



Stonnington Flood Emergency Plan

A Sub-Plan of the Municipal Emergency
Management Plan

For City of Stonnington Council
And
VICSES Unit Malvern



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15	Operations Officer	CFA (District Headquarters)	
16	EM Unit	Ambulance Victoria	
17	Emergency Management Officer	Dept of Education (DEECD)	
18	Emergency Management Coordinator	Department of Human Services	
19	Commander	MFB	
20	ICC's - Mulgrave, Sunshine	VICSES	
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Document Transmittal Form / Amendment Certificate

This Municipal Flood Emergency Plan (MFEP) will be amended, maintained and distributed as required by VICSES in consultation with the City of Stonnington.

Suggestions for amendments to this Plan should be forwarded to VICSES Regional 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
1		Ross Butler	Data Tables and Mapping included
Version 1.	27/6/2013	Michael Potter	Sign off by Steve Relf - MERO City of Stonnington
2	27/5/2016	Ross Butler	Appendix A, B, C & F Updated. Addition of Appendix G.

List of Abbreviations & Acronyms

The following abbreviations and acronyms are used in the Plan:

AEP	Annual Exceedance Probability
AHD	Australian Height Datum (the height of a location above mean sea level in metres)
AIIMS	Australasian Inter-service Incident Management System
AoCC	Area of Operations Control Centre / Command Centre
ARI	Average Recurrence Interval
ARMCANZ	Agricultural & Resource Management Council of Australia & New Zealand
AV	Ambulance Victoria
BoM	Bureau of Meteorology
CEO	Chief Executive Officer
CERM	Community Emergency Risk Management
CFA	Country Fire Authority
CMA	Catchment Management Authority
RERC	Regional Emergency Response Coordinator
RERCC	Regional Emergency Response Coordination Centre
DHS	Department of Human Services
DH	Department of Health
DoI	Department of Infrastructure
DPI	Department of Primary Industries
DSE	Department of Sustainability and Environment (successor body to DNRE)
EMMV	Emergency Management Manual Victoria
EMT	Emergency Management Team
EO	Executive Officer
FO	Floodway Overlay
FWS	Flood Warning System
FZ	Floodway Zone
IC	Incident Controller
ICC	Incident Control Centre
IMT	Incident Management Team
IMS	Incident Management System
EMLO	Emergency Management Liaison Officer
LSIO	Land Subject to Inundation Overlay
MECC	Municipal Emergency Coordination Centre
MEMP	Municipal Emergency Management Plan
MEMPC	Municipal Emergency Management Planning Committee
MERC	Municipal Emergency Response Coordinator
MERO	Municipal Emergency Resource Officer
MFB	Metropolitan Fire and Emergency Services Board
MRM	Municipal Recovery Manager
PMF	Probable Maximum Flood
RCC	Regional Control Centre
RDO	Regional Duty Officer
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 Flood Emergency Plan (MFEP) has been prepared by the Municipal Flood Planning Committee (MFPC) and with the authority of the City of Stonnington MEMPC pursuant to Section 20 of the Emergency Management Act 1986 (as amended).

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

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

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

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

Endorsement

Stephen Relf (MERO City of Stonnington)	Date

Ray Jasper (Regional Manager VICSES Central Region)	Date

1.2 The Municipality

An outline of City of Stonnington 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 Flood Emergency Plan

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

As such, the scope of the Plan is to:

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

1.4 Municipal Flood Planning Committee (MFPC)

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

- VICSES (i.e. Unit Controller & Regional Officer – Emergency Management) (**Chair**),
- City of Stonnington,
- Victoria Police (i.e. Municipal Emergency Response Co-ordinator) (MERC),
- Catchment Management Authority,
- Department of Health (DH) as required,
- Department of Human Services (DHS) as required,
- Department of Sustainability and Environment (DSE) as required,
- Water Authorities as required,
- Bureau of Meteorology as required,
- Local community representatives and
- Other agencies as required

1.5 Responsibility for Planning, Review & Maintenance of this Plan

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

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

The MFPC will meet at least once per year.

The plans should be reviewed:

- Following any new flood study;
- Change in non-structural and/or structural flood mitigation measures;

-
- After the occurrence of a significant flood event within the Municipality to review and where necessary amend arrangements and information contained in this Plan.

1.6 Endorsement of the Plan

The MFEP will be circulated to the MEMPC in order to seek acceptance and endorsement of this plan and its inclusion as a sub-plan of the MEMP.

Part 2. PREVENTION / PREPAREDNESS ARRANGEMENTS

2.1 Community Awareness for all Types of Flooding

VICSES with the support of Stonnington City Council and Melbourne Water will coordinate community education programs for flooding within the council area. E.g. FloodSafe / StormSafe.

A Community Education Plan (CEP) to support this plan will be developed in conjunction with VICSES local units who will lead the delivery of the CEP with support from the Stonnington City Council and the VICSES Central Region.

2.2 Structural Flood Mitigation Measures

The following summary of structural flood mitigation measures exist within the Council area:

Refer to appendix C for detailed information of 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. Refer to section 4.7 of the EMMV for guidance.

2.3.2 Flood Warning

Arrangements for flood warning are contained within the State Flood Emergency Plan and the EMMV (Part 3.7) and on the BoM website.

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

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.

The following arrangements for Flood Wardens have been established:

The City of Stonnington does not have Flood Wardens in place at this particular time.

