of the flood affected area.

Details of houses and facilities to be evacuated under a range of flood scenarios are presented in the flood reports in Appendix 6.5. The inundation areas for these flood scenarios are presented in the flood Inundation maps in Appendix 6.6. These flood reports recommend taking the following actions based on the inundation level:

- **No action** - water level is more than **0.4** metres **below** the floor of the property;
- **Monitor** - water level is between **0.4** metres and **0.1** metres **below** the floor of the property;
- **Sandbag** - water level is between **0.1** metres below and **0.3** metres **above** the floor of the property; and
- **Evacuate** - water is more than **0.3** metres **above** the floor of the property.

4.3 Evacuation management

The criteria for evacuation and for closing roads have been determined in consultation with Tasmania Police, SES and the West Coast Council with the primary objective being life risk reduction. These criteria are:

- the direct threat to life from rapidly flowing water;
- the difficulty of living in a flooded structure; and
- the possible adverse health consequences of living in a flooded or recently flooded area.

Bridges and low-level roads have been surveyed to determine which evacuation routes may be available, or when evacuations may need to be made prior to the flood because the predictions indicate that these routes will be blocked. Road closures for through-traffic may also be necessary. Evacuation procedures and the evacuation route maps are provided in Appendix 6.4.

Tasmania Police/SES will be responsible for managing evacuations and will also attempt to maintain security over properties that have been evacuated. The actions in Appendix 6.1 (warning message) should be followed, with periodic monitoring of flood levels and road and bridge conditions. West Coast Council staff will assist Tasmania Police and SES where requested.

In some instances, evacuations may be required well in advance of actual flooding. This will be the case when it is known that the expected flood will block roads and bridges that provide the only evacuation route from affected properties.

Evacuation centres may be established by the West Coast Council with support from the Department of Health and Human Services at suitable public centres.

These centres will be provided with a range of facilities and services to sustain the evacuees for the period of the flood. They may be in operation for a period after the flood until properties can be reoccupied. The centres will remain as the focal points for communities and should provide advisory services on a range of flood related issues such as status of floods at the concerned locations, status of evacuation of the residents, weather forecasts and safety advice as well as arranging for the delivery of essential supplies to people isolated by floodwater.

It is anticipated that the residents will undertake self-evacuation along the prescribed route upon request by SES or Tasmania Police, based on warning advisories or based on physical observation of storage level or river conditions.

4.4 Evacuation information and maps

Natural flood events including Dam Crest Flood without dambreak scenarios

- The natural flood events (1:50, 1:100 and 1:200 AEP) do not result in any major inundation at Tullah or Rosebery. Initially, self-evacuation of the population to higher grounds Farrell Heritage Park at Tullah (corner of Murchison Hwy and Mackintosh Dam Road) and nominated evacuation points.
- The population in Corinna will need to be evacuated via C249/B23 to Burnie via Savage River and Waratah.
- The population at Pieman Heads will need to be evacuated to a high point for helicopter evacuation or off beach for evacuation to Strahan by boat.

Dambreak flood scenarios

- Before the arrival of floodwaters, Tullah will be evacuated towards Burnie via A10 as shown in the evacuation maps in Appendix 6.4. An alternative evacuation route, towards Queenstown via B28 (Anthony Rd) may also be used.
- During flood conditions DO NOT attempt to cross the bridges and take the A10 towards Rosebery. Move to higher ground (Farrell Heritage Park at Tullah - corner of Murchison Hwy and Mackintosh Dam Road).
- Residents of Rosebery will be evacuated to nominated evacuation points
- The population in Corinna will need to be evacuated via C249/B23 towards Burnie via Savage River and Waratah or towards Zeehan via C249.
- The population at Pieman Heads needs to be evacuated to a high point for helicopter evacuation or off- beach for evacuation by boat to Strahan. Roads out of Pieman Heads may be impassable during flood conditions. Local evacuation to a property on the higher ground could be a possibility. In dambreak scenarios, evacuation to above the SL 20 or 30 m contour line is advisable. Following the passage of the flood wave, evacuation by helicopter or by boat to Strahan may be considered.
- The maps showing the evacuation routes are shown in Appendix 6.4. Overall layout of the road network around the area is shown in Appendix 6.3.

Evacuation maps are provided along with inundation maps in Appendix 6.4.

