Bass Coast

Municipal
Flood & Storm Emergency Plan

A Sub-Plan of the
Municipal Emergency Management Plan

For Bass Coast Shire Council and
VICSES Unit(s) Phillip Island, San Remo,
Inverloch and Wonthaggi

Version 3.2 December 2018

Distribution List

The Distribution List for this sub plan is the same as in the Municipal Emergency Management Plan (MEMP).

Document Transmittal Form / Amendment Certificate

This Municipal Flood & Storm Emergency Plan (MFSEP) will be amended, maintained and distributed as required by VICSES in consultation with Bass Coast Shire Council.

Suggestions for amendments to this Plan should be forwarded to:

VICSES East Regional Headquarters
82a Moore Street
MOE VIC 3825

Amendments listed below have been included in this Plan and promulgated to all registered copyholders			
Amendment/Version Number	**Date**	**Amendment Entered By**	**Summary of Amendment**
V3.1	8 October 2018	Tracie McIntosh (BCSC)	Version 3.1 draft distributed to members of Municipal Flood and Storm Planning Sub-Committee for review and comment
V3.0 Amend 6	25 June 2018 (rec'd by BCSC on 22 Oct 2018)	Ross Butler (SES)	Update of Appendices A, B, C, F and addition of Appendix G
V3.2	19 November 2018	Tracie McIntosh	Merging and formatting of changes made in above 2 items by: • Moving V3.0(6) Appendices A, B, C, F and G to V3.1 • Renaming/Moving V3.1 Appendices A & B to H & I • Renaming/Moving V3.1 Appendix I to J • Changed cross references for the Appendices in Parts 1, 2, 3 and 4 • Added District Names (Island / Waterline / Bunurong to titles of V3.0(6) Appendices C1, C2 and C3
V3.2	3 December 2018	Tracie McIntosh	Added MEMPC endorsement date to page 8

Table of Contents

APPENDICES

List of Abbreviations & Acronyms

The following abbreviations and acronyms are used in the Plan:

AEP	Annual Exceedance Probability
AHD	Australian Height Datum (the height of a location above mean sea level in metres)
AIIMS	Australasian Inter-service Incident Management System
AOCC	Area of Operations Control Centre/Command Centre
ARI	Average Recurrence Interval
ARMCANZ	Agricultural & Resource Management Council of Australia & New Zealand
AV	Ambulance Victoria
BoM	Bureau of Meteorology
CEO	Chief Executive Officer
CERA	Community Emergency Risk Assessment
CFA	Country Fire Authority
CMA	Catchment Management Authority
COUNCIL	Bass Coast Shire Council
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DELWP	Department of Environment, Land, Water & Planning
DHHS	Department of Health & Human Services
DNRE	Department of Natural Resources and Environment
EMLO	Emergency Management Liaison Officer
EMMV	Emergency Management Manual Victoria
EMT	Emergency Management Team
ERC	Emergency Relief Centre
EO	Executive Officer
FO	Floodway Overlay
FWS	Flood Warning System
FZ	Floodway Zone
IC	Incident Controller
ICC	Incident Control Centre
IMS	Incident Management System
IMT	Incident Management Team
LSIO	Land Subject to Inundation Overlay
MCC	Municipal Coordination Centre
MEMP	Municipal Emergency Management Plan
MEMPC	Municipal Emergency Management Planning Committee
MERC	Municipal Emergency Response Coordinator
MERO	Municipal Emergency Resource Officer
MFSPC	Municipal Flood and Storm Planning Sub-Committee
MFB	Metropolitan Fire and Emergency Services Board
MRM	Municipal Recovery Manager
PMF	Probable Maximum Flood
RCC	Regional Control Centre
RDO	Regional Duty Officer
RERC	Regional Emergency Response Coordinator
RERCC	Regional Emergency Response Coordination Centre
SBO	Special Building Overlay
SCC	State Control Centre
SEWS	Standard Emergency Warning System
SHERP	State Health Emergency Response Plan
SOP	Standard Operating Procedure
VicPol	Victoria Police
VICSES	Victoria State Emergency Service
WGCMA	West Gippsland Catchment Management Authority

Part 1 INTRODUCTION

1.1 The Municipality

Bass Coast Shire is located in south-eastern Victoria, about 130 kilometres south-east of the Melbourne CBD and encompasses an area of approximately 865 km^2. The Shire is bounded by Western Port Bay in the north and west, Cardinia Shire in the north-east, South Gippsland Shire in the east, and Bass Strait in the south.

Wonthaggi is the largest town within the Shire and has its origin in coal mining. Other major towns include Inverloch, Grantville and Cowes on Phillip Island. Smaller towns include Bass, Coronet Bay, Dalyston, Cape Paterson, Corinella, Kilcunda, Newhaven, Rhyll and San Remo.

According to the Bass Coast Community Profile, as at 2017 the estimated residential population was 34,390 however during peak holiday periods the population exceeds 70,000.

There are two major waterways within Bass Coast, both of which flow in a generally westwards direction into Western Port Bay and Bass Strait respectively:

- The Bass River, approximately 50 km in length (managed by Melbourne Water) from downstream of the South Gippsland Highway; and
- The Powlett River, 42 km in length (managed by West Gippsland Catchment Management Authority WGCMA) from downstream of the Outtrim – Inverloch and Scotts Estate Roads

There are also many small creeks and watercourses. Only minor creeks and drainage overflow paths are located in major townships. As a result, flooding in major townships is generally experienced only when overland flow paths or underground drainage systems are blocked or stormwater flows exceed the design capacity of the piped drainage system.

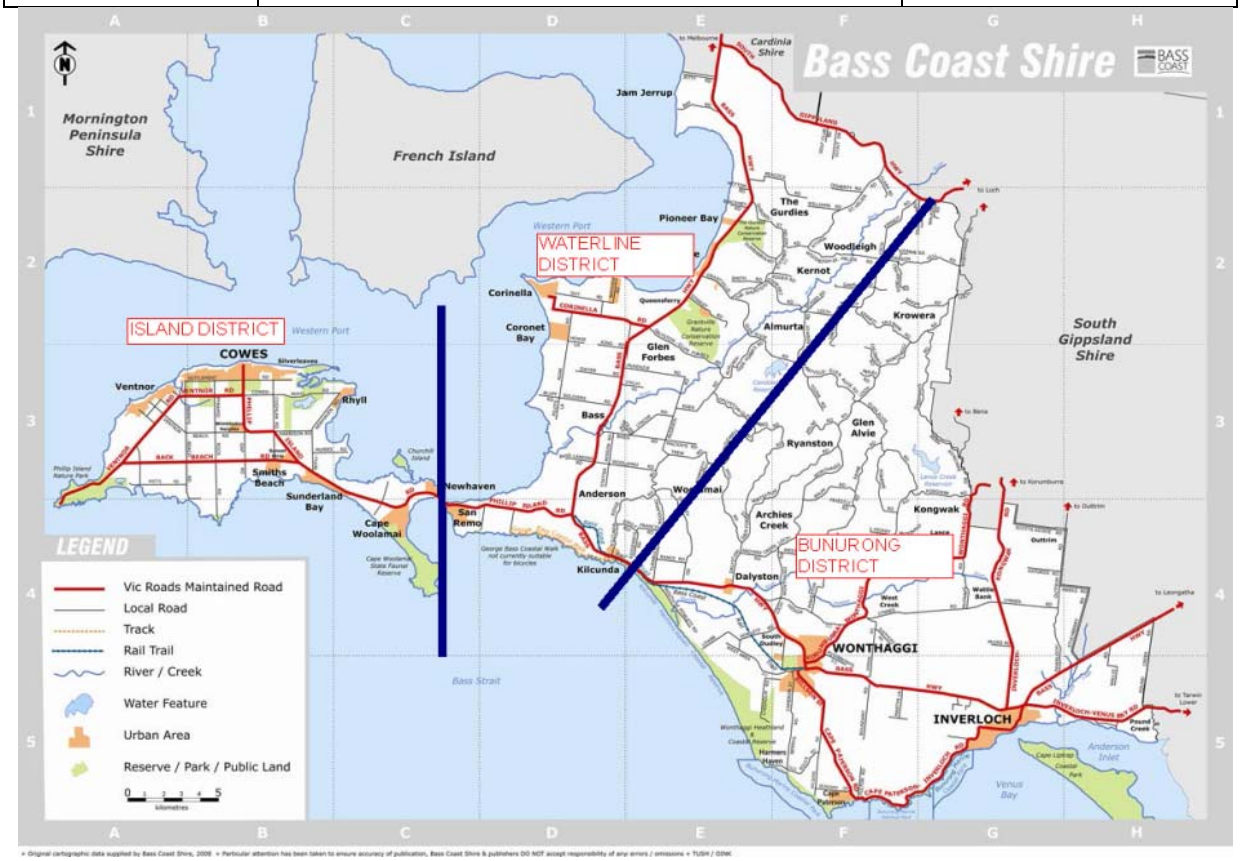
There are two good sized reservoirs in Bass Coast which are discussed later in the plan.

- Candowie Reservoir (Bass River)
- Lance Creek Reservoir (Powlett River)

1.2 The Districts

For the purpose of this Plan the Municipality has been split into 3 distinct districts:

District	Towns included	Waterway
Island	All towns on Phillip Island including Cowes, Silverleaves, Rhyll, Newhaven	n/a
Waterline	All mainland towns on Western Port including Pioneer Bay, Grantville, Tenby Point, San Remo, Bass and including Kilcunda	Bass River
Bunurong	Dalyston, Wonthaggi, Cape Paterson, Inverloch, Lance Creek, Glen Forbes	Powlett River Anderson Inlet Wreck Creek



1.3 Municipal Endorsement

This Municipal Flood & Storm Emergency Plan (Plan) is a sub-plan of Bass Coast Shire Council's Municipal Emergency Management Plan (MEMP).

It has been prepared by the Bass Coast Municipal Flood and Storm Planning Sub-Committee (MFSPC) with the authority of the Municipal Emergency Management Committee (MEMPC) (refer to section 1.6 Endorsement of Plan) pursuant to Section 20 of the *Emergency Management Act 1986* (as amended).

This Plan is consistent with the Emergency Management Manual Victoria (EMMV) and the Victoria Flood Management Strategy (DNRE, 1998a), and takes into account the outcomes of the Community Emergency Risk Assessment (CERA) process undertaken by the Bass Coast MEMPC which found Storm to be a High priority Municipal emergency risk. A copy of the current Municipal CERA Storm Hazard Assessment can be found in Appendix I.

This Plan links with the Flood Management Plan, prepared by Bass Coast Shire Council (Council) and Melbourne Water, to assist in the delivery of flood management responsibilities and the implementation of suitable measures to manage the risks associated with flooding.

This Plan is consistent with the Regional Flood Emergency Plan, Regional Storm Emergency Response Plan, State Flood Emergency Plan and the State Storm Emergency Plan.

This Plan is a result of the cooperative efforts of the Bass Coast MFSPC and its member agencies. The signatories below, on behalf of their respective agencies, commit to the implementation of this Plan as it applies to each agency.

This Plan was endorsed by the Bass Coast MEMPC at its meeting on 3 December 2018

1.4 The Municipality Flood Risk Summary

Area	Description of Flood Risk
Bass Coast Shire • Inverloch • Pound Creek • Newhaven • Pioneer Bay • Rhyll • Silverleaves • Grantville • Cowes • Bass • Queensferry • Lang Lang (part)	**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.

Source: East (Gippsland) Region Emergency Response Plan: Flood Sub-Plan Version 1.7

1.5 The Municipality Flood Risk Profile

An outline of Bass Coast in terms of its location, demography and other general matters is provided in the MEMP. Risk assessment processes have been conducted within the Flood Management Plan process. Detailed flood threats and response information for Bass Coast is provided in the attachments to this Plan.

Significant Flood Events in Bass Coast	
1951 May	Flood submerged the Wonthaggi to Dalyston Road under 750mm of water near Wonthaggi cutting the town off to the north The river, normally 18 metres wide, was up to 800 metres wide. Roads to Wonthaggi from Bass, Loch and Korumburra, the Woolamai-Glen Forbes

Significant Flood Events in Bass Coast	
	Road, and the Bass-Glen Forbes Road were all closed due to flooding
2007	Rain that fell in late June / early July caused the Powlett River to burst its banks and flood 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.
2012	Heavy rain on 25 May (eg 50mm to 80mm in 10 hours) on wet catchments resulted in widespread flooding across West Gippsland. Water washed over about 40 of the roads 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. SES 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

1.6 The Municipality Storm Risk Profile

A risk review process has been conducted using the Community Emergency Risk Assessment (CERA) process. Municipalities, agencies and community members should all be engaged as part of the CERA process. The risk assessments are performed under the guidance of a VICSES facilitator at MEMPC level and used to inform their planning, mitigation and response to all hazards. The integrity of the risk assessment outcomes is reliant on having the relevant subject matter experts and agencies in the room to provide key information, guide discussions and assist with validating risks.

The 2018 Review of the CERA Review identified Storm as a high risk within Bass Coast. Storm risk in this context includes wind storms, dust storms, blizzards, storm tides and severe thunderstorms including hail storms, tornados and heavy rain and resultant flooding.

A copy of the current Municipal CERA Storm Hazard Assessment can be found in Appendix I.

Storm events affecting land based communities are general divided into two broad categories: severe thunderstorms and severe weather. Severe weather can cause short duration high intensity rainfall, thunderstorms, high winds, localised flash flooding, hail and lightening. Flash flooding from these storms occurs with little warning and localised damage can be severe. Blocked or capacity impaired stormwater drains can also lead to overland flows and associated flooding. Low pressure systems and high on-shore winds can exacerbate flooding within the coastal areas or create areas of flooding in and around the drainage network.

Storm surge occurs when sea levels are elevated above the usual tidal limit due to the action of intense low pressure systems over the open ocean. The low pressure causes sea level to rise as there is less air pressing down on the sea. Combined with gale force onshore winds, this can lead to flooding of low-lying coastal land. This can exacerbate flooding within the coastal areas of the Shire or create areas of flooding in and around the drainage network.

Significant Storm Events in Bass Coast	
1993 13 June	In the early hours of the morning, a large windstorm (in the form of a microburst) hit the township of Wonthaggi. The structural damage to residential properties in the path of the storm was enormous; particularly to the Dudley Campus of Wonthaggi Secondary College (the entire north wing of the campus was destroyed). The Leisure Centre and main commercial shopping area were also severely damaged. Had this occurred during school hours there would have been catastrophic loss of life.
1998 8 May	A water spout incident occurred resulting in damage to 18 properties in the residential area of Wonthaggi (mainly roofs) and other outbuildings and fences. Other smaller similar incidents have since occurred.
2008 2 April	Huge wind storms occurred across Victoria, said to be a one in one hundred years wind storm. This created a lot of damage state wide, including in Bass Coast. The cleanup took several weeks and VICSES, contractors and Council were all involved.

1.7 Purpose and Scope of this Flood & Storm Emergency Plan

The purpose of this Plan is to detail arrangements agreed for the planning, preparedness/prevention, response, relief and recovery from flood and storm events within Bass Coast.

As such, the scope of the Plan is to:

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

1.8 Municipal Flood and Storm Planning Sub Committee (MFSPC)

Membership of the MFSPC comprises representatives from the following agencies and organisations:

- Victoria Police (ie Municipal Emergency Response Coordinator) (MERC) (Chair);
- VICSES, Regional Officer – Emergency Management;
- Bass Coast Shire Council, Municipal Emergency Resource Officer (MERO);
- Bass Coast Shire Council, Infrastructure representative;
- Melbourne Water;
- West Gippsland Catchment Management Authority;
- VicRoads; and
- Other agencies and community representatives or consultants as required.

1.9 Responsibility for Planning, Review & Maintenance of this Plan and Action Plan

This Plan and Action Plan must be maintained in order to remain effective. VICSES through the MSFPC has responsibility for preparing, reviewing, maintaining and distributing this plan. The MFSPC will meet at least once per year to discuss the need to review/exercise the Plan and to determine what actions are to be included in the following year's Action Plan.

The Plan and Action Plan should be reviewed:

- Following any new flood study;
- Significant change in non-structural and/or structural flood mitigation measures;
- After the occurrence of a significant flood or storm event within Bass Coast to review and where necessary amend arrangements and information contained in this Plan.

1.10 Endorsement of the Plan

The Plan will be circulated to MFSPC members seeking acceptance of the draft plan.

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

Part 2 PREVENTION / PREPAREDNESS ARRANGEMENTS

2.1 Community Awareness for all Types of Flooding and Storms

Details of this Plan will be released to the community through local media, the FloodSafe/StormSafe programs, websites (VICSES and Bass Coast) upon formal adoption by Bass Coast MEMPC.

Customer service scripts prior to and during an event detailing where to obtain information and numbers to call for assistance are available in Appendix I.

2.2 Structural Flood and Storm Mitigation Measures

Subject to the provisions of the Bass Coast Planning Scheme, Council encourages residents and business owners / operators in potentially flood prone areas to plan and put in place effective flood protection measures for their dwellings and business premises. This applies in particular to areas subject to flash flooding and overland flows.

2.3 Non-structural Flood and Storm Mitigation Measures

2.3.1 Flood and Storm Warning

Arrangements for flood and storm warnings are contained within the State Flood Emergency Plan, the State Flood & Storm Emergency Plans, the EMMV (Part 3.7) and on the BoM website.

Severe Weather Outlook will be provided by BoM to VICSES - a five day outlook produced twice weekly for severe weather events involving significant rain, hail and wind but excluding severe thunderstorms (distribution is restricted to registered users).

The Victorian Severe Thunderstorm Warning is typically issued on a Weather District basis, although reference locations such as provincial towns, roads or rivers may be used to define the warning area more specifically.

As part of a partnership agreement, VICSES and the BoM will conduct a "Weather Outlook Teleconference" twice a week with the purpose of briefing VICSES on the five to six day weather outlook, based on the "Severe Weather Outlook" product and where relevant the "Thunderstorm Chart". If significant weather is predicted VICSES will commence notifications to other stakeholders for preparedness purposes.

The BoM does not provide a flood forecasting and warning system in Bass Coast.

2.3.2 Flood Wardens

No arrangements exist or are planned in Bass Coast for Flood Wardens due to the local conditions.

Part 3 RESPONSE ARRANGEMENTS

3.1 Introduction

3.1.1 Activation of Response

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

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

3.1.2 Responsibilities

There are a number of agencies with specific roles that will act in support of VICSES and provide support to the community in the event of a serious flood within Bass Coast. These agencies will be engaged through the Emergency Management Team (EMT).

The general roles and responsibilities of supporting agencies are as agreed within Council's MEMP, Gippsland Response and Recovery Standard Operating Procedure, EMMV (Part 7 'Emergency Management Agency Roles'), State Flood Emergency Plan, State Storm Emergency Plan and Regional Flood Emergency Plan.

General Roles and Responsibilities	
Victoria Police (VICPOL)	Ensure the effective coordination of resources or services in response to the emergency
	Ensure there is an effective control structure in place
	Support VICSES with public information when requested
	Manage the evacuation process (withdrawal, shelter and return stages of the evacuation) and maintain ongoing communication with Incident Controller in regards to evacuation issues
	Coordinate Urban Search and Rescue (USAR) resources in consultation with Incident Controller
	Support the Initial Impact Assessment process
	Coordinate requests for Commonwealth resources
	Traffic Management
VICROADS	Assist management of road closures and diversions
	Support the Initial Impact Assessment process
	Provide skilled personal to provide engineering advice regarding damaged structures
	Clear storm debris from VICROADs managed roads
	Assist with debris removal
	Assist with plant and skilled operators
	Assist with the dissemination of warnings through warning signs
Bass Coast Shire Council (Council)	Coordination of council resources
	Support the Initial Impact Assessment process
	Provision of engineering advice
	Provision of council facilities for emergency services staging areas
	Assist VICSES with the delivery of public information (see Appendix I)
	Co-ordination of the provision and operation of emergency relief (includes catering for impacted community and setting up emergency relief centres)
	Clear storm debris from public land and council managed roads
	Assist with the provision of plant and skilled operators
	Support to VICROADS for partial/full road closures and determination of alternative routes (see Appendix)
	Activate during event scripts for customer service (see Appendix I)

General Roles and Responsibilities	
Victoria State Emergency Service (VICSES)	Control Agency for Flood and Storm
	Undertake strategic planning for response
	initial Impact Assessment
	Provision of public information and warnings including the provision of public safety advice to the community
	Supporting VICPOL with evacuations
	Rescue of persons entrapped by collapsed structures

3.1.3 Municipal Coordination Centre (MCC)

If an MCC is established for a flood or storm event, VICSES will log on to Crisisworks and monitor activities. The VICSES RDO / ICC will liaise with the MCC directly. If an Incident EMT is established, Council will also maintain involvement in the Incident EMT. The function, location, establishment and operation of the MCC will be as detailed in Council's MEMP.

3.1.4 Escalation

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

Resourcing and event escalation arrangements are described in the EMMV ('State Emergency Response Plan' – section 3.5).

The six Gippsland municipalities have a resource sharing agreement in place for emergency events as detailed in the MEMP.

3.2 Strategic Control Priorities

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

- Protection and preservation of life is paramount - this includes:
    - Safety of emergency services and other agency personnel: and
    - Safety of community members including vulnerable community members and visitors/tourist located within the incident area.
    - 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 supports 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 values that considers the cultural, biodiversity, and social values of the environment

Circumstances may arise where the Incident Controller is required to vary these priorities, with the exception being that the protection of life should remain the highest. This shall be

done in consultation with the State Controller and relevant stakeholders based on sound incident predictions and risk assessments.

3.3 Command, Control & Coordination

The Command, Control and Coordination arrangements in this Municipal Flood & Storm Emergency Plan must be consistent with those detailed in State and Regional Flood & Storm Emergency Plans. For further information, refer to sections 3.4, 3.5 & 3.6 of the EMMV.

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

3.3.1 Control

Functions 5 (1) (a & c) at Part 2 of the *Victoria State Emergency Services Act 2005* (as amended) detail the authority for VICSES to plan for and respond to flood.

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

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

3.3.2 Incident Controller (IC)

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

3.3.3 Incident Control Centre (ICC)

As required, the Control Agency or the Incident Controller will determine the location for an Incident Control Centre (ICC) from which to initiate incident response command and control functions.

Pre-determined Incident Control Centre locations are

- Level 1 – Local VICSES Unit (refer Appendix I)
- Level 2 - VICSES East Region Headquarters, 82a Moore St Moe
  or VICSES East Region Office, 130 Macleod Street, Bairnsdale
- Level 3 – Multi Agency control facility, Franklin Street, Traralgon
  or VICSES East Region Office, 130 Macleod Street, Bairnsdale

3.3.4 Divisions and Sectors

To ensure that effective Command and Control are in place, the Incident Controller may establish Divisions and Sectors depending upon the complexity of the event and resource capacities. Pre- determined Divisional Command points are listed in the VICSES Regional Response Plan.

3.3.5 Incident Management Team (IMT)

The Incident Controller will form an Incident Management Team (IMT). Refer to 3.5 of the EMMV for guidance on IMTs and Incident Management Systems (IMSs).

3.3.6 Emergency Management Team (EMT)

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

Organisations, including Council, required within the EMT will provide an Emergency Management Liaison Officer (EMLO) to the ICC if and as required as well as other staff and / or resources identified as being necessary, within the capacity of the organisation.

Refer to 3.5 of the EMMV for guidance on EMTs.

3.3.7 On Receipt of a Flood Watch / Severe Weather Warning

Council will operate as defined within their Standard Operating Procedures.

The VICSES Incident Controller/ RDO will:

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

3.3.8 If Flood/Storm Impact Occurs

Council will operate as defined within their Standard Operating Procedures.

The VICSES Incident Controller/ RDO will:

- Continue to review flood/storm intelligence to assess likely flood consequences;
- Determine what the at-risk community need to know and do as the flood/storm develops;
- Continue to warn the at-risk community including ensuring that an appropriate warning and community information strategy is implemented;
- Liaise with relevant asset owners as appropriate (i.e. water and power utilities);
- Implement response strategies as required based upon flood/storm consequence assessment;
- Continue to monitor the flood/storm situation – www.BoM.gov.au/vic/flood/ and www.BoM.gov.au and
- Continue to undertake reconnaissance of low-lying areas.

3.4 Community Information and Warnings

The BoM has the responsibility for issuing Flood and Severe Weather Warnings. VICSES, as the Control Agency, co-ordinates further community messaging.

Council has the responsibility to assist VICSES to warn individuals as required within the municipality.

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

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

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

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

3.5 Media Communication

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

3.6 Initial Impact assessment

Initial impact assessment will be conducted in accordance with part 3 of the EMMV to assess and record the extent and nature of damage caused by the storm or flooding. This information will then be used to provide the basis for further needs assessment and recovery planning by DHHS, Council and recovery agencies.

3.7 Preliminary Deployments

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

3.8 Response to Flash Flooding

Emergency management response to flash flooding should be consistent with the guidelines within the State Flood & Storm Emergency Plans.

Local response to flash flooding is currently managed as the event occurs. Council, VICSES and VicPol are currently working through the Flood and Storm Sub Committee to ensure planning for a coordinated local response.

3.9 Evacuation

VicPol is the control agency responsible for evacuations. The decision to recommend evacuation to VicPol rests with the Incident Controller.

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

VICSES is responsible for the development and communication of evacuation warnings.

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

Council may take on responsibility for the provision of a dedicated relief centre for affected communities.

Refer to section 3.8 of the EMMV and the Evacuation Guidelines for guidance of evacuations for flood and storm emergencies.

3.10 Flood Rescue

VICSES may conduct flood rescues. Appropriately trained and equipped VICSES units or other agencies that have appropriate training, equipment and support may carry out rescues.

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

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

3.11 Aircraft Management

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

Air support operations will be conducted under the control and approval of the Incident Controller. Airfields are located at Tooradin, Mornington, and Leongatha.

Heliport facilities are located at: Hastings (emergency only), Phillip Island (Cowes and Grand Prix Circuit), Rosebud (emergencies), Sorrento Rescue and Cerberus.

3.12 Resupply

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

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

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

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

3.13 Essential Community Infrastructure and Property Protection

Essential Community Infrastructure and Property (eg residences, businesses, roads, power supply etc.) may be affected in the event of a flood or storm.

Each VICSES Unit maintains a small stock of sandbags (refer Appendix I). The Incident Controller will determine the priorities related to the use of sandbags, which will be consistent with the strategic priorities.

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

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

Council maintains a small stock of sandbags and some sand. Back-up supplies of sand will be available through contractors. Refer to Appendix I.

There is no further relevant information in this Plan regarding essential infrastructure apart from saying it is not subject to flooding.

3.14 Disruption to Services

Disruption to services other than essential community infrastructure and property can occur in flood and storm events. Refer to Appendix I for specific details of likely disruption to services.

3.15 Road Closures

Council and VicRoads will carry out their formal functions of road closures including observation and placement of warning signs, road blocks etc. to its designated local and regional roads, bridges, walking and bike trails (refer Appendix I).

Council will advise VicRoads as to the need for VicRoads to erect warning signs and/or closing roads and bridges under VicRoads jurisdiction.

Council will advise VicRoads of all road closures within Council's jurisdiction. Council will also tell VicRoads when these roads reopen.

VicRoads are responsible for designated main roads and highways and Council is responsible for the designated local and regional road network.

VicRoads will communicate community information regarding road closures.

3.16 Trees Down

The following are the conditions under which VicSES will respond to trees down in an event.

- Trees or limbs of a tree that have fully or partially fallen down:
    - Across roadways presenting a public safety risk
    - Onto structures
    - Onto vehicles
    - Across powerlines
    - In a public area and are presenting a safety risk, or
- Limbs that are preventing the rescue of a person (for example, a motor vehicle crash involving a tree)

Council will respond to trees down on Council land and roads managed by Council. Council will also attend where trees from Council managed land have fallen on to private property (refer Appendix I).

VicRoads or their contractors will respond to trees down on VicRoads managed roads.

3.17 Dam Failure

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

There are two main reservoirs in Bass Coast with the potential to cause significant rural inundation and possible agricultural damage.

- Almurta – Candowie Reservoir (Westernport Water)
- Glen Alvie – Lance Creek Reservoir (South Gippsland Water)

3.18 Waste Water related Public Health Issues and Critical Sewerage Assets

Inundation of critical sewerage assets including septic tanks and sewerage pump stations may result in water quality problems within the Municipality.

Where this is likely to occur or has occurred, it is the responsibility of Melbourne Water, Westernport Water and South Gippsland Water to undertake the following:

- Advise VICSES and Council of the security of critical sewerage assets to assist preparedness and response activities in the event of flood
- Maintain or improve the security of critical sewerage assets
- Check and correct where possible the operation of critical sewerage assets in times of flood
- Advise the ICC in the event of inundation of critical sewerage assets.
- The MERO or ICC will seek advice from Council's Environmental Health Officer on the appropriate responses to the community in regards to providing information on possible water supply contamination and the safety of the drinking water supply. However, it should be assumed if there is flooding, there will be some contamination.

3.19 After Action Review

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

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

Part 4 EMERGENCY RELIEF AND RECOVERY ARRANGEMENTS

4.1 General

Relief and recovery arrangements within Bass Coast are detailed in the Bass Coast MEMP and/or the Relief and Recovery Sub-plan.

4.2 Emergency Relief

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

Opening of an ERC is a decision made by the Victoria Police in their role as MERC. During Flood and Storm events, this decision is made in consultation with the Incident Controller, Council's MERO and the MRM.

Council/s may choose to activate ERCs where a situation is assessed to be a genuine (or potential) emergency. An activated ERC should only be established to provide basic support services such as food and water, first aid and emergency shelter.

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

Details of the relief arrangements are available in the MEMP / Relief and Recovery Sub Plans and the Gippsland Emergency Relief Centre Standard Operating Procedures.

4.3 Animal Welfare

Matters relating to the welfare of livestock, companion animals and wildlife (including feeding and rescue) are to be referred to DEDJTR (livestock/companion animals) and DELWP (wildlife).

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

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

Council will provide support to this process and will provide assistance to the ERC with relation to Animal Control where attendees are arriving with their animals and/or pets.

4.4 Transition from Response to Recovery

VICSES as the Control Agency is responsible for ensuring effective transition from response to recovery. This transition will be conducted in accordance with existing arrangements as detailed in Part 3 Section 3.10 of the EMMV.

Bass Coast Municipal Flood & Storm Emergency Plan

Appendices A-J

Version 3.2
December 2018

ACCURACY & CONFIDENTIALITY

Use this information as a guide to the possible effects of a flood. This plan and the information contained within, is based on estimates of flood behaviour and particular effects may occur at heights different from those indicated here. They may also occur at slightly different heights in different floods. This plan may contain sensitive information about the effects of flooding on private property. Specific reference to private addresses or businesses must be made directly to owners or other emergency services but not via broadcast or print media.

Powlett River flooding – Wattle Bank

TABLE OF CONTENTS

APPENDIX A - FLOOD THREATS FOR BASS COAST SHIRE

GENERAL

Bass Coast is located about 80 km south east of Melbourne, with frontages to both Western Port Bay and Bass Strait coastlines and encompasses an area of approximately 800 km^2.

In 2011 Bass Coast Shire had a resident population of 29,614 (Australian Bureau of Statistics). During peak holiday periods, the population exceeds 70,000. Wonthaggi is the largest town within the Bass Coast Shire and has its origin in coal mining. Other major towns include Inverloch, Grantville and Cowes on Phillip Island. Smaller towns include Bass, Coronet Bay, Dalyston, Cape Paterson, Corinella, Kilcunda, Newhaven, Rhyll and San Remo.

The main waterways in Bass Coast Shire are the Bass River, approximately 50 km in length (managed by Melbourne Water) and the Powlett River, 42 km in length (managed by WGCMA). There are however many small creeks and watercourses. Only minor creeks and drainage overflow paths are located in major townships. As a result, flooding in major townships is generally experienced only when overland flow paths or underground drainage systems are blocked or stormwater flows exceed the design capacity of the piped drainage system.

RIVERINE FLOODING

There is little recognised riverine flooding risk in Bass Coast with the majority of impact being too low lying rural land and roads. Riverine flooding can cause isolation when access/egress roads are cut by flood waters.
Prolonged moderate to heavy rain often leads to flooding within the Shire and generally occur as a result of:

- Moist warm airflow from northern Australia bringing moderate to heavy rainfall over a period of 12 hours or more following a prolonged period of general rainfall. The period of general rainfall “wets up” the catchments and (partially) fills both the on-stream dams and the natural floodplain storage. These combine to increase the runoff generated during the subsequent period of heavy rainfall.

- Successive cold fronts, often during winter and spring, that bring periods of rain that wet up the catchments and prime them for flooding from a further front or complex low pressure system that is perhaps slower moving and / or brings heavier rainfall.

- A low pressure system (often intense and known as an ‘east coast low’) that develops within eastern Bass Strait or over the Tasman Sea and directs moist air for a period of 12 hours or more onto West Gippsland. The lifting that occurs as it travels inland results in heavy rain and possible flooding. The earlier stages of an east coast low, as a low pressure system moves from the west and deepens over Bass Strait, tends to result in the heaviest rainfall over the catchments of the streams that flow through Bass Coast.

FLASH FLOODING & OVERLAND FLOWS

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. Flooding from these storms occurs with little warning and localised damage can be severe.