2.4 Introduction

2.4.1 Activation of Response

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

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

2.4.2 Responsibilities

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

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

2.4.3 Municipal Emergency Coordination Centre (MECC)

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

The function, location, establishment and operation of the MECC will be as detailed in the City of Stonnington MEMP.

2.4.4 Escalation

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

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

2.5 Strategic Control Priorities

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

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

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

2.6 Command, Control & Coordination

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

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

2.6.1 Control

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

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

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

2.6.2 Incident Controller (IC)

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

2.6.3 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

- Mulgrave ICC
- Sunshine ICC

2.6.4 Divisions and Sectors

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

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

Malvern Unit: 293 Tooronga Road Malvern East

Currently the following locations have been identified as possible Divisional Command Points for events within the Stonnington Municipality.

Oakleigh SES- 92 Bignell Road, Bentleigh East

Southbank SES 168 Sturt Street, Southbank

2.6.5 Incident Management Team (IMT)

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

Refer to 3.5 of the EMMV for guidance on IMTs and Incident Management Systems (IMSS).

2.6.6 Emergency Management Team (EMT)

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

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

Refer to 3.5 of the EMMV for guidance on EMTs.

2.6.7 On Receipt of a Flood Watch / Severe Weather Warning

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

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

2.6.8 On Receipt of the First and Subsequent Flood Warnings

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

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

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

2.7 Community Information and Warnings

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

Community information and warnings communication methods available include:

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

Refer to Appendix C and 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.

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

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

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

DHS will coordinate information regarding public health and safety precautions.

2.8 Media Communication

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

2.9 Rapid impact assessment

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

2.10 Preliminary Deployments

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

2.11 Response to Flash Flooding

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

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

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

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

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

2.12 Evacuation

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

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

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

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

Refer to Appendix C of this Plan for detailed evacuation arrangements for City of Stonnington.

2.13 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

2.14 Aircraft Management

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

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

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

Suitable airbase facilities are located at:

- Essendon
- Moorabbin

2.15 Resupply

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

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

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

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

2.16 Essential Community Infrastructure and Property Protection

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

The Stonnington City Council does not maintain a stock of sandbags; supplies are available through the VICSES Regional Headquarters. The Incident Controller will determine the priorities related the use of sandbags, which will be consistent with the strategic priorities.

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

2.17 Disruption to Services

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

2.18 Road Closures

City of Stonnington and VicRoads will carry out their formal functions of road closures including observation and placement of warning signs, road blocks etc. to its designated local and regional roads, bridges, walking and bike trails. The City of Stonnington staff may also liaise with and advise VicRoads as to the need or advisability of erecting warning signs and / or of closing roads and bridges under its jurisdiction. VicRoads are responsible for designated main roads and highways and Council's are responsible for the designated local and regional road network.

VICROADS and [Enter Municipality Name] will communicate community information regarding road closures.

2.19 Dam Failure

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

Major dams with potential to cause structural and community damage within the Municipality are contained in Appendix A.

2.20 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 responsibility 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 City of Stonnington Environmental Health Officer to inspect and report to the MERO and the ICC on any water quality issues relating to flooding.

2.21 After Action Review

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

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

Part 3. EMERGENCY RELIEF AND RECOVERY ARRANGEMENTS

3.1 General

Arrangements for recovery from a flood incident within City of Stonnington are detailed in the City of Stonnington MEMP and/or the Recovery Sub-plan.

3.2 Emergency Relief

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

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

Suitable relief facilities identified for use during floods are detailed in the MEMPlan as well as details for relief arrangements.

3.3 Animal Welfare

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

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

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

Refer to City of Stonnington MEMPlan for details of animal shelter compound locations.

3.4 Transition from Response to Recovery

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

APPENDIX A - FLOOD THREATS FOR CITY OF STONNINGTON

GENERAL

The City of Stonnington is located in Melbourne's inner south-eastern suburbs covering an area of 25.6 square kilometres. The City of Stonnington consists of the suburbs of Prahran, Windsor (part), South Yarra (part), Toorak, Armadale, Malvern, Malvern East, Kooyong and Glen Iris (part).

The Yarra River and Gardiners Creek form the northern boundary of the municipality and the City of Stonnington shares this boundary with the Cities of Yarra and Boroondara; Punt Road is the western boundary with the City of Melbourne; Warrigal Road forms the eastern boundary with the City of Monash; and Dandenong Road and Princes Highway/Queens Way form the southern boundary with the Cities of Port Phillip and Glen Eira.

The City is primarily a residential area, with some commercial, industrial and institutional land uses. Stonnington has significant commercial centres along Chapel Street, Toorak Road, High Street, Glenferrie Road and at the Chadstone Shopping Centre in East Malvern. Stonnington has a variety of parks, gardens and open space including Victoria Gardens, Central Park and the Glen Iris Wetlands. Recreation facilities include the Malvern Valley Golf Club, two aquatic centres, sports grounds, tennis centres and bicycle paths.

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 around areas adjacent to the Yarra River. 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 that connect to the Yarra River around South Yarra to discharge stormwater runoff into the river.

DESCRIPTION OF MAJOR WATERWAYS & DRAINS

The City of Stonnington has three major waterways: Yarra River; Gardiners Creek; and Scotchmans Creek. Gardiners Creek and Scotchmans Creek flow into the Yarra River which enters Port Phillip Bay at Port Melbourne.

