East (Gippsland) Region

Emergency Response Plan

SES

Flood Sub Plan

Published by Victoria State Emergency Service

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This publication is intended to be consistent with the State Emergency Response Plan (SERP), published by Emergency Management Victoria (EMV) in 2016.

Authorised by the Victoria State Emergency Service

168 Sturt Street, Southbank

An electronic version of the plan can be obtained at: www.ses.vic.gov.au.

Version Control

East Region
Emergency Response Plan – Flood Sub-plan

Vs.1.7, July 2018
Final edit

East (Gippsland) Region Emergency Response Plan – Flood Sub-plan Certification

The East (Gippsland) Region Emergency Response Plan – Flood Sub-plan deals with response to flood incidents within East (Gippsland) area of responsibility.

The following plan is intended to provide the framework for East (Gippsland) Region to effectively and efficiently respond to future emergencies caused by floods, and will remain current until rescinded by authority of the Victoria State Emergency Service (VICSES) Chief Officer Operations.

_____ Date: _____

Tim Wiebusch
Chief Officer Operations

This plan is produced by VICSES and has been adapted from the State Emergency Response Plan (SERP) – Flood Sub-plan. All information contained in this plan was current at time of publication.

VICSES would like to acknowledge the significant contribution of key stakeholders to ensure the content contained within this plan is of a high quality to support response activities.

For further details about this plan, please contact East (Gippsland) Region:

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State Emergency Management Priorities

The State Emergency Management Priorities are:

- Protection and preservation of life is paramount. This includes:
  - Safety of emergency response personnel.
  - Safety of community members including vulnerable community members and visitors/tourists.
- 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.
- Protection of critical infrastructure and community assets that support community resilience.
- Protection of residential property as a place of primary residence.
- Protection of assets supporting individual livelihoods and economic production that supports individual and community financial sustainability.
- Protection of environmental and conservation assets that considers the cultural, biodiversity, and social values of the environment.

Table of Contents

1. Introduction

1.1. Purpose

The purpose of this plan is to provide strategic guidance for the effective emergency management of floods in the East (Gippsland) Region.

1.2. Objective

The objective of the East (Gippsland) Region Flood Emergency Response Plan is to outline the regional arrangements for ensuring an integrated and coordinated approach to the management of flood events across East (Gippsland) Region, in order to reduce the impact and consequences of these events on the community, infrastructure and services.

1.3. Scope

This East (Gippsland) Region Emergency Response Plan – Flood Sub-plan includes:

- Description of potential risks and consequences of floods to the social, built, agricultural and natural environments within the East (Gippsland) Region.
- Regional specific emergency management arrangements for the management of floods.
- Links to sources of information where the reader can obtain further detail.

1.4. Authorising environment

The *Emergency Management Act (1986 and 2013)* is the empowering legislation for the management of emergencies in Victoria.

The Emergency Management Manual Victoria (EMMV) contains policy and planning documents for emergency management in Victoria, and provides details about the roles different organisations play in the emergency management arrangements.

The SERP (Part 3, EMMV) identifies Victoria's organisational arrangements for managing the response to emergencies.

This plan has been developed as a subordinate plan of the SERP – Flood Sub-plan. This plan has been shared with the Regional Emergency Management Committee for comment, and approved by the VICSES Chief Officer Operations.

Other relevant legislation includes:

- *Victoria State Emergency Service Act 2005.*
- *Essential Services Act 1958.*
- *Planning and Environment Act 1989.*
- *Local Government Act 1989.*
- *Alpine Resorts (Management) Act 1997.*

1.5. Activation of the plan

The arrangements in this plan apply on a continuing basis and do not require activation.

1.6. Audience

The audience for this plan comprises the Victorian Government and agencies within the emergency management sector, including business and community groups with a significant role in the management of the emergency.

Although the wider community is not the primary audience, community members may find the contents of this plan informative.

1.7. Linkages

This plan is a sub-plan of the SERP – Flood Sub-plan. It reflects legislation, the arrangements in the SERP, the strategic direction for emergency management in Victoria and the accepted State practice for managing emergencies.

This plan outlines regional response arrangements which impact arrangements detailed in Municipal Flood Emergency Plans (MFEPs) developed at municipal level and are also subordinate plans to Municipal Emergency Management Plans (MEMPs). It is likely that flood events will occur in conjunction with severe weather.

For arrangements regarding management of severe weather events, refer to the SERP – Storm Sub-plan and East (Gippsland) Region Storm Sub-plan at www.ses.vic.gov.au.

Arrangements within this plan have not been repeated from the forementioned plans, unless necessary to ensure context and readability. All available VICSES plans can be accessed at www.ses.vic.gov.au, and more information on MFEPs can be accessed by respective council websites or as outlined in section 4.5 Municipal Flood Planning.

Arrangements for the management of secondary consequences are contained in the following:

- Health response – State Health Emergency Response Plan (SHERP)
- Rescue – Victorian Urban Search and Rescue (USAR) Response Arrangements
- Coastal flood response – SERP – Tsunami Sub-plan

1.8. Exercising and evaluation

This plan will be exercised within one year from the date of approval and once every three years thereafter as part of a phased cycle. Region Flood Scenarios have been created to support this function available in Attachment 1 – Region Flood Scenarios. Exercises will be evaluated and, where improvements to the emergency management arrangements in this plan are required, the plan will be amended and a revised version issued. Exercises will be conducted in accordance with the EMV State Exercising Framework.

Any operational activity in East (Gippsland) Region requiring the management of a flood event will be regarded as exercising of the plan. The event is to be evaluated and reviewed, as outlined above.

1.9. Review

This plan was current at the time of publication and remains in effect until modified, superseded or withdrawn.

This plan will be reviewed and updated every three years. Consideration will be given to an earlier revision if the plan has been applied in a major emergency or exercise, or following a substantial change to the relevant legislation or arrangements.

2. Flood risk within the East (Gippsland) Region

2.1. Region description

Gippsland is a rural region of Victoria located in the south-eastern part of the state. It covers an area of 41,556[1] square kilometres and lies to the east of Melbourne. Gippsland is comprised of seven municipalities: Baw Baw, Bass Coast, South Gippsland, Wellington, East Gippsland, Latrobe, and the Southern Alpine Resort Management Board (Mt Baw Baw).

Gippsland has an estimated population of 271269[2], with the principal population centres being Traralgon, Moe, Wonthaggi, Warragul, Morwell, Sale, Bairnsdale, Drouin, Leongatha, and Phillip Island. There are many more remote areas in Gippsland containing smaller, more isolated communities.

Gippsland is best known for its primary production such as mining, power generation and farming as well as its tourist destinations, including Phillip Island, Wilsons Promontory, the Gippsland Lakes, Walhalla, the Baw Baw Plateau and the Strzelecki Ranges to name a few. The Princes Hwy is the main arterial transport route through Gippsland and runs from east to west.

Tourism is an important industry for Gippsland. The region received over 5.4 million domestic (overnight and daytrip) and international overnight visitors combined, who spent an estimated $872 million in the year ending December 2017[3]. A major flood during a peak tourist season could have major economic impacts and additional complications with vastly exceeded local populations.

Melbourne Water and two Catchment Management Authorities (CMAs) being West Gippsland and East Gippsland, cover the entire East (Gippsland) Region. The Bureau of Meteorology (BoM) weather districts that cover East (Gippsland) Region are West and South Gippsland and East Gippsland, with a small area in the far south west covered by Central.

Gippsland has a complex array of rivers, streams, lakes, dams and coastal lagoons, all of which pose a flood risk to private properties and community infrastructure. Areas to the east are generally subject to riverine and lakes flooding whereas those in the west are generally prone to flash flooding[4].

Heavy rain in Gippsland is often caused by low pressure weather systems off the NSW south coast (east coast lows), low pressure weather systems entering the region from central Australia and/or rainfall on the Great Divide and adjoining catchments[5].

The coastline is vulnerable to coastal inundation during significantly high tides, particularly when in conjunction with storm surges[6].

Flooding in the Gippsland Lakes will likely become more frequent and to higher levels as a result of rising sea levels and likely changes in rainfall characteristics associated with climate change. This sea level increase, while variable across the Gippsland Lakes, is estimated to be more than 0.8 metres for Lakes Entrance by 2100[7].

The east of Victoria has a history of significant flooding, most recently throughout 2007, 2010, 2011, 2012 and 2016. See Attachment 7 – East (Gippsland) Region Detailed Flood History for more information about historical flood events.

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[1] Australian Bureau of Statistics (ABS), Census 2016. http://www.abs.gov.au/census.

[2] Australian Bureau of Statistics (ABS), Census 2016. http://www.abs.gov.au/census

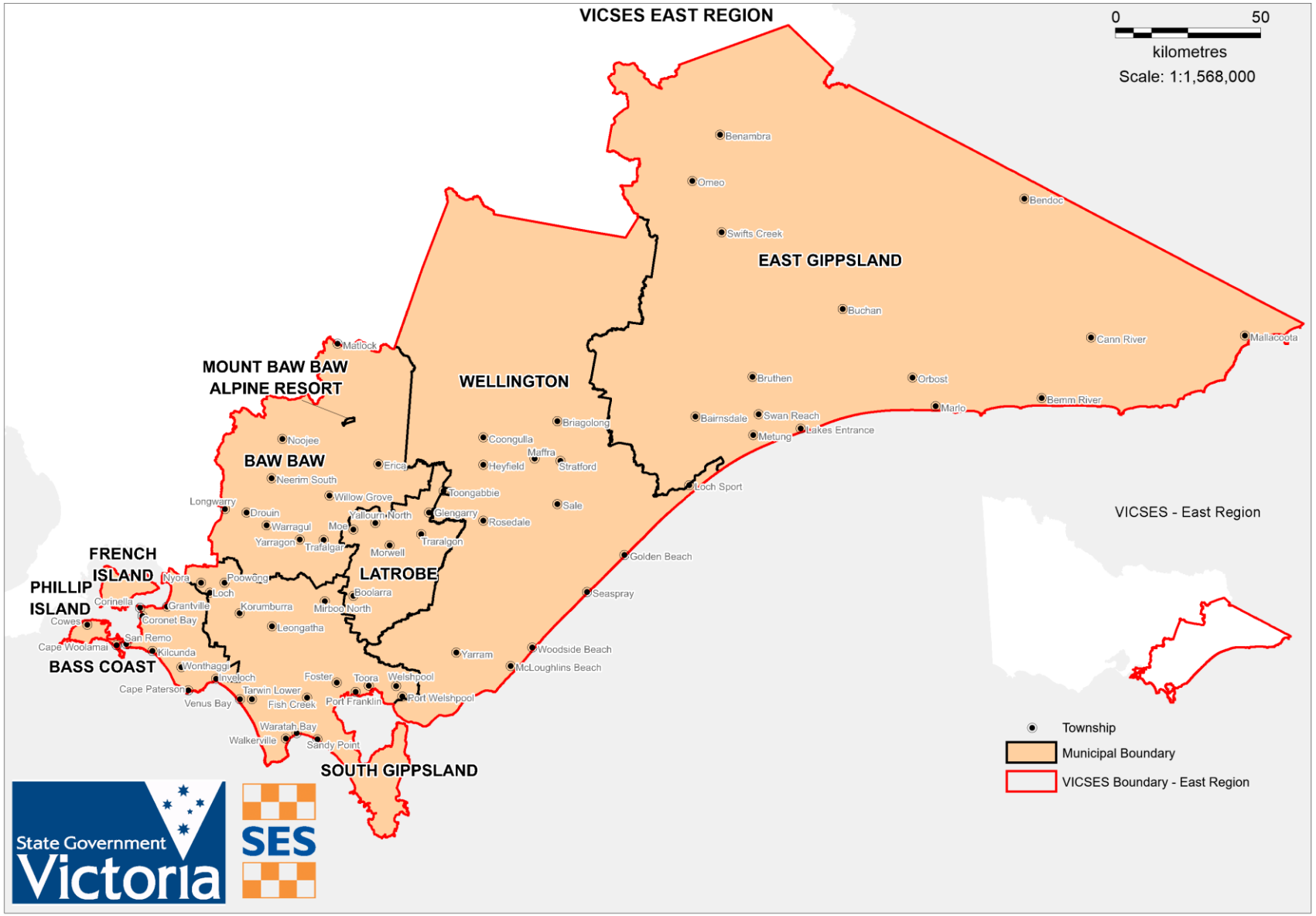
[3] Gippsland Regional Tourism Summary, Tourism Victoria, December 2017. http://www.business.vic.gov.au/__data/assets/pdf_file/0010/1643779/Gippsland-Regional-Summary-year-ending-December-2017.pdf

[4] VICSES Gippsland Regional Flood Emergency Plan, vs 1, November 2013, File ref: CD/13/76597

[5] VICSES Gippsland Regional Flood Emergency Plan, vs 1, November 2013, File ref: CD/13/76597

[6] West Gippsland Catchment Management Authority, West Gippsland Regional Floodplain Management Strategy, 2017, (Available Online) https://www.wgcma.vic.gov.au/wp-content/uploads/2016/08/WGCMA-FloodplanMan-final-FULL.pdf

[7] EGCMA (2017) *East Gippsland Floodplain Management Strategy,* East Gippsland Catchment Management Authority, Bairnsdale.



Map of VICSES East (Gippsland) Region 1
Map source: BMT WBM Pty Ltd

2.2. The flood hazard

Flooding may be defined as an overflowing or influx of water from its normal confines onto land not usually submerged. Within the East (Gippsland) Region the following mechanisms may cause flooding:

- **Heavy rainfalls**, which cause runoff to enter watercourses, overtopping the banks of rivers and creeks, overflowing lakes, detention basins and stormwater drains, causing local overland flooding, or resulting in releases or spills from dams. Many factors contribute to the extent and nature of flooding caused by heavy rainfall such as the amount and duration of rainfall, the spatial distribution of rainfall, prior weather conditions and characteristics of a catchment including its size, shape, soil types, vegetation and land use. The characteristics of a river also influence the extent of flooding. These characteristics include the size and nature of the river, the presence of vegetation in and around the river, flood control structures and embankments that may restrict floodwater and downstream river levels[8].

- **Snow melt**, which involves increased surface run off from warmer climatic conditions such as warm winds or rain which can add to spring flooding events.

- **Storm surges**, which involve the temporary raisings of sea levels above the astronomical tide. These are caused by deep low-pressure systems located off the coast and result in sea water invading low-lying areas along the coast.

- **Tsunami**, resulting from undersea earthquakes, landslides, meteorite impacts or volcanic activity. The arrangements for the emergency management of tsunami are contained in the SERP – Tsunami Sub-plan.

- **Dam failure**, which involves the failure of a dam structure. There are a number of dams throughout Gippsland that both store and provide water to communities which have the potential to cause flooding in the event of failure. Dam safety risk management processes are in place and the possibility of dam failure is considered low, however consequences could be catastrophic in some circumstances.

- **Levee failure,** which involves the failure of a levee structure. There are a number of levees across Gippsland, created to redirect flood water to minimise impacts of flooding. Levee failure can result from poorly created and/ or maintained levee structures or overtopping of levee structures due to significant water flows exceeding the structures capacity.

There are ten (10) drainage basins across Gippsland collectively hosting 35 rivers which travel through 225 communities and through many agricultural areas located on the floodplains[9]. South Gippsland catchments tend to be smaller and more prone to flash flooding (riverine). Catchments further to the east are larger where longer duration events tend to dominate.

Intense heavy rainfall over a short period of time can cause flash flooding to occur within minutes to hours. Flash flooding can be defined as 'flooding occurring within about 6 hours of rain, usually the result of intense local rain and characterised by rapid rises in water levels (BOM, 2001[10])'. Flash flooding typically occurs in small catchments. As there is little warning time, flash flooding is difficult to predict and manage. In larger catchments, floods can occur over several days to weeks, and are easier to forecast and manage.

There is a lack of information and gauging available on the many waterways that exist in Gippsland which can be very responsive to rainfall. With limited real time intelligence collection ability currently available and catchments that respond in different ways depending where rain falls within the catchment, predictive abilities are limited.

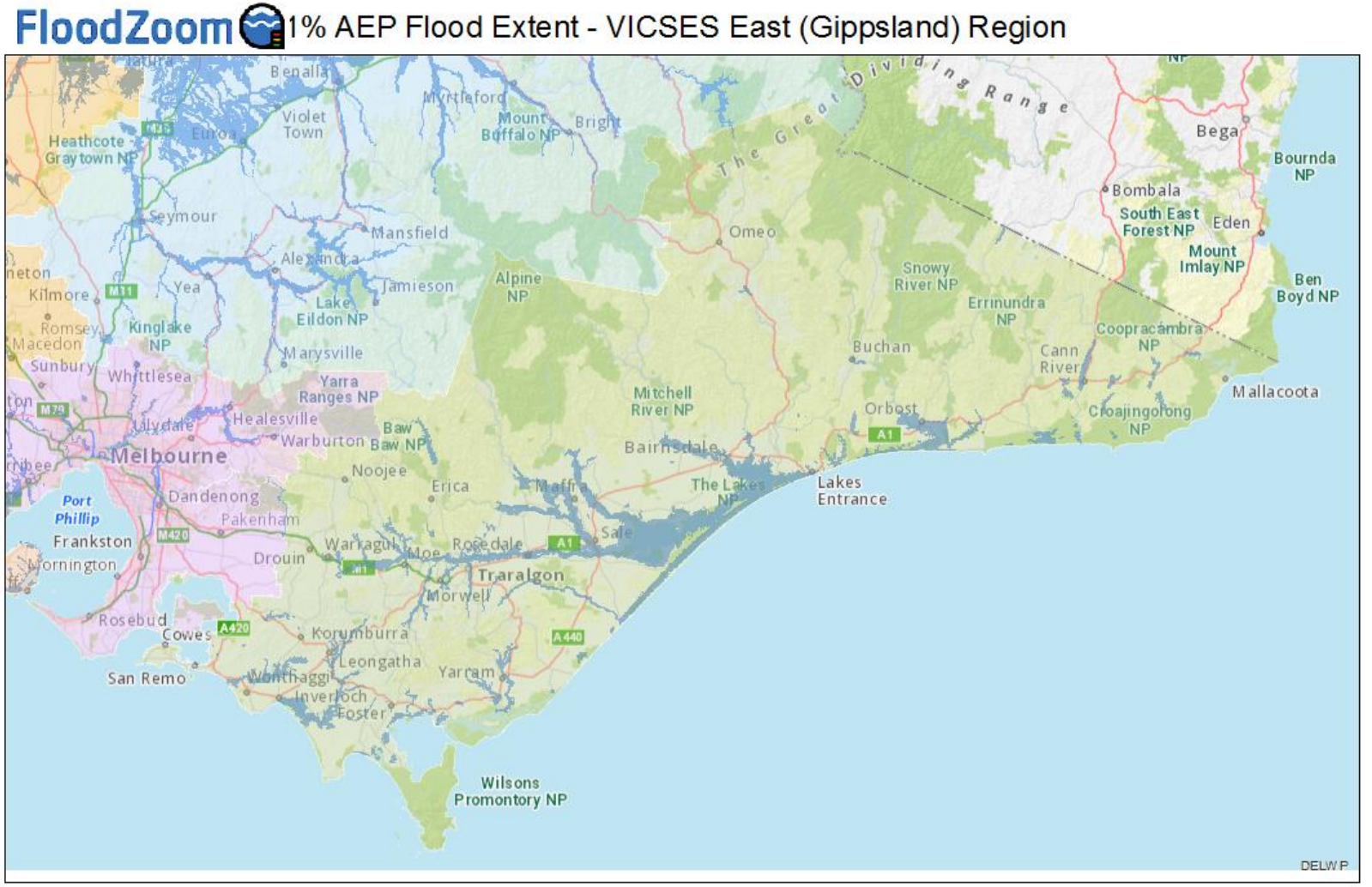
Gippsland is subject to minor flooding at least every year with major events occurring every few years. MFEPs exist for six (6) of the seven (7) municipalities in Gippsland which include more detail about specific flood risk in each river and community and the detail of significant events – see Attachment 4- Municipal Flood Emergency Plans and Local Flood Guides (LFG) List.

[8] Queensland Government (2011) Understanding floods: Questions and Answers. [Available Online] chiefscientist.qld.gov.au/publications/understanding-floods

[9] VICSES Gippsland Regional Flood Emergency Plan, vs 1, November 2013, File ref: CD/13/76597

[10] Bureau of Meteorology (nd) Arrangements for Flood Warning Services in Victoria from the Weather Services Handbook, February 2001, [Available Online] www.bom.gov.au/vic/flood/brochures/flood_warning/February_2001/Principles_for_Non_Flash_and_Flash_Flood_Warning.shtml

A map of areas susceptible to 1% probability of riverine flooding, known as a 1% Annual Exceedance Probability (AEP) event or a 1 in 100 year flood event in the VICSES East (Gippsland) Region is provided on page 15.