High intensity rainfall associated with thunderstorms (ie- average rainfall rates of more than 35mm/hour for 30 minutes or more or 17mm in 30 minutes) is likely to lead to flash flooding, across the urbanised parts of the Shire.

Blocked or capacity impaired stormwater drains can also lead to overland flows and associated flooding: the drain surcharges and excess water flows above ground.

Changes in rainfall patterns associated with climate change are likely to lead to less rainfall overall; however, there is likely to be more frequent and extreme riverine and flash flood events.

TIDAL FLOODING & STORM SURGES (COASTAL INUNDATION)

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 storm-water 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. Sea level rise is expected to exacerbate this situation. Areas expected to be vulnerable to sea level rise include:

Suburb/s / Towns		
Bass	Coronet Bay	Pioneer Bay
Cowes	Grantville	Queensferry
Corinella	Jam Jerrup	Silverleaves

Table A1 – Areas expected to be vulnerable to sea level rise and storm surges.

Lang Lang Foreshore Caravan Park may need to be evacuated as access will be cut off in the event of catchment or coastal storm surge events.

DESCRIPTION OF MAJOR WATERWAYS & DRAINS

There are two major waterways within Bass Coast, both of which flow in a generally westwards direction into Western Port Bay and Bass Strait respectively:

- The Bass River from downstream of the South Gippsland Highway; and
- The Powlett River from downstream of the Outtrim – Inverloch and Scotts Estate Roads.

  There are also two good sized reservoirs in Bass Coast which are discussed later in the plan.

- Candowie Reservoir (Bass River)
- Lance Creek Reservoir (Powlett River)

Maps showing the major waterways are provided in **Appendix F**.

Bass River

The Bass River is a relatively short (30km) coastal river that rises in the Strzelecki Ranges to the south of Poowong in South Gippsland Shire. It passes into Bass Coast at the South Gippsland Highway and flows in a south westerly direction through the wide, flat Bass Valley and estuary and into Western Port near the town of Bass.

The area is characterised by steep slopes and erosion and is subject to tidal influence as far upstream as Bass Township. There are many farm dams in the tributary watercourses restricting flows into the river until the dams are full. This can cause very different outcomes during a heavy rainfall event if the dams are full as opposed to empty.

At the top of the river, Bellview Creek and Little Bass River join below Poowong and become the Bass River. It then flows west and then south west toward Loch and then Almurta. From Almurta the terrain is relatively flat farmland which is subject to flooding after heavy rain. The Poowong Butter Factory owns Poowong Reservoir, a small deep reservoir on the river at Poowong.

Powlett River

The Powlett River rises as many tributaries in steep farmland in the Strzelecki Ranges south of Korumburra near Outtrim in South Gippsland Shire and flows south into Bass Coast downstream of the Outtrim – Inverloch and Scotts Estate Roads. The Powlett has a catchment area of around 555 km^2. Its main tributary is Foster Creek which rises below Holmes Hill south of Korumburra and flows south through hilly rural areas, just to the west of Kongwak where it joins the Powlett River before it swings west south of Korumburra. The river continues in its
westerly path, crosses the Bass Highway just east of Dalyston, is joined by a small tributary called Bridge Creek
and then flows into Bass Strait. Other tributaries include Lance Creek, West Creek and Woolshed Creek

The catchment extends over two municipalities; the Shires of South Gippsland and Bass Coast. South Gippsland generally covers the catchment to the east of Foster Creek and includes the townships of Kongwak, Outtrim, Jumbunna and Korumburra. Bass Coast covers the catchment area west of Foster Creek (downstream of the Outtrim – Inverloch and Scotts Estate Roads) and includes the townships of Wonthaggi, Archies Creek and Dalyston.

The Powlett River has a significant floodplain area and land use within the catchment is predominantly agriculture-based. The catchment consists of three major physiographic zones as follows:

- The South Gippsland Highlands zone which is characterised by a highly dissected ridge and valley relief.
- The Powlett River Plains zone which is characterised by flat to gently undulating terrain. The Plains contain major drainage systems located south of the Powlett River that were established to allow farming of waterlogged and flood prone land. The drainage system consists of a number of major drainage lines that run from east to west, from about the Kongwak-Inverloch Road and join the Powlett River just west of the Korumburra-Wonthaggi Road. The mid-section of the Powlett River is perched above the floodplain and during flood events floodwaters break the banks and flow out across the plain. In some places, flood flows can be up to approximately 2kms away from the river. Old

abandoned river courses, which are apparent on the floodplain, provide evidence that the river is subject to periodic changes in course due to avulsion (river breakaway development).

- The River Mouth zone which occurs between the downstream end of the alluvial Powlett plains zone and the coast. This part of the river is influenced by tides and storm surge as well as the natural processes of sand transport that periodically block the mouth of the river. These natural processes can cause isolated flood events, which inundate farmland within the zone. When there is a significant blockage, the mouth of the river is excavated to reopen the entrance and release the built up water. Approval for the estuary opening is managed by the WGCMA in consultation with landowners, Council and Parks Victoria with Parks Victoria being responsible for the actual works.

Melbourne Water Drains & Waterways	Suburb/s / Towns	Melbourne Water Drains & Waterways	Suburb/s / Towns
Bass River	Almurta, Bass, Glen Forbes & Woodleigh	Peacock Road Drain	Jam Jerrup & Lang Lang
Bay Road Drain	Jam Jerrup	Red Bluff Creek	Lang Lang & Loch
Blue Gum Drain	Cowes	Red Rocks Drain	Cowes
Blue Mountain Creek	Woolamai	Saltwater Creek	Cowes & Ventnor
Boat Creek	Ventnor	Settlement Road Drain	Cowes & Rhyll
Colbert Creek	Grantville & The Gurdies	Smith's Beach Drain	Cowes, Smiths Beach & Sunset Strip
Coronet Bay Drain	Coronet Bay	Swan Lake Drain	Summerlands & Ventnor
Gorge Creek	Glen Forbes	Telfer Creek	Kernot
Native Dog Creek	Ventnor	Tennant Creek	Almurta
Norsemans Road Drain	Coronet Bay	Wattle Creek	Krowera

Table A1 – Melbourne Water Drains and Waterways within or bordering Bass Coast Shire

FLOOD MITIGATION SYSTEMS

There are three flood mitigation levees managed by Melbourne Water within Bass Coast (see table below). Their locations and the connecting waterway/drainage systems can be seen on map B in **Appendix F**. Other retarding basins, some of which are designed for 1 in 100 year flows, such as Ayr Creek, Marina Place, Surf Estate, Albert Ruttle Road, Broadbeach Resort and Ullathorne Road in Inverloch, Blue Water Circle in Cape Paterson, Seagrove Estate, Kent Haven Estate, Ramada Resort, Shearwater and Seagrove in Cowes, Justice Road Farm and White Sands Estate in Ventnor, Silver Water Resort and Penniwells in San Remo, Crystal Brook Estate in Kilcunda, Grantville-Glen Alvie Road and Grantville Rise Estate in Grantville, Summer Fields Estate, Fuller Road and College Estate in Wonthaggi, Waterdale Estate in Dalyston and Wonthaggi Wetlands on South Dudley Road. A couple of minor basins have been constructed in Wonthaggi at Sussex Court and Grantville opposite Agnes Street.

RETARDING BASINS

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Level	ANCOLD Hazard Rating	Houses In Flow Path (dam breach)	VicMap Reference
North Norseman	Norsemens Road Drain	2.24 ha	~10 ML	3.50m AHD	Unavailable	~4.0m AHD	Very Low	0	6875 D15
Smith's Beach	Smith's Beach Drain	0.46 ha	~10 ML	~27.2m AHD	~27.2m AHD	~27.5m AHD	High C	Unavailable	6917 J8
Town Oval	Coronet Bay Drain	1.37 ha	11 ML	N/A	Unavailable	~9.0m AHD	Very Low	0	6919 D1

Table A2 – Melbourne Water Retarding Basins within Bass Coast

LEVEES

There are a number of rural levees along the Powlett River, mainly to provide protection from smaller nuisance flooding. Overtopping of these levees has little consequence for built assets or infrastructure.

FLOOD WARNING SYSTEM

Along the Bass River & Western Port Catchments, Melbourne Water has three hydrographic monitoring sites which are outlined in the table below. These gauges can be monitored online through Melbourne Water at: http://www.melbournewater.com.au/waterdata/rainfallandriverleveldata/Pages/Rainfall-and-river-level-new.aspx or through the Bureau of Meteorology at: http://www.bom.gov.au/cgi-bin/wrap_fwo.pl?IDV60201.html. To view their locations, see mapping in **Appendix F**.

Hydrographic Monitoring Station	Station No.	Location	Owner	Stream Level & Flow Gauge	Rain Gauge	Tide Gauge	VicMap Reference
Bass River at Glen Forbes South	227231A	South bank of the river, west side of McGrath Road, Bass	GRWMP	✓	✓		6920 A4
Bass River at Loch	227219A	South bank of the river, north side of Loch-Poowong Road, Loch	GRWMP	✓	✓		6877 J7
Lang Lang	228209B	North bank of the river, 400m west of Heads Road, Lang Lang	Melbourne Water	✓	✓		6824 A9
Pound Creek	85099	West bank of the creek, 200m south of Inverloch-Venus Bay Road	BoM		✓		6963 G6
Tooradin	228399A	Evans Inlet, Tooradin	Melbourne Water			✓	6821 J6
Upper Lang Lang	586196	North side of Drouin-Korumburra Road, Poowong East between Stabens Road and Main South Road	Melbourne Water		✓		6878 G7
Wonthaggi	86127	South Gippsland Water Authority Depot, Watt Street, Wonthaggi	BoM		✓		8220 G9

Table A3 – Hydrographic Monitoring Stations servicing the Bass Coast Shire

The Bureau does not issue formal flood warnings for the Bass River or Coastal areas of Western Port Bay. However warnings for the region can be monitored on the Bureau's website (**http://www.bom.gov.au/vic/warnings/index.shtml**). While the Bass Coast Shire monitors these warnings in times of high rainfall, there are no specific guidelines to advise how these situations should be responded to.

HEALTH & ENVIRONMENTAL RISKS

There are many septic tanks in the rural areas that may be inundated by floodwaters. There is also risk posed by farm chemicals stored in farm sheds on the floodplain. Runoff from farmland into waterways and acid sulphate soils in coastal areas also provide a health risk.

HISTORIC FLOODS

NOVEMBER 1934

One of the most prominent recorded historical floods in the region occurred on the 29th November 1934. Across the Port Phillip and South Gippsland regions, 350 mm was recorded over a 48-hour period, resulting in landslides, road closures and evacuations.

MAY 1951

The flood submerged the Wonthaggi to Dalyston road under 2ft: 6in. (750mm) of muddy Powlett River water near Wonthaggi cutting the town off to the north. The river, usually 20 yards (18 metres) wide, was up to half a mile (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.

JULY 2007

Rain that fell in late June / early July caused the Powlett River to burst its banks and flood 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.

MAY 2012

Heavy rain on 25 May 2012 (e.g. 50mm to 80mm in 10 hours) on wet catchments resulted in widespread flooding across West Gippsland. 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. SES 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.

Significant floods (with high flood gauge levels and likely flooding consequences to property and infrastructure) to have occurred within Bass Coast Shire are as follows in the table below. To view the locations of these floods.

Event	Bass River at Loch (227219A)		Bass River at Glen Forbes South (227231A)		Powlett River d/s Foster Creek
	Rainfall at Gauge	River Level	Rainfall at Gauge	River Level	Creek Level
Normal Water Level		0.3m		0.4m	Unavailable
Minor Flood Class	-	-	-	-	-
Moderate Flood Class	-	-	-	-	-
Major Flood Class	-	-	-	-	-
29th June 1980	-	3.15m	-	5.38m	4.96m
5th July 1980	-	1.55m	-	4.84m	4.33m
13th September 1983	-	2.13m	-	4.48m	4.14m
29th July 1985	-	1.70m	-	4.47m	4.41m
18th September 1984	-	2.34m	-	5.14m	4.67m
23rd October 1986	-	1.56m	-	4.26m	4.13m
11th July 1989	-	1.94m	-	4.33m	4.36m
11th October 1990	-	2.62m	-	5.27m	4.67m
18th September 1991	-	1.99m	-	4.93m	4.26m
16th September 1993	-	1.65m	-	4.73m	4.17m
30th July 1996	-	2.35m	-	5.40m	4.85m
26th May 2012	61mm / 15 hrs	2.57m	41mm / 10 hrs	5.52m	4.38m
22nd June 2012	-	2.72m	-	**5.82m**	4.88m
19th September 2013	51mm / 18 hrs	2.29m	72mm / 19 hrs	5.58m	-
14th November 2013	71mm / 31 hrs	1.86m	79mm / 31 hrs	5.50m	-
6th July 2016	44mm / 8 hrs	2.30m	27mm / 15 hrs	4.83m	-
16th September 2017	57mm / 57 hrs	1.74m	53mm / 56 hrs	4.82m	-

Table A4 – Selection of Historical Flood Events along the Bass and Powlett Rivers

DAM FAILURE FLOOD RISK

All dams have a risk of failure. Dams within Bass Coast (Candowie – Westernport Water; Lance Creek – South Gippsland Water) are all subject to rigorous dam safety management programs implemented by the managing entity and are the subject of individual Dam Safety Emergency Management Plans (DSEPs). DSEPs identify possible dam failure scenarios and provide direction on the order and detail of the necessary communications and incident management tasks to be initiated. They also refer to intelligence and maximum inundation extent mapping arising from detailed dam break analyses. Intelligence can include travel times to key locations, maximum depths and velocities and the time to reach those maxima at those key locations, as well as other information that would inform the response effort. Close communication with the dam manager is essential in the event of a dam safety incident.

Flooding resulting from failure of the following dams has the potential to cause significant structural and community damage within Bass Coast. Note that if the storage capacity is reached and water flows over the spillway, this is not to be referred to as a flow release or as a storage breach or failure.

Name	Location	Water Authority	Dam Capacity	VicMap Reference
Candowie Reservoir	1.5km east of Almurta along Tennant Creek, discharging into the Bass River	Westernport Water	2,263 ML (increasing to 4,463 ML)	6920 F3
Lance Creek Reservoir	3km northwest of Kongwak along Lance Creek discharging into Powlett River	South Gippsland Water	4,200 ML	6921 E8

Table A13 – Dams that pose a risk to Bass Coast Shire from Dam Failure

Failure of any of the above dams or one of the many farm dams within Bass Coast may pose a threat to life and property depending on the mode of failure and the dam's proximity to downstream roads and buildings.

CANDOWIE RESERVOIR

Fed by Tennent Creek which is a tributary to the Bass River, Candowie Reservoir supplies water to the towns around Western Port and Phillip Island. The dam consists of an earth-filled structure topped with an L-shaped retaining wall and concrete lined spillway. The reservoir also has an outlet tower. Upgrade works at the dam (as at March 2013) will increase the capacity of the reservoir and strengthen the existing structures. A doubling of capacity from 2,263 ML to 4,463 ML will be achieved by raising the spillway crest from RL59.35 to RL62.35 (new FSL), raising the dam embankment from RL59.20 to RL62.90, raising the dam wall from RL61.30 to RL64.60 and undertaking other works at site. The increased capacity will enable Westernport Water to capture flood events on Tennant Creek and the Bass River, as well as store bore water from the Corinella Bore field. The upgraded dam will be able to safely pass a 1 in 100,000 year flood event.

LANCE CREEK RESERVOIR

Lance Creek Reservoir is situated on Lance Creek, a tributary of the Powlett River about 3km north of Kongwak. It supplies water to a number of townships in Bass Coast including Wonthaggi, Inverloch and Cape Patterson. It also supplements Candowie Reservoir and has a maximum storage capacity of 4,200ML.

MAJOR ROAD CLOSURES

Towns along the Bass River such as Loch, Kernot, Glen Forbes and Bass may have access cut over the Bass River for a period while the river is in flood. These towns are also at risk of isolation for a number of hours if the Bass River's tributaries are also in flood. Some localised short-duration isolation may also occur due to flash flooding following localised heavy rainfall, usually associated with thunderstorms.

Bass Highway	South Gippsland Highway
Kilcunda (Bourne Creek)	Loch (South Gippsland Shire)
Dalyston (towards Kilcunda)	
Inverloch	
Wonthaggi (between Boundary & Pearsall Roads)	
Wonthaggi (McKenzie St)	
Lance Creek	
Korumburra Rd, Wonthaggi	
Kira Rd, between Wonthaggi & Inverloch	
Screw Creek, Between Inverloch & Leongatha	

MINOR ROAD CLOSURES

Most roads on the floodplain or that cross water courses are subject to flooding in Bass Coast.

FLASH FLOODING / OVERLAND FLOWS	Water Over Road
PHILLIP ISLAND	**PHILLIP ISLAND**
Phillip Island Rd, Surf Beach	Watts Road, Ventnor
Back Beach Rd, Smiths Beach	Kitty Miller Road, Ventnor
Ventnor Beach Rd, Ventnor	Berry's Beach Road, Ventnor
Pyramid Rock Road, Ventnor	The Esplanade, Cowes – Between Findlay St & Bass Ave
Phillip Island Rd, Cowes	Cowes Rhyll Road, Cowes
Moore Street, Silverleaves	Gap Rd – Cowes
	Rhyll Newhaven Rd – Rhyll (just past McFees Rd
INVERLOCH	**INVERLOCH**
A'Beckett Street	Treadwell's Road/Mars Landing Rd – Inverloch
Veronica Street	
Diane Place	**COAST**
Acacia Ct	Ridgeway Rd, Kilcunda
Honey Eater Circuit	Wilsons Road, Cape Paterson
Inverloch-Kongwak Road	
RIVERINE FLOODING	
Bass River	
Stewart Rd, Kernot	Soldiers Rd, Bass
Gaw Rd, Kernot	Woolamai Road, Bass
Bass Landing Rd & Pilots La, Bass	Turnbull-Woolamai Road, Woolamai
Mapleson Rd, Bass	Woodleigh-St Helier Road, Woodleigh
McGraths Rd, Glen Forbes	
Woodleigh Rd & Short Rd, Woodleigh	
Peacock Road, Woodleigh	

POWLETT RIVER	
| Korumburra South Rd - near Outtrim	| Lance Creek Rd
| Kongwak to Outtrim Rd	| McCraws Road, Wattle Bank
| Scotts Estate Road, Outtrim	| Pinkerton Road, West Creek
| Inverloch-Outtrim Road, Outtrim (Near Meeks Rd)	| Korumburra-Inverloch Rd
| Korumburra-Inverloch Rd - near Kongwak	| Loch-Wonthaggi Road, near the Powlett River crossing
| Korumburra-Wonthaggi Rd – near McCraws Rd	| West Creek Road – at Powlett river bridge
| McCraws Rd – various places	| Lynnes Road, Wattle Bank (Kirrak Road Intersection)
| Scotts Estate Rd	
| Korumburra Rd - @ Lance Creek	
WONTHAGGI	| Kirrak Road, Wonthaggi
| Loch-Wonthaggi Road, Wonthaggi	| Lower Powlett Road, Wonthaggi
| Heslop Road, North Wonthaggi	| West Area Road, Wonthaggi
| Pinkerton Road, Wonthaggi	| Murray St, Wonthaggi
| South Dudley Rd Wonthaggi	| Billson St, Wonthaggi
| Heslop Road, North Wonthaggi	
| Korumburra Road/Heslop Road Intersection, Wonthaggi	
TIDAL / COASTAL STORM SURGE	
| Lang Lang – Jetty Road	| Bayview Ave – Tenby Point
| Pioneer Bay – Sonia Cres	| Beach Road, Rhyll
| Pioneer Bay – Beach Boulevard	| All roads, Silverleaves
| Wonthaggi Cres – San Remo	

DISRUPTION TO SERVICES

The region's main road transport link, the Bass Highway, is often wetted during heavy rain events due to flows in drainage lines exceeding culvert capacities and / or low spots not draining very well. The Highway is also affected by flooding in the Powlett River as well as on the numerous small creeks within Bass Coast. It is likely that a big flood on the Bass River would also affect the Bass Highway and the South Gippsland Highway. In times past, the railway line has been flooded but current status is unknown

APPENDIX B - TYPICAL FLOOD PEAK TRAVEL TIMES

In using the information contained in this Appendix, consideration needs to be given to the time of travel of the flood peak. A flood on a 'dry' waterway will generally travel more slowly than a flood on a 'wet' waterway (eg. The first flood after a dry period will travel more slowly than the second flood in a series of floods). Hence, recent flood history, soil moisture and forecast weather conditions all need to be considered when using the following information to direct flood response activities.

Note that flooding will start some time ahead of the time indicated by the following travel times – these are the time between the flood peaks at respective sites.
Where negative values are shown in the table below this indicates that a flood peak may be expected at the gauge downstream before a separate flood peak is experienced at the upstream gauge. This phenomenon may be due to the location of the thunderstorm passing through the catchment between the two gauges, or because of the urban environment found downstream causing floodwaters to enter the waterway quicker than those in a more rural setting upstream. Lastly this may be because of the existence of a retarding basin between the two gauges.

Typical Travel Times

Height Range at Loch Gauge	Location to (Gauge)	Typical Travel Time	Comments
BASS RIVER			
1.30m to 1.70m	Glen Forbes South	Between 8 to 20 hours	Height Ranges based upon Equal Distribution of Historical Flood Peaks Recorded
1.71m to 2.00m	Glen Forbes South	Between 8 to 17 hours	
2.01m to 3.15m	Glen Forbes South	Between 6 to 13 hours	

Table B1 – Typical Flood Travel Times between gauges on the Bass River

Historical Travel Times

Flood Event	Height At Loch Gauge	Height At Glen Forbes South Gauge	Flood Peak Travel Time
BASS RIVER			
8th July 1974	1.84m	4.19m	13 hours
23rd September 1976	1.30m	4.18m	8 hours
26th July 1977	1.92m	4.86m	10 hours
29th June 1980	3.15m	5.38m	9 hours
5th July 1980	1.55m	4.84m	20 hours
9th September 1983	2.13m	4.48m	13 hours
13th September 1983	1.46m	4.38m	10 hours
29th July 1984	1.70m	4.47m	20 hours
18th September 1984	2.34m	5.14m	9 hours
17th July 1985	1.64m	4.32m	13 hours
23rd October 1986	1.56m	4.26m	14 hours
11th December 1988	1.80m	4.63m	14 hours
11th July 1989	1.94m	4.33m	15 hours
28th October 1989	1.93m	4.45m	17 hours
12th October 1990	2.62m	5.27m	12 hours
18th September 1991	1.99m	4.93m	11 hours
16th September 1993	1.65m	4.73m	14 hours
30th July 1996	2.35m	5.40m	8 hours
12th September 2004	1.43m	4.50m	20 hours
13th November 2004	1.59m	4.56m	13 hours
14th April 2011	1.87m	5.23m	9 hours
11th November 2011	1.77m	5.05m	14 hours
4th May 2012	1.63m	4.90m	14 hours
26th May 2012	2.57m	5.52m	13 hours
4th June 2012	2.02m	5.58m	6 hours
22nd June 2012	2.72m	**5.82m**	6 hours
19th September 2013	2.29m	5.58m	7 hours
14th November 2013	1.86m	5.50m	8 hours
6th July 2016	2.30m	4.83m	17 hours
16th September 2017	1.74m	4.82m	13 hours

Table B2 – Historical Flood Travel Times between gauges on the Bass River

APPENDIX C1 – PHILLIP ISLAND (ISLAND DISTRICT) FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Phillip Island is located approximately 130km south-east of Melbourne. It is connected to the mainland by the Bass Highway at the coastal town of San Remo.

High intensity, short duration rainfall events can cause flash flooding on Phillip Island along the number of stormwater drains or small creeks. The area sees a mixture of moderate to slow water movement due to the presence of rolling hills and flat terrain on the Island. As a result, flood waters may persist for a number of hours or days in areas where the ground is flat. See mapping in Appendix F for more insight into flooding in the area.

Phillip Island Road, which is the only road to the mainland is susceptible to flooding at Newhaven. The road may still be passible, but there is a risk access to San Remo via the bridge would be cut off to all but Cape Woolamai & Newhaven residents on the island. Churchill Island is also at risk of isolation, with Samuel Amess Drive likely flooded during a 1% AEP storm surge (tidal) event.

Storm Surge (tidal) flooding events are a risk to coastal areas of the Island, with residents in Silverleaves and the eastern fringe of Cowes most likely flooded during an event.

This Summary table is generated from Victorian Government data. 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 access this information should make appropriate enquiries to assess the currency of the data.

Summary of Consequences in a 1% AEP (100yr ARI) flash flood around Phillip Island

Property					
Properties	**56**				
Residential	56				
Commercial	0				
Industrial	0				
Public Land	0				
Rural	0				
Community Infrastructure					
Health Facilities	0		Child Care / Kindergartens	0	
Care Facilities	0		Community Venues	0	
Retirement Villages	0		Places of Worship	0	
Schools / Colleges	0		Prisons	0	
Essential Infrastructure					
Major Roads	4	Back Beach Road; Cowes-Rhyll Road; Phillip Island Road; & Ventnor Road	Police Stations	0	
Major Rail	0		Government Buildings	0	
Bus Routes	2	Wonthaggi-Cowes; & Foutain Gate-Cowes	Sewerage Facilities	0	
Power Facility	0		Levees	0	

Summary of Consequences in a 1% AEP (100yr ARI) flash flood around Phillip Island					
Comms Services	0		Drainage Facilities	1	Smiths Beach Retarding Basin
Emergency Services	0		Airports / Airfields	0	
Tourism / Recreation					
Sports Facilities	0		Caravan Parks	0	
Recreation Facilities	0		Camping Grounds	0	
Government Boundaries					
Local Gov't Areas	1	Bass Coast	CMA	1	Port Phillip & Westernport
Adjacent LGAs	0		CFA District	1	District 08
SES Resp' Boundary	1	Phillip Island	MFB District	0	

Table C1.1 – Consequence Summary of 1% AEP flood around Phillip Island

This Summary table is generated from Victorian Government data. 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 access this information should make appropriate enquiries to assess the currency of the data.

Summary of Consequences in a 1% AEP (100yr ARI) storm surge flood around Phillip Island					
Property					
Properties	**361**				
Residential	359				
Commercial	0				
Industrial	0				
Public Land	0				
Rural	2				
Community Infrastructure					
Health Facilities	0		Child Care / Kindergartens	0	
Care Facilities	0		Community Venues	0	
Retirement Villages	0		Places of Worship	0	
Schools / Colleges	0		Maritime	4	Newhaven Jetty; Newhaven Marina; Rhyll Jetty; Anderson Road Boat Ramp
Essential Infrastructure					
Major Roads	0		Police Stations	0	
Major Rail	0		Government Buildings	0	
Public Transport	1	Cowes Jetty Ferry Services	Sewerage Facilities	0	
Power Facility	0		Levees	0	
Comms Services	0		Drainage Facilities	0	
Emergency Services	0		Airports / Airfields	0	
Tourism / Recreation					
Sports Facilities	1	Cowes Golf Club	Caravan Parks	0	
Recreation Facilities	1	Penguin Parade	Camping Grounds	0	
Government Boundaries					
Local Gov't Areas	1	Bass Coast	CMA	1	Port Phillip & Westernport
Adjacent LGAs	0		CFA District	1	District 08

Summary of Consequences in a 1% AEP (100yr ARI) storm surge flood around Phillip Island					
SES Resp' Boundary	1	Phillip Island	MFB District	0	

Table C1.2 – Consequence Summary of 1% AEP flood around Phillip Island

WARNING TIMES

Whilst there is a hydrographic/telemetry station (gauge) in the Western Port Bay Catchment, Melbourne Water does not provide any flood warning service at this point. No Gauges are currently present on Phillip Island.

Hydrographic/Telemetry Station	Station No.	Owner	Tide Gauge	Melway Reference
Tooradin Tide Recorder at Evans Inlet	228399A	Melbourne Water	✓	144 A3

Table C1.3 – Hydrographic Monitoring Stations servicing Phillip Island's coastline

These Gauges may provide some warning of expected flooding. See the Melbourne Water website for more information on these gauges: http://www.melbournewater.com.au/waterdata/rainfallandriverleveldata/Pages/Rainfall-and-river-level-new.aspx. It is advised that residents monitor the Bureau of Meteorology's website http://www.bom.gov.au/ and the VicEmergency website https:/emergency.vic.gov.au/ for any thunderstorm, flood or severe weather warnings present for their area.

AREAS OF FLOOD RISK

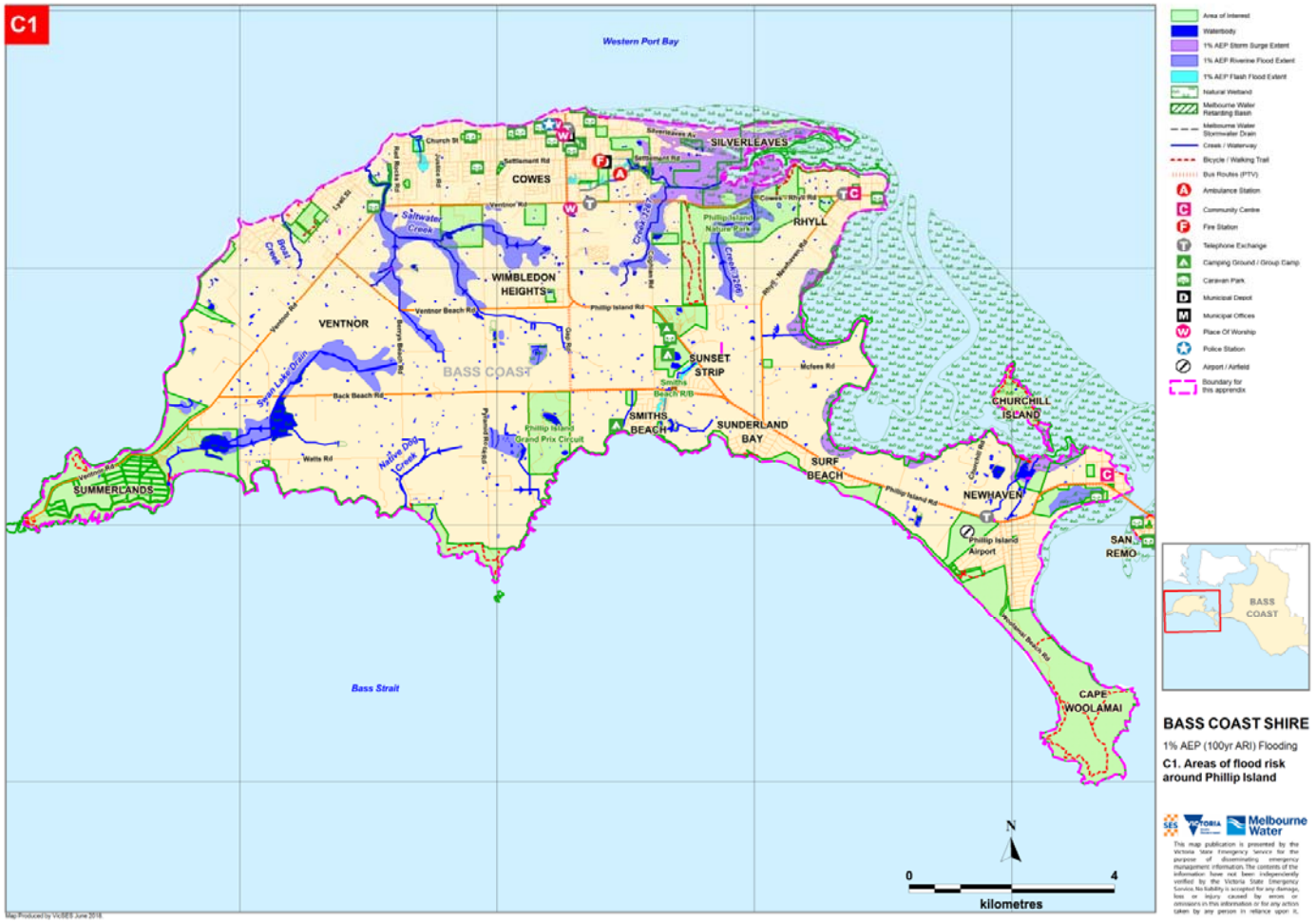


Figure C1 – Areas of flood risk around Phillip Island

PROPERTIES AT FLOOD RISK

Properties listed in the table below are at risk from flooding around Phillip Island's stormwater drainage network. As more intelligence becomes available, this list may change. This table has been populated based on modelling work as part of the Phillip Island (Melbourne Water and Cardno, June 2015) flood mapping and risk assessment program.

This Property Flood Risk Table is presented by the Victoria State Emergency Service for the purpose of disseminating emergency management information. The contents of the information have not been independently verified by the Victoria State Emergency Service. No liability is accepted for any damage, loss or injury caused by errors or omissions in this information or for any action taken by any person in reliance upon it.