Melbourne Water has 18 Main Drains and Drains within the City of Stonnington noted in the table below.

Melbourne Water Drains & Waterways	Suburb/s	Melbourne Water Drains & Waterways	Suburb/s
Beatty Avenue Main Drain	Armadale & Toorak	Moonga Road Main Drain	Toorak
Canberra Road Main Drain	Toorak	Murrumbeena Main Drain	Malvern East
Chadstone Main Drain	Malvern East	Prahran Main Drain	Armadale, South Yarra & Toorak
Creswick Street Main Drain	Glen Iris & Malvern	Scotchmans Creek Main Drain	Malvern East
Darling Road Main Drain	Ashburton & Malvern East	Surrey Road Main Drain	Prahran & South Yarra
East Malvern Main Drain	Malvern East	Tooronga Road Main Drain	Glen Iris, Malvern & Malvern East
Essex Street Main Drain	Prahran, South Yarra & Windsor	Union Street Main Drain	Windsor
Gardiners Creek	Glen Iris, Kooyong, Malvern, Malvern East & Toorak	Williams Road Main Drain	South Yarra & Toorak
Hedgeley Dene Main Drain	Glen Iris & Malvern East	Yarra Street Drain, Prahran	Toorak
Lara Street Main Drain	Malvern		

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

FLOOD MITIGATION SYSTEMS

There are no formal retarding basins, levees or pumping stations in the City of Stonnington. A number of reserves and parklands act as retarding basins during flooding events. These include:

Reserve / Park	On Drain / Waterway	Location
Como Park	Williams Road Diversion Drain & Yarra River	Williams Road, South Yarra
Darling Park	Gardiners Creek	Basil Street, Malvern East
Glen Iris Park	Gardiners Creek	High Street, Glen Iris
Kooyong Park	Gardiners Creek	Talbot Crescent, Kooyong
Princes Gardens	Essex Street Drain	Malvern Road, South Yarra
Treyvaud Memorial Park	Chadstone Main Drain	Chadstone Road, Malvern East

Table A2 – Reserves or Parks in the City of Stonnington that may hold water during a flood event

SEWERAGE INFRASTRUCTURE

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

SEWER EMERGENCY RELIEF POINTS

On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Yarra River	South	Alexandra Avenue at the Railway Bridge, South Yarra	2L H2
Yarra River	East	Denham Street, Hawthorn	2H H6
Gardiners Creek	South East	The Harlequin Rugby Club, Ashwood Reserve, 106 High Street Road, Ashwood	60 G12
Gardiners Creek	South	Malvern Valley Public Golf Course, Golfers Drive, Malvern East	69 C1
Gardiners Creek	East	Patterson Reserve, Auburn Road, Hawthorn	59 E3
Gardiners Creek	South	Along Gardiners Creek Trail bordering St Kevins College and the Kooyong Lawn Tennis Club, Toorak	59 B3

Table A3 – Sewer Emergency Relief Points within or close to the City of Stonnington

FLOOD WARNING SYSTEM

Within the City of Stonnington, Melbourne Water has three hydrographic monitoring sites along the two major waterways in the Municipality. These are outlined in the table below. There are also monitors upstream from the Municipality, including at Fairfield, Abbotsford, Hawthorn and Ashwood. These gauges can be monitored online through Melbourne Water at: <http://www.melbournewater.com.au/waterdata/rainfallandriverleveldata/Pages/Rainfall-and-river-level-new.aspx> or through the Bureau of Meteorology at: http://www.bom.gov.au/cgi-bin/wrap_fwo.pl?IDV60201.html. To view their locations, see mapping in **Appendix F**.

Hydrographic Monitoring Station	Station No.	Location	Owner	Gauge Type	Melway Ref
Yarra River at Burnley	229621A	North side of River and Freeway at SP AusNet Richmond Terminal Station, Richmond	Melbourne Water	Tide Level & Rain	44 G12
Gardiners Creek at Glenferrie Rd, Hawthorn	229231A	North side of Channel at Glenferrie Road bridge under the Monash Fwy, Hawthorn	Melbourne Water	Stream Level	59 C2
Gardiners Creek at Gardiner	229624A	Southwest side of the creek at Great Valley Road bridge, Glen Iris	Melbourne Water	Stream Level & Rain	59 J7

Table A4 – Hydrographic Monitoring Stations within the City of Stonnington

Other gauges located in adjoining Municipalities that may assist in flood warning for the Yarra River, Gardiners Creek and Stormwater Drains are outlined below. To view their locations, see mapping in **Appendix F**.

Hydrographic Monitoring Station	Station No.	Location	Owner	Gauge Type	Melway Ref
Yarra River at Chandler Hwy, Fairfield	229143A	North side of the river at Chandler Hwy bridge, Fairfield	Melbourne Water	Stream Level & Rain	31 B12
Yarra River at Johnston St, Abbotsford	229622A	West side of the river at Johnston St bridge, Abbotsford	Melbourne Water	Stream Level	2D C8
Yarra River at Hawthorn	229687A	West side of the river at Wallen Road bridge, Burnley	Melbourne Water	Tide Level & Rain	45 A11
Gardiners Creek at Ashwood	229625A	East side of the Creek adjacent to Hedley Hull Field, Ashwood	Melbourne Water	Stream Level & Rain	60 H11
Caulfield North	586194	Caulfield Park, Balaclava Road, Caulfield North	Melbourne Water	Rain	59 C12

Table A5 – Hydrographic Monitoring Stations within adjacent Municipalities to the City of Stonnington

There are currently three Melbourne Water flood warning gauges on the Yarra River and Gardiners Creek that could be used to assist with public safety through the issue of flood warnings. These are at Fairfield, Abbotsford & Gardiner. Those gauges with flood class levels established are outlined in the table below.

