





# Corangamite Shire Flood Emergency Plan

A Sub-Plan of the Municipal Emergency  
Management Plan

For Corangamite Shire Council & VICSES South West Region  
including Camperdown, Cobden, Lismore, Port Campbell and  
Terang Units

Version 2.4, August 2014



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## Distribution List

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1		Council Office Copy	
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5		Deputy MRM	
6		MERC (Camperdown Police Station)	
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9		Skipton Police Station	
10		VICSES South West RHQ	
11		VICSES Camperdown Unit	
12		VICSES Cobden Unit	
13		VICSES Lismore Unit	
14		VICSES Port Campbell Unit	
15		VICSES Terang Unit	
16		Corangamite Catchment Management Authority	
17		Glenelg Hopkins Catchment Management Authority	
18		Wannon Water	
19		Bureau of Meteorology (Flood Warning)	
20		DEPI Ballarat	
21		Parks Victoria (Port Campbell)	
22		CFA Skipton Brigade	
23		CFA Lismore Brigade	
24		CFA Barwon South West Region District 6 Headquarters - Colac	
25		VicRoads Barwon South West Region	
26		DHS Barwon South West Region -	
27		Powercor	
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## Document Transmittal Form / Amendment Certificate

This Municipal Flood Emergency Plan (MFEP) will be amended, maintained and distributed as required by VICSES in consultation with the Corangamite Shire Council

Suggestions for amendments to this Plan should be forwarded to VICSES South West Region Headquarters, Corner Little Malop & Fenwick Streets, Geelong, Victoria, 3220 or by email to [southwest@ses.vic.gov.au](mailto:southwest@ses.vic.gov.au).

Amendments listed below have been included in this Plan and promulgated to all registered copyholders.

Amendment Number	Date of Amendment	Amendment Entered By	Summary of Amendment
2.3	August 2014	Arno van der Schans	Details of Nos1 & 2 Irrigation Dams at 463 Moreys Road, Brucknell included. Updated references to EMMV (July 2014)
2.4	August 2014	Arno van der Schans	Details for Evans Dam, 357 Batemans Road, Camperdown included

This Plan will be maintained on the Corangamite Shire website at [www.corangamite.vic.gov.au](http://www.corangamite.vic.gov.au).

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## List of Abbreviations & Acronyms

The following abbreviations and acronyms are used in the Plan:

AEP	Annual Exceedance Probability
AHD	Australian Height Datum (the height of a location above mean sea level in metres)
AIIMS	Australasian Inter-service Incident Management System
AoCC	Area of Operations Control Centre / Command Centre
ANCOLD	Australian National Committee on Large Dams
ARI	Average Recurrence Interval
ARMCANZ	Agricultural & Resource Management Council of Australia & New Zealand
AV	Ambulance Victoria
BoM	Bureau of Meteorology
CEO	Chief Executive Officer
CERA	Community Emergency Risk Assessment
CFA	Country Fire Authority
CMA	Catchment Management Authority
RERC	Regional Emergency Response Coordinator
RERCC	Regional Emergency Response Coordination Centre
DEPI	Department of Environment and Primary Industries (successor body to DPI and DSE)
DHS	Department of Human Services
DH	Department of Health
DoI	Department of Infrastructure
DSEP	Dam Safety Emergency Plan
EMMV	Emergency Management Manual Victoria
EMT	Emergency Management Team
EO	Executive Officer
FO	Floodway Overlay
FWS	Flood Warning System
FZ	Floodway Zone
IC	Incident Controller
ICC	Incident Control Centre
IMT	Incident Management Team
IMS	Incident Management System
EMLO	Emergency Management Liaison Officer
LSIO	Land Subject to Inundation Overlay
MECC	Municipal Emergency Coordination Centre
MEMP	Municipal Emergency Management Plan
MEMPC	Municipal Emergency Management Planning Committee
MERC	Municipal Emergency Response Coordinator
MERO	Municipal Emergency Resource Officer
MFB	Metropolitan Fire and Emergency Services Board
MRM	Municipal Recovery Manager
PMF	Probable Maximum Flood
RCC	Regional Control Centre
RDO	Regional Duty Officer (VICSES)
SBO	Special Building Overlay
SCC	State Control Centre
SEWS	Standard Emergency Warning System
SHERP	State Health Emergency Response Plan
SOP	Standard Operating Procedure
VicPol	Victoria Police
VICSES	Victoria State Emergency Service



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# Part 1. INTRODUCTION

## 1.1 Municipal Endorsement

This Municipal Flood Emergency Plan (MFEP) has been prepared by the Corangamite Shire Flood Planning Committee with the authority of the Corangamite Shire Municipal Emergency Management Planning Committee pursuant to Section 20 of the Emergency Management Act 1986 (as amended).

This MFEP is a sub plan to the Corangamite Shire Municipal Emergency Management Plan (MEMP), is consistent with the Emergency Management Manual Victoria (EMMV) and the Victoria Flood Management Strategy (DNRE, 1998a), and takes into account the outcomes of the Community Emergency Risk Management (CERM) process undertaken by the Municipal Emergency Management Planning Committee (MEMPC).

The Municipal Flood Emergency Plan is consistent with the Regional Flood Emergency Plan and the State Flood Emergency Plan.

This Municipal Flood Emergency Plan is a result of the cooperative efforts of the Corangamite Shire Flood Planning Committee (MFPC) and its member agencies.

This Plan is endorsed by the Corangamite Shire MEMPC as a sub-plan to the MEMP.

### Endorsement

.....	
Councillor Jo Beard, Chair of MEMPC	Date
.....	
Matt Maywald Regional Manager VICSES South West Region	Date

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## 1.2 The Municipality

An outline of Corangamite Shire in terms of its location, demography and other general matters is available from the Council website ([www.corangamite.vic.gov.au](http://www.corangamite.vic.gov.au)). An outline of the flood threat is provided in Appendix A of this Plan.

## 1.3 Purpose and Scope of this Flood Emergency Plan

The purpose of this MFEP is to detail arrangements agreed too for the planning, preparedness / prevention, response and recovery from flood incidents within Corangamite Shire.

As such, the scope of the Plan is to:

- Identify the Flood Risk within Corangamite Shire;
- Support the implementation of measures to minimise the causes and impacts of flood incidents within Corangamite Shire;
- Detail Response and Recovery arrangements including preparedness, Incident Management, Command and Control;
- Identify linkages with Local, Regional and State emergency and wider planning arrangements with specific emphasis on those relevant to flood.

## 1.4 Municipal Flood Planning Committee (MFPC)

Membership of the Corangamite Shire Flood Planning Committee (MFPC) will comprise of the following representatives from the following agencies and organisations:

- VICSES – Regional Officer – Emergency Management (**Chair**)
- VICSES Camperdown Unit – Controller and Deputy Controller
- VICSES Cobden Unit – Controller and Deputy Controller
- VICSES Lismore Unit – Controller and Deputy Controller
- VICSES Port Campbell Unit – Controller and Deputy Controller
- VICSES Terang Unit – Controller and Deputy Controller
- Corangamite Shire – Manager Environment & Emergency (MEM & MERO),
- Corangamite Shire – Municipal Emergency Management Officer (MEMO)
- Victoria Police (MERC),
- Wannon Water (as required),
- CFA Corangamite Operations Officer,
- DHS Regional Emergency Management Coordinator
- DEPI
- Glenelg Hopkins Catchment Management Authority
- Corangamite Catchment Management Authority

## 1.5 Responsibility for Planning, Review & Maintenance of this Plan

This Municipal Flood Emergency Plan must be maintained in order to remain effective.

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VICSES through the Flood Planning Committee has responsibility for preparing, reviewing, maintaining and distributing this plan.

The MFPC will meet at least once per year.

The MFEP should be reviewed and arrangements and information contained in the Plan amended where necessary:

- Following any new flood study;
- Following a change in non-structural and / or structural flood mitigation measures;
- After the occurrence of a significant flood event within the Municipality.

## **1.6 Endorsement of the Plan**

The MFEP will be circulated to MFPC members to seek acceptance of the draft plan.

Upon acceptance, the plan is forwarded to the MEMPC for endorsement with the recommendation to include the MFEP as a sub-plan of the MEMP.

# **Part 2. PREVENTION / PREPAREDNESS ARRANGEMENTS**

## **2.1 Community Awareness for all Types of Flooding**

Details of this MFEP will be released to the community through local media, the FloodSafe program, websites (VICSES and the Municipality) upon formal adoption by Corangamite Shire.

VICSES with the support of Corangamite Shire will coordinate community education programs for flooding within the council area. E.g. FloodSafe / StormSafe.

A Community Education Plan (CEP) to support this MFEP will be developed in conjunction with VICSES local units. VICSES local units will lead the delivery of the CEP with support from Corangamite Shire and VICSES Regions.

## **2.2 Structural Flood Mitigation Measures**

There are no formal structural flood mitigation measures on streams within Corangamite Shire.

## **2.3 Non-structural Flood Mitigation Measures**

### **2.3.1 Exercising the Plan**

Arrangements for exercising this Plan will be at the discretion of the MEMPC. This Plan should be exercised regularly, preferably on a bi-annual basis (i.e. every two years) unless activation has occurred. Refer to section 4.7 of the EMMV for guidance.

### **2.3.2 Flood Warning**

Arrangements for flood warning are contained within the State Flood Emergency Plan and the EMMV (Part 3.11) and on the BoM website <http://www.bom.gov.au>.

Specific details of local flood warning system arrangements are provided in Appendix E.

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### 2.3.3 Community Observers

VICSES Observers provide local knowledge to the appropriate control agency regarding the consequences of an incident and may assist with the dissemination of information to community members. Observers may also participate in flood emergency planning, exercises and community education activities.

The following arrangements for Flood Wardens / Observers are planned to be established:

- At Skipton consistent with recommendations arising from the Skipton Flood Investigation – List and include communication methodology and expectations, location and limitations of responsibility. Ref VICSES Local Knowledge Policy.
- As at the date of this Plan, there have been no VICSES Observers established within the Corangamite Shire.

## Part 3. RESPONSE ARRANGEMENTS

### 3.1 Introduction

#### 3.1.1 Activation of Response

Flood response arrangements may be activated by the Regional Duty Officer (RDO) VICSES South West Region or Incident Controller.

The Incident Controller / RDO VICSES will activate agencies as required and documented in the State Flood Emergency Plan.

#### 3.1.2 Responsibilities

There are a number of agencies with specific roles that will act in support of VICSES and provide support to the community in the event of a serious flood within Corangamite Shire. These agencies will be engaged through the Incident EMT.

The general roles and responsibilities of supporting agencies are as agreed within the Corangamite Shire MEMP, EMMV (Part 7 'Emergency Management Agency Roles'), State Flood Emergency Plan and Regional Flood Emergency Plan.

#### 3.1.3 Escalation

Most flood incidents are of local concern and an appropriate response can usually be coordinated using local resources. However, when these resources are exhausted, the State's arrangements provide for further resources to be made available, firstly from neighbouring Municipalities (on a regional basis) and then on a State-wide basis.

Resourcing and event escalation arrangements are described in the EMMV ('State Emergency Response Plan' – section 3.12).

### 3.2 Strategic Control Priorities

To provide guidance to the Incident Management Team (IMT), the following strategic control priorities shall form the basis of incident action planning processes:

1. Protection and preservation of life is paramount - this includes:
  - a. Safety of emergency services personnel, and;

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- b. Safety of community members including vulnerable community members and visitors / tourist located within the incident area.
  2. Issuing of community information and community warnings detailing incident information that is timely, relevant and tailored to assist community members make informed decisions about their safety.;
  3. Protection of critical infrastructure and community assets that supports community resilience;
  4. Protection of residential property as a place of primary residence;
  5. Protection of assets supporting individual livelihoods and economic production that supports individual and community financial sustainability
  6. Protection of environmental and conservation values that considers the cultural, biodiversity, and social values of the environment;

Circumstances may arise where the Incident Controller is required to vary these priorities, with the exception being that the protection of life should remain the highest priority. This shall be done in consultation with the State Controller and relevant stakeholders based on sound incident predictions and risk assessments.

### **3.3 Command, Control & Coordination**

The Command, Control and Coordination arrangements in this Municipal Flood Emergency Plan must be consistent with those detailed in State and Regional Flood Emergency Plans. For further information, refer to sections 3.5, 3.6, 3.7 & 3.8 of the EMMV.

The specific details of the Command, Control and Coordination arrangements for this plan are to be provided in Appendix C.

#### **3.3.1 Control**

Functions 5(a), 5(b) and 5(c) at Part 2 of *the Victoria State Emergency Service Act 1986 (as amended)* detail the authority for VICSES to plan for and respond to flood.

Part 7.1 of the EMMV prepared under the *Emergency Management Act 1986 (as amended)*, identifies VICSES as the Control Agency for flood. It identifies DEPI as the Control Agency responsible for “*dam safety, water and sewerage asset related incidents*” and other emergencies

All flood response activities within Corangamite Shire including those arising from a dam failure or retarding basin / levee failure incident will therefore be under the control of the appointed Incident Controller, or his / her delegated representative.

#### **3.3.2 Incident Controller (IC)**

An Incident Controller (IC) will be appointed by the VICSES (as the Control Agency) to command and control available resources in response to a flood event on the advice of the Bureau of Meteorology (or other reliable source) that a flood event will occur or is occurring. The Incident Controller responsibilities are as defined in Part 3.5 of the EMMV

### 3.3.3 Incident Control Centre (ICC)

As required, the Incident Controller will establish an Incident Control Centre (ICC) from which to initiate incident response command and control functions. The decision as to if and when the ICC should be activated, rests with the Control Agency (i.e. VICSES).

Pre-determined Incident Control Centre locations are

- Level 3 ICC
  - Primary: CFA District 5 Office Warrnambool,  
Corner Raglan Parade and Walsh Road, Warrnambool
  - Secondary: VICSES SW Geelong Office, Furner Avenue, Geelong

### 3.3.4 Divisions and Sectors

To ensure that effective Command and Control are in place, the Incident Controller may establish Divisions and Sectors depending upon the complexity of the event and resource capacities.

The following Divisions and Sectors may be established to assist with the management of flooding within the Municipality:

<b>Division</b> (pre-determined Divisional Command locations)	<b>Sectors</b> (Pre-determined Sector Command locations)
To be confirmed	Northern
	Southern

### 3.3.5 Incident Management Team (IMT)

The Incident Controller will form an Incident Management Team (IMT).

Refer to Part 3.9 of the EMMV for guidance on IMTs and Incident Management Systems (IMs).

### 3.3.6 Emergency Management Team (EMT)

The Incident Controller will establish a multi-agency Emergency Management Team (EMT) to assist the flood response. The EMT will consist of key personnel (with appropriate authority) from stakeholder agencies and relevant organisations who need to be informed of strategic issues related to incident control and who are able to provide high level strategic guidance and policy advice to the Incident Controller for consideration in developing incident management strategies.

Organisations, including Corangamite Shire Council, required within the EMT will provide an Emergency Management Liaison Officer (EMLO) to the ICC or Divisional Command if requested and as required.

Refer to 3.7 of the EMMV for guidance on EMTs.

### 3.3.7 Coordination

The Municipal Emergency Response Coordinator (MERC) for Corangamite Shire will ensure that the Coordination function is undertaken. The Incident Controller / RDO will ensure that communications are established with the MERC and that regular situational updates are provided. This may be undertaken through the Division / Sector Commander where appointed.

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### **3.3.8 Municipal Emergency Coordination Centre (MECC)**

If a MECC is established, liaison with the MECC will be through the established Division / Sector Command and through Municipal involvement in the Incident EMT, in particular the Municipal Emergency Response Coordinator (MERC). The VICSES RDO / ICC will liaise with the MECC directly if no Division / Sector Command is established.

The function, location, establishment and operation of the MECC is as detailed in the Corangamite Shire MEMP.

### **3.3.9 VICSES actions on receipt of a Flood Watch / Severe Weather Warning**

Incident Controller or VICSES RDO (until an Incident Controller is appointed) will undertake actions as defined within the flood intelligence cards (Appendix C). General considerations by the Incident Controller / VICSES RDO will be as follows:

- Review flood intelligence to assess likely flood consequences
- Monitor weather and flood information – [www.bom.gov.au](http://www.bom.gov.au)
- Assess Command and Control requirements
- Review local resources and consider needs for further resources regarding personnel, property protection, flood rescue and air support
- Notify and brief appropriate officers. This includes Regional Control Centre (RCC) (if established), State Control Centre (SCC) (if established), Council, other emergency services through the EMT.
- Assess ICC readiness (including staffing of IMT and EMT) and open if required
- Ensure flood bulletins and community information are prepared and issued to the community
- Monitor watercourses and undertake reconnaissance of low-lying areas
- Develop media and community information management strategy
- Ensure flood mitigation works are being checked by owners
- Develop and issue incident action plan, if required
- Develop and issue situation report, if required

### **3.3.10 On receipt of the First and Subsequent Flood Warnings**

Incident Controller / VICSES RDO (until an Incident Controller is appointed) will undertake actions as defined within the flood intelligence cards (Appendix C). General considerations by the Incident Controller / VICSES RDO will be as follows:

- Develop an appreciation of current flood levels and predicted levels. Are floodwaters, rising, peaking or falling?
- Review flood intelligence to assess likely flood consequences. Consider:
  - What areas may be at risk of inundation
  - What areas may be at risk of isolation
  - What areas maybe at risk of indirect affects as a consequence of power, gas, water, telephone, sewerage, health, transport or emergency service infrastructure interruption
  - The characteristics of the populations at risk

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- Determine what the at-risk community need to know and do as the flood develops.
  - Warn the at-risk community including ensuring that an appropriate warning and community information strategy is implemented including details of:
    - The current flood situation
    - Flood predictions
    - What the consequences of predicted levels may be
    - Public safety advice
    - Who to contact for further information
    - Who to contact for emergency assistance
  - Liaise with relevant asset owners as appropriate (i.e. water and power utilities)
  - Implement response strategies as required based upon flood consequence assessment
  - Continue to monitor the flood situation – [www.bom.gov.au/vic/flood/](http://www.bom.gov.au/vic/flood/)
  - Continue to conduct reconnaissance of low-lying areas

### **3.4 Community Information and Warnings**

Guidelines for the distribution of community information and warnings are contained in the State Flood Emergency Plan.

Community information and warnings communication methods available include:

- Emergency Alert;
- Phone messages (including SMS);
- Radio and Television;
- Two-way radio;
- Mobile and fixed public address systems;
- Sirens;
- Verbal Messages (i.e. Doorknocking);
- Agency Websites;
- VICSES Flood Storm Information Line;
- Variable Message Signs (i.e. road signs);
- Community meetings;
- Newspapers;
- Email;
- Telephone trees;
- Community Flood Observers;
- Fax Stream;
- Newsletters;
- Letter drops;
- Social media and / or social networking sites (i.e. twitter and / or facebook).



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Refer to Appendix C and E for specific details of how community information and warnings are to be provided.

The release of flood bulletins and information with regard to response activities at the time of a flood event is the responsibility of VICSES, as the Control Agency.

Council has the responsibility to assist VICSES to warn individuals within the community including activation of flood warning systems, where they exist. Responsibility for public information, including media briefings, rest with VICSES as the Control Agency.

Other agencies such as CFA, DEPI and VICPOL may be requested to assist VICSES with the communication of community flood warnings.

In cases where severe flash flooding is predicted, dam failure is likely or flooding necessitating evacuation of communities is predicted, the Incident Controller may consider the use of the Emergency Alert System and Standard Emergency Warning System (SEWS).

Department of Health will coordinate information regarding public health and safety precautions.

### **3.5 Media Communication**

The Incident Controller through the Information Unit established at the ICC will manage Media communication. If the ICC is not established the VICSES RDO will manage all media communication.

Corangamite Shire Council will work with the Incident Controller to ensure that consistent and timely messaging occurs.

### **3.6 Impact Assessment**

An impact assessment can be conducted in accordance with part 3 of the EMMV to assess and record the extent and nature of damage caused by flooding. This information may then be used to provide the basis for further needs assessment and recovery planning by DHS, Local Government and recovery agencies.

### **3.7 Preliminary Deployments**

When flooding is expected to be severe enough to cut access to towns, suburbs and / or communities the Incident Controller will consult with relevant agencies to ensure that resources are in place if required to provide emergency response. These resources might include emergency service personnel, food items and non-food items such as medical supplies, shelter, assembly areas, relief centres etc.

### **3.8 Response to Flash Flooding**

Emergency management response to flash flooding should be consistent with the guideline for the emergency management of flash flooding contained within the State Flood Emergency Plan.

When conducting pre-event planning for flash floods the following steps should be followed, and in the order as given:

1. Determine if there are barriers to evacuation by considering warning time, safe routes, resources available etc.;

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2. If evacuation is possible, then evacuation should be the adopted strategy and it must be supported by a public information capability and a rescue contingency plan;
  3. Where it is likely that people will become trapped by floodwaters due to limited evacuation options, safety advice needs to be provided to people at risk. Advising them not to attempt to flee by entering floodwater if they become trapped, and that it may be safer to seek the highest point within the building and to telephone 000 if they require rescue. This advice needs to be provided even when evacuation may be possible, due the likelihood that not all community members will evacuate.
  4. For buildings known to be structurally un-suitable, an earlier evacuation trigger will need to be established (return to step 1 of this cycle).
  5. If an earlier evacuation is not possible then specific preparations must be made to rescue occupants trapped in structurally unsuitable buildings either pre-emptively or as those people call for help.

During a flash flood, it will often be difficult, due to the rapid development of flooding, to establish evacuation (relief) centres ahead of actually triggering the evacuation as is normal practice but this is insufficient justification for not adopting evacuation.

Refer to Appendix C for response arrangements for flash flood events.

Refer to VicRoads website for road closures <http://alerts.vicroads.vic.gov.au>.

### **3.9 Evacuation**

In Victoria, evacuation is largely voluntary. However, in particular circumstances, legislation provides some emergency services with authority to remove people from areas or prohibit their entry.

The decision to recommend or warn people to prepare to evacuate or to evacuate immediately rests with the Incident Controller.

It is the choice of individuals as to how they respond to this recommendation.

Once the decision is made VicPol are responsible for the management of the evacuation process where possible. VICSES and other agencies will assist where practical. VICSES is responsible for the development and communication of evacuation warnings.

VicPol and / or Australian Red Cross will take on the responsibility of registering people affected by a flood emergency including those who have been evacuated.

Refer to Section 3.11 of the EMMV and the Evacuation Guidelines for guidance of evacuations for flood emergencies.

Refer to Appendix D of this Plan for detailed evacuation arrangements for Corangamite Shire.

There are currently no detailed evacuation arrangements for Corangamite Shire.

### **3.10 Flood Rescue**

VicPol as the designated Control Agency for water rescue coordinates rescues undertaken during flood events.

In order to activate water rescue services, VICSES as Control Agency for overall flood response, will identify areas at risk of requiring rescue and notify the Officer in Charge of

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the Water Police Search and Rescue Squad to request pre-deployment of rescue resources to these areas.

In conducting rescues, VicPol may require assistance of appropriately trained and equipped personnel. In these circumstances, appropriately trained and equipped VICSES units or other agencies may carry out rescues.

Rescue operations may be undertaken where voluntary evacuation is not possible, has failed or is considered too dangerous for an at-risk person or community. An assessment of available flood rescue resources (if not already done prior to the event) should be undertaken prior to the commencement of Rescue operations.

Rescue is considered a high-risk strategy to both rescuers and persons requiring rescue and should not be regarded as a preferred emergency management strategy. Rescuers should always undertake a dynamic risk assessment before attempting to undertake a flood rescue.

The following resources are available within Corangamite Shire to assist with rescue operations:

- VICSES Cobden, Camperdown, Lismore, Terang and Port Campbell Units – general rescue capability
- CFA Brigades with high clearance vehicles.

VICPOL and VICSES can access rescue boats, but there is a lead-time required to get them on-site within the Shire.

There are no known high-risk areas / communities where rescues might be required on a large scale, but experience has shown (e.g. January 2011) that property isolations can occur quickly in some rural areas, as well as stranded person(s) in vehicles trapped in floodwaters. Both of these types of events may require specialist rescue.

### **3.11 Animal Welfare**

Animal management guidelines are provided in the Corangamite Shire Emergency Animal Welfare Plan V2 - 2012 along with the location and contact details for appropriate animal welfare entities.

Matters relating to the welfare of livestock and companion animals (including feeding and rescue) are to be referred to DEPI. This includes requests for emergency supply and / or delivery of fodder to stranded livestock or for livestock rescue.

Matters relating to the welfare of wildlife are to be referred to DEPI.

### **3.12 Aircraft Management**

Aircraft can be used for a variety of purposes during flood operations including evacuation, resupply, reconnaissance, intelligence gathering and emergency travel.

Air support operations will be conducted under the control of the Incident Controller.

The Incident Controller may request aircraft support through the State Air Desk located at the State Control Centre who will establish priorities.

Suitable airbase facilities are located at:

- Warrnambool and Ballarat Airports (24 hrs lighting)

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The following Helicopter Landing Zones are available for use. In addition, there are numerous areas that could be used for helicopter landings.