Note: SDF dambreak evacuation should be done in the same manner as described under Dambreak flood scenarios.

4.5 Evacuation times

The strategy of evacuation and the estimated evacuation time at the various regions for various flood scenarios shown in Table 4.2 (Tullah), Table 4.3 (Rosebery) and Table 4.4 (Corinna/Pieman Heads).

*For an up-to-date list of key resource contacts for emergency responses, refer to the specialist resource list in the *West Coast Municipal Emergency Management Plan, West Coast*; (April 2012, West Coast Council).

** For an up-to-date list of evacuation meeting points refer to the list in the *West Coast Municipal Emergency Management Plan, West Coast*; (April 2012, West Coast Council).

Note: All notifications need to be directed to Tasmania Police who will then coordinate with SES and West Coast Council (WCC).

Table 4.2: Evacuation strategy and response time – Tullah

Region	Scenario	Resources*	Steps taken	Where to evacuate to**	Time required
Tullah	Small floods (e.g. 1:50, 1:100 and 1:200 AEP) where only some homes are flooded and access to Tullah is clear.	<ul style="list-style-type: none"> • Tasmania Police • SES • Council Staff 	<ul style="list-style-type: none"> • Travel to Tullah • Door knocking 	<ul style="list-style-type: none"> • Higher ground within Tullah or evacuation meeting points 	4 hours
	Larger floods (DCF without DB) where more homes are flooded and access to Tullah is blocked by flooded bridges.	(Number of resources will be as coordinated by Tasmania Police)	<ul style="list-style-type: none"> • Travel to Tullah • Door knocking • Road closures • Evacuation registration • Clearing cars from surrounding roads 	<ul style="list-style-type: none"> • Evacuation meeting points north of Tullah or Queenstown via Anthony Road (B28) 	8 hours
	Extreme flood (DCF+DB) where the majority of Tullah is flooded and access to Tullah is blocked by flooded bridges.				

Table 4.3: Evacuation strategy and response time - Rosebery

Region	Scenario	Resources*	Steps taken	Where to evacuate to**	Time required
Rosebery	Small flood where (e.g. 1:50, 1:100 and 1:200 AEP) only a small number of homes are flooded.	<ul style="list-style-type: none"> • Tasmania Police • SES • Council Staff 	<ul style="list-style-type: none"> • Travel to Rosebery • Door knocking 	<ul style="list-style-type: none"> • Higher ground within Rosebery (Rosebery District High School) or evacuation meeting point in Zeehan via Murchison Highway (A10) 	4 hours
	Extreme flood where more homes are flooded and access to Rosebery is potentially blocked in both directions.	(Number of resources will be as coordinated by Tasmania Police)	<ul style="list-style-type: none"> • Travel to Rosebery • Door knocking • Road closures • Evacuation registration • Clearing cars from surrounding roads 		8 hours

Table 4.4: Evacuation strategy and response time – Pieman Heads/Corinna

Region	Scenario	Resources*	Steps taken	Where to evacuate to**	Time required
Pieman Heads/Corinna	Predicted flooding of buildings with ample warning time.	<ul style="list-style-type: none"> • Strahan Police x 2 and 1 boat <p>Or</p> <ul style="list-style-type: none"> • Zeehan Police and commandeered boat 	<ul style="list-style-type: none"> • Travel to Corinna • Door knock at Corinna • Launch boat at Corinna and travel to Pieman Heads • Door knock at Pieman Heads 	<ul style="list-style-type: none"> • From Pieman Heads back to Corinna in their own boat or police boat • From Pieman Heads to higher ground within local area • From Corinna towards Zeehan via Corinna Road (C249) or towards Burnie via Waratah Road (B23) 	8 hours
	Predicted flooding of buildings with limited warning time.	<ul style="list-style-type: none"> • Zeehan Police for Corinna • Helicopter (nearest available) for Pieman Heads 	<ul style="list-style-type: none"> • Travel to Corinna • Door knock at Corinna • Helicopter to Pieman Heads • Door knock at Pieman Heads 	<ul style="list-style-type: none"> • From Corinna towards Zeehan via Corinna Road (C249) or towards Burnie via Waratah Road (B23) • From Pieman Heads via helicopter • From Pieman Heads to higher ground within local area 	4 hours

4.6 Order of priority to evacuate

The WCC in participation with the Tasmania Police/SES will:

1. Ensure that identified groups or individuals with special needs are provided with adequate support and information including:
 - transport provisions;
 - interpretation services;
 - medical support ; and
 - animal protection.