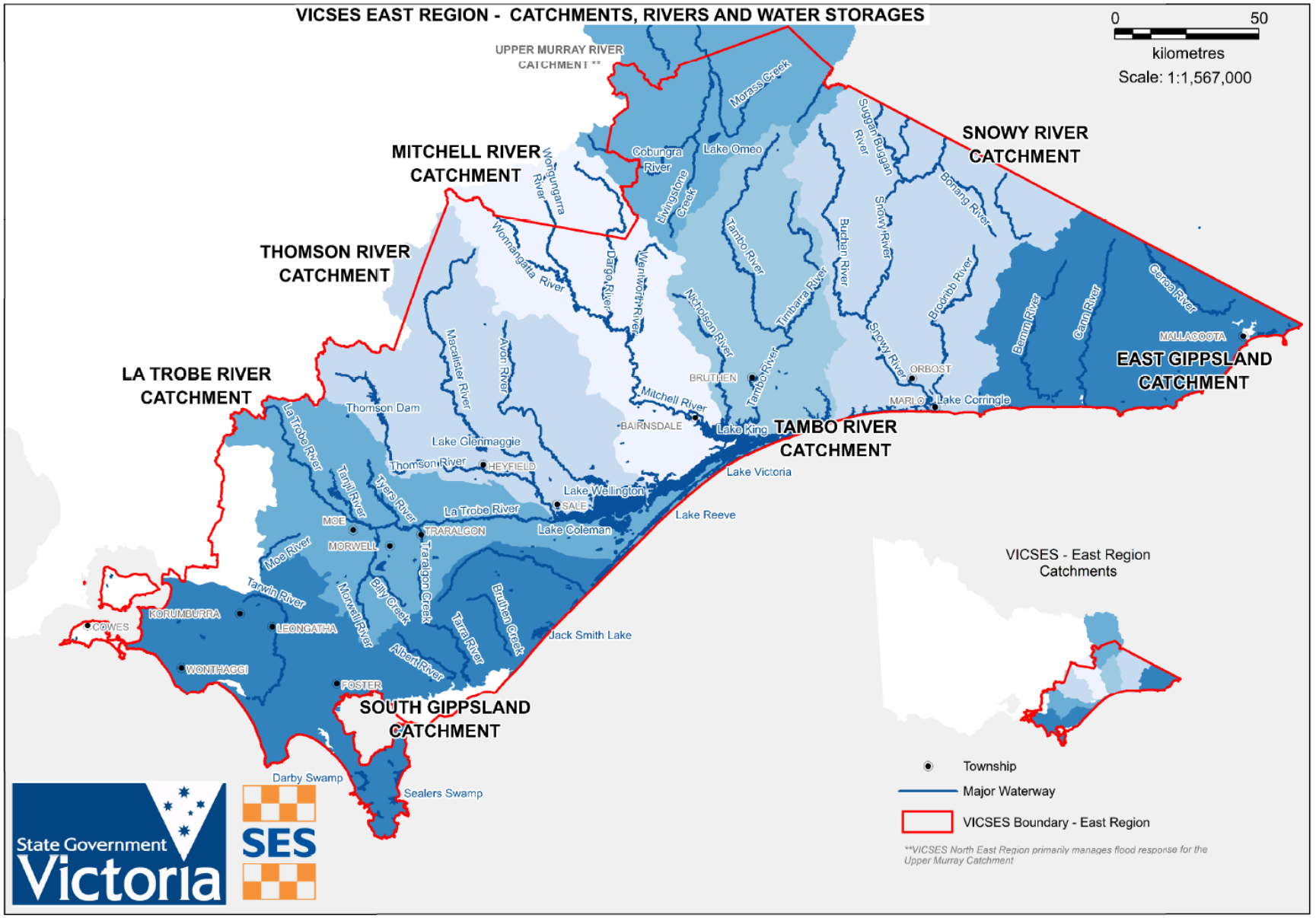
Map 1% AEP Flood Extent in East (Gippsland) Region
Map source: FloodZoom

2.3. East (Gippsland) Region catchments, schematics and intelligence cards

The following major catchments are contained within the East (Gippsland) Region:

- East Gippsland
- Latrobe River
- Mitchell River
- Snowy River
- South Gippsland
- Tambo River
- Thompson River
- Upper Murray (part of)

A map of major catchments in the East (Gippsland) Region is presented on page 17.



Map of Major Catchments in East (Gippsland) Region
Map source: BMT WBM Pty Ltd

Catchment Management Authorities and Melbourne Water in East (Gippsland) Region

Below is an outline of the management arrangements for the major catchments contained within the East (Gippsland) Region.

Melbourne Water

Melbourne Water borders with West Gippsland CMA and crosses over into Bass Coast, Baw Baw Shires and South Gippsland Shires. As a result strong relationships are held with Melbourne Water.

Melbourne Water is the custodian of 33,000 hectares of land across the state of Victoria, supplying customers with over 428 billion litres of drinking water each year. This water is collected from a total catchment area of 157,000 hectares.

Melbourne Water is working with other organisations to meet the challenges of population growth and climate change for the long term interests of the local communities and future generations.

West Gippsland Catchment Management Authority

The West Gippsland CMA covers an area of 19,639 square kilometres (including the marine environment) out to three nautical miles from the coast. This accounts for almost 8% of Victoria's total land area. 59% of the region is under public ownership, with the remaining 41% under private ownership.

West Gippsland CMA region is diverse and is characterised by areas of natural forest, fertile floodplains for agriculture, coastal wetlands, inlets and estuaries and areas of high conservation value. The region is a significant contributor to the Victoria economy through power production and agribusiness.

West Gippsland is responsible for over 40,000km of designated waterways across the region. All of these waterways flow to the Victorian coast, discharging through the Gippsland Lakes, or directly into Bass Strait and the Southern Ocean.

The West and East Gippsland CMAs share responsibilities across the Gippsland Lakes.

East Gippsland Catchment Management Authority

The East Gippsland CMA region is comprised of 2.2 million hectares of land, lakes and coastal waters out to 5.5 kilometres, in the easternmost part of Victoria.

The region covers about 10% of Victoria. It includes most of the East Gippsland Shire and the northern part of the Wellington Shire[11] and part of the Alpine Shire south of the Great Dividing Range. It abuts the Rural City of Wangaratta and the NSW Shires of Snowy River, Bombala, and Eden Valley.

The region supports major conservation, agriculture, tourism, native forestry, plantation forestry and fisheries. About 83% of the land in the region is in public ownership, mainly as State Forests or National Parks.

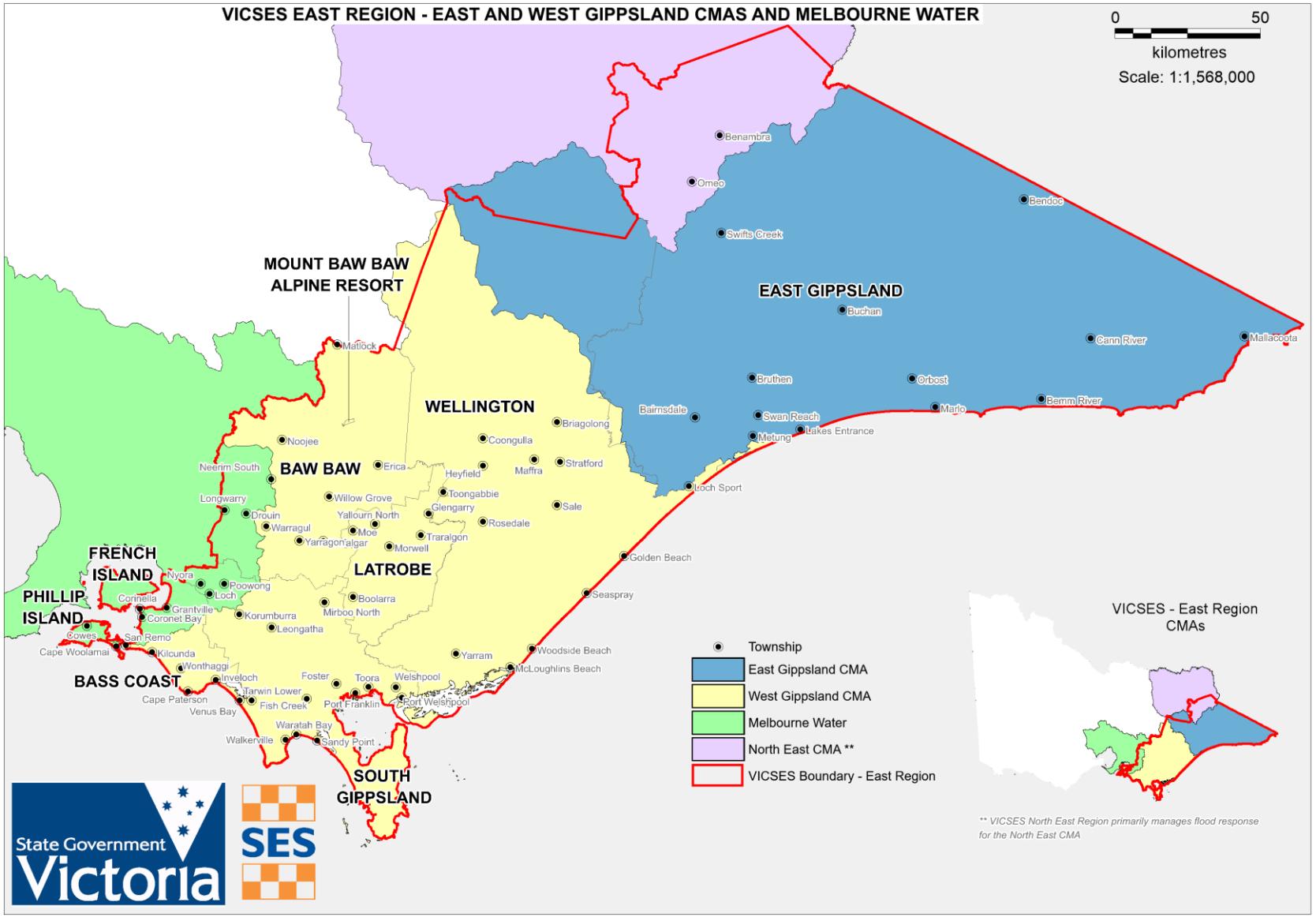
Over 40,000 people live in the region. Steady population growth is occurring in some parts of the catchment, notably centres within commuting distance of Melbourne.

See page 17 for a map of the Melbourne Water, West and East Gippsland CMA areas and corresponding municipalities in East (Gippsland) Region.

See Attachment 3 – Major Catchment Maps and Flood Gauges for detailed maps of East (Gippsland) Region major catchments and locations of gauges.

See individual MFEPs for detailed flood intelligence cards for each municipal area. A complete list of MFEPs within East (Gippsland) Region is available in Attachment 4 – Municipal Flood Emergency Plans and Local Flood Guides List.

[11] East Gippsland CMA, www.egcma.vic.gov.au.



Map of Melbourne Water and CMAs areas in East (Gippsland) Region
Map source: BMT WBM Pty Ltd

2.4. Region flood risks

Region flood risks including urban, rural and communities at risk of experiencing isolation in East (Gippsland) Region are outlined in respective MFEPs (refer to Attachment 4 – Municipal Emergency Flood Plans and Local Flood Guides List for a full list of plans) and should be referred to during operational activity.

Communities at risk of isolation have not been summarised here due to the variance in impacts caused by complexities with different flooding types and levels, refer to MFEPs.

See Attachment 9 – East (Gippsland) Region Flood Risk Summary by Municipality for a summary of key risk data per municipality with links to relevant MFEPs.

2.5. Major dams

VICSES, while not responsible for dam management, is responsible for the response to the flooding caused by dam failure, when water overflows dam walls or a dam wall fails.

Dams on waterways impose a range of permanent effects on natural stream flows and typically modify the peak flow, timing and duration of floods such that downstream flooding effects are reduced. Depending on their operating rules, dams with control devices such as gates, valves or fuse plugs may have the ability to further modify flood flows. When control devices are used to release water during flood events, downstream flooding consequences can occur rapidly, which can create unexpected adverse impacts on downstream communities.

Only a small number of dams in Victoria have spillway gates, providing the capability to make flow releases during or prior to a flooding event. Such dams are owned by water corporations. Particular notice should be given to response capability and flood preparedness for flooding from dams within the Macalister catchment (Lake Glenmaggie), this dam is relatively small in volume compared with the size of the catchment. This catchment has a history of responding rapidly to heavy rainfall and can produce significant floods with little warning.

Each catchment responds differently to rainfall events. Therefore it is important that all dam operators, and emergency response and support agencies understand the unique behaviour of the catchment and operating requirements for each dam within their region.

Flood Operations Plans or Dam Safety Emergency Plans developed by dam operators include warning arrangements to provide timely notice to the Department of Environment, Land, Water and Planning (DELWP), VICSES and other stakeholders of a potential situation concerning flooding arising from controlled releases from a dam, escalating up to uncontrolled releases and from a possible flood arising from the failure of a dam.

More information regarding dams in the East (Gippsland) Region may be accessed within respective MFEPs that are listed in Attachment 4 – Municipal Flood Emergency Plans and Local Flood Guides List.

A list and description of major dams located within the Region is provided in the table below:

Dam Name	Nearest Town	Dam Height (m)	Reservoir Capacity (ML)	Dam Safety Emergency Management Plan in place?	Dam Regulator	Dam Owner
Blue Rock Dam	Willow Grove	72	208,000	Yes	DELWP	Southern Rural Water
Moondarra Reservoir	Moondarra	41	30,458	Yes	DELWP	Gippsland Water
Glenmaggie	Glenmaggie, Coongulla, Heyfield	37	177,000	Yes	DELWP	Southern Rural Water
Narracan Dam	Moe, Newborough, Yallourn North	17.4	7,230	Yes	-	Southern Rural Water
Yallourn Weir	Moe, Newborough, Yallourn North	3.2	388	Yes	-	Southern Rural Water
Cowarr Weir	Cowarr	6.4	250	Yes	DELWP	Southern Rural Water

Reservoir 1 (Leongatha No:1)	Leongatha	8	18.9	Yes	DELWP	South Gippsland Water
Reservoir 2 (Leongatha No: 2)	Leongatha	10	83.6	Yes	DELWP	South Gippsland Water
Reservoir 3 (Sir Herbert Highland Dam) - Highland Leongatha No:3	Leongatha	22	671.1	Yes	DELWP	South Gippsland Water
Reservoir 4 (Leongatha 4)	Leongatha	25	1137	Yes	DELWP	South Gippsland Water
Reservoir 1 (Coalition Creek Korumburra No: 1)	Korumburra	13	221	Yes	DELWP	South Gippsland Water
Reservoir 2 (Ness Gully Korumburra No:2)	Korumburra	11	73.5	Yes	DELWP	South Gippsland Water
Reservoir 3 (Bellview Creek - Korumburra No:3)	Korumburra	16	362	Yes	DELWP	South Gippsland Water
Little Bass Reservoir	Poowong	12	226	Yes	DELWP	South Gippsland Water
Deep Creek Storage	Foster	9	14.3	Yes	DELWP	South Gippsland Water
Cooks Dam	Toora North	3	58.7	Yes	DELWP	South Gippsland Water
Candowdie	Almurta	20	4463	Yes	DELWP	Westernport Water
Lance Creek	Glen Alvie	21	4200	Yes	DELWP	South Gippsland Water
Tarago	Neerim South	34	37,574	Yes	DELWP	Parks Victoria
Thomson	Mt Baw Baw	166	1,123,089	Yes	DELWP	Melbourne Water
Brooker Park Retarding Basin	Warragul	3	2.5	Yes	-	Baw Baw Shire
Landsborough Retarding Basin	Warragul	5	143	Yes	-	Baw Baw Shire
Bull Swamp Creek Dam	Warragul	6	10	Yes	-	Baw Baw Shire
Gordon Street Reserve Dam	Heyfield	3	7.5	Yes	-	Wellington Shire
Foleys Road Dam	Yanakie	5	2	Yes	-	South Gippsland Shire

2.6. Levee Management

Significant levee systems exist within the East (Gippsland) Region. They include rural levees, coastal levees or sea walls, earthen levees and more specific regulating structures and floodway systems[12].

An inventory of levees in the West Gippsland region was undertaken by West Gippsland CMA in order to document all known information about the levees, including service levels, main beneficiaries and management arrangements[13]. This is available in Attachment 2 – Regional Levees.

While there are a number of levees in the East Gippsland Region (e.g. on the floodplains of the lower Tambo, Snowy and Cann Rivers) on both private and public land, none have a formal flood mitigation role. Standards of design and construction are unknown, and no formal maintenance regimes are in place. As a result, they provide no assured 'level of service' during large flood events and cannot be relied on to mitigate the impacts of large floods[14].

Many of these levees do have some beneficial function during frequent smaller type floods. In concert with drainage works, they can reduce the frequency of flooding across productive land and can reduce the likelihood of river channel instability. Any flood modelling within the East Gippsland CMA boundary does not take into consideration private levees as there is no formal process in place to manage or track their viability[15].

East (Gippsland) Region levees are summarised in Attachment 2 – Regional Levees and appear in map form on page 24 and 25. Individual MFEPs should be consulted regarding levee flood intelligence.

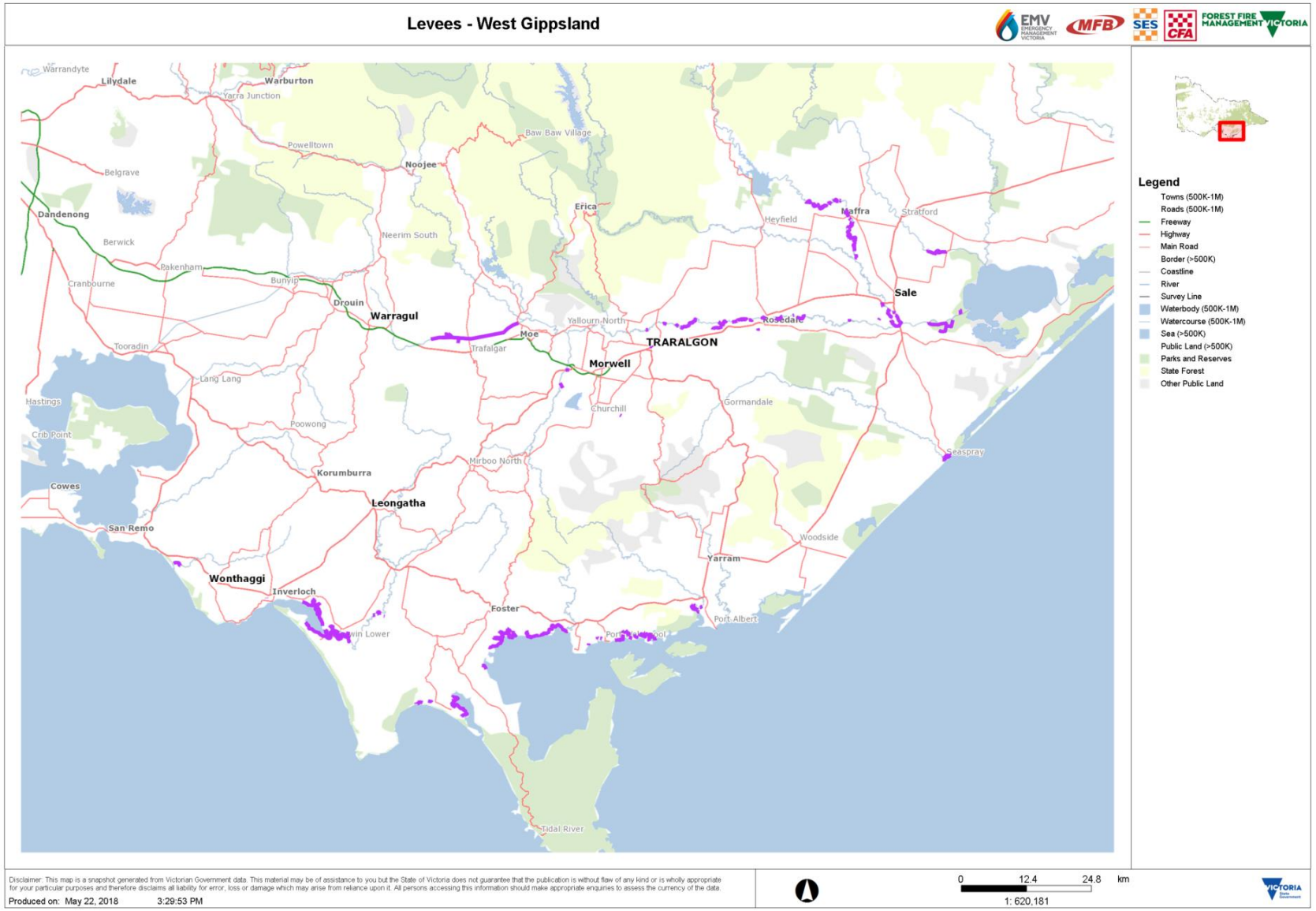
SOP 036 – Construction, Removal or Altering of Levee and Removal of Debris outlines VICSES powers under Section 32AC of the *VICSES Act 2005* to construct, remove or alter a levee on land or premises if it is determined that the construction, removal or alteration is required to protect life or property.

[12] West Gippsland CMA (2017) West Gippsland Floodplain Management Strategy, Available Online http://www.wgcma.vic.gov.au/flood-advice/flood-studies/floodplainstrategy.

[13] West Gippsland CMA (2017) West Gippsland Floodplain Management Strategy, Available Online http://www.wgcma.vic.gov.au/flood-advice/flood-studies/floodplainstrategy.

[14] And East Gippsland CMA (2017) East Gippsland Floodplain Management Strategy.