Properties at risk from Flooding around Phillip Island's Stormwater Drainage Network

Residential	Commercial	Industrial	Rural	Public Use

Street No. at Risk in AEP Event		Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	1% AEP				
-	117	Back Beach Road	Smiths Beach	Smiths Beach Drain	Flash
-	9	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
-	11	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
-	14	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
-	16	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
-	17	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
-	21	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
-	23	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
26	26	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
-	32	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
-	47	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
51	51	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
-	1/49	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
-	2/49	Barramundi Avenue	Smiths Beach	Smiths Beach Drain	Flash
-	2	Bernard Court	Smiths Beach	Smiths Beach Drain	Flash
-	4	Bernard Court	Smiths Beach	Smiths Beach Drain	Flash
-	6	Bernard Court	Smiths Beach	Smiths Beach Drain	Flash
-	2	Dolphin Drive	Smiths Beach	Smiths Beach Drain	Flash
-	50	Dolphin Drive	Smiths Beach	Smiths Beach Drain	Flash
-	24	Galleon Crescent	Sunset Strip	Smiths Beach Drain	Flash
26	26	Galleon Crescent	Sunset Strip	Smiths Beach Drain	Flash
-	30	Galleon Crescent	Sunset Strip	Smiths Beach Drain	Flash
-	32	Galleon Crescent	Sunset Strip	Smiths Beach Drain	Flash
-	34	Galleon Crescent	Sunset Strip	Smiths Beach Drain	Flash
36	36	Galleon Crescent	Sunset Strip	Smiths Beach Drain	Flash
38	38	Galleon Crescent	Sunset Strip	Smiths Beach Drain	Flash
-	40	Galleon Crescent	Sunset Strip	Smiths Beach Drain	Flash
-	42	Galleon Crescent	Sunset Strip	Smiths Beach Drain	Flash
-	44	Galleon Crescent	Sunset Strip	Smiths Beach Drain	Flash
-	4	Gilmore Street	Smiths Beach	Smiths Beach Drain	Flash
-	8	Hill Court	Cowes	Red Rocks Drain	Flash
-	37	Hobsons Parade	Cowes	Red Rocks Drain	Flash
-	39	Hobsons Parade	Cowes	Red Rocks Drain	Flash
-	40	Hobsons Parade	Cowes	Red Rocks Drain	Flash

Properties at risk from Flooding around Phillip Island's Stormwater Drainage Network						
Residential		Commercial	Industrial	Rural	Public Use	
Street No. at Risk in AEP Event		Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type	
20% AEP	1% AEP					
-	41	Hobsons Parade	Cowes	Red Rocks Drain	Flash	
-	42	Hobsons Parade	Cowes	Red Rocks Drain	Flash	
-	43	Hobsons Parade	Cowes	Red Rocks Drain	Flash	
-	45	Hobsons Parade	Cowes	Red Rocks Drain	Flash	
-	50	Hobsons Parade	Cowes	Red Rocks Drain	Flash	
-	52	Hobsons Parade	Cowes	Red Rocks Drain	Flash	
-	44-48	Hobsons Parade	Cowes	Red Rocks Drain	Flash	
-	3	Kauri Close	Cowes	Blue Gum Drain	Flash	
-	5	Kauri Close	Cowes	Blue Gum Drain	Flash	
-	5	Marlin Street	Smiths Beach	Smiths Beach Drain	Flash	
-	7	Marlin Street	Smiths Beach	Smiths Beach Drain	Flash	
-	9	Marlin Street	Smiths Beach	Smiths Beach Drain	Flash	
-	12	Marlin Street	Smiths Beach	Smiths Beach Drain	Flash	
15	15	Marlin Street	Smiths Beach	Smiths Beach Drain	Flash	
2	2	Murray Street	Smiths Beach	Smiths Beach Drain	Flash	
4	4	Murray Street	Smiths Beach	Smiths Beach Drain	Flash	
-	24	Redwood Drive	Cowes	Blue Gum Drain	Flash	
1	1	Rogerson Road	Sunset Strip	Smiths Beach Drain	Flash	
1A	1A	Rogerson Road	Sunset Strip	Smiths Beach Drain	Flash	
2	2	Rogerson Road	Sunset Strip	Smiths Beach Drain	Flash	
2A	2A	Rogerson Road	Sunset Strip	Smiths Beach Drain	Flash	
Totals						
12	56					

Table C1.4 – Properties at risk of flooding along the stormwater drainage network on Phillip Island

Properties listed in the table below are at risk from flooding around the Western Port Bay coastline. As more intelligence becomes available, this list may change.

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Properties at risk from Storm Surge flooding around the Western Port Bay Coastline during a 1% AEP event					
Residential	Commercial	Industrial	Rural	Public Use	
No. of Properties in Street	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type	
1	Banksia Street	Silverleaves	Western Port Bay	Storm Surge	
2	Banksia Street	Silverleaves	Western Port Bay	Storm Surge	
3	Banksia Street	Silverleaves	Western Port Bay	Storm Surge	
4	Banksia Street	Silverleaves	Western Port Bay	Storm Surge	
10	Beach Road	Rhyll	Western Port Bay	Storm Surge	
11A	Beach Road	Rhyll	Western Port Bay	Storm Surge	
12	Beach Road	Rhyll	Western Port Bay	Storm Surge	
73	Beach Road	Rhyll	Western Port Bay	Storm Surge	
1	Bruce Road	Silverleaves	Western Port Bay	Storm Surge	

Properties at risk from Storm Surge flooding around the Western Port Bay Coastline during a 1% AEP event				
Residential	Commercial	Industrial	Rural	Public Use
No. of Properties in Street	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
3	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
5	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
7	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
9	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
11	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
13	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
17	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
19	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
21	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
23	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
25	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
27	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
29	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
31	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
33	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
35	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
39	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
43	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
45	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
47	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
60	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
62	Bruce Road	Silverleaves	Western Port Bay	Storm Surge
2	Chale Court	Silverleaves	Western Port Bay	Storm Surge
4	Chale Court	Silverleaves	Western Port Bay	Storm Surge
6	Chale Court	Silverleaves	Western Port Bay	Storm Surge
7	Chale Court	Silverleaves	Western Port Bay	Storm Surge
8	Chale Court	Silverleaves	Western Port Bay	Storm Surge
9	Chale Court	Silverleaves	Western Port Bay	Storm Surge
10	Chale Court	Silverleaves	Western Port Bay	Storm Surge
11	Chale Court	Silverleaves	Western Port Bay	Storm Surge
13	Chale Court	Silverleaves	Western Port Bay	Storm Surge
22	Chale Court	Silverleaves	Western Port Bay	Storm Surge
24	Chale Court	Silverleaves	Western Port Bay	Storm Surge
26	Chale Court	Silverleaves	Western Port Bay	Storm Surge
298	Coghlan Road	Silverleaves	Western Port Bay	Storm Surge
346	Coghlan Road	Silverleaves	Western Port Bay	Storm Surge
353	Coghlan Road	Cowes	Western Port Bay	Storm Surge
8	Collins Street	Silverleaves	Western Port Bay	Storm Surge
10	Collins Street	Silverleaves	Western Port Bay	Storm Surge
11	Collins Street	Silverleaves	Western Port Bay	Storm Surge
12	Collins Street	Silverleaves	Western Port Bay	Storm Surge
2	Cove Place	Cowes	Western Port Bay	Storm Surge
4	Cove Place	Cowes	Western Port Bay	Storm Surge
6	Cove Place	Cowes	Western Port Bay	Storm Surge

Properties at risk from Storm Surge flooding around the Western Port Bay Coastline during a 1% AEP event				
Residential	Commercial	Industrial	Rural	Public Use
No. of Properties in Street	**Street**	**Suburb**	**Along Melbourne Water Watercourse**	**Flood Risk Type**
8	Cove Place	Cowes	Western Port Bay	Storm Surge
10	Cove Place	Cowes	Western Port Bay	Storm Surge
12	Cove Place	Cowes	Western Port Bay	Storm Surge
14	Cove Place	Cowes	Western Port Bay	Storm Surge
16	Cove Place	Cowes	Western Port Bay	Storm Surge
18	Cove Place	Cowes	Western Port Bay	Storm Surge
20	Cove Place	Cowes	Western Port Bay	Storm Surge
2	Dolphin Drive	Silverleaves	Western Port Bay	Storm Surge
7	Fairway Mews	Cowes	Western Port Bay	Storm Surge
3	Hazelwood Court	Silverleaves	Western Port Bay	Storm Surge
5	Hazelwood Court	Silverleaves	Western Port Bay	Storm Surge
7	Hazelwood Court	Silverleaves	Western Port Bay	Storm Surge
1	Honeyeater Drive	Silverleaves	Western Port Bay	Storm Surge
2	Honeyeater Drive	Silverleaves	Western Port Bay	Storm Surge
3	Honeyeater Drive	Silverleaves	Western Port Bay	Storm Surge
4	Honeyeater Drive	Silverleaves	Western Port Bay	Storm Surge
6	Honeyeater Drive	Silverleaves	Western Port Bay	Storm Surge
8	Honeyeater Drive	Silverleaves	Western Port Bay	Storm Surge
10	Honeyeater Drive	Silverleaves	Western Port Bay	Storm Surge
12	Honeyeater Drive	Silverleaves	Western Port Bay	Storm Surge
1	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
2	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
2A	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
3	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
5	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
6	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
7	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
8	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
10	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
11	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
12	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
13	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
14	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
15	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
18	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
19	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
21	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
23	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
25	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
27	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
35	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
36-46	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
37	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
39	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge

Properties at risk from Storm Surge flooding around the Western Port Bay Coastline during a 1% AEP event				
Residential	Commercial	Industrial	Rural	Public Use
No. of Properties in Street	**Street**	**Suburb**	**Along Melbourne Water Watercourse**	**Flood Risk Type**
41	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
45	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
47	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
48	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
49	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
50	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
51	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
52	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
53	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
54	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
55	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
56	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
57	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
58	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
59	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
1/61	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
2/61	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
3/61	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
62	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
63	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
64	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
68	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
70	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
72	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
74	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
76	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
78	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
80	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
82	Honeysuckle Grove	Silverleaves	Western Port Bay	Storm Surge
2	Malabar Court	Cowes	Western Port Bay	Storm Surge
4	Malabar Court	Cowes	Western Port Bay	Storm Surge
6	Malabar Court	Cowes	Western Port Bay	Storm Surge
8	Malabar Court	Cowes	Western Port Bay	Storm Surge
10	Malabar Court	Cowes	Western Port Bay	Storm Surge
12	Malabar Court	Cowes	Western Port Bay	Storm Surge
20	Martin Street	Silverleaves	Western Port Bay	Storm Surge
21	Martin Street	Silverleaves	Western Port Bay	Storm Surge
22	Martin Street	Silverleaves	Western Port Bay	Storm Surge
23	Martin Street	Silverleaves	Western Port Bay	Storm Surge
24	Martin Street	Silverleaves	Western Port Bay	Storm Surge
25	Martin Street	Silverleaves	Western Port Bay	Storm Surge
27	Martin Street	Silverleaves	Western Port Bay	Storm Surge
6A	Moore Street	Silverleaves	Western Port Bay	Storm Surge
14	Sanders Road	Silverleaves	Western Port Bay	Storm Surge

Properties at risk from Storm Surge flooding around the Western Port Bay Coastline during a 1% AEP event				
Residential	Commercial	Industrial	Rural	Public Use
No. of Properties in Street	**Street**	**Suburb**	**Along Melbourne Water Watercourse**	**Flood Risk Type**
16	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
18	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
20	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
22	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
35	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
36	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
37	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
38	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
40	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
41	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
42	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
45	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
47	Sanders Road	Silverleaves	Western Port Bay	Storm Surge
1-5	Settlement Road	Rhyll	Western Port Bay	Storm Surge
7	Settlement Road	Rhyll	Western Port Bay	Storm Surge
12	Settlement Road	Silverleaves	Western Port Bay	Storm Surge
19-23	Settlement Road	Rhyll	Western Port Bay	Storm Surge
22A	Settlement Road	Silverleaves	Western Port Bay	Storm Surge
22B	Settlement Road	Silverleaves	Western Port Bay	Storm Surge
25	Settlement Road	Rhyll	Western Port Bay	Storm Surge
26	Settlement Road	Silverleaves	Western Port Bay	Storm Surge
27-29	Settlement Road	Rhyll	Western Port Bay	Storm Surge
28B	Settlement Road	Silverleaves	Western Port Bay	Storm Surge
28A	Settlement Road	Silverleaves	Western Port Bay	Storm Surge
28	Settlement Road	Silverleaves	Western Port Bay	Storm Surge
35	Settlement Road	Cowes	Western Port Bay	Storm Surge
37	Settlement Road	Cowes	Western Port Bay	Storm Surge
39	Settlement Road	Cowes	Western Port Bay	Storm Surge
41	Settlement Road	Cowes	Western Port Bay	Storm Surge
43	Settlement Road	Cowes	Western Port Bay	Storm Surge
45	Settlement Road	Cowes	Western Port Bay	Storm Surge
47	Settlement Road	Cowes	Western Port Bay	Storm Surge
1	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
3	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
5	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
9	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
13	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
15	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
16	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
17	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
18	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
20	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
21	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
22	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge

Properties at risk from Storm Surge flooding around the Western Port Bay Coastline during a 1% AEP event				
Residential	Commercial	Industrial	Rural	Public Use
No. of Properties in Street	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
23	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
24	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
25	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
26	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
27	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
28	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
29	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
30	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
31	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
32	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
33	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
34	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
35	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
36	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
37	Shearwater Drive	Silverleaves	Western Port Bay	Storm Surge
1	Silvergull Court	Silverleaves	Western Port Bay	Storm Surge
3	Silvergull Court	Silverleaves	Western Port Bay	Storm Surge
5	Silvergull Court	Silverleaves	Western Port Bay	Storm Surge
6	Silvergull Court	Silverleaves	Western Port Bay	Storm Surge
7	Silvergull Court	Silverleaves	Western Port Bay	Storm Surge
8	Silvergull Court	Silverleaves	Western Port Bay	Storm Surge
9	Silvergull Court	Silverleaves	Western Port Bay	Storm Surge
1	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
3	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
4	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
5	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
6	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
7	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
8	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
9	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
10	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
11	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
12	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
13	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
14A	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
15	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
16	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
17	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
18	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
19	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
20	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
21	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
22	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
24	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge

Properties at risk from Storm Surge flooding around the Western Port Bay Coastline during a 1% AEP event				
Residential	Commercial	Industrial	Rural	Public Use
No. of Properties in Street	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
25	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
26	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
27	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
28	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
29	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
30	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
33	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
34A	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
35	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
36	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
37	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
38	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
40	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
42	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
43	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
44	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
45	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
47	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
48	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
49	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
50	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
52	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
54	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
55	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
56	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
57	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
58	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
59	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
60	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
61	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
62	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
63	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
64	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
65	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
66	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
68	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
69	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
70	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
71	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
73	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
83	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
87	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
90	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
91	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge

Properties at risk from Storm Surge flooding around the Western Port Bay Coastline during a 1% AEP event				
Residential	Commercial	Industrial	Rural	Public Use
No. of Properties in Street	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
92	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
93	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
94	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
96	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
98	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
100	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
102	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
104	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
106	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
108	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
110	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
112	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
113	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
114	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
116	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
117	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
118	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
120	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
121	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
122	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
123	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
124	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
125	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
126	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
127	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
128	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
130	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
133	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
134	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
135	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
136	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
137	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
138	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
139	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
140	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
142	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
144	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
145	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
146	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
147	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
148	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
149	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
150	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
151	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge

Properties at risk from Storm Surge flooding around the Western Port Bay Coastline during a 1% AEP event				
Residential	Commercial	Industrial	Rural	Public Use
No. of Properties in Street	**Street**	**Suburb**	**Along Melbourne Water Watercourse**	**Flood Risk Type**
152	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
153	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
155	Silverleaves Avenue	Silverleaves	Western Port Bay	Storm Surge
1	Tedwood Court	Silverleaves	Western Port Bay	Storm Surge
4	Tedwood Court	Silverleaves	Western Port Bay	Storm Surge
5	Tedwood Court	Silverleaves	Western Port Bay	Storm Surge
6	Tedwood Court	Silverleaves	Western Port Bay	Storm Surge
7	Tedwood Court	Silverleaves	Western Port Bay	Storm Surge
7A	Tedwood Court	Silverleaves	Western Port Bay	Storm Surge
9	Tedwood Court	Silverleaves	Western Port Bay	Storm Surge
10	Tedwood Court	Silverleaves	Western Port Bay	Storm Surge
30	Tunbridge Street	Rhyll	Western Port Bay	Storm Surge
1	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
2	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
3	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
4	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
5	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
6	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
7	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
9	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
10	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
11	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
12	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
14	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
15	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
17	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
18	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
19	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
20	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
21	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
22	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
23	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
24	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
25	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
26	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
27	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
28	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
29	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
30	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
31	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
32	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
33	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
34	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge
36	Woodland Avenue	Silverleaves	Western Port Bay	Storm Surge

Properties at risk from Storm Surge flooding around the Western Port Bay Coastline during a 1% AEP event				
Residential	Commercial	Industrial	Rural	Public Use
No. of Properties in Street	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
Totals				
361				

Table C1.5 – Properties at risk of storm surge flooding along the Western Port Bay coastline during a 1% AEP event

ISOLATION

- Churchill Island likely to be inaccessible via Samuel Amess Drive during a 1% AEP Storm Surge / Tidal event and will remain isolated until the road is passable.

The other risk to residents of Phillip Island is if Phillip Island Road were to be flooded at Newhaven. This would restrict access to San Remo, via the only bridge to the mainland. A flood risk along Phillip Island Road at the Phillip Island Airport exists, although the road may still remain passable. Some localised short-duration isolation may also occur due to flash flooding.

ESSENTIAL INFRASTRUCTURE

- Cowes Jetty off The Esplanade, Cowes likely flooded during a 1% AEP Storm Surge Event with Ferry Services to Stony Point and French Island (Tankerton) very likely impacted

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. http://ptv.vic.gov.au/live-travel-updates/. Details of public transport services within Bass Coast are located at: https://www.ptv.vic.gov.au/getting-around/local-areas/show/6

Apart from the roads outlined below, all other essential infrastructure and services areas around Phillip Island are expected to remain unaffected by flooding during 1% AEP (100yr ARI) storm and tidal events.

ROAD CLOSURES

The following roads are subject to closure during flooding around Phillip Island due to either flash flooding from a storm event or Storm Surge / Tidal flooding. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

VicRoads Roads flooded in a 1% AEP (100yr ARI) Flash Flood event
• Back Beach Road, Smiths Beach at Beachcomber Avenue
• Cowes-Rhyll Road, Cowes at Coghlan Road
• Phillip Island Road, Cowes near St Mary's Catholic Church
• Phillip Island Road, Newhaven at Phillip Island Airport between Woolamai Beach Road and Veterans Drive
• Phillip Island Road, Surf Beach at Glen Street
• Ventnor Road, Cowes at McKenzie Road Intersection

Table C1.6 – VicRoads Possible Road Closures during a flash flooding event

Bass Coast Shire Roads flooded in a 1% AEP (100yr ARI) Flash Flood event	
COWES	**SMITHS BEACH**
• Church Street	• Bernard Court
• Harvey Drive	• Murray Street
• Hill Court	**SUNSET STRIP**
• Hobsons Parade	• Rogerson Road
• Kauri Close	**VENTNOR**
• Lions Court	• Watts Road
• Shorland Close	
• Walton Street	

Table C1.7 – Bass Coast Council Possible Road Closures during a flooding event

VicRoads Roads flooded in a 1% AEP (100yr ARI) Storm Surge event
• Nil expected

Table C1.8 – VicRoads Possible Road Closures during a storm surge flooding event

Bass Coast Shire Roads flooded in a 1% AEP (100yr ARI) Storm Surge event	
COWES	• Christopher Street
• Cove Place	• Dolphin Road
• Malabar Drive	• Ellen Road
NEWHAVEN	• Honeyeater Drive
• Samuel Amess Drive	• Honeysuckle Grove
RHYLL	• Robin Road
• Beach Road	• Sanders Road
• Coghlan Road	• Settlement Road
SILVERLEAVES	• Shearwater Drive
• Banksia Street	• Silverleaves Avenue
• Bayview Road	• Tedwood Court
• Chale Court	• Woodland Avenue

Table C1.9 – Bass Coast Council Possible Road Closures during a storm surge flooding event

FLOOD MITIGATION

RETARDING BASINS

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Level	ANCOLD Hazard Rating	Houses In Flow Path (dam breach)	VicMap Reference
Smith's Beach	Smith's Beach Drain	0.46 ha	~10 ML	~27.2m AHD	~27.2m AHD	~27.5m AHD	High C	Unavailable	6917 J8

Table C1.10 – Melbourne Water Retarding Basins on Phillip Island

COMMAND, CONTROL & COORDINATION

VICSES will assume overall control of the response to flood incidents. Other agencies will be requested to support operations as detailed in this Plan. Control and coordination of a flood incident shall be carried out at the lowest effective level and in accordance with the State Emergency Response Plan (EMMV Part 3). During significant events, VICSES will conduct incident management using multi-agency resources.

FLOOD IMPACTS & OPERATIONAL CONSIDERATIONS (INTELLIGENCE CARDS)

The tables on the following pages provide a breakdown of the possible consequences of flooding around Phillip Island at various bay heights or rain totals. These tables are to be used only as a guide as no two floods at a location will have identical impacts.
Intelligence Cards have been included for the following locations:

- Western Port Bay
- Phillip Island Stormwater Drains

FLOOD INTELLIGENCE CARD – TOORADIN GAUGE, WESTERN PORT BAY

Version 3 – June 2018

Note: flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Flood intelligence cards detail the relationship between flood magnitude and flood consequences. More details about flood intelligence and its use can be found in the Australian Emergency Management Manuals flood series.

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LOCATION	**Footbridge adjacent to South Gippsland Highway over Evans Inlet, Tooradin**
VICMAP REFERENCE:	**6821 J6**
STREAM:	**Western Port Bay**
GAUGE NUMBER:	**228399A**
GAUGE ZERO:	**0.00m AHD**
GAUGE TYPE	**Tide Level**

MINOR:	**N/A**
MODERATE:	**N/A**
MAJOR	**N/A**
LEVEE HEIGHT:	**N/A**
TELEMETRIC/MANUAL	**Telemetric**
HIGHEST RECORDED FLOOD:	**2.39m (31st July 2014)**

Seal Level Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
2.60m	1% AEP (100yr ARI) Flood Level	**Properties at Flood Risk** **361 Properties in Total** • 73 Beach Road, Rhyll • 30 Tunbridge Street, Rhyll • 10, 11A & 12 Beach Road, Rhyll • 1, 2, 3 & 4 Banksia Street, Silverleaves • 1, 3, 5, 7, 9, 11, 13, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 39, 43, 45, 47, 60 & 62 Bruce Road, Silverleaves • 2, 4, 6, 7, 8, 9, 10, 11, 13, 22, 24 & 26 Chale Court, Silverleaves • 298, 346 & 353 Coghlan Road, Silverleaves • 8, 10, 11 & 12 Collins Street, Silverleaves • 2, 4, 6, 8, 10, 12, 14, 16, 18 & 20 Cove Place, Cowes • 2 Dolphin Drive, Silverleaves • 7 Fairway Mews, Cowes	

Seal Level Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 3, 5 & 7 Hazelwood Court, Silverleaves • 1, 2, 3, 4, 6, 8, 10 & 12 Honeyeater Drive, Silverleaves • 1, 2, 2A, 3, 5, 6, 7, 8 10, 11, 12, 13, 14, 15, 18, 19, 21, 23, 25, 27, 35, 34-46, 37, 39, 41, 45, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 1/61, 2/61, 3/61, 62, 63, 64, 68, 70, 72, 74, 76, 78, 80 & 82 Honeysuckle Grove • 2, 4, 6, 8, 10 & 12 Malabar Court, Cowes • 20, 21, 22, 23, 24, 25 & 27 Martin Street, Silverleaves • 1-5, 7, 12, 19-23, 22A, 22B, 25, 26, 27-29, 28, 28A, 28B, 35, 37, 39, 41, 43, 45 & 47 Settlement Road, Cowes • 1, 3, 5, 9, 13, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36 & 27 Shearwater Drive, Silverleaves • 1, 3, 5, 6, 7, 8 & 9 Silvergull Court, Silverleaves • 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14A, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 33, 34A, 35, 36, 37, 38, 40, 42, 43, 44, 45, 47, 48, 49, 50, 52, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 68, 69, 70, 71, 73, 83, 87, 90, 91, 92, 93, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 113, 114, 116, 117, 118, 120, 121, 122, 123, 124, 125, 126, 127, 128, 130, 133, 134, 135, 136, 137, 138, 139, 140, 142, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153 & 155 Silverleaves Avenue, Silverleaves • 1, 4, 5, 6, 7, 71, 9 & 10 Tedwood Court, Silverleaves • 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34 & 36 Woodland Avenue, Silverleaves **Community Infrastructure Flooded** • Newhaven Jetty, Beach Crescent, Newhaven • Newhaven Marina, Beach Crescent, Newhaven • Rhyll Jetty, Beach Road, Rhyll • Cowes Golf Club on Settlement Road, Cowes & Rhyll • Anderson Road Boat Ramp, Cowes • The Penguin Parade on Summerland Beach possibly impacted with Summerland Beach at very high tide. Viewing Areas likely to remain relatively dry. **Essential Infrastructure Impacted** • Cowes Jetty off The Esplanade, Cowes with Ferry Services to Stony Point and French Island (Tankerton) very likely impacted **Water Over Road** • Samuel Amess Drive, Newhaven & Churchill Island • Beach Road, Rhyll at Lock Road	

Seal Level Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Coghlan Road, Rhyll Intersection with Settlement Road • Settlement Road, Silverleaves intersection with Coghlan Road • Malabar Drive, Cowes • Cove Place, Cowes • Tedwood Court, Silverleaves • Sanders Road, Silverleaves • Honeyeater Drive, Silverleaves • Chale Court, Silverleaves • Honeysuckle Grove, Silverleaves • Shearwater Drive, Silverleaves • Ellen Road, Silverleaves between Shearwater Drive and Woodland Avenue • Woodland Avenue, Silverleaves • Silverleaves Avenue, Silverleaves • Christopher Street, Silverleaves • Robin Road, Silverleaves • Banksia Street, Silverleaves • Bayview Road, Silverleaves • Dolphin Road, Silverleaves	

Table C1.11 – Breakdown of likely consequences at various tide gauge level heights on Phillip Island with operational considerations

FLOOD INTELLIGENCE CARD – PHILLIP ISLAND STORMWATER DRAINS (UNGAUGED)

Version 3 – June 2018

Note: flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Flood intelligence cards detail the relationship between flood magnitude and flood consequences. More details about flood intelligence and its use can be found in the Australian Emergency Management Manuals flood series.

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CLOSEST RAIN GAUGE	**Bass River at McGraths Road, Glen Forbes South**
LOCATION	**McGraths Road, Glen Forbes**
VICMAP REF:	**6920 A4**

GAUGE NUMBER	**227231A**
GAUGE TYPE	**Stream Level & Rain**
TELEMETRIC/MANUAL	**Telemetric**

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	**Annual Exceedance Probability (% AEP)**	**Consequence / Impact**	**Operational Considerations**
10mm in 10 mins; 17mm in 30 mins; 22mm in 1 hour; 29mm in 2 hours; 42mm in 6 hours; or 54mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	20% AEP (5 year ARI)	**Properties at Flood Risk** **12 Properties in Total** **Smith's Beach Drain** • 26 & 51 Barramundi Avenue, Smiths Beach • 2, 4 & 6 Bernard Court, Smiths Beach • 2 & 50 Dolphin Drive, Smiths Beach • 26, 36 & 38 Galleon Crescent, Sunset Strip • 15 Marlin Street, Smiths Beach • 2 & 4 Murray Street, Smiths Beach • 1, 1A, 2 & 2A Rogerson Road, Sunset Strip **Water Over Road (Over 300mm Depth)** **Blue Gum Drain** • Kauri Close, Cowes **Red Rocks Drain** • Hobsons Parade, Cowes **Smith's Beach Drain** • Rogerson Road, Sunset Strip • Murray Street, Smiths Beach	

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
20mm in 10 mins; 32mm in 30 mins; 40mm in 1 hour; 52mm in 2 hours; 75mm in 6 hours; or 95mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	1% AEP (100 year ARI)	**Properties at Flood Risk (Over 300mm Depth)** **56 Properties in Total** **Blue Gum Drain** • 3 & 5 Kauri Close, Cowes • 24 Redwood Drive, Cowes **Red Rocks Drain** • 8 Hill Court, Cowes • 37, 39, 40, 41, 42, 43, 44-48, 45, 50 & 52 Hobsons Parade, Cowes • 550 Settlement Road, Cowes **Smith's Beach Drain** • 117 Back Beach Road, Smiths Beach • 9, 11, 14, 16, 17-19, 21, 23, 26, 32, 47, 1/49, 2/49 & 51 Barramundi Avenue, Smiths Beach • 2, 4 & 6 Bernard Court, Smiths Beach • 2 & 50 Dolphin Drive, Smiths Beach • 24, 26, 30, 32, 34, 36, 38, 40, 42 & 44 Galleon Crescent, Sunset Strip • 4 Gilmore Street, Smiths Beach • 5, 7, 9, 12 & 15 Marlin Street, Smiths Beach • 2 & 4 Murray Street, Smiths Beach • 1, 1A, 2 & 2A Rogerson Road, Sunset Strip **Water Over Road (Over 300mm Depth)** **Blue Gum Drain** • Shorland Close, Cowes • Harvey Drive, Cowes • Kauri Close, Cowes • Walton Street, Cowes at Smith Street **Red Rocks Drain** • Hobsons Parade, Cowes • Hill Court, Cowes **Smith's Beach Drain** • Rogerson Road, Sunset Strip • Murray Street, Smiths Beach • Bernard Court, Smiths Beach **Creek 3261**	

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Phillip Island Road, Newhaven at Phillip Island Airport between Woolamai Beach Road and Veterans Drive **Creek 3267** • Coghlan & Cowes-Rhyll Road Intersection, Cowes **Creek 3288** • Back Beach Road, Smiths Beach at Beachcomber Avenue **Native Dog Creek & Swan Lake Drain** • Watts Road, Ventnor at Kitty Miller Bay Road and Berrys Beach Road **Local Drainage** • Phillip Island Road, Surf Beach at Glen Street • Phillip Island Road, Cowes near St Mary's Catholic Church • Ventnor Road, Cowes at McKenzie Road Intersection • Church Street, Cowes at Cowes Caravan Park • Lions Court, Cowes	

Table C1.12 – Breakdown of possible consequences at various rainfall intensities around Phillip Island with operational considerations

APPENDIX C2 – BASS RIVER (WATERLINE DISTRICT) FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Bass River runs southwest through the towns of Loch, Woodleigh, Kernot, Glen Forbes & Bass. The greatest flood risk exist in the Bass Landing Road area of Bass where the flat terrain and location near the mouth of the Bass River give rise to wide-scale and possibly protracted flooding with tides from Western Port Bay also having an influence.
Other areas of concern are St Helier–Woodleigh Road in Woodleigh and McGraths Road in Glen Forbes South which may be cut by floodwaters, restricting access across the river at these locations.

This Summary table is generated from Victorian Government data. 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 access this information should make appropriate enquiries to assess the currency of the data.

Summary of Consequences in a 1% AEP (100yr ARI) flood along the Bass River					
Property					
Properties	**9**				
Residential	0				
Commercial	0				
Industrial	0				
Public Land	0				
Rural	9				
Community Infrastructure					
Health Facilities	0		Child Care / Kindergartens	0	
Care Facilities	0		Community Venues	0	
Retirement Villages	0		Places of Worship	0	
Schools / Colleges	0		Prisons	0	
Essential Infrastructure					
Major Roads	0		Police Stations	0	
Major Rail	0		Government Buildings	0	
Bus Routes	0		Sewerage Facilities	1	Septic Tanks
Power Facility	0		Levees	0	
Comms Services	0		Drainage Facilities	0	
Emergency Services	0		Airports / Airfields	0	
Tourism / Recreation					
Sports Facilities	0		Caravan Parks	0	
Recreation Facilities	0		Camping Grounds	0	
Government Boundaries					
Local Gov't Areas	1	Bass Coast	CMA	1	Port Phillip & Westernport
Adjacent LGAs	1	South Gippsland	CFA District	1	District 08
SES Resp' Boundary	1	San Remo	MFB District	0	

Table C2.1 – Consequence Summary of 1% AEP flood along the Bass River

WARNING TIMES

In general, riverine floods rise and fall quickly within the Bass River catchment. In very general terms, the approximate time between start of heavy rain and maximum flood levels / extents in the lower parts of the Bass River will be of order 6 to 12 hours for big floods and 12 to 18 hours or so for smaller floods. The smaller creeks (the tributaries) will respond a little faster. Levels fall around a half to a third the rate of rise – it takes roughly 2 to 3 times as long to fall as it does to rise. These general guidance timings will be influenced strongly (extended) by storm surge, if present.

Neither the Bureau of Meteorology nor Melbourne Water currently provides flood forecasts for the Bass River. All flood response actions must therefore be driven by rainfall and / or river level observations. Telemetered water level / flood gauges are located at Loch and Glen Forbes within the Bass River catchment. See Appendix B for typical flood travel times for the Bass River.