Hydrographic Monitoring Station	River / Creek Flood Class Level (m)		
	Minor	Moderate	Major
Yarra River at Chandler Hwy, Fairfield	3.0m	6.0m	8.7m
Yarra River at Johnston St, Abbotsford	2.7m	6.7m	8.9m
Gardiners Creek at Gardiner	3.4m	4.4m	4.8m

Table A6 – Hydrographic Monitoring Stations with established Flood Class Levels for the City of Stonnington

At these sites on the Yarra River and Gardiners 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 Stonnington monitors these warnings in times of high rainfall, there are no specific guidelines to advise how these situations should be responded to.

HISTORIC FLOODS

Historically, the Stonnington municipality was significantly impacted by flooding from the Yarra River. In the Great Flood of 1891, for example, the Yarra River rose 14 metres above its normal level in some areas. It flooded many riverside suburbs including Prahran and caused extensive damage. There was also extensive flooding along the Yarra River in 1934. Since the 1891 flood, extensive remedial work has been carried out on the lower Yarra River, including widening and redirecting its course to Port Phillip Bay. As a result, the impact of riverine flooding on the community has now been substantially reduced.

The last major flooding within the Stonnington municipality was in February 2011 when large areas across the municipality were affected. The storm caused significant basement flooding with some evacuations of residential and commercial property. It also affected public areas and infrastructure.

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

Event	Yarra River at Abbotsford (229622A)	Yarra River at Burnley (229621A)		Gardiners Creek at Gardiner (229624A)	
	River Height	Rainfall at Gauge	River (Tide) Height	Rainfall at Gauge	Creek Height
Normal Water Level	0.89m	-	0.61m	-	0.22m
Minor Flood Class	2.7m	-	-	-	3.4m
Moderate Flood Class	6.7m	-	-	-	4.4m
Major Flood Class	8.9m	-	-	-	4.8m
13 th July 1891	12.60m	-	7.38m	-	-
20 th October 1901	9.53m	-	3.98m	-	-
23 rd September 1916	9.37m	-	3.96m	-	-
1 st December 1934	12.55m	-	5.55m	-	5.41m
18 th October 1937	7.98m	-	2.70m	-	3.22m
13 th July 1952	9.75m	-	-	-	3.90m
22 nd September 1952	9.23m	-	-	-	-
8 th August 1978	4.47m	-	1.40m	-	3.24m
19 th November 1978	5.19m	-	1.91m	-	-
25 th December 1978	-	-	1.53m	-	4.76m
6 th October 1979	2.75m	-	1.29m	-	3.41m
19 th September 1984	-	-	2.20m	-	4.77m
30 th July 1987	6.02m	-	1.92m	-	2.89m
22 nd November 1988	4.11m	-	1.38m	-	4.42m
11 th June 1989	5.94m	39mm / 45hrs	1.87m	28mm/ 20hrs	1.46m
22 nd March 1991	2.01m	39mm / 22hrs	1.33m	75mm/ 11hrs	3.80m
19 th September 1991	3.35m	-	1.58m	62mm/ 8days	1.40m
11 th October 1992	5.13m	55mm / 6days	1.63m	75mm/ 6days	2.05m
27 th December 1993	4.83m	79mm / 49hrs	1.68m	91mm/ 49hrs	3.96m
1 st August 1996	4.92m	35mm / 37hrs	1.73m	49mm/ 36hrs	0.83m
3 rd December 2003	5.38m	41mm / 8 hrs	1.99m	-	3.35m
8 th November 2004	5.50m	87mm / 6days	1.83m	91mm / 6days	2.75m
3 rd February 2005	6.50m	138mm / 37hrs	2.94m	132mm/ 37hrs	4.15m
25 th February 2006	2.76m	56mm / 17hrs	1.35m	65mm/ 10hrs	4.49m
2 nd December 2007	2.20m	14mm / 11 hrs	1.17m	36mm/ 12hrs	3.53m
5 st February 2011	4.53m	122mm / 33 hrs	1.27m	152mm/ 32hrs	5.60m
12 th April 2011	3.71m	80mm / 65hrs	1.29m	83mm/ 66hrs	3.63m
27 th November 2011	3.46m	52mm / 23hrs	1.01m	68mm / 23hrs	1.64m
25 th December 2011	4.19m	40mm / 16hrs	0.94m	30mm / 14hrs	2.24m
1 st June 2013	5.25m	54mm / 14hrs	1.69m	65mm/ 17hrs	2.41m

Table A7 – Selection of Historical Flood Events along the lower Yarra River and Gardiners Creek

DAM FAILURE

Flooding resulting from failure of the following dams is likely to cause significant structural and community damage within the City of Stonnington. 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
Sugarloaf Reservoir	Christmas Hills	Melbourne Water	93,411 ML	178.00m AHD	273E6
Upper Yarra Reservoir	Reefton	Melbourne Water	200,051 ML	366.53m AHD	-

Table A8 – Melbourne Water Reservoirs that pose a risk to the City of Stonnington from Dam Failure

APPENDIX B - TYPICAL FLOOD PEAK TRAVEL TIMES

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

Note that flooding will start some time ahead of the time indicated by the following travel times – these are the time between the flood peaks at respective sites.