The priority groups and individuals during any evacuation may include:

- senior citizens and mobility impaired persons and
 - Lake Rosebery Ski Club;
2. Attempt to identify any additional groups or individuals requiring extra assistance.
 3. Ensure warning dissemination successfully reaches:
 - tourist accommodation providers;
 - camps and camping facilities along Pieman River; and
 - Sporting grounds and facilities.

4.7 Emergency operations centres

Any major flood in the Pieman River system will affect the towns of Tullah, Rosebery and Corinna as well as other low-lying areas. An Operations Centre will need to be located centrally and should be able to manage the responses of all affected areas. The Operations Centre will need to have the capacity to communicate with these areas and provide a range of resources to those responsible for implementing the emergency response (incident management team). The West Coast Council, Tasmania Police and SES will set up the emergency operation centre. These operation centres are equipped to provide all the necessary facilities and are in ideal locations for an operations centre.

The operations centres will be the focal point for all tactical decisions relating to evacuation, road closures, evacuee centres and the provision of services to all affected people. There will be senior staff from SES and Tasmania Police who will form the incident management team during an emergency.

4.8 Transport

Other than in Pieman Heads, evacuation by boat is not recommended. It is unlikely that boats will be used for evacuation due to difficulty in manoeuvring in fast-flowing flood waters and the hazards posed by floating debris.

After roads have been closed, it is possible that access can still be made with large vehicles with a snorkel or high air intakes, if there is an urgent need of doing so. Such access should only be attempted when flow velocities are low and by experienced persons familiar with the road.

Driving, riding or walking through the flood water at any time is dangerous and should be avoided.

When high flood waters prevent vehicles access, evacuation shall be carried out using a helicopter or by foot to high ground considering the time available and remoteness of the location.

4.9 Media and public information

During any emergency event, information must be provided to the affected community and to the broader community. Tasmania Police / SES will be responsible for coordinating public warnings and media liaison. The West Coast Council in conjunction with SES and Tasmania Police will prepare regular community information sheets and media statements. They will provide details of the likely effects of the floods and where the community can seek advice on such matters as: insurance issues, legal services, temporary housing and counselling. (Refer back to 4.1)

4.10 Finance

Each organisation will be responsible for its own expenditure on flood evacuation operations. State or Commonwealth governments may not reimburse such expenditures. Nevertheless, separate accounts should be kept of emergency expenditure in the event that reimbursement is made available through the natural disaster relief arrangements or some other funding source.

5 Plan management

5.1 Plan owner

The WCC is the owner of this flood evacuation plan.

5.2 Plan holders

The organisations which are listed in Appendix 6.2 of this document are the plan holders.

5.3 Plan maintenance

It is the responsibility of the WCC, to review and maintain this Plan in consultation with the WCEMC at least once every two years in accordance with the *Emergency Management Act 2006* (Section 35(5)).

A review should investigate the benefits that additional survey data may provide to the Plan (e.g. additional floor level survey and river cross sections in Tullah and Rosebery). The review should ensure that any new roads and buildings need to be surveyed and included in the Plan.

5.4 Plan validation

Regular validation activities are to be undertaken by the organisations set out in Section 1.4 to ensure the effectiveness of the Plan. Regular validation activities are to be undertaken by the following organisations to ensure the accuracy of the Plan:

- West Coast Council;
- Tasmania Police;
- State Emergency Service;
- Hydro Tasmania; and
- Department of Health & Human Services.

5.5 Public awareness strategies

Specific strategies – A public awareness education program is the most effective way of increasing knowledge of what to do prior to, during and after a flood. An effective program will significantly enhance the smooth operation of the plan, minimise risks to life, reduce damages and significantly reduce demands on emergency service personnel for basic information during an emergency event.

Specific public awareness strategies to improve the understanding of the likelihood and consequence of different flood events include:

- publicity of the Plan through local media, presentations to community groups and within local schools;
- display of the Plan at the local government offices;
- flood awareness materials distributed to residents and businesses located within the modelled flood inundation areas; and

- for residents at risk of flooding, specific details of the risks, the warning procedures, the prediction to flood peak times, the expected water levels for the property, evacuation routes and evacuation centres, and the duration before flood waters will recede.