Hydrographic Monitoring Station	Station No.	Location	Owner	Stream Level & Flow Gauge	Rain Gauge	Tide Gauge	VicMap Reference
Bass River at Glen Forbes South	227231A	South bank of the river, west side of McGrath Road, Bass	GRWMP	✓	✓		6920 A4
Bass River at Loch	227219A	South bank of the river, north side of Loch-Poowong Road, Loch	GRWMP	✓	✓		6877 J7
Upper Lang Lang	586196	North side of Drouin-Korumburra Road, Poowong East between Stabens Road and Main South Road	Melbourne Water		✓		6878 G7

Table C2.2 – Hydrographic Monitoring Stations within the Bass River catchment

These Gauges may provide some warning of expected flooding. See the Melbourne Water website for more information on these gauges: http://www.melbournewater.com.au/waterdata/rainfallandriverleveldata/Pages/Rainfall-and-river-level-new.aspx. It is advised that residents monitor the Bureau of Meteorology's website http://www.bom.gov.au/ and the VicEmergency website https:/emergency.vic.gov.au/ for any thunderstorm, flood or severe weather warnings present for their area.

AREAS OF FLOOD RISK

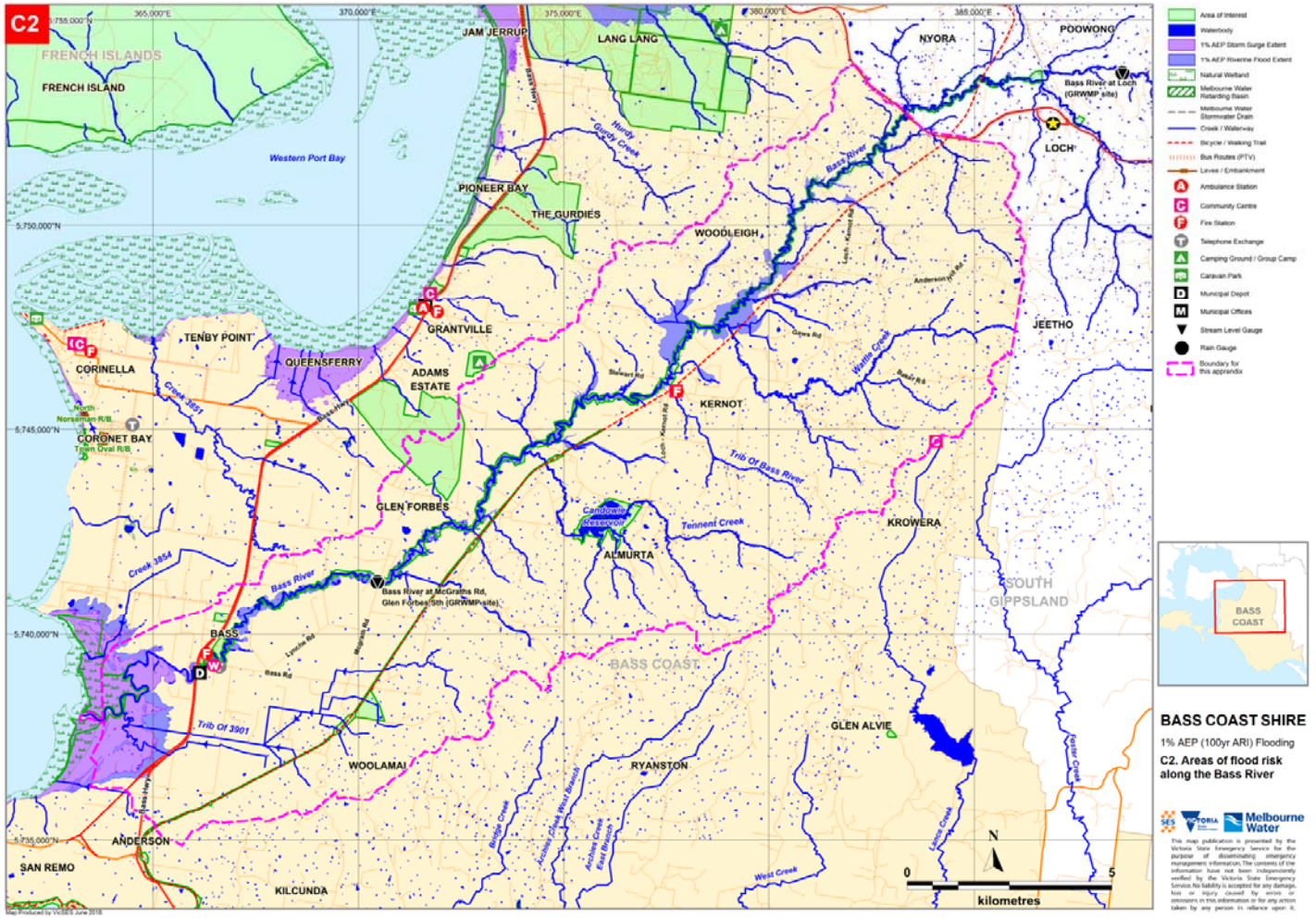

Figure C2 – Areas of flood risk along the Bass River in the Bass Coast Shire

PROPERTIES AT FLOOD RISK

Properties listed in the table below are at risk from flooding along the Bass River in Bass Coast. As more intelligence becomes available, this list may change. This table has been populated based on modelling work as part of the Bass River (Melbourne Water, June 2009) flood mapping and risk assessment program.

This Property Flood Risk Table is presented by the Victoria State Emergency Service for the purpose of disseminating emergency management information. The contents of the information have not been independently verified by the Victoria State Emergency Service. No liability is accepted for any damage, loss or injury caused by errors or omissions in this information or for any action taken by any person in reliance upon it.

Properties at risk from Flooding during a 1% AEP riverine flood event along the Bass River				
Residential	Commercial	Industrial	Rural	Public Use

Street No. at Risk	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
100	Bass Landing Road	Bass	Bass River	Riverine
125	Bass Landing Road	Bass	Bass River	Riverine
165	Bass Landing Road	Bass	Bass River	Riverine
190	Bass Landing Road	Bass	Bass River	Riverine
230	Gaws Road	Woodleigh	Bass River	Riverine
109	Netherwood Lane	Bass	Bass River	Riverine
51	Pilots Lane	Bass	Bass River	Riverine
120	Pilots Lane	Bass	Bass River	Riverine
125	Woodleigh St Helier Road	Woodleigh	Bass River	Riverine

Totals
9

Table C2.3 – Properties at risk of flooding along the Bass River in Bass Coast Shire

ISOLATION

No major isolation risks exist for areas along the Bass River during a 1% AEP (100yr ARI) event. Rural properties in the Bass Landing Road area may experience prolonged flooding or isolation due to the flat terrain and tidal influences.

ESSENTIAL INFRASTRUCTURE

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. http://ptv.vic.gov.au/live-travel-updates/. Details of public transport services within Bass Coast are located at: https://www.ptv.vic.gov.au/getting-around/local-areas/show/6

Apart from the roads outlined below, all other essential infrastructure and services areas along the Bass River are expected to remain unaffected by flooding during a 1% AEP (100yr ARI) event.

ROAD CLOSURES

The following roads are subject to closure during flooding along the Bass River area in Bass Coast. Check the VicRoads website for more details: http://alerts.vicroads.vic.gov.au/

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
• Nil Expected

Table C2.4 – VicRoads Possible Road Closures during a flooding event

Bass Coast Shire Roads flooded in a 1% AEP (100yr ARI) event	
BASS	**GLEN FORBES**
• Bass Landing Road	• McGraths Road
• Mapleson Road	**WOODLEIGH**
• Pilots Lane	• Woodleigh – St Helier Road

Table C2.5 – Bass Coast Shire Council Possible Road Closures during a flooding event

FLOOD MITIGATION

No formal Retarding Basins, Pumping Stations or Levees exist along the Bass River in Bass Coast Shire.

SEWERAGE INFRASTRUCTURE

There are many septic tanks in the rural areas that may be inundated by floodwaters.

COMMAND, CONTROL & COORDINATION

VICSES will assume overall control of the response to flood incidents. Other agencies will be requested to support operations as detailed in this Plan. Control and coordination of a flood incident shall be carried out at the lowest effective level and in accordance with the State Emergency Response Plan (EMMV Part 3). During significant events, VICSES will conduct incident management using multi-agency resources.

FLOOD IMPACTS & OPERATIONAL CONSIDERATIONS (INTELLIGENCE CARDS)

The tables on the following pages provide a breakdown of the possible consequences of flooding along the Bass River at various river heights or rain totals within Bass Coast Shire. These tables are to be used only as a guide as no two floods at a location will have identical impacts.

Intelligence Cards have been included for the following locations:

- Bass River at Loch
- Bass River at Glen Forbes South

FLOOD INTELLIGENCE CARD – LOCH GAUGE, BASS RIVER

Version 3 – June 2018

Note: flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Flood intelligence cards detail the relationship between flood magnitude and flood consequences. More details about flood intelligence and its use can be found in the Australian Emergency Management Manuals flood series.

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LOCATION	**South bank of the river, north side of Loch-Poowong Road, Loch**
VICMAP REFERENCE:	**Central 6877 J7**
STREAM:	**Bass River**
GAUGE NUMBER:	**227219A (GRWMP Site)**
GAUGE ZERO:	**Unavailable**
GAUGE TYPE	**Stream Level & Rain**

MINOR:	**Not Established**
MODERATE:	**Not Established**
MAJOR	**Not Established**
LEVEE HEIGHT:	**N/A**
TELEMETRIC/MANUAL	**Telemetric**
HIGHEST RECORDED FLOOD:	**3.20m (21st March 1970)**

River Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
4.0m		• Bank Full Level at gauge location	
6.0m		**Water Over Road** • McGraths Road, Glen Forbes	

Table C2.6 – Breakdown of likely consequences at various Loch gauge level heights along the Bass River in Bass Coast with operational considerations

FLOOD INTELLIGENCE CARD – GLEN FORBES SOUTH GAUGE, BASS RIVER

Version 3 – June 2018

Note: flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Flood intelligence cards detail the relationship between flood magnitude and flood consequences. More details about flood intelligence and its use can be found in the Australian Emergency Management Manuals flood series.

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LOCATION	**Bass River at McGraths Road, Glen Forbes South**
VICMAP REFERENCE:	**Central 6920 A4**
STREAM:	**Bass River**
GAUGE NUMBER:	**227231A**
GAUGE ZERO:	**11.30m AHD**
GAUGE TYPE	**Stream Level & Rain**

MINOR:	**Not Established**
MODERATE:	**Not Established**
MAJOR	**Not Established**
LEVEE HEIGHT:	**N/A**
TELEMETRIC/MANUAL	**Telemetric**
HIGHEST RECORDED FLOOD:	**5.82m (22nd June 2012)**

River Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
4.0m		• Approximate Bank Full Level at gauge location	
6.0m		**Water Over Road** • McGraths Road, Glen Forbes	
6.55m	1% AEP (100yr ARI) Flood Level	**Properties at Flood Risk** **9 Properties in Total** • 125 Woodleigh – St Helier Road, Woodleigh • 230 Gaws Road, Woodleigh • 100, 125, 165 & 190 Bass Landing Road, Bass • 79 Netherwood Lane, Bass • 51 & 120 Pilots Lane, Bass **Water Over Road** • Woodleigh – St Helier Road Road, Woodleigh at river crossing and to the east • Mapleson Road, Bass • Bass Landing Road, Bass • Pilots Lane, Bass	

Table C2.7 – Breakdown of likely consequences at various Glen Forbes South gauge level heights along Bass River in Bass Coast with operational considerations

APPENDIX C3 - SOUTH GIPPSLAND BASIN & POWLETT RIVER (BUNURONG DISTRICT) (INDICATIVE FLOOD / NO FLOOD GUIDANCE TOOL)

INTRODUCTION

The BoM does not currently provide flood forecasts for the South Gippsland Basin and the Powlett River. All flood response actions must therefore be driven by rainfall and / or river level observations.

Water level / flood gauges within the South Gippsland Basin are listed in **Appendix A**.

Rainfall data is available from a number of gauges within the South Gippsland Basin. Automatic weather stations (AWS') are operated by the Bureau at Wilsons Promontory and Pound Creek. Data from these two stations are available from the BoM website at half hourly intervals.

INDICATIVE FLOOD BEHAVIOURS

In general, riverine floods rise and fall quickly in the South Gippsland Basin. In very general terms, in the lower floodplain areas of the Powlett River, levels begin to rise around 18 to 24 hours after the start of heavy rainfall and peak within 30 to 36 hours for big floods and 2 or so days for smaller floods. Levels fall around a third the rate of rise – it takes roughly 3 times as long to fall as it does to rise. These general guidance timings will be influenced strongly (extended) by storm surge, if present.

USING THE TOOL DURING AN EVENT

If rainfall is from any event other than an East Coast Low, it is suggested that rainfall data from the Pound Creek site (or alternative locations closer to areas considered likely to experience the heaviest rainfall) should be used to determine an appropriate rainfall depth for use in the Indicative Flood / No Flood guidance tool provided below. If rainfall is from an East Coast Low, it is suggested that an average of the Wilsons Promontory and Pound Creek rainfalls should be used for all periods for which the Wilsons Promontory rainfall is higher. Again, alternative locations closer to areas considered likely to experience the heaviest rainfall could be used if available. Care should be exercised however, as it must be remembered that runoff from headwater as well as low land areas contribute to flooding.

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

Approach 1: Using the total rainfall depth obtained from the start of the event (discount early drizzle or very light rain), plot the rainfall depth against elapsed time on a copy of the tool. Assess the likelihood and expected severity of flooding from the curves with due regard for included notes.

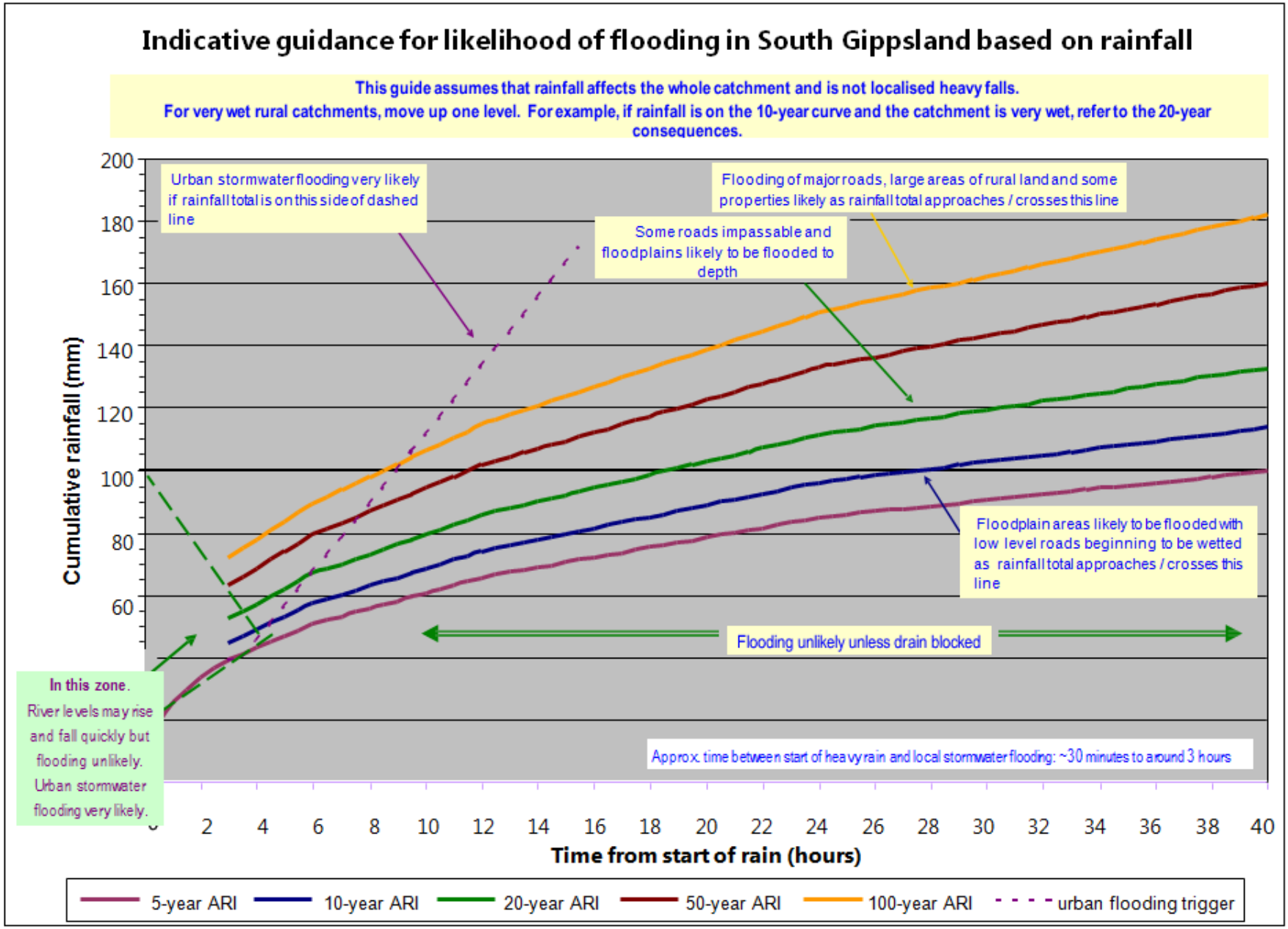
Approach 2: Discount the early lighter rain from consideration (i.e. begin calculating rainfall

depth from start of heavy rain) and plot depth against time on a copy of the tool. Assess the likelihood and expected severity of flooding from the curves with due regard for included notes.

CAUTION. The tool is based on a number of gross assumptions and generalisations. It is indicative only and while it will not always indicate flooding / no flooding correctly, it will usually give a heads up to severe flooding. The tool is not location specific and does not enable accurate predictions of expected flooding, peak flood heights, the time of flood peak, the severity of expected flooding or the likely consequences.

AFTER A FLOOD EVENT

After a flood event, plot the event rainfall depth (with date) on the tool and include an overview of the event, including antecedent conditions, in **Appendix A** of this MSFEP. Relevant information should also be added to **Appendix C3**.


Indicative guidance for likelihood of flooding in South Gippsland based on rainfall
This guide assumes that rainfall affects the whole catchment and is not localised heavy falls.
For very wet rural catchments, move up one level. For example, if rainfall is on the 10-year curve and the catchment is very wet, refer to the 20-year consequences.
Urban stormwater flooding very likely if rainfall total is on this side of dashed line
Some roads impassable and floodplains likely to be flooded to depth
Flooding of major roads, large areas of rural land and some properties likely as rainfall total approaches / crosses this line
Floodplain areas likely to be flooded with low level roads beginning to be wetted as rainfall total approaches / crosses this line
Flooding unlikely unless drain blocked
In this zone. River levels may rise and fall quickly but flooding unlikely. Urban stormwater flooding very likely.
Approx. time between start of heavy rain and local stormwater flooding: ~30 minutes to around 3 hours
Cumulative rainfall (mm)
200
180
160
140
120
100
80
60
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Time from start of rain (hours)
5-year ARI
10-year ARI
20-year ARI
50-year ARI
100-year ARI
urban flooding trigger

APPENDIX D – EVACUATION ARRANGEMENTS

The Incident Controller may make the decision to evacuate an at-risk community. Evacuation is the responsibility of VICPOL and will be conducted as per the EMMV and the MEMP.

APPENDIX E - FLOOD WARNING SYSTEM

Neither the Bureau of Meteorology nor Melbourne Water provides flood warning services for Bass Coast

APPENDIX F – MAPS

Overview

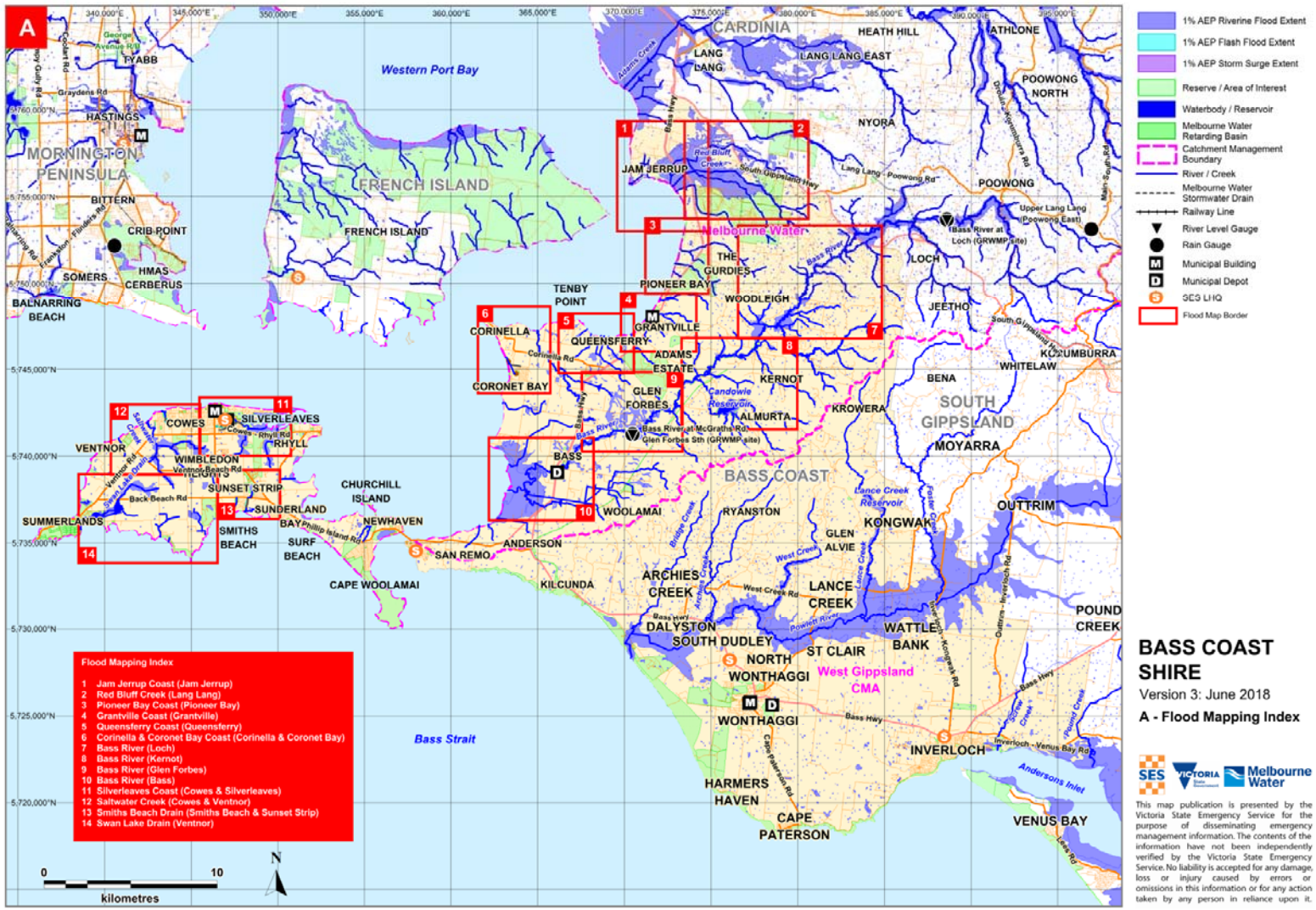
Maps considered useful to flood response are included in this Appendix. They include:

- A map showing the Municipal boundary together with the open waterways and underground stormwater drainage pipe network within Bass Coast Shire and the 1% AEP (100-year ARI) flood extents (sourced from Melbourne Water GIS).
- A set of 14 maps showing flooding risks within Bass Coast Shire together with the 1% AEP (100-year ARI) flood extents (sourced from the Melbourne Water GIS).

Note that:

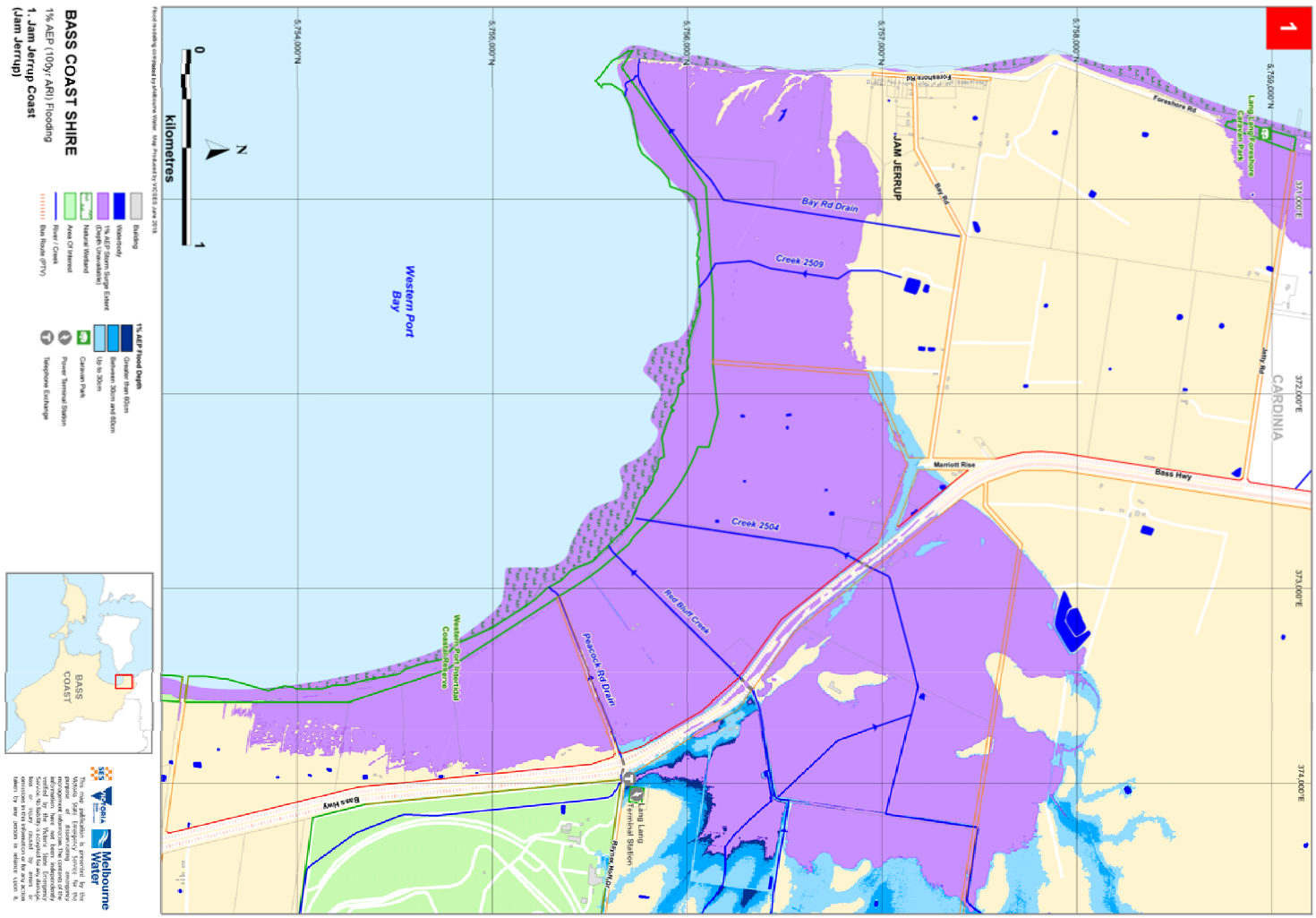
- The mapping/data provided in this Appendix has been developed from Melbourne Water and other sources and taken from historical records and flood modelling. It may not include more recent data or local anecdotal information. It is planned that the mapping/data be updated as further studies or modelling is completed and other Information obtained.
- Maps showing the Special Building Overlay and Land Subject to Inundation Overlay are included in the Bass Coast Planning Scheme can be used as a guide to areas that may flood during an event. The maps can be found in hard copy form at the Council's main office or online at the Department of Environment, Land, Water & Planning website http://planningschemes.dpcd.vic.gov.au/.
- Maps showing 1 in 100-year ARI (1% AEP) flood extents and floodways (together with volume, height and water quality data) are shown at DELWP's mapshare website http://mapshare.maps.vic.gov.au/MapShareVic/index.html?viewer=MapShareVic.PublicSite&locale=en-AU

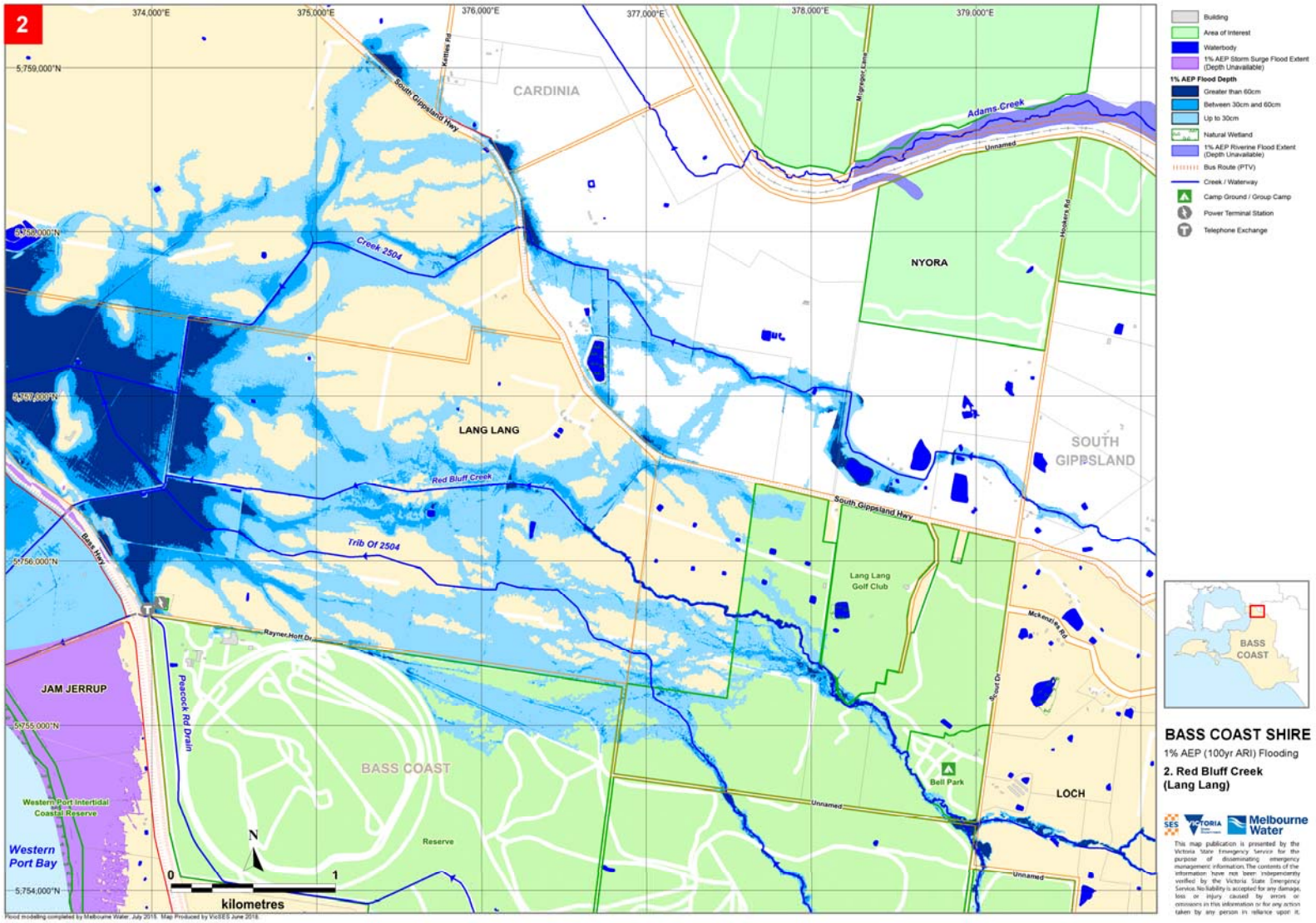
Bass Coast Shire Municipal Maps (sourced Melbourne Water GIS)