- Skipton oval

### 3.13 Resupply

Communities, neighbourhoods or households can become isolated during floods as a consequence of road closures or damage to roads, bridges and causeways. Under such circumstances, the need may arise to resupply isolated communities / properties with essential items.

When predictions / intelligence indicates that communities, neighbourhoods and / or households may become isolated, VICSES will advise businesses and / or households that they should stock up on essential items.

After the impact, VICSES can support isolated communities through assisting with the transport of essential items to isolated communities and assisting with logistics functions.

Resupply operations are to be included as part of the emergency relief arrangements with VICSES working with the relief agencies to service communities that are isolated.

### 3.14 Essential Community Infrastructure and Property Protection

Essential community infrastructure and property (e.g. residences, businesses, roads, power supply etc.) may be affected in the event of a flood.

The Incident Controller will ensure that owners of essential community infrastructure are kept advised of the flood situation. essential community infrastructure providers must keep the Incident Controller informed of their status and ongoing ability to provide services.

Property may be protected by:

- Sandbagging to minimise entry of water into buildings
- Encouraging businesses and households to lift or move contents
- Construction of temporary levees in consultation with the CMA, Local Government and VICPOL and within appropriate approval frameworks.

#### **Priorities for sandbags**

Consistent with the Strategic Control Priorities within the State Emergency Flood Plan, sandbags will be issued in priority order of protecting:

1. Community Critical Infrastructure identified:
  - (a) in the MEMP or this MFEP; or
  - (b) by the Incident Management Team
2. Residential properties identified in the potential flood area
3. Commercial properties identified in the potential flood area
4. Environmental and conservation areas identified in the potential flood area

Any properties identified as being outside the potential flood area will be referred to an alternative source of sandbags (e.g. local hardware store or sandbag supplier).

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## Quantities

As a guide, 25 sandbags are reasonable to supply to residents to allow for coverage of doorways, blocking vents, drains and toilets. Additional sandbags may be provided on a case-by-case basis having an understanding of individual issues and local priorities identified by the Incident Management Team.

The Corangamite Shire maintains a small stock of sandbags at the Skipton Depot. The Camperdown, Cobden, Lismore, Port Campbell and Terang VICSES Units will also maintain sandbag stocks. Additional supplies are available through the VICSES Regional Headquarters to supplement local stocks.

The Incident Controller will determine the priorities related to the use of sandbags, which will be consistent with the strategic priorities.

If VICSES sandbags are becoming limited in supply, then priority will be given to protection of essential community infrastructure. Other high priorities may include for example the protection of historical buildings.

Refer to Appendix C for further specific details of essential infrastructure requiring protection and location of sandbag collection point(s).

### 3.15 Disruption to Services

Disruption to services other than essential community infrastructure and property can occur in flood events. Refer to Appendix C for specific details of likely disruption to services and proposed arrangements to respond to service disruptions in Corangamite Shire.

### 3.16 Levee Management

Levee owners / operators are responsible for the maintenance, operation and monitoring of their levees.

Levee owners / operators must keep the Incident Controller informed of levee status and be prepared to provide expert advice to the Incident Controller about the design and construction of their levees.

In accordance with the strategic control priorities, the Incident Controller may assist levee owners to coordinate resources, both technical and physical, to provide advice and affect temporary repairs to or augmentation of levees.

Levees will only be raised by sandbagging or earthworks with the approval of the responsible authority (owner and / or managing authority) and then only after careful consideration and consultation, if time permits, with the Control Agency (VICSES), Council, CMA and / or the Department of Environment and Primary Industries.

### 3.17 Road Closures

Corangamite Shire Council and VicRoads are responsible for road closures including observation and placement of warning signs, roadblocks etc. to the road network, bridges and walking and bike trails. Corangamite Shire Council staff may also liaise with and advise VicRoads as to the need for warning signs and / or of closing roads and bridges under VicRoads' jurisdiction. VicRoads are responsible for designated main roads and highways and Councils are responsible for the designated local and regional road network.

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VicRoads and Corangamite Shire will distribute community information regarding road closures.

Within Corangamite Shire, there are a number of roads that are impacted by floodwater. For details of the highways and arterial roads affected see the Flood Intelligence Cards for each stream in Appendix C. Information on road closures can be obtained from the VicRoads website.

### **3.18 Dam Failure**

DEPI is the Control Agency for dam safety incidents (e.g. breach, failure or potential breach / failure of a dam), however VICSES is the Control Agency for any flooding that may result.

Major dams with potential to cause structural and community damage within the Municipality are listed in Appendix A. The owner / operators of these dams are required to develop and maintain emergency plans in case of failure.

### **3.19 Waste Water related Public Health Issues and Critical Sewerage Assets**

Inundation of critical sewerage assets including septic tanks and sewerage pump stations may result in water quality problems within the Municipality. Where this is likely to occur or has occurred the agency responsible for the critical sewerage asset should undertake the following:

- Advise VICSES of the security of critical sewerage assets to assist preparedness and response activities in the event of flood;
- Maintain or improve the security of critical sewerage assets;
- Check and correct where possible the operation of critical sewerage assets in times of flood;
- Advise the ICC in the event of inundation of critical sewerage assets.

It is the responsibility of the Corangamite Shire Council Environmental Health Officer to inspect and report to the MERO and the ICC on any water quality issues relating to flooding.

### **3.20 After Action Review**

VICSES will coordinate the after action review arrangements of flood operations as soon as practical following an event.

All agencies involved in the flood incident should be represented at the after action review.

## **Part 4. EMERGENCY RELIEF AND RECOVERY ARRANGEMENTS**

### **4.1 General**

Arrangements for recovery from a flood incident within the Corangamite Shire are detailed in the Corangamite Shire MEMP and / or the Recovery Sub-Plan.

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## 4.2 Emergency Relief

The decision to recommend the opening of an emergency relief centre rests with the Incident Controller. Incident Controllers are responsible for ensuring that relief arrangements have been considered and implemented where required under the State Emergency Relief and Recovery Plan (Part 4 of the EMMV).

The range and type of emergency relief services to be provided in response to a flood event will be dependent upon the size, impact, and scale of the flood. Refer to 4.4 of the EMMV for details of the range of emergency relief services that may be provided.

Suitable relief facilities identified for use during flood are detailed in the MEMP.

Details of the relief arrangements are available in the MEMP.

## 4.3 Animal Welfare

Matters relating to the welfare of livestock and companion animals (including feeding and rescue) are to be referred to DEPI.

Requests for emergency supply and / or delivery of fodder to stranded livestock or for livestock rescue are to be passed to DEPI.

Matters relating to the welfare of wildlife are to be referred to DEPI.

See also Corangamite Shire Emergency Animal Welfare Plan V2 – 2012.

### **Disposal of dead stock**

This work is to be undertaken in accordance with the EPA Industrial Waste Resource Guideline:

- *Environment Protection (Industrial Waste Resource) Regulations 2009*. Publication IWRG641 – June 2009.

## 4.4 Transition from Response to Recovery

VICSES as the Control Agency is responsible for ensuring effective transition from response to recovery. This transition will be conducted in accordance with existing arrangements as detailed in Part 3 Section 3.13 of the EMMV and the Corangamite Shire MEMP.

## ACCURACY & CONFIDENTIALITY

The information in the following Appendices provides a guide to the likelihood and possible effects of a flood. The information is based on estimates of rainfall rates and depths and on flood behaviours at particular heights or flows following actual flood events and / or hydrologic and hydraulic modelling. However, as all floods are different, those behaviours and effects may occur as a result of different rainfalls and / or heights and flows. They may also occur at different heights in different floods.

This document may contain sensitive information about the effects of flooding on private property. Specific reference to private addresses or businesses may be made directly to owners or other emergency services but should not be made public via broadcast or print media unless authorised specifically by the Incident Controller.



## APPENDIX A – FLOOD THREATS FOR CORANGAMITE SHIRE

### 1. General

Corangamite Shire is bounded by Moyne Shire to the west, Pyrenees Shire to the north, Golden Plains Shire to the northeast, Colac-Otway Shire to the east and the Port Campbell National Park and Southern Ocean to the south. The Shire boundary runs along Woody Yallock River from Werneth south to Lake Martin and Lake Corangamite and along the eastern shore of both lakes. Mount Emu Creek forms the western boundary of the Shire upstream from Glenormiston North while the Curdies River forms part of the southwest boundary.

The Shire is spread across the Hopkins, Otway Coast and Lake Corangamite basins. While there are many small creeks, the main streams within the Shire include:

- Hopkins basin - Mount Emu Creek and Brucknell Creek;
- Otway Coast basin – Curdies River, Scotts Creek, Squirrel Creek, Wallaby Creek, Gellibrand River, Latrobe Creek, Kennedys Creek and Cooriemungle Creek;
- Lake Corangamite basin – Woody Yallock River, Gnarkeet Chain of Ponds, Haunted Gully, Mundy Gully and Browns Waterholes.

The main towns are Camperdown (largest town), Cobden, Lismore, Skipton, Timboon, Terang (second largest town), Princetown and Port Campbell. Cressy and Peterborough are just outside the Shire in Colac-Otway and Moyne shires respectively.

Major transport corridors include the Glenelg Highway, Hamilton Highway, Princes Highway and Great Ocean Road. Main railway lines are the Geelong – Warrnambool line and the Melbourne – Adelaide national rail line.

The main flooding risks within the Shire are associated with **Mt Emu Creek**. While there is limited information on flood risk within the Mt Emu Creek catchment, the floods of late 2010 and January 2011 demonstrated that Beaufort (Pyrenees Shire), Miners Rest and Invermay (City of Ballarat) and Skipton (Corangamite Shire) are all susceptible to substantial inundation during large flood events.

Mt Emu Creek rises to the west of Ballarat in an area between Beaufort and Lexton to the north of Corangamite Shire. From there it meanders southwest through Skipton and then continues southward to join the Hopkins River just upstream of Warrnambool near Cudjee. The creek has a catchment area to Cudjee of 3,150km<sup>2</sup>, which is around 35% of the overall contributing catchment at that location. It forms part of the boundary between Corangamite Shire and the adjoining Moyne and Pyrenees Shires. The northern (upstream) boundary of Corangamite Shire along the Creek is just south of Guthries Bridge on the Mt Emu Settlement Road. The downstream boundary is at Ayresford Road near Garvoc about 30km to the east (upstream) of Cudjee near where the Creek joins the Hopkins River.

There are five major sub-catchments comprising:

- Upper Mt Emu Creek with its headwaters just south of Lexton;
- Yam Holes Creek which rises to the north and west of and then passes through Beaufort;
- Trawalla Creek with its headwaters a little to the east and north of Chute;
- Spring Hill Creek which joins Mt Emu Creek a little downstream from Mena Park; and
- Burrumbeet Creek, which rises to the northeast of Ballarat, passes through Invermay and Miners Rest and discharges into Lake Burrumbeet. Lake Burrumbeet outflows to Baillie Creek which joins Mt Emu Creek well downstream from Mena Park.



Other tributary creeks include Broken Creek, Blacks Creek, Reedy Creek and numerous small, unnamed or locally named tributaries.

Apart from the township areas of Skipton, Beaufort, Wendouree and Miners Rest, land use across the catchment is primarily agricultural.

It is noted that:

- Lake Goldsmith (situated on the western side of the catchment between Beaufort and Skipton) and its catchment are currently disconnected from Mt Emu Creek. The hydrologic modelling undertaken as part of the Skipton Flood Investigation (Water Technology, 2012) demonstrated that as a result of this disconnection this part of the catchment (of order 49km<sup>2</sup>) does not contribute to flooding in Mt Emu Creek. The lake has a surface area of around 8.9km<sup>2</sup> and a capacity at full level of approximately 7,500ML.
- The Baillie Creek catchment (between Lake Burrumbeet and Mt Emu Creek) is significant and inflows to Mt Emu Creek can be substantial. However, Lake Burrumbeet has a substantial attenuating effect on flows from Burrumbeet Creek into Baillie Creek (Water Technology, 2012). Lake Burrumbeet has a capacity at full level of approximately 38,400ML<sup>1</sup>.

There are no major water supply dams within the Mt Emu Creek catchment. However:

- At Beaufort, Cemetery Creek includes a significant recreational online storage, Lake Beaufort, just upstream of the town. The lake has a maximum surface area of approximately 16ha (0.16km<sup>2</sup>) and a reported volume of 297ML (TGM, 2004). The Lake overtopped during the January 2011 flood which led to some concerns regarding possible failure.
- At Skipton, an unnamed creek supplies Jubilee Park Lake which discharges via Skipton Dam upstream from Montgomery Street. The storage has an estimated volume of 16ML, a surface area of approximately 0.6ha (0.006km<sup>2</sup>) and a catchment area of around 2.7km<sup>2</sup> (GHD, 2012a). The right hand abutment of the southern spillway suffered erosion during the January 2011 flood. This damage has been repaired. The Shire maintains a DSEP for the dam.

The area to the north and north-west of Lake Corangamite is crossed with drainage paths flowing in a southerly direction generally towards Lake Corangamite. The main drainage paths are Woody Yallock River, Gnarkeet Chain of Ponds, Browns Waterholes, and Haunted Gully. The township of Lismore is located on the edge of the Browns Waterhole depression.

The **Woody Yallock River** and its many tributary creeks rise to the north of Cressy in Colac-Otway Shire near Linton and Newton and flows south into Lake Corangamite through Lake Martin. The small town of Cressy is located on the left bank of the river at the northern end of the lake within Colac-Otway Shire. The floodplain between Cressy and Lake Martin is small and well defined. When Lake Martin is at full supply level, water backs up along the river, flooding adjoining farmland and causing some inconvenience.

**Lake Corangamite** is a Ramsar wetland and one of the largest lakes in Victoria with a surface area of 23,000ha (230km<sup>2</sup>). Lake Gnarpurt, Lake Martin and Cundare Pool adjoin the lake which is divided from Lake Beac / Lake Colac to the east by stony rises formed by volcanic

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<sup>1</sup> The Lake Burrumbeet outlet structure is a weir with a crest length of 30.7m and a crest level of 378.7mAHD and removable wooden planks to a height of 379.1mAHD. The boards are thought to have been installed to allow control of outflows from Lake Burrumbeet under flood conditions. However, there appears to be no operating rules in place for the weir or boards.

activity. The lake has no natural outlets. Water is mainly lost by evaporation or seepage. The area surrounding the lake is flat and scattered with numerous small depressions. Each depression has its own catchment and a lake usually forms at the lowest point, its size dependent on the catchment area. Due to the flatness of the landscape, these small lakes overtop and flow into adjoining depressions, generally towards Lake Corangamite creating wide flow paths. Because of the area's character, flooding is dependent on cumulative rainfall over a number of years rather than specific rainfall events.

The Woody Yallock River diversion channel near Cundare Pool allows diversion of floodwaters from Lake Corangamite to the Barwon River via Warrambine Creek. This method of controlling water levels in Lake Corangamite was implemented following severe flooding in 1956 when large areas of surrounding farmland were inundated.

The **Gellibrand River** originates outside the Shire in the Otway Ranges near Upper Gellibrand, enters the Shire at Lower Gellibrand and discharges to the Southern Ocean at Princetown. It has many tributary creeks, mainly within the Colac-Otway Shire. Within Corangamite Shire, Kennedys Creek is its main tributary. The floodplains of the Gellibrand River and its tributaries are well developed and have a relatively flat gradient. Floodwaters are therefore generally well confined by the narrow floodplain and are fast flowing with significant depths.

The **Curdies River** originates near Lake Purrumbete located approximately 10km west of Lake Corangamite and enters the Southern Ocean at Peterborough. A drain skirting the edge of a lava flow originating from Mount Porndon connects Lake Purrumbete to the Curdies River channel where the tributary streams of Bostock and Burnip also join. The river flows in a southerly direction threading through a series of narrow valleys that gradually flatten out closer to the coast. Scotts Creek, the main tributary, joins a little north of Timboon. Localised flooding is likely to occur in the area around Lake Purrumbete due to the numerous small depressions associated with the stony rises typical of the area. At Peterborough, the inlet is formed by a sand bar which periodically blocks the river mouth. Flooding in the lower reaches is dependent on the level of the sandbar at the entrance. Water continues to pool behind the bar until it either overtops or floodwater is released by excavation.

While there are no major storages in the catchment, Cobden Dam is on Cobden Creek, a tributary to the Curdies River, at Victoria Street in Cobden. It has a volume of approximately 25ML, a surface area of 1.2ha (0.012km<sup>2</sup>) and a catchment area of around 8.3km<sup>2</sup> (GHD, 2012b).

There are numerous small creeks and drainage lines within the Shire and the demarcation between rural flooding and mainstream flooding is not always clear. Further, there is very limited information about rural flooding. Similarly, for flooding in localised areas resulting from heavy rain and inadequate stormwater drainage.

There are a number of farm dams within the Shire including Yoolburra Dam at 139 Latrobe Road, Princetown. A DSEP has been prepared for this dam and a copy of that plan provided to Corangamite Shire.

There have been very few flood studies undertaken within the Shire. The most recent and most substantial was the Skipton Flood Investigation (Water Technology, 2012).

## **2. Riverine Flooding**

Generally, a wet catchment and a period of heavy rain are required to produce riverine flooding within the municipality. The more severe riverine floods generally occur as a result of:

- Moist warm airflow from northern or north western Australia (perhaps from a decaying tropical cyclone such as occurred in January 2011) bringing heavy rainfall over a period of 12 hours or more following a period of general rainfall. The initial period of general rainfall “wets up” the catchments and (partially) fills both the off-stream dams and the natural floodplain storage. These combine to increase the runoff generated during the subsequent period of heavy rainfall.
- Successive cold fronts, often during winter and spring, that bring prolonged periods of rain that wet up the catchments and prime them for flooding from a further front or complex low pressure system that is perhaps slow moving and brings heavy rainfall.
- A low pressure system with a good moisture feed stalled or moving slowly over southern Victoria or slightly to the south (i.e. directing moisture over southwest Victoria) as a result of a (complex) blocking pattern to the east.

### **3. Flash Flooding and Overland Flows**

Short duration, high intensity rainfall (usually associated with severe thunderstorms or small scale weather systems that are locally intense and slow moving) can also cause flash flooding across the Shire. They are mainly confined to the summer months, do not generally create widespread flooding since they only last for a short time and affect limited areas. Flooding from these storms occurs with little warning. These sorts of events are particularly important for Skipton and Cobden, because of the Skipton and Cobden dams.

High intensity rainfall such as associated with thunderstorms giving average rainfall rates of typically more than 30 mm/hour sustained over a period of 30 minutes (i.e. 15mm of rain) or so is likely to lead to high flows in the local creeks and / or overland flows, even on a dry catchment. This amount of rain on a wet catchment would result in more severe flooding.

With this sort of rain, the creek flowing through Jubilee Park Lake is likely to flood the main street (Montgomery Street) with four (4) buildings, including the pub, at risk of over-floor flooding. Details are provided in Appendix C1.

### **4. Overview of Catchment and Flood Behaviour – Mt Emu Creek**

A period of rain is required to “wet up” the catchment and fill the natural floodplain storage (which is substantial) before significant runoff is generated. Water levels then rise quite quickly within Mt Emu Creek with initial rises occurring at Skipton within about 4 hours or so of the start of heavy rain (the unnamed creek flowing through Jubilee Park Lake would contribute to this early rise) and peak levels occurring within about 30 hours.

General rain of around 40 – 50mm in 6 to 12 hours across a wet Mt Emu Creek catchment will cause significant rises at Skipton – to around 4.00m on the gauge. More substantial rainfall, of order 75mm to 100mm or more in 24 hours or less, again on a wet catchment, will cause severe flooding and deep over-floor inundation of a number of buildings within the town.

### **5. Overview of Levees within the Municipality**

There are no major levees recorded within the municipality.

### **6. Dam Failure Flood Risk**

All dams have a risk of failure. All major dams are subject to rigorous dam safety management programs implemented by the managing entity and are the subject of individual Dam Safety Emergency Plans (DSEPs). DSEPs identify possible dam failure scenarios and provide direction on the order and detail of the necessary communications and incident

management tasks to be initiated. They also refer to intelligence and maximum inundation extent mapping arising from detailed dam break analyses. Intelligence can include travel times to key locations, maximum depths and velocities and the time to reach those maxima at those key locations, as well as other information that would inform the response effort. Close communication with the dam manager is essential in the event of a dam safety incident.

Failure of dams or retarding basins is not a major consideration within the municipality as there are no major storages (i.e. capacity of 1,000ML or more). However, failure of the **Skipton Dam** or the **Cobden Dam** would present some localised problems at Skipton or Cobden. Procedures for incident response are detailed in respective DSEPs maintained by Corangamite Shire and VicRoads.

Wannon Water maintain a number of water supply reservoirs throughout the Municipality. The Camperdown storage is sited on a hill above town but the capacity is only of the order of 180ML. Another storage of around 500ML is located 10km or so outside Camperdown. Wannon Water maintain appropriate incident management plans for each site.

A private dam (**Yoolburra Dam**) with a licensed capacity of 64ML (but a calculated capacity of up to ~96ML) and a dam wall height of up to 10m is located at 130 Latrobe Road, Princetown. See Appendix C6.

Two private dams (**Nos. 1 & 2 Irrigation Dams**) are located at 463 Moreys Road, Brucknell. Both dams have licensed capacities in excess of 50ML. See Appendix C7.

A private dam (**Evans Dam**) is located at 357 Batemans Road, Camperdown. This dam has a licensed capacity of 60ML (but a calculated capacity of 63ML) and a dam wall height in excess of 5m. The dam exceeds ANCOLD guidelines for large and / or hazardous dams. Due to a number of issues identified with the dam's wall, the dam's ANCOLD hazard category is "significant". A DSEP has been prepared by the dam owners and has been lodged at Corangamite Shire. The DSEP identifies travellers along Batemans Road as being potentially at risk in the event of a dam failure.

## 7. Health and Environmental Risks

There are many septic tanks within the Shire that may be inundated by floodwaters. Further, chemicals and fuel may be stored in farm sheds and tanks on floodplains.

## 8. Properties at Risk

While information on property floor levels and the likelihood of over-floor flooding is available for Skipton (see Appendix C1 and Water Technology, 2012) similar information is not currently available for other locations within the Shire.

## 9. Infrastructure

### 9.1 Overview

Major infrastructure within the municipality affected by flooding includes:

- Major transport corridors (e.g. Glenelg Highway, Hamilton Highway, Princes Highway, Great Ocean Road);
- Railway lines (e.g. Geelong – Warrnambool line which follows the Princes Highway and the Melbourne – Adelaide national rail line which follows the Hamilton Highway)
- Health care facilities / hospital at Skipton (unlikely to be directly impacted by flooding but access may be cut off)

## 9.2 Major Roads

Dependant on flood magnitude the following roads may be inundated.

- The Glenelg Highway at Skipton. The road is affected by flash flooding from about the 5-year ARI event. Flooding from the unnamed creek flowing through Jubilee Park Lake (Skipton Dam) occurs initially, followed by flooding dominated by Mt Emu Creek in a 10-year ARI and larger events. The bridge was overtopped by the largest flood on record in January 2011. This event approximated a 100-year ARI event according to the 2012 Skipton Flood Investigation (Water Technology, 2012).
- The Lismore – Skipton Road just past the first bend downstream from Skipton.
- The Skipton - Beaufort Road at Lake Goldsmith (within Pyrenees Shire).
- The Mt Emu Settlement Road Bridge at Guthries.
- The Princes Highway at Boorcan (see Figure A1 below of Mt Emu Creek in January 2011).
- The Great Ocean Road at Gellibrand River / Princetown and Curdies Inlet / Peterborough.
- The Hamilton Highway north of Lake Corangamite and at Darlington (Mt Emu Creek).
- Cobden -Terang Rd - closed at Dixie Bridge.

Many minor roads in and around Skipton as well as across the municipality may also be inundated during severe rain events, such as occurred in January 2011.

## 9.3 Other Infrastructure

### Reclamation plant

In Camperdown: Camperdown Reclamation Plant in Depot Road.

**Wastewater treatment plant** – unlikely to be flooded.

### Sewer pump stations

In Skipton: The primary pump station is located at the Cleveland Street-Glenelg Highway intersection on the western side of Mt Emu Creek. Secondary stations exist on the eastern side of the creek off Anderson Street, north of the Glenelg Highway, and at the Smythe Street Bridge. The latter station is telemetered. All stations are likely to be flooded.

In Camperdown: Camperdown Sewer Pump Station in Cobden Road.

In Port Campbell: Port Campbell Sewer Pump Station in Morris Street (in the Holiday Park).

### Water treatment plant

In Port Campbell: Port Campbell Water Treatment Plant in Lord Street.

### Potable water pump stations

In Lismore: The Lismore - Ettrick Springs Potable Water Pump Station located near the Camperdown-Lismore / Lower Darlington Road intersection.

### Potable water disinfection plant

In Lismore: The Lismore - Ettrick Springs Disinfection Plant located near the Camperdown-Lismore / Lower Darlington Road intersection.