Where negative values are shown in the table below this indicates that a flood peak may be expected at the gauge downstream before a separate flood peak is experienced at the upstream gauge. This phenomenon may be due to the location of the thunderstorm passing through the catchment between the two gauges, or because of the urban environment found downstream causing floodwaters to enter the waterway quicker than those in a more rural setting upstream. Lastly this may be because of the existence of a retarding basin between the two gauges.

1. Typical Travel Times

Location From (gauge)	Location To (gauge)	Typical Travel Time	Comments
YARRA RIVER			
Abbotsford	Burnley	Between 1 min and 5 hours	Minor Flood (this section of river is affected by tidal flows from Port Phillip Bay)
Abbotsford	Burnley	Unknown	Moderate Flood (this section of river is affected by tidal flows from Port Phillip Bay)
Abbotsford	Burnley	Unknown	Major Flood (this section of river is affected by tidal flows from Port Phillip Bay)
GARDINERS CREEK			
Ashwood	Gardiner	Between 1 min and 2 hours	Minor Flood
Ashwood	Gardiner	Around 1 hour	Moderate Flood
Ashwood	Gardiner	Around 1 hour	Major Flood

Table B1 – Typical Flood Travel Times between gauges on the lower Yarra River and Gardiners Creek

2. Historical Travel Times

Flood Event	Location From (gauge)	Location To (gauge)	Flood Peak Travel Time	Flood Class at
YARRA RIVER				Abbotsford
8 th August 1978	Abbotsford	Burnley	Burnley peaked 2 hours before Abbotsford	Minor
19 th November 1978	Abbotsford	Burnley	3 hours	Minor
May 1981	Abbotsford	Burnley	Less than 1 hour	Minor
30 th July 1987	Abbotsford	Burnley	2 hours	Minor
11 th June 1989	Abbotsford	Burnley	Burnley peaked 1 hour before Abbotsford	Minor
19 th September 1991	Abbotsford	Burnley	Burnley peaked 3 hours before Abbotsford	Minor
11 th October 1992	Abbotsford	Burnley	Less than 1 hour	Minor
27 th December 1993	Abbotsford	Burnley	2 hours	Minor
1 st August 1996	Abbotsford	Burnley	2 hours	Minor
3 rd December 2003	Abbotsford	Burnley	Less than 1 hour	Minor
8 th November 2004	Abbotsford	Burnley	6 hours	Minor

Flood Event	Location From (gauge)	Location To (gauge)	Flood Peak Travel Time	Flood Class at
3 rd February 2005	Abbotsford	Burnley	Unknown	Minor
5 th February 2011	Abbotsford	Burnley	3 hours	Minor
25 th December 2011	Abbotsford	Burnley	5 hours	Minor
1 st June 2013	Abbotsford	Burnley	1 hour	Minor
GARDINERS CREEK				Gardiner
25 th December 1978	Ashwood	Gardiner	1 hour	Moderate
6 th October 1979	Ashwood	Gardiner	Less than 1 hour	Minor
19 th September 1984	Ashwood	Gardiner	1 hour	Moderate
22 nd November 1988	Ashwood	Gardiner	1 hour	Moderate
22 nd March 1991	Ashwood	Gardiner	1 hour	Minor
27 th December 1993	Ashwood	Gardiner	1 hour	Minor
3 rd February 2005	Ashwood	Gardiner	1 hour	Minor
25 th February 2006	Ashwood	Gardiner	Less than 1 hour	Moderate
2 nd December 2007	Ashwood	Gardiner	1 hour	Minor
5 th February 2011	Ashwood	Gardiner	1 hour	Major
12 nd April 2011	Ashwood	Gardiner	2 hours	Minor

Table B2 – Historical Flood Travel Times between gauges on the lower Yarra River and Gardiners Creek

APPENDIX C1 – YARRA RIVER FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Toorak & South Yarra are located approximately 4km south east of Melbourne in a predominantly residential area. The Yarra River is the prominent watercourse in the area, flowing from the North East through the municipalities of Yarra, Boroondara and beyond. High Intensity, short duration rainfall events can cause flash flooding in and around the area, while prolonged rainfall may see the Yarra River flood.

Flooding is also influenced by tidal conditions which extend up the Yarra River beyond the City of Stonnington. See mapping in **Appendix F** for more insight into flooding in the area.

WARNING TIMES

Warnings are available for flooding expected along the lower Yarra River at Abbotsford, just upstream of the City of Stonnington. For other hydrographic/telemetry (river gauges) within the Municipality, Melbourne Water does not provide any flood warning service at this point, due to the influence of tidal flows.