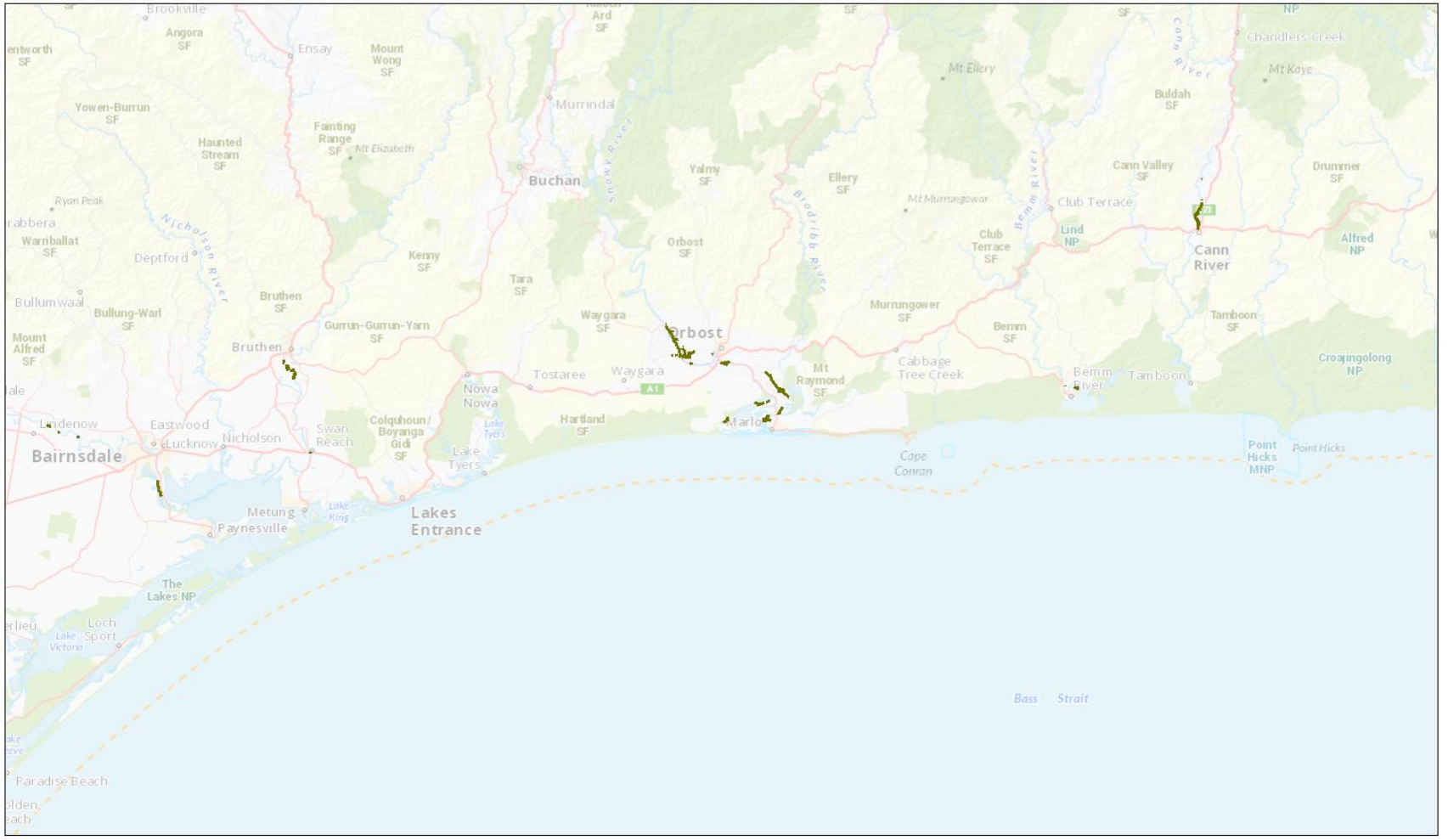
[15] East Gippsland CMA (2017) East Gippsland Floodplain Management Strategy.



Map of levees in West Gippsland
Map source: eMap, West Gippsland CMA.

FloodZoom

Levees - East Gippsland



June 1, 2018

1:577,791

0 5 10 20 mi

0 10 20 40 km

Disclaimer: this map is a snapshot generated from Victorian Goverment data. This material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.

Map of levees in East Gippsland
Map source: FloodZoom

2.7. Regional Resources

A full list of the regional resources available within the East (Gippsland) Region for flood response is available in Attachment 5 – Regional Resources.

Regional resources that are included in MFEPs are listed in Attachment 4 – Municipal Flood Emergency Plans and Local Flood Guides.

VICSES resource processes are set out in the 'VICSES Operations Management Manual' and *Standard Operating Procedure* (*SOP) J3.09 Resource Request Process.*

Additional expert multi-agency resources may be accessed during operations through the Australasian Inter-Service Incident Management System (AIIMS) structure.

3. Consequences

3.1. Possible flood consequences

The East (Gippsland) Region has many flood prone communities. Some of the effects of flooding on the community are included in the list below (not in priority order) and these are managed in line with the State Emergency Management Priorities:

- Death and injuries.
- Inundation of properties.
- Damage to essential infrastructure, public and private assets and property.
- Inundation of farmland, damage to crops and loss of livestock and fodder.
- Short or long term displacement of people.
- Isolation of properties or communities.
- Disruption to essential services.
- Impacts on livelihood.
- Tourism.
- Social connection/ community welfare.

Significant community disruption can occur as a result of damage to essential infrastructure, which may lead to cascading secondary consequences. For example a loss of power may result in a loss of telecommunications, traffic signals and disruption to supply chains, among other impacts. Damage and flooding of road infrastructure may result in isolation of properties and/ or communities.

3.2. Flood history

The flood history table below provides a summary of historical floods within East (Gippsland) Region when one or more of the consequences listed above has occurred.

The history suggests that flood events will be more frequent and of higher intensity than the past.

For more detailed flood history information, see Attachment 7 – East (Gippsland) Region Detailed Flood History.

d/s = downstream u/s = upstream

Year	Location
1894	Gippsland Lakes
1920	Tambo River, Bruthen (largest flood on record)
1934	Snowy River, Orbost Moe River, Moe (largest on record) Latrobe River, Rosedale (largest on record) Port Phillip and South Gippsland
April 1935	Merrimans Creek, Seaspray/ Longford
1936	Mitchell River, Bairnsdale (largest on record)
April 1950	Avon and Perry Rivers, Stratford/ Sale/ Maffra
1951	Gippsland Lakes (largest flood on record) Powlett River, Wonthaggi
1952	Tambo River, Swifts Creek Merrimans Creek, Seaspray
June 1952	Snowy River, Orbost
February 1971	Cann River, Cann River Genoa River, Genoa Snowy River, Orbost

June 1978	Thomson River, Sale Traralgon Creek, Traralgon Merrimans Creek, Seaspray Latrobe River, Rosedale Snowy River, Orbost
1980	Tambo River
April 1990	Mitchell River, Glenaladale and Bairnsdale Avon River, Boisdale and Stratford Thomson and Macalister Rivers, Maffra/ Sale
Sept 1993	Merrimans Creek, Seaspray Traralgon Creek, Traralgon Thomson River, Sale Latrobe River, Rosedale
Nov 1995	Traralgon Creek, Traralgon
June 1998	Tambo River, Swifts Creek Mitchell River, Glenaladale Cann River, Weeragua
April 2007	Avon and Perry River, Stratford
June 2007	Macalister River, d/s Glenmaggie Thomson River, u/s Cowwarr Avon River, The Channel Mitchell River, Glenaladale Gippsland Lakes, Lakes Entrance Snowy River Tambo River, various communities in East Gippsland
July 2007	Powlett River, Wonthaggi
Nov 2007	Macalister River, d/s Glenmaggie[16]
March 2011	Tarwin River, Tarwin
March 2012	Snowy River
May 2012	South Gippsland catchment, various southern Bass Coast communities Moe River flats, highest recorded floods.
June 2012	Moe River/Canal Gippsland catchments Powlett River, whole catchment Buchan River, Buchan Swifts Creek, Swifts Creek Mitchell River, Bairnsdale Avon River, d/s Boisdale Traralgon Creek, Traralgon
June/July 2016	Stockyard Creek, Foster Snowy River, Basin Creek Mitchell River, Glenaladale Snowy River, Buchan/ Jarramond/ Orbost

[16] Flood Victoria, www.floodvictoria.vic.gov.au, accessed March 2018.

4. Community Resilience

4.1. Shared and individual responsibility for action

The National Strategy for Disaster Resilience and VICSES Community Resilience Strategy together provide high level guidance on disaster management for our people, providing examples on how we can work together to build safer and more resilient communities.

Together this can be done by building capacity, increasing collaboration and fostering connections. Foremost is the principle of society taking responsibility for preparing for disasters. The role of the community in disasters is based on individuals taking their share of the responsibility for preventing, preparing for, responding to and recovering from disasters. Examples in the context of flooding include:

- Individuals being aware of their flood risk, and following advice from emergency services.
- Responding to warnings.
- Local governments and communities including flood risk within their Community Emergency Risk Assessment (CERA) activities, including consideration within emergency management planning; and land use planning.
- Industry and businesses planning for the risk of disruption, and ensuring arrangements are in place to maintain critical services, and assist communities where possible.
- Government agencies undertaking:
    - Risk assessments to gain an appreciation of flood risk.
    - Engaging with the community regarding flood risk.
    - Working with communities to plan the management of flood risk.
    - Providing emergency information and flood warnings.
    - Ensuring an effective, well-coordinated response during floods.
    - Helping communities to recover and learn from their experience and build their resilience for future events.

We therefore recognise the importance of working in partnership with communities. When communities play a role in their own safety, resilience is enhanced. The benefits of building community resilience and investing in disaster preparedness (disaster risk reduction) initiatives include:

- Safer communities.
- Less demands on emergency services for assistance.
- Less damage to property and infrastructure.
- Speedier recovery.
- Reduction in overall (impact and recovery) costs to the lovsl economy.
- Increase capacity and capability across the board.

The East (Gippsland) Region has developed and delivers a range of programs to achieve the goals outlined in the VICSES Community Resilience Strategy and delivers programs to at-risk communities to provide information on what to do before, during and after floods. More information can be found in section 4.6 Community Engagement.

4.2. Flood warning services

Flood warnings and notifications are provided by BOM and VICSES to the Victorian community. The flood warning services provided by BOM are dependent on local infrastructure, including flood gauges. The service is documented in the Service Level Specification for Flood Forecasting and Warning Services for Victoria which can be accessed at www.bom.gov.au/vic/flood/. A map of flood gauges for the East (Gippsland) Region can be seen at Attachment 3 – Major Catchment Maps and Flood Gauges.

VICSES provides warnings and emergency information to the community by publishing Flood Community Notifications using Emergency Management – Common Operating Picture (EM-COP) Public Publisher on the VicEmergency website via www.emergency.vic.gov.au/respond/.

Flood Community Notifications are informed by BOM, Melbourne Water/ CMAs and local information and intelligence.

4.3. Regional Floodplain Management Strategies

Regional Floodplain Management Strategies outline how flood management agencies will work together to manage flood risks and increase community preparedness. They are prepared per CMA area (and Melbourne Water) and aligned with the Victorian Floodplain Management Strategy, emergency management arrangements and planning policy.

The flood strategies build on previous strategies and add new emphasis on:

- Governance arrangements for sustainably managing existing and new levees.
- An acknowledgement of the value of Aboriginal communities both in planning and responding to floods.
- Adapting to climate change to manage flood risk.
- Clarification around emergency management roles and responsibilities.
- Guiding principles to support the role of CMAs in land use planning.
- Clarification of who is responsible for maintaining flood warning gauges.
- Consideration of the environmental benefits of flooding.

The Regional Floodplain Management Strategies that exist within the East (Gippsland) Region are for West and East Gippsland CMAs and for the small part of Melbourne Water area in the west of the Region. They are located at:

West Gippsland CMA: **www.wgcma.vic.gov.au**

East Gippsland CMA **www.egcma.vic.gov.au**

Melbourne Water **www.melbournewater.com.au**

4.4. Flood intelligence

Flood intelligence supports decision making and planning for flooding by providing reliable and accurate information relating to:

- The level, depth and velocity of floodwater and its consequences.
- Determination of actions to be undertaken in response to the identified consequences.

VICSES works closely with CMAs, DELWP, other agencies and trusted local sources to ensure available resources and platforms containing flood information and intelligence are utilised.

DELWP maintains FloodZoom, the Victorian flood intelligence platform. FloodZoom is a web based platform which assists VICSES and other emergency services agencies identify the possible local consequences of flooding and supports CMAs in land use planning and flood risk assessments.

EMV maintains the online multi-agency operational platform, EM-COP used for sharing flood intelligence with the sector, before, during and after flood emergencies.

The community and other organisations can provide valuable local information about hazards, incidents and how they may evolve. This information is commonly referred to as local knowledge. This local knowledge provides an invaluable ‘on the ground’ understanding of an unfolding situation from the people who understand the area best. Refer to Appendix G of relevant MFEP.

It is essential that communication pathways are created and maintained to ensure appropriate local knowledge can be captured before, during and after incidents. As an incident escalates from local control to a larger incident

management structure, it is essential that local knowledge capability is retained within the overall structure. VICSES is committed to ensuring that plans and processes are put in place before, during and after incidents to capture local knowledge and consider it as part of emergency planning and incident management decision making processes.

VICSES uses a variety of strategies to ensure local knowledge is captured, utilised, respected and considered and wherever possible incorporated into VICSES decision making before, during and after incidents. This is outlined in VICSES Policy 10.2 - Local Knowledge.

4.5. Municipal flood planning

Municipal Flood Emergency Planning is managed by Municipal Emergency Management Planning Committees. MFEPs are created by municipalities that are considered to have a high susceptibility to flooding. MFEPs can be found online at respective council websites, FloodZoom for registered users, and on the VICSES website at www.ses.vic.gov.au.

A list of completed MFEPs finalised within the East (Gippsland) Region is available at Attachment 4 – Municipal Flood Emergency Plans and Local Flood Guides List.

Each municipality that falls within the Melbourne Water footprint will also have a Flood Management Plan. The overarching goal of the Flood Management Plan is to contribute to reducing the risk and impacts of flooding on local communities.

These plans outline the roles and responsibilities and describe, at a high level, Council, CMA and Melbourne Water key flood management activities. They identify specific actions to improve flood management at each municipal level over the next five years.

4.6. Community engagement

Community engagement programs to build community resilience for flooding are conducted in accordance with the VICSES Community Resilience Strategy, as outlined in section 4.1 Shared and Individual Responsibility for Action.

East (Gippsland) Region community engagement involves, but is not limited to:

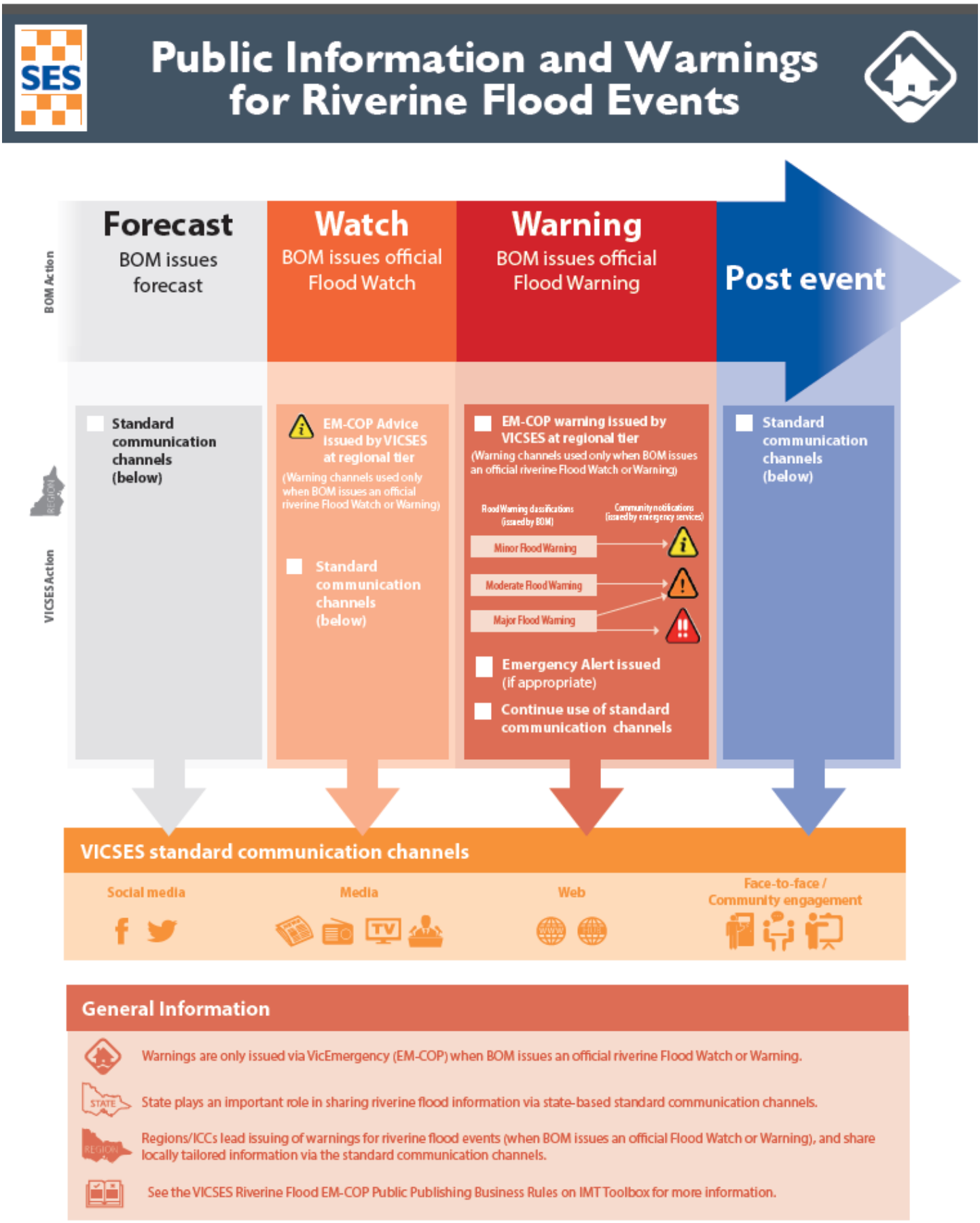
- Deliver Community Education Facilitator (CEF) courses twice a year to equip volunteers with the required tools, skills and knowledge to build awareness in their local communities.
- Endorsed CEFs from across the region come together to form a Community Education Advisory Group where they support and share ideas on activities used to engage with their community.
- Participation in flood studies conducted across the region to identify high risk areas and the impacts to various communities.
- LFGs are created for locations which have been identified as having a high flood risk. They explain local flood risks for communities and advise on how to prepare for and respond to flood events. These guides can be found at www.ses.vic.gov.au/get-ready.
- Awareness building during the rollout process of new LFGs, such as targeted doorknock delivery in high risk areas.
- Provision of support to local councils to advise on flood risks to identified communities who have chosen to create a Local Incident Management Plan:
    - Events conducted within the community by the local unit members with tailored activities to generate a discussion before, during and after to reinforce the flood risk message.
    - Participation in multi-agency activities including municipal flood education responsibilities.
    - Participation in community led emergency planning.
    - Building resilience and capacity within communities, for example, effective sandbag filling and laying techniques and cache locations.

4.7. Household and business plans

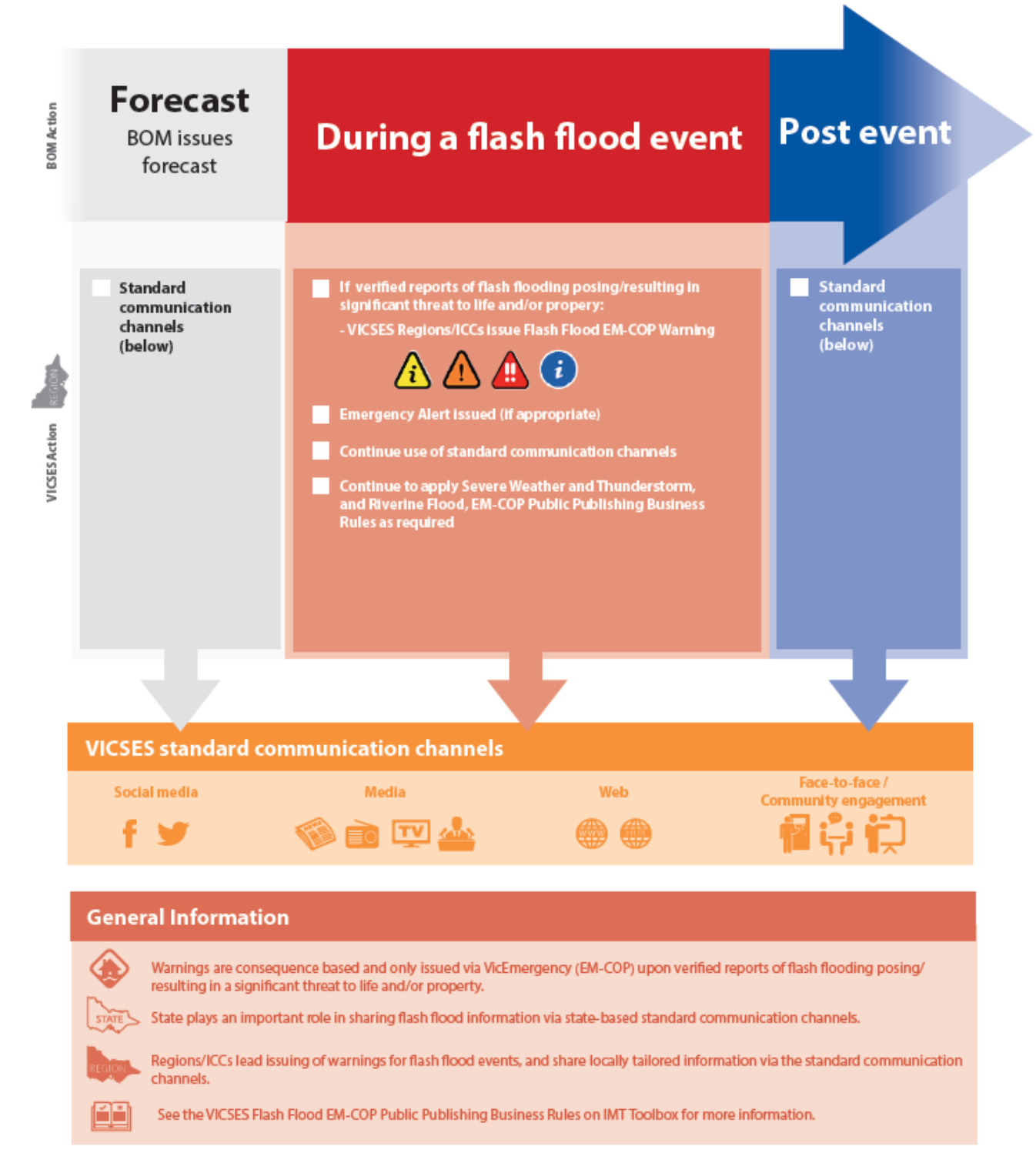
VICSES advises that every household and business should have written emergency plans. Information on the development of household and business plans can be found at www.ses.vic.gov.au/getready.

4.8. Community safety messaging

VICSES provides advice to community in the form of key safety messages for minor, moderate and major flooding. These are summarised below for riverine flooding and flash flooding.



Public Information and Warnings for Flash Flood Events



5. Managing a flood event

5.1. Roles and responsibilities

Roles and responsibilities of agencies involved in responding to floods are detailed in the SERP – Flood Sub-plan.