**Mobile network telephone towers** – none known.

**Electrical power kiosks / zone sub-stations (cabinets)** – none known.

**Community facilities at Skipton** - Shops located in the lower part of Montgomery Street including the public toilets, supermarket, chemist, hotel, garage, art gallery, pottery and Historical Society (affected by the September 2010 and January 2011 floods).



Figure A1: Mt Emu Creek and the Princes Highway at Boorcan in January 2011 (source: GHCMA)

## 10. Historical Floods

### **Mt Emu Creek**

The largest flood recorded at Skipton to date occurred on 15 January 2011. Prior to 2011, the highest recorded flood occurred in 1909 but neither the peak flow nor the peak flood level is known.

The largest flood recorded at Skipton between July 1920 and December 1986 was on 31 July 1923. Other significant large floods occurred in 1870, 1896, December 1933 and August 1924 and more recently in August 2010, September 2010 and January 2011. Significant but much smaller floods occurred in 1983 and 1975.

### **Lake Corangamite**

Flooding of the area around Lake Corangamite is dependent on the cumulative rainfall over a number of years rather than specific rain events. Frequent flooding was observed in the period from 1890 to 1910. This was followed by a relatively dry period that lasted for just over 40 years. Following high rainfall in 1951 and 1952, Lake Colac in the adjoining Colac-Otway Shire overflowed into the Lough Calvert system, inundating large areas of farmland. It appears that significant flooding occurred in the area again in 1956. Following a succession of wet years from 1973 to 1975, Lake Colac again overflowed in 1975 flooding a considerable area of farmland. More recent significant floods occurred in 1980 and 1991, again due to high rainfall in the preceding years.

### **Gellibrand River**

While there are no records of flooding as such in the Gellibrand River, significant flows were

recorded in October 1971, October / November 1975, June / July 1977, June and August 1978, June 1980, September 1984, September 1996 and August 2010.

### **Curdies River**

Flooding was recorded along the Curdies River in 1929, 1966, 1974, August 1975, June 1977, August 1978, September 1984, September 1991, August 1992, September 1996, September 2004, August 2010 and June 2011. The August 2010 flood was by far the largest in recent times (i.e. since 1975). The 1977 event was attributed to local run-off.

### **August 2010 flood**

Conditions prior to August 2010 were relatively dry. From Tuesday 10<sup>th</sup> to Thursday 12<sup>th</sup> August a low pressure system which developed over the interior of the continent moved over the State and into Bass Strait. As the low moved into Bass Strait and deepened on Wednesday 11<sup>th</sup>, very heavy rainfall was recorded in most western catchments including the Mt Emu Creek and Burrumbeet Creek catchments. The highest daily falls were recorded on the 12<sup>th</sup> (e.g. Skipton, 32.4mm; Ballarat Aerodrome, 49.6mm; Beaufort, 33.2mm). Falls over the month were generally between 100mm and 200mm. Beaufort received its highest ever August rainfall total in 128 years of records.

Mt Emu Creek through Skipton experienced relatively minor flooding (approx 5 to 10-year ARI) over the period 11<sup>th</sup> to 14<sup>th</sup> August with the peak near or just above the top of bank through the town and at Stewart Park. No roads or buildings were inundated.

Both the Gellibrand River and the Curdies River experienced significant flows with the flow in the Curdies being the highest on record.

### **September 2010 flood**

Heavy rain was recorded in the Mt Emu Creek and Burrumbeet Creek catchments from late Friday 3<sup>rd</sup> into Saturday 4<sup>th</sup> as a result of the deepening of a low pressure system over South Australia and its passage into Bass Strait. The highest daily falls for the month were mostly recorded on the 4<sup>th</sup> (e.g. Ballarat Aerodrome, 46mm; Beaufort, 29.2mm). The highest daily fall at Skipton (10mm) was recorded on the 13<sup>th</sup>.

The flooding in Skipton was more severe than in August. The unnamed creek flowing through Jubilee Park Lake flooded first. It inundated Anderson Street and Montgomery Street and flooded a number of properties. Later, over-bank flooding from Mt Emu Creek occurred on the west (right) bank upstream of the Glenelg Highway Bridge and flooded a number of properties and dwellings. Backflow through a stormwater drain into the main commercial centre (Montgomery Street) also flooded a number of business premises and cut the Glenelg Highway (Montgomery Street). The eastern (left) bank of Mt Emu Creek was not overtopped. This flood is regarded as between a 10 and 20-year ARI event.

### **January 2011 flood**

Conditions across the Mt Emu Creek catchment and other parts of the Shire prior to the January flood were wetter than average.

The extreme rainfall observed during the month was generated by the passing of complex and persistent low pressure systems. A broad slow moving trough centred over western Victoria and a ridge of high pressure to the south of Tasmania were the main drivers for the rainfall which commenced on Sunday 9<sup>th</sup> January. The two systems created exceptionally humid conditions and unstable easterly flow across Victoria. The trough strengthened on Wednesday 12<sup>th</sup> and developed into a low pressure system over eastern South Australia on Thursday 13<sup>th</sup> as a high pressure system moved into the Tasman Sea. The low pressure system cleared the State on Friday evening after adding an additional 50mm to 100mm of



## APPENDIX A

rain. The Mt Emu Creek and Burrumbeet Creek catchments received between 200mm and 300mm of rain for the month. The highest daily falls were recorded on the 14<sup>th</sup> (e.g. Skipton 64.4mm; Ballarat Aerodrome 95mm; Beaufort 78.6mm).

In Skipton, shops on the lower end of Montgomery Street (the main commercial centre) including the supermarket, chemist, hotel, garage, art gallery and pottery were flooded along with 30 residential properties. Flood depths exceeded 1.5m in some properties. The Glenelg Highway Bridge was overtopped and the Highway was closed for more than 2 days. The town was split in two. This was the largest flood on record at Skipton.

### February 2011 flood

Follow-on rain on top of a very wet catchment resulted in a relatively small flood through Skipton on the 5<sup>th</sup> and 6<sup>th</sup> of February.



Figure A2: Skipton township, showing extent of the January 2011 flood (source: DSE)

## 11. River Gauges

Stream flow gauges in the Hopkins, Corangamite and Otway basins, within and around Corangamite Shire are listed below.

Basin	Gauging Station No	River / Creek, Location
Hopkins	236213	Mount Emu Creek, Mena Park
	236203	Mount Emu Creek, Skipton
	236213	Mount Emu Creek, Taroon
Corangamite / Otway	234201	Woody Yallock River, Cressy



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Basin	Gauging Station No	River / Creek, Location
	235238	Gellibrand River, South Otway Pumping Station
	235224	Gellibrand River, Burrupa
	235211	Kennedys Creek, Kennedys Creek
	235223	Scotts Creek, Scotts Creek
	235237	Scotts Creek, Curdie (Digney's Bridge)
	235302	Curdies River, Curdie

### 12. Flood Inundation Mapping

Flood inundation maps have been produced by Water Technology (November 2012) for Mt Emu Creek at Skipton for the 5, 10, 20, 50, 100 and 200-year ARI flood events. These maps include the extent of flooding from the unnamed creek which runs through Jubilee Park Lake. A subset of those maps is included in this MFEP at Appendix F.

The Corangamite Planning Scheme shows areas along watercourses likely to be inundated by a 1% AEP (100-year ARI) flood event where detailed flood mapping has been completed, as LSIO. While it is not practical to reproduce the LSIO as an attachment to this Plan, hard copies are available from the Municipality. They are also available in hard copy form and as PDF digital copies at the MECC and in digital form at the DEPI website [www.dpcd.vic.gov.au/planningschemes](http://www.dpcd.vic.gov.au/planningschemes).

Coarse flood extent maps were also developed in 2000 as part of a state-wide Flood Data Transfer Project (FDTP) (DNRE, 2000). However, coverage within Corangamite Shire is sparse. For example, only about 6 to 10km of Mt Emu Creek is covered at Garvoc. Although this flood extent mapping has a low level of accuracy the maps can be a useful guide to highlight areas subject to flooding where detailed mapping is not yet available. The associated reports provide guidance on likely accuracies and associated confidence in delineations.

### 13. Digital Flood Extent Datasets and Flood Photography

The Victorian Flood Data (VFD) datasets (available from Glenelg Hopkins CMA) contain a significant quantity of flood information in GIS format. For Mt Emu Creek at Skipton this includes a number of surveyed flood levels from the August and September 2010 and January 2011 floods. It also includes 1929 and 1974 flood levels for the Curdies River at Peterborough and a 1966 flood level for the Curdies River at the Timboon – Curdievale Road. Extents for the October 1956 flood around Lake Corangamite and the adjoining Gnarpurt, Cundare and Martin lakes are also available.

Orthorectified aerial flood photography for the January 2011 event (flown on the 14<sup>th</sup> and 15<sup>th</sup> January) is available from the Glenelg Hopkins CMA.

A number of ground level still photographs are available from the Glenelg Hopkins CMA for the August 2010, September 2010 and January 2011 events. Corangamite Shire also has a large number of photographs from these events as well, in addition to all of the known historical photographs.

The Glenelg Hopkins CMA and Corangamite Shire also hold a variety of other datasets that include:

- Contour and survey information, including LiDAR data (Shire does not hold LiDAR data).
- Drainage and road infrastructure data.
- Digital cadastral information.
- Flood and non-flood aerial photography (Shire does not hold aerial flood photography).

#### **14. Flood Intelligence Cards – see Appendix C**

All flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Flood intelligence cards detail the relationship between flood magnitude and flood consequences and provide practical guidance on appropriate flood response actions. Further information about flood intelligence and its use can be found in the Australian Emergency Management Manuals flood series at <http://www.ema.gov.au> and in particular in Manual 20 “Flood Preparedness”.

## APPENDIX B – TYPICAL FLOOD RISE, RECESSON AND PEAK TRAVEL TIMES

Definitive information on the time it takes flash flooding (i.e. resulting from heavy rainfall associated with severe weather or thunderstorm activity) to develop (i.e. to arrive at a location) following the start of heavy rain and the time it takes for the maximum water depth / extent to be reached is not available. **Timing is however likely to be short: of order 30 minutes or so.**

In the case of riverine flooding, the time of travel of a flood peak will be influenced by antecedent conditions. A flood on a ‘dry’ watercourse will generally travel more slowly than a flood on a ‘wet’ watercourse (e.g. the first flood after a dry period will travel more slowly than the second flood in a series of floods) and big floods tend to travel faster than small floods. Hence, the size of the flood, recent flood history, soil moisture and forecast weather conditions all need to be considered when using the following information to direct flood response activities.

Mt Emu Creek floods travel reasonably quickly within the main stream. At Skipton, the rate of rise starts somewhere around 150 to 200mm/hour but slows to around 50 to 75mm/hr as it nears the peak, peaks extend for a few hours only and the rate of fall is generally close to or a little slower than the rate of rise.

Location From	Location To	Typical Travel Time	Comments
<b>RIVERINE FLOODING – Mt Emu Creek</b>			
Floods are characterised by steady rises, peaks that extend for a few hours only and recessions that are similar to or a little slower than the rate of rise. The further down the catchment the longer the peak and the slower the recession. A second flood on the creek will travel faster than a flood on a dry creek and a big flood will in general travel faster than a small flood.			
Start of rainfall	Mena Park	4 to 6 hours	To start of rise.
Start of rainfall	Skipton	4 to 8 hours	To start of rise. Initial rise likely to be driven by local inflows.
		30 to 32 hours	To peak.
Mena Park	Skipton	16 to 20+ hours	The bigger the flood the closer travel time will be to 16 hours.
Guthries Bridge	Skipton	4 to 6 hours	

APPENDIX B

Location From	Location To	Typical Travel Time	Comments
<b>RIVERINE FLOODING –</b>			
<b>FLASH FLOODING – Skipton - unnamed creek flowing through Jubilee Park Lake</b>			
<p style="color: blue;">Floods are characterised by rapid rises and falls.                      A wet catchment will reduce response times – everything will happen quicker and flooding will be more severe for similar rainfalls.</p>			
Start of rainfall	Montgomery Street	30 minutes to 1 hour	To start of rise. Volume of water in Jubilee Park Lake prior to rain has little effect on flooding.
		4 hours max	To peak
<b>FLASH FLOODING – Cobden – Cobden Creek flowing through Cobden Dam at Victoria Street</b>			
Start of rainfall	Victoria Street	45 to 90 minutes	To start of rise. Volume of water in Cobden Dam prior to rain has little effect on flooding downstream.
			To peak



## **APPENDIX C1 – SKIPTON COMMUNITY FLOOD EMERGENCY MANAGEMENT PLAN**

### **1. Overview**

Skipton, located approximately 50km west of Ballarat, is a small rural township straddling Mt Emu Creek. The upstream catchment area is 1,251km<sup>2</sup>.

A wet catchment and a period of heavy rain are generally required to produce flooding at Skipton.

The unnamed creek that flows through the Jubilee Park Lake responds quickly to heavy rain and floods across Anderson Street and Montgomery Street, inundating businesses in the commercial precinct as well as a number of dwellings.

If heavy rain is not localised, Mt Emu Creek rises after the unnamed creek has subsided and re-floods the commercial area along with additional properties via a combination of backflow through stormwater pipes and overbank flows. As creek levels rise, overbank flows occur into Stewart Park. As levels continue to rise, flows break out of the creek opposite Stewart Park and flow south across the floodplain towards Smythe Street. Back flow then occurs through the drainage pipe on the right bank of the creek to the north of the Eel Factory which combines with a breakout from the channel further upstream. This water then flows southwards towards the Highway, inundating properties on the floodplain. Flooding also occurs in the left floodplain in the main street due to backflows from the local drainage system.

It should be noted that Burrumbeet Creek flows do not provide a good indicator of Mt Emu Creek flows at Skipton due the attenuating effect of Lake Burrumbeet (Water Technology, 2012). Flooding at Beaufort however may provide an early heads-up of substantial flows from the north western part of the catchment. These flows will show up at Mena Park some 4 to 6 hours later and some 16 to 20 hours upstream from Skipton. However, because of the size of the catchment between Mena Park and Skipton and the many tributaries that drain this area, there is not a direct correlation between flows at Mena Park and flows at Skipton: flow behaviour at Mena Park is not a reliable indicator of flow behaviour at Skipton.

Major flooding at Skipton is most likely when significant flows occur in both Mt Emu Creek and Bailie Creek. Bailie Creek flows into Mt Emu Creek just upstream of Guthries Bridge on Mt Emu Settlement Road. Flow at Guthries Bridge is therefore a reasonable indicator of the likely magnitude of a Mt Emu Creek flood event at Skipton.

### **2. Overview of Flooding Consequences**

#### **2.1 Warning Times**

The flood warning time for Skipton is of order 30 minutes to an hour for flooding from the unnamed creek flowing through Jubilee Park Lake and somewhat longer at around 24 hours (based on rainfall, not creek levels) for flooding from Mt Emu Creek - see Appendix B.

#### **2.2 Areas Affected**

Maps at Appendix F1 provide guidance on where flooding is likely to occur.

The floodplain in the vicinity of and through Skipton is confined and narrow: there are no major flow breakouts. However, the commercial centre of the town, on Montgomery Street, is subject to very deep, high hazard flooding. Large floods tend to be deep and fast flowing with

only a marginal increase in lateral extent due to the confined nature of the floodplain. See maps at Appendix F1 and Figure C1-1 below.

## 2.3 Properties Affected

### 2.3.1 Summary

A summary of the number of properties likely to be flooded at Skipton and the number likely to be inundated over-floor is provided in Section 6 of this Appendix.

In broad terms, properties in the commercial precinct on Montgomery Street and on Cleveland Street near the Glenelg Highway Bridge are most at risk of flooding

### 2.3.2 Detailed List

A list of these properties along with the expected depth of over-ground flooding and the likely depth of over-floor inundation is provided in Section 6 of this Appendix. **It is strongly recommended that the list is used in conjunction with the flood inundation maps (see Appendix F1) and the indicative flood guidance tool provided in Section 6.5.**

### 2.3.3 Update of List of Properties Likely to be Flooded

The list of properties likely to be flooded (with corresponding levels and indication of over-floor flood depth) should be updated within twelve (12) weeks of a flood. Update should occur with information collected as part of post-flood information recording activities and as may be collected as a consequence of the event debrief. Information on the collective experience of the IMT should also be gathered and utilised.



Figure C1-1: Skipton township, showing extent of the January 2011 flood (source: DEPI)

## 2.4 Isolation

The main access roads for Skipton are the:

- ◆ Glenelg Highway;



- ◆ Lismore – Skipton Road;
- ◆ Skipton Road north to Beaufort.

The Glenelg Highway becomes impassable from about the 20-year ARI event level (i.e. about 5.10m on the Skipton gauge if a Mt Emu Creek flood) and some 12 hours or so after the start of rise during a large flood. The bridge is likely to be impassable for 2 days or more during large floods such as the January 2011 event.

The Lismore-Skipton Road is severely affected between the 50-year and 100-year ARI event (i.e. between about 5.6m and 6.0m on the Skipton gauge).

Local roads further up the catchment are likely to be impassable for a day or more.

Overtopping of the Glenelg Highway Bridge splits the town in two and, together with flooding on Anderson Street, causes difficulties for the hospital in terms of maintaining function and for staff at shift-change.

## 2.5 Critical Infrastructure

Critical infrastructure at Skipton, other than the Glenelg Highway, is limited to the hospital / nursing home and sewer pump stations located:

- at the Cleveland Street-Glenelg Highway intersection on the western side of Mt Emu Creek;
- on the eastern side of Mt Emu Creek off Anderson Street and;
- at the Smythe Street Bridge.

Note that the commercial precinct begins to flood from the 5-year ARI event. The supermarket, chemist, hotel, garage, art gallery and pottery are all affected as levels rise.

## 3. Flood Mitigation

### 3.1 General

Flood intelligence MUST have regard for changes within the catchment that modify likely flood behaviour (e.g. mitigation works that reduce the severity of flood risk).

### 3.2 Flood Protection Levees

There are no flood protection levees at Skipton.

### 3.3 Drainage Works

There are currently no specific drainage works aimed at alleviating flooding within Skipton.

## 4. Flood Impacts and Required Actions

Refer to the following Flood Intelligence Card.

Note that users of the flood intelligence card should consider rainfall depth and rates at locations in the vicinity of Skipton and across the upper catchment and use the indicative Flood / No Flood guidance tool at Section 6.5 in order to better appreciate likely flood impacts at Skipton. Local data and / or data from the BoM website (<http://www.bom.gov.au/>) should be used. It is suggested that the following sites, available from the BoM website, will provide useful indicative rainfall data:

- ◆ Mena Park
- ◆ Ballarat AWS
- ◆ Ben Nevis AWS



- ◆ Beaufort and Skipton daily read rain gauge.

## **5. Command, Control and Coordination**

The Command, Control and Coordination arrangements in this MFEP will be as detailed in the EMMV.

All flood response activities within Corangamite Shire will be under the Control of the VICSES Regional Duty Officer / Incident Controller.

An EMT may be established by the Incident Controller in accordance with the EMMV.

An ICC will be established by the Control Agency (i.e. VICSES) for the command and control functions in response to any flood event within the Municipality. It will be operated in accordance with VICSES arrangements.

The ICC for Corangamite Shire and any Divisional or Sector Commands will be located as detailed in the VICSES South-West Region Flood Emergency Plan.

## 6. Flood Intelligence Card, Property Inundation List and Indicative Flood / No Flood Guidance Tool

### 6.1 Introduction

The BoM does not currently provide flood forecasts for Skipton. All actions must therefore be driven by rainfall and / or creek level observations.

Water level / flood gauges within the Mt Emu Creek catchment and of direct relevance to flooding at Skipton are currently located at Mena Park and Skipton.

Rainfall data is available from a gauge at Mena Park and from the BoM operated Ballarat AWS and Ben Nevis AWS as well as (at 9am) from the BoM daily read stations at Beaufort and Skipton - see BoM website. Data from these sites (or alternative closer locations) should be used to determine an appropriate rainfall depth for use in the indicative Flood / No Flood guidance tool provided at Section 6.5. Instructions for use of the tool are also provided in Section 6.5.

#### Notes:

1. While flood intelligence cards provide guidance on the relationship between flood magnitude and flood consequences, flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Further, the hydrologic and hydraulic modelling that underpins much of the intell detailed below is informed by a number of assumptions and approximations that are unlikely to be replicated exactly during a flood event. Actual impacts under similar rainfall conditions are therefore expected to be similar but may not be exactly the same: there are likely to be some differences. More details about flood intelligence and its use can be found in the Australian Emergency Management Manuals flood series at <http://www.ema.gov.au> and in particular in Manual 20 "Flood Preparedness".
2. All levels, impacts and actions listed in the following flood intelligence card and indicative Flood / No Flood guidance tool may need to be adjusted to better reflect experience.

### 6.2 Flood Intelligence Card

Observed Rainfall (see graph)	AEP of flood	Water level at Skipton (m) (mAHD)	Consequence / Impact	Action Actions may include (but not limited to) evacuation, closure of roads, sandbagging, issue of warnings and who is responsible
<ul style="list-style-type: none"> <li>It is important that the decision to mobilise to remove furniture etc from buildings is made early and that, in general, sandbagging is reserved for non-weatherboard buildings.</li> <li>Consider how best to assist staff attend the Hospital / Nursing Home in Skipton when Montgomery Street, Anderson Street and Johnson Street are flooded.</li> </ul>				

## APPENDIX C1 - SKIPTON

**USING THIS INTELLIGENCE CARD.** Obtain rainfall data and use the flood guidance tool to determine the approximate flood severity. Consider the appropriate flood inundation map. Review all consequences and actions in this table, from the first row down to the approximate expected severity of flooding. Initiate all actions in a logical sequence. Note that that some actions may need to be initiated in an order that is different from their relative placement in this table. Remember that flooding generally occurs first from the unnamed creek that runs through Jubilee Park Lake. Levels will drop away and then start to rise again as Mt Emu Creek rises.

**If response has been initiated locally, the first action should be a call to VICSES, followed by a call to the MERO at Corangamite Shire. Note time available – see below.**

Note that::

- o The unnamed creek passing through the Jubilee Park Lake will start to rise within 30 minutes to an hour after start of rain and peak within about 4 hours.
- o Mt Emu Creek will begin to rise 4 to 8 hours after start of rain (initial rise likely to be driven by local inflows) and peak within around 22 to 28 hours later.