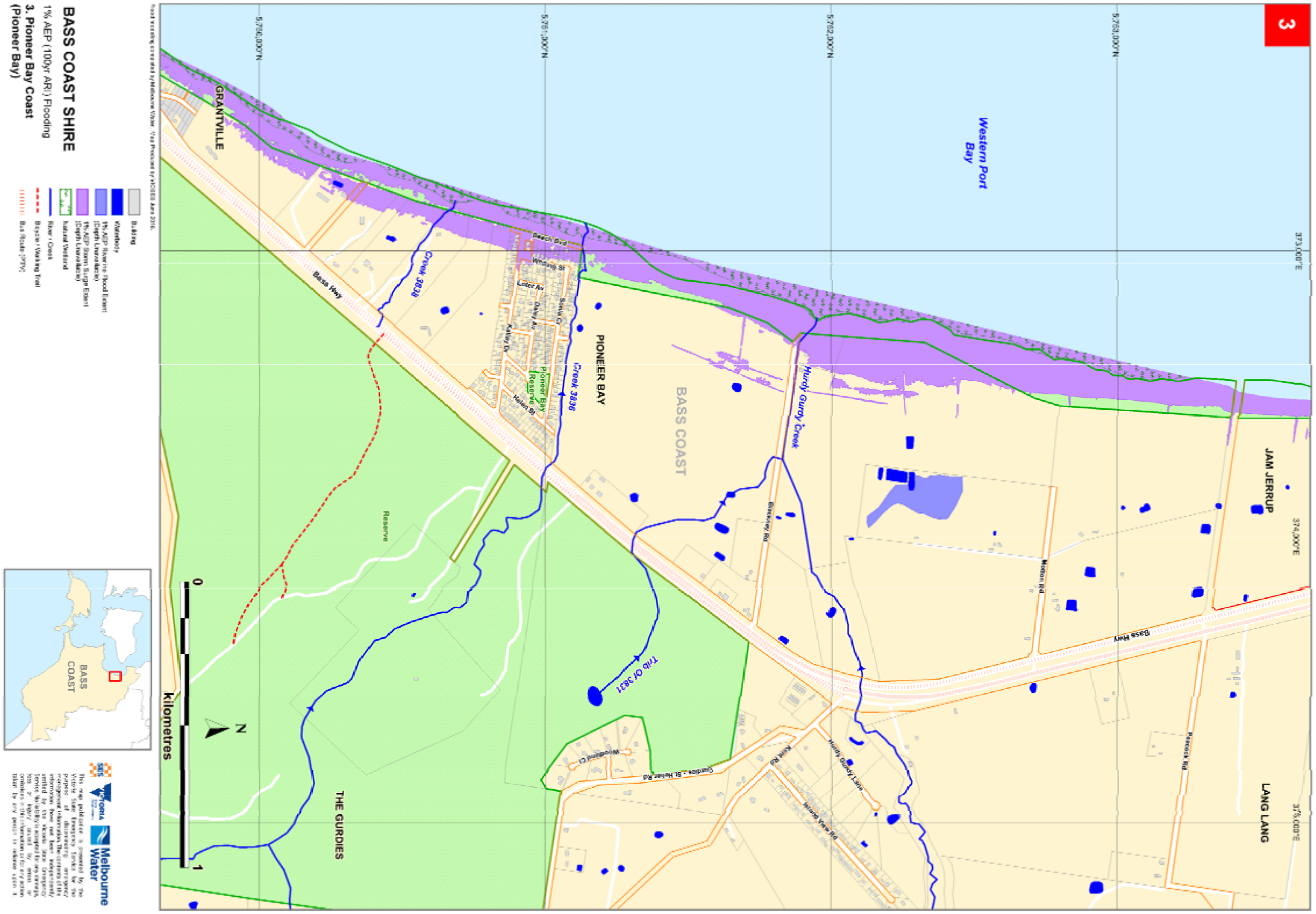


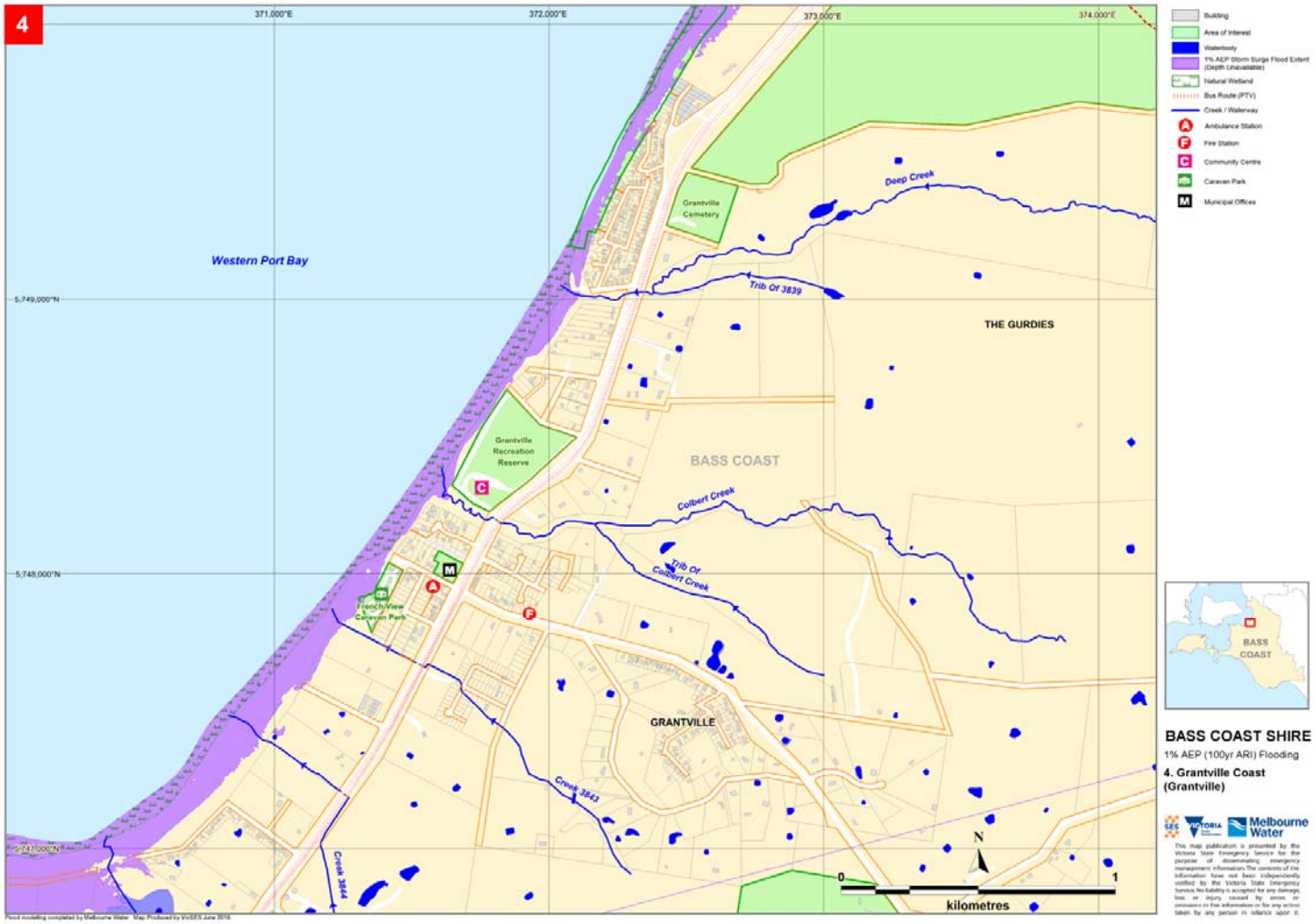

B
Western Port Bay
Bass Strait
FRENCH ISLAND
MORNINGTON PENINSULA
CARDINIA
LANG LANG
LANG LANG EAST
HEATH HILL
ATHLONE
POOWONG NORTH
POOWONG
NYORA
JAM JERRUP
Melbourne Water
THE GURDIES
PIONEER BAY
WOODLEIGH
LOCH
JEETHO
KOORUMBURRA
WHITELAW
BENA
SOUTH GIPPSLAND
MOYARRA
KERNOT
KROWERA
ALMURTA
GLEN FORBES
CORONET BAY
CORINELLA
TENBY POINT
QUEENSFERRY
GRANTVILLE
ADAMS ESTATE
BASS
BASS COAST
WOOLAMAI
RYANSTON
KONGWAK
OUTTRIM
GLEN ALVIE
LANCE CREEK
ARCHIES CREEK
KILCUNDA
ANDERSON
SAN REMO
NEWHAVEN
CHURCHILL ISLAND
CAPE WOOLAMAI
SURF BEACH
SMITHS BEACH
SUNDERLAND BAY
SUMMERLANDS
SUNSET STRIP
WIMBLEDON
VENTNOR
RHYLL
COWES
SILVERLEAVES
BALNARRING BEACH
SOMERS
HMAS CERBERUS
CRIB POINT
BITTERN
HASTINGS
TYABB
DALYSTON
SOUTH DUDLEY
NORTH WONTHAGGI
ST CLAIR
WONTHAGGI
West Gippsland CMA
WATTLE BANK
POUND CREEK
INVERLOCH
HARMERS HAVEN
CAPE PATERSON
VENUS BAY
Andersons Inlet
Bass River at McGrath Rd Glen Forbes Sth (GRWMP site)
Bass River at Loch (GRWMP site)
Upper Lang Lang (Poowong East)
Candowie Reservoir
Lance Creek Reservoir
Flood Study Details
(a). Bass River (Melbourne Water, June 2009)
(b). Blue Gum Drain (Phillip Island Flood Mapping, Cardno, June 2015)
(c). Powlett River (West Gippsland CMA)
(d). Red Bluff Creek (Melbourne Water, July 2015)
(e). Smiths Beach Drain (Phillip Island Flood Mapping, Cardno, June 2015)
0
10
kilometres
N
1% AEP Riverine Flood Extent
1% AEP Flash Flood Extent
1% AEP Storm Surge Extent
Reserve / Area of Interest
Waterbody / Reservoir
Melbourne Water Retarding Basin
Catchment Management Boundary
River / Creek
Melbourne Water Stormwater Drain
Railway Line
River Level Gauge
Rain Gauge
Municipal Building
Municipal Depot
SES LHQ
BASS COAST SHIRE
Version 3: June 2018
B - 1% AEP (100yr ARI) Flood Extent
SES
VICTORIA
Melbourne Water
This map publication is presented by the Victoria State Emergency Service for the purpose of disseminating emergency management information. The contents of the information have not been independently verified by the Victoria State Emergency Service. No liability is accepted for any damage, loss or injury caused by errors or omissions in this information or for any action taken by any person in reliance upon it.

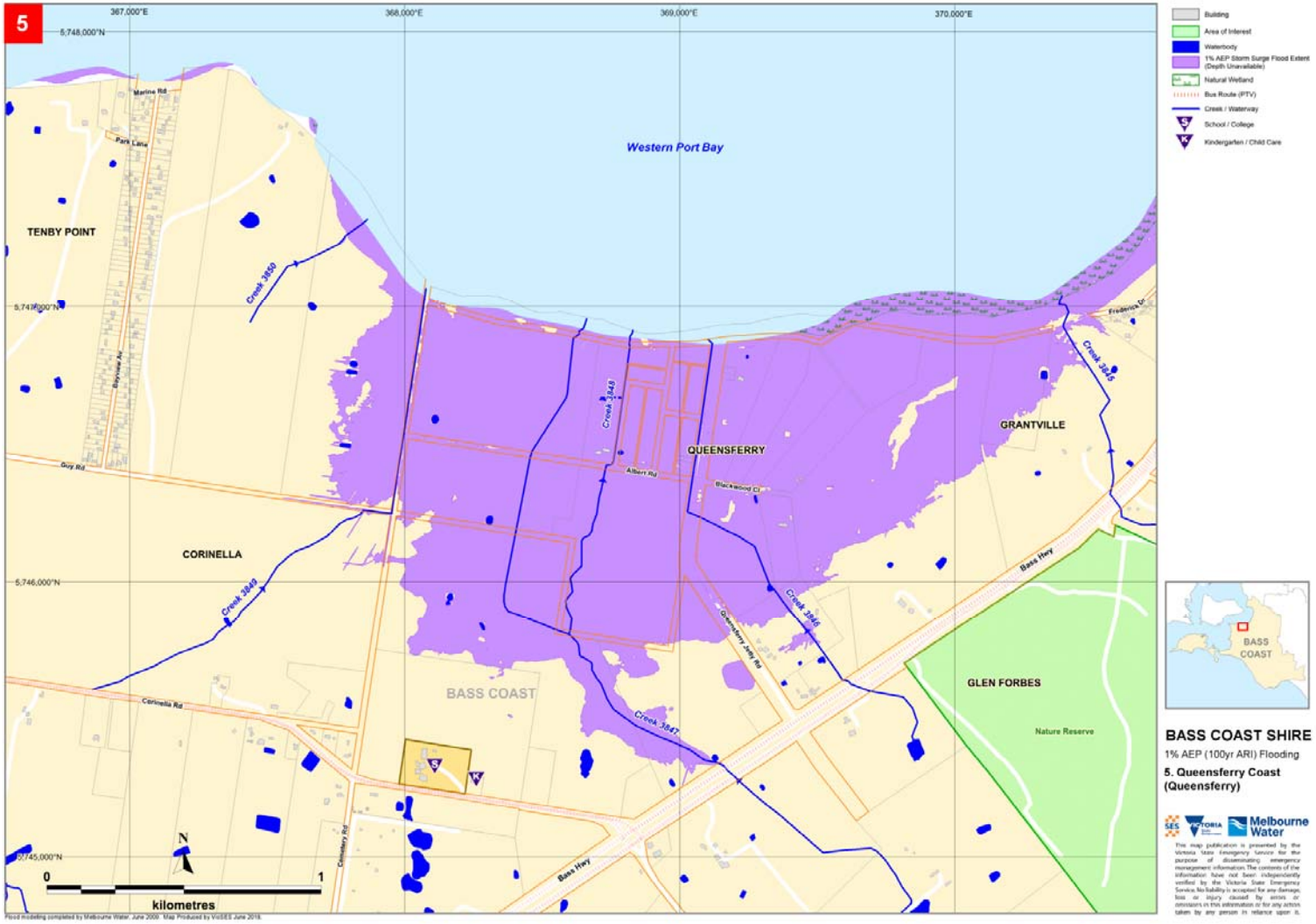
Flood Extent Maps (sourced Melbourne Water GIS)




2
374,000°E
375,000°E
376,000°E
377,000°E
378,000°E
379,000°E
5,759,000°N
5,758,000°N
5,757,000°N
5,756,000°N
5,755,000°N
5,754,000°N
CARDINIA
NYORA
LANG LANG
SOUTH GIPPSLAND
JAM JERRUP
BASS COAST
LOCH
Creek 2504
Red Bluff Creek
Trib Of 2504
Adams Creek
Unnamed
South Gippsland Hwy
Bass Hwy
Peacock Rd Drain
Rayner-Hoff Dr
Hookers Rd
Mckenzies Rd
Scout Dr
Lang Lang Golf Club
Bell Park
Western Port Intertidal and Coastal Reserve
Western Port Bay
Reserve
N
0
1
kilometres
Building
Area of Interest
Waterbody
1% AEP Storm Surge Flood Extent (Depth Unavailable)
1% AEP Flood Depth
Greater than 60cm
Between 30cm and 60cm
Up to 30cm
Natural Wetland
1% AEP Riverine Flood Extent (Depth Unavailable)
Bus Route (PTV)
Creek / Waterway
Camp Ground / Group Camp
Power Terminal Station
Telephone Exchange
BASS COAST
BASS COAST SHIRE
1% AEP (100yr ARI) Flooding
2. Red Bluff Creek (Lang Lang)
Melbourne Water


BASS COAST SHIRE
1% AEP (100yr ARI) Flooding
3. Pioneer Bay Coast
(Pioneer Bay)
Western Port
Bay
GRANTVILLE
PIONEER BAY
BASS COAST
JAM JERRUP
LANG LANG
THE GURDIES
Creek 3838
Creek 3836
Hurdy Gurdy Creek
Trib Of 3831
Bass Hwy
Pioneer Bay Reserve
Reserve
kilometres
0
1
N
3
Melbourne Water
BASS COAST


4
371,000°E
372,000°E
373,000°E
374,000°E
5,749,000°N
5,748,000°N
5,747,000°N
Western Port Bay
Grantville Cemetery
Deep Creek
Trib Of 3839
THE GURDIES
Grantville Recreation Reserve
BASS COAST
Colbert Creek
Trib Of Colbert Creek
French View Caravan Park
GRANTVILLE
Creek 3843
Creek 3844
N
0
1
kilometres
Building
Area of Interest
Waterbody
1% AEP Storm Surge Flood Extent (Depth Unavailable)
Natural Wetland
Bus Route (PTV)
Creek / Waterway
Ambulance Station
Fire Station
Community Centre
Caravan Park
Municipal Offices
BASS COAST
BASS COAST SHIRE
1% AEP (100yr ARI) Flooding
4. Grantville Coast (Grantville)
SES
VICTORIA
Melbourne Water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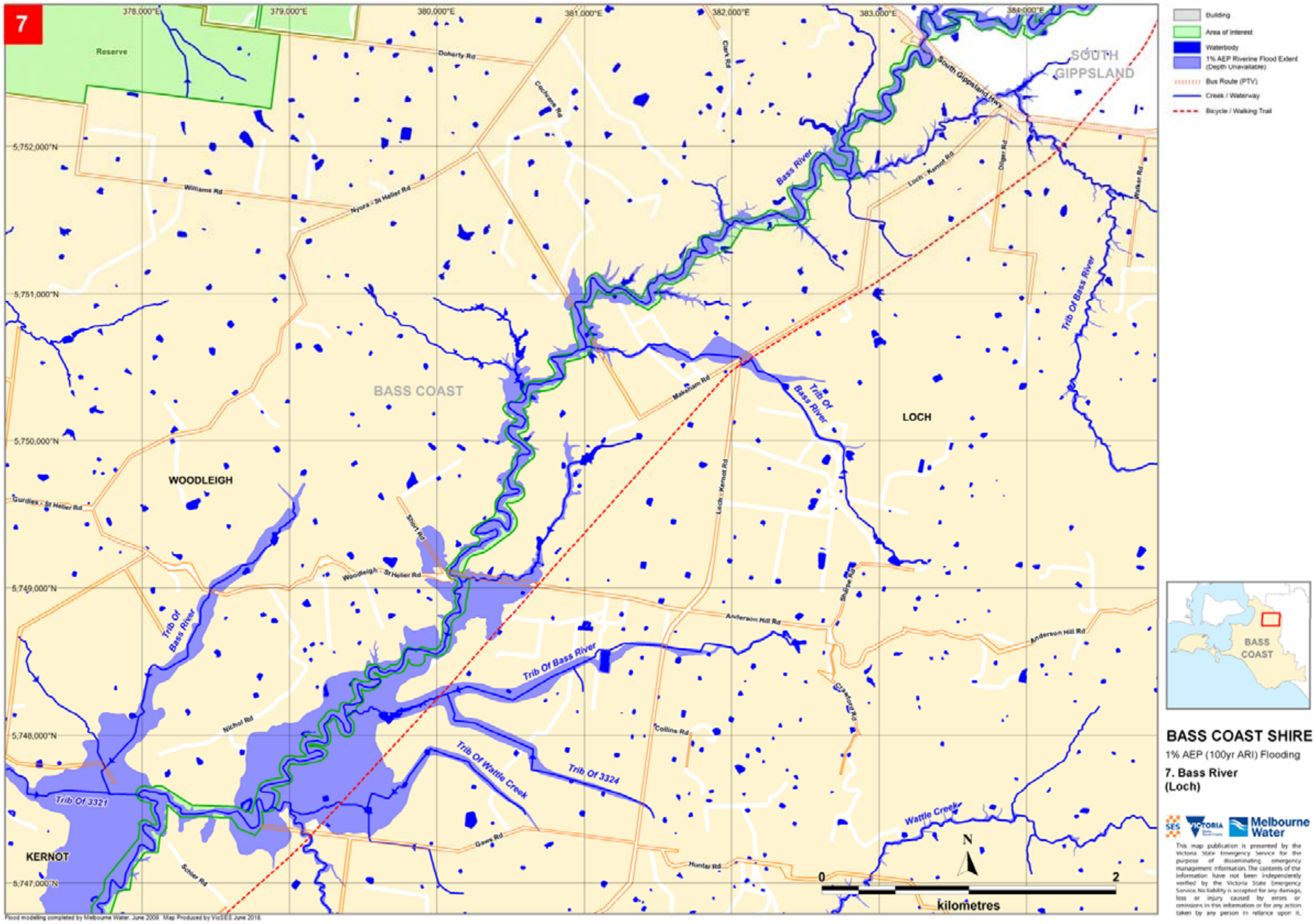
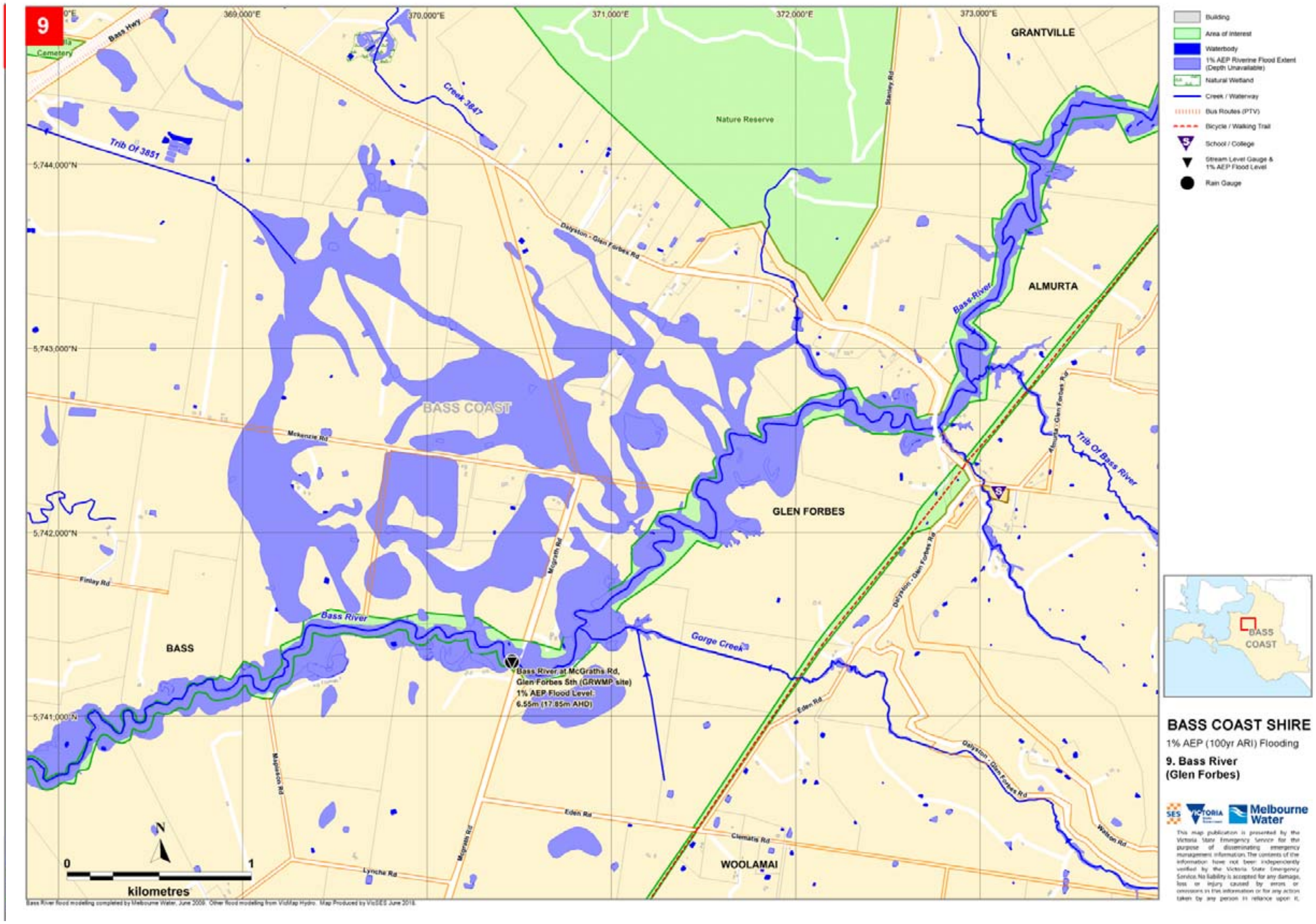
367,000°E
368,000°E
369,000°E
370,000°E
5,748,000°N
5,747,000°N
5,746,000°N
5,745,000°N
Western Port Bay
TENBY POINT
CORINELLA
QUEENSFERRY
GRANTVILLE
GLEN FORBES
BASS COAST
Nature Reserve
Marine Rd
Park Lane
Bayview Av
Guy Rd
Creek 3850
Creek 3848
Albert Rd
Blackwood Cl
Frederica Dr
Creek 3845
Creek 3849
Queensferry Jetty Rd
Creek 3846
Bass Hwy
Corinella Rd
Creek 3847
Cemetery Rd
N
0
1
kilometres
Building
Area of Interest
Waterbody
1% AEP Storm Surge Flood Extent (Depth Unavailable)
Natural Wetland
Bus Route (PTV)
Creek / Waterway
School / College
Kindergarten / Child Care
BASS COAST
BASS COAST SHIRE
1% AEP (100yr ARI) Flooding
5. Queensferry Coast (Queensferry)
SES
VICTORIA
Melbourne Water

6
BASS COAST SHIRE
1% AEP (100yr ARI) Flooding
6. Corinella & Coronet Bay Coast
(Corinella & Coronet Bay)
Western Port Bay
CORINELLA
CORONET BAY
BASS COAST
BASS
kilometres
0
1
N


7
BASS COAST SHIRE
1% AEP (100yr ARI) Flooding
7. Bass River
(Loch)
BASS COAST
WOODLEIGH
LOCH
KERNOT
SOUTH GIPPSLAND
Reserve
Bass River
Trib Of Bass River
Trib Of 3321
Trib Of 3324
Trib Of Wattle Creek
Wattle Creek
kilometres
0
2
N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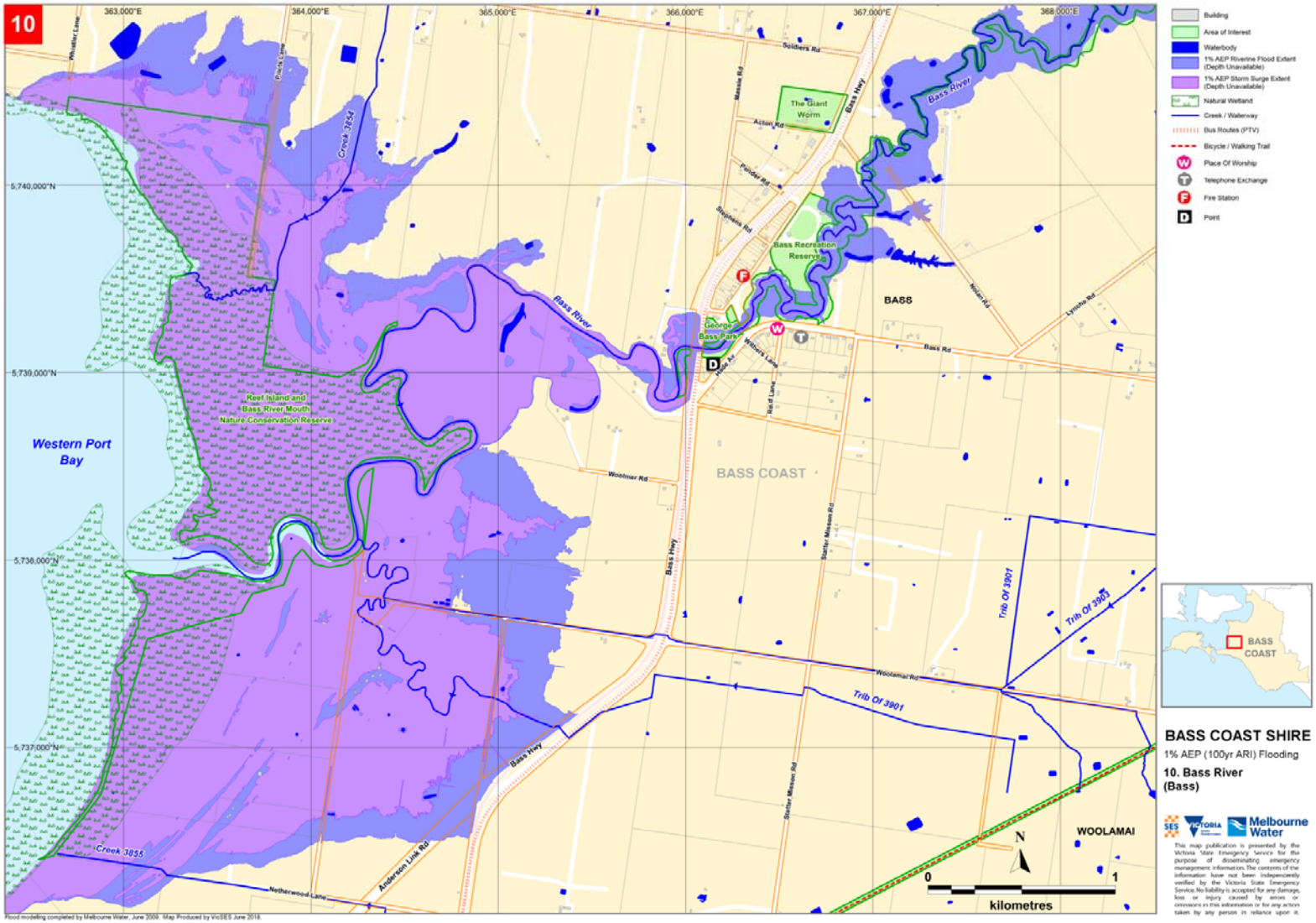
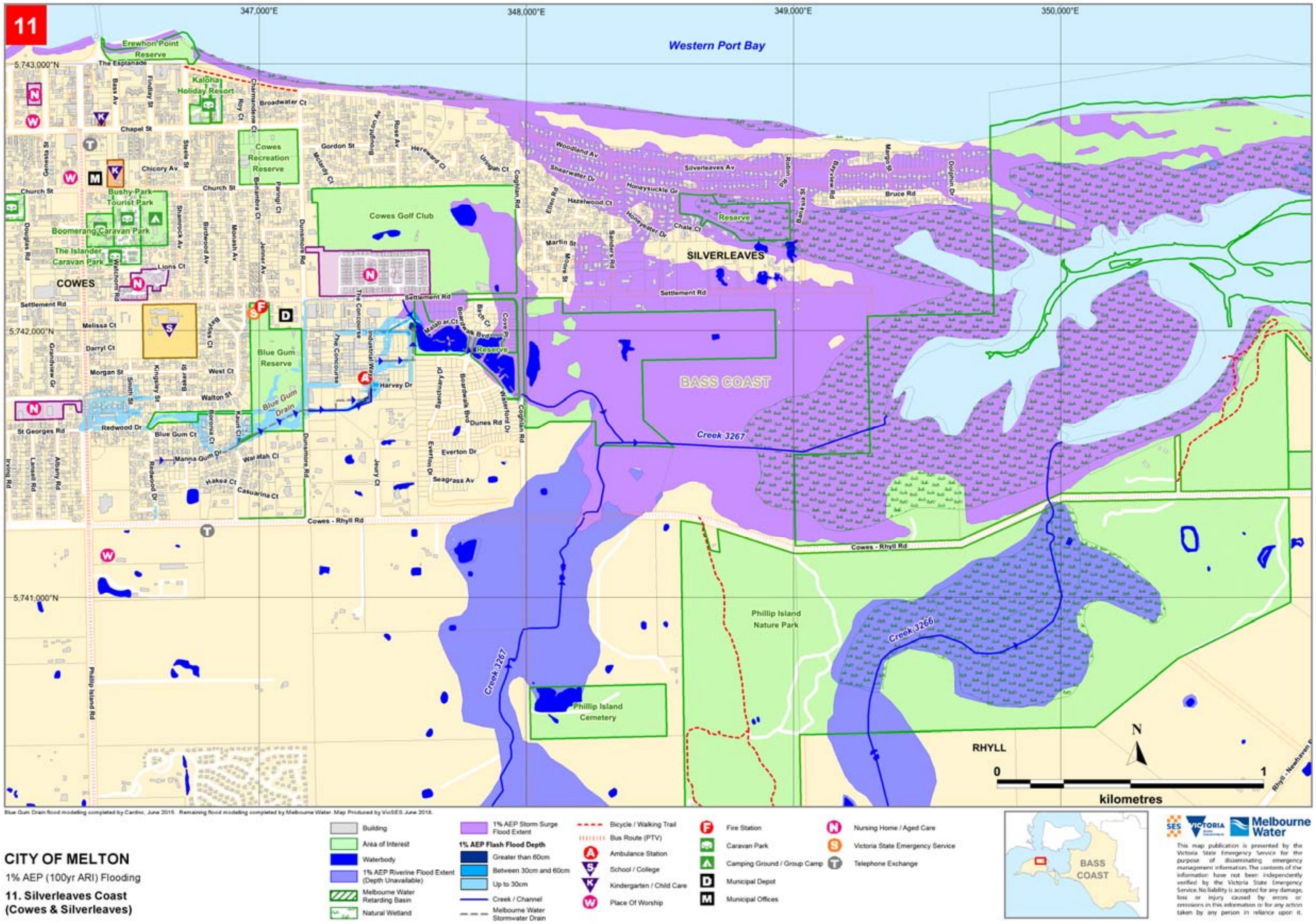
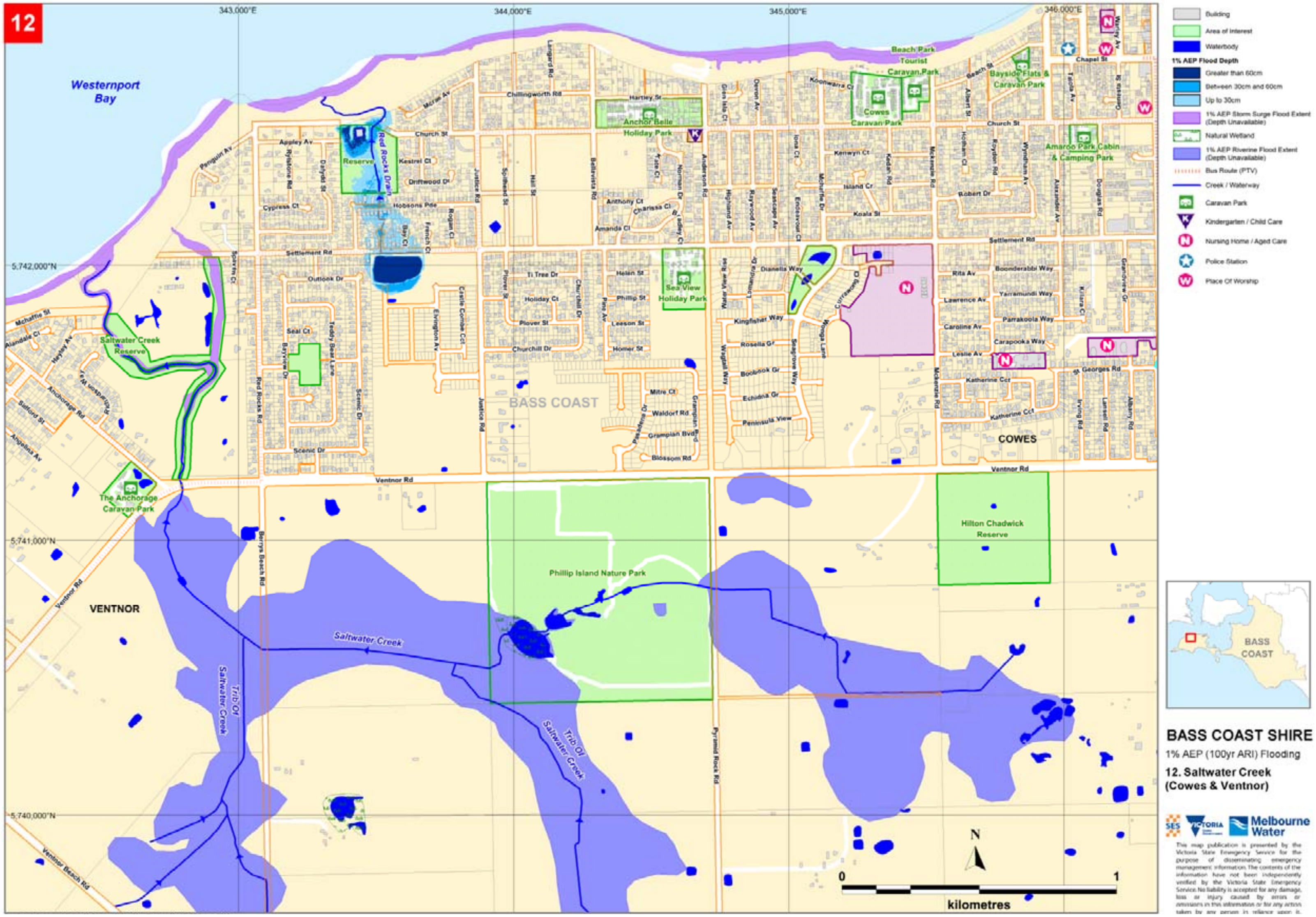
BASS COAST SHIRE
1% AEP (100yr ARI) Flooding
9. Bass River
(Glen Forbes)
GRANTVILLE
ALMURTA
GLEN FORBES
BASS
WOOLAMAI
BASS COAST
Nature Reserve
Bass River
Gorge Creek
Trib Of 3851
Creek 3847
Trib Of Bass River
Bass River at McGraths Rd,
Glen Forbes Sth (GRWMP site)
1% AEP Flood Level:
6.55m (17.85m AHD)
kilometres