Hydrographic Monitoring Station	Station No.	Location	Owner	Gauge Type	Melway Ref
Yarra River at Chandler Hwy, Fairfield	229143A	North side of the river at Chandler Hwy bridge, Fairfield	Melbourne Water	Stream Level & Rain	31 B12
Yarra River at Johnston St, Abbotsford	229622A	West side of the river at Johnston St bridge, Abbotsford	Melbourne Water	Stream Level	2D C8
Yarra River at Hawthorn	229687A	West side of the river at Wallen Road bridge, Burnley	Melbourne Water	Tide Level & Rain	45 A11
Yarra River at Burnley	229621A	North side of River and Freeway at SP AusNet Richmond Terminal Station, Richmond	Melbourne Water	Tide Level & Rain	44 G12

Table C1.1 – Hydrographic Monitoring Stations within the lower Yarra River catchment

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

AREAS OF FLOOD RISK

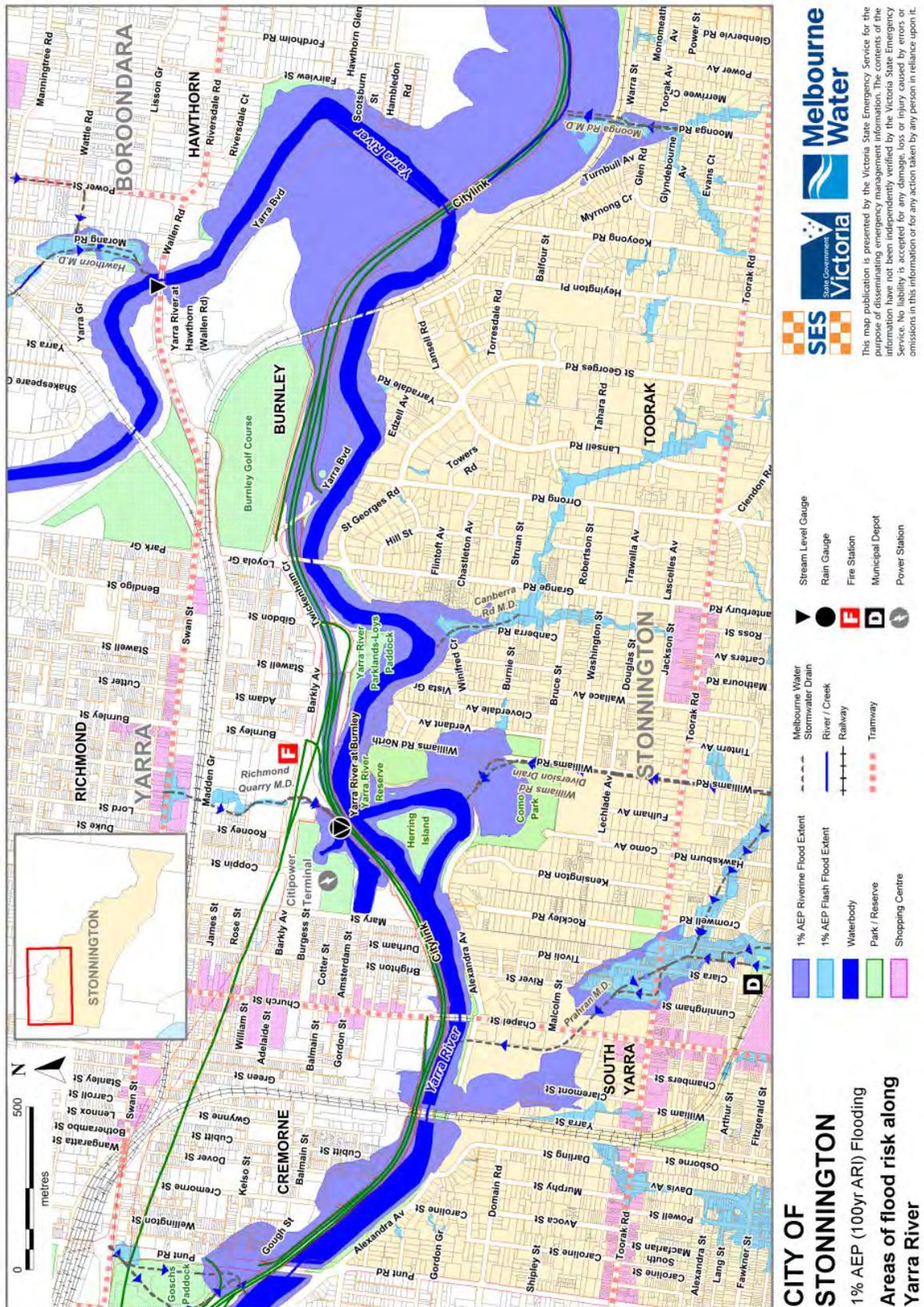


Figure C1 – Areas of flood risk along the Yarra River in the City of Stonnington

PROPERTIES AT FLOOD RISK

Properties listed in the table below are at risk from flooding during a 1% AEP Yarra River flood event. As more intelligence becomes available, this list may grow.