5.2. Concept of operations

The concept of operations for responding to floods is detailed in the SERP – Flood Sub-plan.

5.3. Escalation and notification

BOM publishes Flood Watches and Warnings, as detailed in section 4.2 Flood Warning Service, on its public website (www.bom.gov.au) and provides them to pre identified agencies, organisations and media outlets, including via pager and email warning messages to VICSES at the State and Regional Level.

As the control agency for flood response VICSES has a responsibility to ensure the dissemination of these flood watches and warnings to its members, the community and other stakeholders. The notifications undertaken by VICSES are to support the planning and preparation for potential flooding.

The escalation and notification process for flood response is operationalised by VICSES in *SOP 009 – Flood Notification and Activation Process.*

5.4. Strategic response planning

On receipt of advice from BOM of the potential for significant flooding, the Regional Agency Commander (RAC) will undertake strategic level planning in anticipation of an event.

Responsibility may transition to the Regional Controller (RC) to support multi-agency response when significant impacts caused by a flood event occur.

Associated flood readiness levels and Incident Control Centre (ICC) footprints can be accessed within *Joint Standard Operating Procedure* (*JSOP) 2.03 Incident Management Team (IMT) Readiness Arrangements* or the *VICSES Flood Readiness and Activation Trigger Considerations (v3.0)*, also available via Attachment 8 – IMT Readiness Levels – Flood.

5.5. Cross border arrangements

For the East (Gippsland) Region, cross border arrangements exist with NSW SES, supported by a Memorandum of Understanding that outlines how VICSES will request assistance from the NSW SES.

5.6. Regional Control Centre

The pre-determined facility in East (Gippsland) Region that is suitable for the establishment of a Regional Control Centre (RCC) for the management of emergency events, including for flood response, is:

Gippsland Region
Level 1, 181 Franklin Street, Traralgon, 3844
Phone: 03 5177 3240
Fax: 03 5177 3284
E: rccgip.all@rcc.vic.gov.au

5.7. Incident Control Centres

ICC locations that have been pre-determined for emergency response in the East (Gippsland) Region are detailed in the table below.

Name	Agency	Location
Bairnsdale	DELWP	574 Main street, Bairnsdale
Traralgon	DELWP	Level 2, 181 Franklin Street, Traralgon

A map of standard ICC footprints is available in Attachment 8 – IMT Readiness Levels – Flood. The actual footprint may be altered at the discretion of the Assistanct Chief Officer or RAC where deemed necessary.

5.8. Divisional Command Points/ Forward Operations Vehicle

VICSES facilities equipped as Divisional Command Points (DCPs) are listed in the table below:

Location	Address	Agency
Bairnsdale Regional Head Office	130 Macleod Street, Bairnsdale	VICSES
Moe Regional Head Office	82A Moore Street, Moe	VICSES
Bairnsdale Unit	189 Macleod Street, Bairnsdale	VICSES
Sale Unit	35-37 Union Street, Sale	VICSES
Moe Unit	265 Monash Road, Newborough	VICSES
Yarram Unit	Railway Avenue, Yarram	VICSES

Further facilities suitable for use as DCPs for flooding are available from the Country Fire Authority (CFA). Local Command Facilities (LCFs) are equipped to DCP standard. Refer to Attachment 4 – Municipal Flood Emergency Plans and Local Flood Guides for individual MFEPs likely to be used.

Where fixed Command and Control Facilities are not available or appropriate to operational conditions, a mobile facility may be deployed to enable an Incident Controller or Commander to manage the incident.

The Field Operation Vehicle (FOV) is a mobile facility which provides working space to support a base of operations including, Incident Control Point, Sector or Division Command Point. Refer to *SOP 069 – Operation of Mobile Command Facilities (MCV/FOV).*

5.9. Regional resource requirements

The table below provides a list of resource requirements that have been identified to support operational response to a significant flood event, such as outlined in Attachment 1 – Region Flood Scenarios, within the East (Gippsland) Region. A full list of East (Gippsland) Region resources is available in Attachment 5 – Regional Resources should any of these scenarios be used for training purposes.

Resources listed below are those that would be required at the peak of an event, and would represent the resources of all agencies with responsibilities under the SERP – Flood Sub-plan.

Core capability	Human resources	Equipment available
Swift Water Rescue (in water)	Swift Water Rescue Team from Victoria Police (VICPOL) or Melbourne Fire Brigrade (MFB)	-
Aerial observations	Aircraft Officer Air Observer	Drones or rotary aircraft
Hydrology/ flood expert	Hydrologists	-
Sandbag filling teams	Department of Justice work crews	Sandbagging trailer
Impact Assessment Teams		-
Land Based Swift water Teams	VICSES Members	

Glossary

AEP	Annual Exceedance Probability
AIIMS	Australasian Inter-Service Incident Management System
ARI	Average Recurrence Interval
BOM	Bureau of Meteorology
CEF	Community Education Facilitator
CERA	Community Emergency Risk Assessment
CFA	Country Fire Authority
CMA	Catchment Management Authority
DCP	Divisional Command Point
DELWP	Department of Environment, Land, Water and Planning
EM-COP	Emergency Management – Common Operating Picture
EMMV	Emergency Management Manual Victoria
EMV	Emergency Management Victoria
EMT	Emergency Management Team
FOV	Field Operation Vehicle
ICC	Incident Control Centre
IEMT	Incident Emergency Management Team
IMT	Incident Management Team
JSOP	Joint Standard Operating Procedure
LCF	Local Command Facilities
LFG	Local Flood Guide
MFB	Metropolitan Fire Brigade
MEMP	Municipal Emergency Management Plan
MFEP	Municipal Flood Emergency Plan
RAC	Regional Agency Commander
RC	Regional Controller
RCC	Regional Control Centre
RFA	Request for Assistance
SERP	State Emergency Response Plan
SOP	Standard Operating Procedure
USAR	Urban Search and Rescue
VICSES	Victoria State Emergency Service
VICPOL	Victoria Police

Attachments

Attachment 1 – Region Flood Scenarios

Region flood scenarios have been developed to support periodic training requirements (outlined in section 1.8), and provide the opportunity to document anecdotal and/or known flood impacts based on historic events.

The below scenarios are based on likely flood scenarios of varying intensity.

Scenario 1 – 1990 Event

Weather System

By early morning Friday 20 April, a low pressure centre had developed over western of NSW which intensified and moved to the south east, located just off the far south NSW coast by early morning Saturday 21 April. At this stage a strengthening and extremely moist south easterly airstream had extended across Gippsland to the Great Dividing Range and intense rainfall had commenced. The intense rainfall persisted for a period of 35 to 48 hours over a substantial part of the area.

Forecasts

Indications on Friday 20 April were that prolonged and heavy rain would be required to overcome the dry state of Gippsland catchments. In addition, the low flows observed in Gippsland streams over the preceding weeks suggested substantial runoff would be needed to cause rivers to rise to flood level.

Although rain with local heavy falls was the main theme of meteorological forecasts and outlooks issued for Gippsland on the Friday, it was considered the dryness of catchments would lessen the likelihood of immediate flooding from even moderately heavy rain.

The Mitchell River flood warning system was designed to provide warnings for the river flats between Glenaladale and Bairnsdale. However, during the April 1990 event it was not possible to provide quantitative warnings because of a lack of rainfall data and failure of the Glenaladale stream gauge.

Event

Runoff commenced shortly after the heavy rainfall, because the ground was unable to absorb it quickly enough.

The flood on the Mitchell resulted from rainfall across the whole catchment with a concentration of heavier falls in the mid to lower reaches. This caused flood flow contributions from all watercourses in the basin. The relative timing of these contributions had a significant impact on the timing and character of the resulting flood along the Lindenow flats and around Bairnsdale.

The rivers in the upper reaches of the catchment which combine to form the Mitchell River flooded late on Saturday 21 April.

At Glenaladale, the river rose rapidly to high levels during Saturday afternoon in response to local runoff, this was followed by a further rise overnight Saturday and during Sunday as high flows arrived from the upper reaches.

Heavy rain over the catchments of the creeks which flow through the Mitchell River floodplain caused them to flood during Saturday. These creeks are not instrumented but flow into the Mitchell downstream of the Glenaladale gauging station. Their contribution to the Mitchell River on this occasion was very significant. The effect is seen in the severe flooding which occurred on the Lindenow flats overnight Saturday, the unusually rapid rise experienced at Bairnsdale early on Sunday morning (followed by a further gradual rise to the peak some 14 hours later) and the relative timing of the Glenaladale and Bairnsdale peaks.

Impacts

Flows to the upper catchment streams of the Dargo, Wongungarra, Wentworth and Wonnangatta Rivers were the highest measured within the period of gauge record. Mitchell River flows in the lower catchment were also the highest measured on record.

The whole floodplain between Glenaladale and Bairnsdale was inundated and extensive damage to vegetable crops and property occurred along the Mitchell River flats.

A fatality occurred on the Mitchell River below Bairnsdale when a boat owner was trapped in his capsized boat at the old road bridge near Lake King. In the Bairnsdale area 46 houses were flooded and seven at Lindenow.

Agricultural damages for the Mitchell River floodplain were $4.8 million, while road damages – City and Shire of Bairnsdale – equalled $450,000.

Scenario 2 – 2007 Event

Weather System

During June 2007 four major east coast lows formed off the coast of NSW and east of Victoria. Each east coast low produced varying amounts of heavy rain. In the week commencing 17th June, BOM weather forecasts began to mention an east coast low that was likely to bring considerable rain to Gippsland.

As this low pressure system weakened and moved away from the east coast, BOM weather forecasts began to refer to another east coast low, scheduled for the following week. It is this east coast low that produced the heavy rainfall that resulted in the significant flood event.

A low pressure trough over South Australia on Monday 25 June moved eastwards over Victoria on Tuesday 26 June to form an intense low pressure system in eastern Bass Strait, near the south coast of NSW. The low deepened rapidly overnight on the 27th and became complex and moved close to eastern Victoria early on Thursday 28th.

Forecasts

BOM weather forecasts predicted a number of days in advance the commencement of heavy rain on Wednesday 27th and for the rain to continue until the early part of Thursday 28th before easing. Rainfall totals for the 48 hours commencing 9am on the Wednesday were expected to range mostly between 100-175mm over the eastern and mountain parts of Gippsland with some isolated falls above 200mm possible.

Event

The intense rainfall over Gippsland and the southern slopes of the Great Dividing Range was well in excess of infiltration capacity and caused all seven of the rivers that flow into the Gippsland Lakes – the Latrobe, Thomson, Macalister, Avon, Mitchell, Nicholson and Tambo – to flood. In turn this caused flooding through the Lakes system which at various times and degrees was exacerbated by unhelpful wind conditions and tidal variations including a king tide.

This event was the largest in recent times with levels rising over 1.3m above normal lake level as floodwaters from the surrounding rivers entered. This event was estimated to be around a 20 year Annual Recurrence Interval (ARI) event. Lake levels would have been even higher had the Latrobe catchment been subjected to higher rainfalls and severe flooding.

For the first time BOM issued flood warnings for the Gippsland Lakes. Peak levels around the Lakes were influenced by the high inflows combined with tidal conditions and winds and were in general a little higher than experienced in 1998.

Wind and tide influences and the timing of the floodwaters entering the lakes from the different river systems caused the peaks in Paynesville, Metung and Lakes Entrance to occur ahead of Lake Wellington.

Impacts

The flood caused substantial community disruption and damage. Estimated direct damage was of the order of $110 million and total damage upwards of $116 million. Difficulties in quantifying indirect and intangible damages means that the total cost of this flood to the community may never be fully assessed.

All lakeside communities were impacted to different degrees, including Hollands Landing, Seacombe, Loch Sport, Paynesville, Eagle Point, Raymond Island, Metung, Mosquito Point, Tambo Bay and Lakes Entrance. There were many isolations in most of these communities for an extended period. The Raymond Island Ferry ceased operating and isolated residents for 7 days causing over 70 residents and visitors to leave the island. In all, 13 houses and 30 sheds were inundated in the town and along the north western shoreline of the Island.

Scenario 3 – 2012 Event

Weather System

In early June 2012 an extensive band of rain and damaging winds developed across Gippsland.

The above average rainfall in preceding months in Bass Coast, East and South Gippsland, Baw Baw and Latrobe resulted in saturated catchments with varying degrees of ability to absorb any more water. This led to higher than average soil moisture storage levels, and an increased conversion of rainfall to runoff. The major reservoirs in the West and East CMA regions were all above 70% capacity during May 2012.

Forecast

BOM advised VICSES that an east coast low was expected to develop on Monday 4th of June with heaviest falls likely over Gippsland from midday Monday to midday Tuesday, with peak totals around 100mm possible on the ranges with the potential for damaging gusts up to around 100km/hr along the coast. Flood Watches were issued for East Gippsland and West and South Gippsland during the afternoon.

The weather system intensified overnight Sunday with a low developing just east of Gabo Island, and deepening rapidly during Monday. This directed a strong onshore south easterly flow over eastern Victoria, resulting in significant rainfall totals in Gippsland.

On Monday morning VICSES was advised that expected rainfall amounts had increased and that 80-120mm was possible through central and eastern Gippsland with peak totals about the ranges of around 150mm.

Event

Gippsland received significant rainfall over the course of a few days. Large areas of central and eastern Gippsland received 150-200mm. Numerous stations recorded up to twice the average monthly rainfall in just two days.

Major flooding resulted in ten catchments across Gippsland, including flash flooding in Traralgon Creek at Traralgon South.

Strong winds developed along the coast and at elevated locations in the East with a 144km/hr gust recorded at Mt Buller and 120km/hr at Gabo Island.

While all municipalities were impacted, the greatest flooding was centred on Latrobe City, Wellington and East Gippsland.

The peak 24 hour rainfall totals included:

- 203mm Avon/Mitchell at Reeves Knob.
- 193mm Snowy at Basins Creek.
- 191mm Thomson at Murderers Hill.
- 178mm Traralgon Creek at Mt Tassie.
- 173mm Tambo at Mt Elizabeth.
- 165mm Macalister at Licola.

Impacts

Hundreds of trees fell as a result of the strong winds causing damage to properties and blocked roads and major highways. Infrastructure, such as bridges, roads and recreational areas (including caravan parks) was also damaged. Some locations east of Bairnsdale temporarily lost power and landline phones. There was significant rural inundation, including crop losses and more than 1,500 farmers impacted.

VICSES received 722 Requests for Assistance (RFAs) from Gippsland. There were 33 rescue events involving persons trapped or stranded by floodwaters.

If the above scenarios are to be used for training purposes, please see Attachment 5 – Regional Resources and section 5.9 Regional Resource Requirements for a list of all available resources for events in East (Gippsland) Region.

Attachment 2 – Regional Levees

East (Gippsland) Region Levees – detail extracted from MFEPs.

Name of levee	Area protected	Design height AEP%	Additional information (any key information of significance (i.e. condition)
Bulmers Levee	Lindenow	-	Mitchell River
Regulating structure and floodway system	Seaspray	-	Constructed after 1978 flooding in response to waterway flooding
Irving St Levee	Seaspray	-	Used for vehicle access to the Buckley St pumping station
Griffioens Levee	Seaspray	Outflanked in 1993 which was considered to be a 2% AEP (1 in 50 yr) event	Protection from Merrimans Creek
Hansen St Levee	Seaspray	Outflanked in 1993 which was considered to be a 2% AEP (1 in 50 yr) event	Protection from Merrimans Creek
Government Rd Levee	Seaspray	Outflanked in 1993 which was considered to be a 2% AEP (1 in 50 yr) event	Protection from Merrimans Creek
Trood St Levee	Seaspray	-	Protection from Merrimans Creek
Shoreline Rd Levee	Seaspray	-	Protection from Merrimans Creek
Peterkin St	Parts of Traralgon	-	Includes sections of earthen levee through parkland and brick walls on private property boundaries
Earthen Levee to Northwest of Tinamba	-	-	Constructed by a property owner on private land in 2014
Port Albert Sea Wall	Port Albert	-	The sea wall is not continuous and allows seawater to enter the town from the rear

East (Gippsland) Region Levees – as provided by West Gippsland CMA

Locality	Levee Name	Levee Description	Levee Height (m)	Levee Width (m)	Length (m)	Land Manager	Land Owner	Current Manager	Previous Manager	Constructed by
Latrobe River East of Rosedale	Levee on the Latrobe River	Levee on the Latrobe River	0	0	200		Private			
Located in the Kilmany area		Now lower than it was originally	0	0	700		Private		Latrobe River Improvement Trust	
Located in the Kilmany area	McCanns Bank	McCanns Bank	2	1.5	1400	Landholder	Private	Landholder	Latrobe River Improvement Trust	Latrobe River Improvement Trust
Located along Possum Creek, the LaTrobe River, and the Thompson River, at the confluence	Levee protecting farmland from flooding.	Levee protecting farmland from flooding	0	0	2600	Landholder	Private	Landholder		
Located in the Kilmany area	Known as the Kilmany bank. Stops the area West	Known as the Kilmany bank. Stops the area West of the bank from flooding from the La Trobe and Thompson Rivers	3.5	2.5	500		Crown		Latrobe River Improvement Trust	As part of the Soldier Settlement Scheme
South West of Sale, along the Thompson River	Low levee protecting the caravan park, McArdles	Low levee protecting the caravan park, McArdles Gap	0.4	1.5	200					Council
5km upstream from Rosedale (Alan Whately's property)	Levee protecting farmland from flooding	Levee protecting farmland from flooding	1	0	800	Blow outs repaired by the CMA with some landholde*	Likely to be private	Blow outs repaired by the CMA with some landholder assistance		
Flynn, near the Latrobe River	Private levee located near the Sheepwash creek	Private levee located near the Sheepwash creek floodgates.	3.5	3	2000	Landholder	Private	Landholder	Landholder	Landholder
Just North of the LaTrobe River, in the Kilmany district			0	0	0					
Downstream of the Gippsland Railway bridge (east of Rosedale) (Richard Crooke's property)	Levee protecting farmland from flooding.	Levee protecting farmland from flooding	0.7	0	2000	Blow outs repaired by the CMA with some landholder assistance	Likely to be private	Blow outs repaired by the CMA with some landholder assistance		
3km downstream of Rosedale (Jack Garret's property)	Levee protecting farmland from flooding	Levee protecting farmland from flooding	0.5	0	1500	Blow outs repaired by the CMA with some landholder assistance	Likely to be private	Blow outs repaired by the CMA with some landholder assistance		
Latrobe River at Rosedale (Tim Bowman's property)	Levee protecting farmland from flooding	Levee protecting farmland from flooding	1	0	1000	Blow outs repaired by the CMA with some landholder assistance	Likely to be private	Blow outs repaired by the CMA with some landholder assistance		
Traralgon Creek in Traralgon	Official Government levee	Official Government levee	3	3	300	Council (council expects to continue to be responsible)	Crown	Council (council expects to continue to be responsible)	Council	Council
1.5km downstream of Traralgon-Maffra road (Neave's property)	Levee protecting farmland from flooding	Levee protecting farmland from flooding	1	0.5	600	Blow outs repaired by the CMA with some landholder assistance	Likely to be private	Blow outs repaired by the CMA with some landholder assistance		
4 km downstream of Traralgon-Maffra road (Marshall's property)	Levee protecting farmland from flooding	Levee protecting farmland from flooding	1	2.5	300	Blow outs repaired by the CMA with some landholder assistance	Likely to be private	Blow outs repaired by the CMA with some landholder assistance		
Latrobe River near Traralgon			0	0	200					Latrobe River Improvement Trust

5km downstream of Traralgon-Maffra road (Barry Farmer's property)	Levee protecting farmland from flooding	Levee protecting farmland from flooding	0.8	0	3500	Blow outs repaired by the CMA with some landholder assistance	Likely to be private	Blow outs repaired by the CMA with some landholder assistance		
Waratah Drainage Area	Pipe (W2) under levee	Pipe (W2) under levee	2.5	2	100	Landholder	Private	Landholder	Landholder	Possibly Council
Waratah Drainage Area	Acts also as access track	Acts also as access track	1	3	200	Landholder	Private	Landholder	Landholder	Landholder
Waratah Drainage Area	Protects land south of levee from hillside runoff	Protects land south of levee from hillside runoff	1.5	1	800	Landholder	Private	Landholder	Landholder	Landholder
Waratah Drainage Area	Keeps drain north of levee running East	Keeps drain north of levee running East	0	0	800	Landholder	Private	Landholder	Landholder	Landholder
			0	0	0					
Diane Court Inverloch	Ayr Creek Levee	Built by Council to protect properties in Diane Court. See 'Ayr Creek Management Plan' for more detail	0	0	0	Council		Council		Council
	Buffalo Tarwin Lower Rd, Middle Tarwin		0	0	390.101		Unknown			
	Shady Creek Levee Banks		0	0	769.959		Unknown			
			0	0	2614.03		Unknown			
		Lake Reeve Floodway Regulating Structure	0	0	51.0866	Wellington Shire Council	Unknown			
			0	0	692.217		Unknown			
			0	0	70.4855		Unknown			
	Eight Mile Road Levee Bank	Eight Mile Road Levee Bank	0	0	985.314		Unknown			
	Bank		0	0	351.017		Unknown			
			0	0	351.017		Unknown			
	Levee between Wrights and Smiths Road		0	0	2704.51		Unknown			
	Wurruk Hotel Levee		0	0	755.564		Unknown			
	Griffioens Levee	Griffioens Levee	0	0	136.664	Wellington Shire Council	Unknown			
	Part of the 'Pound Creek Drainage Area'	Part of the 'Pound Creek Drainage Area'	0	0	3518.41		Unknown			
			0	0	135.381		Unknown			
	Government Road Levee	Government Road Levee	0	0	270.215	Wellington Shire Council	Unknown			
	Blind Joes Creek Levee	Blind Joes Creek Levee	0	0	439.06		Unknown			
			0	0	1274.92		Unknown			
			0	0	1074.78		Unknown			
	Irving Street Levee	Irving Street Levee	0	0	234.961	Wellington Shire Council	Unknown			
	Hansen Street Levee	Hansen Street Levee	0	0	1538.96	Wellington Shire Council	Unknown			
	Shoreline Road Levee	Shoreline Road Levee	0	0	1023.86	Wellington Shire Council	Unknown			
			0	0	1241.1		Unknown			
	Trood Street Levee	Trood Street Levee	0	0	570.793	Wellington Shire Council	Unknown			
		Venus Bay Levees. This acts as a levee for floods, as well as a seawall	0	0	2231.83		Unknown			

