



Frankston City Council Storm and Flood Emergency Plan

A Sub-Plan of the Municipal Emergency
Management Plan

for Frankston City Council
and
VICSES Unit Frankston

Version – Public November 2017



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Distribution List

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10	Assistant MECC Centre Manager	City of Frankston	
11	Municipal Building Surveyor	City of Frankston	
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13	Environmental Health Coordinator	City of Frankston	
14	BIT Manager	City of Frankston	
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17	Director Corporate Development	City of Frankston	
18	Director City Development	City of Frankston	
19	MERC (Carrum Downs Police Station)	Victoria Police	
20	Deputy MERC (Frankston Police Station)	Victoria Police	
21	Assistant MERC (Frankston Police Station)	Victoria Police	
22	RERC	Victoria Police	
23	REMI	Victoria Police	
24	Controller	VICSES – Frankston Unit	
25	ROEM	VICSES Central Region Headquarters	
26	Team Leader Hydrology & Flood Warnings	Melbourne Water	
27	Flood Warning Manager	Bureau of Meteorology (Flood Warning)	
28	Regional Emergency Management Officer	VicRoads	
29	Operations Officer	CFA – Frankston Fire Station	
30	Operations Manager	CFA – District 8 Headquarters	
31	Emergency Management Unit	Ambulance Victoria	
32	District Manager	DELWP District Office	
33	Manager Emergency Management	Department of Health and Human Services	
34	Manager Emergency Services	United Energy UED Network	

35	Manager Compliance and Quality	South East Water	
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Document Transmittal Form / Amendment Certificate

This Municipal Storm and Flood Emergency Plan (MSFEP) will be amended, maintained and distributed as required by VICSES in consultation with the Frankston Council

Suggestions for amendments to this Plan should be forwarded to VICSES Central Region Office Unit 6, 3–5 Gilda Court, Mulgrave VIC 3170.

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

Amendment Number	Date of Amendment	Amendment Entered By	Summary of Amendment
Issue date of Flood Emergency Plan -			
Public	October 2017	VICSES and FCC	Initial Public version of the Storm and Flood Emergency Plan
Public	November 2017	VICSES and FCC	Minor amendments

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
AAR	After Action Review
AV	Ambulance Victoria
BoM	Bureau of Meteorology
CEO	Chief Executive Officer
CEP	Community Education Plan
CERA	Community Emergency Risk Assessment
CFA	Country Fire Authority
CMA	Catchment Management Authority
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DELWP	Department of Environment, Land, Water and Planning
DHHS	Department of Health and Human Services
EA	Emergency Alert
EMLO	Emergency Management Liaison
EMMV	Emergency Management Manual Victoria
EMT	Emergency Management Team
EO	Executive Officer
FWS	Flood Warning System
IC	Incident Controller
ICC	Incident Control Centre
IERC	Incident Emergency Response Coordinator
IMT	Incident Management Team
IMS	Incident Management System
LSIO	Land Subject to Inundation Overlay
MECC	Municipal Emergency Coordination Centre
MEMP	Municipal Emergency Management Plan
MEMPC	Municipal Emergency Management Planning Committee
MERC	Municipal Emergency Response Coordinator
MERO	Municipal Emergency Resource Officer
MFB	Metropolitan Fire and Emergency Services Board
MSFEP	Municipal Storm And Flood Emergency Plan
MFPC	Municipal Flood Planning Committee
MRM	Municipal Recovery Manager
PMF	Probable Maximum Flood
RCC	Regional Control Centre
RERC	Regional Emergency Response Coordinator
RE RCC	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

Part 1. INTRODUCTION

1.1 Municipal Endorsement

This Municipal Storm and Flood Emergency Plan (MSFEP) has been prepared by the Frankston Municipal Emergency Management Planning Committee pursuant to Section 20 of the Emergency Management Act 1986 (as amended).

This MSFEP is a sub plan to the Frankston City Council Municipal Emergency Management Plan (MEMP), is consistent with the Emergency Management Manual Victoria (EMMV), the Victoria Flood Management Strategy, the Regional Flood Emergency Plan and the State Flood Emergency Plan and takes into account the outcomes of the Community Emergency Risk Assessment (CERA) process undertaken by the Municipal Emergency Management Planning Committee (MEMPC).

This MSFEP is a result of the cooperative efforts of the Frankston City Council's Municipal Emergency Management Planning Committee (MEMPC)) and its member agencies.

Minor and administrative amendments will be made to this MSFEP from time to time without representing the Plan to the MEMPC. Any major structural or policy changes will be considered before adoption.

This Plan is endorsed by the Frankston City Council MEMPC as a sub-plan to the MEMP.

Endorsement

.....
Chair MEMPC	Date
.....
Regional Manager Central Region VICSES	Date

1.2 The Municipality

An outline of Frankston City Council in terms of its location, demography and other general matters is provided in the MEMP. An outline of the flood threat is provided in **Appendix A** of this Plan.

1.3 Purpose and Scope of this Storm and Flood Emergency Plan

The purpose of this MSFEP is to detail arrangements agreed for the planning, preparedness/prevention, response and recovery from flood incidents within the Frankston City Council

As such, the scope of the Plan is to:

- Identify the storm and flood risk to Frankston City Council;
- Support the implementation of measures to minimise the causes and impacts of storm and flood incidents within the Frankston City Council;
- Detail Response and Recovery arrangements including preparedness, incident management, command and control;
- Identify linkages with Local, Regional and State emergency and wider planning arrangements with specific emphasis on those relevant to storm and flood.

1.4 Municipal Emergency Management Planning Committee (MEMPC)

Membership of the Frankston City Council's MEMPC is comprised of representatives from various agencies and organisations and is available in the MEMPlan part 2 'MEMPC contact list'.

1.5 Responsibility for Planning, Review & Maintenance of this Plan

This MSFEP must be maintained in order to remain effective.

VICSES through the MEMPC has responsibility for preparing, reviewing, maintaining and distributing this plan.

The MEMPC may delegate to a sub-committee and meet at least once per year.

The plan should be reviewed and where necessary, arrangements and information contained in it should be amended:

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

1.6 Endorsement of the Plan

The MSFEP is endorsed by the MEMPC as a sub-plan of the MEMPlan. The MSFEP will be circulated to MSFPC members seeking acceptance of the plan following any large changes to the plan.

Part 2. PREVENTION / PREPAREDNESS ARRANGEMENTS

2.1 Community Awareness for all Types Storm and Flooding

Details of this MSFEP will be released to the community through local media, VICSES FloodSafe and StormSafe programs and websites (VICSES and the Municipality) upon formal adoption by Frankston City Council MEMPC.

VICSES with the support of Frankston City Council and Melbourne Water will coordinate community education programs for storm and flooding within the council area (i.e. Local Flood Guides and public events).

2.2 Structural Flood Mitigation Measures

Refer to Appendix A and C for detailed structural flood mitigation measures..

2.3 Non-structural Flood Mitigation Measures

2.3.1 Exercising the Plan

Arrangements for exercising this Plan will be at the discretion of the MEMPC. This Plan should be regularly exercised, preferably on an annual basis and reviewed after a significant event.

2.3.2 Storm and Flood Warning

Arrangements for storm and flood warning are contained within the State Storm Emergency Plan and State Flood Emergency Plan (see <https://www.ses.vic.gov.au/em-sector/vicses-emergency-plans>) and the EMMV and on the BoM website (see <http://www.bom.gov.au>)..

2.3.3 Flood Wardens

Flood Wardens provide a means of gathering information in real time on flood behaviour along a stream system, and a network for the distribution of community information and warnings to the community along the stream system.

No Flood wardens are appointed in Frankston City Council; however local knowledge is incorporated into this plan through consultation with local response agencies. Previous event history and likely operational considerations are noted in the Flood Intelligence Cards in **Appendix C**. In line with the VICSES Local Knowledge Policy, reviews of this plan will be undertaken with input from multiple local sources to ensure appropriate local knowledge can be captured before, during and after incidents.

Part 3. RESPONSE ARRANGEMENTS

3.1 Introduction

3.1.1 Activation of Response

Storm and Flood response arrangements may be activated by the VICSES Central Region RDO or IC.

The RDO / IC will activate agencies as required and documented in the VICSES Central Region and State Storm Emergency Plan and the State Flood Emergency Plan (see <https://www.ses.vic.gov.au/em-sector/vicses-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 storm and/or flood within the Frankston City Council. These agencies will be engaged through the EMT.

The general roles and responsibilities of supporting agencies are as agreed within the Frankston City Council MEMP, EMMV (Part 7 'Emergency Management Agency Roles'), VICSES Central Region Flood Emergency Plan and State Flood and Storm Emergency Plans.(see <https://www.ses.vic.gov.au/em-sector/vicses-emergency-plans>).

3.1.3 Municipal Emergency Coordination Centre (MECC)

Where activated, the function, location, establishment and operation of the MECC (or similar coordination centre) will be as detailed in the Frankton City Council MEMP.

Liaison with the MECC will be through the VICSES Central Region RDO / IC or established ICC.

In the event that a MECC is not operating Frankston City Council MERO will be contacted.

3.1.4 Escalation

Most storm and/or flood incidents are of local concern and an appropriate response can usually be coordinated using local resources. However, when these resources are exhausted, the Regional arrangements provide for further resources to be made available, and then on a State-wide basis.

3.2 State Emergency Management Priorities

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

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

Circumstances may arise where the IC 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 Response 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 MSFEP must be consistent with those detailed in the VICSES Central Region Storm and Flood Emergency Plans and State Storm and Flood Emergency Plans. For further information, refer to Part 3 of the EMMV.

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

3.3.1 Control

Sections 5 (1) (a) and 5(c) of *the Victoria State Emergency Service Act 2005* detail the authority for VICSES to plan for and respond to flood.

Part 7 of the EMMV, identifies VICSES as the Control Agency for storm and flood. It identifies DELWP as the Control Agency responsible for dam safety as well as water and waste water service disruption related incidents and other emergencies.

All flood response activities within the Frankston City Council including those arising from a dam failure or retarding basin/levee bank failure incident will therefore be under the control of the appointed IC or his/her delegated representative.

3.3.2 Incident Controller (IC)

An IC will be appointed by the VICSES (as the Control Agency) to command and control available resources in response to a storm and /or flood event on the advice of the Bureau of Meteorology, or other reliable source, that a storm and/or flood event will occur or is occurring. The IC responsibilities are as defined in Part 3 of the EMMV

3.3.3 Incident Control Centre (ICC)

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

Pre-determined Incident Control Centre locations are:

- Dandenong ICC
- Ferntree Gully IC
- Burnley ICC

3.3.4 Divisions and Sectors

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

Divisions and Sectors may be established to assist with the management of storm and flooding within the Municipality.

Predetermined Divisional Command Locations may include:

- Frankston Unit LHQ
- Moorooduc (CFA)

Sector Command locations are allocated on an as needs basis.

3.3.5 Incident Management Team (IMT)

The IC will form an IMT in line with AIIMS principals.

Refer to Part 3 of the EMMV for guidance on IMTs.

3.3.6 Incident Emergency Management Team (IEMT)

The IC will establish a multi-agency IEMT to assist the storm and flood response. The IEMT 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 IC for consideration in developing incident management strategies.

Organisations required within the IEMT (including Frankston City Council) 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 Part 3 of the EMMV for guidance on IEMTs.

3.3.7 On Receipt of a Flood Watch / Severe Weather Warning

The VICSES RDO/IC will undertake actions as defined within the flood intelligence cards (**Appendix C**). General considerations by the VICSES RDO/IC will be as follows:

- Review storm and flood intelligence to assess likely storm and 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, storm/flood rescue and air support;
- Notify and brief appropriate officers. This includes RCC(if established), SCC(if established), Council (as outlined in the Frankston City Council MEMP), other emergency services through the IEMT;
- Assess ICC readiness (including staffing of IMT and IEMT) and open if required;
- Ensure flood bulletins and community information are prepared and issued to the community;
- Monitor watercourses and undertake reconnaissance of low-lying areas;
- Develop media and community information management strategy;
- Ensure storm and flood mitigation works are being checked by owners;
- Develop and issue incident action plan, if required;
- Develop and issue situation report, if required.

3.3.8 On Receipt of the First and Subsequent Storm and/or Flood Warnings

The VICSES RDO, or the IC will undertake actions as defined within the flood intelligence cards (**Appendix C**). General considerations by the VICSES RDO/Incident Controller will be as follows:

- Develop an appreciation of current flood levels and predicted levels. Are floodwaters, rising, peaking or falling?
- Review storm and flood intelligence to assess likely flood consequences. Consider:
 - What areas may be at risk of inundation.
 - What areas may be at risk of isolation.
 - What areas may be at risk of indirect affects as a consequence of power, gas, water, telephone, sewerage, health, transport or emergency service infrastructure interruption.
- What areas may be at risk of building damage.
 - The characteristics of the populations at risk.
- Determine what the at-risk community need to know and do as the storm and/or flood develops.
- Warn the at-risk community including ensuring that an appropriate warning and community information strategy is implemented including details of:
 - The current storm and/or flood situation;
 - Storm and/or flood predictions;
 - What the consequences of predicted levels may be;

-
- Public safety advice;
 - Who to contact for further information;
 - Who to contact for emergency assistance.
 - Liaise with relevant asset owners as appropriate (i.e. water and power utilities).
 - Implement response strategies as required based upon storm/or flood consequence assessment.
 - Continue to monitor the storm /flood situation – www.bom.gov.au/
 - Continue to conduct reconnaissance of low-lying areas.

3.4 Community Information and Warnings

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

Community information and warnings communication methods available include:

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

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

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

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

Other agencies such as CFA, DELWP and VICPOL may also be requested to assist VICSES with the communication of community storm and/or flood warnings.

In cases where severe flash flooding is predicted, dam failure or landslide is likely or flooding necessitating evacuation of communities is predicted, the IC may consider the use of the Emergency Alert System and SEWS.