10
363,000°E
364,000°E
365,000°E
366,000°E
367,000°E
368,000°E
5,740,000°N
5,739,000°N
5,738,000°N
5,737,000°N
Western Port Bay
Keet Island and Bass River Mouth Nature Conservation Reserve
Creek 3854
Creek 3855
Bass River
The Giant Worm
Bass Recreation Reserve
George Bass Park
BASS
BASS COAST
Soldiers Rd
Acton Rd
Ponder Rd
Stephens Rd
Bass Rd
Woolamai Rd
Anderson Link Rd
Netherwood Lane
Trib Of 3901
WOOLAMAI
Building
Area of Interest
Waterbody
1% AEP Riverine Flood Extent (Depth Unavailable)
1% AEP Storm Surge Extent (Depth Unavailable)
Natural Wetland
Creek / Waterway
Bus Routes (PTV)
Bicycle / Walking Trail
Place Of Worship
Telephone Exchange
Fire Station
Point
BASS COAST
BASS COAST SHIRE
1% AEP (100yr ARI) Flooding
10. Bass River (Bass)
N
0
1
kilometres
Melbourne Water


11
Western Port Bay
347,000°E
348,000°E
349,000°E
350,000°E
5,743,000°N
5,742,000°N
5,741,000°N
Erewhon Point Reserve
Kaloha Holiday Resort
Cowes Recreation Reserve
Bushy Park Tourist Park
Boomerang Caravan Park
The Islander Caravan Park
COWES
Cowes Golf Club
Blue Gum Reserve
Blue Gum Drain
SILVERLEAVES
Reserve
BASS COAST
Creek 3267
Creek 3266
Phillip Island Nature Park
Phillip Island Cemetery
RHYLL
kilometres
0
1
N
CITY OF MELTON
1% AEP (100yr ARI) Flooding
11. Silverleaves Coast
(Cowes & Silverleaves)
Building
Area of Interest
Waterbody
1% AEP Riverine Flood Extent (Depth Unavailable)
Melbourne Water Retarding Basin
Natural Wetland
1% AEP Storm Surge Flood Extent
1% AEP Flash Flood Depth
Greater than 60cm
Between 30cm and 60cm
Up to 30cm
Creek / Channel
Melbourne Water Stormwater Drain
Bicycle / Walking Trail
Bus Route (PTV)
Ambulance Station
School / College
Kindergarten / Child Care
Place Of Worship
Fire Station
Caravan Park
Camping Ground / Group Camp
Municipal Depot
Municipal Offices
Nursing Home / Aged Care
Victoria State Emergency Service
Telephone Exchange
BASS COAST
Melbourne Water


12
Westernport Bay
343,000°E
344,000°E
345,000°E
346,000°E
5,742,000°N
5,741,000°N
5,740,000°N
VENTNOR
BASS COAST
COWES
Saltwater Creek
Trib Of Saltwater Creek
Phillip Island Nature Park
Hilton Chadwick Reserve
Saltwater Creek Reserve
The Anchorage Caravan Park
Anchor Belle Holiday Park
Sea View Holiday Park
Cowes Caravan Park
Beach Park Tourist Caravan Park
Bayside Flats & Caravan Park
Amaroo Park Cabin & Camping Park
Red Rocks Drain
Reserve
Ventnor Rd
Settlement Rd
Church St
Chapel St
Ventnor Beach Rd
Berrys Beach Rd
Pyramid Rock Rd
Red Rocks Rd
N
0
1
kilometres
Building
Area of Interest
Waterbody
1% AEP Flood Depth
Greater than 60cm
Between 30cm and 60cm
Up to 30cm
1% AEP Storm Surge Flood Extent (Depth Unavailable)
Natural Wetland
1% AEP Riverine Flood Extent (Depth Unavailable)
Bus Route (PTV)
Creek / Waterway
Caravan Park
Kindergarten / Child Care
Nursing Home / Aged Care
Police Station
Place Of Worship
BASS COAST
BASS COAST SHIRE
1% AEP (100yr ARI) Flooding
12. Saltwater Creek
(Cowes & Ventnor)
SES
VICTORIA
Melbourne Water
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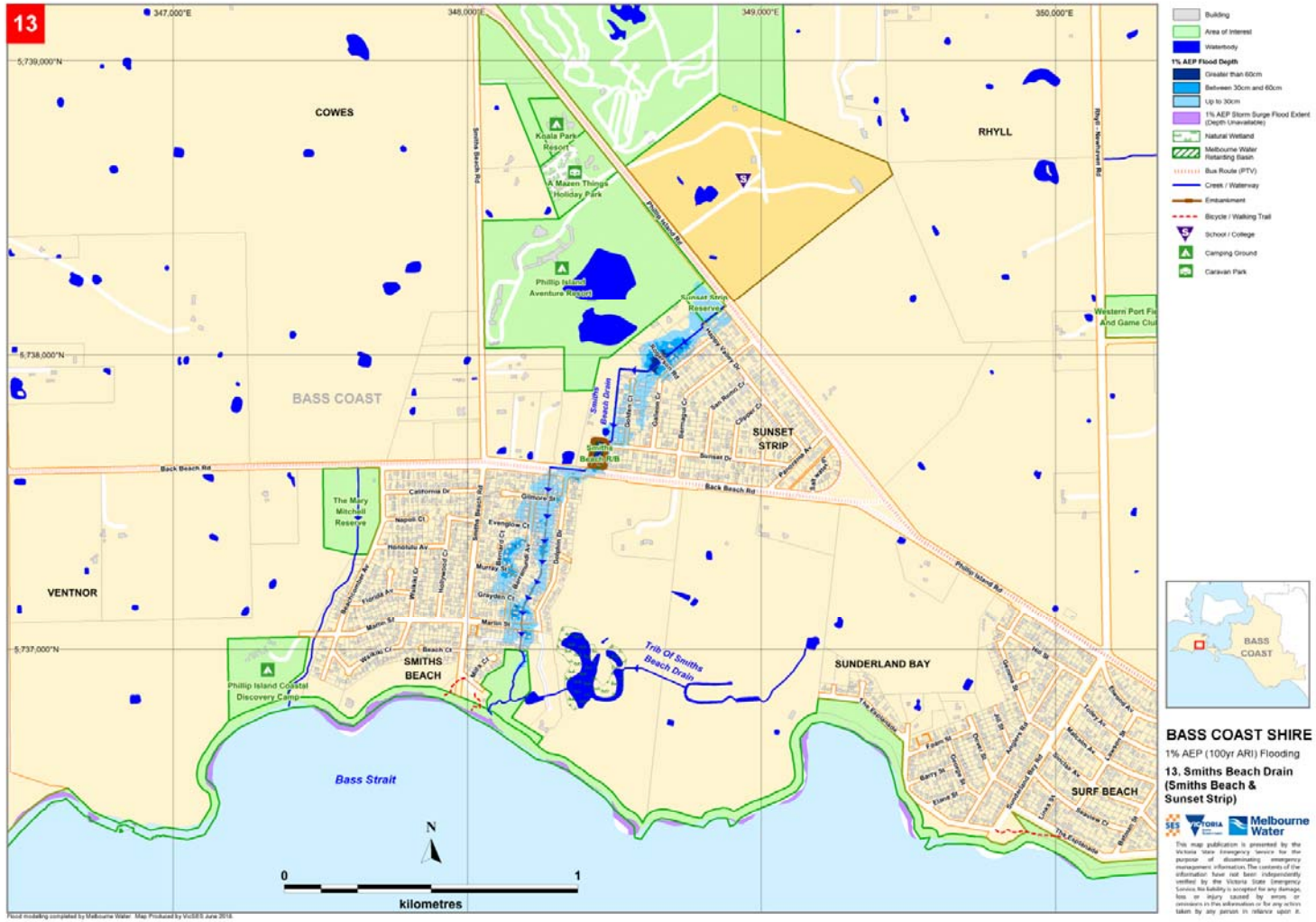
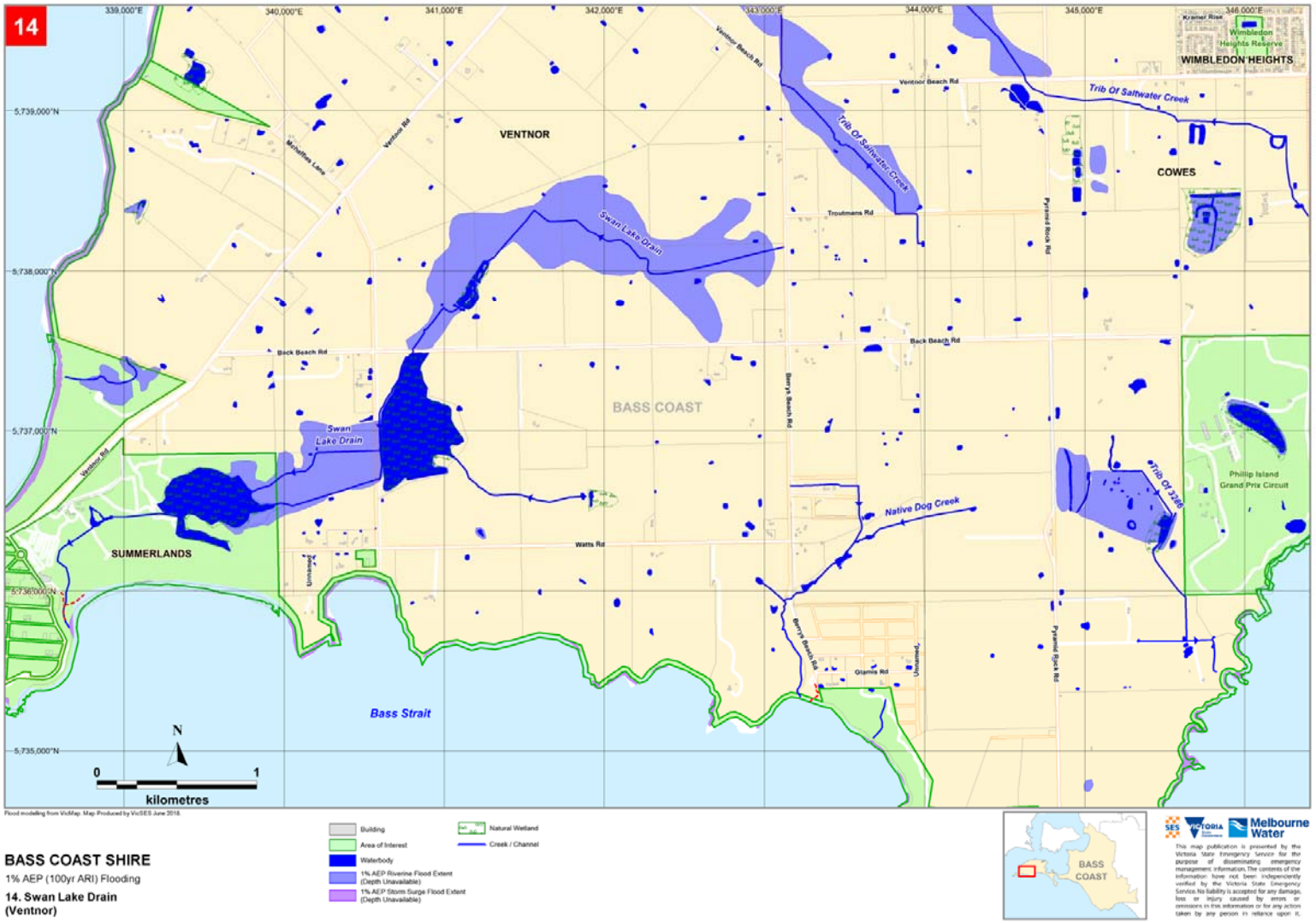

13
347,000°E
348,000°E
349,000°E
350,000°E
5,739,000°N
5,738,000°N
5,737,000°N
COWES
RHYLL
BASS COAST
SUNSET STRIP
VENTNOR
SMITHS BEACH
SUNDERLAND BAY
SURF BEACH
Bass Strait
Back Beach Rd
Phillip Island Rd
Smiths Beach Drain
Trib Of Smiths Beach Drain
Knala Park Resort
A Mazen Things Holiday Park
Phillip Island Aventure Resort
Sunset Strip Reserve
The Mary Mitchell Reserve
Phillip Island Coastal Discovery Camp
Smiths Beach Rd
Rhyll – Newhaven Rd
Western Port Fi And Game Clu
N
0
1
kilometres
Building
Area of Interest
Waterbody
1% AEP Flood Depth
Greater than 60cm
Between 30cm and 60cm
Up to 30cm
1% AEP Storm Surge Flood Extent (Depth Unavailable)
Natural Wetland
Melbourne Water Retarding Basin
Bus Route (PTV)
Creek / Waterway
Embankment
Bicycle / Walking Trail
School / College
Camping Ground
Caravan Park
BASS COAST
BASS COAST SHIRE
1% AEP (100yr ARI) Flooding
13. Smiths Beach Drain (Smiths Beach & Sunset Strip)
Melbourne Water



BASS COAST SHIRE

1% AEP (100yr ARI) Flooding

14. Swan Lake Drain (Ventnor)

APPENDIX G – CATCHMENT SCHEMATICS

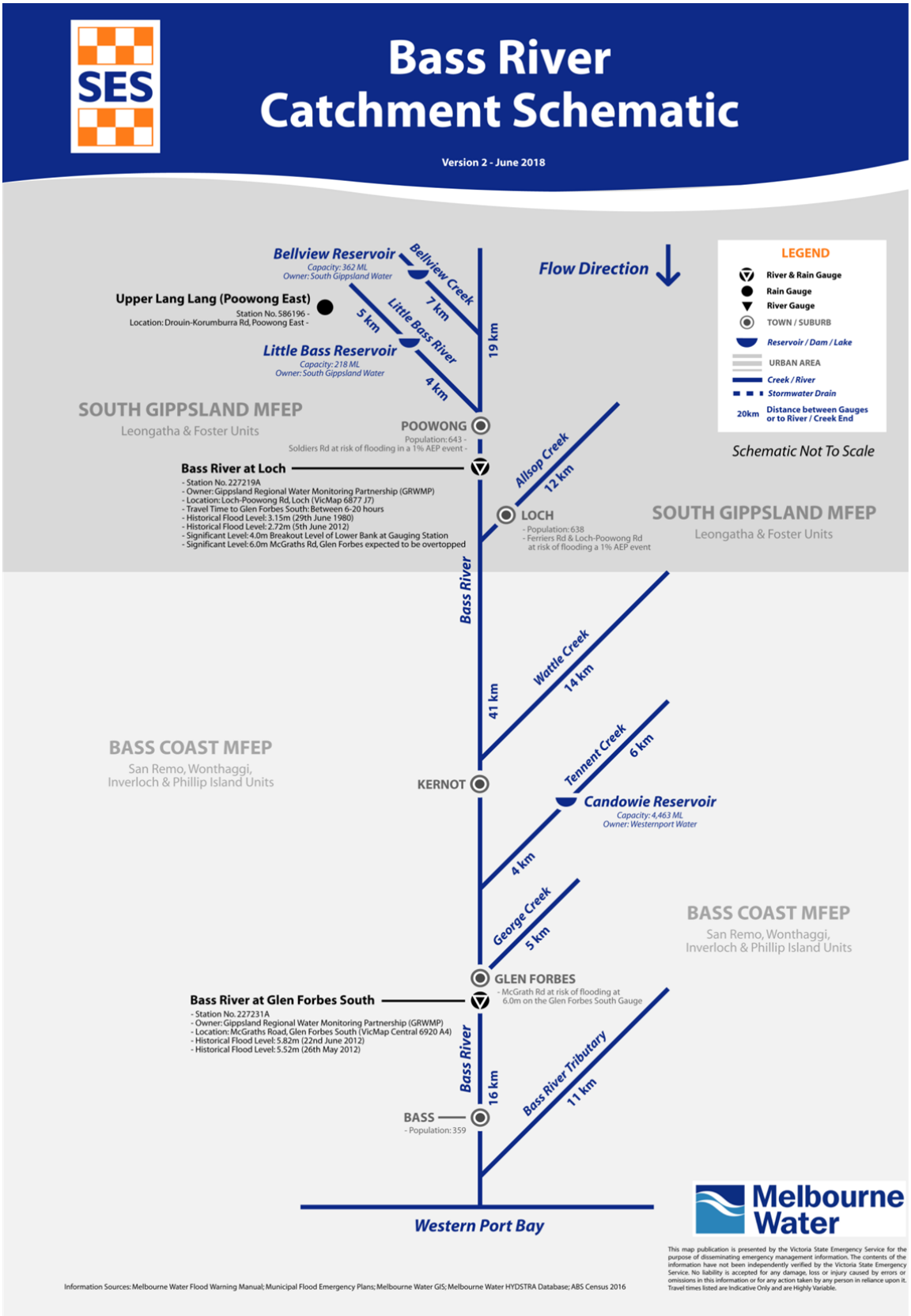
Schematics detailing the drainage catchments relevant for this municipality have been included in this Appendix. Each Schematic outlines the drainage system comprising of rivers, creeks or storm-water drains contained within one of the major catchments in the Port Phillip & Westernport Region.

Within each Schematic, there are details useful to flood response such as those relating to gauges, towns, rivers, creeks, drains and reservoirs. Historical facts and figures may also be shown.

The schematics also detail the response boundaries for SES Units and local government, and provide a reference link to the corresponding Municipal Flood Emergency Plan.

Details within these Catchment Schematics reflect those contained within either other sections of this Municipal Flood Emergency Plan or refer to other Municipal Flood Emergency Plans. These details have been filtered to contain only key facts. For more information on a gauge, drainage system or town consult the corresponding Flood Emergency Plan

Note that not all waterways or drains are included in the schematics, only those that are likely to contribute to flooding further on along the drainage system. Note also the flow direction; the schematics either flow from the top of the page to the bottom, or vice versa.


Bass River
Catchment Schematic
Version 2 - June 2018
Bellview Reservoir
Capacity: 362 ML
Owner: South Gippsland Water
Bellview Creek
7 km
Upper Lang Lang (Poowong East)
Station No. 586196 -
Location: Drouin-Korumburra Rd, Poowong East -
5 km
Little Bass River
Little Bass Reservoir
Capacity: 218 ML
Owner: South Gippsland Water
4 km
19 km
Flow Direction
LEGEND
River & Rain Gauge
Rain Gauge
River Gauge
TOWN / SUBURB
Reservoir / Dam / Lake
URBAN AREA
Creek / River
Stormwater Drain
20km
Distance between Gauges or to River / Creek End
Schematic Not To Scale
SOUTH GIPPSLAND MFEP
Leongatha & Foster Units
POOWONG
Population: 643 -
Soldiers Rd at risk of flooding in a 1% AEP event -
Bass River at Loch
- Station No. 227219A
- Owner: Gippsland Regional Water Monitoring Partnership (GRWMP)
- Location: Loch-Poowong Rd, Loch (VicMap 6877 J7)
- Travel Time to Glen Forbes South: Between 6-20 hours
- Historical Flood Level: 3.15m (29th June 1980)
- Historical Flood Level: 2.72m (5th June 2012)
- Significant Level: 4.0m Breakout Level of Lower Bank at Gauging Station
- Significant Level: 6.0m McGraths Rd, Glen Forbes expected to be overtopped
Allsop Creek
12 km
LOCH
- Population: 638
- Ferriers Rd & Loch-Poowong Rd at risk of flooding a 1% AEP event
SOUTH GIPPSLAND MFEP
Leongatha & Foster Units
Bass River
41 km
Wattle Creek
14 km
BASS COAST MFEP
San Remo, Wonthaggi,
Inverloch & Phillip Island Units
KERNOT
Tennent Creek
6 km
Candowie Reservoir
Capacity: 4,463 ML
Owner: Westernport Water
4 km
George Creek
5 km
BASS COAST MFEP
San Remo, Wonthaggi,
Inverloch & Phillip Island Units
GLEN FORBES
- McGrath Rd at risk of flooding at 6.0m on the Glen Forbes South Gauge
Bass River at Glen Forbes South
- Station No. 227231A
- Owner: Gippsland Regional Water Monitoring Partnership (GRWMP)
- Location: McGraths Road, Glen Forbes South (VicMap Central 6920 A4)
- Historical Flood Level: 5.82m (22nd June 2012)
- Historical Flood Level: 5.52m (26th May 2012)
Bass River
16 km
Bass River Tributary
11 km
BASS
- Population: 359
Western Port Bay
Melbourne Water
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Information Sources: Melbourne Water Flood Warning Manual; Municipal Flood Emergency Plans; Melbourne Water GIS; Melbourne Water HYDSTRA Database; ABS Census 2016

APPENDIX H – BASS COAST SHIRE COUNCIL ACTION PLAN 2019-2020

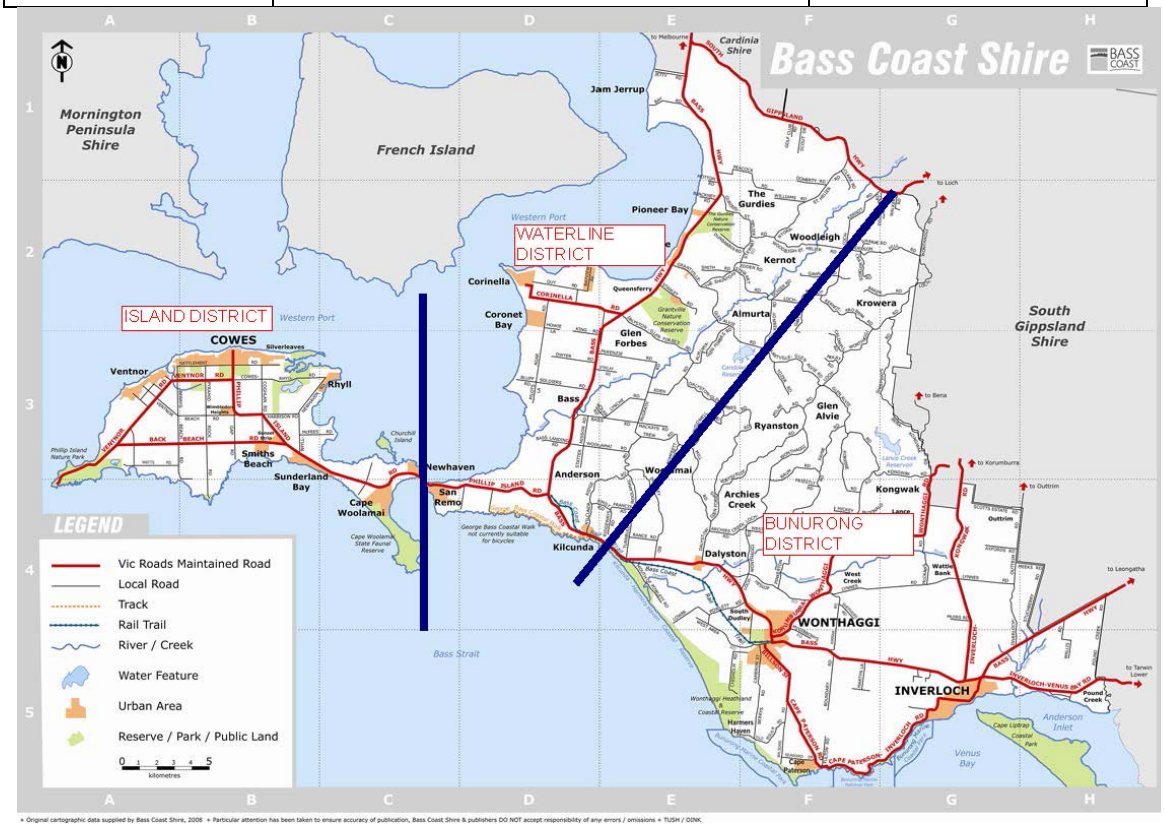
Action Number	Action	Timing	Responsibility
2019.1	Liaise with SES and identity and incorporate into Plan more data relating to storm events	Ongoing	BCSC Emergency Management
2019.2	Continue development of the Bass Coast Roads Subject to Flooding Tool (Appendix J)	Ongoing	BCSC Emergency Management and Roads Teams
2019.3	Develop Community guidelines for the cleanup and disposal of sandbags	By April 2019	BCSC Waste Team
2019.4	Conduct annual review of Flood risk using CERA tool	By October 2019	MFSPC
2019.5	Conduct a review of this Action Plan (2019-2020)	By December 2019	MFSPC
2019.6	Exercise the Plan to determine what priority actions are to be included in the following year's Action Plan.	By October 2019	MFSPC
2019.7	Committee endorsement of Action Plan for 2020-2021	By October 2019	MFSPC
2019.8	Endorsement of Action Plan for 2020-2021	March 2020	MEMPC
2019.9	Source up to date and relevant flood mapping for the Bunurong District (Powlett River / West Gippsland Catchment Management Authority Area)	By March 2019	SES

APPENDIX I – BASS COAST RESPONSE PLAN

BASS COAST DISTRICTS

For the purpose of this Plan the Municipality has been split into 3 distinct districts:

District	Towns included	Waterway
Island	All towns on Phillip Island including Cowes, Silverleaves, Rhyll, Newhaven	n/a
Waterline	All mainland towns on Western Port including Pioneer Bay, Grantville, Tenby Point, San Remo, Bass and including Kilcunda	Bass River
Bunurong	Dalyston, Wonthaggi, Cape Paterson, Inverloch, Lance Creek, Glen Forbes	Powlett River Anderson Inlet Wreck Creek



CONSEQUENCES AND IMPACTS SUMMARY

There are no properties in Bass Coast known as at the date of this Plan to be at risk from above-floor inundation. Areas that may be affected by flooding during an extreme rainfall event are contained in the Maps in Appendix E.

COMMUNITY EMERGENCY RISK ASSESSMENT (CERA)

CERA is an all hazards risk assessment tool which aims to identify, mitigate and reduce risk within the community following the Australian Standard for risk management, ISO 31000.

The 2018 Review of the CERA Review identified Storm as a high risk within Bass Coast. Storm risk in this context includes wind storms, dust storms, blizzards, storm tides and severe thunderstorms including hail storms, tornados and heavy rain and resultant flooding.

2018 CERA Review	ED18 112947 2018 09 03 Bass Coast CEF

Powlett River Flooding – looking towards Victorian Desalination Plan

COMMUNICATIONS

Road Closures - Communication

Process for Immediate Road Closure by Emergency Services due to tree/s and/or water across road

Purpose

To provide a consistent Council process for the communication of immediate road closures by Emergency Services caused by an obstruction (ie trees or water over roads) over the roadway.

Background

In different situations Emergency Services will be required to close roads for the safety of the public or due to an obstruction of the roadway.

This document defines how this information will be communicated by Council to the MERO/MRM, Municipal Coordination Centre (if required), emergency services and the community.

Procedures	
Trees and/or water across	
Council managed roads (refer Map Appendix 1)	**VicRoads managed roads (refer Map Appendix 1)**

If call is received via Council's 24hr on call number 1300 BCOAST (1300 226 278):
• Infrastructure on call officer
  ○ will follow the relevant Traffic Management Procedure - filling out the relevant traffic risk assessment record sheets
  ○ makes determination of additional resources required and organises
  ○ discusses traffic management and road closure signage with VicPol/VicSES
• Any diversion routes will take into consideration known road closures and road quality.
• notification to agencies included in Appendix 2 will be emailed
• Site will be cleared and road reopened
	Contact VicRoads on 13 11 70
	The following procedure should be used when there are **no possible diversion routes on a VicRoads road.**
	On making the closure **Vic Police will**:
	• be the main contact with VicRoads
	• request VicRoads update the VicRoads' website and associated app with information on the road closure and predicted opening time giving estimated time the closure will be in place. VicRoads' will notify media outlets
	• update the Bass Coast Eye Watch Page (if possible)
	• contact Council MERO on 0407 317 866
	
	On making the closure **Council will**:
	• email notification to agencies included in Appendix 2
	▪ will record and disperse information as required to the ICC and relevant emergency response and recovery agencies
	▪ support communications using its Facebook page directing people to VicRoads App and Website for more information
	▪ (if provided with direction from Vic Police) position VMS boards in agreed locations (if available) or change messages on boards in situ
	• consider
	  • keeping toilets open or requesting additional cleaning of toilets on the route (if feasible)
	  • implementing other Bass Coast EM Procedures

ED18/130219

Process for Immediate Road Closure by Council due to tree/s and/or water across road

Purpose

To provide a consistent process for the closure of municipal controlled roads in emergency situations and the sharing of that information with emergency services and the Municipal Coordination Centre (MCC).

Background - Road Closures

In different emergency situations Council will be required to close roads for the safety of the public. This document defines how this information will be communicated to the MERO/MRM, Municipal Coordination Centre and emergency services. The VicRoads/VicTraffic website/application is the central repository for the management of this information.

Procedures

When Council's Infrastructure Maintenance Staff need to close a Council controlled road they will follow the relevant Traffic Management Procedure - filling out the relevant traffic risk assessment record sheets. Any diversion routes will take into consideration known road closures and road quality.

On completing the closure the operator will:

During work hours if the MCC is set up:

- report to Infrastructure Maintenance Administration who may have set up an operations centre
- the operation centre/Infrastructure Maintenance Administration will send email confirmation to mcc@basscoast.vic.gov.au
- MCC staff will record and disperse information as required to the ICC and relevant emergency response and recovery agencies
- the MERO will ensure information is available on VicTraffic website/application.

If no MCC set up (ie after hours):

- on call staff member provide details to MERO on 0407 317 866,
- notifications will be provided by email or text to the predetermined contacts noted on Appendix 2. VicRoads contact after hrs is 131170.

ED18/130219

Traffic Management CoOrdinating Equipment

Purpose

To provide a consistent process for the provision of traffic management equipment and personnel in emergency situations where requested by the MERC on Council Controlled Roads.

VicRoads requests should be made through their 131170 number.

Background

In different emergency situations Council will be required to provide equipment or resources to aid in traffic management activities. This document defines how this process should be undertaken.

Procedures

When MERO is requested to provide equipment or resources to aid in traffic management activities he will contact the Coordinator Roads to confirm current resources available.