Proposed minor flood level		4.00 281.012		<ul style="list-style-type: none"> <li>o Monitor rainfall and water levels.</li> <li>o With regard for expected severity of flooding, consider:                             <ul style="list-style-type: none"> <li>➢ Either mobilising to remove furniture etc from buildings likely to be flooded over-floor or to begin sandbagging.</li> <li>➢ Implementing evacuation plan.</li> </ul> </li> </ul>
<p>Around Skipton: ~15mm in 30 minutes to ~65mm in 24 hours</p> <p>Upper catchment: ~45mm in 6 hours to ~70mm in 24 hours</p>	20% AEP (5-year ARI)	4.09 281.102	<p><b><u>Local creek – Jubilee Park</u></b> Local catchment flows enter main street east of the Highway Bridge flooding around the shops and along Lismore-Skipton Road. Minor overbank flows to Mt Emu Creek along Lismore-Skipton Road.</p> <p><b><u>Mt Emu Creek</u></b> Stewart Park fills early. No overbank flows.</p> <p><b><u>Summary</u></b> 4 x properties flooded over-floor including the Hotel, Pharmacy, Garage, pottery and 1 x weatherboard house all in Montgomery Street.</p> <p>Water on side of Glenelg Highway / Montgomery St.</p> <p>Water flowing over parts of Johnson St, Anderson St, Montgomery St and Smythe St up to 250mm deep – low hazard.</p>	<ul style="list-style-type: none"> <li>o Continue to monitor rainfall and water levels.</li> <li>o With regard for expected severity of flooding, remove furniture etc from buildings likely to be flooded over-floor or to begin sandbagging and revisit evacuation plan.</li> <li>o Place “Water over road” signs and consider closing these roads.</li> <li>o If creek flooding likely to increase consider how to maintain functioning of Hospital / Nursing Home.</li> </ul>
Peak of 12 August 2010 flood at 17:15		4.16 281.172	Mt Emu Creek near or just above the top of bank through town.	
<p>Around Skipton: ~20mm in 30 minutes to</p>	10% AEP (10-year ARI)	4.70 281.712	<p><b><u>Local creek – Jubilee Park</u></b> Local catchment flows enter main street east of the Highway Bridge causing significant flooding around the shops and</p>	<ul style="list-style-type: none"> <li>o Continue to monitor rainfall and water levels.</li> <li>o Continue with evacuation plan, removal of furniture etc from buildings likely to be flooded</li> </ul>

APPENDIX C1 - SKIPTON

Observed Rainfall (see graph)	AEP of flood	Water level at Skipton (m) (mAHD)	Consequence / Impact	Action Actions may include (but not limited to) evacuation, closure of roads, sandbagging, issue of warnings and who is responsible
<ul style="list-style-type: none"> <li>It is important that the decision to mobilise to remove furniture etc from buildings is made early and that, in general, sandbagging is reserved for non-weatherboard buildings.</li> <li>Consider how best to assist staff attend the Hospital / Nursing Home in Skipton when Montgomery Street, Anderson Street and Johnson Street are flooded.</li> </ul>				
<p><b>USING THIS INTELLIGENCE CARD.</b> Obtain rainfall data and use the flood guidance tool to determine the approximate flood severity. Consider the appropriate flood inundation map. Review all consequences and actions in this table, from the first row down to the approximate expected severity of flooding. Initiate all actions in a logical sequence. Note that that some actions may need to be initiated in an order that is different from their relative placement in this table. Remember that flooding generally occurs first from the unnamed creek that runs through Jubilee Park Lake. Levels will drop away and then start to rise again as Mt Emu Creek rises.</p>				
<p><b>If response has been initiated locally, the first action should be a call to VICSES, followed by a call to the MERO at Corangamite Shire. Note time available – see below.</b></p>				
<p>~75mm in 24 hours Upper catchment: ~50mm in 6 hours to ~80mm in 24 hours</p>			<p>along Lismore-Skipton Rd. Minor overbank flows to Mt Emu Creek along Lismore-Skipton Rd.</p> <p><b>Mt Emu Creek</b> Backflow from creek into right floodplain via drainage pipe upstream of Eel Factory resulting in overland flows southward towards Highway. Later in the event, a breakout occurs from the creek on the right bank (upstream of pipe) but volumes are limited. Minor backflow from the creek via drainage pipes on left bank.</p> <p><b>Summary</b> 4 x properties identified above subject to deeper over-floor flooding and the Pottery also flooded over-floor. Water on side of Glenelg Highway / Montgomery St as a result of the unnamed creek flowing through Jubilee Park and from backwater over right bank of Mt Emu Creek. Water flowing over parts of Johnson St, Anderson St, Montgomery St and Smythe St up to 250mm deep – low to medium hazard. Water over left bank d/s from Highway Bridge. Water encroaching on Lismore-Skipton Rd d/s from Station St.</p>	<p>over-floor and / or continue sandbagging buildings.</p> <ul style="list-style-type: none"> <li>Place “Water over road” signs and consider closing these roads.</li> <li>If creek flooding likely to increase consider how to maintain functioning of Hospital / Nursing Home.</li> </ul>

APPENDIX C 1 - SKIPTON

Observed Rainfall (see graph)	AEP of flood	Water level at Skipton (m) (mAHD)	Consequence / Impact	Action Actions may include (but not limited to) evacuation, closure of roads, sandbagging, issue of warnings and who is responsible
<ul style="list-style-type: none"> <li>▪ It is important that the decision to mobilise to remove furniture etc from buildings is made early and that, in general, sandbagging is reserved for non-weatherboard buildings.</li> <li>▪ Consider how best to assist staff attend the Hospital / Nursing Home in Skipton when Montgomery Street, Anderson Street and Johnson Street are flooded.</li> </ul>				
<p><b>USING THIS INTELLIGENCE CARD.</b> Obtain rainfall data and use the flood guidance tool to determine the approximate flood severity. Consider the appropriate flood inundation map. Review all consequences and actions in this table, from the first row down to the approximate expected severity of flooding. Initiate all actions in a logical sequence. Note that that some actions may need to be initiated in an order that is different from their relative placement in this table. Remember that flooding generally occurs first from the unnamed creek that runs through Jubilee Park Lake. Levels will drop away and then start to rise again as Mt Emu Creek rises.</p>				
<p><b>If response has been initiated locally, the first action should be a call to VICSES, followed by a call to the MERO at Corangamite Shire. Note time available – see below.</b></p>				
Proposed moderate flood level	4.70 281.712		<ul style="list-style-type: none"> <li>o Continue to monitor rainfall and water levels.</li> <li>o Consider closing the Glenelg Highway This will effectively split the town in two.</li> <li>o Consider closing other local roads.</li> <li>o Consider implementing contingency plans for access to the Hospital / Nursing Home.</li> </ul>	
Peak of 5 Sept 2010 flood at 16:45	4.97 281.982	Creek flowing through Jubilee Park Lake flooded before Mt Emu Ck and inundated Anderson St and Montgomery St and flooded a number of properties. Later, over-bank flooding from Mt Emu Creek occurred on the west (right) bank upstream of the Glenelg Highway Bridge and flooded a number of properties and dwellings. Backflow through stormwater drains into the main commercial centre (Montgomery St) also flooded a number of business premises and cut the Glenelg Highway.	<ul style="list-style-type: none"> <li>o</li> </ul>	
Proposed major flood level	5.10 282.112	<b>Local creek – Jubilee Park</b> Local catchment flows enter main street east of the Highway Bridge causing significant flooding around the shops and	<ul style="list-style-type: none"> <li>o Continue to monitor rainfall and water levels.</li> <li>o Continue with evacuation plan, removal of furniture etc from buildings likely to be flooded</li> </ul>	

## APPENDIX C 1 - SKIPTON

Observed Rainfall (see graph)	AEP of flood	Water level at Skipton (m) (mAHD)	Consequence / Impact	Action Actions may include (but not limited to) evacuation, closure of roads, sandbagging, issue of warnings and who is responsible
<ul style="list-style-type: none"> <li>▪ It is important that the decision to mobilise to remove furniture etc from buildings is made early and that, in general, sandbagging is reserved for non-weatherboard buildings.</li> <li>▪ Consider how best to assist staff attend the Hospital / Nursing Home in Skipton when Montgomery Street, Anderson Street and Johnson Street are flooded.</li> </ul>				
<p><b>USING THIS INTELLIGENCE CARD.</b> Obtain rainfall data and use the flood guidance tool to determine the approximate flood severity. Consider the appropriate flood inundation map. Review all consequences and actions in this table, from the first row down to the approximate expected severity of flooding. Initiate all actions in a logical sequence. Note that that some actions may need to be initiated in an order that is different from their relative placement in this table. Remember that flooding generally occurs first from the unnamed creek that runs through Jubilee Park Lake. Levels will drop away and then start to rise again as Mt Emu Creek rises.</p>				
<p><b>If response has been initiated locally, the first action should be a call to VICSES, followed by a call to the MERO at Corangamite Shire. Note time available – see below.</b></p>				
<p>Around Skipton: ~25mm in 30 minutes to ~85mm in 24 hours</p> <p>Upper catchment: ~60mm in 6 hours to ~90mm in 24 hours</p>	<p>5% AEP (20-year ARI)</p>	<p>along Lismore-Skipton Road. Overbank flows to Mt Emu Creek along Lismore-Skipton Road.</p> <p><b><u>Mt Emu Creek</u></b> Backflow from creek into right floodplain via drainage pipe upstream of Eel Factory resulting in overland flows southward towards Highway. Later, a breakout occurs from the creek on right bank (upstream of pipe), flows overland, joins the backflow and moves overland towards Highway. Properties flooded on right floodplain and some flooding across Highway. Backflow from the creek through drainage pipes into left floodplain causing flooding in main street. Overbanks flows into the left floodplain upstream of Highway Bridge contributing to flooding in main street. Significant floodplain inundation d/s of Highway Bridge. Houses on floodplain d/s of the bridge are inundated.</p> <p><b><u>Summary</u></b> 5 x properties identified above subject to deeper over-floor flooding. Museum, Art Gallery and Eel Factory along with 4 x additional houses and 2 x commercial properties flooded over-floor.</p>	<p>over-floor and / or continue sandbagging buildings.</p> <ul style="list-style-type: none"> <li>◦ If not done, close Glenelg Highway, Johnson St, Anderson St and Smythe St.</li> <li>◦ Consider closing the Lismore-Skipton Rd.</li> <li>◦ If not done, implementing contingency plans for access to the Hospital / Nursing Home.</li> </ul>	

APPENDIX C 1 - SKIPTON

Observed Rainfall (see graph)	AEP of flood	Water level at Skipton (m) (mAHD)	Consequence / Impact	Action Actions may include (but not limited to) evacuation, closure of roads, sandbagging, issue of warnings and who is responsible
<ul style="list-style-type: none"> <li>It is important that the decision to mobilise to remove furniture etc from buildings is made early and that, in general, sandbagging is reserved for non-weatherboard buildings.</li> <li>Consider how best to assist staff attend the Hospital / Nursing Home in Skipton when Montgomery Street, Anderson Street and Johnson Street are flooded.</li> </ul>				
<p><b>USING THIS INTELLIGENCE CARD.</b> Obtain rainfall data and use the flood guidance tool to determine the approximate flood severity. Consider the appropriate flood inundation map. Review all consequences and actions in this table, from the first row down to the approximate expected severity of flooding. Initiate all actions in a logical sequence. Note that that some actions may need to be initiated in an order that is different from their relative placement in this table. Remember that flooding generally occurs first from the unnamed creek that runs through Jubilee Park Lake. Levels will drop away and then start to rise again as Mt Emu Creek rises.</p>				
<p><b>If response has been initiated locally, the first action should be a call to VICSES, followed by a call to the MERO at Corangamite Shire. Note time available – see below.</b></p>				
			<p>Approaches to Glenelg Highway Bridge are under water up to 500mm deep but bridge deck is still clear. The town is split in two.</p> <p>Water flowing over parts of Johnson St, Anderson St, Montgomery St and Smythe St up to 500mm or more deep – medium to high hazard.</p> <p>Water over Lismore-Skipton Rd d/s from Station St. up to 250mm deep – low hazard.</p>	
<p>Around Skipton: ~30mm in 30 minutes to 105mm in 24 hours</p> <p>Upper catchment: ~75mm in 6 hours to ~110mm in 24</p>	<p>2% AEP (50-year ARI)</p>	<p>5.61 282.622</p>	<p><b>Local creek – Jubilee Park</b> Significant flooding in the main street from local catchment flows.</p> <p><b>Mt Emu Creek</b> Significant flooding over the right bank and across the floodplain up and downstream of Highway Bridge. Flooding in main street on left floodplain due to backflow through the drainage system from the creek and overbank</p>	<ul style="list-style-type: none"> <li>Continue to monitor rainfall and water levels.</li> <li>Continue with evacuation plan, removal of furniture etc from buildings likely to be flooded over-floor and / or continue sandbagging buildings.</li> <li>Monitor contingency plans for access to the Hospital / Nursing Home.</li> </ul>



APPENDIX C1 - SKIPTON

Observed Rainfall (see graph)	AEP of flood	Water level at Skipton (m) (mAHD)	Consequence / Impact	Action Actions may include (but not limited to) evacuation, closure of roads, sandbagging, issue of warnings and who is responsible
<ul style="list-style-type: none"> <li>It is important that the decision to mobilise to remove furniture etc from buildings is made early and that, in general, sandbagging is reserved for non-weatherboard buildings.</li> <li>Consider how best to assist staff attend the Hospital / Nursing Home in Skipton when Montgomery Street, Anderson Street and Johnson Street are flooded.</li> </ul>				
<p><b>USING THIS INTELLIGENCE CARD.</b> Obtain rainfall data and use the flood guidance tool to determine the approximate flood severity. Consider the appropriate flood inundation map. Review all consequences and actions in this table, from the first row down to the approximate expected severity of flooding. Initiate all actions in a logical sequence. Note that that some actions may need to be initiated in an order that is different from their relative placement in this table. Remember that flooding generally occurs first from the unnamed creek that runs through Jubilee Park Lake. Levels will drop away and then start to rise again as Mt Emu Creek rises.</p>				
<p><b>If response has been initiated locally, the first action should be a call to VICSES, followed by a call to the MERO at Corangamite Shire. Note time available – see below.</b></p>				
hours			<p>flows. Glenelg Highway Bridge overtopped.</p> <p><b>Summary</b> 14 x properties identified above subject to deeper over-floor flooding.</p> <p>The Supermarket (existing and new premises) and 4 x additional houses flooded over-floor.</p> <p>Approaches and deck of Glenelg Highway Bridge are under water. Water more than 1m deep in places. Bridge impassable.</p> <p>Water flowing over parts of Johnson St, Anderson St, Montgomery St and Smythe St is 1m deep or more – high hazard.</p> <p>Water over Lismore-Skipton Rd d/s from Station St. up to 250mm deep – low hazard. .</p>	<ul style="list-style-type: none"> <li>Consider closing the Lismore-Skipton Rd.</li> <li>Check integrity of Skipton Dam.</li> </ul>
			Depth of water over the Lismore-Skipton Rd is increasing.	<ul style="list-style-type: none"> <li>Close the Lismore-Skipton Rd if not done already.</li> </ul>
Peak of 15 January 2011 flood at 6:30		6.04 283.052	Shops in the lower part of Montgomery St including the supermarket, chemist, hotel, garage, art gallery and pottery were flooded along with 30 residential properties. Flood depths exceeded 1.5m in some properties. The Glenelg	<ul style="list-style-type: none"> <li></li> </ul>

APPENDIX C 1 - SKIPTON

Observed Rainfall (see graph)	AEP of flood	Water level at Skipton (m) (mAHD)	Consequence / Impact	Action Actions may include (but not limited to) evacuation, closure of roads, sandbagging, issue of warnings and who is responsible
<ul style="list-style-type: none"> <li>It is important that the decision to mobilise to remove furniture etc from buildings is made early and that, in general, sandbagging is reserved for non-weatherboard buildings.</li> <li>Consider how best to assist staff attend the Hospital / Nursing Home in Skipton when Montgomery Street, Anderson Street and Johnson Street are flooded.</li> </ul>				
<p><b>USING THIS INTELLIGENCE CARD.</b> Obtain rainfall data and use the flood guidance tool to determine the approximate flood severity. Consider the appropriate flood inundation map. Review all consequences and actions in this table, from the first row down to the approximate expected severity of flooding. Initiate all actions in a logical sequence. Note that that some actions may need to be initiated in an order that is different from their relative placement in this table. Remember that flooding generally occurs first from the unnamed creek that runs through Jubilee Park Lake. Levels will drop away and then start to rise again as Mt Emu Creek rises.</p>				
<p><b>If response has been initiated locally, the first action should be a call to VICSES, followed by a call to the MERO at Corangamite Shire. Note time available – see below.</b></p>				
			<p>Highway Bridge was overtopped and the Highway was closed for more than 2 days. The town was split in two.</p>	
<p>Around Skipton: ~40mm in 30 minutes to 120mm in 24 hours Upper catchment: ~85mm in 6 hours to ~125mm in 24 hours</p>	<p>1% AEP (100-yr ARI)</p>	<p>6.07 283.082</p>	<p><b>Local creek – Jubilee Park</b> Significant flows into the main street from local catchment. Sufficient to create overbank flow into Mt Emu Creek at the Lismore-Skipton Road and immediately u/s of the Bridge.</p> <p><b>Mt Emu Creek</b> Significant flooding over the right bank and across the floodplain up and downstream of Highway Bridge. Significant flooding over the left bank and across the floodplain. Inundation of Glenelg Highway and Bridge overtopped. Inundation of a significant number of properties on both sides of the river.</p> <p><b>Summary</b> 20 x properties identified above subject to deeper over-floor flooding. 5 x additional houses flooded over-floor. Approaches and deck of Glenelg Highway Bridge are under water. Water more than 1m deep. Bridge impassable. Water flowing over parts of Johnson St, Anderson St, Montgomery St and Smythe St is more than 1m deep – high</p>	<ul style="list-style-type: none"> <li>Continue to monitor rainfall and water levels.</li> <li>Monitor implementation of plans – evacuation, removal of furniture etc from buildings, sandbagging, maintenance of access to the Hospital / Nursing Home, etc.</li> <li>Check integrity of Skipton Dam.</li> </ul>

APPENDIX C1 - SKIPTON

Observed Rainfall (see graph)	AEP of flood	Water level at Skipton (m) (mAHD)	Consequence / Impact	Action Actions may include (but not limited to) evacuation, closure of roads, sandbagging, issue of warnings and who is responsible
<ul style="list-style-type: none"> <li>It is important that the decision to mobilise to remove furniture etc from buildings is made early and that, in general, sandbagging is reserved for non-weatherboard buildings.</li> <li>Consider how best to assist staff attend the Hospital / Nursing Home in Skipton when Montgomery Street, Anderson Street and Johnson Street are flooded.</li> </ul>				
<p><b>USING THIS INTELLIGENCE CARD.</b> Obtain rainfall data and use the flood guidance tool to determine the approximate flood severity. Consider the appropriate flood inundation map. Review all consequences and actions in this table, from the first row down to the approximate expected severity of flooding. Initiate all actions in a logical sequence. Note that that some actions may need to be initiated in an order that is different from their relative placement in this table. Remember that flooding generally occurs first from the unnamed creek that runs through Jubilee Park Lake. Levels will drop away and then start to rise again as Mt Emu Creek rises.</p>				
<p><b>If response has been initiated locally, the first action should be a call to VICSES, followed by a call to the MERO at Corangamite Shire. Note time available – see below.</b></p>				
			<p>hazard. Water over Lismore-Skipton Rd d/s from Station St. up to 500mm deep – medium to high hazard.</p>	
<p>Heavy rain (eg. 100mm or more in 12 hours or so) on a wet catchment</p>	<p>0.5% AEP (200-yr ARI)</p>	<p>6.54 283.552</p>	<p><b>Local creek – Jubilee Park</b> Significant flows into the main street from local catchment. Sufficient to create overbank flow into Mt Emu Creek at the Lismore-Skipton Road and immediately u/s of the Bridge.</p> <p><b>Mt Emu Creek</b> Significant flooding over the right bank and across the floodplain up and downstream of Highway Bridge. Significant flooding over the left bank and across the floodplain. Inundation of Glenelg Highway and Bridge overtopped. Inundation of a significant number of properties on both sides of the river.</p> <p><b>Summary</b> 25 x properties identified above subject to deeper over-floor flooding. 1 x additional weatherboard house flooded over-floor. Approaches and deck of Glenelg Highway Bridge are under water.</p>	<ul style="list-style-type: none"> <li>Continue to monitor rainfall and water levels.</li> <li>Continue to implement and monitor plans as required.</li> <li>Check integrity of Skipton Dam.</li> </ul>

APPENDIX C1 - SKIPTON

Observed Rainfall (see graph)	AEP of flood	Water level at Skipton (m) (mAHD)	Consequence / Impact	Action Actions may include (but not limited to) evacuation, closure of roads, sandbagging, issue of warnings and who is responsible
<ul style="list-style-type: none"> <li>It is important that the decision to mobilise to remove furniture etc from buildings is made early and that, in general, sandbagging is reserved for non-weatherboard buildings.</li> <li>Consider how best to assist staff attend the Hospital / Nursing Home in Skipton when Montgomery Street, Anderson Street and Johnson Street are flooded.</li> </ul>				
<p><b>USING THIS INTELLIGENCE CARD.</b> Obtain rainfall data and use the flood guidance tool to determine the approximate flood severity. Consider the appropriate flood inundation map. Review all consequences and actions in this table, from the first row down to the approximate expected severity of flooding. Initiate all actions in a logical sequence. Note that that some actions may need to be initiated in an order that is different from their relative placement in this table. Remember that flooding generally occurs first from the unnamed creek that runs through Jubilee Park Lake. Levels will drop away and then start to rise again as Mt Emu Creek rises.</p>				
<p><b>If response has been initiated locally, the first action should be a call to VICSES, followed by a call to the MERO at Corangamite Shire. Note time available – see below.</b></p>				

APPENDIX C1 - SKIPTON

6.3 Summary of Properties Flooded

Summary of number of flood affected properties in Skipton EXISTING CONDITIONS						
	Design Flood AEP (%)					
	20%	10%	5%	2%	1%	0.5%
Level at Skipton gauge, Emu Creek	4.09	4.70	5.10	5.61	6.07	6.54
Equivalent level in mAHD	281.102	281.712	282.112	282.622	283.082	283.552
Number of properties flooded above floor	4	5	14	20	25	26
Number of properties flooded below floor only	1	1	3	1	2	1
Total number of flooded properties	5	6	17	21	27	27

6.4 Detailed List of Properties Flooded

Skipton – EXISTING CONDITIONS													
It is suggested that this table be used in conjunction with the flood inundation maps													
LEGEND	Within 100mm of flooding over-floor						Depth of over-floor flooding						Comments
	Depth of flooding on the property for each ARI						Depth of over-floor flooding at property for each ARI						
Location (Number & Street)	5yr	10yr	20yr	50yr	100yr	200yr	5yr	10yr	20yr	50yr	100yr	200yr	
	4.09	4.70	5.10	5.61	6.07	6.54	4.09	4.70	5.10	5.61	6.07	6.54	
7 Anderson Street				0.71	1.32	1.95				0.52	1.12	1.75	Residential

APPENDIX C1 - SKIPTON

Skipton – EXISTING CONDITIONS													
It is suggested that this table be used in conjunction with the flood inundation maps													
LEGEND	Within 100mm of flooding over-floor						Depth of over-floor flooding						Comments
	Depth of flooding on the property for each ARI						Depth of over-floor flooding at property for each ARI						
	5yr	10yr	20yr	50yr	100yr	200yr	5yr	10yr	20yr	50yr	100yr	200yr	
Location (Number & Street)	4.09	4.70	5.10	5.61	6.07	6.54	4.09	4.70	5.10	5.61	6.07	6.54	
38 Bridge Road			1.01	1.61	2.12	2.70			1.01	1.61	2.12	2.70	Residential
1 Cleveland Street			0.63	1.27	1.80	2.36			0.37	1.01	1.54	2.11	Old common school - bluestone
3 Cleveland Street			0.74	1.40	1.96	2.54			0.35	1.02	1.58	2.16	Residential
3 Cleveland Street			0.50	1.13	1.66	2.24			0.35	0.98	1.51	2.09	Residential – brick
5 Cleveland Street			0.44	1.09	1.62	2.19			0.18	0.83	1.36	1.93	Residential
Lot 2 Hardy Street			0.31	0.82	1.27	1.73			0.31	0.82	1.27	1.73	Commercial - tin shed "Castlebar"
16 Montgomery St			0.07	0.16	0.79	1.38					0.34	0.93	Residential
18 Montgomery St					0.52	1.11					0.14	0.73	Residential
20 Montgomery St					0.08	0.67						0.17	Residential - weatherboard
22 Montgomery St					0.38	0.38					0.38	0.38	Residential – concrete blocks

APPENDIX C1 - SKIPTON

<b>Skipton – EXISTING CONDITIONS</b>													
<b>It is suggested that this table be used in conjunction with the flood inundation maps</b>													
<b>LEGEND</b>	Within 100mm of flooding over-floor						Depth of over-floor flooding						<b>Comments</b>
<b>Location (Number &amp; Street)</b>	<b>Depth of flooding on the property for each ARI</b>						<b>Depth of over-floor flooding at property for each ARI</b>						
	<b>5yr</b>	<b>10yr</b>	<b>20yr</b>	<b>50yr</b>	<b>100yr</b>	<b>200yr</b>	<b>5yr</b>	<b>10yr</b>	<b>20yr</b>	<b>50yr</b>	<b>100yr</b>	<b>200yr</b>	
	<b>4.09</b>	<b>4.70</b>	<b>5.10</b>	<b>5.61</b>	<b>6.07</b>	<b>6.54</b>	<b>4.09</b>	<b>4.70</b>	<b>5.10</b>	<b>5.61</b>	<b>6.07</b>	<b>6.54</b>	
23 Montgomery St	0.63	0.67	0.71	1.38	2.02	2.62	0.34	0.38	0.42	1.09	1.73	2.33	Skipton Hotel Bar - bluestone
	0.51	0.55	0.59	1.28	1.92	2.51	0.36	0.40	0.45	1.14	1.77	2.37	Hotel Dining Room - rendered brick
	0.55	0.58	0.61	1.22	1.86	2.49	0.55	0.58	0.61	1.22	1.86	2.49	Shed - bluestone
25 Montgomery St	0.60	0.64	0.67	1.29	1.93	2.56	0.31	0.35	0.38	1.00	1.64	2.27	Commercial - weatherboard
31 Montgomery St				0.43	0.98	1.54				0.38	0.93	1.49	Residential
33 Montgomery St			0.16	0.83	1.36	1.89				0.17	0.55	1.08	Residential
34 Montgomery St					0.40	0.40					0.40	0.40	Residential - weatherboard
<b>Commercial properties in Montgomery Street</b>													
Museum		0.13	1.11	1.54	1.86	2.29			0.50	0.93	1.26	1.69	Historical Society Museum
Art Gallery			0.90	1.40	1.81	2.37			0.72	1.22	1.63	2.19	Art Gallery
Crawford Dowling					0.57	1.20					0.10	0.73	Commercial
Eel Factory			0.60	1.31	1.92	2.57			0.42	1.13	1.73	2.39	Commercial



APPENDIX C1 - SKIPTON

<b>Skipton – EXISTING CONDITIONS</b>													
<b>It is suggested that this table be used in conjunction with the flood inundation maps</b>													
<b>LEGEND</b>	Within 100mm of flooding over-floor						Depth of over-floor flooding						<b>Comments</b>
<b>Location (Number &amp; Street)</b>	<b>Depth of flooding on the property for each ARI</b>						<b>Depth of over-floor flooding at property for each ARI</b>						
	<b>5yr</b>	<b>10yr</b>	<b>20yr</b>	<b>50yr</b>	<b>100yr</b>	<b>200yr</b>	<b>5yr</b>	<b>10yr</b>	<b>20yr</b>	<b>50yr</b>	<b>100yr</b>	<b>200yr</b>	
	<b>4.09</b>	<b>4.70</b>	<b>5.10</b>	<b>5.61</b>	<b>6.07</b>	<b>6.54</b>	<b>4.09</b>	<b>4.70</b>	<b>5.10</b>	<b>5.61</b>	<b>6.07</b>	<b>6.54</b>	
Foodworks-existing				1.02	1.63	2.21				0.99	1.60	2.18	Supermarket
Foodworks-new				0.74	1.37	1.96				0.19	0.82	1.41	Supermarket
Pharmacy	0.28	0.33	0.37	1.07	1.69	2.27	0.28	0.33	0.37	1.07	1.69	2.27	Commercial
Garage - workshop	0.69	0.72	0.75	1.34	1.99	2.63	0.48	0.51	0.54	1.13	1.78	2.42	Commercial
Skipton Pottery	0.38	0.42	0.45	1.12	1.77	2.41		0.04	0.07	0.72	1.39	2.02	Commercial
37 Wright Street					0.06	0.06							Residential - cladding
44 Wright Street			0.34	0.96	1.48	1.97				0.39	0.91	1.40	Residential

**6.5 Indicative Flood / No Flood Guidance Tool**

**6.5.1 In the lead up to a flood event**

It is suggested that data from Mena Park, Ballarat AWS and Ben Nevis AWS as well as (at 9am) from the BoM daily-read stations at Beaufort and Skipton (see BoM website) or alternative closer locations is used to determine an appropriate rainfall depth for use in the following indicative Flood / No Flood guidance tool. It is further suggested that either an average value is used to drive the tool or, for a more conservative approach, the maximum depth from appropriate gauges. This approach will work reasonably well provided the lower (solid) curves are used for the unnamed creek through Jubilee Park Lake and the upper (dashed) curves are used for Mt Emu Creek flooding.