DHHS will coordinate information regarding public health and safety precautions.

3.5 Media Communication

The IC 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.

Frankston City Council will work with the IC to ensure that consistent and timely messaging occurs.

3.6 Impact assessment

An impact assessment can be conducted in accordance with Part 3 of the EMMV to assess and record the extent and nature of damage caused by storm and/or flooding. This information may then be used to provide the basis for further needs assessment and recovery planning by council and DHHS and applicable recovery agencies.

The control agency is responsible for coordinating the collection, collations and dissemination of IA information on a whole-of government basis during the emergency response. The purpose, function and conduct of IAs are outlined in the State Flood Emergency Plan. All IAs should be conducted in accordance with Part 3 of the EMMV.

3.7 Preliminary Deployments

When storm impacts and/or flooding is expected to be severe enough to cut access to towns, suburbs and/or communities the IC 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. in line with the Frankston City Council MEMP.

3.8 Response to Flash Flooding

Emergency management response to flash flooding should be consistent with the guideline for the emergency management of flash flooding contained within the VICSES Central Region Storm and Flood Emergency Plans and State Storm Emergency Plan and State Flood Emergency Plan.

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

1. Determine if there are barriers to evacuation by considering warning time, safe routes and resources available;
2. Should evacuation be the adopted strategy it must be supported by a public information capability and a rescue contingency plan; Contact MERC who liaises with MERO and MRM about activating ERC (see page 3 of MEMP Part 5);
3. Where its likely people will become trapped by floodwaters, safety advice needs to be provided to people at risk advising them not to attempt to flee by entering floodwater if they

become trapped, and that it may be safer to seek the highest point within the building and to telephone 000 if they require rescue;

4. For buildings known to be structurally unsuitable an earlier evacuation trigger will need to be established (return to step 1 of this cycle).
5. If an earlier evacuation is not possible then specific preparations must be made to rescue occupants trapped in structurally unsuitable buildings either pre-emptively or as those people call for help.
6. Contact MERC and MERO at the earliest opportunity to allow relief preparation to commence.

Due to the rapid development of flash flooding it will often be difficult, to establish emergency relief centres ahead of triggering the evacuation. This is normal practice but this is insufficient justification for not adopting evacuation.

Response arrangements for flash flood events may be contained in **Appendix C**. Refer to the Vic Road Website for road closures (<http://alerts.vicroads.vic.gov.au>).

3.9 Evacuation

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

The decision to recommend or warn people to prepare to evacuate or to evacuate immediately rests with the IC and where possible the EMT.

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

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

VicPol (or delegate to Australian Red Cross) may take on the responsibility of registering people affected by the emergency (through the register find reunite program) including those who have been evacuated.

Refer to Evacuation Guidelines in Part 8 of the EMMV, Part 3 of the EMMV and the Frankston City Council Relief and Recovery section of the MEMPlan for guidance on evacuations for flood emergencies. If evacuation is determined as appropriate, Frankston City Council should be notified.

There are currently no detailed evacuation arrangements for the Frankston City Council. Detail will be populated into **Appendix D** of this plan if determined.

3.10 Flood Rescue

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

In order to activate water rescue services, VICSES as a Control Agency for overall flood response, will identify areas at risk of requiring rescue and notify the Officer in Charge of the Water Police Search and Rescue Squad to request pre-deployment of rescue resources to those areas.

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

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

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

3.11 Aircraft Management

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

Air support operations will be conducted under the control of the Incident Controller in line with State Aircraft Unit Policy 01-Air Operations.

3.12 Essential Infrastructure and Property Protection

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

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

The Frankston City Council maintains a small stock of sandbags, and back-up supplies are available through the VICSES Regional Headquarters. The IC will determine the priorities related the use of sandbags, which will be consistent with the State Emergency Management priorities and VICSES Sandbagging policy.

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

Property may be protected by:

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

Refer to **Appendix C** for further specific details of essential infrastructure requiring protection.

3.13 Disruption to Services

Disruption to services other than essential infrastructure and property can occur in storm and/or flood events. Refer to Appendix D for specific details of likely disruption to services and proposed arrangements to respond to service disruptions in City of Frankston.

3.14 Levees

Levee owners / operators are responsible for the maintenance, operation and monitoring of their levees. Levee owners / operators must keep the IC informed of levee status and be prepared to provide expert advice to the IC about the design and construction of their levees. In accordance with the strategic emergency management priorities, the IC may assist levee owners to coordinate resources, both technical and physical, to provide advice and affect temporary repairs to or augmentation of levees.

3.15 Road Closures

Frankston City Council, VicPol and VicRoads will carry out their formal functions of road closures. This includes observation and placement of warning signs, road blocks to its designated local and regional roads, bridges, walking and bike trails. VicPol may liaise with and advise Frankston City Council and VicRoads of the need to erect warning signs and / or for closure of roads and bridges. VicRoads are responsible for designated main roads and highways and Frankston City Council is responsible for the designated local and regional road network.

VicRoads, VicPol and Frankston City Council will communicate community information regarding road.

3.16 Dam Failure

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

Details of the major dam within the Frankston City Council with potential to cause structural and community damage within the Municipality are contained in **Appendix A**.

3.17 Waste Water related Public Health Issues and Critical Sewerage Assets

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

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

It is the responsibility of the Frankston City Council Environmental Coordinator to inspect and report to the MERO and the ICC on any water quality issues relating to flooding.

General Public Health information and messages are provided by Frankston City Council and DHHS and may contain information that is relevant prior to, during and following an incident. Information may also be provided in sub plans to the MEMP, specific health notifications and, after discussion within the IEMT may be included in Flood Bulletins.

3.18 After Action Review

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

All agencies involved in the storm/and or flood incident should be represented at the After Action Review.

Part 4. EMERGENCY RELIEF AND RECOVERY ARRANGEMENTS

4.1 General

Arrangements for emergency relief and recovery from any emergency, including storm/flood incident within the Frankston City Council are detailed in the MEMP.

4.2 Emergency Relief

The IC determines the need for emergency relief services with advice from the emergency management team (such as IEMT) including the MRM in accordance with Part 4 of the EMMV. IC's 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). These should be carried out in line with the Frankston City Council MEMP.

The range and type of emergency relief services to be provided in response to a storm/flood event will be dependent upon the size, impact, and scale of the storm/flood. Refer to Section 4 of the EMMV for further information.

Suitable relief facilities identified for use during storm/floods are detailed in **Appendix D** and the MEMP.

Details of the relief arrangements are available in the Frankston City Council MEMPlan.

4.3 Animal Welfare

Matters relating to the welfare of livestock are to be referred to DEDJTR.

Matters relating to companion animals will be shared between Council and RSPCA. Council assists in the rehousing of displaced companion animals.

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

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

4.4 Transition from Response to Recovery

VICSES as the Control Agency is responsible for ensuring effective transition from response to recovery.

Transition should be done in consultation with emergency management teams (including IEMT and MRM). Further information about transition is provided in the EMMV Part 4 and the Frankston City Council MEMP.

APPENDIX A - FLOOD THREATS FOR CITY OF FRANKSTON

GENERAL

The Frankston City Council is located in the southern area of Metropolitan Melbourne along Port Phillip Bay. The Frankston City Council has two distinct morphological zones; that of the Baxter sandstones and old marine sediments uplifted at the Selwyn's fault in the southern portion of the municipality and then that of the sunk-lands that evolved to form the Carrum Lowlands that dominate in the northern portion of the Municipality.

The Carrum Lowlands comprise over 4000 hectares of swamp and alluvial flats that drain to Kananook Creek. Kananook Creek is a creek that has had its channel and valley form established through a number of processes over a long period of time. Essentially Kananook Creek as it is today is the result of many thousands of years of formation by forces of flows from the larger Dandenong and Eumemmerring Creek catchments and that of longshore action along the coast of Port Phillip Bay, which formed a series of parallel dunes along the seaward interface of the Carrum Carrum Swamp. The Carrum Carrum Swamp is part of a geological trough (Figure A1) that is bounded on the north side by a monoclinical fold near Beaumaris and on the south side by Selwyn's Fault near Frankston.

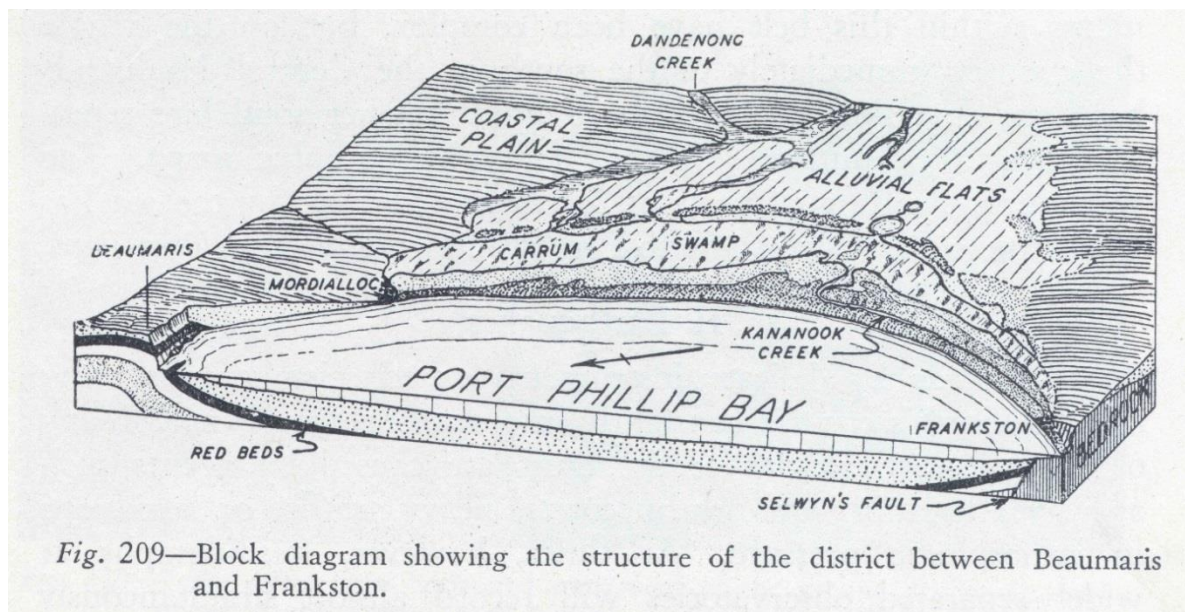


Fig. 209—Block diagram showing the structure of the district between Beaumaris and Frankston.

Figure A1 Diagram of Kananook Creek & Carrum Lowlands Physiography (Sherbourne Hills 1951)

RIVERINE FLOODING

Large severe floods within the Municipality generally occur as a result of a 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.

Large but less severe floods result from sequences of cold fronts during winter and spring that progressively wet up the catchments and fill the on-stream dams and the natural floodplain storage. Prolonged moderate to heavy rain leads to major flooding.

FLASH FLOODING & OVERLAND FLOWS

Short Duration, high intensity rainfall (usually associated with thunderstorms) can also cause localised flooding within the municipality along overland flow paths when the local urban drainage system surcharges. 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 such as associated with thunderstorms giving average rainfall rates of more than 20mm/hour for an hour or more is likely to lead to flash flooding and / or overland flows, across the urbanised parts of the municipality.

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

TIDAL FLOODING & STORM SURGES

Moderate to heavy rainfall, coupled with a high or incoming tide from Port Phillip Bay can exacerbate flooding within the municipality or create areas of flooding in and around the drainage network. Due to the proximity of the Municipality to Port Phillip Bay and its flat terrain, tidal flows from Port Phillip Bay may reduce the capacity of the stormwater drains to discharge runoff back into the bay, while extreme storm events can cause backflow to the point where water surcharges back above ground around the drainage pits and channels. This is most notably seen along Kananook Creek where floodwaters entering from Eel Race Drain, Seaford Wetlands, Skye Rd / Karingal, Lee Street Drain & Sandgate Avenue Drains may backup in Kananook Creek if tide levels from Port Phillip Bay are high.

DESCRIPTION OF MAJOR WATERWAYS & DRAINS

There are three main waterways within the Frankston City Council - Kananook Creek, Boggy Creek and Sweetwater Creek. Their total length is approximately 47.3 km and Map B in **Appendix F** shows their location. Outlined below is a description of the three main waterways.

- Sweetwater Creek is located in the south west corner of the municipality and discharges into Port Phillip Bay. Sweetwater Creek also contains the Frankston Reservoir.
- Boggy Creek starts on the eastern edge of the municipality on the outskirts of Langwarrin and flows to the northwest corner near Patterson Lakes (Kingston municipality). Here it becomes the Eel Race Drain which transfers the water to Kananook Creek which flows parallel to Port Phillip Bay on the western edge of the municipality.
- Kananook Creek discharges into Port Phillip Bay near Frankston CBD. However in flood events, the majority of flow is diverted through Riviera Outlet north of Seaford.