Black Swamp Drainage Area		Sea Wall	0	2.5	1209.94		Private	Landholders	Council	Syndicate of 9 landholders
Corner Inlet Drainage Area		Section 5 of the sea wall	0	2	5237.71		Private	Corner Inlet Drainage Area Advisory Committee	Corner Inlet Drainage Area Advisory Committee	First built during the depression. Current walls effectively built during the mid to late 1960's by Council
Corner Inlet Drainage Area		Section 4 of the sea wall	0	2	3250.67		Private	Corner Inlet Drainage Area Advisory Committee	Corner Inlet Drainage Area Advisory Committee	First built during the depression. Current walls effectively built during the mid to late 1960's by Council
Corner Inlet Drainage Area		Section 3 of the sea wall	0	2	3044.12		Private	Corner Inlet Drainage Area Advisory Committee	Corner Inlet Drainage Area Advisory Committee	First built during the depression. Current walls effectively built during the mid to late 1960's by Council
Corner Inlet Drainage Area		Section 3 of the sea wall	0	2	3930.08		Private	Corner Inlet Drainage Area Advisory Committee	Corner Inlet Drainage Area Advisory Committee	First built during the depression. Current walls effectively built during the mid to late 1960's by Council
Corner Inlet Drainage Area		Located immediately East of Section 3	0	2	812.741		Private	Corner Inlet Drainage Area Advisory Committee	Corner Inlet Drainage Area Advisory Committee	First built during the depression. Current walls effectively built during the mid to late 1960's by Council
Corner Inlet Drainage Area		Eastern part of Section 2, as well as Section 1 of the sea wall	0	2	3871.05		Private	Corner Inlet Drainage Area Advisory Committee	Corner Inlet Drainage Area Advisory Committee	First built during the depression. Current walls effectively built during the mid to late 1960's by Council
Corner Inlet Drainage Area		Western part of Section 2	0	2	7590.66		Private	Corner Inlet Drainage Area Advisory Committee	Corner Inlet Drainage Area Advisory Committee	First built during the depression. Current walls effectively built during the mid to late 1960's by Council
Corner Inlet Drainage Area		Located on inland side of Section 3	0	2	298.415		Private	Corner Inlet Drainage Area Advisory Committee	Corner Inlet Drainage Area Advisory Committee	First built during the depression. Current walls effectively built during the mid to late 1960's by Council
Shady Creek Drainage Area		Located in Shady Creek Drainage Area, on Corner Inlet	0	0	333.537					
Shady Creek Drainage Area		Located in Shady Creek Drainage Area, on Corner Inlet	0	0	347.583					
Shady Creek Drainage Area		Located in Shady Creek Drainage Area, on Corner Inlet	0	0	315.246					
	Structures east of Port Welshpool		0	0	2105.91					
	Albert River at Port Albert Levees		0	0	0					
		Levee used for flood protection so known as an 'outer levee bank'	0	0	3088.83					
North of Tarwin River	Tarwin Lower Levees and Sea Walls	Known as an 'inner tide bank'. 'Inner tide banks' are only to protect from salt water inundation. Recently the Tarwin Bass Waterways Authority surveyed this bank to check the height complied with it's guidelines	0	0	2720.13		Private		Tarwin Bass Waterways Authority	Landholder
		Levee and fenced/vegetated silt trap	0	0	0					

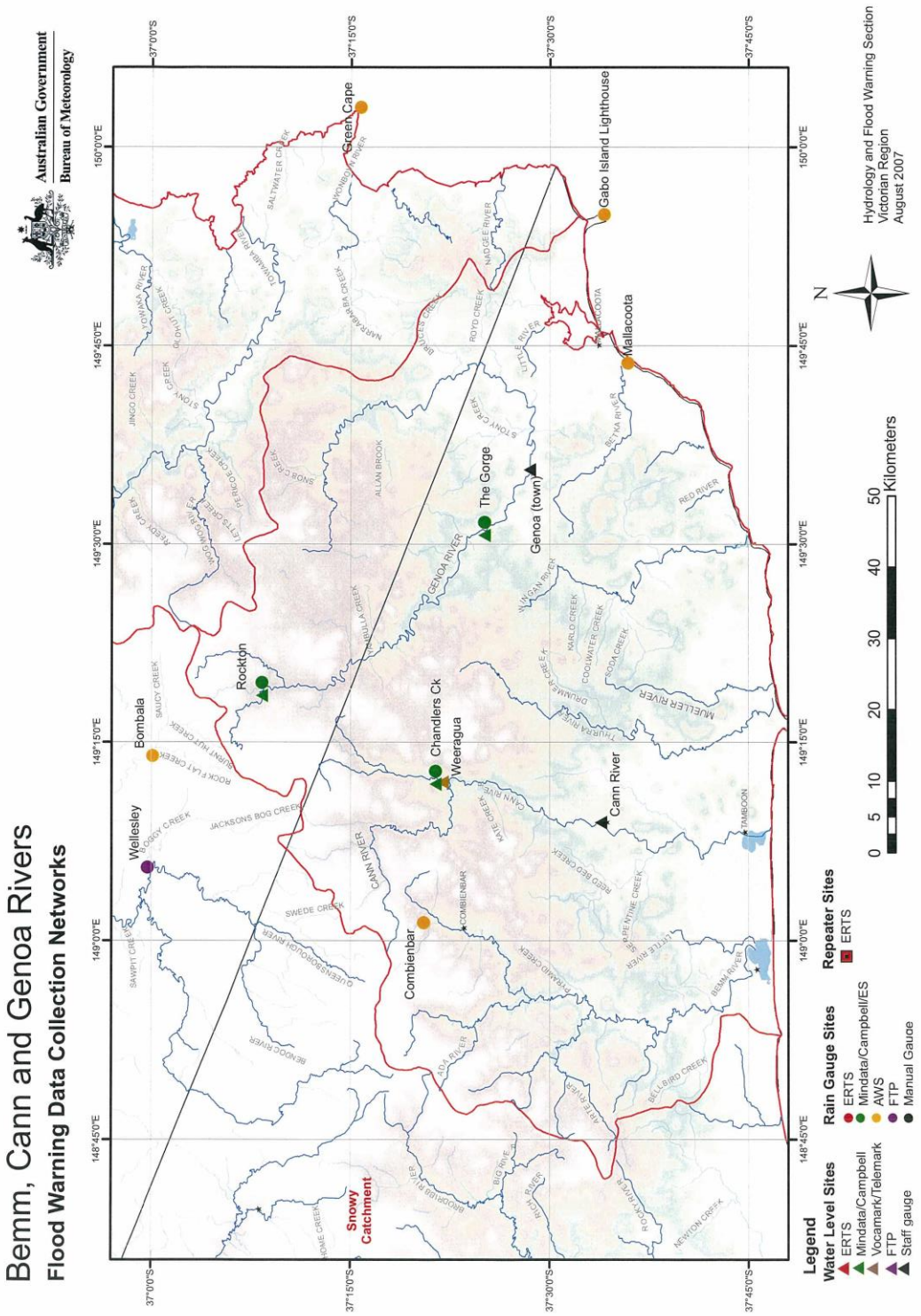
		Levee and fenced/vegetated Silt Trap	0	0	0					
		Levee	0	0	0					
	Dowd Morass Levees		0	0	0					
		Old Levee	0	0	0					
	Macalister Levees		0	0	0					
		Known as 'Matheson's bank'	0	0	0					
		Raised road (about 18"")	0	0	0					
Sandy Point Drainage Area		Protects land all along the drain from tidal intrusion	0	2.5	0		Private	Individual Landholders	Individual Landholders	Individual Landholders
	Moe Drain North Side Levee	north and south – from near Yarragon to downstream of Trafalgar East	0	0	0					
	Moe Drain South Side Levee		0	0	0					

Attachment 3 – Major catchment maps and flood gauges

The East (Gippsland) Region catchment maps and associated monitored flood gauges have been provided by the BOM, and were last updated in 2013.

For further information please refer to the following links:

- FloodZoom (those with user access) – https://www.floodzoom.vic.gov.au/FIP.Site/map
- BOM – http://www.bom.gov.au/vic/flood/rain_river.shtml



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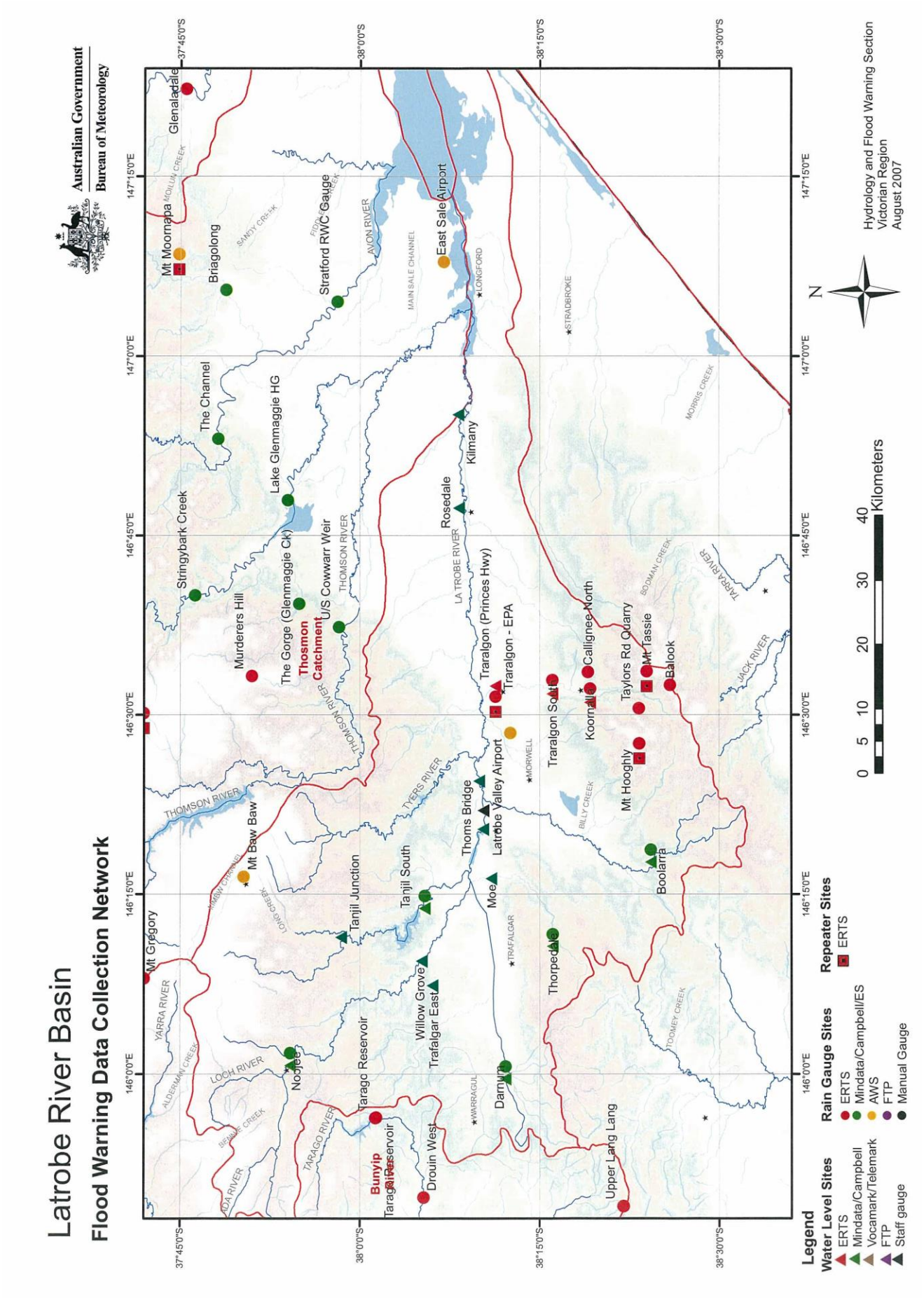

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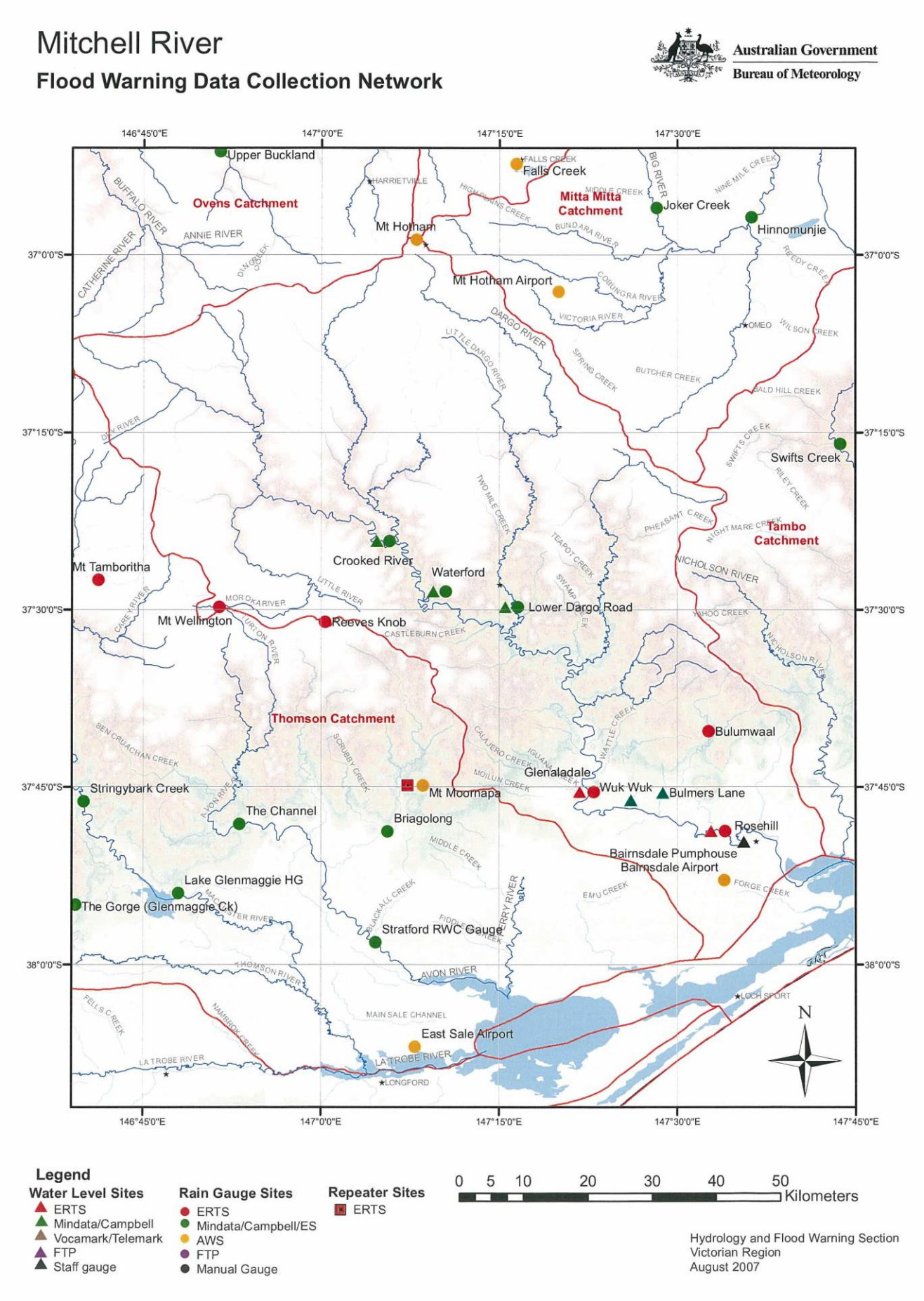

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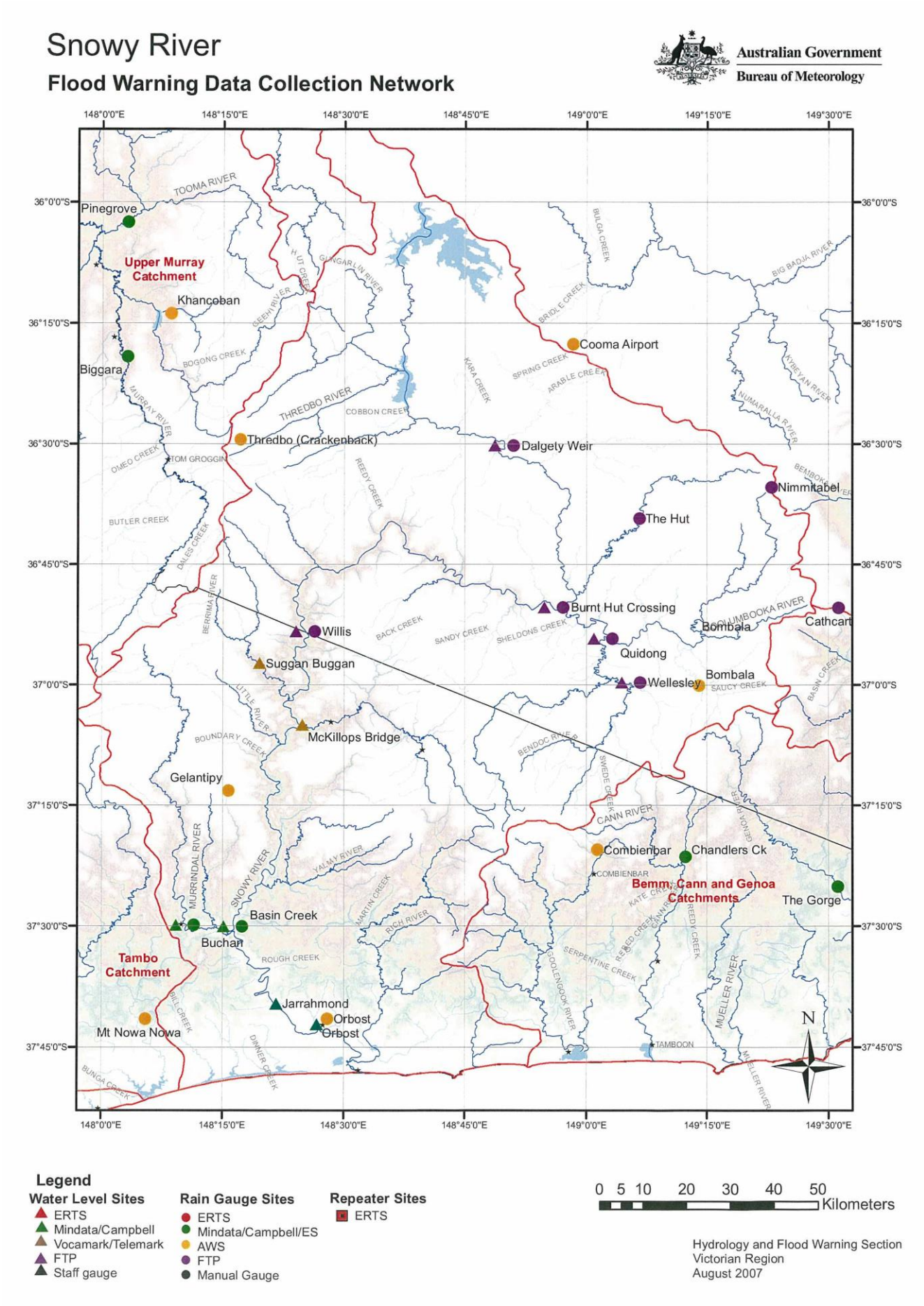

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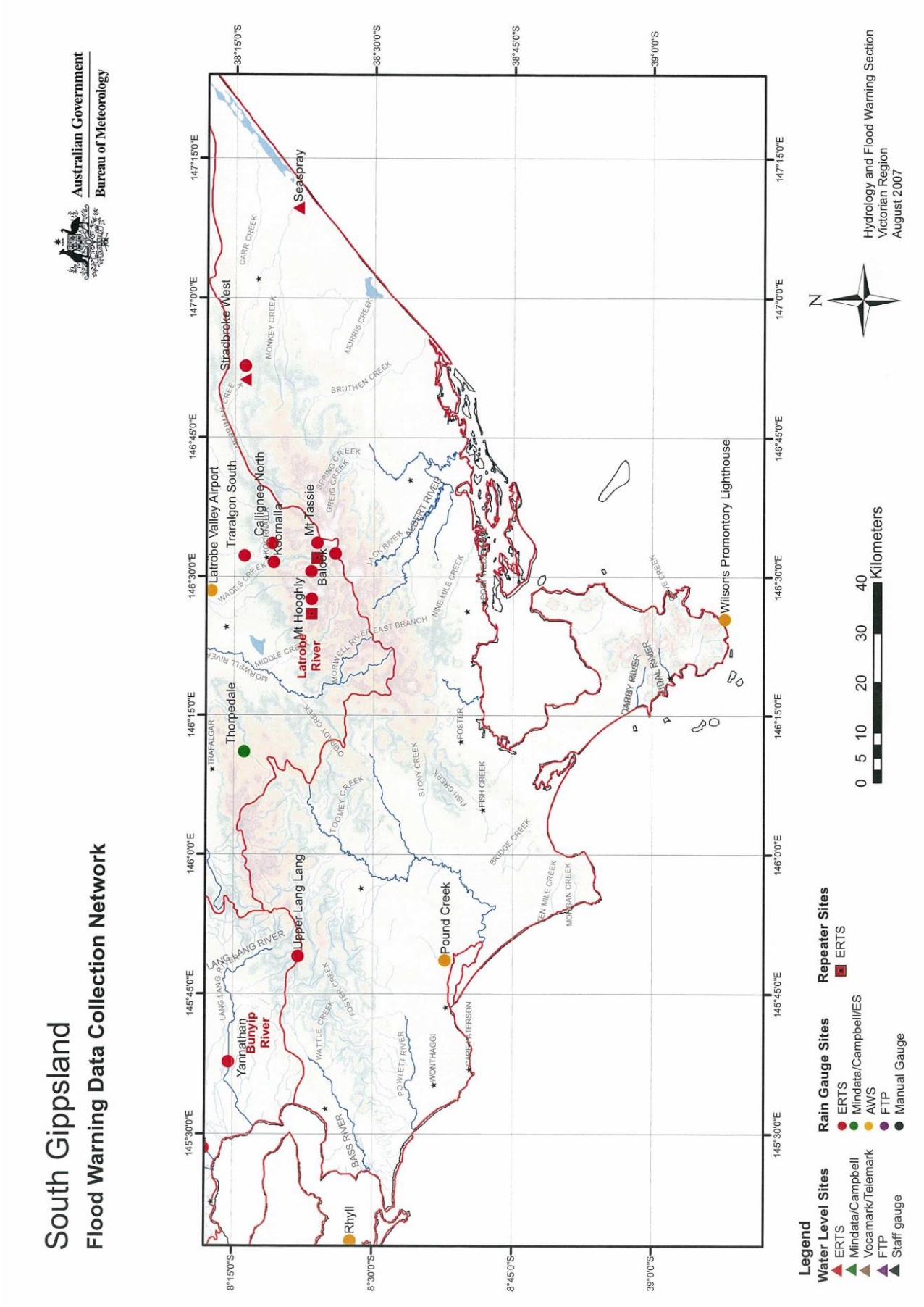