Education material – Community education material may include:

- What to do in a flood (http://www.bom.gov.au/water/floods/document/What_todo_floods.pdf)
- Emergency Management Australia, 2005 (<http://www.ema.gov.au>)

A significant body of work which addresses the above issues already exists so the WCC could adopt and adapt these for use on the West Coast region. The best Tasmanian example has been developed at Launceston City Council (LCC). The documents can be accessed through the links below:

- Flooding in Launceston, Launceston City Council
http://www.launceston.tas.gov.au/upfiles/lcc/cont/_council/community_engagement/publications/flood_dl_brochurecombined_previous_brochure_trio.pdf
- Standby notice for evacuation, Launceston City Council
http://www.launceston.tas.gov.au/upfiles/lcc/cont/_council/community_engagement/publications/1201_lcc_a4_flood_evacuation_info_sheet.pdf

LCC may only require an acknowledgement to allow use and adaption of the materials. It is recommended that the WCC approach LCC's Emergency Management officer Bev Allen to facilitate this. It may even be possible to develop a resource sharing agreement with LCC to gain direct input to WCC's education program from LCC's emergency management officer.

5.6 Revision history

A new issue history and amendment list will be issued each time a separate amendment is issued to holders of this document. Each amendment list is to replace this page, and this page should then be destroyed.

Please ensure that required amendments are notified to:

Executive Officer
WCEMC
c/- West Coast Council
11 Sticht St, Queenstown, TAS 7467

Table 5.1: Revision history

Issue date	Expiry date	Comments
October 2005	October 2007	Original issue.
February 2006	October 2007	FEP Revised to include updates in flood levels due to upgrades carried out on Hydro Tasmania's dams in the Pieman River. Pages iii, 1, 3, 8, 16 and the flood report for Mackintosh have been reissued.
July 2013	July 2015	FEP document texts revised to include the flood levels for new survey and upgraded hydrology. Flow chart and summary section added. FEP operationalised in consultation with WCEMC.

The following are recommended to include in the next revision of this flood evacuation plan:

- Real tidal effect during flooding at Corinna and Pieman Heads. The current plan does not consider any tidal effects. However, a quick check revealed that approximate height of the tides on the west coast is 0.7 m¹.
- For natural flood events, consider the effects from Whyte, Savage and Donaldson Rivers on flood levels at Corinna and Pieman Heads with and without Reece spillway discharges, as the contribution from these rivers has not been estimated or included in the current hydraulic modelling.
- The BoM does not have a flood warning system for river levels/flows for the west coast of Tasmania. Future revisions of the plan should consider the work required for BoM to develop a flood warning system for the Pieman River.
- Inclusion of flood modelling and evacuation plans for the any new infrastructure relating to the proposed Venture Minerals mines along the Pieman Road.

¹ Maritime Safety Queensland, <http://msq.qld.gov.au/Tides/Diurnal-tidal-planes.aspx>

6 Appendices

Appendix 6.1: Sample warning message

Appendix 6.2: Distribution list

Appendix 6.3: Map of Pieman River flood zones

Appendix 6.4: Flood evacuation information and maps

Appendix 6.5: Flood reports

Appendix 6.6: Flood inundation maps

Appendix 6.1: Sample warning message

The primary objective of a warning system is to enable individuals and communities to respond appropriately to a threat to reduce the risk of death, injury, property loss and damage. An effective warning will inform each member of the community at risk of:

- what is happening;
- what it means to you; and
- what you can do.

An example of an effective warning message for flooding within the Pieman River system is shown below.

Major Flood Warning

Major flooding is predicted for the Pieman River from Dam to Pieman Heads.

Properties in low lying areas, including Tullah/Rosebery/ Corinna/ Pieman Heads, will be flooded.

Houses will need to be evacuated before affected areas become isolated.

Residents will be advised by Tasmania Police or the State Emergency Service to evacuate before the flood peak when some roads will be blocked.

Evacuation centres will be established at

If you are advised to evacuate you should:

- gather your medicines, personal valuables and papers, money, photograph albums and family belongings which you can carry or fit into a vehicle;
- turn off the power, gas, beware of fallen power lines and isolate your water supply; and
- go to your designated evacuation centre.