Below contains an asset list of Waterways and Drain managed by Melbourne Water in the City of Frankston

Melbourne Water Drains & Waterways	Suburb/s	Melbourne Water Drains & Waterways	Suburb/s
Ballarto Road Drain	Carrum Downs & Skye	Rodds Drain	Skye
Bardia Avenue Drain	Seaford	Sandgate Avenue Drain	Frankston & Frankston South
Baxter East Drain	Frankston South & Langwarrin South	Seaford Lowlands Drain	Seaford
Baxter West Drain	Frankston South	Seaford Wetlands Drain	Seaford
Boggy Creek	Langwarrin	Skye Road / Karingal	Frankston & Seaford
Eastern Contour Drain	Sandhurst & Skye	Skye Road North Drain	Frankston & Langwarrin
Eel Race Creek	Carrum Downs	Skye South Drain	Skye
Eel Race Creek East Branch	Carrum Downs & Sandhurst	Sweetwater Creek	Frankston South
Eel Race Creek North Branch	Carrum Downs	Sweetwater Creek South Branch	Frankston South
Kananook Creek	Seaford & Frankston	Tamarisk Creek	Langwarrin
Langwarrin Drain	Langwarrin	Tamarisk Creek Diversion	Carrum Downs & Frankston North
Langwarrin South Drain	Langwarrin & Langwarrin South	Upper Carrum Downs Drain	Carrum Downs, Sandhurst & Skye
Lathams Road Drain	Carrum Downs & Seaford	Valley Road Drain	Carrum Downs, Langwarrin & Skye
Lee Street Drain	Frankston	Wadsleys Drain	Carrum Downs
Little Boggy Creek	Carrum Downs & Langwarrin	Wells Road Drain	Seaford
Lower Carrum Downs Drain	Carrum Downs	Wells Road Extension Drain	Seaford
Potts Road West Drain	Langwarrin		

Table A1 – Melbourne Water Drains and Waterways within or bordering the City of Frankston

FLOOD MITIGATION SYSTEMS

Flood mitigation has predominantly been developed in the form of 16 Retarding Basins, 8 Pumping Stations, 9 Levees & 1 set of Tidal Gates. These flood mitigation systems are as follows in the tables below. To view their locations and connecting waterway/drainage systems, see map B in **Appendix F**. Further details on these structures may be found in the **Appendix C** for which they are located.

RETARDING BASINS

Frankston City Council Retarding Basin	Address	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Level	ANCOLD Hazard Rating	Properties in Flow Path (WD DCF Failure)	Melway Reference
STUDIO PARK OVERFLOW RETARDING DEVICE	Poplar Grove Langwarrin				59.80	In Cut		0	103 F3
EDBALE/EVELYN STREET RETARDING BASIN	Ebdale Street Frankston	6500m2		2.70	2.80	3.00		10	99 D12
PAT ROLLO RESERVE RETARDING BASIN	Silver Avenue Frankston North					In Cut		0	100 B6
BEAUTY PARK RETARDING BASIN / LAKE	High Street Frankston					In Cut		0	102 C3
WORLAND PARK RESERVE RETARDING BASIN	Belar Avenue Frankston					In Cut		0	103 B2
WOODSIDE AVENUE RETARDING BASIN	Woodside Avenue Frankston South					In Cut		0	102 J12
LEE STREET (Nursery Reserve) RETARDING BASIN (Natural depression)	Lee Street Frankston					In Cut		0	102 K4
CHRISTOPHER RESERVE RETARDING BASIN (Moorooduc Hwy near Christopher Drive)	Frankston Flinders Road Frankston South					In Cut		0	102 H12

REX STREET SMALL RETARDING BASIN (Natural depression)	Joy Street Frankston					In Cut		0	102 E2
BAXTER PARK (Sages Road) RETARDING BASIN	Frankston Flinders Road Frankston South	1.8 ha		50.85	50.85	51.00		Approx. 20	106 H4
BALLAM PARK RETARDING BASIN (Soccer Training Pitch #2) AND SPORTING GROUNDS	Cranbourne Road Frankston	1.6 ha						Approx. 10	103 A4
MONTAGUE PARK RETARDING BASIN	Bentley Place Frankston	2200m2		35.75		36.00		Approx. 5	102 C5
VICTORIA PARK RETARDING BASIN	Williams Street Frankston	7500m2		22.60		22.80			102 C4
JUBILEE PARK RETARDING BASIN	Hillcrest Road Frankston							Approx. 13	102 J4
PINDARA RETARDING BASINS	Pindara Boulevard Langwarrin					In Cut		0	103 G2
SKYE VALLEY PARK RETARDING BASIN #1 (Santa Clara Mews)	Santa Clara Mews Skye	370m2						Approx. 5	100 K8
SKYE VALLEY PARK RETARDING BASIN #2 (Rhone Court)	Santa Clara Mews Skye					In Cut		0	100 K9
DIAMOND PARADE RETARDING BASIN	Diamond Parade Carrum Downs					In Cut		0	132 A8
FLAME ROBIN RESERVE RETARDING BASIN (Natural Reserve & Wetland)	North Road Langwarrin					In Cut		0	103 D7
BLACK WALLABY DRIVE RETARDING BASIN (Upper & Lower)	Black Wallaby Drive Langwarrin	4100m2				76.95		Approx. 2	103 E7

STEVENS RESERVE RETARDING BASIN	Stevens Road Langwarrin					In Cut		0	136 A1
PARK VALLEY RESERVE RETARDING BASIN (Natural drainage depression)	Park Valley Crescent Langwarrin					In Cut		0	136 A6
RETARDING BASIN Sediment Basin	Hafey Way Langwarrin					In Cut		0	132 E12
RETARDING BASIN Sediment Basin & WETLAND	Hafey Way Langwarrin					In Cut		0	132 D12
PARC RETARDING BASIN	Olive Grove Frankston					In Cut		0	102 E2

Table A2 – Frankston City Council Water Retarding Basins within the City of Frankston

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Level	ANCOLD Hazard Rating	Properties in Flow Path (WD DCF Failure)	Melway Reference
Banyan Reserve	Upper Carrum Downs Drain	7.942 ha	76.3 ML	15.4m AHD	Unknown	16.0m AHD	High C	Unknown	98 G12
Botany Park / O'Grady's Road	Ballarto Road Drain	5.471 ha	58.9 ML	18.22m AHD	18.7m AHD	19.15m AHD	High C	Unknown	100 F5
Claude Street	Skye Road / Karingal	Unknown	Unknown	nil	Unknown	In cut	Very Low	0	99 G8
Garden Brae Court	Baxter East Drain	0.123 ha	0.5 ML	nil	Unknown	Unknown	Very Low	0	107 F4
Karingal Hub	Skye Road / Karingal	0.335 ha	6.0 ML	61.6m AHD	62.0m AHD	62.5m AHD	Very Low	0	103 D4
Langwarrin South	Langwarrin South Drain	4.006 ha	10 ML	nil	61.8m AHD	62.0m AHD	Very Low	0	136 D10
Little Boggy Creek	Little Boggy Creek	6.658 ha	Unknown	50.7m AHD	51.0m AHD	Unknown	High A	Unknown	136 A1
Lee Street	Lee Street Drain	2.346 ha	80.8 ML	49.4m AHD	50.22m AHD	50.5m AHD	Very Low	98	102 K5
Long Island	Skye Road / Karingal	Unknown	33 ML	nil	8.89m AHD	8.89m AHD	Significant	49	99 G11
McCulloch Avenue	Skye Road / Karingal	0.536 ha	4.0 ML	nil	Unknown	2.1m AHD	Very Low	0	99 F8
Mile Grove	Bardia Avenue Drain	1.092 ha	6.0 ML	nil	1.4m AHD	Unknown	Low	4	99 F6
Nursery Avenue	Lee Street Drain	Unknown	Unknown	Unknown	Unknown	Unknown	High C	Unknown	102 H4
Sandgate Avenue	Sandgate Avenue Drain	3.024 ha	8.3 ML	75.62m AHD	75.61m AHD	75.65m AHD	Very Low	13	102 H8
Skye Road	Skye Road / Karingal	2.084 ha	44.0 ML	nil	16.0m AHD	17.5m AHD	Significant	0	99 K12

Wells Road	Bardia Avenue Drain	0.735 ha	6.5 ML	nil	3.2m AHD	In cut	Very Low	0	99 G6
Wingham Park	Skye Road / Karingal	~ 0.8 ha	6 ML	22.0m AHD	21.8m AHD	22.0m AHD	Very Low	171	99 K12

Table A3 – Melbourne Water Retarding Basins within the City of Frankston

Private Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Level	ANCOLD Hazard Rating	Properties in Flow Path (WD DCF Failure)	Melway Reference
MCCLELLAND DRIVE RETENTION BASIN 3	Karingal Hub Shopping Centre					In Cut		0	103 D4
BOGGY CREEK Retention Basin and Dwarf Galaxia Habitat	257 North Road Langwarrin					In Cut		0	103 K8
RETENTION BASIN 170 Union Road	170 Union Road Langwarrin					In Cut			103 K8
WATER STORAGE DAM	70 Valley Road Skye					In Cut			100 K9
RETENTION BASIN 75 Playne Street	75 Playne Street Frankston					In Cut			100A E8
RETENTION BASIN 70 Protea Street	70 Protea Street Carrum Downs					In Cut			
SANDHURST RESIDENTIAL ESTATE	75A Sandhurst Boulevard Sandhurst					In Cut			128 C9
SANDARA RESIDENTIAL ESTATE	345 McCormicks Road Sandhurst					In Cut			98 K10
SANDHURST GOLF CLUB	680 Thompsons Road Sandhurst					In Cut			128 C9

Table A4 – Private Water Retarding Basins within the City of Frankston

PUMPING STATIONS

Melbourne Water Pumping Station	On Drain / Waterway	Location	No. of Pumps	Consequence of Failure	Melway Reference
Bardia Avenue	Bardia Avenue Drain	Within Creek reserve at west end of Bardia Avenue	1	High Levels of Black Aerobic Bacteria likely to occur in Bardia Ave Drain within 2 to 3 days	99 E6
Bunna Avenue	Skye Road / Karingal	Corner of Lyster and Buna Avenue, south side. Next to primary school grounds.	1	Local flooding of up to 100 properties	99 F9
James Street	Seaford Lowlands	End of James Street and adjacent to bicycle path abutting Seaford Wetland.	1	Local flooding of up to 50 properties	99 F2
Kananook Creek	Eel Race Drain	Palm Beach Drive. North side levee of Eel Race drain opposite no 93-95.	2	Rapid deterioration (within hours) of water quality along Kananook Creek and into Patterson Lakes when temperatures are greater than 30 degrees	97 G9
McCulloch Avenue	Skye Road / Karingal	North side of MucCulloch Avenue next to Kananook Reserve entrance	1	Local flooding of up to 100 properties	99 F8
Parc Pump	Upper Carrum Downs Drain	Eastern Treatment Plant	1	Loss of environmental flow to Wetland	98 E8
Wadsleys Drain	Wadsleys Drain	East side of freeway on drain just up-stream of junction with Eel Race drain. Access from the freeway.	1	Loss of environmental flow to the Seaford Wetlands	97 J9
Weatherston Road	Kananook Creek	Between Kananook Creek and Seaford Oval. Access from Seaford Road via track next to east side of Kananook Creek Bridge	1	Water in Weatherston Road Drain becomes Black Aerobic within 2 to 3 days	99 E5

Table A5 – Melbourne Water Pumping Stations within the City of Frankston

LEVEES

Levee	Reach	Side	Levee Height	Levee Length	Expected Level of Protection	ANCOLD Hazard Rating	Consequences of Failure	Melway Reference
Boggy Creek	Eel Race Drain to Eastlink	East	2.0m	700m		Very Low	Flooding of Boggy Creek Wetland. 0 properties expected to be affected.	98A10-A12
Boggy Creek	Eel Race Drain to Eastlink	West	2.0m	700m		Very Low	Flooding of Boggy Creek Wetland. 0 properties expected to be affected.	98A10-A12
Eel Race Creek	Boggy Creek to Wadsley Drain	North	2.0m	530m		Very Low	None significant	97K10-98A10
Eel Race Creek	Boggy Creek to Peninsula Fwy	South	2.0m	540m		Very Low	None significant	97K10-98A10
Eel Race Drain	Mornington Peninsula Fwy to Footbridge	South	1.0m	1.3km	100yr ARI Event with in excess of 800mm freeboard	Low	Flooding of ~2500 residential properties, Patterson River Secondary College, Seaford North Primary School and Seaford Wetland	97F10-97J10
Kananook Creek Retaining Wall	Beach Street to Mouth	East	1.52m	310m			Restrictions out flow from Kananook Creek to Port Philip	102C1-102C2
Kananook Creek Retaining Wall	Wells Street to Mouth	West	1.52m	310m			Restrictions out flow from Kananook Creek to Port Philip	102C1-102C2
Peninsula Link Bund Wall	Peninsula Link to Tamarisk Creek	East		60m				100 D6
Wadsley Drain	Eel Race Creek to Wadsley Rd	East	1.26m	900m	100yr ARI Event (freeboard unknown)	Low	None significant	97K7-97K10
Wadsley Drain	Eel Race Creek to Wadsley Rd	West	1.26m	900m	100yr ARI Event (freeboard unknown)	Very Low	Mornington Freeway likely closed in case of flooding	97K7-97K10

Table A6 – Levees within the City of Frankston

TIDAL GATES

On Drain / Waterway	Location	Regulate Gates at Level against Gauge	Melway Reference
Kananook Creek	Riviera Outlet Gates, Riviera Street directly behind the Riviera Hotel. Access via Riviera Street	1.1m at the Seaford Gauge. Gates opened / closed based upon flood risk to lower Frankston area and tide levels.	97 D11

Table A7 – Tidal Gates within the City of Frankston

SEWERAGE INFRASTRUCTURE

Sewerage Infrastructure of note during a severe flood event located within the City of Frankston is contained within the following table. To view their locations, view mapping in **Appendix F**.

SEWER PUMPING STATIONS

Melbourne Water Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Supernatant Pump Station No.4	Eel Race Creek	North	Melbourne Water Eastern Treatment Plant, Thompsons Road, Carrum Downs	98 F7
Supernatant Pump Station No.4A	Eel Race Creek	North	Melbourne Water Eastern Treatment Plant, Thompsons Road, Carrum Downs	98 F7

Table A8 – Sewer Pumping Stations within or close to the City of Frankston

FLOOD WARNING SYSTEM

Within the City of Frankston, Melbourne Water has three hydrographic monitoring sites along the four major waterways in the Municipality. These 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_two.pl?IDV60201.html. To view their locations, see mapping **Appendix F**.