**6.5.2 Using the tool**

Two approaches can be used during a rainfall event to determine the likelihood and expected severity of flooding. Both approaches can be used simultaneously using the same copy of the tool. **Unless there are unusual circumstances, actions as per the Flood Intelligence Card should be initiated as soon as the tool suggests flooding is likely.** Response can be escalated if the tool indicates an increase in the expected severity of flooding.

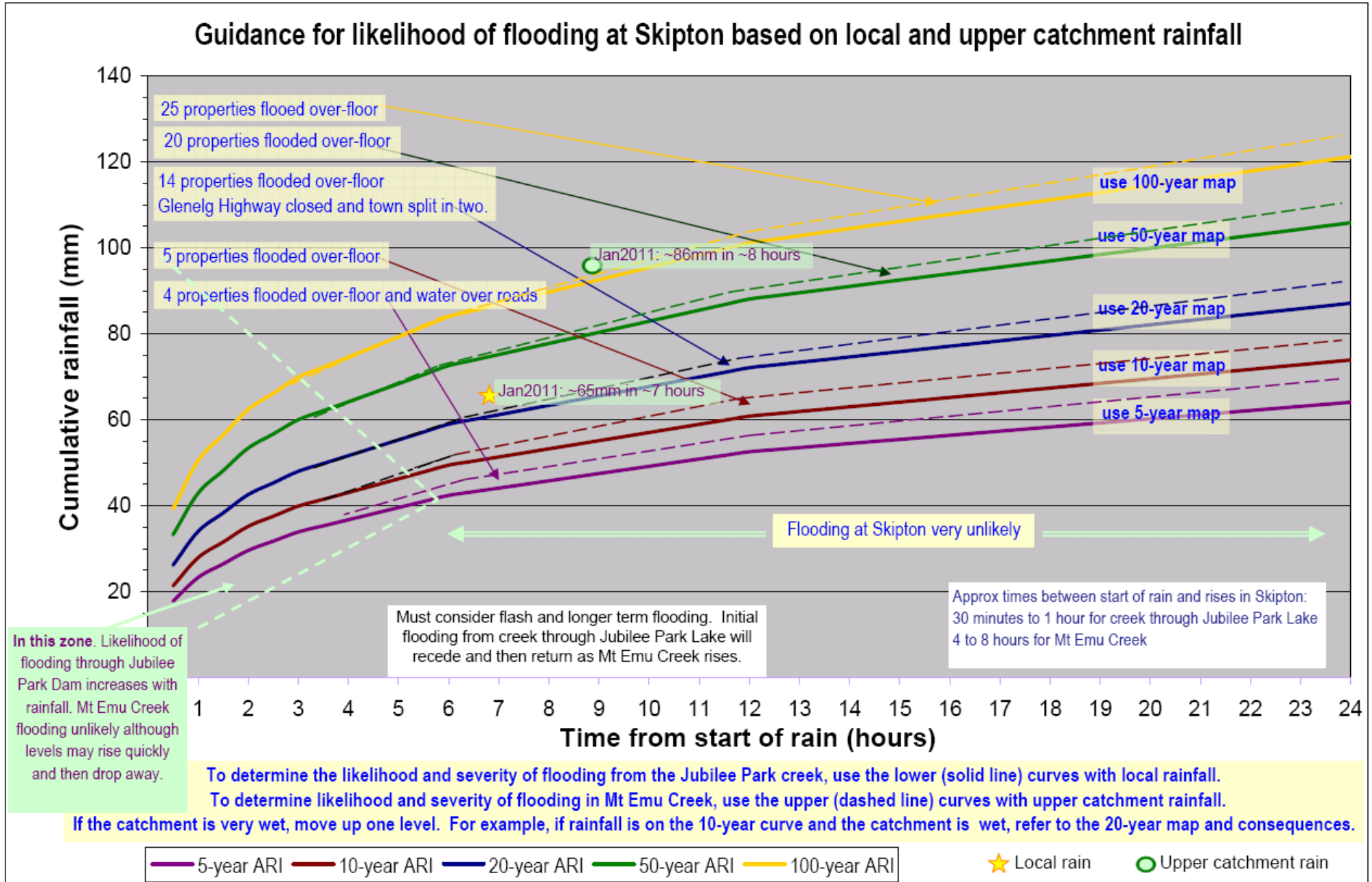
**Approach 1:** Using the total rainfall depth obtained from the start of the event (discount early drizzle or very light rain), plot the rainfall depth against elapsed time on a copy of the tool. A new plot should be started on receipt of data for each new time step and existing plots should be extended using the new data. Assess the likelihood and expected severity of flooding from the curves with due regard for included notes. A crossing of the curves by any of the plots indicates that flooding is likely.

**Approach 2:** Discount the early lighter rain from consideration (i.e. begin calculating rainfall depth from start of heavy rain) and plot depth against time on a copy of the tool. A new plot should be started on receipt of data for each new time step and existing plots should be extended using the new data. Assess the likelihood and expected severity of flooding from the curves with due regard for included notes. A crossing of the curves by any of the plots indicates that flooding is likely

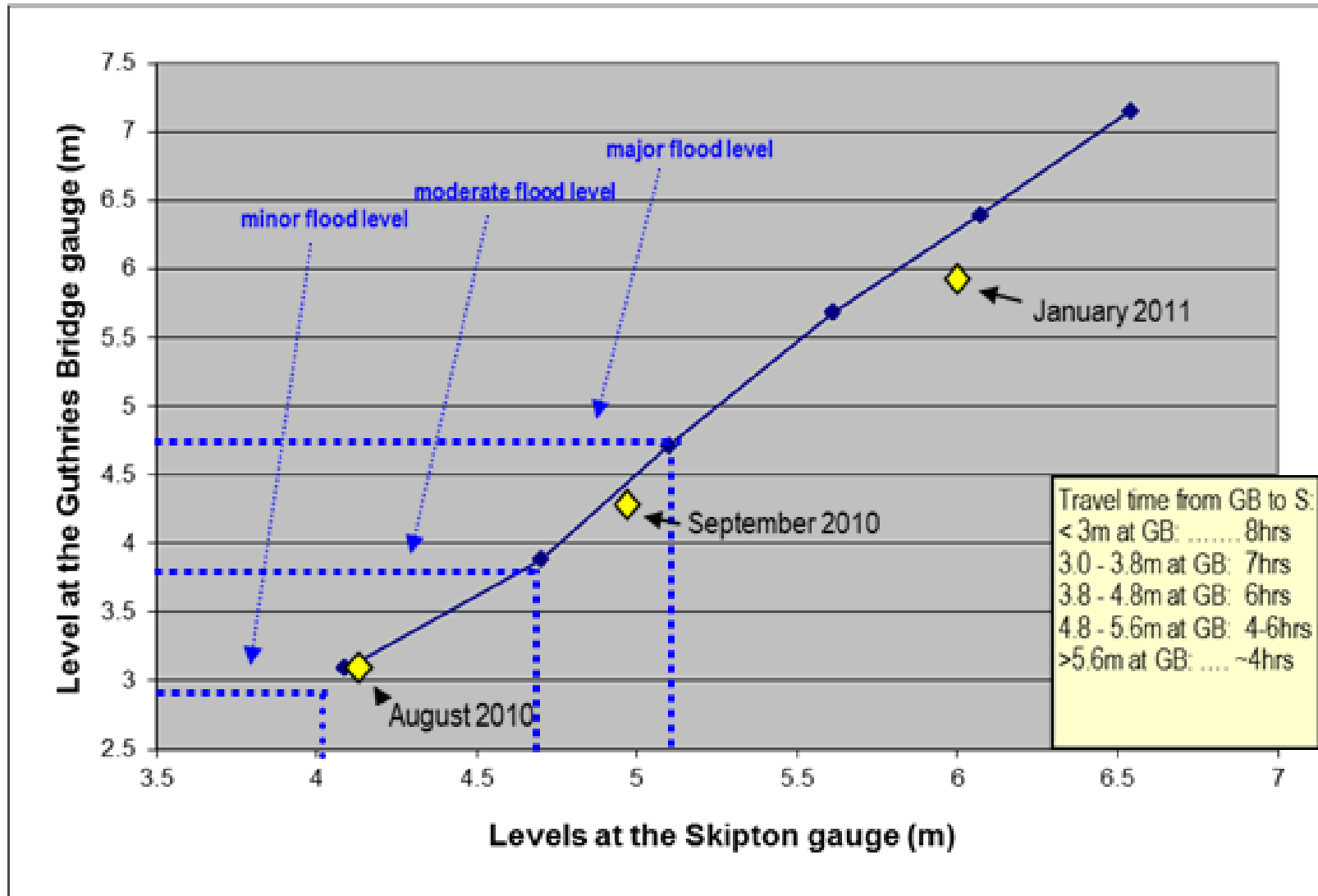
CAUTION. The tool is based on a number of gross assumptions and generalisations. It is indicative only and will not enable accurate predictions of peak gauge heights or time of flood peak to be made. It does however give indicative guidance as to the expected severity of flooding and thus likely consequences although it will not always indicate the expected severity of flooding correctly. A strength of the tool is that it does provide a quick ball-park answer to questions such as “will we flood” and “how bad will it be” and will usually give a heads up to severe flooding and thus of likely consequences.

### 6.5.3 After a flood event

After a flood event, plot the event rainfall depth (with date) on the tool and include an overview of the event, including antecedent conditions, in Appendix A of this MFEP. Relevant information should also be added to Appendix C1.



6.6 Flood Forecast Tool: Approximate Level at Skipton based on River Level at Guthries Bridge



## APPENDIX C1 - SKIPTON

	Approximate Levels at Skipton for ARI Flood Events						
ARI (Yr.)		5	10	20	50	100	200
Gauge Levels (m)	Guthries Bridge	3.09	3.88	4.71	5.68	6.39	7.15
	Skipton	4.09	4.7	5.1	5.61	6.07	6.54

### 6.6.1 After a flood event

After a flood event, plot the stream gauge levels (including times and dates) and include an overview of the event. Relevant information should be added to Appendix C1.

## **APPENDIX C2 – CAMPERDOWN COMMUNITY FLOOD EMERGENCY MANAGEMENT PLAN**

### **1. Overview**

Camperdown's stormwater drainage system comprises a combination of open and piped drains that discharge to the north and into Lake Colongulac. The lake is surrounded by farmland and is a Ramsar listed wetland.

Most of the open drains within Camperdown are well grassed on gently sloping grades.

There are six sub-catchments within Camperdown that discharge into four swale outlets: Cressy Street, Church Street, Old Timboon Road and Bowyer Street. The Cressy Street, Old Timboon Road, Bowyer Street and Bowen Street sub-catchments consist of a mix of urban and agricultural areas while the Church Street and Meiklejohn Street sub-catchments are predominantly urban.

The swale outlets are defined open drains that flow through agricultural land and terminate at Lake Colongulac.

## APPENDIX C3 – TERANG COMMUNITY FLOOD EMERGENCY MANAGEMENT PLAN

### 1. Overview

Terang has a history of stormwater and drainage issues. Terang's stormwater drainage system is composed of modified waterways, swales, constructed channels and piped drains.

The worst flooding in recent years occurred following heavy rain in January 1991. The paddocks to the north of town became flooded. Water was approximately 300mm deep over a wide area near the railway line and north of Black Street. The drains along Blackiston Street and Black Street were unable to accommodate the flow.

Wallaces Plumbtec building was flooded in 2005 due to flow across the intersection of the Peterborough Road and the Cobden – Terang Road.

### 2. Flooding Hot Spots

The following flooding hot spots have been identified in Terang:

- ◆ Cameron Street at the railway line. There is a low area on the south side of the railway line at Cameron Street. If runoff exceeds culvert capacity or the culvert is blocked, flooding is likely on the east side of Cameron Street. Existing culverts have < 5-year ARI capacity.
- ◆ Shadforth Street at the railway line. Some of the land upstream of the railway line is lower than the railway line and may flood if the culvert is blocked or runoff exceeds culvert capacity. Culvert capacity is ~50% of the 5-year ARI flow.
- ◆ Swanston Street west of Shadforth Street. There is a low point in Swanston Street just east of Shadforth Street. The road and the downstream property near the main culvert under Swanston Street just west of Shadforth Street may flood. In addition, backwater from the railway line may flood under / around the house on the northwest corner of Shadforth Street and Swanston Street.
- ◆ Peterborough Road at Terang – Cobden Road. If the culvert under the Terang – Cobden Road and / or pipe on the east side of Peterborough Road cannot take the flow, overland flow occurs on to the west side of Peterborough Road and into the Plumbtec building. Most of the catchment is west of Peterborough Road. When this occurred in 2005, flow occurred diagonally across the intersection from the northwest to the southeast.
- ◆ Blackiston Street
- ◆ Shadforth Street, north of the rail line
- ◆ Hardy Street, north of the rail line
- ◆ Thompson Street near railway line
- ◆ Thomson Street at Cobham Street. There is a depression in the road pavement in the Thompson Street median. During heavy runoff, ponding can affect vehicle access across the Thompson Street median.
- ◆ Black Street
- ◆ Neil Avenue
- ◆ The open drain in the laneway at Strong Street and Hampden Street
- ◆ McKinnon Street Pony Club
- ◆ Both sides of Simpson Street
- ◆ East side of Seymour Street from Bolivar Street to Baynes Street
- ◆ South side of Swanston Street from Pitt Street to Seymour Street



- ◆ South side of Emeny Street
- ◆ East end of Bourkes Road
- ◆ South side of the Princes Highway at the Bowls Club. There is a low point in front of the Bowls Club. Ponded water could flow over the footpath and down an embankment onto the bowling greens. Has occurred previously but has only resulted in shallow water on the green.
- ◆ Near the 80kph zone sign on the Princes Highway at the Warrnambool end of town.
- ◆ Princes Highway – Nos 62 to 66. Water could pond in some of these front yards up to 1 mm deep causing property flooding and possibly blocking one or more driveways. Probably due to mismatched culverts.
- ◆ Princes Highway – school car park and Caravan Park entry. Some overland flows likely during a heavy rain event.
- ◆ High Street near Strong Street. Water could pond on the south side of the street before becoming deep enough to flow east for a short distance and then through the central median gap to the north side of High Street.
- ◆ Wilson Street. There is a low point at the north end of the court in Wilson Street. Any overland flow would overtop the curb and flow into the railway reserve and along the railway line to Thomson Street. Nuisance flooding has been observed in the railway reserve in the past
- ◆ Corner property at Baynes Street and Cameron Street
- ◆ Hardy Street drain
- ◆ Flooding across fairways at a few locations on the golf course
- ◆ Flooding in the swale drains in Ewing Street opposite the Uniting Church
- ◆ Grey Street at Simpson Street. Minor nuisance flooding on the edge of the road at the corner.

## **APPENDIX C4 – PORT CAMPBELL COMMUNITY FLOOD EMERGENCY MANAGEMENT PLAN**

### **1. Overview**

The Port Campbell Holiday Park is located on the banks of Campbell's Creek (a small creek which flows from near Coorimungle to the southern ocean at Port Campbell – small catchment) near the ocean and is protected from rising creek water by a levee bank. Most years, the creek forms a bar to the ocean during the summer months which then traps water behind it. The water builds up until it breaks the bar.

It has been suggested that if a major flash flood was to occur during the time the creek was barred, it is possible that the water would top the levee bank and spill into the Holiday Park before breaking through the bar.

A Wannon Water sub-station is located within the grounds of the Holiday Park. It is understood that this sub-station has been inundated during past high water events. It is further understood that Wannon Water has completed work to attempt to stop the impact of rising water on the sub-station although when this document was being prepared, Wannon Water were unable to locate any records of flooding at the pump station.

Any response required from VICSES in the case of such a flood event affecting the Holiday Park would depend on whether there were any visitors at the park. There may be a requirement to assist residents to evacuate from the park.

Note that during the 2010 and 2011 floods, the only impact on the Holiday Park was from water coming back through drainage points in the levee bank which caused water to pool in small areas. This issue has since been resolved by the Holiday Park lessee.

## APPENDIX C5 – LAKE CORANGAMITE COMMUNITY FLOOD EMERGENCY MANAGEMENT PLAN

### 1. Overview

**Lake Corangamite** is a Ramsar wetland and one of the largest lakes in Victoria with a surface area of 23,000ha (230km<sup>2</sup>). Lake Gnarpurt, Lake Martin and Cundare Pool adjoin the lake which is divided from Lake Beac / Lake Colac to the east by stony rises. The lake has no natural outlets. Water is mainly lost by evaporation or seepage.

The area to the north and northwest of Lake Corangamite is crossed with drainage paths flowing in a southerly direction generally towards Lake Corangamite. The main drainage paths are Woody Yallock River, Gnarkeet Chain of Ponds, Browns Waterholes, and Haunted Gully. The township of Lismore is located on the edge of the Browns Waterhole depression. High water is likely to encroach on the edge of the Lismore Caravan Park.

The area surrounding Lake Corangamite is flat and scattered with numerous small depressions. Each depression has its own catchment and a lake usually forms at the lowest point, its size dependent on the catchment area. Due to the flatness of the landscape, these small lakes overtop and flow into adjoining depressions, generally towards Lake Corangamite creating wide flow paths. Because of the area's character, flooding is dependent on cumulative rainfall over a number of years rather than specific rainfall events – see below.

The **Woody Yallock River** and its many tributary creeks rise to the north of Cressy in Colac-Otway Shire near Linton and Newton and flows south into Lake Corangamite through Lake Martin. The small town of Cressy is located on the left bank of the river at the northern end of the lake within Colac-Otway Shire. The floodplain between Cressy and Lake Martin is small and well defined. When Lake Martin is at full supply level, water backs up along the river, . .

The Woody Yallock River is not known to have experienced flooding problems. The floodplain between Cressy (in the Shire of Colac-Otway) and Lake Martin is small and well defined. When Lake Martin is at full capacity, water backs up along the river flooding adjoining farmland and causing some inconvenience.

The Woody Yallock River diversion channel near Cundare Pool allows diversion of floodwaters from Lake Corangamite to the Barwon River via Warrambine Creek. This method of controlling water levels in Lake Corangamite was implemented following severe flooding in 1956 when large areas of surrounding farmland were inundated. The flood diversion scheme is further described on the Corangamite CMA website <http://www.cma.vic.gov.au/what-we-do/water/drainage-schemes.aspx>

### 2. Flood Impacts

Flooding of the area around Lake Corangamite is dependent on the cumulative rainfall over a number of years rather than specific rain events. Frequent flooding was observed in the period from 1890 to 1910. This was followed by a relatively dry period that lasted for just over 40 years. Following high rainfall in 1951 and 1952, Lake Colac in the adjoining Colac-Otway Shire overflowed into the Lough Calvert system, inundating large areas of farmland. It appears that significant flooding occurred in the area again in 1956. Following a succession of wet years from 1973 to 1975, Lake Colac again overflowed in 1975 flooding a considerable area of farmland. More recent significant floods occurred in 1980 and 1991, again due to high rainfall in the preceding years.

## APPENDIX C5 - LAKE CORANGAMITE

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There are recorded flood extents for the October 1956 flood around Lake Corangamite and the adjoining Lakes (Gnarputt, Martin and Cundare). An extent also exists for the 1952 flood (dated 23 December 1952) in the Lough Calvert area. These are available through the VFD.

A 1% AEP flood level of 118.12 mAHD was set for planning purposes at Foxhow, a town on the northern shore of the lake, allegedly based on the October 1956 flood level. This level is probably applicable to the whole lake.

The BoM does not currently provide flood forecasts for Lake Corangamite, its catchment or tributary streams.

## APPENDIX C6 – GELLIBRAND RIVER COMMUNITY FLOOD EMERGENCY MANAGEMENT PLAN

### 1. Overview

The Gellibrand River originates outside the Shire in the Otway Ranges near Upper Gellibrand, enters the Shire at Lower Gellibrand and discharges to the Southern Ocean at Princetown. It has many tributary creeks, mainly within the Colac-Otway Shire. Within Corangamite Shire, Kennedys Creek is its main tributary.

The floodplains of the Gellibrand River and its tributaries are well developed and have a relatively flat gradient. Floodwaters are therefore generally well confined by the narrow floodplain and are fast flowing with significant depths.

Farmland on the floodplain may be inaccessible to farmers during times of flooding. The recreation reserve (seasonal caravan park) at Princetown is liable to be inundated if the Gellibrand River floods.

While there are no records of flooding as such in the Gellibrand River, significant flows were recorded in October 1971, October / November 1975, June / July 1977, June and August 1978, June 1980, September 1984, September 1996 and August 2010.

It is possible that the telephone exchange at Kennedys Creek will be affected by 1% AEP flooding.

The BoM does not currently provide flood forecasts for the Gellibrand River or its tributaries.

### 2. Dam Failure

A private dam (**Yoolburra Dam**) with a licensed capacity of 64ML (but a calculated capacity of up to ~96ML) and a dam wall height of up to 10m is located at 130 Latrobe Road, Princetown. While not large in volume terms, the dam does exceed ANCOLD guidelines for large and / or hazardous dams. The owners of the dam have therefore prepared a DSEP and lodged a copy of that plan with Corangamite Shire. The DSEP identifies travellers along the Colac – Lavers Hill Road as being potentially at risk in the event of a dam failure.

## APPENDIX C7 – CURDIES RIVER COMMUNITY FLOOD EMERGENCY MANAGEMENT PLAN

### 1. Overview

The Curdies River originates near Lake Purrumbete, approximately 10km west of Lake Corangamite, and enters the Southern Ocean at Peterborough. A drain skirting the edge of a lava flow originating from Mount Porndon connects Lake Purrumbete to the Curdies River channel where the tributary streams of Bostock and Burnip also join. The river flows in a southerly direction threading through a series of narrow valleys that gradually flatten out closer to the coast. Scotts Creek, the main tributary, joins a little north of Timboon.

Localised flooding is likely to occur in the area around Lake Purrumbete due to the numerous small depressions associated with the stony rises typical of the area.

At Peterborough, the inlet is formed by a sand bar which periodically blocks the river mouth. This may cause low lying farmland to be flooded. Flooding in the lower reaches is dependent on the level of the sandbar at the entrance. Water continues to pool behind the bar until it either overtops or floodwater is released by excavation. A 1978 survey of the bar indicated a height of 2.3mAHD.

A 1% AEP flood level of 2.8mAHD was set by the Rural Water Commission in April 1978 and is considered a reasonable estimate given the lack of flood data.

### 2. Flood Impacts

Flooding was recorded along the Curdies River in 1929, 1966, 1974, August 1975, June 1977, August 1978, September 1984, September 1991, August 1992, September 1996, September 2004, August 2010 and June 2011. The August 2010 flood was by far the largest in recent times (i.e. since 1975). The 1977 event was attributed to local run-off.

Rain overnight on 3<sup>rd</sup> / 4<sup>th</sup> August 2013 caused an emergency opening of the Curdies River mouth late on 4<sup>th</sup> August. River levels rose to a height of 1.8m, 500mm above the level at which the mouth is usually opened. The water rose to within a few centimetres of flooding six bungalows in the Peterborough caravan park and flooded access to others. Access to surrounding houses was also blocked. Parks Victoria decided to open the mouth when alerted to the situation.