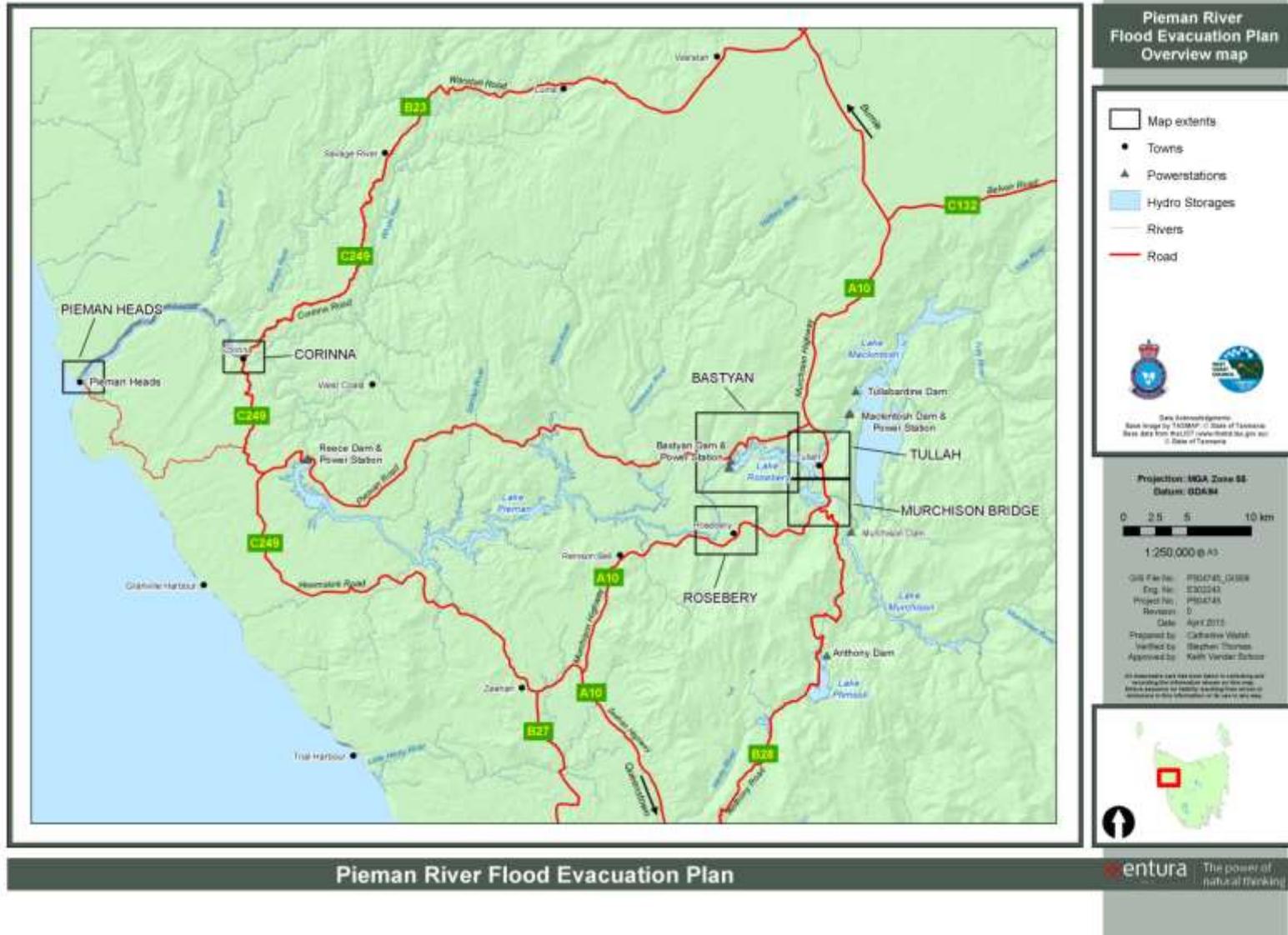
If you encounter flooded roads or bridges, **DO NOT** attempt to cross them. Move to high ground and seek shelter.