Melbourne Water Hydrographic Monitoring Station	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Eel Race Drain at Riviera St Culverts, Seaford North	228371A	Pedestrian Crossing along Riviera Street, Seaford	✓	✓	97 D11
Kananook Creek at Seaford Rd, Seaford	228372A	East bank on the North side of Seaford Road bridge	✓		99 E5
Skye Road Retarding Basin at Frankston North	228378A	North side of Skye Road opposite Bokissa Drive, Frankston	✓	✓	99 K12

Table A9 – Hydrographic Monitoring Stations within the City of Frankston

Other gauges located in adjoining Municipalities that may assist in flood warning for Port Phillip Bay are outlined below.

Melbourne Water Hydrographic Monitoring Station	Station No.	Location	Tide Level	Rain Gauge	Melway Reference
Patterson River at Patterson Lakes	228383A	Whalers Cove Floodgate, at end of boat ramp & parking area, Patterson Lakes	✓		97 F6
Mornington Tide Recorder	228397A	Mornington Yacht Club, Schnapper Point Drive, Mornington	✓		104 D9

Table A10 – Hydrographic Monitoring Stations within adjacent Municipalities to the City of Frankston

The Bureau does not issue formal flood warnings for Little Boggy Creek, Eel Race Creek or Skye / Karingal Drain due to their rapid response to rainfall. This is due to either to the urban surrounds which quickly direct stormwater into drains and waterways or the small catchment size. These result in rapid stream rises during thunderstorms and heavy rainfall creating a short lead time for response.

There is currently one Melbourne Water flood warning gauge on Kananook Creek that could be used to assist with public safety through the issue of flood warnings. This is at Seaford North and its flood class levels established are outlined in the table below.

Hydrographic Monitoring Station	Creek Flood Class Level		
	Minor - Moderate	Major	
Eel Race Drain at Riviera St Culverts, Seaford North	1.1m – 1.5m	1.1m – 1.5m	1.5m

Table 11 – Hydrographic Monitoring Stations with established Flood Class Levels for the City of Frankston

At this site on Kananook Creek, the Bureau of Meteorology (the Bureau) in consultation with Melbourne Water will issue flood warnings if levels reach those classified above. This warning will be placed on the Bureau's website (<http://www.bom.gov.au/vic/warnings/index.shtml>). While the City of Frankston monitors these warnings in times of high rainfall, there are no specific guidelines to advise how these situations should be responded to.

HISTORIC FLOODS

Significant floods (with high flood gauge levels and likely flooding consequences to property and infrastructure) to have occurred within the City of Frankston are as follows in the table below.

Event	Kananook Creek Seaford North (228371A)		Kananook Creek at Seaford (228372A)	Skye Road Retarding Basin at Frankston North (228378A)	
	Rainfall at Gauge	Stream / Tide Level	Stream / Tide Level	Rainfall at Gauge	Stream Level
Normal Water Level		0.7m	0.4m – 0.6m		0.20m
Minor Flood Class		1.1m – 1.5m	-		-
Moderate Flood Class		1.1m – 1.5m	-		-
Major Flood Class		1.5m	-		-
16 th October 1983	-	-	0.79m	75mm / 24hrs	3.26m
20 th February 1984	-	-	0.95m	29mm / 4hrs	2.50m
18 th September 1984	-	-	0.87m	54mm / 52hrs	2.38m
10 th December 1988	-	-	0.96m	20mm / 2hrs	4.10m
28 th April 1989	-	-	0.78m	38mm / 4hrs	2.93m
18 th July 1990	-	-	0.80m	33mm / 7hrs	2.77m
28 th January 1995	-	0.64m	0.75m	15mm / 5hrs then 14mm / 1hr	2.43m
4 th September 1995	-	1.15m	0.66m	-	0.45m
23 rd June 1996	25mm / 12hrs	1.11m	-	25mm / 14hrs	1.49m
22 nd April 2001	59mm / 15hrs	1.34m	-	57mm / 16hrs	2.05m
13 th November 2004	28mm / 7hrs	-	1.09m	33mm / 7hrs	2.16m
3 rd February 2005	104mm / 28hrs	1.17m	1.11m	102mm / 28hrs	2.69m
7 th May 2006	11mm / 2hrs	0.86m	0.79m	30mm / 3hrs	2.26m
28 th February 2007	17mm / 4hrs	0.84m	0.81m	31mm / 4hrs	2.53m
10 th July 2008	-	-	1.12m	6mm / 4hrs	0.35m
13 th December 2008	55mm / 20hrs	1.09m	0.88m	63mm / 19hrs	2.77m
27 th September 2009	12mm / 9hrs	1.12m	0.92m	5mm / 4hrs	1.93m
20 April 2010	20-30mm / 48hrs				1.86m
31 st October 2010	57mm / 26hrs	1.25m	1.08m	55mm / 28hrs	2.71m
5 th February 2011	80mm / 15hrs	0.90m	1.04m	55mm / 15hrs	3.42m
5 th July 2011	0mm	1.11m	0.97m	0mm	0.28m
9 th November 2011	37mm / 8hrs	0.90m	1.00m	50mm / 7hrs	3.22m
26 th November 2011	59mm / 13hrs	1.00m	0.94m	25mm / 9hrs	2.45m
24 th April 2012	57mm / 21hrs	1.00m	0.94m	49mm / 21hrs	2.34m
22 nd June 2012	58mm / 22hrs	0.91m	0.91m	49mm / 21hrs	2.86m
26 th February 2013	21mm / 3hrs	0.81m	0.88m	28mm / 3hrs	2.50m
13 th June 2013	10mm / 3hrs	0.80m	0.88m	27mm / 6hrs	2.70m
24 th June 2014	7mm / 2hrs	1.13m	0.95m	6mm / 2hrs	1.28m
12 th July 2016	6mm / 16hrs	1.09m	1.10m	4mm / 15hrs	0.81m
29 th December 2016	42mm / 4hrs	0.90m	1.01m	35mm / 4hrs	2.62m
5 th February 2017	39mm / 5hrs	0.83m	0.88m	38mm / 5hrs	2.50m

Table A12 – Selection of Historical Flood Events along the Kananook Creek and Skye / Karingal Waterways

DAM FAILURE

Flooding resulting from failure of the following dams is likely to cause significant structural and community damage within the City of Frankston. See Dam Failure in Section 3 of this plan for more information. 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 a storage breach or failure.

Melbourne Water Dam	Location	Owner	Dam Capacity	Full Supply Level	Melway Reference
Frankston Reservoir	Frankston South	Parks Victoria	680 ML	77.25m AHD	102 E10

Table A13 – Melbourne Water Reservoirs that pose a risk to the City of Frankston from Dam Failure

Service Reservoirs located within the Municipality are listed below.

Melbourne Water Service Reservoir	Location	Owner	Material	Reservoir Capacity	Melway Reference
Frankston Chlorine Detention Reservoir	Frankston Reservoir, Sweetwater Creek	Melbourne Water	Steel	2.0 ML	102 E9
Frankston Steel Tank	Frankston Reservoir, Sweetwater Creek	Melbourne Water	Steel	53 ML	102 E10

Table A14– Melbourne Water Service Reservoirs in the City of Frankston

Frankston City Council Water Dam	Location	Owner	Dam Capacity	Full Supply Level	Melway Reference
Baxter Park Dam	Frankston South	Frankston City Council	22 ML	67.5m AHD	106 4G

Table A15 – Frankston City Council Dam in the City of Frankston

There may be private dams within the municipality, particularly within rural areas, which have not yet been identified for inclusion within this Plan.

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 (e.g. 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, because of the urban environment found downstream causing floodwaters to enter the waterway quicker than those in a more rural setting upstream, because of tidal influences, or lastly because of the existence of retarding basins upstream.

1. Typical Travel Times

Location From (gauge)	Location To (gauge)	Typical Travel Time	Comments
KANANOOK CREEK			
Seaford North	Seaford	Between (-2) to 1 hour	Minor – Moderate Flood at Seaford North
		Unknown	Major Flood at Seaford North

Table B1 – Typical Flood Travel Times between gauges on Kananook Creek

2. Historical Travel Times

Flood Event	Location From (gauge)	Location To (gauge)	Flood Peak Travel Time	Flood Class at
KANANOOK CREEK				Seaford North
4 th September 1995	Seaford North	Seaford	1 hour	Minor-Moderate
3 rd February 2005	Seaford North	Seaford	Seaford peaked 2 hours before Seaford North	Minor-Moderate
27 th September 2009	Seaford North	Seaford	Seaford peaked 1 hour before Seaford North	Minor-Moderate
31 st October 2010	Seaford North	Seaford	Seaford peaked 1 hour before Seaford North	Minor-Moderate
5 th July 2011	Seaford North	Seaford	1 hour	Minor-Moderate
24 th June 2014	Seaford North	Seaford	Less than 1 hour	Minor-Moderate

Table B2 – Historical Flood Travel Times between gauges on Kananook Creek

APPENDIX C1 – SEAFORD & FRANKSTON FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Seaford and parts of Frankston are located on the site of the old Carrum Flats; an area of reclaimed marsh and wetlands. Because of this, the terrain is flat and the area sees slow moving flood waters which spread out across streets and properties.

The Eel Race drain delivers stormwater from Langwarrin, Carrum Downs and Bangholme along the City of Frankston's northern border, to the Seaford Wetlands and Kananook Creek in Seaford. A diversion drain is located on Kananook Creek to discharge a proportion of the flow directly into Port Phillip Bay. Remaining flow will be deposited into the Bay further south in Frankston.

The predominant risk of flooding in the area comes from overland flow from the Seaford Lowlands, Skye / Karingal, Lee Street and Sandgate Drains which all join Kananook Creek and various points. Approximately 3729 properties are at risk of flooding during a 1% AEP event, with 1583 of these at risk of over-floor flooding.

Other risks in the area include the Electrical Sub-station on Wright Street, Seaford which may be flooded during a 2% AEP event; Cranbourne Road, Frankston east of Moorooduc Highway which may need to be closed during a 5% AEP event; and the site of the Frankston VicSES Unit and City of Frankston Municipal Depot on McCulloch Street and Buna Avenue respectively may experience flooding during a 2% AEP event.

WARNING TIMES

Warnings are available for flooding expected along Kananook Creek at Seaford North. All other flood response actions must therefore be driven by rainfall and / or river level observations. Telemetered water level / flood gauges are located at Seaford & Frankston North within the Kananook Creek catchment. See Appendix B for typical flood travel times for Kananook Creek.

Melbourne Water Hydrographic Monitoring Station	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Eel Race Drain at Riviera St Culverts, Seaford North	228371A	Pedestrian Crossing along Riviera Street, Seaford	✓	✓	97 D11
Kananook Creek at Seaford Rd, Seaford	228372A	East bank on the North side of Seaford Road bridge	✓		99 E5
Skye Road Retarding Basin at Frankston North	228378A	North side of Skye Road opposite Bokissa Drive, Frankston	✓	✓	99 K12

Table C1.1 – Hydrographic Monitoring Stations within the Eel Race Drain, Kananook Creek & Skye/Karingal catchments.

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.

PROPERTIES AT FLOOD RISK

Specific properties data has been omitted from the public version of this plan.

Properties (Residences, Businesses & Public Use) at risk from Flooding Over-Floor

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
5% AEP	2% AEP	1% AEP				
Totals						
271	454	1583				

Table C1.2 – Properties at risk of flooding around Frankston, Frankston North & Seaford

ISOLATION

No major isolation risks exist for areas around Seaford & Frankston during a 1% AEP (100yr ARI) event. Some localised short-duration isolation may occur due to flash flooding.

ESSENTIAL INFRASTRUCTURE

- Frankston SES LHQ on McCulloch Street, Seaford likely flooded during a 2% AEP event
- Parts of the City of Frankston Municipal Depot on Buna Avenue, Seaford likely flooded during a 2% AEP event
- Electrical Substation on Wright Street, Seaford likely flooded during a 2% AEP event
- The Frankston and Stony Point Railway Line may have low level flooding crossing the tracks at various locations during a 1% AEP flood. Unknown whether this will force the closure of the line.