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

No. of Property in Street	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
1/159	Alexandra Avenue	Toorak	Yarra River	Riverine
2/159	Alexandra Avenue	Toorak	Yarra River	Riverine
3/159	Alexandra Avenue	Toorak	Yarra River	Riverine
4/159	Alexandra Avenue	Toorak	Yarra River	Riverine
5/159	Alexandra Avenue	Toorak	Yarra River	Riverine
6/159	Alexandra Avenue	Toorak	Yarra River	Riverine
7/159	Alexandra Avenue	Toorak	Yarra River	Riverine
8/159	Alexandra Avenue	Toorak	Yarra River	Riverine
9/159	Alexandra Avenue	Toorak	Yarra River	Riverine
10/159	Alexandra Avenue	Toorak	Yarra River	Riverine
11/159	Alexandra Avenue	Toorak	Yarra River	Riverine
12/159	Alexandra Avenue	Toorak	Yarra River	Riverine
1/161	Alexandra Avenue	Toorak	Yarra River	Riverine
2/161	Alexandra Avenue	Toorak	Yarra River	Riverine
3/161	Alexandra Avenue	Toorak	Yarra River	Riverine
4/161	Alexandra Avenue	Toorak	Yarra River	Riverine
5/161	Alexandra Avenue	Toorak	Yarra River	Riverine
6/161	Alexandra Avenue	Toorak	Yarra River	Riverine
7/161	Alexandra Avenue	Toorak	Yarra River	Riverine
8/161	Alexandra Avenue	Toorak	Yarra River	Riverine
9/161	Alexandra Avenue	Toorak	Yarra River	Riverine
10/161	Alexandra Avenue	Toorak	Yarra River	Riverine
21	Canberra Road	Toorak	Yarra River	Riverine
23	Canberra Road	Toorak	Yarra River	Riverine
1/25	Canberra Road	Toorak	Yarra River	Riverine
2/25	Canberra Road	Toorak	Yarra River	Riverine
26	Canberra Road	Toorak	Yarra River	Riverine
27	Canberra Road	Toorak	Yarra River	Riverine
29	Canberra Road	Toorak	Yarra River	Riverine
30	Canberra Road	Toorak	Yarra River	Riverine
32	Canberra Road	Toorak	Yarra River	Riverine
34	Canberra Road	Toorak	Yarra River	Riverine
36	Canberra Road	Toorak	Yarra River	Riverine
38	Canberra Road	Toorak	Yarra River	Riverine
40	Canberra Road	Toorak	Yarra River	Riverine
42	Canberra Road	Toorak	Yarra River	Riverine
1/44	Canberra Road	Toorak	Yarra River	Riverine
2/44	Canberra Road	Toorak	Yarra River	Riverine
46	Canberra Road	Toorak	Yarra River	Riverine
24-26	Claremont Street	South Yarra	Yarra River	Riverine
25	Claremont Street	South Yarra	Yarra River	Riverine

No. of Property in Street	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
28	Claremont Street	South Yarra	Yarra River	Riverine
29	Claremont Street	South Yarra	Yarra River	Riverine
30-32	Claremont Street	South Yarra	Yarra River	Riverine
33	Claremont Street	South Yarra	Yarra River	Riverine
34-36	Claremont Street	South Yarra	Yarra River	Riverine
37	Claremont Street	South Yarra	Yarra River	Riverine
38-40	Claremont Street	South Yarra	Yarra River	Riverine
39-41	Claremont Street	South Yarra	Yarra River	Riverine
42-48	Claremont Street	South Yarra	Yarra River	Riverine
45	Claremont Street	South Yarra	Yarra River	Riverine
49	Claremont Street	South Yarra	Yarra River	Riverine
51	Claremont Street	South Yarra	Yarra River	Riverine
55	Claremont Street	South Yarra	Yarra River	Riverine
56-58	Claremont Street	South Yarra	Yarra River	Riverine
3-5	Edzell Avenue	Toorak	Yarra River	Riverine
7	Edzell Avenue	Toorak	Yarra River	Riverine
9	Edzell Avenue	Toorak	Yarra River	Riverine
1	Forrest Hill	South Yarra	Yarra River	Riverine
1/91A	Grange Road	Toorak	Yarra River	Riverine
2/91A	Grange Road	Toorak	Yarra River	Riverine
1	Matthews Court	Toorak	Yarra River	Riverine
1A	Matthews Court	Toorak	Yarra River	Riverine
805	Orrong Road	Toorak	Yarra River	Riverine
106	St Georges Road	Toorak	Yarra River	Riverine
108	St Georges Road	Toorak	Yarra River	Riverine
110	St Georges Road	Toorak	Yarra River	Riverine
112	St Georges Road	Toorak	Yarra River	Riverine
114	St Georges Road	Toorak	Yarra River	Riverine
116	St Georges Road	Toorak	Yarra River	Riverine
118	St Georges Road	Toorak	Yarra River	Riverine
120	St Georges Road	Toorak	Yarra River	Riverine
16	Winifred Crescent	Toorak	Yarra River	Riverine
18	Winifred Crescent	Toorak	Yarra River	Riverine
12	Yarra Street	South Yarra	Yarra River	Riverine
15	Yarradale Road	Toorak	Yarra River	Riverine
17	Yarradale Road	Toorak	Yarra River	Riverine
19	Yarradale Road	Toorak	Yarra River	Riverine
21	Yarradale Road	Toorak	Yarra River	Riverine
Totals				
79				

Table C1.2 – Properties at risk of flooding along the Yarra River catchment in the City of Stonnington

ISOLATION

No major isolation risks exist for Toorak or South Yarra as a result of the Yarra River flooding during a 1% AEP (100yr ARI) event. Some localised short-duration isolation may occur due to flash flooding.

ESSENTIAL INFRASTRUCTURE

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. <http://ptv.vic.gov.au/live-travel-updates/>

Apart from the roads outlined below, all other essential infrastructure and services areas around Toorak & South Yarra are expected to remain unaffected by a Yarra River flood during a 1% AEP (100yr ARI) event.