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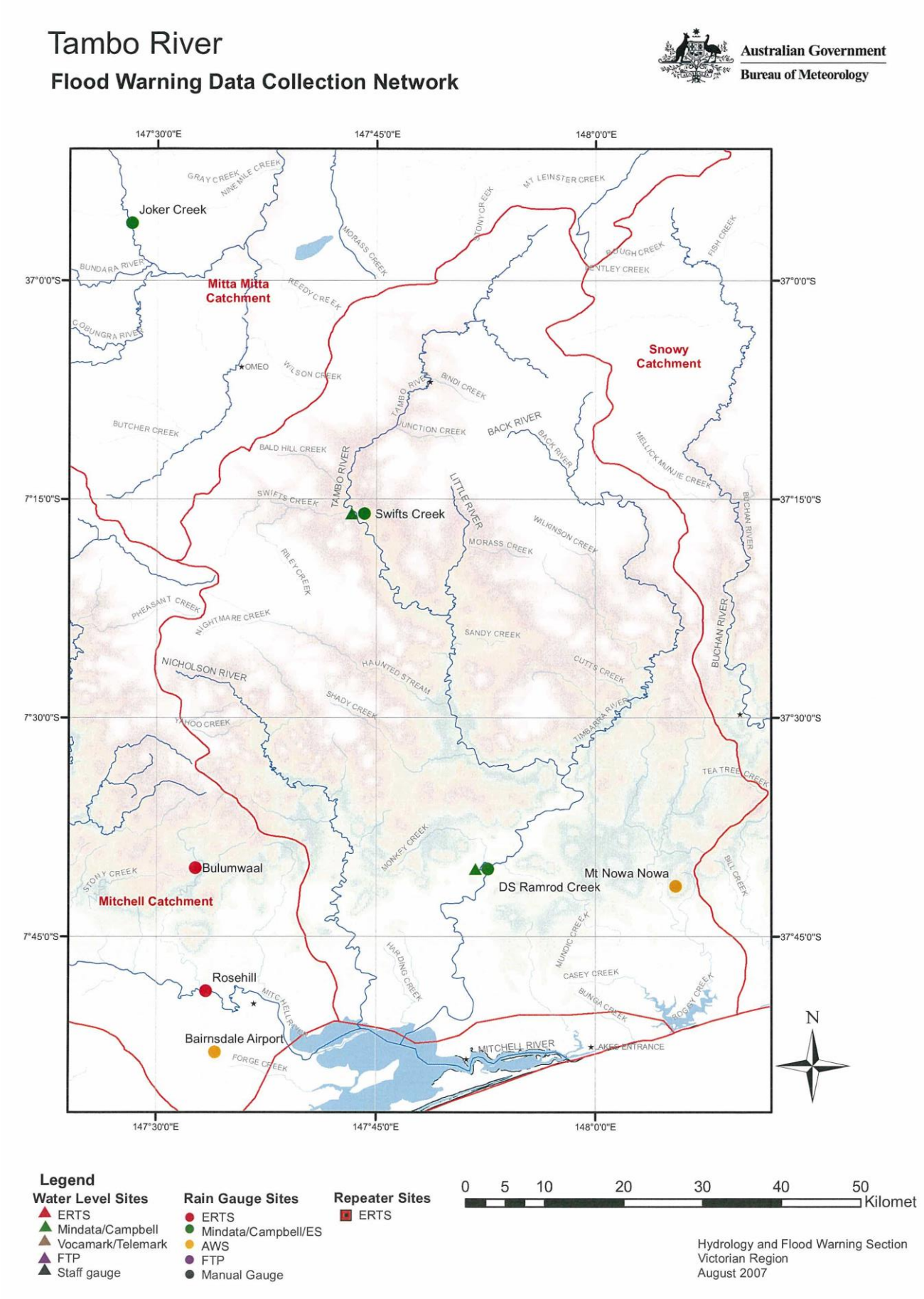

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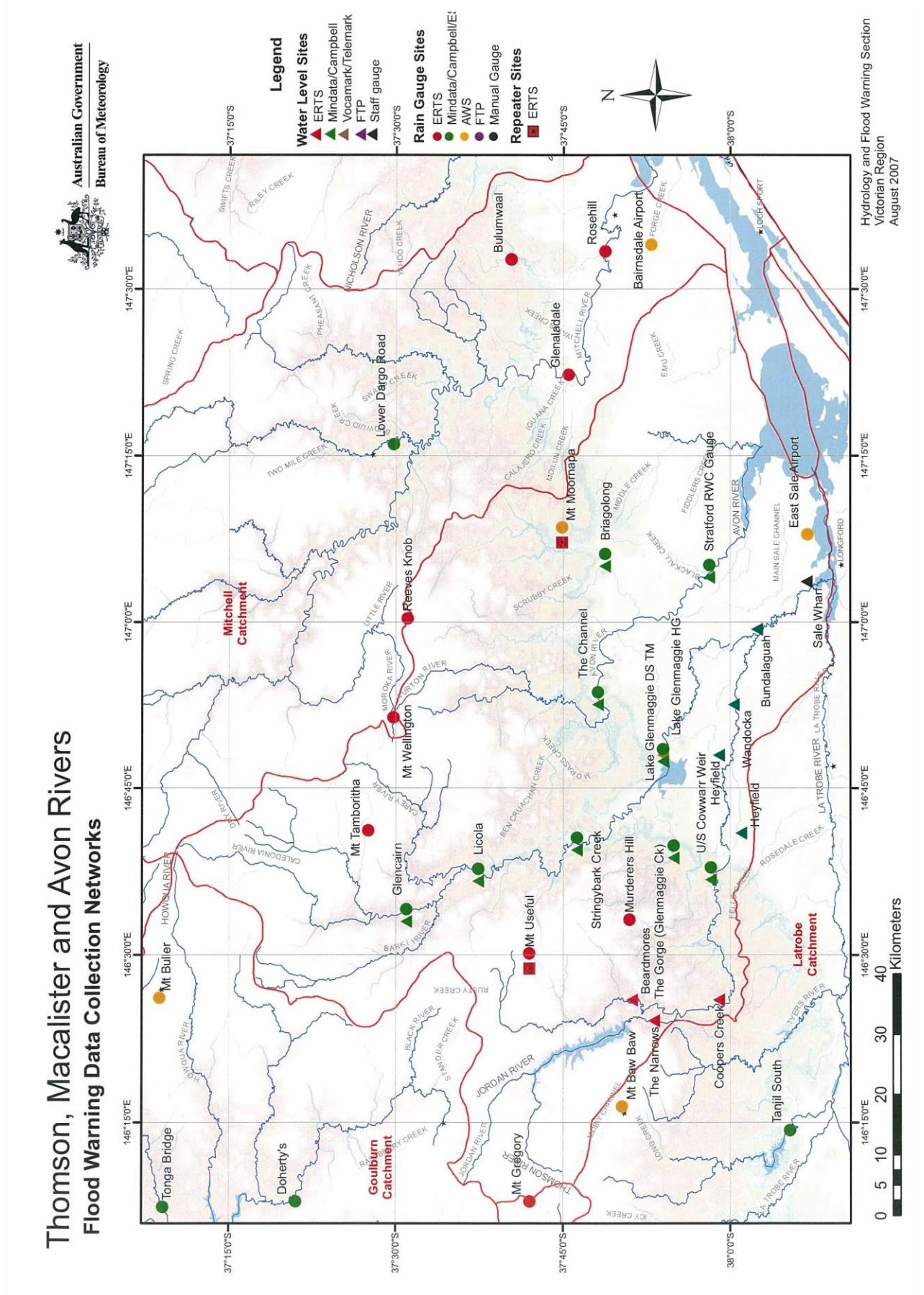


Attachment 4 – Municipal Flood Emergency Plans and Local Flood Guides List

All LFGs are published at www.ses.vic.gov.au/get-ready/your-local-flood-information and in FloodZoom (user access required) at https://www.floodzoom.vic.gov.au.

Local Government Area (All have MFEPS)	Local Flood Guides
Bass Coast	N/A
Baw Baw	Moe River Flats Warragul
East Gippsland 1 x MFEP with Gippsland Lakes attachment 1 x MFEP without Gippsland Lakes attachment	Eagle Point Lakes Entrance Metung Paynesville Raymond
Latrobe	N/A
South Gippsland	Tarwin Valley
Wellington	Avon River Catchment (Briagolong, Bushy Park, Boisdale and Stratford) Hollands Landing Loch Sport Macalister Catchment (Licola, Glenmaggie, Tinamba, Newry, Maffra and Riverslea) Sale Boisdale

Attachment 5 – Regional resources

The table below outlines the resources available for response held by East Region VICSES Units.

See relevant MFEP for more detail and refer to Attachment 6 – VICSES Unit Map and Contacts.

Unit name	Primary vehicle/s	Support vehicle/s	4WDs	Boats	Trailers	Lighting towers
Bairnsdale	Primary Rescue (heavy)	Storm/ rescue support	4WD x 2	Rescue Boat – 5.0 Gemini RIB Rescue Boat – 4.7 Jabiru	Storm Trailer	N/A
Bruthen	Ranger 4WD	Storm/ rescue support	4WD x 1	N/A	Storm Trailer	Light Tower
Bendoc	Primary Rescue (Medium)	Storm/ rescue support	4WD	N/A	N/A	N/A
Buchan	Primary Rescue (6 wheel drive medium)	Storm/ rescue support	4WD	N/A	Storm Trailer – (Due Mid 2018	N/A
Cann River	Primary Rescue (Medium)	Storm/ Rescue Support	4WD x2	Rescue Boat – 3.8 Quicksilver IRB (Inflatable Rigid Hull)	N/A	Light Tower
Erica	4WD	Storm/ Rescue Support	4WD	N/A	Storm Trailer	Light Tower
Foster	Primary Rescue (Medium)	Storm/ Rescue Support	4WD x2	Rescue Boat – 4.8 Zodiac RHIB (Rigid Hull Inflatable Boat)	Storm Trailer	Light Tower
Inverloch	4WD Twin cab ute	Medium truck to tow boat	4WD	Off Shore Rescue Boat 8.0 Stabicraft & Rescue Boat – 4.8 Zodiac RHIB (Rigid Hull Inflatable Boat)	N/A	N/A
Leongatha	Primary Rescue (Heavy)	Storm/ Rescue Support	4WD x 2	N/A	N/A	Light Tower
Loch Sport	Ranger 4WD	Storm/ Rescue Support	4WD x 1	Rescue Boat – 5.0 Gemini RIB	Storm Trailer	N/A
Maffra	Primary Rescue (6 wheel drive Medium)	Storm/ Rescue Support	4WD x 2	N/A	Storm Trailer	N/A
Mallacoota	Primary Rescue (Medium)	Storm/ Rescue Support	4WD	Rescue Boat – 4.7 Jabiru Rescue Boat – 4.0 Zodiac IRB IRB (Inflatable Rigid Hull)	N/A	N/A
Moe	Primary Rescue (Medium)	Storm/ Rescue Support	4WD x 2	Rescue Boat – 4.2 Gemini RIB	Storm Trailer	N/A

Morwell	Primary Rescue (Heavy)	Storm/ Rescue Support	4WD	Rescue Boat – 5.2 Jabiru & Rescue Boat – 3.8 Quicksilver IRB (Inflatable Rigid Hull)	N/A	Light Tower
Traralgon (Morwell satellite)	Primary Rescue (Heavy)	Storm/ Rescue Support	4WD	N/A	Storm Trailer	N/A
Orbost	Primary Rescue (Heavy)	Storm/ Rescue Support	4WD	Rescue Boat – 4.7 Jabiru	Storm Trailer	N/A
Phillip Island	Primary Rescue (Heavy)	Storm/ Rescue support	4WD	N/A	Storm Trailer	N/A
Rosedale	Primary Rescue (Heavy)	Storm/ Rescue Support	4WD	N/A	Storm Trailer	Light Tower
Sale	Primary Rescue (Heavy)	Storm/ Rescue Support	4WD x 2	Rescue Boat – 4.8 Zodiac RHIB (Rigid Hull Inflatable Boat)	Storm Trailer	N/A
San Remo	Primary Rescue (Heavy)	Storm/ Rescue Support	4WD	N/A	N/A	N/A
Stratford	Primary Rescue (Medium)	Storm/ Rescue Support	4WD x 2	N/A	N/A	N/A
Tambo Valley	Primary Rescue (Medium)	Storm/ Rescue support	4WD	N/A	N/A	N/A
Warragul	Primary Rescue (Medium)	Storm/ Rescue support	4WD	N/A	Storm Trailer	Light Tower
Drouin (satellite of Warragul)	Primary Rescue (6 wheel drive Medium)	Transport	4WD	N/A	N/A	N/A
Wonthaggi	Primary Rescue (Heavy)	Storm/ Rescue support	4WD x 2	N/A	Storm Trailer	N/A
Yarram	Primary Rescue (Medium)	Storm/ Rescue support	4WD	Rigid Savage Jabiru	N/A	N/A

Note: Only Storm Trailers that meet the approved specifications are on the list – not boxed trailers adapted for use as Storm response trailers.

All requests for such resources should be made via the relevant RAC.

In addition to the unit resources listed above the following VICSES regional strategic resources and composite teams are available.

- 1 x Field Operation Vehicle (Mobile Command Facility).
- 1 x Sandbag Filling Trailer – Stratford.
- 2 x USAR Trailers – Erica .
- Land Based Swift Water Rescue Team – trained personnel exist within the region and are subject to availability.

- 1 x Logistics Truck (with staging area or base camp equipment).

CFA and DELWP maintain specialist resources that are able to be utilised by VICSES during flooding, including:

- IMT personnel.
- Chainsaw Crews.
- Arborists.
- Initial Impact Assessment Teams.
- Base Camp Teams.
- Staging Area Teams.
- Health Monitoring units.

VICSES maintains small community sandbag caches which are listed in the relevant MFEPS. The primary contact person to access these reserves is the VICSES East Regional Duty Officer.
The region also holds strategic reserves of sandbags at the following locations:

Unit Name	Quantities (individual sandbags)
Bairnsdale	2,500
Bendoc	100
Bruthen	1,400
Buchan	3,000
Cann River	2,000
Erica	2,000
Foster	3,500
Inverloch	500
Loch Sport	2,000
Maffra	4,000
Mallacoota	2,000
Moe	3,000
Morwell	5,00
Orbost	2,000
Phillip Island	3,000
Rosedale	1,000
Sale	13,000
San Remo	600
Stratford	10,000
Tambo Valley	1,000
Warragul	4,000
Wonthaggi	7,000
Yarram	2,000
East Region Logistics Building - Bairnsdale	40,000

Sand is available from the following suppliers in region:

Company name	Address	24hr access	BH number	Contact name	AH number	Nominal quantities on site	Supplier in unit area
Jarvis Sand & Soil	14 Mc Millan Street, Lucknow, 3875	Yes	03 5153 1668	Trevor Jarvis	0418 516 307	50 + Metres Access to quarry	Bairnsdale
Riviera Garden Centre	57 Paynesville Road, Paynesville, 3880	Yes	(03) 5156 7466	Anne Maree Higgins	0412 560 338	10 mts Brick 10 mts Washed	Bairnsdale
REAL Hire and Garden Supplies	Princes Hwy, Kalimna West, 3909	Yes	03 5155 5908		0407 096 172	30	Bruthen
Moe Garden Supplies	123 Moore Street, Moe, 3825	Yes	5127 2394	Julie	0409 818 593	100Mts +	Moe Erica Morwell Warragul Rosedale Maffra
Firmins Lane Garden Supplies	195 Firmins Lane, Morwell, 3840	Yes	03 5133 9360	Anne	03 5133 9360	40	Morwell
Ross Chapman Cartage and Earthmoving Contractor	5975 Bass Highway Inverloch, 3996	No	03 5657 4444	Nick	0408 032 387	300	Phillip Island San Remo Wonthaggi Inverloch Foster Leongatha Warragul Moe Morwell Access to East Gippsland Trucks
Sale Garden Supplies	42 Princes Hwy, Sale, 3850	Yes	(03) 5144 4800	Ryan	0439 442 527	50	Sale Maffra Stratford

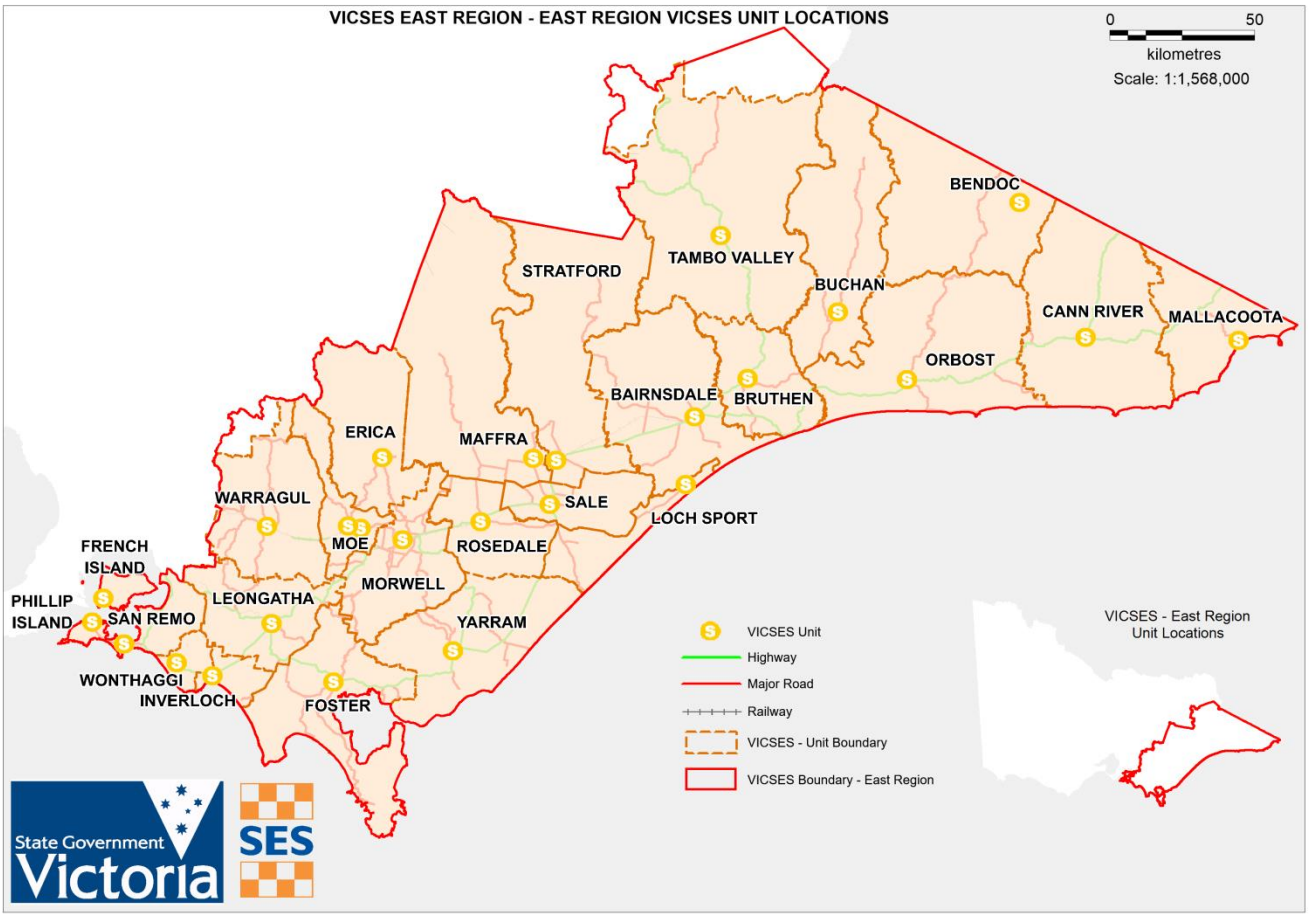
Omeo Concrete	100 Bindi Road, Swifts Creek 3896	Yes	(03) 5159 4307	Stephen Richards	0417 594 444 0427 594 444	100+	Tambo Valley
Warragul Garden Supplies	4 Normanby Street, Warragul, 3820	No	(03) 5623 4522	-	-	50+	Warragul
Donmix	Old Powerhouse Site, Wonthaggi 3995	No	03 5672 3733	-	-	100+	Wonthaggi Inverloch

Attachment 6 – VICSES Unit map and contacts

Units within East (Gippsland) Region include:

- Bairnsdale
- Bendoc
- Bruthen
- Buchan
- East RECC Unit
- East RHQ Support RSU
- Erica
- Foster
- Inverloch
- Leongatha
- Loch Sport
- Maffra
- Mallacoota
- Moe
- Morwell
- Orbost
- Phillip Island
- Sale
- San Remo
- Stratford
- Tambo Valley
- Warragul
- Wonthaggi
- Yarram

Map of VICSES Units within the East (Gippsland) Region:



EAS - Contact number 1800 609 511

Unit Name	Address	Paging Number
Bairnsdale	189 McLeod Stree, Bairnsdale, VIC, 3875	30095
Bendoc	Cnr James & Nichol Streets, Bendoc, VIC, 3888	30099
Bruthen	51 Main Street, Bruthen, VIC, 3885	30101
Buchan	32 Main Street. Buchan, VIC, 3885	30103
Cann River	29 Monaro Hwy, Cann River, VIC, 3890	30105
Erica	1A Lehman Crt, Rawson, VIC, 3825	30109
Foster	14 Pioneer Street, Foster, VIC, 3960	30111
Inverloch	23 Bear Street, Inverloch, VIC, 3996	30113
Leongatha	12 Watson Road, Leongatha, VIC, 3953	30115
Loch Sport	105 National Parks Drive, Loch Sport, VIC, 3851	30117
Maffra	90 Landy Street, Maffra, VIC, 3860	30119
Mallacoota	Lees Road, Mallacoota, VIC, 3892	30121
Moe	265 Monash Road, Moe, VIC, 3825	30123
Morwell	75 Airfield Road, Traralgon West, VIC, 3844	30125
Orbost	5 Wolseley Street, Orbost, VIC, 3888	30127
Phillip Island	125/127 Settlement Road, Cowes, VIC, 3922	30129
Rosedale	47 Cansick Street, Rosedale, VIC, 3847	30131
Sale	37 Union Street, Sale, VIC, 3850	30133
San Remo	14 Davis Point Road, San Remo, VIC, 3925	30135
Stratford	53 Mac Farlane Street, Stratford, VIC, 3862	30137
Tambo Valley	6870 Great Alpine Road, Swifts Creek, VIC, 3896	30139
Warragul	160 Queen Street, Warragul, VIC, 3820	30141
Wonthaggi	319 White Street, South Dudley, VIC, 3995	30143
Yarram	Railway Ave, Yarram, VIC, 3971	30145

Attachment 7 – East (Gippsland) Region detailed flood history

A list of known flood events and associated consequences is provided in the tables below. Where gaps in data or information exist due incomplete record keeping for historic events, this is identified by use of a symbol (-).