Apart from the roads outlined below, all other essential infrastructure and services areas around Seaford & Frankston 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 around Seaford & Frankston. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

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

- o Cranbourne Road, Frankston east of Moorooduc Highway Intersection

Table C1.3 – VicRoads Possible Road Closures during a flooding event

Frankston City Council Roads flooded in a 1% AEP (100yr ARI) event

FRANKSTON	o Jacana Avenue	o Willow Road	o Hunt Drive
o Ashleigh Drive	o James Street	o Winifred Street	o Ilma Court
o Baillie Court	o Kananook Creek Blvd Sth	o Woorilla Court	o Johnstone Street
o Balwyn Street	o Kareela Road	o Young Street	o Jubilee Avenue
o Banyan Drive	o Karingal Drive	FRANKSTON NORTH	o Kananook Avenue
o Barclay Avenue	o Kashmir Crescent	o Alde Court	o Kirkwood Avenue
o Beach Street	o Keys Street	o Bursaria Crescent	o Levuka Street
o Belar Avenue	o Kookaburra Street	o Pecan Court	o Lyster Close
o Bragge Street	o Lee Street	SEAFORD	o Manning Road
o Bush Court	o Lewis Street	o Admans Avenue	o Martha Street
o Cambridge Street	o Lipton Drive	o Arden Court	o Martin Street
o Camoustie Court	o Long Island Drive	o Austin Road	o McCulloch Avenue
o Catherine Parade	o Macrosty Court	o Bardia Avenue	o Michael Court
o Coogee Avenue	o McMahons Road	o Bayside Grove	o Miles Grove
o Dandenong Road East	o Meerlu Avenue	o Boonong Avenue	o Milne Avenue
o Deane Street	o Mereweather Avenue	o Bruce Street	o Molesworth Street
o Dirleton Close	o Mincha Street	o Carder Avenue	o Moresby Avenue
o Douglas Grove	o Murawa Street	o Carrington Court	o Patrick Court
o Eastbourne Court	o New Street	o Chapman Avenue	o Pimpala Avenue
o Ellesmere Court	o Nursery Avenue	o Claude Street	o Prince Crescent
o Ellis Street	o Overton Road	o Duncan Avenue	o Quinn Street
o Emora Court	o Paetrie Street	o Easton Avenue	o Raymond Road
o Erica Street	o Partidge Crescent	o Elisdon Drive	o Riviera Street
o Erskine Street	o Quandong Court	o Elliott Street	o Robinsons Road
o Finch Street	o Raphael Crescent	o Erwin Drive	o Rosslyn Avenue
o Frallon Crescent	o Reid Street	o Fern Court	o Rosslyn Court
o Franciscan Avenue	o Rosella Street	o Fortescue Avenue	o Scott Street
o Frank Street	o Rushcliffe Court	o Galway Street	o Sussex Crescent
o Glenelg Avenue	o Sandpiper Place Frankston	o Govan Street	o Valerie Court
o Grimwade Crescent	o Savannah Court	o Gray Street	o Wicklow Street
o Heatherhill Road	o Sheridan Avenue	o Greaves Court	o Wise Avenue
o Highgate Court	o Skye Road	o Henry Crescent	o Wisewould Avenue
o Hillcrest Road	o Thompson Street	o Heversham Drive	o Wright Street
o Iranda Street	o Tooyal Street	o Hummerstone Road	o Young Street

Table C1.4 – Frankston City Council Possible Road Closures during a 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	Properties in Flow Path (WD DCF Failure)	Melway Reference
Claude Street	Skye Road / Karingal	Unknown	Unknown	nil	Unknown	In cut	Very Low	0	99 G8
Karingal Hub	Skye Road / Karingal	0.335 ha	6.0 ML	61.6m AHD	62.0m AHD	62.5m AHD	Very Low	0	103 D4
Lee Street	Lee Street Drain	2.346 ha	80.8 ML	49.4m AHD	50.22m AHD	50.5m AHD	Very Low	98	102 K5
Long Island	Skye Road / Karingal	Unknown	Unknown	nil	8.7m AHD	8.89m AHD	Significant	49	99 G10
McCulloch Avenue	Skye Road / Karingal	0.536 ha	4.0 ML	nil	Unknown	2.1m AHD	Very Low	0	99 F8
Mile Grove	Bardia Avenue Drain	1.092 ha	6.0 ML	nil	1.4m AHD	Unknown	Low	4	99 F6
Nursery Avenue	Lee Street Drain	Unknown	Unknown	Unknown	Unknown	Unknown	High C	Unknown	102 H4
Sandgate Avenue	Sandgate Avenue Drain	3.024 ha	8.3 ML	75.62m AHD	75.61m AHD	75.65m AHD	Very Low	13	102 H8
Skye Road	Skye Road / Karingal	2.084 ha	44.0 ML	nil	16.0m AHD	17.5m AHD	Significant	0	99 K12
Wells Road	Bardia Avenue Drain	0.735 ha	6.5 ML	nil	3.2m AHD	In cut	Very Low	0	99 G6
Wingham Park	Skye Road / Karingal	~ 0.8 ha	6 ML	22.0m AHD	21.8m AHD	22.0m AHD	Very Low	171	99 K12

Table C1.5 – Melbourne Water Retarding Basins around Frankston, Frankston North & Seaford

Lee Street RB Design Flood Discharges

AEP % (1 in X ARI)	Elevation (mAHD)
20% (5 year)	48.62
10% (10 year)	49.27
5% (20 year)	49.82
FSL 3.2% (31 year)	50.22
DCF 2.4% (42 year)	50.50
2% (50 year)	50.66

(GHD Report for Melbourne Water – Risk Assessment of Lee Street RB, July 2016)

Long Island RB Design Flood Discharges

AEP % (1 in X ARI)	Elevation (mAHD)	Critical Duration Storm for Peak Outflow (hours)
20% (5 year)	8.07	9
5% (20 year)	8.66	9
DCF & FSL 2.3% (44 year)	8.89	unknown
2% (50 year)	8.93	4
1% (100 year)	9.02	3
0.2% (500 year)	9.06	3
0.01% (10,000 year)	9.13	3
PMPDF 0.001% (100,000 year)	9.22	2

(GHD Report for Melbourne Water – Risk Assessment of Long Island RB, July 2016)

Skye Road RB Design Flood Discharges

AEP % (1 in X ARI)	Elevation (mAHD)	Critical Duration Storm for Peak Outflow (hours)
20% (5 year)	15.60	9
10% (10 year)	16.03	9
5% (20 year)	16.46	9
2% (50 year)	17.06	4
DCF 1.05% (95 year)	17.50	3
1% (100 year)	17.54	3
0.5% (200 year)	17.55	3
0.2% (500 year)	17.56	2
0.1% (1,000 year)	17.57	2
PMPDF 0.01% (10,000 year)	17.76	unknown

(GHD Report for Melbourne Water – Risk Assessment of Skye Rd RB, July 2016)

Sandgate Avenue RB Design Flood Discharges

AEP % (1 in X ARI)	Elevation (mAHD)	Critical Duration Storm for Peak Outflow (hours)
20% (5 year)	75.15	unknown
Piping – Partially Full 10% (10 year)	75.50	9
DCF 6.25% (16 year)	75.65	9
5% (20 year)	75.73	9
Overtopping - 2% (50 year)	75.86	2

(GHD Report for Melbourne Water – Risk Assessment of Sandgate Avenue RB, July 2016)

PUMPING STATIONS

Melbourne Water Pumping Station	On Drain / Waterway	Location	No. of Pumps	Consequence of Failure	Melway Reference
Bardia Avenue	Bardia Avenue Drain	Within Creek reserve at west end of Bardia Avenue	1	Water in Bardia Ave Drain becomes Black Aerobic within 2 to 3 days	99 E6
Bunna Avenue	Skye Road / Karingal	Corner of Lyster and Buna Avenue, south side. Next to primary school grounds.	1	Local flooding of up to 100 properties	99 F9
James Street	Seaford Lowlands	End of James Street and adjacent to bicycle path abutting Seaford Wetland.	1	Local flooding of up to 50 properties	99 F2
Kananook Creek	Eel Race Drain	Palm Beach Drive. North side levee of Eel Race drain opposite no 93-95.	2	Rapid deterioration (within hours) of water quality along Kananook Creek and into Patterson Lakes when temperatures are greater than 30 degrees	97 G9
McCulloch Avenue	Skye Road / Karingal	North side of MucCulloch Avenue next to Kananook Reserve entrance	1	Local flooding of up to 100 properties	99 F8
Wadsleys Drain	Wadsleys Drain	East side of freeway on drain just up-stream of junction with Eel Race drain. Access from the freeway.	1	Loss of environmental flow to the Seaford Wetlands	97 J9
Weatherston Road	Kananook Creek	Between Kananook Creek and Seaford Oval. Access from Seaford Road via track next to east side of Kananook Creek Bridge	1	Water in Weatherston Road Drain becomes Black Aerobic within 2 to 3 days	99 E5

Table C1.6 – Melbourne Water Pumping Stations around Frankston, Frankston North & Seaford

LEVEES

Levee	Reach	Side	Levee Height	Levee Length	Expected Level of Protection	ANCOLD Hazard Rating	Consequences of Failure	Melway Reference
Eel Race Creek	Boggy Creek to Wadsley Drain	North	2.0m	500m	Unknown	Very Low	None significant	97K10-98A10
Eel Race Creek	Boggy Creek to Peninsula Fwy	South	2.0m	500m	Unknown	Very Low	None significant	97K10-98A10
Eel Race Drain	Mornington Peninsula Fwy to Footbridge	South	1.0m	1.3km	100yr ARI Event with in excess of 800mm freeboard	Low	Flooding of ~2500 residential properties, Patterson River Secondary College, Seaford North Primary School and Seaford Wetland	97F10-97J10
Kananook Creek Retaining Wall	Beach Street to Wells Street	East	1.52m	310m	Unknown	Unknown	Unknown	102C1-102C2
Wadsley Drain	Eel Race Creek to Wadsley Rd	East	1.26m	900m	100yr ARI Event (freeboard unknown)	Low	None significant	97K7-97K10
Wadsley Drain	Eel Race Creek to Wadsley Rd	West	1.26m	900m	100yr ARI Event (freeboard unknown)	Very Low	Mornington Freeway likely closed in case of flooding	97K7-97K10

Table C1.7 – Melbourne Water Levees along the Eel Race Drain & Kananook Creek catchments

TIDAL GATES

On Drain / Waterway	Location	Regulate Gates at Level against Gauge	Melway Reference
Kananook Creek	Riviera Outlet Gates, Riviera Street directly behind the Riviera Hotel. Access via Riviera Street	1.1m at the Seaford Gauge. Gates opened / closed based upon flood risk to lower Frankston area and tide levels.	97 D11

Table C1.8 – Melbourne Water Tidal Gates along Kananook Creek

SEWERAGE INFRASTRUCTURE

There is no sewerage Pumping Stations or Emergency Relief Points expected to be within the vicinity of floodwaters during severe flood events around Seaford & Frankston.

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 & REQUIRED ACTIONS

The table below is a breakdown of the number of properties flooded in a 1% AEP (100yr ARI) event¹. Refer to the following intelligence card/s for Seaford North, Seaford, Frankston North & Frankston for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	2842
Business	217
Industrial	612
Public Land	58
Rural	0
Total	3729

Table C1.9 – Breakdown of likely land use flooded around Frankston, Frankston North & Seaford during a 1% AEP event

¹ where property boundary is within a 1% AEP flood extent

FLOOD INTELLIGENCE CARD – SEAFORD NORTH GAUGE, KANANOOK CREEK

Version 3 – June 2017



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.

This Flood Intelligence Card 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.

LOCATION	Riviera Street Culverts, Seaford North
MELWAY REFERENCE:	97 D11
STREAM:	Kananook Creek
GAUGE NUMBER:	228371A
GAUGE ZERO:	0.00m AHD
GAUGE TYPE	Stream Level & Rain

MINOR – MODERATE:	1.1m – 1.5m
MAJOR	1.5m
LEVEE HEIGHT:	2.50m
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	1.67m (3 rd February 2005)

Creek Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
1.1m – 1.5m	MINOR - MODERATE FLOOD LEVEL	Properties at Flood Risk 19 Properties in Total <ul style="list-style-type: none"> Beach Grove, Seaford Ti-Tree Grove, Seaford Community Infrastructure Flooded <ul style="list-style-type: none"> Seaford Wetlands Walking Trail flooded in various locations 	<ul style="list-style-type: none"> VICSES to respond on a request by request basis.
1.17m	3 rd February 2005 Flood Level Peak	Event Summary Businesses and factories in Patrick Court, Miles Grove & Bardia Avenue in Seaford were subject to flooding	
1.5m	MAJOR FLOOD LEVEL	Community Infrastructure Flooded <ul style="list-style-type: none"> Grounds of the Seaford North Primary School on Halifax Street, Seaford start flooding 	<ul style="list-style-type: none"> VICSES may provide warnings using EM-COP to Frankston City Council and appropriate agencies as required based on the predictions provided by BoM regarding flood levels and the risk of Flash Flooding. The VICSES Central Duty officer in

Creek Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Water Over Road (Over 300mm Depth) <ul style="list-style-type: none"> Riviera Street, Seaford Greaves Court, Seaford 	conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident. <ul style="list-style-type: none"> VICSES to respond on a request by request Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements
1.7m	1% AEP (100yr ARI) Flood Level (Major)	Properties at Flood Risk <ul style="list-style-type: none"> Many properties between Kananook Creek and the Frankston Freeway likely flooded with a large number flooded over-floor Water Over Road (Over 300mm Depth) <ul style="list-style-type: none"> Many streets between Kananook Creek and the Frankston Freeway likely flooded Chapman Avenue, Seaford 	<ul style="list-style-type: none"> VICSES to respond on a request by request basis
2.5m		<ul style="list-style-type: none"> Levee Height Reached at Eel Race Drain, south bank. Water starts flowing over crest into Seaford Wetlands 	

Table C1.10 – Breakdown of likely consequences at various Seaford North gauge level heights along Kananook Creek with operational considerations

PPENDIX C2 – CARRUM DOWNS & LANGWARRIN FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

The Little Boggie Creek catchment begins in Langwarrin, running north-west through Carrum Downs where the creek joins Eel Race Creek to flow into Kananook Creek. A number of stormwater drainage systems feed into either Boggie Creek or Little Boggie Creek from the estates that reside in the area.

Approximately 1197 properties are at risk from flooding in the catchment, with 83 of these at risk of flooding over-floor in a 1% AEP flooding event. Ballarto Road in Skye and Dandenong-Frankston Road in Carrum Downs may need to be closed for a period during a 1% AEP event because of flooding. The carparks of Carrum Downs Regional Shopping Centre and Carrum Downs Plaza may also flood during a 5% AEP and 20% AEP events respectively.

WARNING TIMES

Neither the Bureau of Meteorology nor Melbourne Water currently provides flood forecasts for the Carrum Downs & Langwarrin areas. All flood response actions must therefore be driven by rainfall and / or river level observations. There are currently no stream level or rain gauges within the Little Boggie Creek catchment. Gauges in Seaford North & Frankston North are the closest available gauges and may provide an indication of rainfall across Carrum Downs & Langwarrin.