If the MCC is set up (ie during office hours):

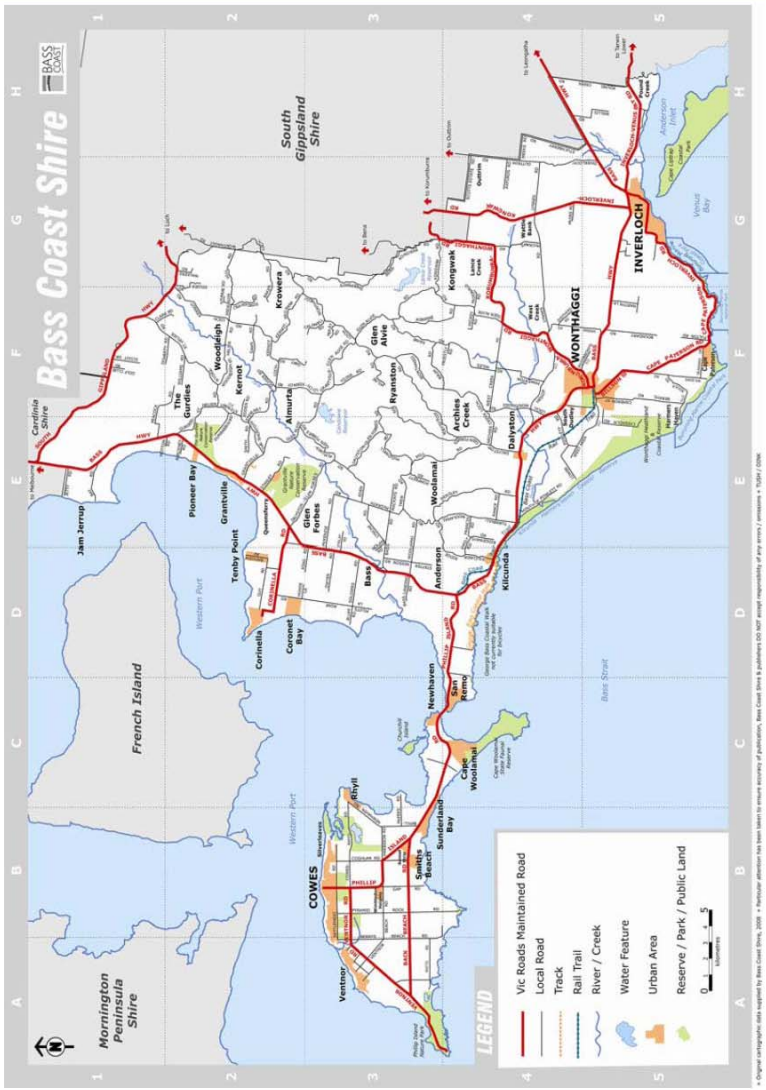
- request will be logged as required on Crisisworks
- staff and resources will be deployed as available
- briefings and follow up as per the Coordinating Equipment Standard Operating Procedure

If the MCC is not set up (ie after hours)

- request will be logged as required on CRS
- staff and resources will be deployed as available
- briefings and follow up as per the Coordinating Equipment Standard Operating Procedure

ED18/130219

Appendix 1 – Map Management of Roads



ED18/130219

Appendix 2 - Road Closure Contacts

Agency	Work Hours & After Hours	Who
BCSC	zz_AlmostAllUsers@basscoast.vic.gov.au	All BCSC Staff
BCSC	Paul.buckley@basscoast.vic.gov.au	Chief Executive Officer
BCSC	AllCouncillors@basscoast.vic.gov.au	All Councillors
CFA	dollar@netspace.net.au	Damien O'Connor
CFA	P.Walters@cfa.vic.gov.au	Peter Walters
CFA	p.summons@cfa.vic.gov.au	Paul Summons
CFA	S.Hamilton@cfa.vic.gov.au	Scott Hamilton
SES	east@ses.vic.gov.au	
SES	inverloch@ses.vic.gov.au	
SES	wonthaggi@ses.vic.gov.au	
SES	sanremo@ses.vic.gov.au	
SES	pi.ses.controller@gmail.com	Phillip Island
SES	lucyna.wilson@ses.vic.gov.au	Lucy Wilson
BCH		
Tourism		
AV	Grantville.teammanager@ambulance.vic.gov.au	
AV	Cowes.teammanager@ambulance.vic.gov.au	
AV	Wonthaggi.teammanager@ambulance.vic.gov.au	
AV	roadclosures@ambulance.vic.gov.au	
MERC	andrew.o'brien@police.vic.gov.au	Andy O'Brien
Vic Roads	julie.cahir@roads.vic.gov.au	Julie Cahir
Vic Roads	tmc@roads.vic.gov.au	VicRoads contact after hrs is 131170.
Vic Roads	Michael.Kearns@roads.vic.gov.au	Michael Kearns
DET	tarrant.glen.g@edumail.vic.gov.au	Glen Tarrant
PINP	dprendergast@penguins.org.au	Damian Prendergast
SGSC	pennie@southgippsland.vic.gov.au	Penni Ellicott
SGSC	virginia.stacey@southgippsland.vic.gov.au	Virginia Stacey

List of VicRoads Controlled Roads (PDF 131kb).

Bass Coast Shire Council Customer Service Scripts

Flooding

What are your contact details?
What is the location of the flooding/potential flooding?
Is anyone in danger?

- If YES call Triple Zero (000)

Is there any flood damage or potential flood damage to private property?

- If YES call VICSES on 132500

Is the flooding on a road and impacting on traffic? Determine possible depth – Ankle depth/ Knee Depth

If YES - on BCSC road:	If YES - on VICROADS road:
• Officer will review the request and prioritise based on current works being undertaken • Call through to Wonthaggi Depot Officers and follow up with logged customer request. • Council staff will make the site safe or close the road if appropriate. • If further works are required Council Officers will return to the site as soon as possible to complete any further works. • A Council Officer may contact you to confirm location details	Call VICROADS on 13 11 70 (24/7)

Storm Damage

What are your contact details?
What is the location of the damage/potential damage?
Is anyone in danger?

- If YES call Triple Zero (000)

Is there roof damage?

If YES - on private property	If YES - on Council land (Council Building)
Call VICSES on 13 25 00	• Officers will review the request and prioritise based on current works being undertaken. • Request to be called through to Depot and follow up with a logged customer request for Building Maintenance team.

Power lines down

Establish if the tree/damage that has come down is from Council Land or from Private Land

If YES - on private property	If YES - on Council land
call Triple Zero (000) and Ausnet Services 13 17 99	• Call Ausnet Services 13 17 99 and Request to be called through to Depot • follow up with a logged customer request for Parks and Gardens team to attend and keep area safe until Ausnet Services arrives.

Tree down over road and impacting on traffic

Is the tree down on a municipal controlled road ie Bass Coast Shire Council road?	Is the tree down on a VicRoads Road (See VicRoads Roads List)
If YES	If YES

Bass Coast Shire Council Customer Service Scripts

• Is it partially blocking the road or blocking the whole road? • Please estimate the size of tree ie. branch/large limb approximately 200mm in diameter, or a whole tree? • We will call the request through to the Depot and follow up with logged customer request. • The request will be reviewed and prioritised based on current works being undertaken. • Council staff will make the site safe or close the road if appropriate. • If further works are required Council officers will return to the site as soon as possible to complete any further works. • A Council officer may contact you to confirm location details – end call	customer to call VICROADS urgent road hazards on 13 11 70 – end call If the tree is impacting on power lines call Ausnet Services 13 17 99

Is the Tree down on private land?
Is the fallen tree preventing someone being able to enter or leave their home?
If YES, customer calls VICSES on 13 25 00 – end call

**If the customer is calling about damage to a neighbouring property where no one is home Customer Service will endeavour to make contact with the owner via phone or mail*

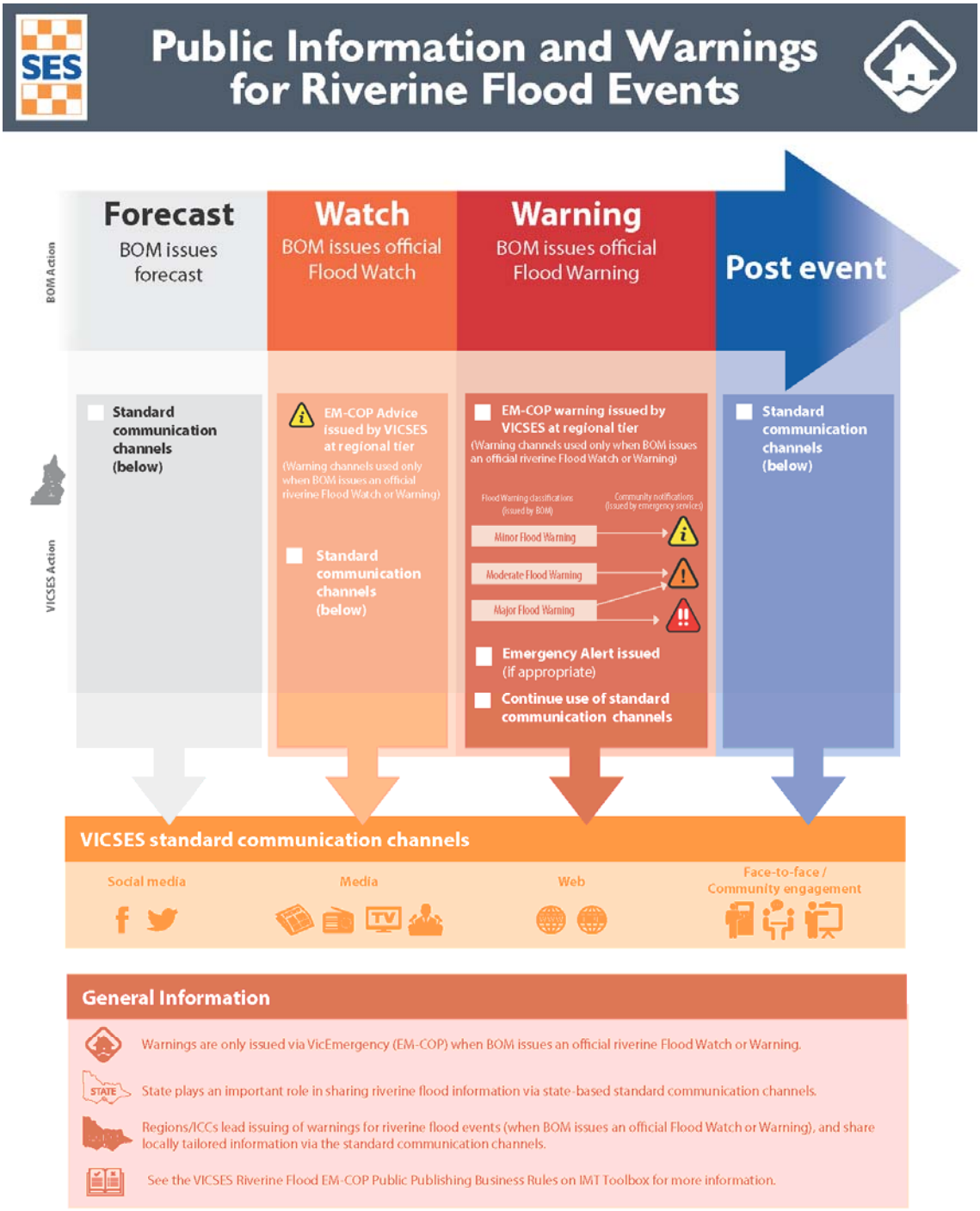
If NO, explain it is the customer's responsibility and they need to engage private contractor to remove the fallen tree or debris – end call

Is there damage to private property? (including vehicles)
If YES, request the customer calls VICSES on 13 25 00 – end call

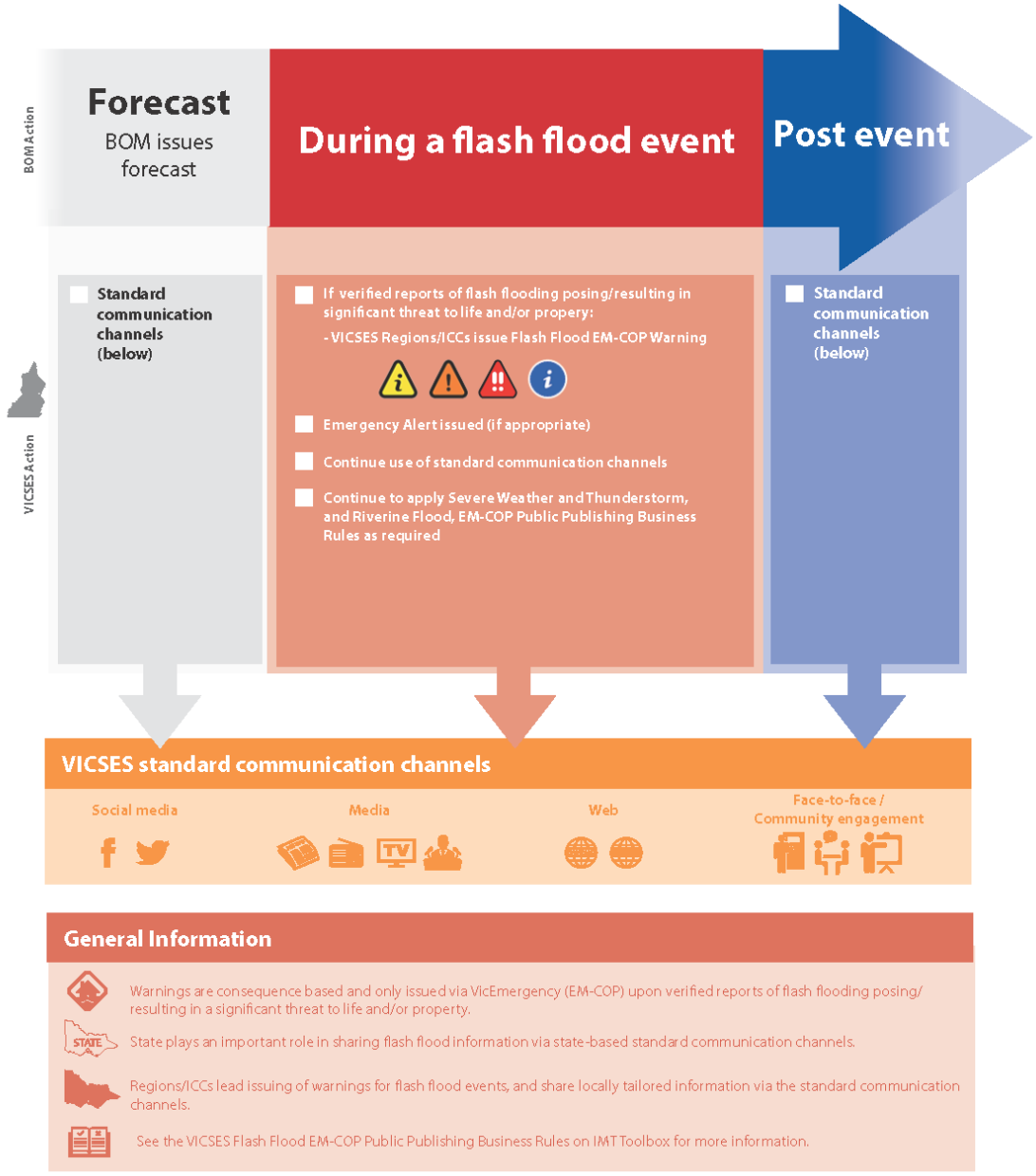
Additional Information:
Victoria State Emergency Service is an emergency agency and may undertake emergency temporary repairs to private property. For minor leaks, superficial damage, the removal of debris and cutting down of trees that are still standing, please contact a professional tradesperson
The Incident Controller may make the decision to evacuate an at-risk community. Evacuation is the responsibility of VICPOL and will be conducted as per the EMMV and the MEMP.

SES COMMUNITY SAFETY MESSAGING

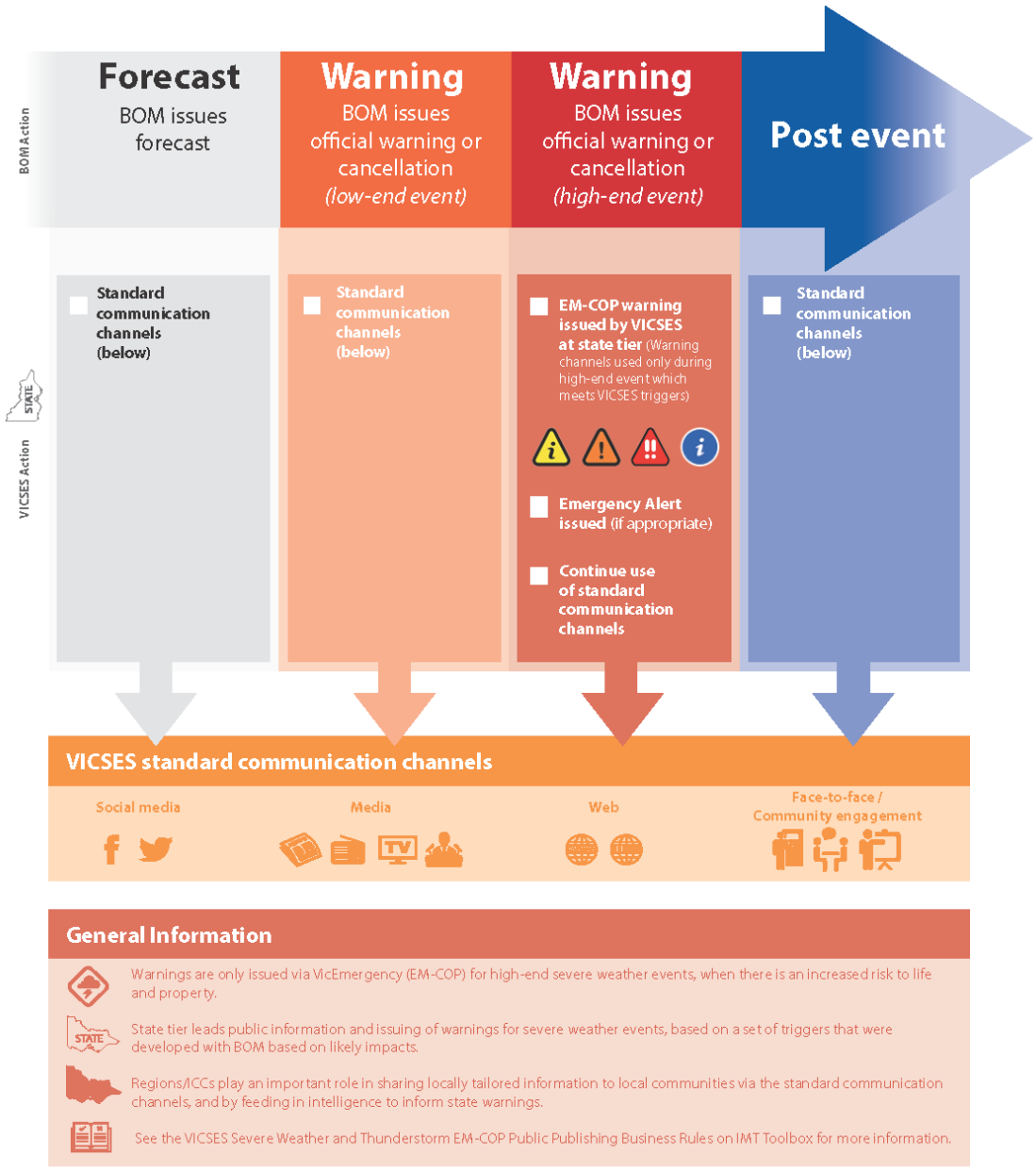
VicSES provides advice to community in the form of key safety messages for minor, moderate and major flooding. These are summarised following.


Public Information and Warnings for Riverine Flood Events
BOM Action
VICSES Action
Forecast
BOM issues forecast
Watch
BOM issues official Flood Watch
Warning
BOM issues official Flood Warning
Post event
Standard communication channels (below)
EM-COP Advice issued by VICSES at regional tier
(Warning channels used only when BOM issues an official riverine Flood Watch or Warning)
Standard communication channels (below)
EM-COP warning issued by VICSES at regional tier
(Warning channels used only when BOM issues an official riverine Flood Watch or Warning)
Flood Warning classifications (issued by BOM)
Community notifications (issued by emergency services)
Minor Flood Warning
Moderate Flood Warning
Major Flood Warning
Emergency Alert issued (if appropriate)
Continue use of standard communication channels
Standard communication channels (below)
VICSES standard communication channels
Social media
Media
Web
Face-to-face / Community engagement
General Information
Warnings are only issued via VicEmergency (EM-COP) when BOM issues an official riverine Flood Watch or Warning.
STATE
State plays an important role in sharing riverine flood information via state-based standard communication channels.
Regions/ICCs lead issuing of warnings for riverine flood events (when BOM issues an official Flood Watch or Warning), and share locally tailored information via the standard communication channels.
See the VICSES Riverine Flood EM-COP Public Publishing Business Rules on IMT Toolbox for more information.

Public Information and Warnings for Flash Flood Events



Public Information and Warnings for Severe Weather Events



KEY CONTACT DETAILS

Service	Email address	Location/Address	Contact
Bass Coast Shire Council	MCC@basscoast.vic.gov.au	76 McBride Ave, Wonthaggi	1300 226 278
Vic Roads	Report a hazard	24 hours, 7 days a week	13 11 70
Cowes			
Police	cowes.uni@police.vic.gov.au	92 Chapel Street Cowes VIC 3922	Station 03 5952 2037
SES	phillipisland@ses.vic.gov.au	127-129 Settlement Road Cowes VIC 3922	Dianne Duncombe 0414 935 160
Unit Controller	dianne.duncombe@members.ses.vic.gov.au		
San Remo			
Police	sanremo.uni@police.vic.gov.au	Phillip Island Road, San Remo	03 5678 5500 - Station
SES	sanremo@ses.vic.gov.au	Davis Point Road, San Remo Vic 3925	Tom Wilson 0417 556 735
Inverloch			
Police	inverloch.uni@police.vic.gov.au	13 Bayview Avenue, Inverloch	03 5674 1202 - Station
SES	kokoda1@me.com	Bear Street, Inverloch	Tony Quinlan - 0418 363 915
Wonthaggi			
Police	wonthaggi.uni@police.vic.gov.au	75-77 Watt Street, Wonthaggi	03 5671 4100 - Station
SES	wonthaggi@ses.vic.gov.au		Jarrod Hargreaves, Controller – 0499 072 117
Unit Controller	jarrod.hargreaves@members.ses.vic.gov.au		
Grantville			
Police	wonthaggi.uni@police.vic.gov.au	75-77 Watt Street, Wonthaggi	03 5671 4100 – Station

Current as at :<details to be confirmed>

SANDBAG ARRANGEMENTS GENERAL

Appropriately placed sandbags can help reduce the impact of flooding to residences, businesses and infrastructure. While sandbags will not completely stop all floodwater, they may reduce the amount of water entering properties.

The IC will determine the priorities related to the use of sandbags, which will be consistent with the strategic priorities and the VICSES Sandbag Policy.

If VICSES sandbags are becoming limited in supply, then priority will be given to protection of Essential Infrastructure. If time permits, requests for supplementary supply should be made to the VICSES East Regional Duty Officer (RDO).

The IC will ensure that owners of Essential Infrastructure are kept advised of the flood situation. Essential Infrastructure providers must keep the IC informed of their status and ongoing ability to provide services.

Bass Coast Shire MERO will liaise with the VICSES East Region RDO/ IC (as appropriate) to ensure effective coordination of listed resources.

Sandbags will be filled in accordance with the VICSES Sandbag Quick Reference Guide and the VICSES Statewide Guideline- Sandbags. A short video depicting the filling procedures and the correct usage of sandbags is available at https://www.youtube.com/watch?v=-_T--I3b-34&feature=youtu.be

Sand may be obtained from the suppliers/locations noted following and as stated in the VICSES MOU: Sand Supply.

SANDBAG ARRANGEMENTS OPERATIONAL

Sandbag Storage Locations

The region holds strategic reserves of sandbags at the following locations.

VICSES	Location	No. of Sandbags	Estimated Response Time	Contact
Inverloch	23 Bear Street	500	1 hour	
Phillip Island	125/127 Settlement Road	3,000	1 hour	
San Remo	14 Davis Point Road	600	1 hour	
Wonthaggi	319 White Road	7,000	1 hour	
VICSES East Region Logistics Building	<address> Bairnsdale	40,000	3 hours	Via VICSES East Regional Duty Officer.

Sand Suppliers

In large events, or when local supplies have been exhausted, supply will be in accordance with VICSES- Supplier MOU: Sand Supply. VICSES FOG (Field Operation Guide) suggests washed river sand as the preferred material.

A heavy bodied or sandy soil is most desirable for filling sandbags, but any usable material at or near the site has definite advantages. Gravelly or rocky soils are generally poor choices because of their permeability. Filled bags of earth material will deteriorate quickly. Sand/ fill material should be free of salt and contaminants where possible.

Company Name	Address	24 hr access	Phone Numbers	Nominal Quantities on site
Ross Chapman Cartage & Earthmoving Contractor	5975 Bass Highway Inverloch	No	5657 4444 (BH) 0408 032 387 (AH)	300 mts
Donmix	Old Powerhouse Site Wonthaggi	No	5672 3733 (BH)	100+

Sandbag Collection Points

Sandbag collection points may be established at the IC's discretion and as conditions permit. Potential locations are noted below. Note that locations documented below are potential sites only and will not be appropriate for use in all events.

Location	Address	Area	Operational Restrictions
Wonthaggi Recreation Reserve	Korumburra Road	Car Park	
Cowes Recreation Reserve	Church Street	Car Park	
Inverloch Recreation Reserve	Sandy Mount Avenue	Car Park	
Bass Recreation Reserve	Hade Avenue	Car Park	

Residents may purchase sandbags or similar from hardware or garden supply stores for protection of residential property or businesses if a sandbag collection point is not available to the public. Some locations may include Bunnings (Wonthaggi) and Mitre10.

Machinery Supply

Appliances documented below will be required when undertaking sandbagging operations

Organisation	Asset	Location	Estimated deployment time	Contact
BCSC	1 x Front End Loader	Wonthaggi	D-1 hour AH-W/ends – 0-2hrs (if staff available)	
	1 x excavator 1 x backhoe	Wonthaggi		
	1 x front end loader	Cowes	As above	
VICSES	Sandbag trailer	Stratford		Via ETDO

Additional resources from Council that could be utilised to aid response include:

- Forklift
- Large Tipper
- Labour resources

At the peak of an event the following Human Resource is also available under the State Emergency Response Plan – Flood Sub-Plan:

- Sandbag filling teams from Department of Justice Work Crews

SANDBAG ARRANGEMENTS POST OPERATIONAL

Clean up and Disposal

Residents, businesses and Essential Infrastructure owners will be encouraged to contact Council to determine the safest method for disposal of sandbags.
Following a flood event within the Municipality, Bass Coast Shire Council will facilitate the disposal of sandbags. Guidelines for such disposal are currently under development.
VICSES will work in conjunction with Council to ensure the disposal of used sandbags is dealt with under the Community Recovery arrangements as outlined in the EMMV.

Powlett River Wattlebank

ISLAND DISTRICT (Phillip Island) DETAILS

FLOOD CLASS LEVELS

There are no Flood Class Levels for Phillip Island.

FLOOD BEHAVIOUR

High intensity, short duration rainfall events can cause flash flooding on Phillip Island, while prolonged rainfall may see the number of small creeks on the Island flood. The area sees a mixture of moderate to slow water movement due to the presence of rolling hills and flat terrain on the Island. As a result, flood waters may persist for a number of hours or days in areas where the ground is flat. See maps in Appendix E for more insight into flooding in the area.

FLOOD MITIGATION SYSTEMS

Smiths Beach Retarding Basin, located on Back Beach Rd in Sunset Strip forms part of the Smiths Beach Drain which carries storm water from Phillip Island Rd, south over Back Beach Rd to Smiths Beach and out to Bass Strait.

Other retarding basins, some of which are designed for 1 in 100 year flows include:-

Island	Seagrove Estate, Kent Haven Estate, Ramada Resort, Shearwater and Seagrove in Cowes, Justice Road Farm and White Sands Estate in Ventnor

SEA LEVEL RISE

The following Island townships are expected to be vulnerable to sea level rise:

Newhaven	Rhyll	Cowes	Silverleaves

ROAD CLOSURES and potential properties impacted

Phillip Island can become isolated for a few hours during an intense rainfall event with the Bass Highway at risk of inundation. Some localised short duration isolation may occur due to flash flooding.

The following roads are subject to closure during flooding around Phillip Island & San Remo. Note that many minor roads may also be inundated.

Ward	Town	Street/Location Description	Exact Location (GPS/Link)	Flash Flooding	Storm Surge/Coastal	Riverine	Water over Roads	Likelihood (L/M/H)	Risk to Ppty (L/M/H)	Action/Road Closures	Minor Road Closure	Major Road Closure
Island	Cowes	Anderson Road Boat Ramp		x	x							
Island	Cowes	Christian Youth Camp	1775 Phillip Island Road	x								
Island	Cowes	Cowes Caravan Park	164 Church Street	x								
Island	Cowes	Cowes General Store	181 Church Street	x								
Island	Cowes	Cowes Rhyll Road		x								
Island	Cowes	Gap Rd		x								
Island	Cowes	Kaloha Caravan Park	17-21 Steele Street	x								
Island	Cowes	Phillip Island Rd		x							x	
Island	Cowes	The Esplanade – Between Findlay St & Bass Ave		x								
Island	Rhyll	Rhyll Newhaven Rd (just past McFees Rd)		x								
Island	Rhyll	Beach Road			x							
Island	Silverleaves	All Roads			x							
Island	Silverleaves	Moore Street		x							x	
Island	Smiths Beach	Back Beach Rd		x							x	
Island	Surf Beach	Phillip Island Rd		x							x	
Island	Ventnor	Berry's Beach Road		x								
Island	Ventnor	Kitty Millers Bay Road		x								
Island	Ventnor	Pyramid Rock Road		x							x	
Island	Ventnor	Ventnor Beach Rd		x							x	
Island	Ventnor	Watts Road		x								

Source: APPENDIX 1 – BASS COAST SHIRE COUNCIL ROADS SUBJECT TO FLOODING TOOL

Moore Street Cowes - 2012

WATERLINE DISTRICT (including Bass River) DETAILS

FLOOD BEHAVIOUR

The region's main road transport link, the Bass Highway, is often wetted during heavy rain events due to flows in drainage lines exceeding culvert capacities and / or low spots not draining very well.

It is likely that a big flood on the Bass River would also affect the Bass Highway and the South Gippsland Highway.

FLOOD MITIGATION SYSTEMS

Retarding Basin	Drain / Waterway	Operator
North Norsemens	Norsemens Rd Drain	Melbourne Water
Town Oval	Coronet Bay / Drain	Melbourne Water

Other retarding basins, some of which are designed for 1 in 100 year flows include:-

Waterline	Silver Water Resort and Penniwells in San Remo, Crystal Brook Estate in Kilcunda, Grantville-Glen Alvie Road and Grantville Rise Estate and Agnes Street in Grantville,

LOCAL GAUGE LOCATIONS

Gauge Name	Location	Gauge Zero m AHD	No.
Bass River @ Loch	Bass River on Loch-Poowong Rd, Loch	0	227219
Bass River @ Glen Forbes South	Bass River on McGraths Rd, Glen Forbes (MW site)	0	227231

INDICATIVE FLOOD BEHAVIOURS

In general, riverine floods rise and fall quickly within the Bass River catchment. In very general terms, the approximate time between start of heavy rain and maximum flood levels / extents in the lower parts of the Bass River will be of order 6 to 12 hours for big floods and 12 to 18 hours or so for smaller floods. The smaller creeks (the tributaries) will respond a little faster. Levels fall around a half to a third the rate of rise – it takes roughly 2 to 3 times as long to fall as it does to rise. These general guidance timings will be influenced strongly (extended) by storm surge, if present.

FLOOD PEAK TRAVEL TIMES

The approximate time between start of heavy rain and maximum flood levels / extents in the lower parts of the Bass River will be of order 6 to 12 hours for big floods and 12 to 18 hours or so for smaller floods. The smaller creeks (the tributaries) will respond a little faster.

SEA LEVEL RISE

The following Waterline townships are expected to be vulnerable to sea level rise:

Pioneer Bay	Queensferry	Grantville	Bass
Lang Lang			

Lang Lang Foreshore Caravan Park may need to be evacuated as access will be cut off in the event of catchment or coastal storm surge events.

ROAD CLOSURES and potential properties impacted

Ward	Town	Street/Location Description	Exact Location (GPS/Link)	Flash Flooding	Storm Surge/Coastal	Riverine	Water over Roads	Likelihood (L/M/H)	Risk to Ppty (L/M/H)	Action/Road Closures	Minor Road Closure	Major Road Closure
Waterline	Bass	Bass Landing Rd & Pilots Lane			x	x					x	
Waterline	Bass	Mapleson Rd				x	x				x	
Waterline	Bass	Soldiers Rd				x	x				x	
Waterline	Bass	Woolamai Road				x	x				x	
Waterline	Glen Forbes	McGraths Rd				x	x				x	
Waterline	Kilcunda	Mouth of Powlett Road				x	x				x	
Waterline	Kilcunda	Powlett River Caravan Park				x						
Waterline	Loch	South Gippsland Highway (South Gippsland Shire)					x					x
Waterline	Pioneer Bay	Beach Boulevard			x		x				x	
Waterline	Pioneer Bay	Sonia Cres			x		x				x	
Waterline	San Remo	Wonthaggi Cres					x					
Waterline	Tenby Point	Tenby Point			x							
Waterline	Woolamai	Turnbull-Woolamai Road				x						

Source: APPENDIX I – BASS COAST SHIRE COUNCIL ROADS SUBJECT TO FLOODING TOOL

Tenby Point – looking west from Agent Road

BUNURONG DISTRICT (including Powlett River & Wreck Creek) DETAILS

FLOOD BEHAVIOUR

The region's main road transport link, the Bass Highway, is often wetted during heavy rain events due to flows in drainage lines exceeding culvert capacities and / or low spots not draining very well.