Appendix 6.2: Distribution list

The current flood evacuation plan is distributed to the following organisation:

Name of organisation	Number of copies
West Coast Council	4
General Manager (2)	
Municipal Coordinator (2)	
Tasmania Police	7
Rosebery (2)	
Queenstown (2)	
Zeehan (2)	
Regional Controller (1)	
Bureau of Meteorology – Flood Warning Centre	1
State Emergency Service	6
Regional Emergency Operations Centre North West (1)	
Regional Manager (1)	
Assistant Director, Emergency Management, Hobart (1)	
SES Unit Managers – Rosebery, Queenstown, Zeehan (3)	
Tasmanian Health Organisation (NW)	2
West Coast Hospital, Queenstown (1)	
Regional Recovery Coordinator, Queenstown (1)	
Department of Infrastructure, Energy and Resources	1
Cradle Mountain Water	1
Tas Rail	1
Hydro Tasmania	2
TOTAL	24

Appendix 6.3: Map of Pieman River flood zones



Appendix 6.4: Flood evacuation information and maps

The maps on the following pages present the modelled inundation areas for various flood events and the suggested evacuation routes.

More details are presented in Section 4.4.

Appendix 6.5: Flood reports

The flood reports provide details on:

- the modelled flood level;
- properties affected;
- the property locations by township and grid reference;
- the flood level below or above property floor levels;
- the actions to be taken to protect life and property; and
- the flood level below or above roads and bridges.

The flood reports are designed to be a guide for actions to be taken for a dam failure flood scenarios and natural flooding events (1:50, 1:100 and 1:200 AEP floods).

The actions are based on the following water levels relative to property floor levels:

- **No action** - water level is more than **0.4 metres below** the floor of the property;
- **Monitor** - water level is between **0.4 metres and 0.1 metres below** the floor of the property;
- **Sandbag** - water level is between **0.1 metres below and 0.3 metres above** the floor of the property; and
- **Evacuate** - water is more than **0.3 metres above** the floor of the property.

A safety margin will be included within the predicted level that is provided to the community in the warning. For example, the State Emergency Service in consultation with the Bureau of Meteorology will add a safety margin to the prediction of 0.2 or 0.5 of a metre. This safety margin is to allow for:

- potential errors in the prediction modelling;
- the effects of variations in flow velocities; and
- the effects of inflow from the minor tributaries downstream of the dam.

The inclusion of water levels over roads and bridges is to enable the selection of evacuation routes and to identify when these routes will be impassable. For all sedan vehicles, 400 millimetres (16 inches) of water over a road will be sufficient to make any attempt to cross it very dangerous.

The flood reports listed in the table below show which residences, buildings, roads and bridges will be inundated for flood induced dambreak scenarios of Mackintosh, Murchison, Bastyan and Reece Dams as well as natural flood events (i.e.1:50, 1:100 and 1:200 AEP floods).

Flood report no.	Flood event AEP	No of sheets
1	1:50 AEP Flood	1
2	1:100 AEP Flood	1
3	1:200 AEP Flood	1
4	Mackintosh DCF + DB	11
5	Murchison DCF + DB	11
6	Bastyan DCF + DB	7
7	Reece DCF + DB	1

The inundated areas are divided into four distinct zones; Tullah township, Rosebery township, Bastyan Dam and Power Station and Corinna/Pieman Heads.

The flood reports provide the following details for the properties and infrastructure concerned:

- the zone;
- the address of the residence or building;
- the easting and northing;
- the predicted flood level in SL m;
- the floor level in SL m (or bridge or road level);
- the estimated flood depth in meters (positive value = flooded depth);
- a description of the dwelling or infrastructure; and
- the suggested action for the flood event, e.g., 'evacuate', 'sand bag', etc.

The predicted flood levels are based on a MIKE-11 flood analysis one-dimensional model of the Pieman River system. The model uses a series of river cross sections and calculates the predicted flood levels at each cross section for particular flood hydrographs. Only the peak flood levels for each flood are recorded in the flood reports.

The flood reports show all properties currently expected to be inundated. Future development within the Pieman River system may increase the number of properties that could be affected by dam failure and natural flood event scenarios.

Appendix 6.6: Flood inundation maps

Flood inundation maps are provided for a range of flood events in the Pieman River system. The modelled inundation areas are based on the MIKE-11 model results and other GIS information available for the Pieman River system.

Flood inundation maps have been prepared for the major population centres and for the major infrastructure in the Pieman River system. The following population centres and infrastructure are included in the flood inundation maps:

- Tullah;
- Murchison Bridge;
- Bastyan (Emu Bay Railway Bridge);
- Rosebery;
- Corinna; and
- Pieman Heads.

Maps only display areas inundated where population is known to exist.