Melbourne Water Hydrographic Monitoring Station	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Eel Race Drain at Riviera St Culverts, Seaford North	228371A	Pedestrian Crossing along Riviera Street, Seaford	✓	✓	97 D11
Kananook Creek at Seaford Rd, Seaford	228372A	East bank on the North side of Seaford Road bridge	✓		99 E5
Skye Road Retarding Basin at Frankston North	228378A	North side of Skye Road opposite Bokissa Drive, Frankston	✓	✓	99 K12
Melbourne Water Hydrographic Monitoring Station	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Eel Race Drain at Riviera St Culverts, Seaford North	228371A	Pedestrian Crossing along Riviera Street, Seaford	✓	✓	97 D11
Skye Road Retarding Basin at Frankston North	228378A	North side of Skye Road opposite Bokissa Drive, Frankston	✓	✓	99 K12

Table C2.1 – Hydrographic Monitoring Stations near the Little Boggie Creek and Carrum Downs Drains catchments

See the Melbourne Water website for more information on these gauges: <http://www.melbournewater.com.au/waterdata/rainfallandriverveldata/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.

PROPERTIES AT FLOOD RISK

Specific properties data has been omitted from the public version of this plan.

Properties (Residences, Businesses & Public Use) at risk from Flooding Over-Floor during a 1% AEP event

Street No. at Risk in a 1% AEP Event	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
Totals				
83				

Table C2.2 – Properties at risk of flooding along the Little Boggy Creek and Carrum Downs Drains Catchments

ISOLATION

No major isolation risks exist for areas around Carrum Downs & Langwarrin during a 1% AEP (100yr ARI) event. Some localised short-duration isolation may occur due to flash flooding.

ESSENTIAL INFRASTRUCTURE

Apart from the roads outlined below, all other essential infrastructure and services areas around Carrum Downs & Langwarrin 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 around Carrum Downs, Skye & Langwarrin. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

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

- Ballarto Road, Skye at Golden Way and at Boggy Creek Crossing (The Pines Reserve)
- Dandenong-Frankston Road, Carrum Downs south of Hall Road

Table C2.3 – VicRoads Possible Road Closures during a flooding event

Frankston City Council Roads flooded in a 1% AEP (100yr ARI) event

CARRUM DOWNS			
• Arcadia Street	• Grebe Court	• Raven Court	• Peninsula Crescent
• Aster Avenue	• Greenwood Drive	• Swan Court	• Raewyn Court
• Avocet Court	• Hall Road	• Swift Court	• Southgateway
• Broderick Road	• Jacana Drive	• Thornbill Drive	• Union Road
• Bushlark Drive	• Juliana Drive	• Tyntynder Drive	SKYE
• Carmela Way	• Lena Place	• Zebrafinch Court	• Arlene Drive
• Currawong Drive	• Loretta Street	LANGWARRIN	• Lady Emily Way
• Dion Drive	• Lyrebird Drive	• Beacon Drive	• McCormicks Road
• Dorchester Crescent	• Moorhen Crescent	• Greenacres Court	• Sven Street
• Firetail Court	• O'Gradys Road	• Jarman Drive	• Veronica Drive
• Frankston Gardens Drive	• Paras Drive	• Laura Court	
• Gamble Road	• Pardalote Avenue	• McClelland Drive	
	• Petrel Court	• Morecroft Way	

Table C2.4 – Frankston City Council Possible Road Closures during a 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)	Melway Reference
Banyan Reserve	Upper Carrum Downs Drain	7.942 ha	76.3 ML	15.4m AHD	Unknown	16.0m AHD	High C	Unknown	98 G12
Botany Park / O'Grady's Road	Ballarto Road Drain	5.471 ha	58.9 ML	18.22m AHD	18.7m AHD	19.15m AHD	High C	Unknown	100 F5
Langwarrin South	Langwarrin South Drain	4.006 ha	10 ML	nil	61.8m AHD	62.0m AHD	Very Low	0	136 D10
Little Boggy Creek	Little Boggy Creek	6.658 ha	Unknown	50.7m AHD	51.0m AHD	Unknown	High A	Unknown	136 A1
Sandgate Avenue	Sandgate Avenue Drain	3.024 ha	8.3 ML	75.62m AHD	75.61m AHD	75.65m AHD	Very Low	13	102 H8

Table C2.5 – Melbourne Water Retarding Basins within the Little Boggy Creek and Carrum Downs Drains catchments in the City of Frankston

PUMPING STATIONS

Melbourne Water Pumping Station	On Drain / Waterway	Location	No. of Pumps	Consequence of Failure	Melway Reference
Parc Pump	Upper Carrum Downs Drain	Eastern Treatment Plant	1	Loss of environmental flow to Wetland	98 E8

Table C2.6 – Melbourne Water Pumping Stations along the Carrum Downs Drains catchments

LEVEES

Levee	Reach	Side	Levee Height	Levee Length	Expected Level of Protection	ANCOLD Hazard Rating	Consequences of Failure	Melway Reference
Boggy Creek	Eel Race Drain to Eastlink	East	2.0m	700m	Unknown	Very Low	Flooding of Boggy Creek Wetland. 0 properties expected to be affected.	98A10-A12
Boggy Creek	Eel Race Drain to Eastlink	West	2.0m	700m	Unknown	Very Low	Flooding of Boggy Creek Wetland. 0 properties expected to be affected.	98A10-A12
Peninsula Link Bund Wall	Peninsula Link to Tamarisk Creek	East	Unknown	60m	Unknown	Unknown	Unknown	100 D6

Table C2.7 – Melbourne Water Levees in the Little Boggy Creek Catchment in the City of Frankston

SEWERAGE INFRASTRUCTURE

Sewerage Infrastructure of note during a severe flood event located around Carrum Downs and Langwarrin are contained within the following table.

Melbourne Water Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Supernatant Pump Station No.4	Eel Race Creek	North	Melbourne Water Eastern Treatment Plant, Thompsons Road, Carrum Downs	98 F7
Supernatant Pump Station No.4A	Eel Race Creek	North	Melbourne Water Eastern Treatment Plant, Thompsons Road, Carrum Downs	98 F7

Table C2.8 – Sewer Emergency Relief Points in the Little Boggie Creek and Carrum Downs Drains Catchments in the City of Frankston

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 & REQUIRED ACTIONS

The table below is a breakdown of the number of properties flooded (cadastre intersects a flood extent) in a 1% AEP (100yr ARI) event. Refer to the following intelligence card/s for Carrum Downs or Langwarrin for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	1048
Business	39
Industrial	98
Public Land	8
Rural	4
Total	1197

Table C2.9 – Breakdown of likely land use flooded in the Little Boggie Creek and Carrum Downs Drains catchments during a 1% AEP event

APPENDIX D - FLOOD EVACUATION ARRANGEMENTS

Phase 1 - Decision to Evacuate

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

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

The following should be considered when planning for evacuation:

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

The decision to evacuate is to be made by the IC in consultation with the MERO, MERC, MRM, DHHS, Health Commander and other key agencies and expert advice (CMA's and Flood Intelligence specialists).

There are currently no pre-established triggers for evacuation within the City of Frankston.

Phase 2 – Warning

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

Evacuation warning messages will be developed and issued by VICSES in consultation with the MERO, MERC, MRM, DHHS and other key agencies and expert advice (CMA's and Flood Intelligence specialists).

Phase 3 – Withdrawal

Withdrawal will be controlled by VicPol. VICSES will provide advice regarding most appropriate evacuation routes and locations for at-risk communities to evacuate to, etc.

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

VicPol will control security of evacuated areas.

Evacuees will be encouraged to move using their own transport where possible. Transport for those without vehicles or other means will be arranged at the request of the IC or via the appointed VicPol evacuation manager.

Landing zones for helicopters:

No Landing Zones for helicopters have been pre identified. There are numerous parks and open areas which could be utilised in an emergency.

Landing zones for aircraft will be determined by the following:

- The IC will determine the requirements for airborne resources
- The State Aircraft Desk will deploy and coordinate air resources
- The pilot in command will determine the safest location to land.

Vulnerable People in Emergencies

Vulnerable people living in the community will be identified through funded agencies, community service organisations or other community networks. Such people will be assessed against the definition of a vulnerable person and may qualify for registration on the Vulnerable Persons Register (VPR). A list of facilities where vulnerable people may be located is also kept by Council. These may be funded facilities including education, health and childcare, Commonwealth regulated aged care facilities and other locally identified facilities. Further information on Vulnerable People in Emergencies can be obtained from Council's Emergency Management Co-ordinator.

Phase 4 – Shelter

Relief/ Recovery Centres and/or assembly areas which cater for people's basic needs may be established to meet the immediate needs of people affected by storm and/or flooding. Relief Centres will be determined dependent on location and size of event.

The emergency Relief/ Recovery centres and/or Assembly Areas are listed in the table below:

Sector	Relief Centre/Assembly Area (include address)	Comments
To be determined dependant on location/ size of event	Frankston South	As per ERC facility plan available through MERO
To be determined dependant on location/ size of event	Frankston North	As per ERC facility plan available through MERO

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

Animal Shelter

The need for animal shelter compounds will be determined dependant on the location and size of the event. Refer to the MEMPlan for more information.

Caravans and Caravan parks

No caravan evacuation sites have been identified in the City of Frankston. Where present, caravans may be evacuated. Caravan evacuation will be determined dependent on location and size of event.

Phase 5 – Return

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

The IC in consultation with VicPol will determine when it is safe for evacuees to return to their properties and will arrange for the notification of the community.

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

Considerations for deciding whether to return include:

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

Disruption to Services

Disruption to a range of services can occur in the event of a flood. This may include road closures affecting school bus routes, water treatment plant affecting potable water supplies etc.

This table will be populated as a more detailed analysis of flood risk is completed.

Service	Impact	Trigger Point for action	Strategy/Temporary Measures
School Bus Routes	General road closures across network leading to student pick ups being suspended	Inundation of road network and associated damage to an extent that it is unsafe for vehicles to use road	Alternate routes via clearly signed detours. Alternate routes to be determined by Council Traffic Engineers or works crews in conjunction with VicPol. Council works crews to install and monitor detour signage. Council Network Inspectors to monitor road conditions, closure signage and detour signage. Alternate student collection points to be established.
Local Road Network	General road closures across network	Inundation of road network and associated damage to an extent that it is unsafe for vehicles to use road	Alternate routes via clearly signed detours. Alternate routes to be determined by Council Traffic Engineers, Council works personnel and VicPol. Council works crews to install and monitor detour signage. Council Network Inspectors to monitor road conditions, closure signage and detour signage.

Essential Infrastructure and Property Protection

Essential Community Infrastructure and properties may require protection include residences, businesses, roads, power supply etc.

For small scale events sandbags can be purchased from Bunning's. For larger scale events sandbag collection points and filling points will be determined, with the community being informed of these points depending on the nature and proximity of the event.

Rescue

Requests for Frankston City Council resources to support rescue operations will forwarded to the MECC if established or EMLO if an ICC has been established.

Resources are available within the Frankston SES unit to assist with rescue operations. Full details of equipment and resources are held by the SES unit. Known high-risk areas/communities (i.e. low-lying islands) where rescues might be required are detailed in the **Appendix F** flood maps.

APPENDIX E - FLOOD WARNING SYSTEMS

Storm and Flood Warning

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

Flood Bulletins

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

The relevant VICSES RDO or the established ICC will normally be responsible for drafting, authorizing and issuing issue Flood Bulletins, using the VicEmergency system.

Flood Bulletins should refer to the warning title within the Bulletin header, for example Flood Bulletin for Major Flood Warning on Yarra River.

Flood Bulletins should follow the following structure

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

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

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

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

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

Local Flood Warning System Arrangements

There are no local flood warning systems or arrangements in place in the City of Frankston.

Moderate Flood Warning Example

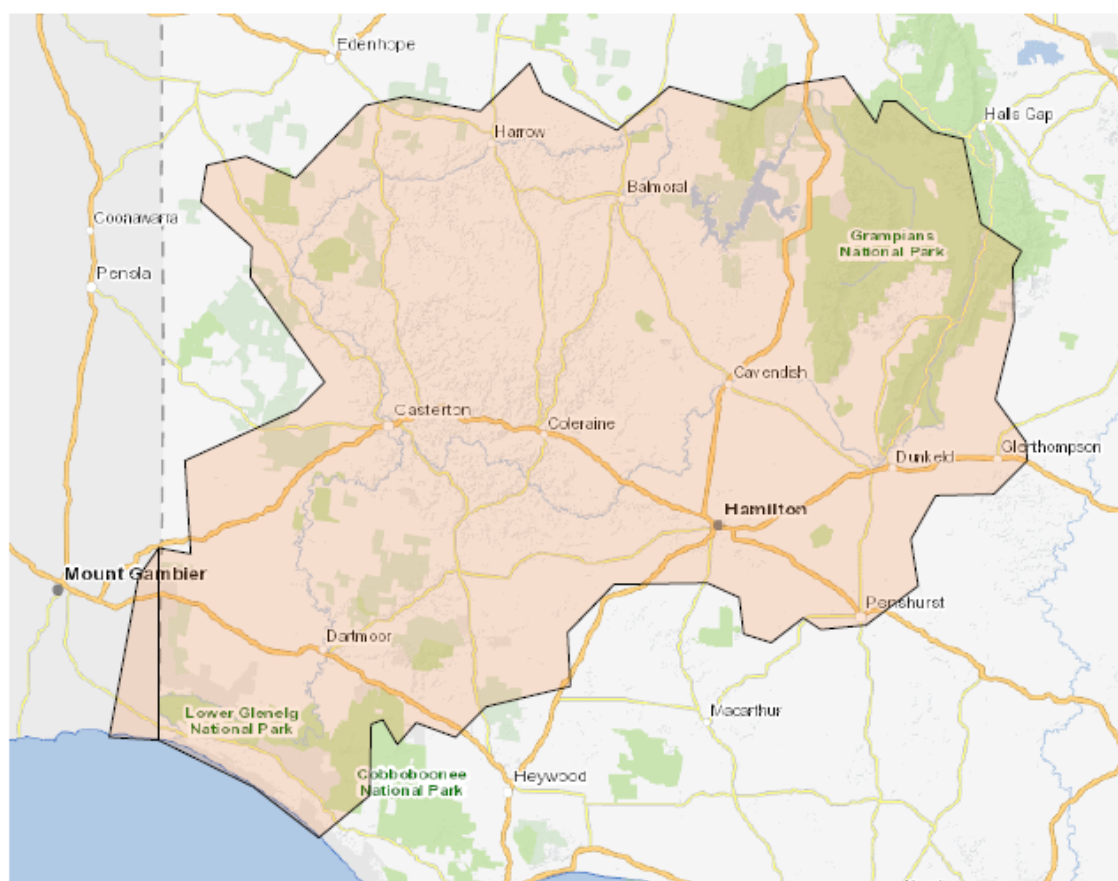
Community Notification Sign-off



WARNING - FLOOD

Incident Location: Glenelg River at Casterton
Incident Name: GlenelgRiverFloodSept2017
Issued: Set at publish time
Next Update Expected:

Map



Message

This **Moderate Flood Warning** is being issued for Glenelg River at Casterton.