The Highway is also affected by flooding in the Powlett River as well as on the numerous small creeks within Bass Coast.

FLOOD MITIGATION SYSTEMS

Retarding basins, some of which are designed for 1 in 100 year flows include:-

Bunurong – Wonthaggi/Dalyston/South Dudley	Summer Fields Estate, Fuller Road, College Estate and at Sussex Court in Wonthaggi, Waterdale Estate in Dalyston Wonthaggi Wetlands on South Dudley Road
Bunurong - Inverloch	Ayr Creek, Marina Place, Surf Estate, Albert Ruttle Road, Broadbeach Resort and Ullathornes Road
Bunurong – Cape Paterson	Blue Water Circle

LOCAL GAUGE LOCATIONS

Gauge Name	Location	Gauge Zero m AHD	No.
Powlett River @ d/s Foster		0	227236
Powlett River @ d/s			227254
Screw Creek @ Bass Highway			227260

Powlett River EstuaryWatch Data Portal

This site's water level monitoring gauge board is located on the western river bank beside the Mouth of Powlett Road Bridge (downstream side).

http://www.estuarywatch.org.au/site/wgcma/556

LEVEES

There are a number of rural levees along the Powlett River, mainly to provide protection from smaller nuisance flooding. Overtopping of these levees has little consequence for built assets or infrastructure.

FLOOD PEAK TRAVEL TIMES

In general, riverine floods rise and fall quickly in the South Gippsland Basin. In very general terms, in the lower floodplain areas of the Powlett River, levels begin to rise around 18 to 24 hours after the start of heavy rainfall and peak within 30 to 36 hours for big floods and 2 or so days for smaller floods. Levels fall around a third the rate of rise – it takes roughly 3 times as long to fall as it does to rise. These general guidance timings will be influenced strongly (extended) by storm surge, if present.

SEA LEVEL RISE

Both Inverloch and Pound Creek are expected to be vulnerable to sea level rise.

Wreck Creek Estuary Closure Management Procedure

Procedure	Responsibility
1. <u>Proactive communication:</u> *a)* **Prior to a predicted closure:** - **Review and if required update:** the re active communications strategy (CS), this closure management procedure (CMP), and the FAQs b) **At commencement of the closure**; - Inform relevant estuary entrance management partners (EEMP's) (i.e. relevant staff from BCSC, PV and WGCMA) - If required organise a meeting with EEMP's to discuss any updates made to the CS, CMP and FAQ's (i.e. documents that inform the closure management / communications). If not required send EEMP's all three documents via email. - Upload FAQs and other relevant information onto BCSC website if required. - Brief BCSC reception staff and provide a link to the CS and FAQs. c) When the water level gets to **1.9 metres AHD**; - Contact EEMP's partners to inform them that an artificial opening is now being considered, and when conditions are suitable for a safe and sustained opening it will be performed, if required (i.e. if it doesn't open naturally) - Organise a meeting with EEMP's and excavator operator (if required) at estuary mouth to discuss the artificial opening arrangement, based on the estuary mouth state, current and forecasted weather / ocean conditions - Erect a sign explaining that estuary mouth closures are a natural event and for further information visit the BCSC website if believed necessary (i.e. if there is a threat of an illegal opening). - Develop a media release to inform the public about the event if believed to be necessary. **d) After the estuary closure event;** - Organise a de brief with the EEMP's if required, to review the closure management and communication approach.	BCSC (with support provided by the WGCMA initially)
2. BCSC to apply for a **works on waterways permit** if required (i.e. current permit has expired)	BCSC (with support provided by the WGCMA initially)
3. **<u>Desktop assessments</u>**: will occur throughout an estuary	BCSC (with support

Procedure		Responsibility
	closure, to identify, forecasted tidal heights, and rainfall and ocean swells, to assist with predicting the rate of water level increase within the estuary. This will occur at the discretion of the BCSC *(Please note: This information and the information gathered during the Estuary Monitoring detailed below, will help to inform the **risk** and **feasibility assessments**, and EEMP's updates).*	provided by the WGCMA initially)
4.	**Estuary monitoring**: onsite water quality, mouth state and water level height monitoring will occur throughout the closure, with monitoring frequency being ramped up once water levels reach 1.6m AHD. The BCSC will also carry out more comprehensive sand berm height monitoring to gather AHD level heights across the sand berm, to assist in predicting the likelihood of a natural estuary opening.	WGCMA
5.	**EEMP's closure updates**: email updates will be sent to EEMP's if required *(i.e. PV, WGCMA, and BCSC)*. Updates will outline latest estuary, and ocean conditions and forecast ocean, tide and rainfall conditions, whether an artificial opening is required based on the most recent risk assessment, and if applicable, whether this is feasible under current conditions. Updates will occur following relevant risk assessments *(see below),* and will occur at the discretion of the BCSC.	BCSC (with support provided by the WGCMA initially)
6.	Prior to conducting an artificial opening, if required based on the results of the risk assessment, a final **feasibility assessment** is required to determine if the water quality, creek flow, ocean conditions, access is suitable to carry out a safe and sustained opening.	BCSC (with support provided by the WGCMA and PV)
7.	Once it is deemed feasible to carry out an **artificial opening**, and WGCMA consent is given, the opening will occur (BCSC (contractor)) to conduct, WGCMA and PV to provide technical support.	BCSC (with support provided by WGCMA and PV)
8.	If it is **not deemed feasible** due to inappropriate water quality, river flow, ocean and access conditions, feasibility monitoring will continue until conditions are suitable.	BCSC (with support provided by WGCMA and PV)
9.	**Once the mouth is opened**; or opens (naturally) estuary monitoring (water quality, mouth state) will occur at discretion of the BCSC and/or WGCMA.	BCSC (with support provided by WGCMA)
(version 2; updated April 2017)		

ROAD CLOSURES and potential properties impacted

Ward	Town	Street/Location Description	Exact Location (GPS/Link)	Flash Flooding	Storm Surge/Coastal	Riverine	Water over Roads	Likelihood (L/M/H)	Risk to Ppty (L/M/H)	Action/Road Closures	Minor Road Closure	Major Road Closure
Bunurong	Cape Paterson	Wilsons Road			x		x					
Bunurong	Dalyston	Bass Highway, towards Kilcunda					x					x
Bunurong	Inverloch	A'Beckett Street		x							x	
Bunurong	Inverloch	Acacia Ct		x							x	
Bunurong	Inverloch	Bass Highway		x								x
Bunurong	Inverloch	Diane Place		x							x	
Bunurong	Inverloch	Honeyeater Circuit		x							x	
Bunurong	Inverloch	Inverloch-Kongwak Road		x							x	
Bunurong	Inverloch	Main Street		x								
Bunurong	Inverloch	Screw Creek				x						x
Bunurong	Inverloch	Treadwell's Road/Mahrs Landing Rd			x		x					
Bunurong	Inverloch	Veronica Street		x							x	
Bunurong	Inverloch	Wreck Creek - if mouth closed				x						
Bunurong	Kernot	Stewart Rd				x	x				x	
Bunurong	Kilcunda	Bourne Creek, Bass Highway			x							x
Bunurong	Kilcunda	Ridgeway Road			x		x					
Bunurong	Kongwak	Korumburra-Inverloch Rd				x	x				x	
Bunurong	Lance Creek	Korumburra Wonthaggi Rd				x	x				x	
Bunurong	Lance Creek	Korumburra-Wonthaggi Rd – near McCraws Rd				x	x				x	
Bunurong	Lance Creek	Lance Creek Rd				x	x				x	
Bunurong	Lang Lang	Jetty Lane			x		x				x	
Bunurong	Outtrim	Inverloch-Outtrim Road (Near Meeks Rd)				x	x				x	
Bunurong	Outtrim	Kongwak to Outtrim Rd				x	x				x	
Bunurong	Outtrim	Korumburra South Rd				x	x				x	
Bunurong	Outtrim	Scotts Estate Road				x	x				x	
Bunurong	Wattle Bank	Lynnes Road (Kirrak Road Intersection)				x	x				x	
Bunurong	Wattle Bank	McCraws Road				x	x				x	
Bunurong	West Creek	Pinkerton Road				x	x				x	
Bunurong	West Creek	West Creek Road – at Powlett river bridge				x						
Bunurong	Wonthaggi	Bass Highway & Korumburra Road		x								x
Bunurong	Wonthaggi	Bass Highway (McKenzie Street)		x								x
Bunurong	Wonthaggi	Bass Highway, Between Boundary & Pearsall Roads					x					x
Bunurong	Wonthaggi	Billson St					x				x	
Bunurong	Wonthaggi	Kirrak Road				x	x				x	
Bunurong	Wonthaggi	Korumburra Wonthaggi Road/Heslop Road Intersection				x	x				x	
Bunurong	Wonthaggi	Loch-Wonthaggi Road, near the Powlett River crossing				x	x				x	
Bunurong	Wonthaggi	Lower Powlett Road				x	x				x	
Bunurong	Wonthaggi	McKenzie Street		x								
Bunurong	Wonthaggi	McKenzie Street properties		x								
Bunurong	Wonthaggi	Murray St				x	x				x	
Bunurong	Wonthaggi	Pinkerton Road		x			x					
Bunurong	Wonthaggi	South Dudley Rd				x	x				x	
Bunurong	Wonthaggi	West Area Road				x	x				x	
Bunurong	Wonthaggi	Wonthaggi Medical Centre	42 Murray Street	x								
Bunurong	Wonthaggi North	Heslop Road				x	x				x	
Bunurong	Woodleigh	Peacock Road				x	x				x	
Bunurong	Woodleigh	St Helier Road				x	x				x	
Bunurong	Woodleigh	Woodleigh Rd & Short Rd				x	x				x	

Source: APPENDIX I – BASS COAST SHIRE COUNCIL ROADS SUBJECT TO FLOODING TOOL

Opening of Wreck Creek

EMERGENCY ACCESS PROCEDURE FOR MOUTH OF POWLETT ROAD (WATERSURE)

WATERSURE

THIESS

EMR-000-PR-011 Revision 02

Emergency Access Procedure for Mouth of Powlett Rd

1. PURPOSE

Access Road # 03 is closed with a locked gate at both ends to prevent general usage:

This procedure describes the emergency situations in which access may be required through Access Road # 03:

- Situations in which the community and public facility users along Mouth of Powlett Road require emergency access to Lower Powlett Road; and
- Situations in which emergency services require urgent access from Lower Powlett Road to Mouth of Powlett Road.

2. SCOPE

This procedure is relevant to the Operation and Maintenance phase of the Victorian Desalination Project and applies to all Watersure employees, and users of Access Road # 03 in an emergency situation

3. SAFETY

3.1 General

An 'emergency' is defined as:

- Any event that precludes access to and from private land, the caravan park and the public facilities along Mouth of Powlett Road; and
- Any event in which emergency services require urgent access to Mouth of Powlett Road.
- In these situations, emergency access through the parkland via Access Road 03 will be provided 24 hours a day, seven days a week.

4. ENVIRONMENT

N/A

5. FORMS TO BE USED

N/A

6. DEFINITIONS

Abbreviation / Term	Definition
HSE	Health, Safety and Environment
WTS	Watersure

7. RESPONSIBILITIES

Managers Shall:

- Ensure that all personnel are adequately trained in this procedure

Employees Shall:

- Adhere to all actions outlined in this procedure

The Community Liaison Officer and HSE Officer shall:

- Ensure awareness of this procedure and any approved revisions
- Ensure this procedure is available to all plant personnel
- Bass Coast Shire Council and local emergency services will be briefed on this Procedure at the Emergency Services Liaison Group meeting and supplied a copy of the Procedure as well as relevant key and/or combination
- Mouth of Powlett Road residents will be advised of this Procedure as well as relevant information regarding process for obtaining combination

- Mouth of Powlett River Caravan Park management will be advised of this procedure to enable it to be incorporated into their Emergency Management Plans and provided with relevant information regarding process for obtaining combination

8. ACTIONS

	Action	Responsibility	When	Tools
1.	**Process for Emergency Access**			
1.1	The following arrangements are in place to ensure swift and safe emergency access to and from Lower Powlett Road. • Emergency contact numbers will be provided at both gates on Access Road 03. • Resident/ landowner / Facility users and emergency services to proceed along the Access Road 02and exit via Lower Powlett Road. • Site Shift Operation team to assist if required	Community Liaison Officer / Operations Officer	When Required	Emergency Contact List / Emergency Guidelines
2.	**Site Wide Emergency**			
2.1	In the event of a site-wide emergency occurring at the same time, the Incident Management Plan will be activated and relevant Incident Controller appointed. This Emergency Access Procedure will be executed in parallel with that Plan.	Incident Controller		Emergency Guidelines
2.2	For Contact details for Mouth of Powlett Road residents refer to the Community Liaison Officer	Community Liaison Officer	When Required	Emergency Contact List / Emergency Guidelines

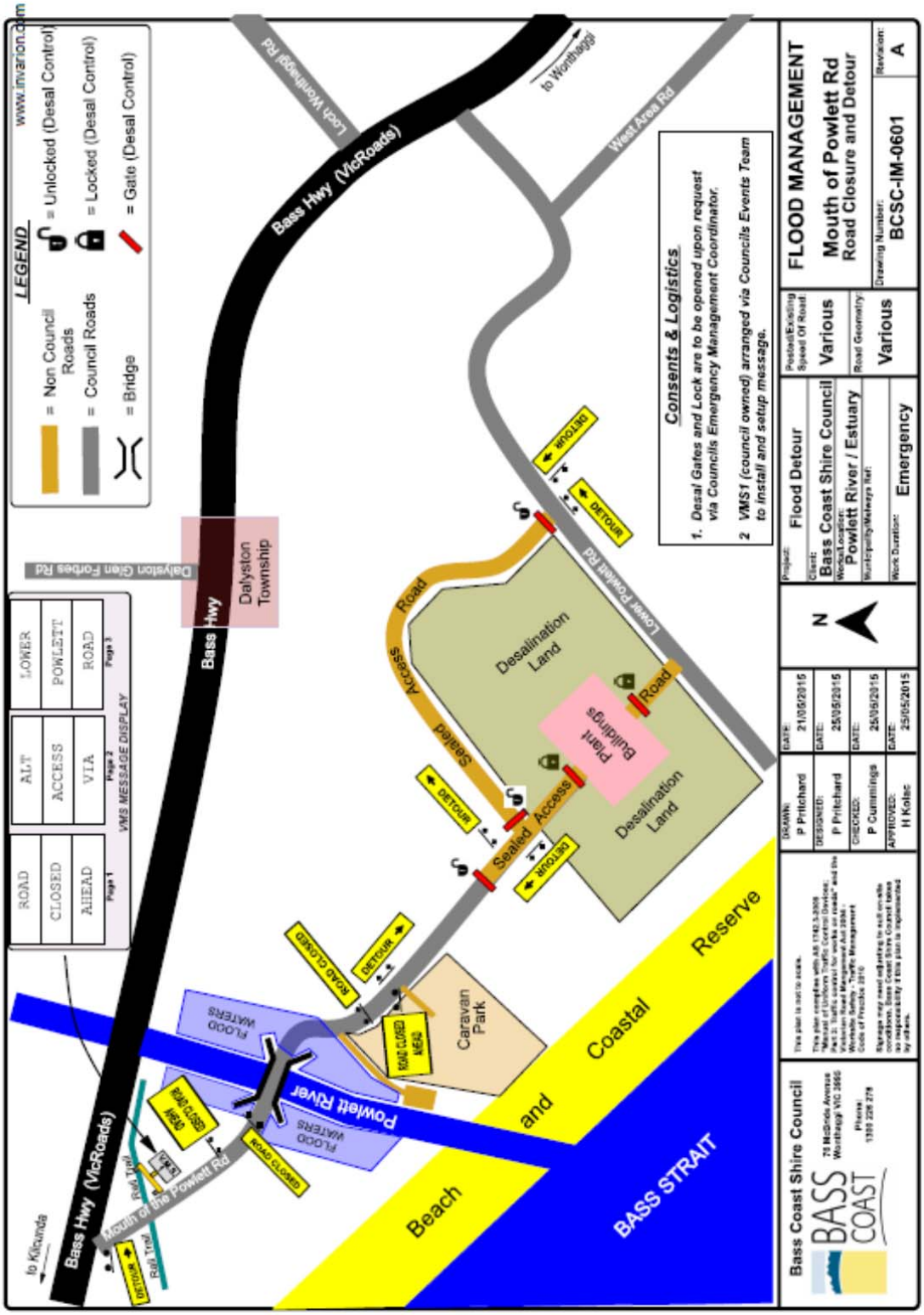
9. RELATED DOCUMENTS

EMR-000-PR-001	Security Patrol
EMR-000-PR-002	Breach of Security
EMR-000-PR-010	Site Security Locking & Unlocking
EMR-000-LT-001	Emergency Contact List
EMR-000-GD-001	Emergency Guidelines

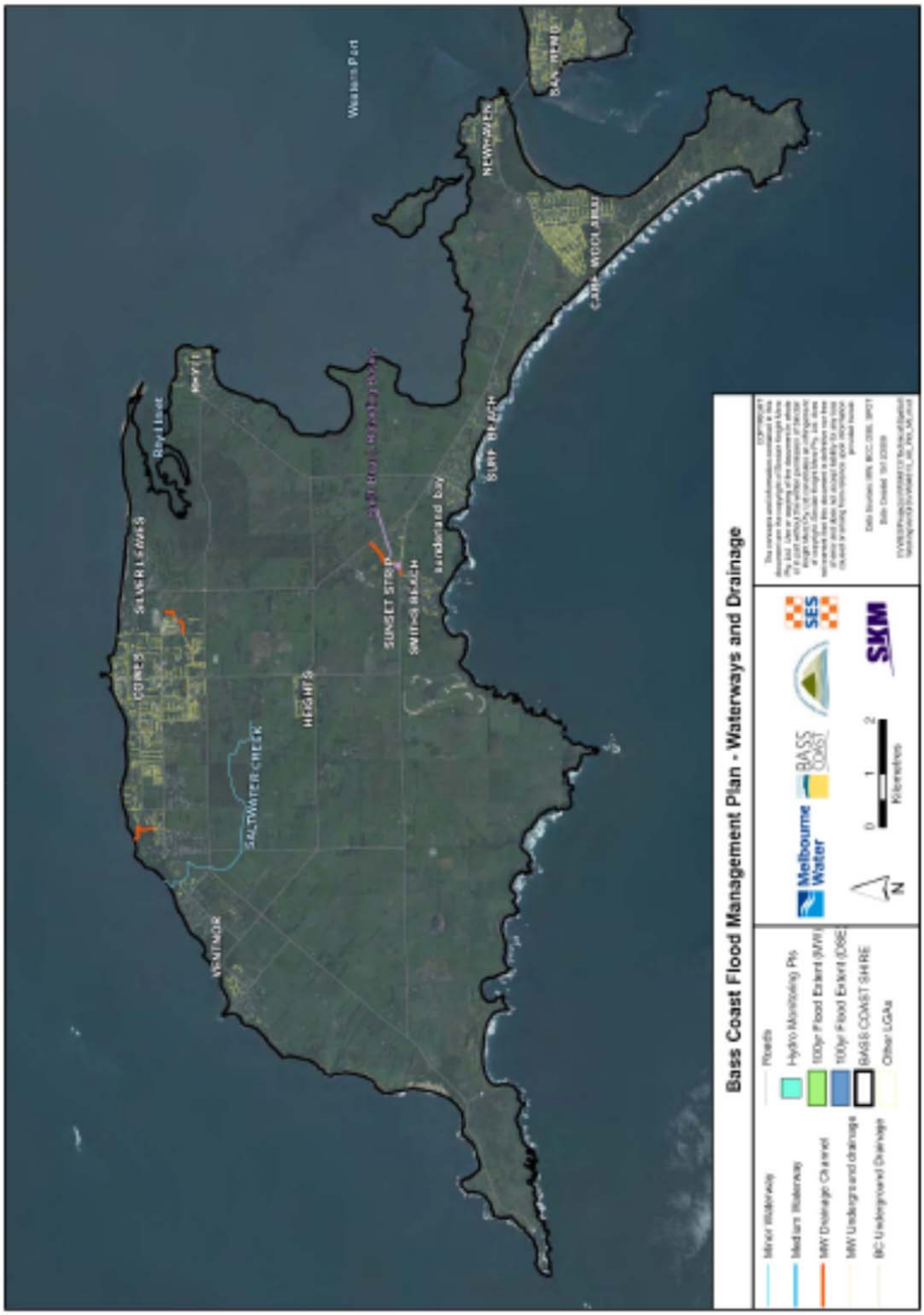
10. REFERENCES

EMR-000-PL-001	Incident Management Plan

FLOOD MANAGEMENT MOUTH OF POWLETT RD
ROAD CLOSURE AND DETOUR SIGNAGE MAP

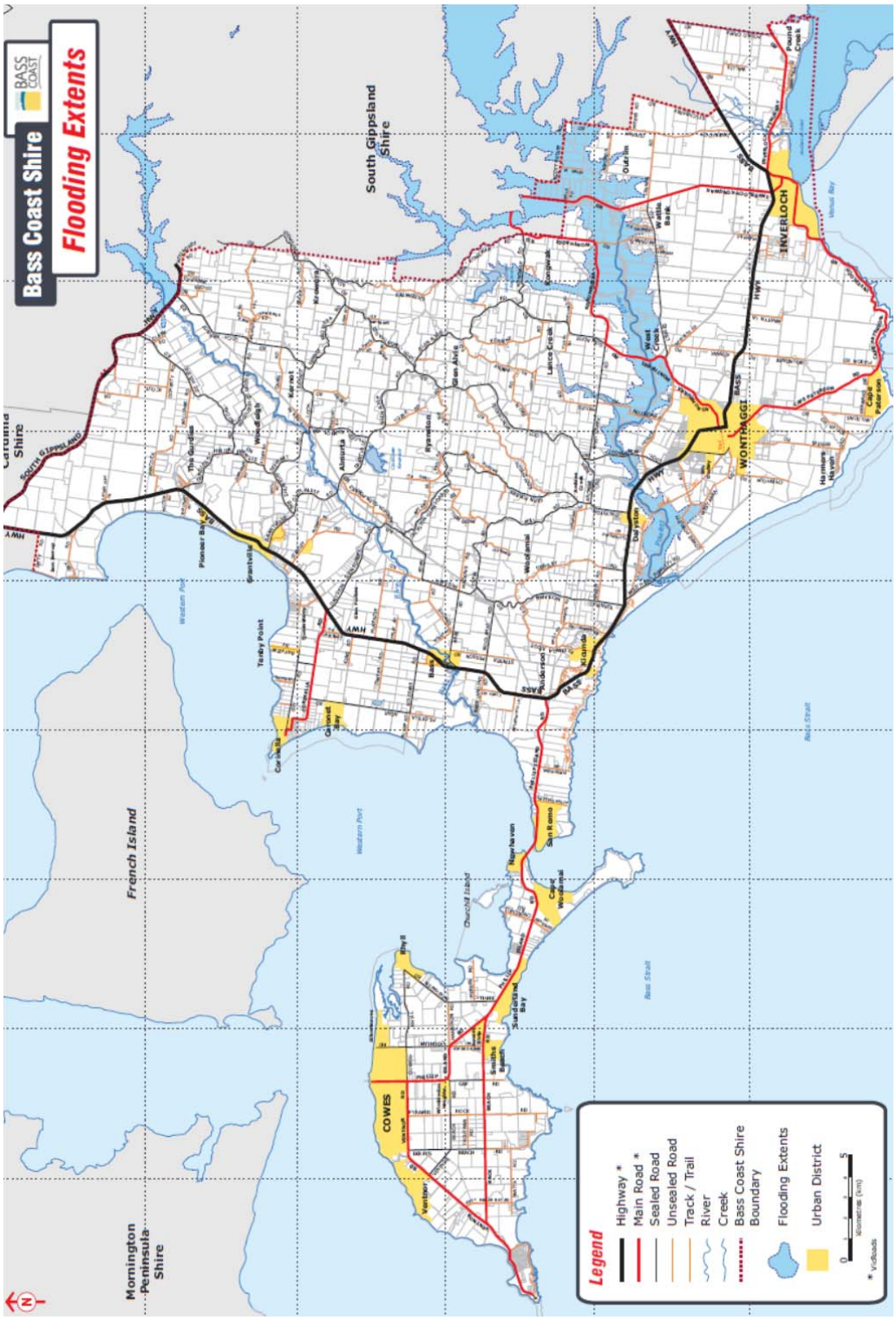


Major Waterways and Drains on Phillip Island

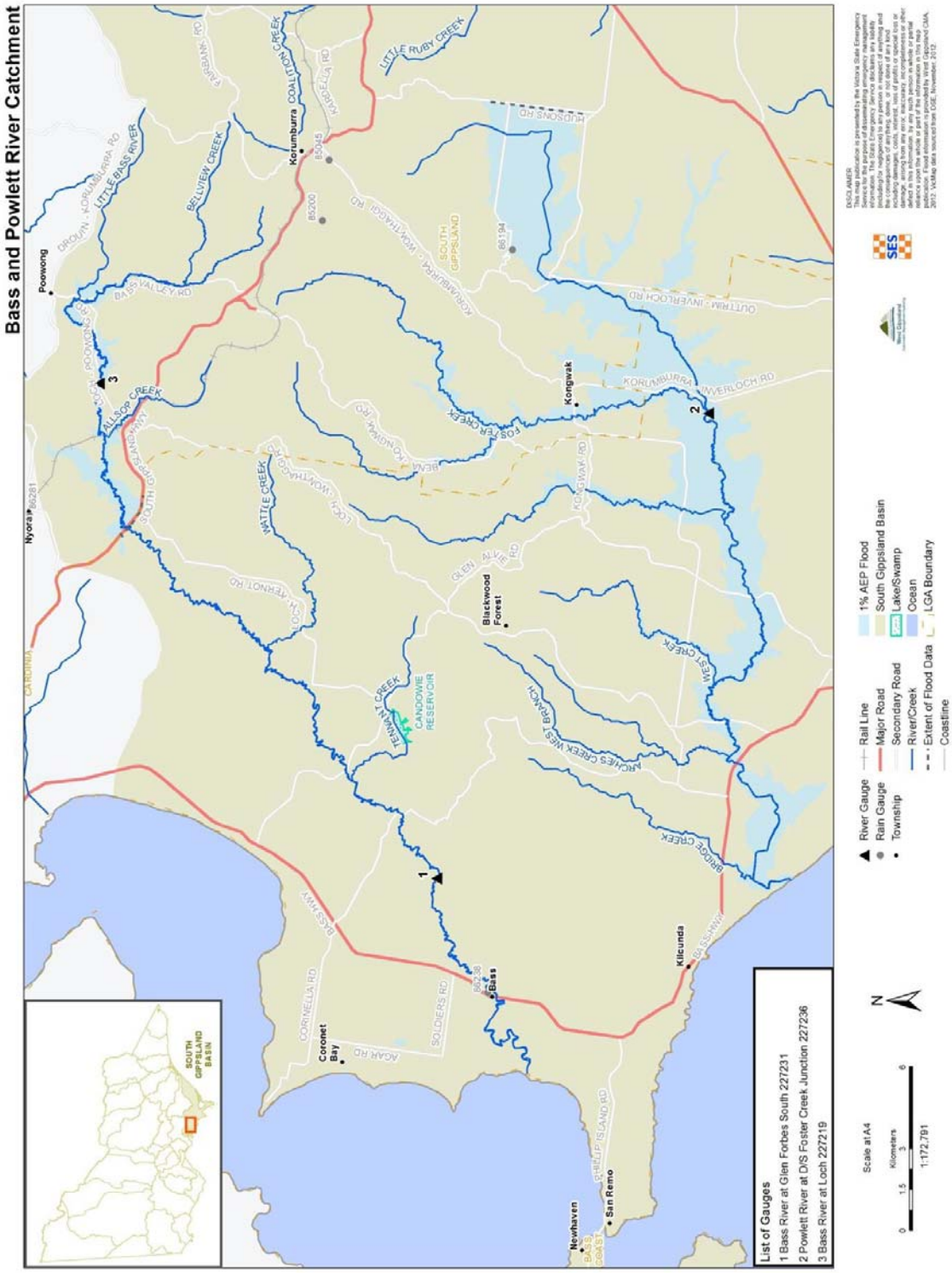


Major Waterways and Drains on Bass Coast Shire Mainland

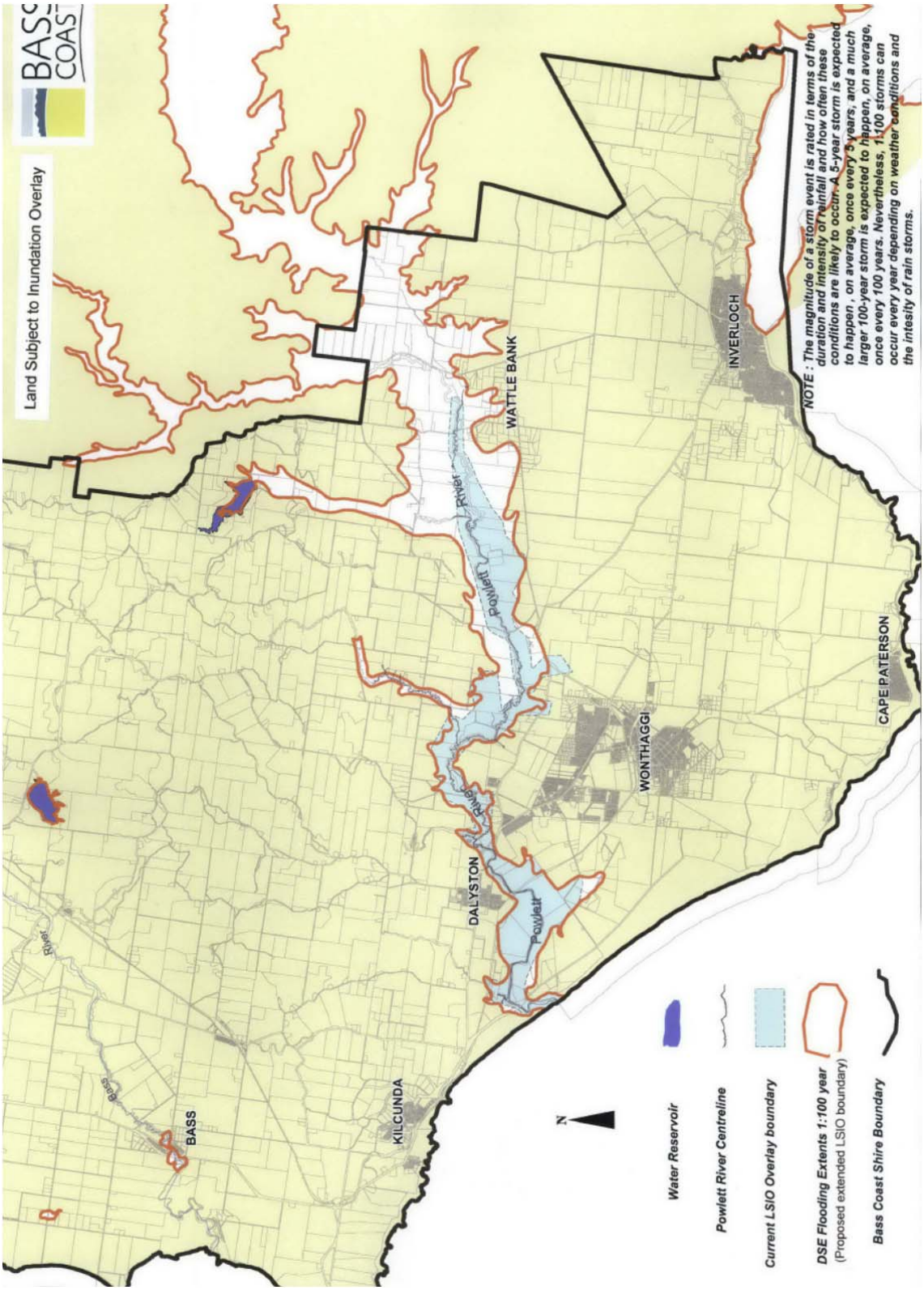
Bass Coast Flood Extent



Bass & Powlett Rivers Flood Extent



Powlett River Flood Extent



APPENDIX J – BASS COAST SHIRE COUNCIL ROADS SUBJECT TO FLOODING TOOL

The following tool is currently under development to assist Council and VicSES to easily identify particular locations of flood prone areas by:

- District
- Town
- Street
- Flood type (flash, storm/coastal surge, riverine)
- Whether water will be over road
- Likelihood of risk to property
- Likelihood of event (low / medium / high)
- Type of Road Closure – whether major or minor
- Road Agency
- Whether fixed signage is available
- Likely duration of the flood event
- Volume of rain that is likely to cause flood at that location