Year	Catchments impacted	Description
1894	Gippsland Lakes	-
1920	Tambo River	Largest flood on record at Bruthen.
Nov 1934	Port Phillip South Gippsland	Across the Port Phillip and South Gippsland regions, 350mm was recorded over a 48-hour period, resulting in landslides, road closures and evacuations. The floods caused 36 deaths across south-east Melbourne, left 6,000 homeless and are noted as the region's most destructive on record (Southern Ocean Exploration 2005). The damage to buildings, roads and infrastructure as a result of the flooding and subsequent landslips was unparalleled.
1934	Moe River	Largest flood on record.
1934	Snowy River	Orbost
1934	Latrobe River	Largest flood on record at Rosedale.
April 1935	Merrimans Creek	The north end of Seaspray township was a huge lake. Every house was surrounded by water, and the few occupants were moving about bare-footed, and in long water-proof boots. They were unable to get to Sale in their cars until the water between Longford and Sale receded. The bridge at Longford became impassable, and most of Punt Lane was underwater. The north end of Seaspray will always be subject to flooding until there is an effective drainage scheme, which is long overdue.
1936	Mitchell River	Largest flood on record at Bairnsdale.
April 1950	Avon/Perry Rivers	Floodwaters reached an 80ft. span of the Avon River bridge at Stratford where a woman fell to her death. Families in the Sale and Maffra districts were evacuated from their homesteads.
1951	Gippsland Lakes	Largest flood on record.
May 1951	Powlett River	The flood submerged the Wonthaggi to Dalyston road under 750mm of water near Wonthaggi cutting the town off to the north. The river, which is normally 18 metres wide, was up to 800 metres wide. Roads to Wonthaggi from Bass, Loch, and Korumburra, the Woolamai-Glen Forbes road, and the Bass-Glen Forbes road were all closed due to flooding.
1952	Merrimans Creek	Residents of Seaspray had plenty of notice that Merrimans Creek would break its banks and overflowed into the settlement. The residents who were likely to suffer evacuated carefully, lifting floor coverings and storing furniture high enough to be out of the way of serious damage. Soon after the people were out of the danger section, the overflowing creek waters were lapping the floorboards. Still rising at a high rate of speed, these waters swirled through the houses leaving a trail of mud and debris. Fortunately there was no sandbar across the mouth of the stream on this occasion and as the water backed up, it forced its way out to sea.
1952	Tambo River	Swifts Creek
June 1952	Snowy River	Snowy River was 10 miles wide at Orbost. 400 men, women and children were flooded out, many rescued from barn lofts. Some farms were inundated to a depth of 25ft. To the east of Orbost, the Princes Hwy was 10ft under water for three

		miles. Nearly half of Orbost railway station was washed away.
1971	VICSES East Gippsland -Cann River -Snowy River -Genoa River	In Genoa, floodwaters reached the top of the counter in the general store and the first step from ground on the east side of the Hotel. Cann River and Orbost
1978	Merrimans Creek	The highest flood on record until 1980. 42/55 permanently occupied residential properties sampled were flooded at or above floor level, while 38/42 seasonally occupied residences sampled were flooded at or above floor level. Only 15-20 allotments out of a total of approximately 320 allotments were not subjected to any inundation during the June 1978 flood. One of the largest on record.
1978	Thomson River	Sale
1978	Traralgon Creek	Traralgon
1978	Latrobe River	Rosedale
1978	Snowy River	Orbost
June 1980	Tambo River	The highest flood since that of 1870, resulting in much damage. The river was still rising when the 22ft. gauge was washed away. A woman named Hunt and her family of small children were surrounded by deep water, but were rescued. The whole of the Kilmorie flats and a large portion of the Mossiface estate were submerged. Many people lost everything.
1990	Mitchell River	At Glenaladale the river rose rapidly to high levels. Severe flooding occurred on the Lindenow flats and a rapid rise was experienced at Bairnsdale. Mitchell River flows in the lower catchment were also the highest measured on record. The whole floodplain between Glenaladale and Bairnsdale was inundated and extensive damage to vegetable crops and property occurred along the Mitchell River flats. A fatality occurred on the Mitchell River below Bairnsdale when a boat owner was trapped in his capsized boat at the old road bridge near Lake King. In the Bairnsdale area 46 houses were flooded and seven at Lindenow. Agricultural damages for the Mitchell River floodplain were $4.8 million, and road damages in City and Shire of Bairnsdale were $450,000.
April 1990	Avon/Perry Rivers	Flooding in the Avon in April 1990 was significantly larger than the previous highest recorded flood in 1971. In Boisdale, overbank flooding caused serious problems to houses and property, especially along the western floodplain. Indications are that it was a 1 in 50 yearr Average Recurrence Interval (ARI) flood event. The river overflowed and caused major flooding across the full extent of the floodplain downstream through Stratford and to Lake Wellington. Major breakouts occurred in the Nuntin Creek (Drain) area. 70 houses were flooded at Boisdale and surrounding districts. In Boisdale and surrounding districts, 70 houses were flooded with 26 out of the 29 houses in the township flooded and all residents evacuated. At Stratford and surrounds 51 houses were flooded. The Princes Highway at Stratford was cut and the rail bridge was severely damaged.
April 1990	Thompson River Macalister Rivers	Peak inflows to Lake Glenmaggie took the storage from 11% to 90%. Had Lake Glenmaggie not mitigated the flood in the Macalister, flood damage in Maffra and Sale area would have been substantially more severe, likely producing a record flood at Sale. As the Thomson River flood approached Sale it flattened out with the South Gippsland Highway being cut early.

		The Port of Sale was flooded and both the Princes Highway and South Gippsland Highway cut at the peak of the flood. Heyfield was the most impacted community during this event.
1993	Traralgon Creek	The September 1993 flood is the largest recorded gauge height reaching a height of 5.64m at Traralgon (adjusted to current gauge Australian Height Datum (AHD) would be 4.90m). There were substantial river modification works completed in the 1980s. During this event 24 residential properties and three commercial properties were flooded above floor. An additional 99 properties were flooded below floor. The estimated total flood damages were $770,000 (HydroTechnology, 1995).
Sept 1993	Merrimans Creek	This event was considered to be a 2% AEP / 50yr ARI event. 186 blocks were impacted, 140 with houses, 75 impacted, 44 flooded above floor level. Seaspray Road area was evacuated with little warning due to the unexpected direction of the floodwaters. Properties on the south-east side of the Lake Reeve floodway were largely spared from flooding, however, some properties were affected by water which flowed under the floodway through the stormwater drainage system. Financial impact equalled approximately $1.3 million for urban residential damage in Seaspray and $134,000 for infrastructure.
Sept 1993	Thomson River	Sale
Sept 1993	Latrobe River	Rosedale
1995	Traralgon Creek	The November 1995 flood is the second largest in modern times, reaching a height of 5.60m at Traralgon (4.86m adjusted height). The flood inundated 24 residences, 3 public buildings and 99 residential allotments, commercial and public building areas as well as low lying creek frontage farm and recreation land.
1998	Tambo River	Swifts Creek
1998	Mitchell River	Glenaladale
1998	Cann River	Weeragua
1998	VICSES East Gippsland	There had been 2.5 years of drought in the lead up to the 1998 flood event. Princes Highway at the Mitchell River Bridge was closed to all traffic. Mitchell Gardens and Wuk Wuk Caravan parks evacuated. State Government financial response to the event reached $62.5 million. Estimated total damage across east Gippsland was $77.5 million. One life was lost, $10.5 million of roads and bridges were destroyed, almost 40,000 sheep and cattle perished and more than 300 houses were damaged by flood water across east Gippsland.
April 2007	Avon/Perry River	At Briagolong on Freestone Creek as well as at both The Channel and Stratford (Avon River), levels and flows were lower than in April 1990, although at Stratford it was very similar. The assessed ARI varied from 22 years at Briagolong to 40 years at The Channel.
June 2007	Snowy River	Resulted in major flooding and widespread damage to community and public assets in Gippsland. The upper parts of the Snowy River catchment experienced minor flooding while the Buchan River and the lower reaches experienced moderate flooding, with the exception of the area around Jarrahmond where the river exceeded the major flood level by around 300mm.
June 2007	Tambo River	A total rainfall in excess of 300mm over two weeks resulting in a flood level on the Tambo River of an estimated 6.18m. Omeo, Swifts Creek, Bruthen, Tambo Upper, Swan Reach, Johnsonville, Metung, and Nicholson all experienced varying degrees of flooding. Major damage was sustained to the old timber bridge over the Tambo River on Stephenson Road which was subsequently replaced by a

		higher concrete bridge. The Princes Hwy was cut at Nicholson and at Lakes Entrance, impacting the townships of Nicholson, Johnsonville and Swan Reach preventing deliveries for two days. The jetty and car park at Nicholson was totally submerged resulting in damage to the toilet block and the Nicholson Angling Club meeting rooms.
June 2007	VICSES East Gippsland -Mitchell River -Avon River -Gippsland Lakes	Rainfall totals exceeded previous highest recorded values in Bairnsdale. Water velocities were high and river rises rapid along parts of the Mitchell River. Flood peaks were significant and in some locations exceeded the April 1990 and June 1998 levels with the event being assessed as a 77 year ARI event at Glenaladale. The floodplain downstream from Glenaladale flooded extensively, flooding was also experienced at Bairnsdale, where the river peaked at the Pumphouse gauging station above 7.66m, the third highest on record. The main water supply pipe to Lindenow and Lindenow South was fractured under the river. Forge Creek Road was washed out, Eastwood Bridge was under more than a metre of water and the Wy Yung football clubhouse all but disappeared. Crops lost totalled $3.4 million. Infrastructure loss equalled $1.1 million. Estimated direct damage was of the order of $110 million and total damage upwards of $116 million. Water levels in the Gippsland Lakes rose over 1.3m above normal lake level as floodwaters from the surrounding rivers entered, this event was estimated to be around a 20 year ARI event. All lakeside communities were impacted to different degrees including Hollands Landing, Seacombe, Loch Sport, Paynesville, Eagle Point, Raymond Island, Metung, Mosquito Point, Tambo Bay and Lakes Entrance. There were many isolations in most of these communities for an extended period. The Raymond Island Ferry ceased operating and isolated residents for 7 days causing over 70 residents and visitors to leave the island. In all, 13 houses and 30 sheds were inundated in the town and along the north western shoreline of the Island.
June 2007	Thompson River Macalister River	Upstream of Lake Glenmaggie, the flood significantly damaged 22km of the southern-most end of Tamboritha Road which is the main access to the Alpine National Park and other public land from the west. There was also significant damage to the Licola Road, including a partial failure of the bridge into the town of Licola, and the loss of Cheynes Bridge, between Heyfield and Licola. Several school camps and caravan parks upstream of Lake Glenmaggie were destroyed, while downstream of the dam significant areas of rural land was inundated, causing damage to fences, crops, shedding, roads and bridges.
July 2007	Powlett River	Powlett River burst its banks and flooded the area in the immediate vicinity of the desalination plant. Levels began to drop after excavators opened the mouth of the river to enable water to drain to sea.
Nov 2007	Macalister River	d/s Glenmaggie
March 2011	Tarwin River	Flooding of Fish Creek (Tarwin River) caused evacuation and road closures. This flood event also affected the Darby River, and culminated in the closure of a number of roads around Yanakie, in particular the access road to the Promontory. Three metres of the Darby River bridge was washed away by the surging waterway, forcing the largest Australian air lift evacuation of stranded people since Cyclone Tracey.
March 2012	Snowy River	The 2012 event is a combination of two consecutive rain events combined with Jindabyne Dam reaching capacity and spilling, followed by a managed spill from Jindabyne to relieve flooding impacts around

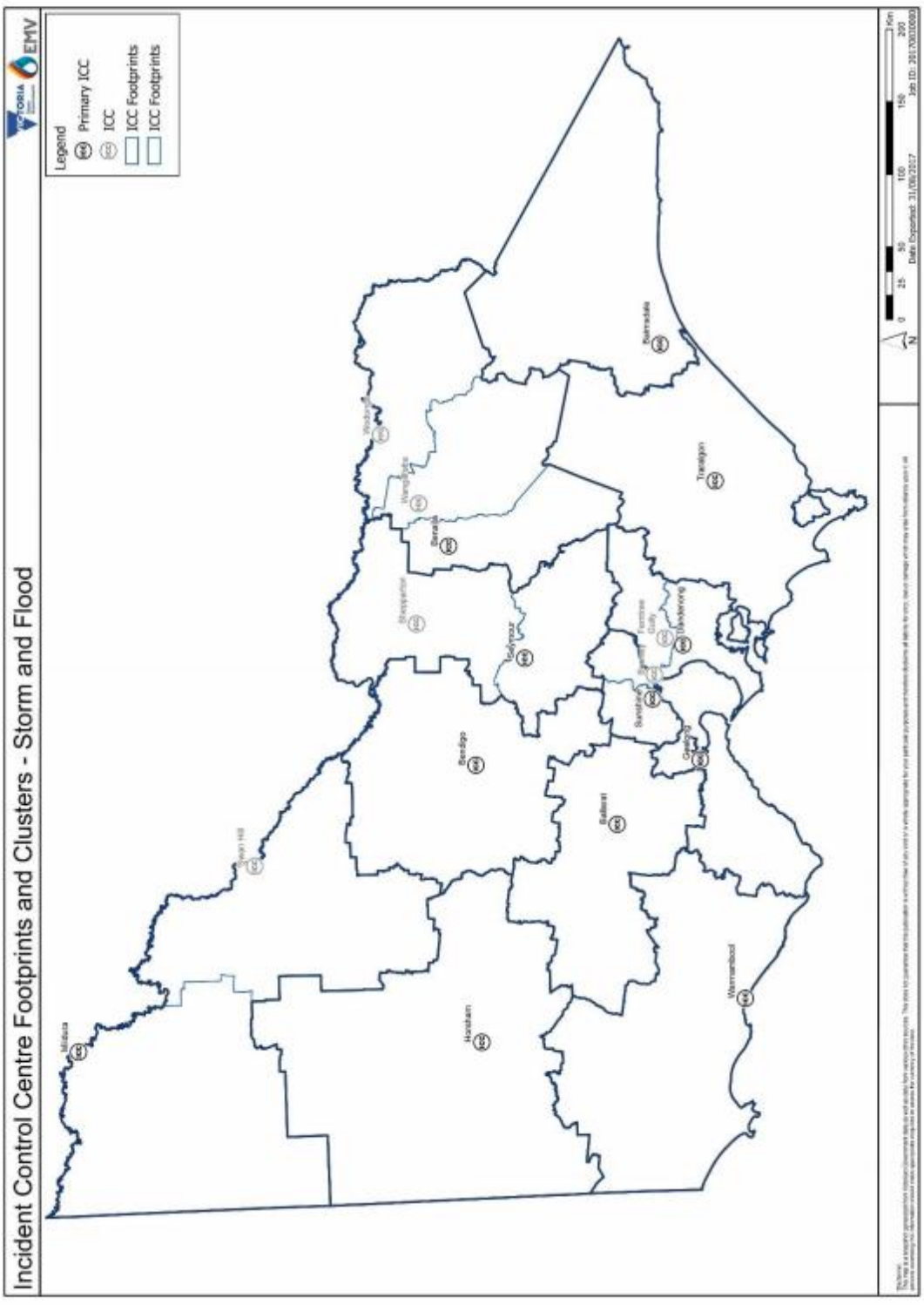
		Lake Jindabyne. In just six days, the inflows into the Snowy catchment accounted for nearly as much water as all the rain that fell in the whole of the drought-hit year of 2006. Over the course of the month, the Snowy had experienced what experts say was a one-in-500-years flood, turning the lower river into a torrent.
May 2012	South Gippsland	Heavy rain on 25 May 2012 (50mm to 80mm in 10 hours) on wet catchments resulted in widespread flooding across West and South Gippsland. A number of roads were closed following large storms, causing significant traffic impacts in both instances. The high rainfall events were responsible for a number of landslips throughout the steeper regions of South Gippsland Shire. Water washed over about 40 of the roads Bass Coast Shire Council is responsible for, including the Kongwak to Outtrim Road and shutting Heslop Road in Wonthaggi as well as McCraws Road in Wattlebank. The Bass Highway was closed at Kilcunda. VICSES crews rescued people in cars trapped by floodwater on the Bass Highway at Kilcunda and at Lance Creek. Water overtopped the Bass Highway at Dalyston as well as at Bourne Creek in Kilcunda.
May and June 2012	Moe River/Canal	The May event recorded the equal highest level on the Moe River at Darnum (4.9m recorded in July 1996 and also the major flood level) and the June event was the 7th highest on record. Both events caused significant flooding along the Moe River Drainage Canal. A number of roads were closed and properties isolated.
June 2012	Gippsland catchments	Substantial rainfall, resulting in major flooding in ten catchments across Gippsland. Rainfall levels included 173mm on the Tambo River at Mt. Elizabeth. Infrastructure, such as bridges, roads and recreational areas (including caravan parks) was damaged. Some locations east of Bairnsdale temporarily lost power and landline phones. There was significant rural inundation, including crop losses and more than 1,500 Gippsland farmers were impacted. New rainfall records were set at towns such as Orbost (which received 91.8mm in 24 hours), Ensay (125.6mm) and Omeo (131.4mm). Omeo recorded its single wettest day since records began 133 years ago.
June 2012	Powlett River	Whole catchment, highest recorded flood
June 2012	Buchan River	Buchan
June 2012	Swifts Creek	Swifts Creek
June 2012	Mitchell River	Bairnsdale, Glenaladale
June 2012	Avon River	d/s of Boisdale
June 2012	Traralgon Creek	Traralgon
June 2016	Snowy River	Basin Creek
July 2016	Mitchell River	Glenaladale
July 2016	Snowy River	Buchan, Jarramond, Orbost
July 2016	Stockyard Creek, Foster	Dam failure (private). Major local flooding destroyed road crossing and inundated houses

Attachment 8 – IMT Readiness Levels – Flood

VICSES Flood Readiness and Activation Trigger Considerations are available on the VICSES Hub at: https://hub.ses.vic.gov.au/library/operational-doctrine.

Schedule 4

ICC Footprint and Clusters – Flood and Storm



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Schedule 6

IMT Readiness Levels – Flood

To determine the readiness level required, all three riverine flood conditions (FCL) described in the table below are needed to be predicted for 50% or more of an ICC footprint. Each river catchment, the upper and lower reaches of a river system have been allocated to an ICC footprint.

The RC may vary the actual number, distribution and level of an IMT from this schedule in order to manage local risks, as per section 15 of this JSOP.

SOP J02.03

IMTs should be in place as advised by the Regional Controller (RC) based on the risk, indicatively 2 hours before the community impact is expected to occur in the ICC footprint.

Where an IMT manages more than one ICC footprint, the RC in consultation with the SRC will determine the location of the IMT based on risk and consistent with the Regional Flood Response Plan and the SES Readiness and Activation considerations. Operational IMTs can be used for readiness, if they have the capacity to manage new emergencies in the initial stages

In addition to this schedule, the SRC may request a RC to form a Reserve IMT for deployment within a region or to support another region

In consultation with the SRC, a RC will advise when an IMT can deactivate or stand down the preparedness level.