While there are no major storages in the catchment, Cobden Dam is on Cobden Creek, a tributary to the Curdies River, at Victoria Street in Cobden. It has a volume of approximately 25ML, a surface area of 1.2ha (0.012km<sup>2</sup>) and a catchment area of around 8.3km<sup>2</sup> (GHD, 2012b). VicRoads maintains a DSEP for the dam.

Flood levels at and near Peterborough		
Date	Level (m)	Location
1966	3.10	Timboon-Curdie Vale Road Bridge over Curdies River north of Peterborough
1929, 1974	2.02	Great Ocean Road Bridge over Curdies River
June 1977	1.8	Runoff from local catchment, not major flood flow

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## APPENDIX C7 - CURDIES RIVER

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~2003	1.6	Anecdotal report – from local newspaper
~2011	1.5	Anecdotal report – from local newspaper
August 2013	1.84	Overnight rain with the river mouth blocked

The BoM does not currently provide flood forecasts for the Curdies River or its tributaries.

### 3. Dam Failure

Two private dams (**Nos 1 & 2 Irrigation Dams**) are located at 463 Moreys Road, Brucknell. No. 1 Irrigation Dam has an estimated and licensed volume of 99ML but a calculated volume of 123ML and a dam wall height estimated at 6m. No. 2 Irrigation Dam has an estimated and licensed volume of 53ML and a calculated volume of 23ML. The wall height is 4.55m. Both dams exceed ANCOLD guidelines for large and / or hazardous dams. A DSEP has been prepared by the dam owners and has been lodged at Corangamite Shire. The DSEP identifies travellers along Nullawarre Road as being potentially at risk in the event of a dam failure.



## **APPENDIX D1 – FLOOD EVACUATION ARRANGEMENTS FOR SKIPTON**

There are five stages in the evacuation process: decision, warning, withdrawal, shelter and return.

### **1 Phase 1 - Decision to Evacuate**

The Incident Controller may make the decision to evacuate an at-risk community under the following circumstances:

- ◆ When life and safety are at risk;
- ◆ Properties are likely to become inundated;
- ◆ Properties are likely to become isolated and occupants are not suitable for isolated conditions;
- ◆ Public health is at threat as a consequence of flooding and evacuation is considered the most effective risk treatment. This is the role of the Health Commander of the incident to assess and manage. Refer to the State Health Emergency Response Plan (SHERP) for details);
- ◆ Buildings have been made uninhabitable;
- ◆ Essential services have been damaged and are not available to a community and evacuation is considered the most effective risk treatment.

The following should be considered when planning for evacuation:

- ◆ Anticipated flood consequences and their timing and reliability of predictions;
- ◆ Size and location of the community to be evacuated;
- ◆ Likely duration of evacuation;
- ◆ Forecast weather;
- ◆ Flood models;
- ◆ Predicted timing of flood consequences;
- ◆ Time required to conduct the evacuation;
- ◆ Time available to conduct the evacuation;
- ◆ Evacuation priorities and evacuation planning arrangements;
- ◆ Access and egress routes available and their potential flood liability;
- ◆ Current and likely future status of essential infrastructure;
- ◆ Resources required to conduct the evacuation;
- ◆ Resources available to conduct the evacuation;
- ◆ Shelter including Emergency Relief Centres, Assembly Areas etc.;
- ◆ Vulnerable people and facilities;
- ◆ Transportation;
- ◆ Registration;
- ◆ People of CALD background and transient populations;
- ◆ Safety of emergency service personnel;
- ◆ Different stages of an evacuation process.

The decision to evacuate should be made in consultation with the MERO, MERC, DHS, Health Commander and other key agencies and expert advice (Glenelg Hopkins CMA and Flood Intelligence specialists) unless time constraints prevent this consultation.

## APPENDIX D1 - SKIPTON

The following **Evacuation Checklist** can be used as a guide when evaluating the need for evacuation in a particular area as a result of flooding.

Key Questions	Answers
Are there any existing Flood Evacuation Plans for the Municipality?	
Name of area(s) at risk.	
How many people are at risk (including special needs groups)?	
When and where are access routes likely to be disrupted?	
Is the area a flood island, accessible by road, accessible overland or land locked?	
How much time is available to warn the area? Where Flash Flooding risks exist adopt the strategy detailed in Section 3.8 of this MFEP.	
Under what circumstances and in what areas is shelter in place and not evacuation the best option?	
Where are Flood Relief Centres located?	
What are the triggers for evacuation? (i.e. a particular area at a specified gauge height?) – refer to Appendix C of this MFEP.	
How will evacuation warning messages be communicated to people? (i.e. OSOM, Emergency Alert, etc.)	
Have standard evacuation messages been developed for predicted or likely flood scenarios?	
What forms of transport are needed to assist with evacuation?	
Where are airbase facilities located?	
Where are animal shelter compounds located? Any other arrangements for management and accommodation of pets / animals?	
What are the local command and control arrangements for evacuation?	
<b>Other Confirmations and Clarifications:</b>	
<p>Clarify and confirm local arrangements and responsibilities for evacuation at the local level. This includes:</p> <ul style="list-style-type: none"> <li>➢ Confirming and facilitating local awareness of responsibilities for the decision to evacuate (i.e. Incident Controller), the management of evacuation (i.e. VicPol) and the tasks to be undertaken for evacuation (i.e. development and communication of evacuation warnings).</li> <li>➢ The role of agencies at the local level involved in evacuation (i.e. VicPol, VICSES, Australian Red Cross, etc.)</li> </ul> <p>Local arrangements must be consistent with arrangements as set out in Section 3.8 of the EMMV and the Evacuation Guidelines.</p>	

The table below details triggers for evacuation. If these circumstances are predicted or are likely to occur, evacuation should be considered.

Sector	Gauge	Trigger

The table below details time required to evacuate established areas.

Sector	Likely time required for evacuation (including resource assumptions)

## 2 Phase 2 – Warning or Recommendation

Warnings may include a warning to prepare to evacuate and a warning to evacuate immediately. Once the decision to evacuate has been made, the at-risk community will be warned to evacuate. Evacuation warnings can be disseminated via methods listed in Part 3 of this Plan.

Evacuation warning messages will be developed and issued by VICSES in consultation with the MERO, MERC, DHS and other key agencies and expert advice (e.g. Glenelg Hopkins CMA and Flood Intelligence specialists).

## 3 Phase 3 – Withdrawal

Withdrawal will be controlled by the VicPol Evacuation Manager. The Evacuation Manager is responsible for managing the withdrawal which will include developing an evacuation plan which clearly identifies activities and timelines as well as the roles and responsibilities of any agencies involved.

VICSES will provide advice regarding the most appropriate evacuation routes and locations for at-risk communities to evacuate to, etc.

VICSES, CFA, AV and Local Government will provide resources where available to support VicPol / VicRoads with route control and may assist VicPol in arranging evacuation transportation.

VICPOL will control security of evacuated areas.

Evacuees will be encouraged to move using their own transport where possible. Transport for those without vehicles or other means will be arranged – refer to the MEMP.

Possible evacuation routes to be used:

Sector	Evacuation Route	Evacuation route closure point or circumstances


Landing zones for helicopters are located at:

- ◆ Skipton oval

Special needs groups and vulnerable residents likely to need help may be identified via the Home and Community Care (HACC) database, via Council’s ‘residents at risk’ register or through community network organisations. Refer to the MEMP or seek information from the MERO or MRM.

#### **4 Phase 4 – Shelter**

Relief Centres and / or assembly areas which cater for people’s basic needs may be established to meet the immediate needs of people affected by flooding. Relief / Recovery Centres are listed in the MEMP.

VicPol will liaise with Local Government and DHS (where regional coordination is required) via the relevant control centre to plan for the opening and operation of relief centres. This can best be achieved through the Emergency Management Team (EMT).

##### **Animal Shelter**

Animal management guidelines are provided in the Corangamite Shire Municipal Emergency Animal Welfare Plan along with the location and contact details for appropriate animal welfare entities.

Matters relating to the welfare of livestock and companion animals (including feeding and rescue) are to be referred to DEPI. This includes requests for emergency supply and / or delivery of fodder to stranded livestock or for livestock rescue.

Matters relating to the welfare of wildlife are to be referred to DEPI and / or ParksVic.

##### **Caravans**

Not applicable in Skipton.

##### **Levee Environments**

Not applicable in Skipton.

##### **Isolated Properties**

Not applicable in Skipton.

#### **5 Phase 5 – Return**

Return will be consistent with the Strategic Plan for the Return of Community.

The Incident Controller in consultation with VicPol and other relevant agencies will determine when it is safe for evacuees to return to the affected area / their properties and will arrange for the notification of the community.

VicPol will manage the return of evacuated people with the assistance of other agencies as required.

Considerations for deciding whether those evacuated may return to the affected area include:

- ◆ Current flood situation;
- ◆ Status of flood mitigation systems;
- ◆ Size and location of the community;
- ◆ Access and egress routes available and their status;
- ◆ Resources required to coordinate the return;
- ◆ Special needs groups;
- ◆ Forecast weather;
- ◆ Transportation particularly for people without access to transport.

## 6 Disruption to Services

Disruption to a range of services can occur in the event of a flood. This may include road closures affecting school bus routes, damage to water treatment plant affecting potable water supplies, etc. [List facilities, trigger point for action and strategy to be employed]

Service	Impact	Trigger point for action	Strategy / Temporary Measures

## 7 Essential Community Infrastructure and Property Protection

Essential community infrastructure and properties (e.g. residences, businesses, roads, power supply, etc) that require protection are as follows: [List facilities, trigger point for action and strategy to be employed]

Facility	Impact	Trigger Point for action	Strategy / Temporary Measures

Corangamite Shire will establish a sandbag collection point if and as required at TBA within Skipton or another community facility as appropriate.

## 8 Rescue

The following resources are available within Corangamite Shire to assist with rescue operations:

- ◆ Aircraft available through the State Aircraft Unit.
- ◆ Boats available through VICSES RDO.
- ◆ VicPol resources available via RERC.

## APPENDIX D1 - SKIPTON

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Corangamite Shire is part of the MAV MoU for resource sharing / mutual assistance with other Municipalities and / or other agencies. Details are provided in the MEMP. Further, resource sharing is facilitated by Victorian incident management arrangements established for flood.

Known high-risk areas / communities (i.e. low-lying areas) where rescues might be required include:

- ◆ Skipton – once the Glenelg Highway is cut.

## APPENDIX E – FLOOD WARNING SYSTEMS

### 1 Flood Warning Products

Flood Warning products and Flood Class Levels can be found on the BoM website. Flood Warning products include Severe Thunderstorm Warnings, Severe Weather Warnings, Flood Watches and Flood Warnings.

As at the date of this Plan, it is noted that while the BoM does issue Flood Watches for catchments within Corangamite Shire, it does not issue Flood Warnings for any river systems within the Shire and that other warnings relating to flash flooding are non-specific and relate more generally to the Barwon South West Region.

### 2 Severe Thunderstorm and Severe Weather Warnings

The BoM can forecast the environment in which severe thunderstorms or small scale weather systems that are locally intense and slow moving may occur and provides a generalised service to that effect. However, it is not yet scientifically possible to predict individual flash flooding events except on time scales of tens of minutes at the very best.

The BoM issues warnings of flash flooding when it becomes apparent that an event has commenced which may lead to flash flooding or when flash flooding has commenced.

### 3 Flood Watches

Flood watches are issued by the BoM to notify communities and other stakeholders within broad areas (rather than specific catchments) of the potential flood threat from a developing weather situation. They provide a ‘heads up’ of likely flooding.

Flood watches are based on an assessment of the developing weather situation and indicators of current catchment wetness. They provide generalised statements about expected forecast rainfall totals, the current state of the catchments within the target area and the streams at risk from flooding. Instructions for obtaining rain and stream level observations and access to updated Watches and Warnings are also included.

Normally, the BoM would issue a Flood Watch 24 to 36 hours in advance of any likely flooding and issue updates as required. If at any time during that period there was an imminent threat of floods occurring, the Flood Watch would be upgraded to a Flood Warning.

### 4 Flood Warnings

#### 4.1 Overview

Flood Warnings are firm predictions of flooding based on actual rainfall and river height information as well as the results of stream flow based models of catchment behaviour that take account of antecedent conditions (i.e. the ‘wetness’ of the catchment, storage levels within dams, etc) and likely future rainfall. Releases from dams are an essential input to such models.

Flood warnings are categorised as ‘minor’, ‘moderate’ or ‘major’ (see BoM website for an explanation of these terms and current flood class levels) and indicate the expected severity of the flood for agreed key locations along the river. More specifically, flood warnings usually include:

- ◆ Rainfall amounts for selected locations within and adjacent to the catchment;
- ◆ River heights and trends (rising, steady, falling) at key locations within the catchment;

- ◆ Outflows (in ML/d) from any major dams within the catchment;
- ◆ Forecasts of the height and time of flood peaks at key locations;
- ◆ Weather forecast and the likely impact of expected rainfall on flooding; and
- ◆ A warning re-issue date and time.

**Note 1:** The term “local flooding” may be used for localised flooding resulting from intense rainfall over a small area.

**Note 2:** The term “significant rises” may be used in the early stages of an event when it is clear that river levels will rise but it is too early to say whether they will reach flood level.

Additional information (e.g. weather radar and satellite images as well as updated rain and river level information) can also be obtained from the Bureau’s website ([www.bom.gov.au/hydro/flood/vic](http://www.bom.gov.au/hydro/flood/vic)) or for the cost of a local call on ☎ 1300 659 217.

### 4.2 Mt Emu Creek

There are currently no specific flood warning systems or arrangements in place for the Mt Emu Creek catchment or for the Skipton township<sup>2</sup>. The tools provided in Section 6.5 and 6.6 of Appendix C1 do however provide some guidance on the likelihood and expected severity of flooding at Skipton based on consideration of catchment rainfall and of stream levels at Guthries Bridge respectively.

Note that the tool in Section 6.5 uses rainfall in the upper parts of the catchment to indicate the likelihood and expected severity of flooding from Mt Emu Creek while it uses local rainfall to indicate the likely response from the creek that passes through Jubilee Park Lake and periodically floods the area around Montgomery Street in Skipton.

### 4.3 Lake Corangamite

There are currently no specific flood warning systems or arrangements in place for Lake Corangamite or its catchment.

### 4.4 Other Watercourses within the Shire

There are currently no specific flood warning systems or arrangements in place for other watercourses within Corangamite Shire.

## 5 Flood Bulletins

VICSES distributes flood emergency information to the media through “Flood Bulletins”. Flood Bulletins provide BoM Flood Warning information as well as information regarding possible flood consequences and safety advice, not contained in BoM Flood Warning products. VICSES uses the title Flood Bulletin to ensure emphasis is placed upon BoM Flood Warning product titles.

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<sup>2</sup> Since the January 2011 flood event, the Glenelg Hopkins CMA has funded the installation of telephone-based telemetry (i.e. Campbell logger which provides current data via SMS when interrogated by telephone and directly when interrogated remotely by computer) at the Mena Park and Skipton gauges. The CMA also funded the installation of a rain gauge at the Mena Park site. Data from both sites is now available from the BoM website.

The equipment enclosure at the gauging station at Skipton was raised above likely flood level during late September / early October 2012.



The relevant VICSES Region Headquarters or the established ICC will normally be responsible for drafting, authorizing and issuing Flood Bulletins, using the One Source, One Message (OSOM) system.

Flood Bulletins should refer to the warning title within the Bulletin header.

Flood Bulletins should follow the following structure:

- What is the current flood situation;
- What is the predicted flood situation;
- What are the likely flood consequences;
- What should the community do in response to flood warnings;
- Where to seek further information;
- Who to call if emergency assistance is required.

It is important that the description of the predicted flood situation is consistent with and reflects the relevant BoM Flood Warning.

Flood Bulletins should be focused on specific gauge (or in the absence of gauges, catchment) reference areas, that is the area in which flood consequences specifically relate to the relevant flood gauge.

Flood Bulletins should be prepared and issued after receipt of each Flood Watch and Flood Warning from the BoM, or after Severe Weather or Thunderstorm Warnings indicating potential for severe flash flooding.

To ensure Flood Bulletins are released in a timely manner, standardised Flood Bulletins may be drafted based on different scenarios, prior to events occurring. The standardised Flood Bulletins can then be adapted to the specifics of the event occurring or predicted to occur.

### 6 Local Flood Warning System Arrangements

There are no specific local flood warning systems or arrangements currently in place within the Municipality.

### 7 Flood Class Levels

The occurrence of a certain class of flooding at one point in a catchment will not necessarily lead to the same class of flooding at other points – for example along the main river and its tributary creeks or along a drainage network’s overland flow paths. This is because the floodplain physiography and use (and thus flood impact) varies along the river or flow path and also because antecedent conditions combined with where and how rainfall occurs (both in time and space) will drive how a flood develops and progresses.

It is emphasised that the flood class levels quoted in the table below refer to that part of the watercourse where the flood effects can be related to the gauge reading.

It is important to remember that flood impact is dependent on more than the peak height or flow. The rate of rise, duration, extent and season of flooding are also important. For this reason, flood class levels can only be considered as a guide to flood severity.

NOTE that preliminary flood class levels have been proposed for **Mt Emu Creek at Skipton** as follows:

- Minor flood level 4.00m (281.012 m AHD)

## APPENDIX E – FLOOD WARNING SYSTEMS

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- Moderate flood level 4.70m (281.712 m AHD)
- Major flood level 5.10m (282.112 m AHD)

## APPENDIX E - FLOOD WARNING SYSTEMS

### 8 Details of relevant gauges

Station No	River / Creek	Station	Flood Class Levels (m)			Gauge Zero AHD (m)	Comments
			Minor	Moderate	Major		
236215	Burrumbeet Creek	u/s Lake Burrumbeet	---	---	---	N/A	Not telemetered and u/s of Lake Burrumbeet. Washed out in January 2011.
236213	Mt Emu Creek	Mena Park	---	---	---	350.789	Captures Yam Holes Ck, Trawalla Ck and upper Mt Emu Ck flows. Rain gauge at site.
236203	Mt Emu Creek	Skipton	Proposed			277.012	Downstream side of Smythe Street Bridge.
?	Mt Emu Creek	Guthries Bridge	2.98	3.81	4.71	324.1	Not telemetered. Located just upstream of Mt Emu Settlement Road (Guthries Bridge).

## APPENDIX F1 – MAPS for SKIPTON

### 1 Overview

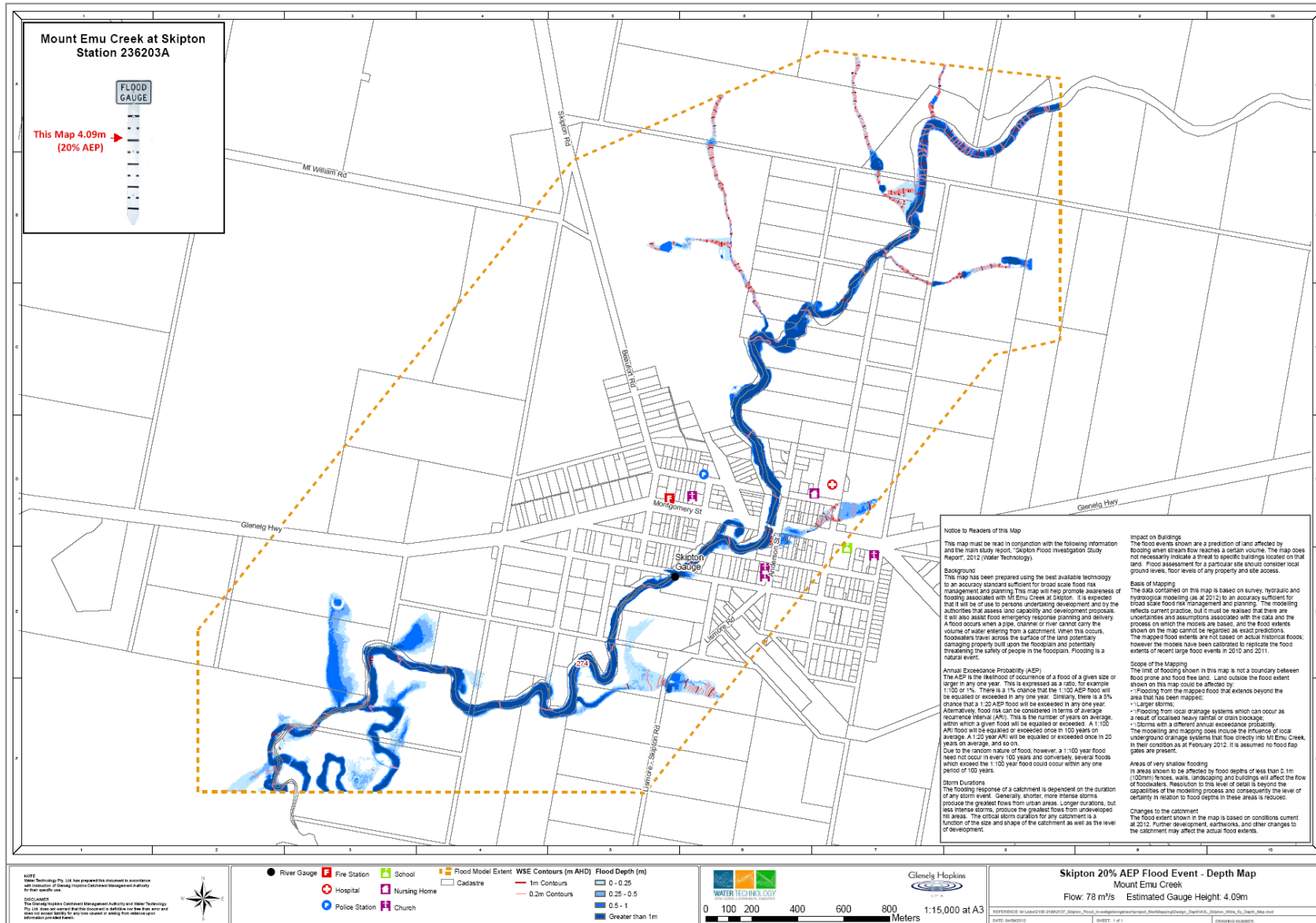
Maps considered useful to flood response at Skipton are included in this Appendix. They comprise:

- A set of maps showing flood extents, depths and hazard (based on consideration of depth and velocity) for each of the design flood events considered (i.e. 5, 10, 20, 50, 100 and 200 year ARI) by Water Technology when delivering the Skipton Flood Investigation (Water Technology, November 2012).
- A map showing flood extent and depth for the January 2011 event.

#### **Note that:**

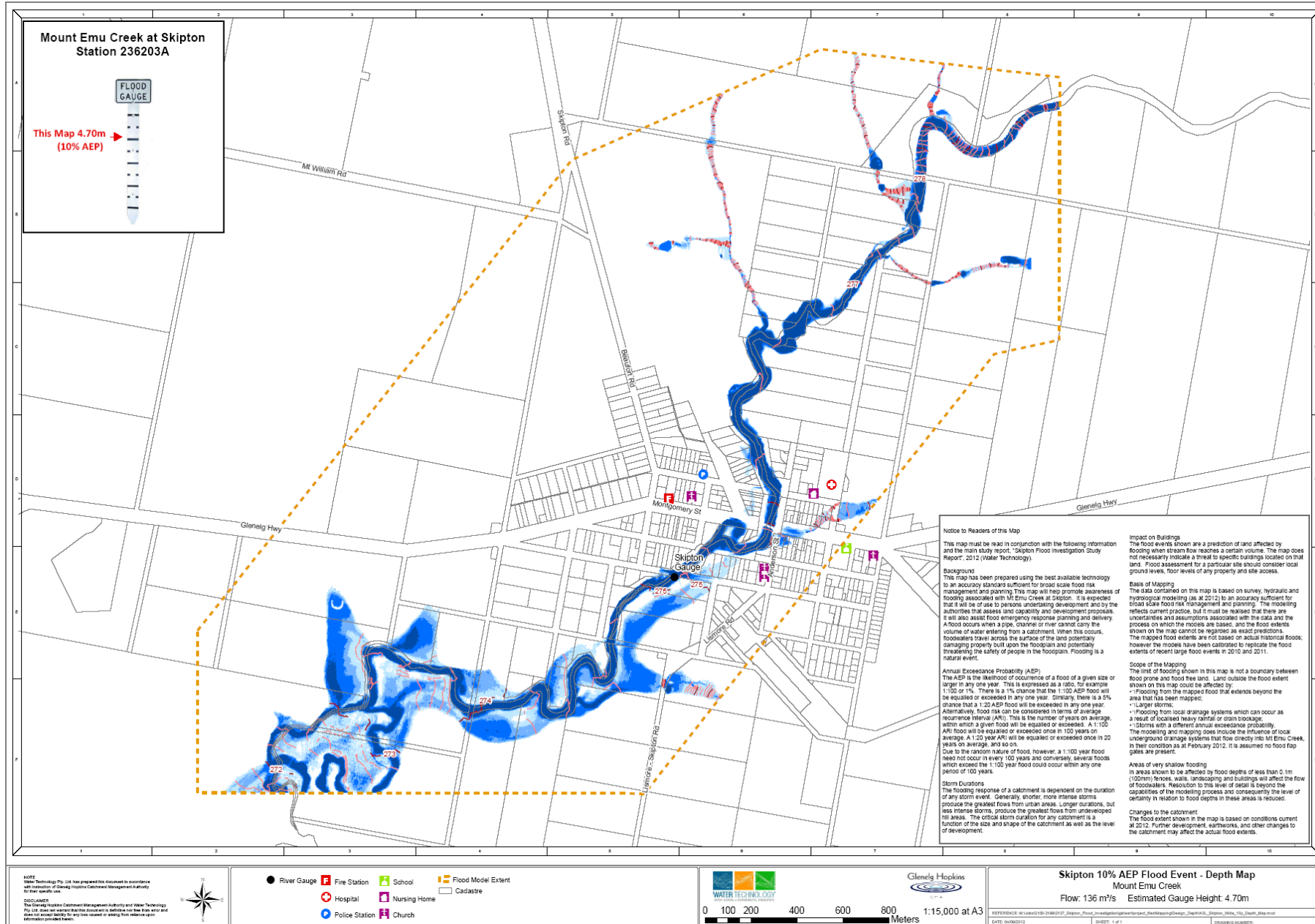
- Equivalent maps to those above but just for the area immediately around Skipton township are included in the deliverables from the Skipton Flood Investigation (Water Technology, November 2012) and are available from the Glenelg Hopkins CMA or Council.
- Maps showing flood extent, depth, velocity and hazard for the January 2011 flood are included in the deliverables from the Skipton Flood Investigation (Water Technology, November 2012) and are available from the Glenelg Hopkins CMA or Council.
- Maps showing flood extent, depth and hazard for the PMF event were also delivered (Water Technology, November 2012) and are available from the Glenelg Hopkins CMA or Council.
- Maps showing the Land Subject to Floodway Overlay are included in the Corangamite Planning Scheme and can be used as a guide to areas that may flood during an event. These maps can be found in hard copy form at the Council's main office or online at the Department of Planning and Community Development website (see the list of references in Appendix G).
- Maps showing 100-year ARI (1% AEP) flood extent and floodways (together with volume, height and water quality data) are shown at the Victorian Water Resources website (see the list of references in Appendix G).