- In the 24hrs to 9am Friday up to 50mm of rainfall was recorded in the Glenelg River catchment.
- A further 5mm to 10mm is forecast for the remainder of Friday.
- Glenelg River: Moderate flooding is likely along the Glenelg River.
- The Glenelg River at Dergholm is above the minor flood level (4.0 m) and rising.
- The Glenelg River at Casterton is currently at 4.50 metres (minor flood level 3.8 m) and rising.
- The Glenelg River at Casterton is likely to exceed the moderate flood level (5.20 m) during Friday.

Act now - take actions immediately to protect your life and property.

What you should do:

Decide if you will evacuate if it becomes necessary.

If you choose to leave:

- Remember to take your pets, mobile phone, spare clothes and medications.
- Travel to the home of family or friends who are in a safe location, away from flooding.
- Be aware of any road closures when you leave.

If you are travelling:

- Be aware of road hazards including mud, debris and damaged roads or bridges.
- Floodwater is dangerous - never drive, walk or ride through floodwater.

If you stay or if it is unsafe to leave:

- Make sure you have enough food, drinking water, medications and pet food to survive for 3-5 days in case you become isolated.

You should stay informed by listening to emergency broadcasters and monitoring warnings.

Impacts in your area:

- Flooding above floor level of a single story home is likely to occur in some locations.

This message was issued by State Emergency Service.

The next update is expected by [warning_next_update] or as the situation changes.

Flood information:

- For river heights check www.bom.gov.au (http://www.bom.gov.au/vic/flood/rain_river.shtml) or phone 1300 659 217.
- For urgent animal welfare issues call Agriculture Victoria (<http://agriculture.vic.gov.au/agriculture/emergencies>) on 136 186 or your local vet.

Emergency contacts:

- For life threatening emergencies call Triple Zero (000).
- For flood and storm emergency assistance (<http://www.ses.vic.gov.au/about/ShouldIcalltheSES.pdf>) from the SES call 132 500.

Stay informed:

- Via www.emergency.vic.gov.au (<http://emergency.vic.gov.au/respond/>).
- Tune in to ABC Local Radio, commercial and designated community radio stations, or Sky News TV.
- Call the VicEmergency Hotline (<https://vicemergency.zendesk.com/hc/en-gb/articles/115001055007-What-is-the-VicEmergency-Hotline->) to talk to someone about this warning on freecall 1800 226 226.
- People who are deaf, hard of hearing, or who have a speech/communication impairment can contact VicEmergency Hotline via the National Relay Service (<http://relayservice.gov.au/>) on 1800 555 677.

- For help with English, call the Translating and Interpreting Service (<https://www.tisnational.gov.au/>) on 131 450 (freecall) and ask them to telephone VicEmergency Hotline. If you know someone who cannot speak English, provide them with this number.
- Download the VicEmergency app (<https://vicemergency.zendesk.com/hc/en-gb/articles/230492607-What-is-the-VicEmergency-app->) or follow VicEmergency on Twitter (<https://twitter.com/vicemergency>) (#vicfloods) or Facebook (<https://www.facebook.com/vicemergency>).

Facebook

WARNING - FLOOD

Incident Location: Glenelg River at Casterton

Incident Name: GlenelgRiverFloodSept2017

Issue Date:

Next Update:

This Moderate Flood Warning is being issued for Glenelg River at Casterton.

- In the 24hrs to 9am Friday up to 50mm of rainfall was recorded in the Glenelg River catchment.
- A further 5mm to 10mm is forecast for the remainder of Friday.
- Glenelg River: Moderate flooding is likely along the Glenelg River.
- The Glenelg River at Dergholm is above the minor flood level (4.0 m) and rising.
- The Glenelg River at Casterton is currently at 4.50 metres (minor flood level 3.8 m) and rising.
- The Glenelg River at Casterton is likely to exceed the moderate flood level (5.20 m) during Friday.

Act now - take actions immediately to protect your life and property.

More details at <http://emergency.vic.gov.au/respond/#!/warning/3941/moreinfo>

Twitter

Moderate Flood Warning for Glenelg River at Casterton. For more info: <http://bit.ly/2tfmm6t> #vicfloods

Sign-off

Authorised By:

Authorised Signature:

APPENDIX F – MAPS

1. Overview

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

- A map outlining a series of flooding hot spot maps within the City of Frankston.
- A map showing the Municipal boundary together with the open waterways and underground stormwater drainage pipe network within the City of Frankston and the 1% AEP (100-year ARI) flood extents (sourced from Melbourne Water GIS).
- A set of 13 maps showing flooding hot spots within the City of Frankston 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 Frankston 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 Planning and Community Development 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 the Victorian Water Resources website <http://nremap-sc.nre.vic.gov.au/MapShare.v2/imf.jsp?site=water>

NOTE: MAPS UNAVAILABLE IN THE PUBLIC VERSION

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.

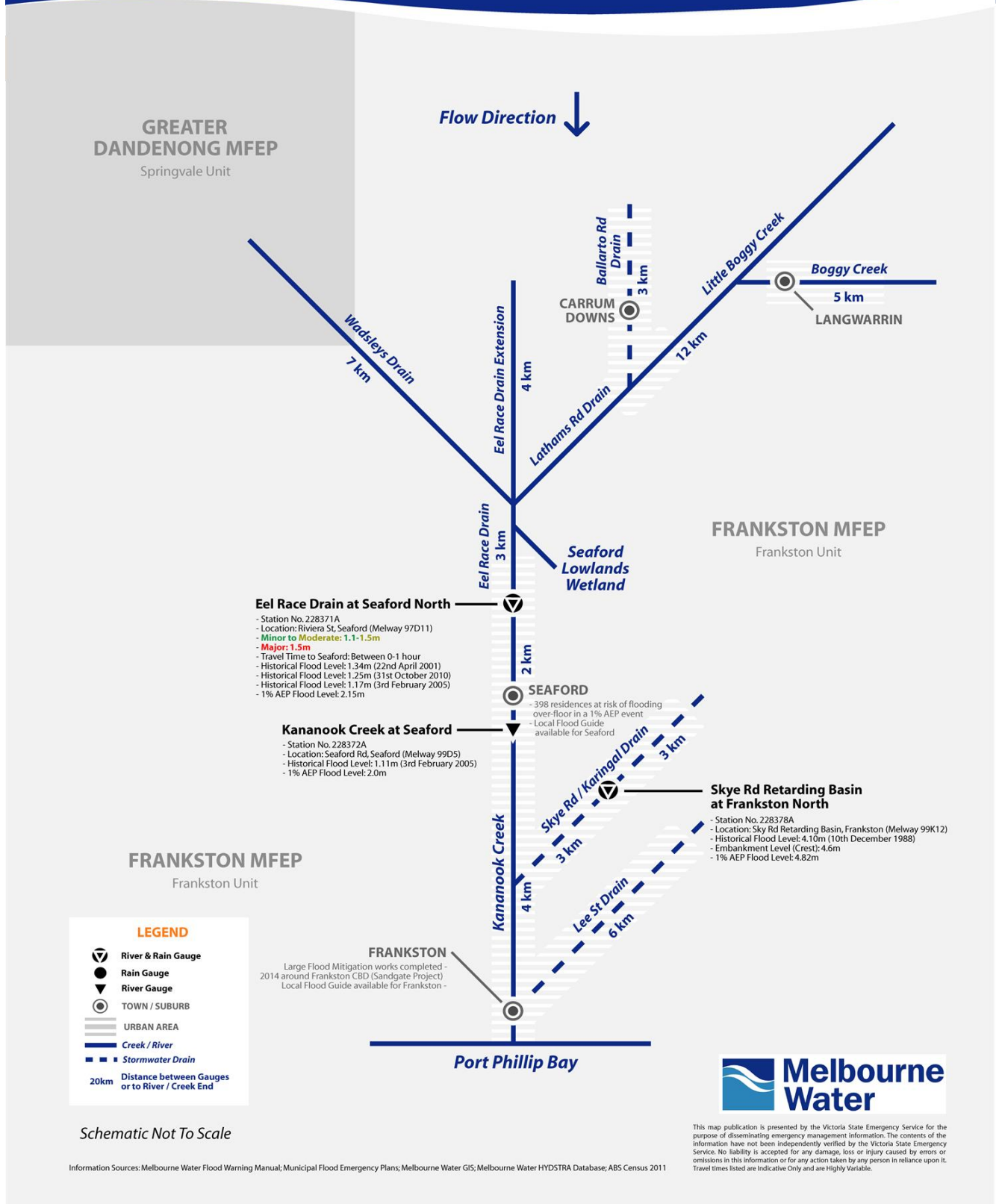
Details within these Catchment Schematics reflect those contained within either other sections of this Municipal Flood Emergency Plan or refer to other Municipal Flood Emergency Plans. These details have been filtered to contain only key facts. For more information on a gauge, drainage system or town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



Kananook Creek Catchment Schematic

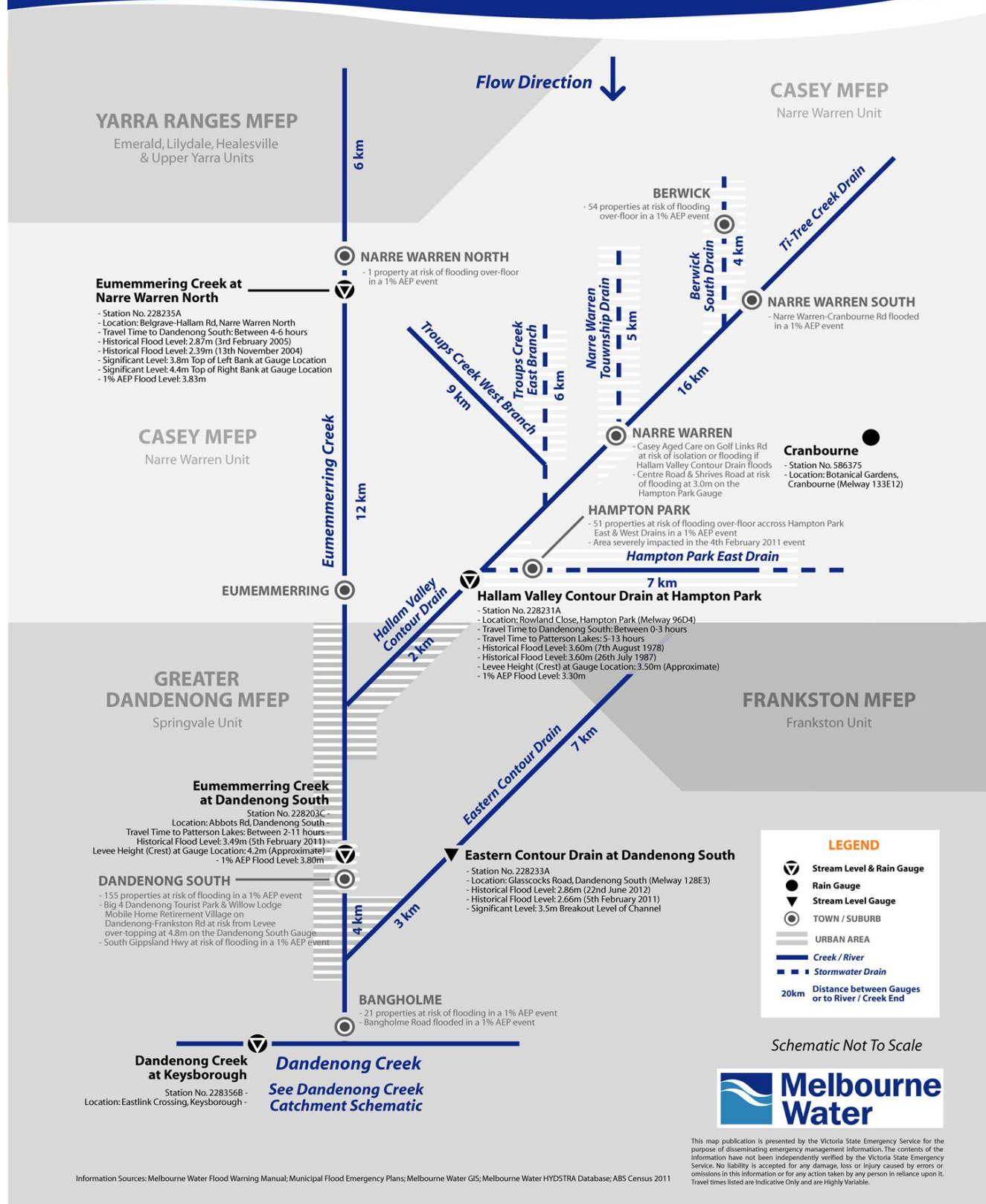
Version 1 - January 2014





Eumemmerring Creek Catchment Schematic

Version 2 - June 2016



APPENDIX H – SEVERE WEATHER (STORM) EVENTS

1. Overview

Frankston municipality is susceptible to severe weather events because of a combination of its undulating terrain, urban boundary location and wind exposed properties. Storm events in the City of Frankston may be subject to include wind storms, hailstorms, and thunderstorms (including lightning activity). There have also been occurrences of atmospheric downbursts/microburst within Frankston and adjacent municipalities.