				Flood Class Level (FCL) [4]		
			Minor	Multiple	Multiple	Multiple
			Mod	> 2	>2	Multiple
			Major	0	≥1	≥2
Region	**Primary ICC**	**ICC Cluster**		**Very High (high end)**	**Severe**	**Extreme**
Loddon Mallee	Bendigo	Bendigo		Base (I)	Base (I)	Full (I)
	Mildura	Mildura		Base (C)	Base (I)	Core (I) Full (C)
		Swan Hill			Base (I)	Core (I) Full (C)
Grampians	Ballarat	Ballarat		Base (C)	Base (I)	Core (I) Full (C)
	Horsham	Horsham		Base (I)	Base (I)	Core (I) Full (C)
Barwon South West	Geelong	Geelong		Base (I)	Base (I) Core (C)	Core (I) Full (C)
	Warrnambool	Warrnambool		Base (C)	Base (I) Core (C)	Core (I) Full (C)
North West Metro	Sunshine	Sunshine		Base (I)	Core (I)	Core (I) Full (C)
		Burnley				Full (I)
Eastern Metro	Dandenong	Ferntree Gully		Base (I)	Core (I)	Core (I) Full (C)
Southern Metro		Dandenong				Full (I)
Hume	Benalla *(NE CMA area)*	Benalla		Base (I)	Base (I) Core (C)	Full (I)
		Wodonga			Base (I) Core (C)	Base (I) Full (C)
		Wangaratta			Base (I) Core (C)	Base (I) Full (C)
	Seymour *(Goulburn Broken - CMA area)*	Seymour		Base (C)	Base (I) Core (C)	Core (I) Full (C)
		Shepparton			Base (I) Core (C)	Full (C)
Gippsland	Traralgon	Traralgon		Base (C)	Base (I) Core (C)	Full (I)
	Bairnsdale	Bairnsdale			Base (I) Core (C)	Full (I)

[4] *Where no FCL provided for a river system, The RC is to consult the SES Agency Commander for the alignment of the warning issued to a FCL.*

Attachment 9 – East (Gippsland) Region Flood Risk Summary by Municipality

Area	Description of flood risk
Bass Coast Shire (Bass Coast Shire MFEP), including: Inverloch Pound Creek Newhaven Pioneer bay Rhyll Silverleaves Grantville Cowes Bass Queensferry Lang Lang *Updated Version 2.4, November 2016*	**Riverine flooding** There is little recognised riverine flooding risk in Bass Coast with the majority of impact being to low lying rural land and roads. Riverine flooding can cause isolation when access/egress roads are cut by flood waters. **Flash flooding** Short duration, high intensity rainfall (usually associated with thunderstorms) can also cause localised flooding along overland flow paths and within urban areas if the capacity of the stormwater drainage system is exceeded. Such events, which 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. **Coastal flooding** High tides on top of storm surge associated with an extra low pressure system and on-shore winds, can exacerbate flooding within the coastal areas of the Shire or create areas of flooding in and around the drainage network. Due to the proximity of Bass Strait to the coast and Western Port, rises in coastal ocean levels may reduce the capacity of the waterways and stormwater drains to discharge runoff, while extreme storm events can cause backflow to the point where water surcharges back above ground around the drainage pits and channels. Some coastal townships are vulnerable to sea level rise, including Inverloch, Pound Creek, Newhaven, Pioneer bay, Rhyll, Silverleaves, Grantville, Cowes, Bass, Queensferry, Lang Lang. See Attachment 1 – Bass Coast MFEP for a detailed appendix for Phillip Island.
Baw Baw Shire (Baw Baw Shire MFEP), including:	**Riverine flooding** Most riverine flooding risk is from the Bunyip River at Longwarry North and on the Moe River (Drain) on the Moe Flats between Yarragon and Moe and to the north of Trafalgar.

Warragul Drouin Trafalgar Yarragon Longwarry Longwarry North Nilma Walhalla Toombon Tanjil Bren Fumina South Tanjil Junction Coopers Creek *Updated Version 8, December 2013*	There is some risk in and around Warragul and Walhalla from the local creeks although both fall within the flash flooding category due to the short response time. There are a number of areas that have significant rural flood risk. Though these areas are not highly populated, rural properties are susceptible to isolation or inundation and a significant number of roads are affected during large floods. Low lying areas around: ▪ Bunyip River –Longwarry North ▪ Moe River – on the flats between Yarragon and Moe and to the north of Trafalgar ▪ Hazel & Spring Cks – Warragul, Nilma ▪ Thomson River –downstream of Coopers Creek ▪ Aberfeldy River – Toombon, Aberfeldy Bridge ▪ Tanjil River – Tanjil Bren, Fumina South, Tanjil Junction **Flash flooding** Townships considered most at risk from flash flooding include Warragul, Trafalgar, Yarragon and Walhalla, with Warragul the highest risk. At Warragul, levels rise and fall very quickly with urban stormwater flooding likely within about 30 minutes of heavy rainfall Roads that cross the Hazel and Spring Creek corridors within Warragul are likely to be drowned out from quite low flows and experience both high velocities and substantial depths during severe events. See Appendices of Baw Baw MFEP for detailed information regarding Warragul and the Moe River flats.
East Gippsland Shire (Att. 1 Eastern Rivers, East Gippsland MFEP) Including: Genoa Mallacoota Cann River township Bemm River township	**Riverine flooding** The closure of the Mallacoota-Genoa Road isolating Gipsy Point and Mallacoota. There are also roads and low lying areas that experience inundation in Mallacoota. The Cann River Caravan Park is located on the floodplain and needs early evacuation. Access cut to Bemm River township due to flooding of the Princes Hwy. **Flash Flooding** There is a flash flooding risk in Mallacoota, Cann River and surrounds. Further study needs to be done to determine the specific flood risk. Number of rural properties affected in 1% AEP event (100 yearr ARI):

Updated from Version 1.0, July 2012	▪ 29 – Genoa River communities ▪ 94 – Cann River communities ▪ 9 – Bemm River communities
East Gippsland Shire (Att. 1 Eastern Rivers, East Gippsland MFEP) Including: Wangarabell Noorinbee North Noorinbee Tonghi Creek Combienbar Club Terrace *Updated from Version 1.0, July 2012*	**Riverine flooding** Significant rural flood risk. Though these areas are not highly populated, rural properties are susceptible to isolation or inundation.
East Gippsland Shire (Att.2 Snowy River, East Gippsland MFEP) Including: Orbost and surrounds Suggan Buggan Buchan and surrounds Marlo and surrounds	**Riverine flooding** Snowy River – Orbost township and low lying areas around Orbost, Deddick Valley, Wulgulmerang East, Bete Belong North, Jarrahmond, Newmerella. Suggan Buggan River – low lying areas around Suggan Buggan. Buchan River – Buchan township and low lying areas around Wulgulmerang West and Buchan. Snowy River Estuary – Marlo township and low lying areas in the flood plain and estuary downstream of Orbost. The Princes Highway in Orbost has been upgraded to ensure closure only occurs during very high floods. Many local roads in and around Orbost are closed at low levels with some becoming dangerous with high velocity flows.

Updated from Version 1.0, July 2012	Properties along the Marlo Rd are isolated early for the duration of the flood event. Number of rural properties affected in 1% AEP event (100 year ARI): ▪ 15 - Delegate River ▪ 15 – Corringle ▪ 38 - Bete Belong ▪ 34 – Marlo ▪ 47 – Newmerella ▪ 47 – Jarrahmond ▪ 114 – Orbost ▪ 13 – Buchan ▪ 20 – Cabbage Tree ▪ 21 – Brodribb River See Attachment 2 – Snowy River, East Gippsland MFEP for a detailed appendix regarding Orbost.
East Gippsland Shire (Att. 3 Tambo Valley, East Gippsland MFEP) Including: Omeo Bruthen Nowa Nowa Boggy Creek Nicholson	**Riverine flooding** Significant rural flood risk. Though these areas are not highly populated, rural properties are susceptible to isolation or inundation. Mossiface, Johnsonville, low lying areas around Swifts Creek, Bruthen, Nicholson, Johnsonville, Swan Reach & Tambo Upper. Tambo River frequently breaks its banks at a number of places along its length between Bruthen and Metung during flood events. The township of Bruthen is not normally susceptible to flooding, but is bounded to the south by the Tambo River flats which become inundated isolating a small number of rural properties. River levels during flooding on the Tambo River at Tambo Upper will rise to just below the Fred Albert bridge in Stephenson Road without overtopping the bridge, but Stephenson Road on the western side of the bridge may be cut. Nicholson River Low lying areas around Sarsfield.

Mossiface Swifts Creek Johnsonville Swan Reach Tambo Upper Lake Tyers Wiseleigh Lake Bunga Bumberrah Sarsfield	Low lying agricultural land on the Tambo and Nicholson River floodplains are subject to riverine flooding which can isolate rural properties. The boat ramp and carpark at Nicholson on the Nicholson River is subject to flooding when the Nicholson River at the downstream Pumphouse gauge reaches 2.5m. Flooding on the Nicholson River causes minimal impact with the most significant inundation being along the unoccupied low lying reaches of the river between Nicholson and Jones Bay. Areas around Nowa Nowa on Boggy Creek are subject to inundation including the Recreation Reserve and the boat ramp and carpark. Road closures do not pose a threat of isolation to the towns in the area due to the availability of alternate routes except in extreme circumstances although the Great Alpine Road between Bruthen and Omeo can be cut due to riverine flooding or landslip. During a large flood event, the Princes Highway at Nicholson may be cut if water levels in Bosses Swamp rise and overtop the road. **Flash flooding** Omeo, Benambra, Cassilis, Brookville, Swifts Creek. Number of rural properties affected in 1% AEP event (1 in 100 year ARI): ▪ 7 – Kalimna ▪ 2 – Lake Tyers ▪ 81 – Swifts Creek ▪ 2 – Nowa Nowa ▪ 1 – Bindi ▪ 17 – Tambo Upper ▪ 33 – Swan Reach ▪ 9 – Wiseleigh ▪ 18 – Mossiface ▪ 2 – Lake Bunga ▪ 4 – Johnsonville ▪ 6 – Bumberrah

Updated from Version 1.0, July 2012	▪ 48 - Bruthen See Attachment 3 Tambo Valley, East Gippsland MFEP for a detailed appendix on Bruthen/Twin Rivers District.
East Gippsland Shire (Att. 4 Mitchell River, East Gippsland MFEP) Including: Bairnsdale and surrounds Wy Yung Lucknow Wonnangatta Crooked River Dargo Iguana Creek Wuk Wuk Calulu Ellaswood Hillside Broadlands East Bairnsdale Eastwood Lidenow Walpa	**Riverine flooding** Significant rural flood risk. Rural areas are not highly populated but are susceptible to isolation or inundation. Floods are a regular occurrence on the Mitchell River flats. A large part of the low lying area surrounding the river is inundated with flood water either from the main stream or one of its tributaries. Wonnangatta River - Wonnangatta, Crooked River. Dargo River – Dargo. Mitchell River – Iguana Creek, Wuk Wuk, Calulu, Ellaswood and the full length of the lower Mitchell River floodplain, Hillside, Broadlands, East Bairnsdale, Eastwood, Lindenow. Skull Creek – Walpa, Lindenow. **Flash flooding** Bairnsdale is prone to flash flooding when large rain events overwhelm the storm water drains impacting internal roadways and some major roadways where the storm water outfalls are located near the river eg Pound Swamp Hill Road. Eastwood, Wy Yung, Lucknow and Broadlands to the north and north east of Bairnsdale are impacted by flash flooding where local creeks are overloaded, e.g. Goose Gully and Clifton Creek, Middle Creek and overland flows, which drain directly to Jones' Bay. Rural areas to the south and south west of Bairnsdale around Forge Creek Road, Glenaladale Road, Humphreys Road and the airport are also subject to flash flooding and overland flows. Areas around Lindenow and Hillside are prone to flash flooding as the deep gullies that transverse the floodplain are overwhelmed with local run off and channelled by rail and road infrastructure. Number of rural properties affected in 1% AEP event (1 in 100 year ARI): ▪ 3 – Glenaladale ▪ 16 – Iguana Creek ▪ 9 – Bengworden

Updated from Version 1.0, July 2012	▪ 7 – Goon Nure ▪ 8 - Broadlands ▪ 18 – Wuk Wuk ▪ 11 – Calulu ▪ 31 – Woodglen ▪ 36 – Forge Creek ▪ 33 – Lindenow ▪ 46 – Walpa ▪ 61 – Hillside ▪ 172 – Bairnsdale area (residential) ▪ 34 – Bairnsdale area (industrial) ▪ 13 – Bairnsdale area (business) See Attachment 4 – Mitchell River EG MFEP for a detailed appendix for Bairnsdale.
East Gippsland Shire (Att. 5 Gippsland Lakes, East Gippsland MFEP) Including: Lakes Entrance Loch Sport Paynesville Hollands Landing Eagle Point	Flooding on the Gippsland Lakes is very complex and the predictions take into account how much water is travelling down the river systems that lead into the lakes, along with wind, tide and coastal ocean levels. Seven rivers lead into the lakes including Latrobe, Thomson, Macalister, Avon, Mitchell, Nicholson and Tambo Rivers. When the volume of water from the rivers reaches the lakes in relation to each other and how quickly it can escape through the entrance are key considerations. Unlike rivers, when the lakes flood it doesn't come through fast and furiously, peak and then recede. It rises slowly and hangs around for up to a week or more with levels rising and falling with tidal and wind conditions and as different river volumes move through the system. Some people and properties can be isolated for up to two weeks. Flooding typically occurs after the rivers have experienced flooding, with peaks slow to rise and recede, sometimes taking up to 14 days. Boat ramps, jetties and car parks flood early causing unwary boat owners to return and find their cars flooded.

Metung Seacombe Boole Poole The Barrier Ocean Grange Nungurner Banksia Peninsula Newlands Arm Lake Bunga Raymond Island Wellington Shire (Att. 5 Wellington Shire MFEP), including: Loch Sport Hollands Landing Seacombe Ocean Grange *Updated from EGMFEP Version 1.0, July 2012 and Wellington MFEP Version 2.0, June 2016.*	There are hundreds of boats moored around the lakes system that will require their mooring lines lengthened once the lakes reach 0.80m. Mooring lines will need to be extended and reduced regularly during the event and jetties will be difficult to access from land during the event. Low lying areas around the lakes edge are at significant risk of flooding eg: Boole Poole, The Barrier, Ocean Grange, Nungurner, Banksia Peninsula, Newlands Arm and Lake Bunga. Number of rural properties affected in 1% AEP event (1 in 100 year ARI): ▪ Lakes Entrance – 9 ▪ Hollands Landing – 19 ▪ Eagle Point – 30 ▪ Metung – 51 ▪ Seacombe – 40 ▪ Boole Poole – 18 ▪ The Barrier – 28 ▪ Ocean Grange – 9 ▪ Nungurner – 3 ▪ Banksia Peninsula – 8 ▪ Lake Bunga – 2 ▪ Loch Sport - 557 ▪ Hollands Landing - 41 ▪ Seacombe - 40 ▪ Ocean Grange - 9 See Attachment 5 – Gippsland Lakes, East Gippsland MFEP for detailed appendices regarding Paynesville, Raymond Island, Eagle Point, Metung and Lakes Entrance. See Attachment 5 – Gippsland Lakes Wellington Shire MFEP for appendices regarding Hollands Landing and Loch Sport.

Latrobe City (Att. 1 Traralgon Creek Latrobe City MFEP) Including: Traralgon Traralgon Sth Koornalla *Updated from Version 1.5, September 2013*	Traralgon experiences localised flooding within the township and along rural roads due to heavy inundation of rainfall. Traralgon Creek can flood within approximately 6 to 8 hours of the start of heavy rain with rapid rises and duration of 12-24hrs (medium floods) and up to 36 hours (large floods). Flooding can occur within town before upstream gauges have peaked. The Princes Highway passes through the town and may be cut during significant floods, which splits the town in two and cuts all east/west traffic for the duration with no alternative access. Areas of Traralgon require evacuation with some houses being impacted above floor. Many roads around the town are flooded, causing much disruption. Significant flood risk in rural areas. Rural properties are susceptible to isolation or inundation. Along the creek, removal of stock and equipment is necessary while some minor roads (e.g. Jones Road, Traralgon South) may be closed. The Traralgon Flood Study (2000) mentions in a 1% riverine flooding event, 66 buildings flooded above floor, including 53 residential, and a further 175 properties flooded, including 157 residential.
Wellington Shire (Att.1 Avon River/Perry River Wellington Shire MFEP) including: Boisedale Briagolong Stratford Monomak Valencia Creek Bushy Park Llowlong *Updated from Version 2.0, June 2016*	**Riverine flooding** The Avon River is reputed to be one of the fastest rising waterways in the southern hemisphere. Avon River – Monomak, Valencia Creek, Bushy Park, Boisdale, Llowlong, Stratford. Freestone Creek – Briagolong, Bushy Park. Properties at risk: ▪ Boisdale – Main Street, 2 properties flooded and isolations. ▪ Briagolong – Landy Street and Rosstrevor Avenue, 11 properties flooded and isolations. ▪ Stratford – Airley Road, Freemans Lane, McMillans Street, Newton Drive, Princes Highway Caravan park, 20 properties flooded and isolations. See Attachment 1 – Avon River/Perry River Wellington Shire MFEP for a detailed appendix regarding Stratford.

Wellington Shire (Att. 2 Thompson River/ Macalister River Wellington Shire MFEP) including: Licola Tinamba Newry Heyfield Sale Maffra Glenmaggie Desailly Flats Coopers Creek Cowwarr Wurruk Glen Falloch Riverslea Bundalaguah Myrtlebank Longford *Updated from Version 2.0, June 2016*	**Riverine flooding** Low lying farmland areas around Licola, Tinamba, Newry, Heyfield, Maffra and Desailly Flats along with access throughout those areas and in and around Sale. Small communities, businesses and rural properties are at risk but no major infrastructure, schools, hospitals or health centres at risk. The South Gippsland Highway is cut at Longford at 2.40m (minor) and is typically closed for several days. The Thomson River Caravan Park is isolated at this time and an alternative route for people travelling to/from Longford, Loch Sport and associated communities is via Rosedale. Thomson River and Rainbow Creek – downstream of Coopers Creek, Cowwarr Weir, Cowwarr, Heyfield, Sale, Wurruk and Desailly Flats. Flooding Creek/Sale Canal – Sale, Desailly Flats. Macalister River – Newry, Glen Falloch, Glenmaggie, Heyfield, Tinamba, Riverslea, Bundalaguah, Myrtlebank. Properties at Risk: ▪ Sale – 64 residential properties, 240 in total in a 1% event. ▪ Heyfield – 1 residential property, 20 total in a 1% event. ▪ Licola – 1. ▪ Newry/Upper Maffra – 52 houses, General Store and Hotel. ▪ Tinamba – 31 houses, Tinamba General Store, Tinamba Hall and Hotel. ▪ Cowwar – 2 houses. ▪ Glenmaggie – 3 houses. ▪ Maffra/Riverslea – 18 houses. See Attachment 2 – Thompson River/Macalister River Wellington Shire MFEP for detailed appendices regarding Sale, Maffra/Tinamba/ Newry.
Wellington Shire	Properties subject to flooding with Sea Level Rise predictions for 2030 have been included as probable flooding impact for storm surge.

(Att. 3 Merrimans Creek Wellington Shire MFEP) including: Seaspray Gormandale Stradbroke Willung *Updated from Version 2.0, June 2016*	Seaspray has been flooded in the past by high sea level, the flood mitigation scheme is also designed to mitigate against this type of event. It was recognised that high sea levels could aggravate Merrimans Creek flooding if peaks coincided. The township of Seaspray situated at the entrance includes all urban flood risk in the catchment. Number of properties impacted in a 1% AEP riverine event (1 in 100 year ARI) ▪ 25 - Seaspray. ▪ 34 – Gormandale. ▪ 38 – Stradbroke. ▪ 31 – Willung. Number of properties impacted in a storm surge 2030 sea level rise event: ▪ 162 - Seaspray See Attachment 3 – Merrimans Creek Wellington Shire MFEP for a detailed appendix regarding Seaspray.
South Gippsland Shire (South Gippsland Shire MFEP), including: Tarwin Lower Fish Creek Meeniyan Port Welshpool Toora Berrys Creek Mardan Sth Mirboo Nth Loch	**Riverine flooding** There is little recognised riverine flooding risk in South Gippsland Shire. Riverine flooding can cause isolation of some towns as the only access road is cut by flood waters. The predominant riverine flooding risk is on the Tarwin River at Tarwin Lower, Fish Creek and Meeniyan and associated rural areas. Tarwin Lower is subject to riverine flooding, overland flow flooding and coastal storm surge flooding. There is an extensive levee system that protects the town and surrounding floodplains. There are a number of areas that have significant rural flood risk. Though these areas are not highly populated, rural properties are susceptible to isolation or inundation. Areas around: ▪ Corner Inlet: particularly around Port Welshpool and south of Toora. ▪ Tarwin River: Berrys Ck, Mardan South, Mirboo North, Tarwin Lower, Fish Creek. ▪ Bass River: Loch and on the floodplain between Poowong and Loch. ▪ Franklin River: Port Franklin. Approximately 3,000 properties are at risk within the municipality of riverine flooding using the 1 in 100 year ARI flood extents incorporating sea level rise to 2100.

Poowong Port Franklin Sandy Inlet Tidal River Waratah Bay *Updated from Version 1.4, Feb 2013*	Caravan Parks at Port Welshpool and Sandy Inlet are also at risk of being flooded during a 1% AEP event. **Flash flooding** Flash flooding can cause many roads to experience high velocity flows for a short period and can trigger landslips undermining roads and dams. Towns such as Fish Creek incurred residential inundations and required evacuation (2011) with flash flooding. While the South Gippsland Highway near Meeniyan can be affected by high flows, the town of Meeniyan is generally not affected. High intensity rainfall such as associated with thunderstorms giving average rainfall rates of more than around 25mm/hour for 30 minutes or more is likely to lead to flash flooding and/or overland flows, across the urbanised parts of the shire. **Coastal Flooding** Townships expected to be vulnerable to sea level rise include Port Welshpool, Tarwin Lower and Waratah Bay. The single access route to Venus Bay is also vulnerable to flooding, both riverine and coastal. See Appendices of South Gippsland MFEP for detailed information regarding Tarwin Lower.