2 Maps showing flood extents and depths (sourced from Skipton Flood Investigation Report, November 2012)



Flood extent and depths for the 20% AEP (5 year ARI) event

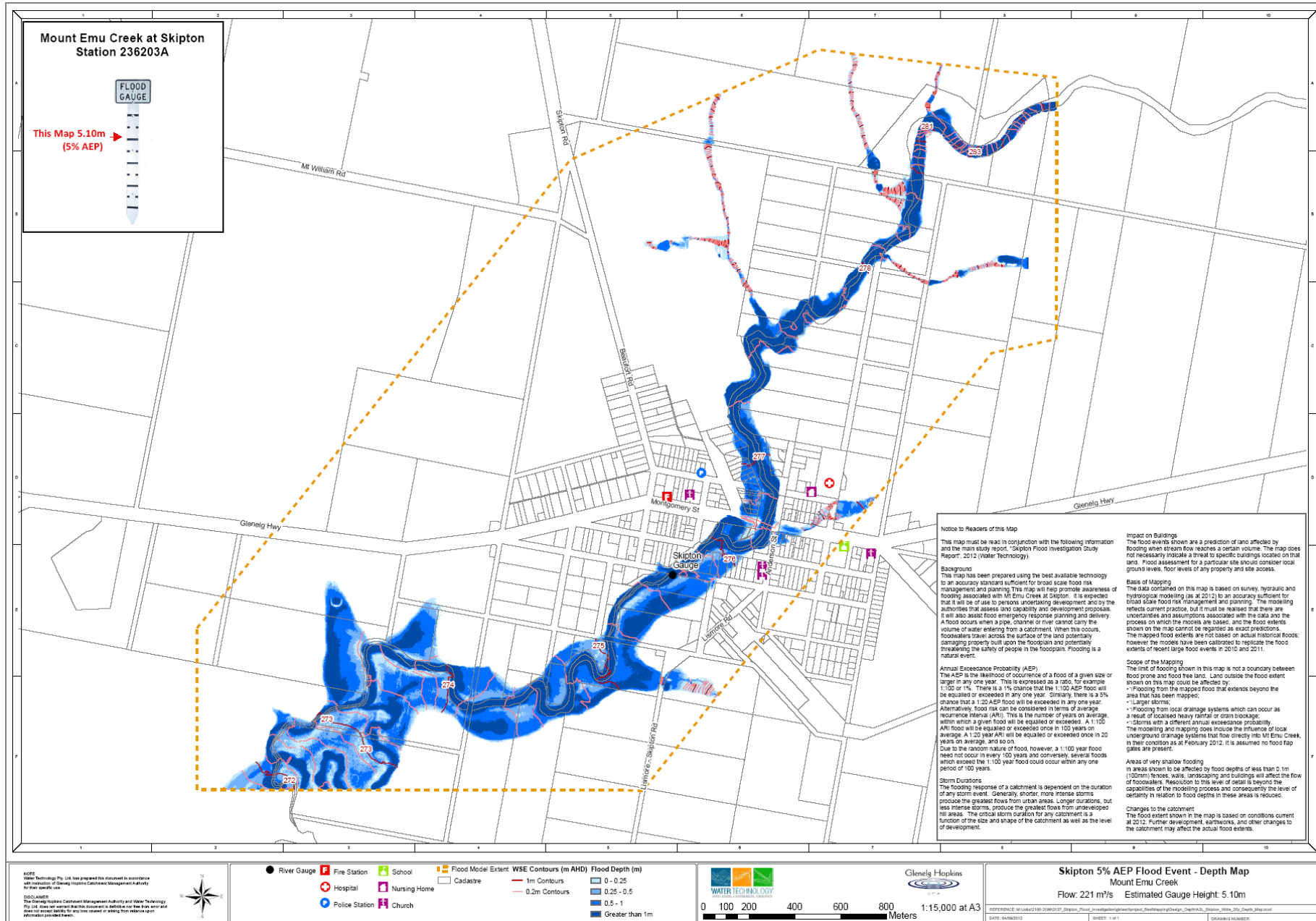
# APPENDIX F1 - MAPS FOR SKIPTON



Flood extent and depths for the 10% AEP (10 year ARI) event

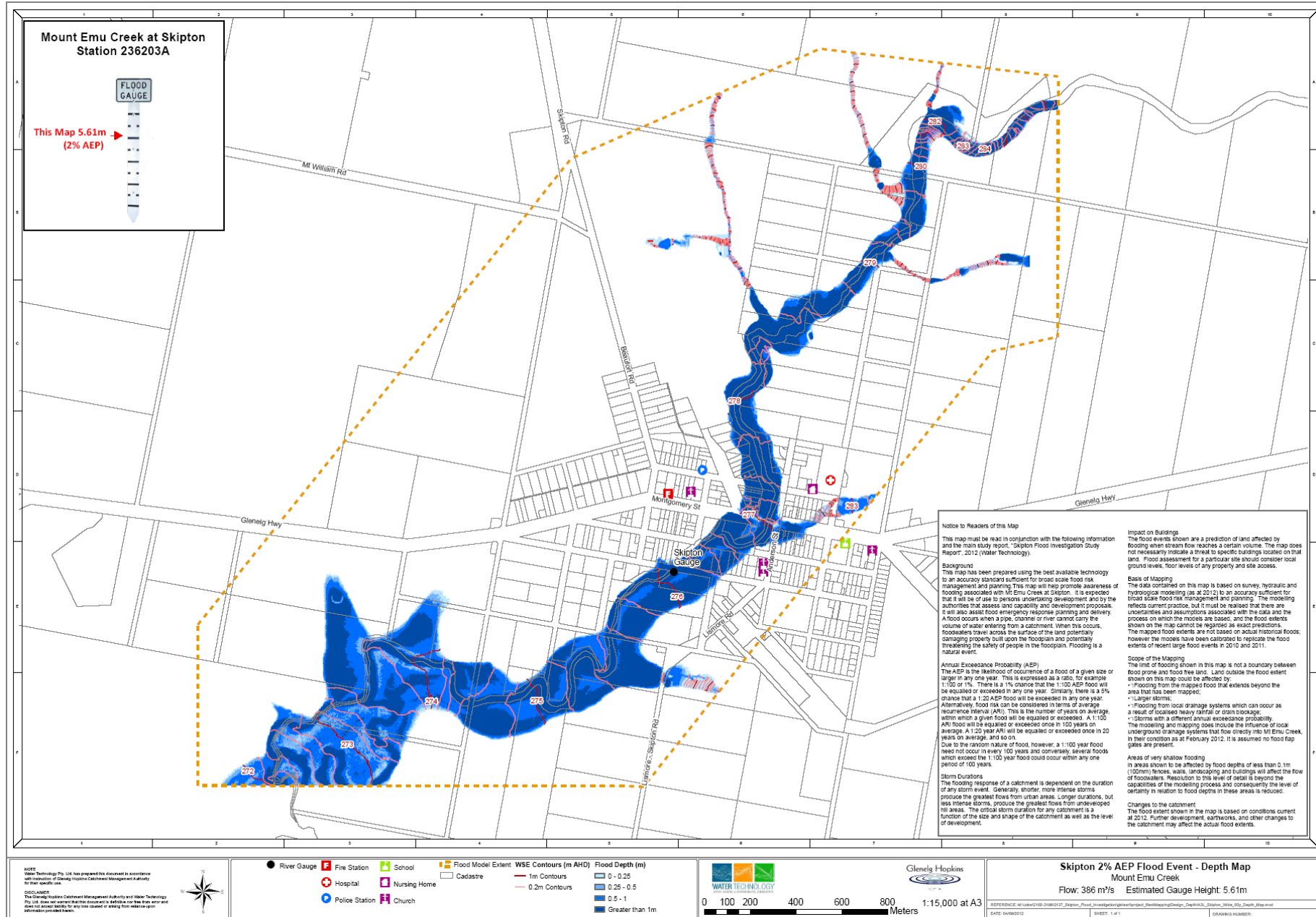


# APPENDIX F1 - MAPS FOR SKIPTON



Flood extent and depths for the 5% AEP (20 year ARI) event

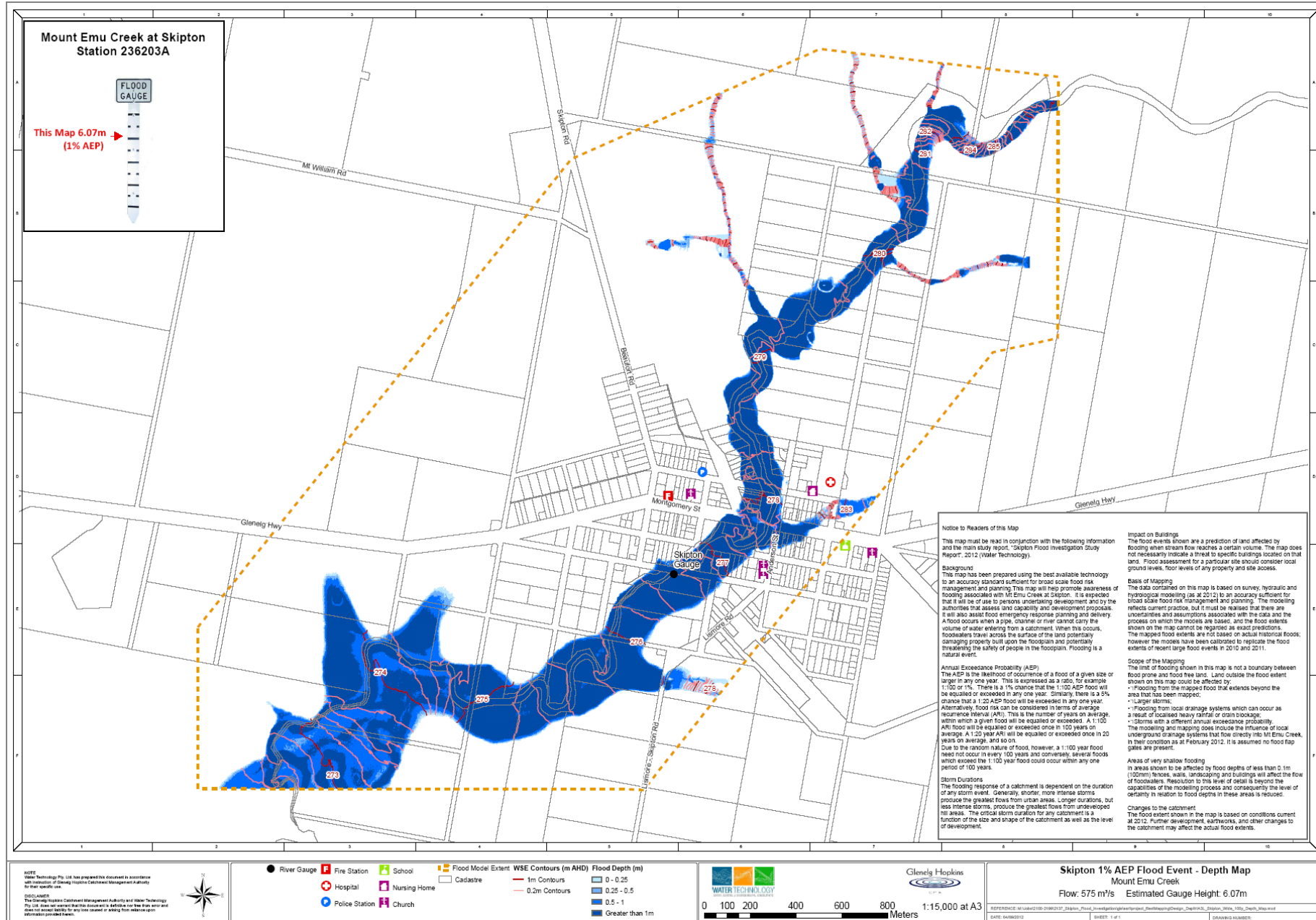
# APPENDIX F1 - MAPS FOR SKIPTON



Flood extent and depths for the 2% AEP (50 year ARI) event

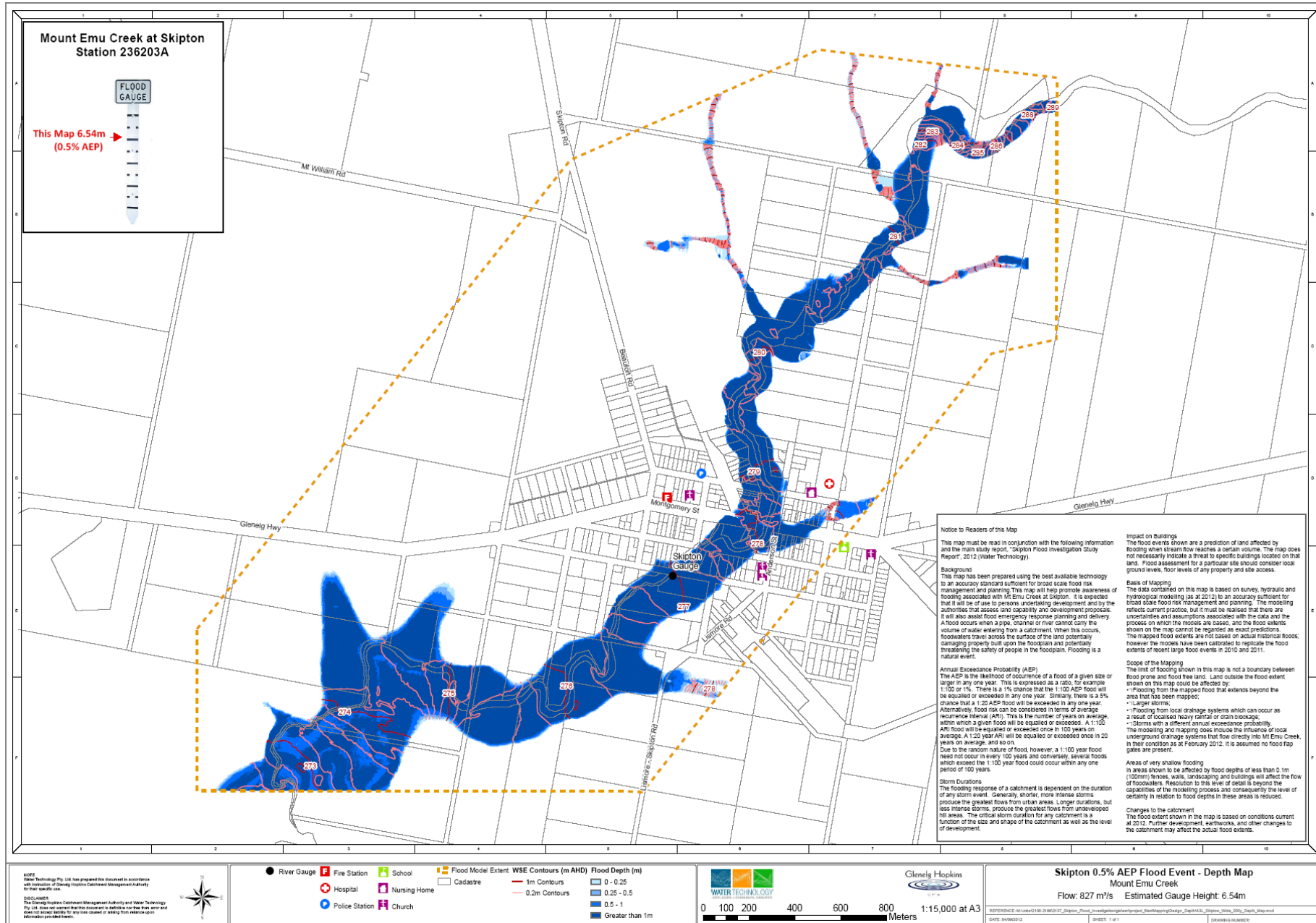


# APPENDIX F1 - MAPS FOR SKIPTON



Flood extent and depths for the 1% AEP (100 year ARI) event

# APPENDIX F1 - MAPS FOR SKIPTON

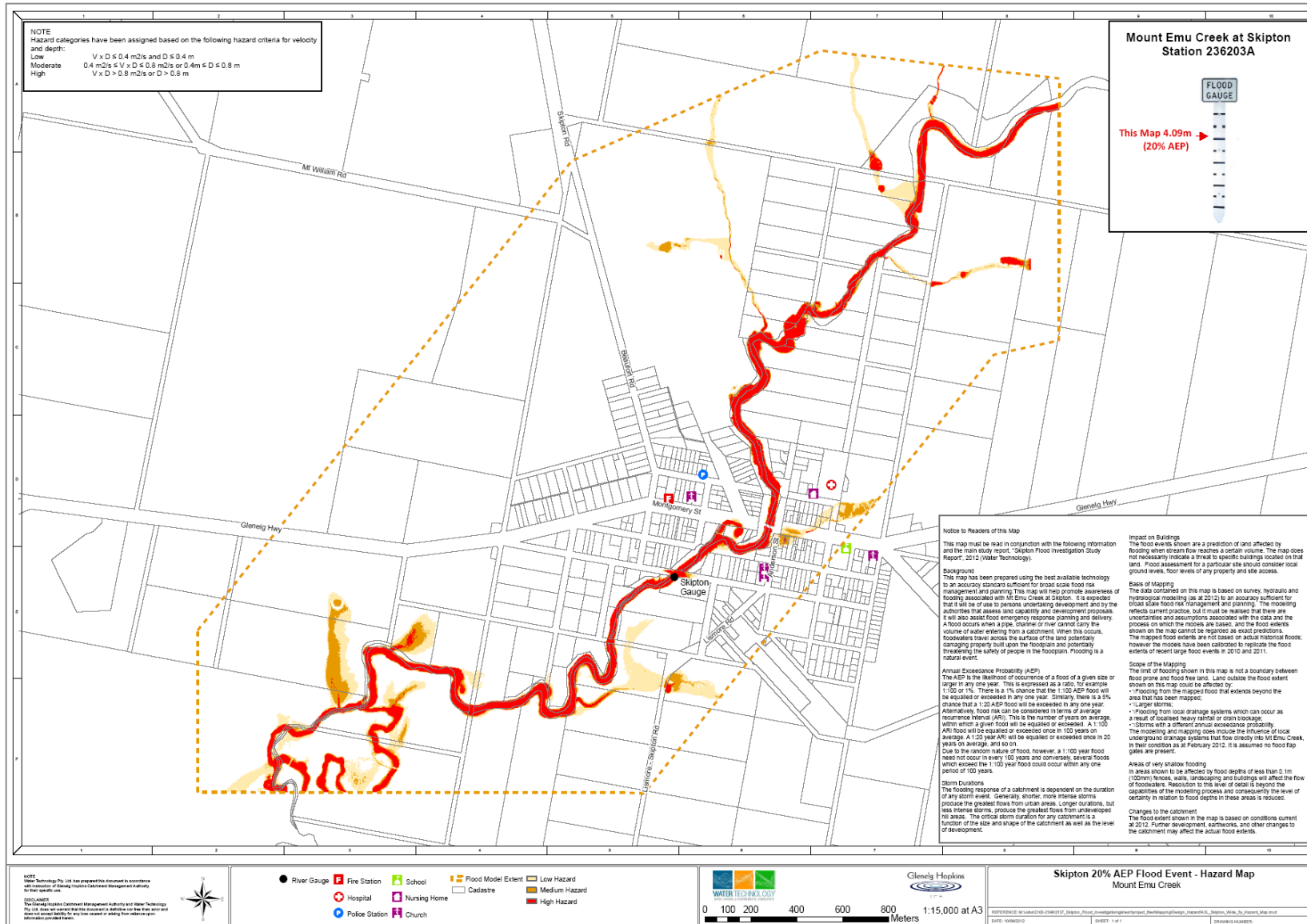


## APPENDIX F1 – MAPS FOR SKIPTON

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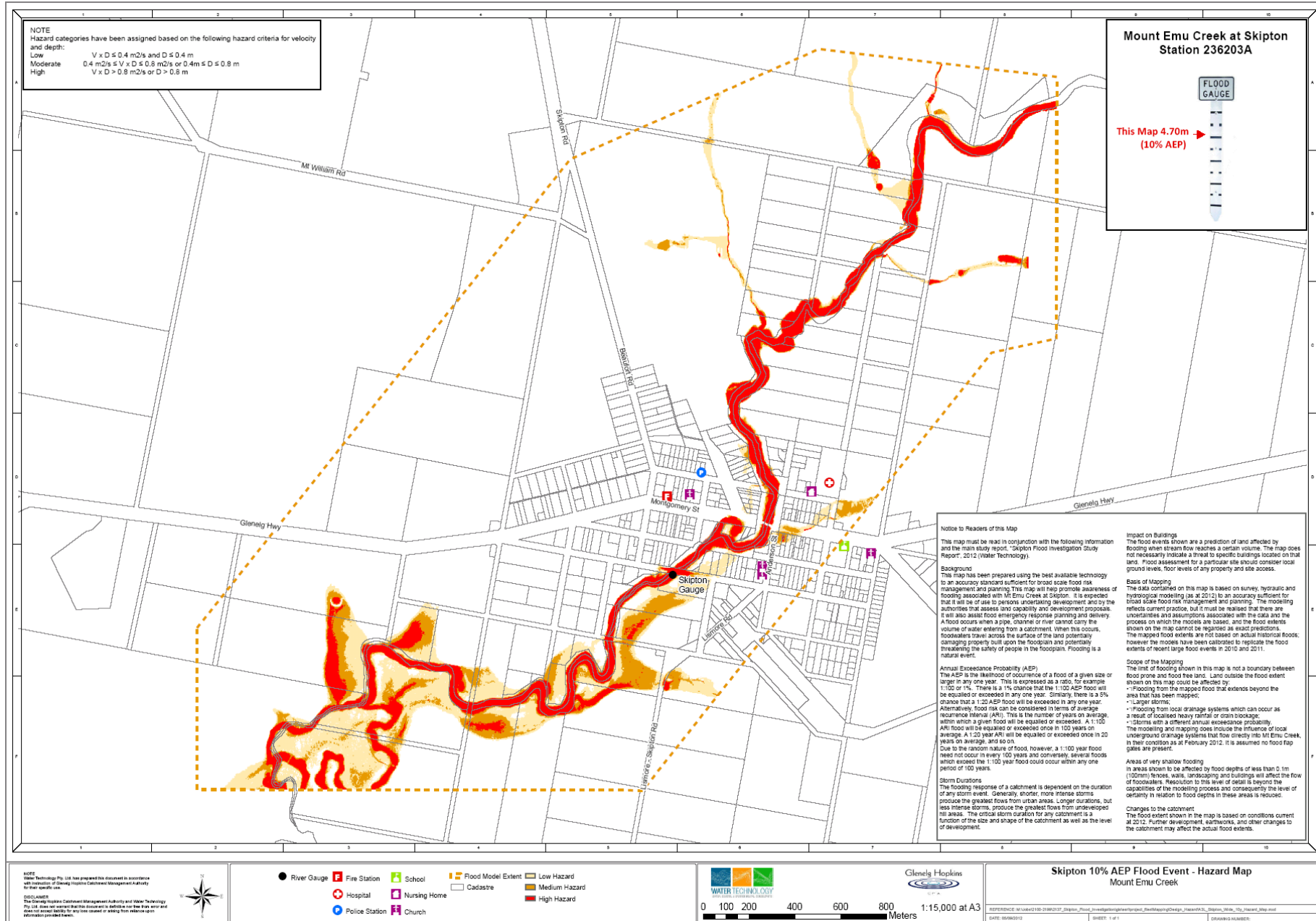
Flood extent and depths for the 0.5% AEP (200 year ARI) event