Severe storm activity could result in injuries and increase in road accidents. Damaging wind events will tend to lead to trees down, with damage to the built and natural environment. Obstructions across roads could disrupt services, affect community functioning and have great potential for road traffic delays.

This Appendix uses Request for Assistance data from the Victoria State Emergency Service (VICSES) to display areas at risk from severe weather events.

2. VICSES requests for assistance

The Victoria State Emergency Service records requests for assistance made by the public during severe weather events. Table 1 below is a breakdown of requests by suburb and damage type during the period June 2010 and January 2017.

Table 1 – Breakdown of Severe Weather Requests for Assistance received by VICSES Frankston Unit by suburb

VicSES Request for Assistance (Jun 2010 – Jan 2017)					
Suburb	Building Damage	Flooding	Tree Down	Tree Down Traffic Hazard	Rescue Persons Trapped *
Carrum Downs	151	42	226	159	
Frankston	492	147	621	382	2
Frankston North	61	6	115	61	
Frankston South	141	42	316	204	
Langwarrin	153	103	278	163	
Langwarrin South	9	3	34	45	
Sandhurst	10	4	2	4	
Seaford	199	71	317	248	
Skye	57	15	70	58	

* Rescue Persons Trapped does not include RFAs for Rescue Road Trapped, Rescue Rail Trapped, Rescue Structure Collapse or Rescue High Angle.

**RFAs relating to Assist fire service, Assist police, Message, SES incident other etc. have not been included in the dataset

Table 2 is a breakdown of requests for assistance by date (month) and damage type. High figures during December 2011 are the result of an intense storm with large hail that moved across the North West metropolitan suburbs on Christmas Day causing significant building damage and some flooding issues.

Table 2 – Breakdown of severe weather requests for assistance received by VICSES Frankston Unit within City of Frankston by date

VICSES Request for Assistance (June 2010 – Jan 2016)					
Date	Building Damage	Flooding	Tree Down	Tree Down Traffic Hazard	Rescue Persons Trapped
Jun 2010	10	1	10	9	
Jul 2010	3	2	3		
Aug 2010	7	4	14	13	
Sep 2010	59	1	133	59	
Oct 2010	14	15	13	9	
Nov 2010	24	11	27	22	
Dec 2010	19	23	25	16	
Jan 2011	10	14	13	10	
Feb 2011	6	26	18	9	
Mar 2011	5		6	10	
Apr 2011	2	3	6	3	
May 2011	10	1	6	6	
Jun 2011	16	2	36	15	
Jul 2011	9	1	11	5	
Aug 2011	2		1	4	
Sep 2011	4	4	11	13	
Oct 2011	2		6	6	
Nov 2011	59	149	37	12	
Dec 2011	3	5	7	2	
Jan 2012	21	3	45	28	
Feb 2012	11	2	42	10	
Mar 2012	19	1	44	13	
Apr 2012	27	4	49	21	
May 2012	13	2	25	10	
Jun 2012	10	9	12	6	
Jul 2012	2	1	4	2	
Aug 2012	8	1	8	10	
Sep 2012	24		67	24	
Oct 2012	1	1	3	1	
Nov 2012	2		12	3	
Dec 2012	4	1	25	14	
Jan 2013	9	2	9	6	
Feb 2013	7	6	10	6	
Mar 2013	14	1	24	17	
Apr 2013	1	1	6	4	
May 2013	2	4	3	7	
Jun 2013	12	2	1	2	
Jul 2013	8	2	19	13	
Aug 2013	39	3	37	24	
Sep 2013	25	1	46	28	
Oct 2013	98		149	69	
Nov 2013	8	3	7	6	
Dec 2013	3	5	7	1	
Jan 2014	4		24	11	
Feb 2014	7	1	14	9	
Mar 2014	23	6	9	3	
Apr 2014	10		5	5	
May 2014	1		3	1	
Jun 2014	77	1	99	70	2
Jul 2014	12	1	23	7	
Aug 2014	2	1	10	2	
Sep 2014	23		44	25	
Oct 2014	14	2	23	11	
Nov 2014	10	1	6	6	

VICSES Request for Assistance (June 2010 – Jan 2016)					
Date	Building Damage	Flooding	Tree Down	Tree Down Traffic Hazard	Rescue Persons Trapped
Dec 2014	9		17	11	
Jan 2015	12	2	28	12	
Feb 2015	7	1	10	12	
Mar 2015	14	1	46	22	
Apr 2015	5	1	4	3	
May 2015	7	1	12	6	
Jun 2015	3		5	4	
Jul 2015	12	3	8	4	
Aug 2015	7	1	5	4	
Sep 2015	7	1		5	
Oct 2015	3	1	5	5	
Nov 2015	6	1	13	6	
Dec 2015	9	2	12	12	
Jan 2016	11	6	44	25	
Feb 2016	3	1	9	6	
Mar 2016	29	3	62	37	
Apr 2016	3	2	10	5	
May 2016	41	14	44	26	
Jun 2016	7	1	16	4	
Jul 2016	47		75	64	
Aug 2016	4	1	2	7	
Sep 2016	5	1	4	1	
Oct 2016	63		101	50	
Nov 2016	16	1	10	8	
Dec 2016	20	28	9	14	
Jan 2017	4	3	7	7	

3. VICSES requests for assistance mapping

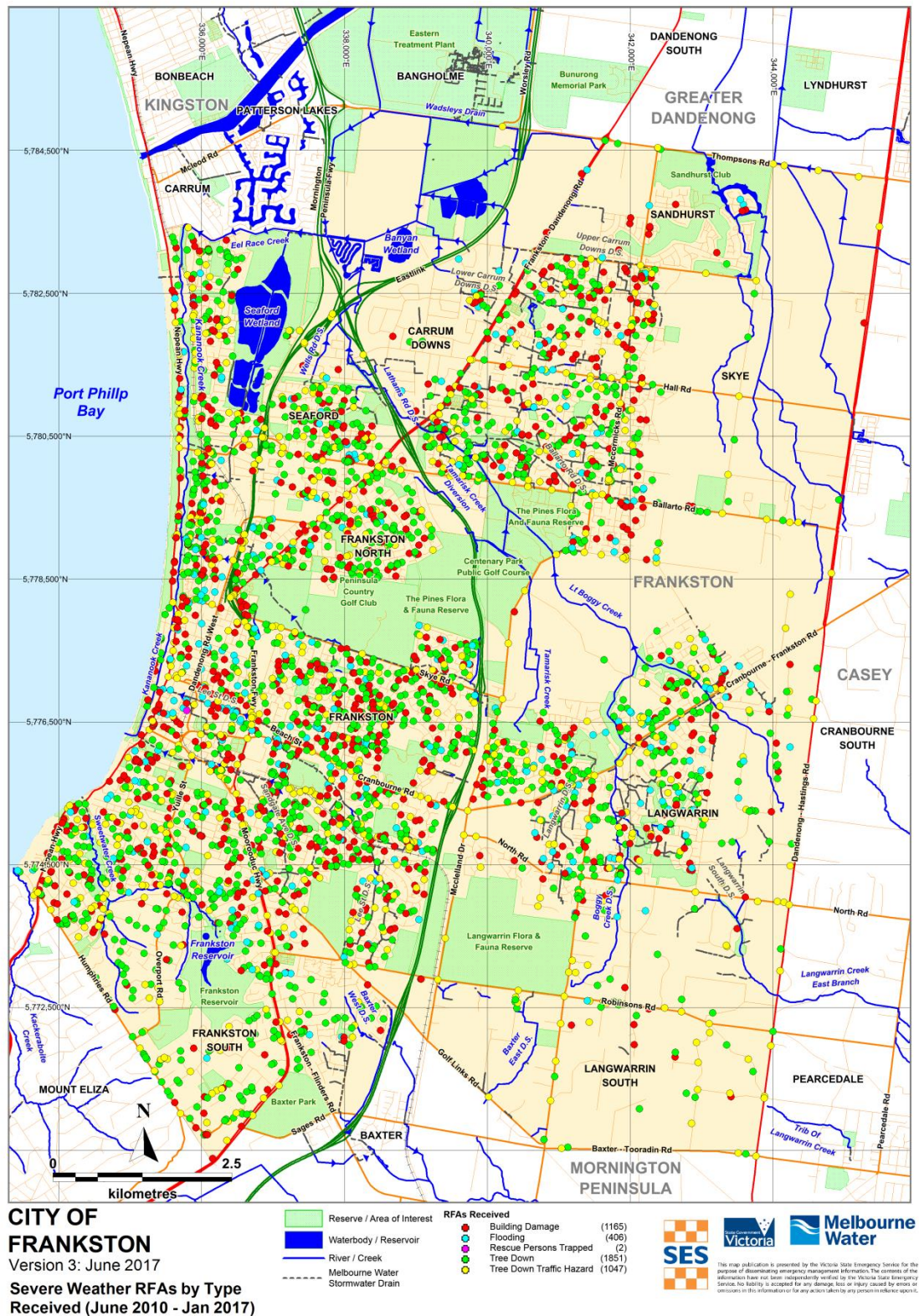
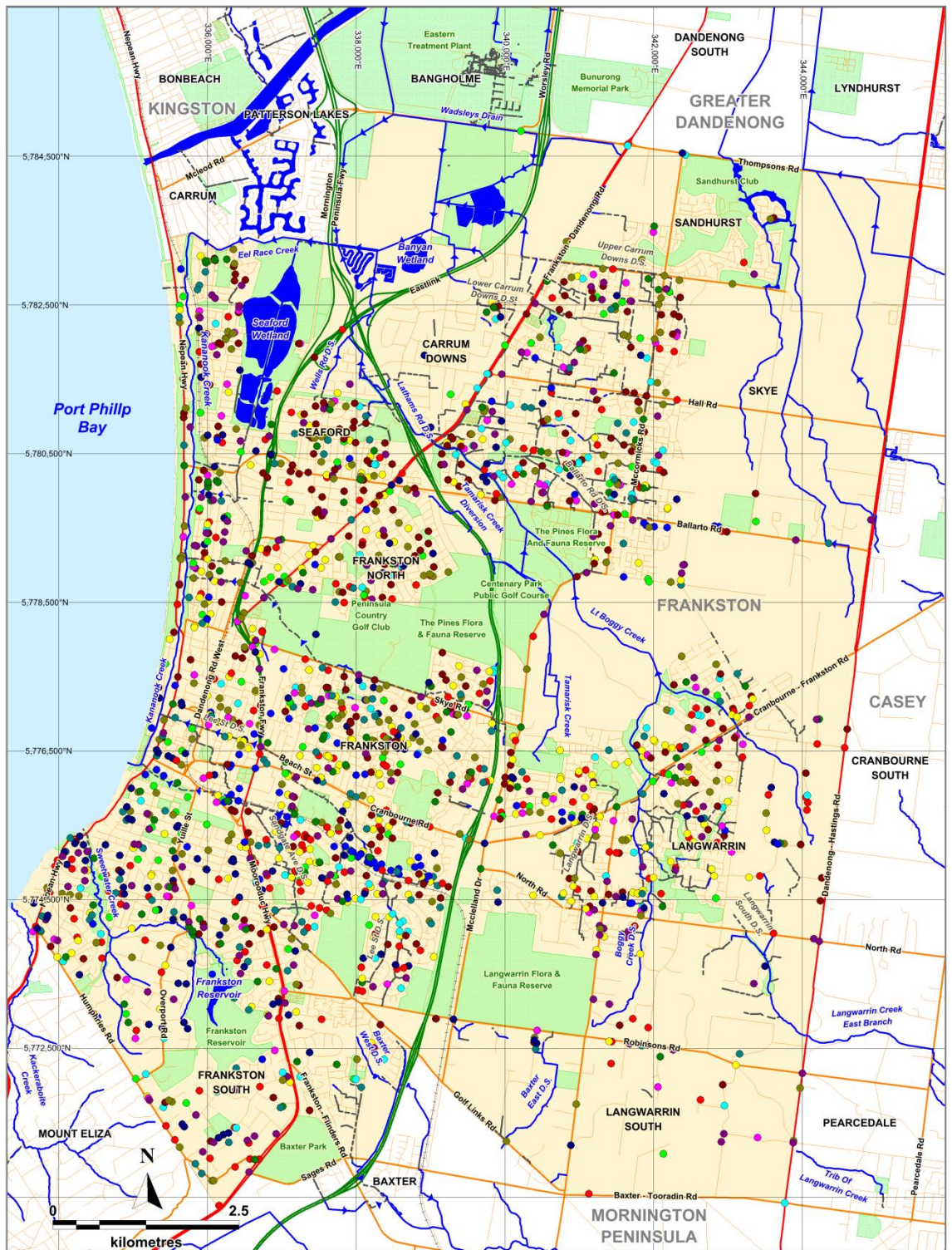


Figure 1 – Breakdown of Severe Weather Requests for Assistance received by VICSES Frankston Unit within Frankston by request type



CITY OF FRANKSTON
Version 3: June 2017

Severe Weather RFAs by Date
Received (June 2010 - Jan 2017)

RFA Received (By Month > 100 Received)	
201009 (252)	201310 (316)
201111 (257)	201406 (249)
201204 (101)	201603 (131)
201209 (115)	201605 (125)
201308 (103)	201607 (186)
201309 (100)	201610 (214)

This map publication is presented by the Victorian State Emergency Service for the purpose of disseminating emergency management information. The contents of the information have not been independently verified by the Victorian 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.

Figure 2 – Breakdown of Severe Weather Requests for Assistance received by VICSES Frankston Unit within Frankston by date