### 3 Maps showing flood hazard (sourced from Skipton Flood Investigation Report, November 2012)



Flood hazard for the 20% AEP (5 year ARI) event

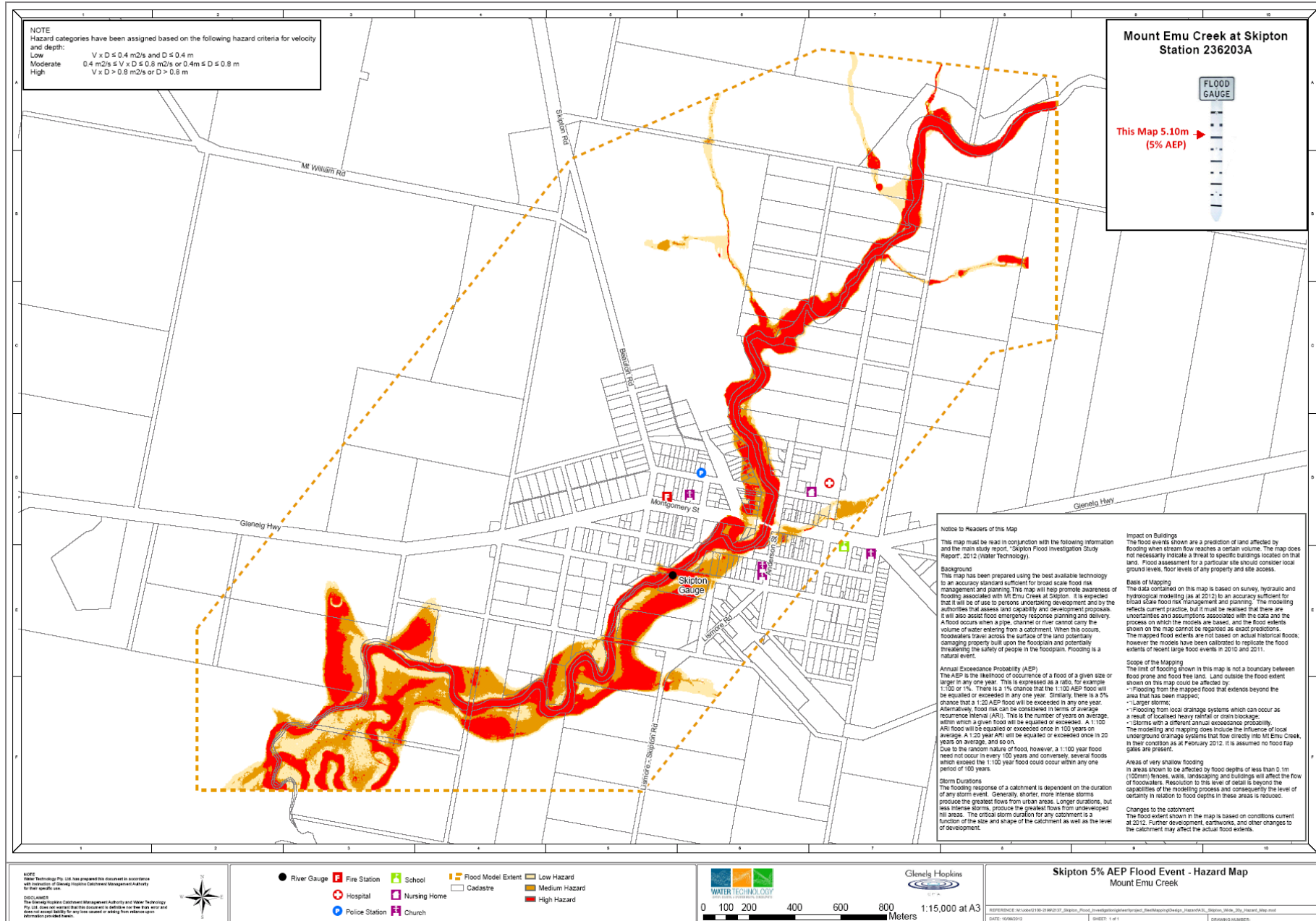
# APPENDIX F1 - MAPS FOR SKIPTON



Flood hazard for the 10% AEP (10 year ARI) event

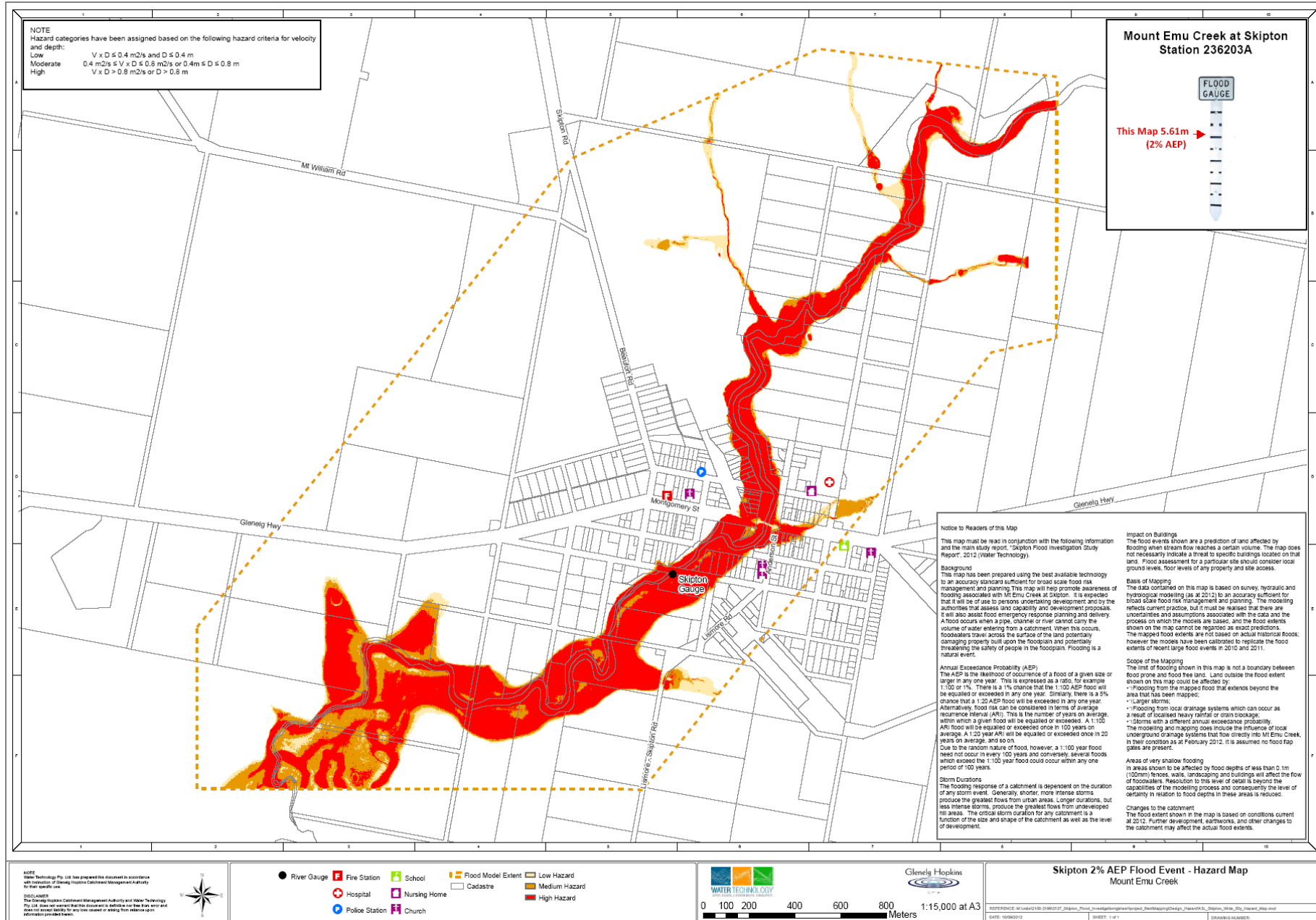


# APPENDIX F1 - MAPS FOR SKIPTON



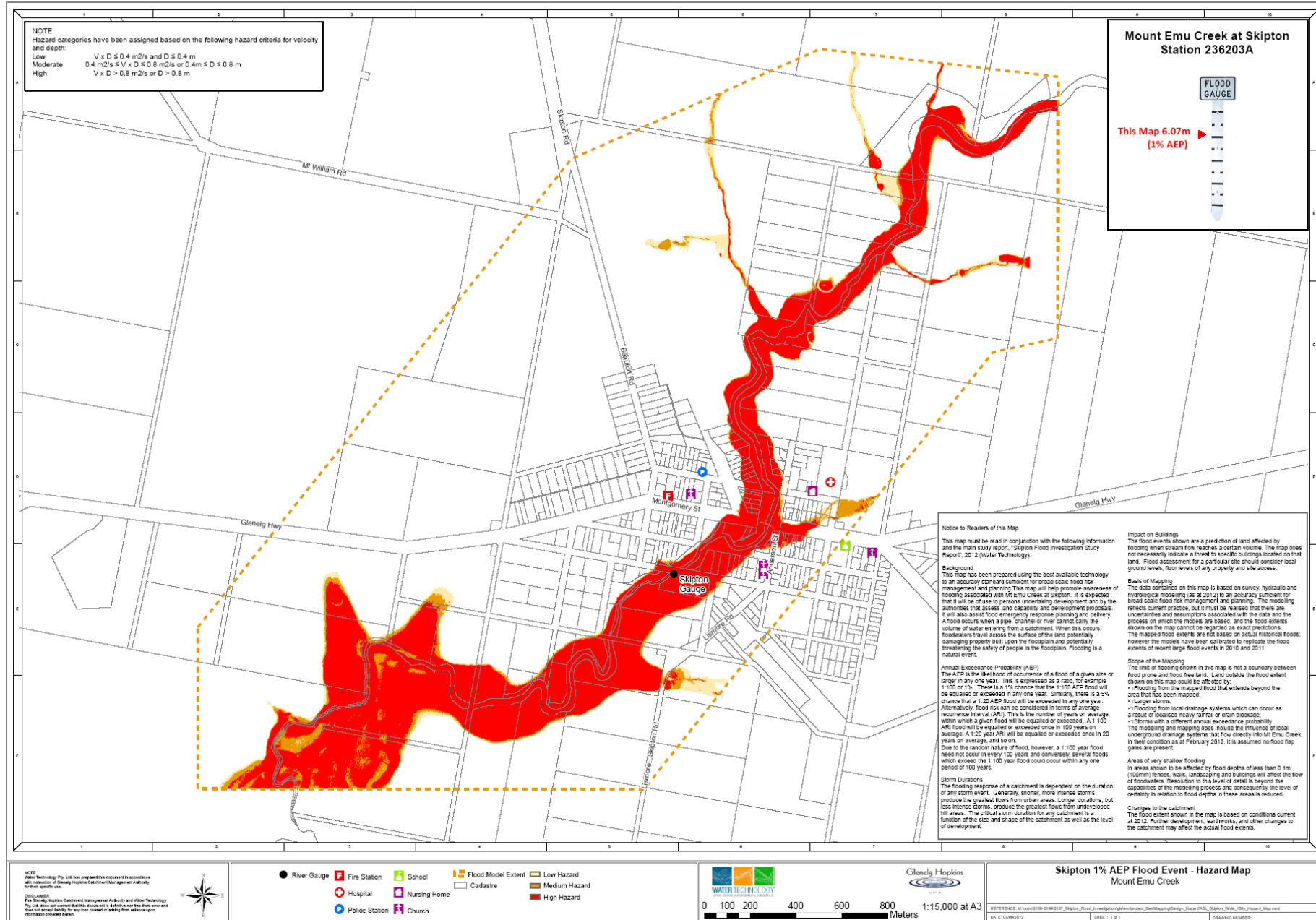
Flood hazard for the 5% AEP (20 year ARI) event

# APPENDIX F1 - MAPS FOR SKIPTON



Flood hazard for the 2% AEP (50 year ARI) event

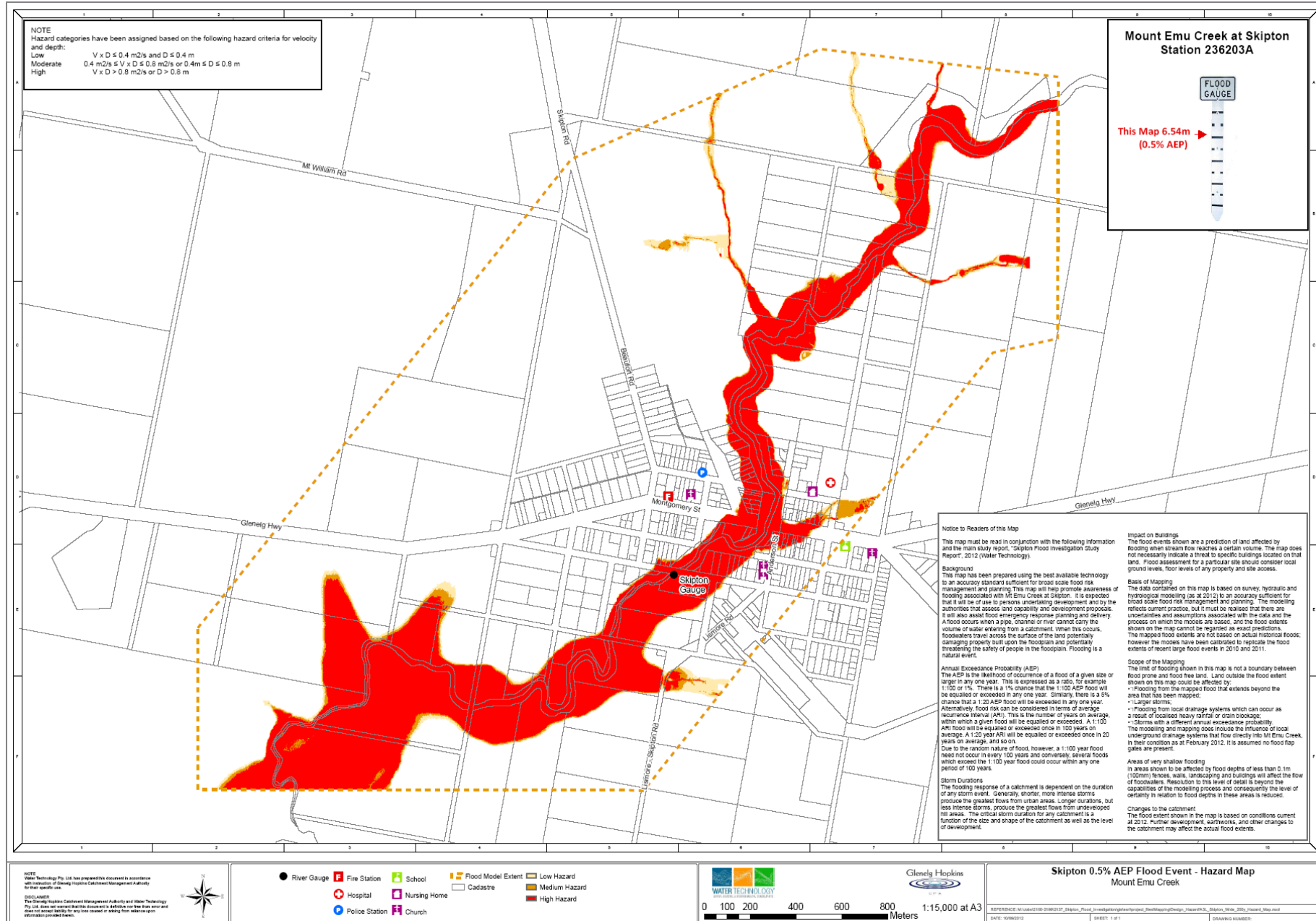
# APPENDIX F1 - MAPS FOR SKIPTON



Flood hazard for the 1% AEP (100 year ARI) event

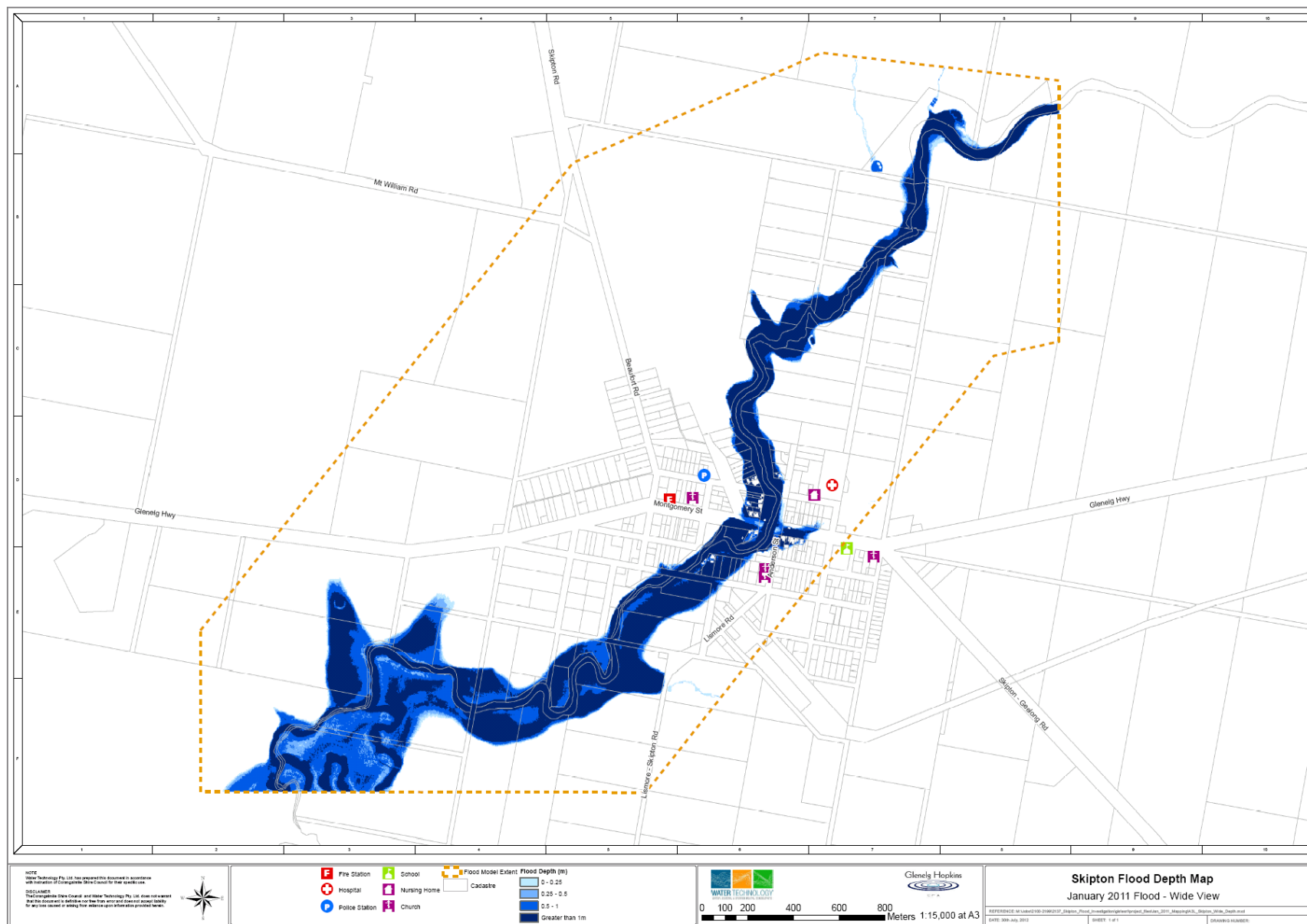


# APPENDIX F1 - MAPS FOR SKIPTON



Flood hazard for the 0.5% AEP (200 year ARI) event

**4 Maps showing flood extent and depth for the January 2011 event (sourced from Skipton Flood Investigation Report, November 2012)**



## APPENDIX G – REFERENCES AND INTEL SOURCES

The following plans may assist during flood events.

- Corangamite Shire (2012): Cobden Dam: Dam Safety Emergency Plan
- Corangamite Shire (2012): Skipton Dam: Dam Safety Emergency Plan
- First Australian Farmalnd (May, 2013): Dam Surveillance Program and Emergency Management Plan for Yoolburra Dam, 139 Latrobe Road, Princetown
- 2020 Engineering Solutions (July, 2014), Dam Surveillance Program & Emergency Plan for Nos. 1 & 2 Irrigation Dams, 463 Moreys Road, Brucknell (Trim D/14/28515)

The following studies maybe useful in understanding the nature of flooding within Corangamite Shire.

- Department of Natural Resources and Environment (DNRE) (2000): *Flood Data Transfer Project* – Flood Data and Flood Planning Maps as well as Flood Mapping and River Basin Reports.
- GHD (2012a): *Scanning Risk Assessment: Report for Skipton Dam*. Report prepared for Corangamite Shire Council, July 2012.
- GHD (2012b): *Scanning Risk Assessment: Report for Cobden Dam*. Report prepared for Corangamite Shire Council, July 2012.
- Keller R.J. & Associates (1996): *Flood Study of the Wendouree Area West of the Midland Highway and of the Miners Rest Area*. Report prepared for City of Ballarat, June 1996.
- Keller R.J. & Associates (1993): *Flood Study of Invermay Area*: Report prepared for Shire of Bungaree, August 1993.
- Lawson & Treloar (2003): *Floodplain Management Plan for Lake Burrumbeet and Burrumbeet Creek Catchment*. December 2003.
- TGM group (2004): *Beaufort Flood Scoping Study*. Consulting report prepared for Glenelg Hopkins Catchment Management Authority, November 2004.
- Water Technology (2012): *Strategic Flood Intelligence Report – Corangamite & Otway Coast Basins*, May 2012.
- Water Technology (2012): *Skipton Flood Investigation*: (Report No. 2137-01/R09V03)
- Water Technology (2013): *Burrumbeet Creek Flood Investigation*.

Other sources of information of direct relevance to the Municipality include:

- ◆ <http://www.ghcma.vic.gov.au>  
Glenelg Hopkins Catchment Management Authority for various references
- ◆ <http://www.ccma.vic.gov.au>  
Corangamite Catchment Management Authority for various references
- ◆ <http://planningschemes.dpcd.vic.gov.au/index.html>  
Department of Planning and Community Development for planning scheme flood maps
- ◆ <http://www.water.vic.gov.au/environment/floodplains>  
for flooding information including mapping
- ◆ <http://www.vicwaterdata.net/vicwaterdata/home.aspx>  
for historical data on water quality, river heights and flows
- ◆ <http://www.bom.gov.au>  
Bureau of Meteorology for river gauge readings and flood warnings
- ◆ <http://www.floodvictoria.vic.gov.au>  
for information on historic floods in Victoria – VERY USEFUL
- ◆ <http://www.ses.vic.gov.au>  
Victoria State Emergency Service
- ◆ <http://www.dse.vic.gov.au/fire-and-other-emergencies>  
Department of Sustainability and Environment emergency management.
- ◆ COUNCIL, GHCMA CCMA and VICSES Geographical Information System (GIS) – these contain layers showing drainage assets, flooding extents, flood related call-out locations,

## APPENDIX G

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roads, title boundaries and other useful information.

- ◆ URS (2006): *Camperdown Urban Stormwater Plan*, March 2006.
- ◆ URS (2007): *Terang Stormwater Quality and Minor Flooding Study*, July 2007.

Relevant but more general references include:

- ◆ Agricultural and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000), Standing Committee on Agriculture and Resource Management (SCARM) Report No 73: *Floodplain Management in Australia, Best Practice Principles and Guidelines*.
- ◆ Bureau of Meteorology (1996): *Bureau of Meteorology Policy on the Provision of the Flash Flood Warning Service*. May 1996.
- ◆ Department of Sustainability and Environment (DSE) (2008): *Victoria Caravan Parks Flood Emergency Management Plan Template and Guidelines*. (Two documents) March 2008.
- ◆ Victorian Flood Management Strategy 1997-2007
- ◆ Emergency Management Act 1986
- ◆ Emergency Management Manual Victoria, 1997 Edition (Updated July 2014)
- ◆ <http://www.ema.gov.au>  
Emergency Management in Australia
  - ◆ Managing the Floodplain, Manual 19, EMA 2009
  - ◆ Flood Preparedness, Manual 20, EMA 2009
  - ◆ Flood Warning, Manual 21, EMA 2009
  - ◆ Flood Response, Manual 22, EMA 2009
  - ◆ Emergency Management Planning for Flood Affected by Dams, Manual 23, EMA 2009
- ◆ Corangamite Shire Municipal Emergency Management Plan
- ◆ Water Act 1989
- ◆ Flood Warning Station Information Manual - February 1999