ROAD CLOSURES

The following roads are subject to closure during flooding along the Yarra River in Toorak & South Yarra. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
<ul style="list-style-type: none">Alexandra Avenue, Toorak between Grange Road and Williams Road (Como Park), and in South Yarra at Railway Underpass
<ul style="list-style-type: none">Citylink (Monash) Freeway
<ul style="list-style-type: none">Williams Road North, Toorak

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

Stonnington City Council Roads flooded in a 1% AEP (100yr ARI) event	
SOUTH YARRA	TOORAK
<ul style="list-style-type: none">Claremont Street	<ul style="list-style-type: none">Canberra Road
<ul style="list-style-type: none">Yarra Street	<ul style="list-style-type: none">Winifred Crescent

Table C1.4 – Stonnington City Council Possible Road Closures during a flooding event

FLOOD MITIGATION

There are no formal retarding basins, levees or pumping stations along the Yarra River in the City of Stonnington. A number of reserves and parklands act as retarding basins during flooding events. These include:

Reserve / Park	On Drain / Waterway	Location	Melway Reference
Como Park	Williams Road Diversion Drain & Yarra River	Williams Road, South Yarra	2M C3

Table C1.5 – Parks and Reserves along the Yarra River in the City of Stonnington

SEWERAGE INFRASTRUCTURE

Sewerage Infrastructure of note during a severe flood event located along the Yarra River in or near the City of Stonnington is contained within the following table.

SEWER EMERGENCY RELIEF POINTS

On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Yarra River	South	Alexandra Avenue at the Railway Bridge, South Yarra	2L H2
Yarra River	East	Denham Street, Hawthorn	2H H6

Table C1.6 – Sewer Emergency Relief Points in the Yarra River Catchment in the City of Stonnington

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) event. Refer to the following intelligence card for the Yarra River at Burnley for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	61
Business / Multi Use	17
Industrial	0
Public Land	1
Rural	0
Total	79

Table C1.7 – Breakdown of likely land use flooded along the Yarra River in the City of Stonnington during a 1% AEP event

FLOOD INTELLIGENCE CARD – BURNLEY GAUGE, YARRA RIVER

Version 2 – May 2016



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

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LOCATION	North side of River and Freeway at SP AusNet Richmond Terminal Station, Richmond
MELWAY REFERENCE:	44 G12
STREAM:	Yarra River
GAUGE NUMBER:	229621A
GAUGE ZERO:	0.00m AHD
GAUGE TYPE	Tide Level & Rain

MINOR:	Not Established
MODERATE:	Not Established
MAJOR	Not Established
LEVEE HEIGHT:	N/A
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	7.38m (13 th July 1891)

River Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
1.1m		<ul style="list-style-type: none"> Water Level at top of wharf at Burnley Depot (SP AusNet Richmond Terminal Station), Barkley St Richmond (Melway 58F1-G1) 	
2.9m	10% AEP (10yr ARI) Flood Level		
3.6m	5% AEP (20yr ARI) Flood Level		
4.9m	2% AEP (50yr ARI) Flood Level		
5.5m	1% AEP (100yr ARI) Flood Level	<p>Properties at Flood Risk</p> <p>79 Properties in Total</p> <ul style="list-style-type: none"> 15, 17, 19 & 21 Yarradale Road, Toorak 3-5, 7 & 9 Edzell Avenue, Toorak 	

River Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> • 805 Orrong Road, Toorak • 106, 108, 110, 112, 114, 116, 118 & 120 St Georges Road, Toorak • 1 & 1A Matthews Court, Toorak • 1/91A & 2/91A Grange Road, Toorak • 16 & 18 Winifred Crescent, Toorak • 21, 23, 1/25, 2/25, 26, 27, 29, 30, 32, 34, 36, 38, 40, 42, 1/44, 2/44 & 46 Canberra Road, Toorak • Units 1-12/159 & Units 1-10/161 Alexandra Avenue, Toorak • 24-26, 25, 28, 29, 30-32, 33, 34-36, 37, 38-40, 39-41, 42-48, 45, 49, 51, 55 & 56-58 Claremont Street, South Yarra • 12 Yarra Street, South Yarra • 1 Forrest Hill, South Yarra <p>Community Infrastructure at Risk</p> <ul style="list-style-type: none"> • St Kevins College, Toorak flooded largely around sporting grounds • Capital City Yarra Trail flooded at various sections between the MacRobertson Bridge, Toorak and Punt Road, South Yarra • Rowing Clubs on Alexandra Ave, South Yarra near Herring Island flooded around boat ramps and surrounding property • Como Park North flooded • Como Park Oval flooded • Royal South Yarra Lawn Tennis Club flooded • Melbourne High School Sports Ground <p>Water Over Road</p> <ul style="list-style-type: none"> • CityLink (Monash) Freeway • Alexandra Avenue, Toorak between Grange Road and Williams Road (Como Park), and in South Yarra at Railway Underpass • Canberra Road, Toorak near Winifred Crescent • Winifred Crescent, Toorak • Williams Road North, Toorak • Yarra Street, South Yarra near Alexandra Avenue • Claremont Street, South Yarra 	

APPENDIX C2 – GARDINERS CREEK FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Gardiners Creek and its adjoining suburbs of Malvern East, Glen Iris, Malvern, Kooyong and Toorak are located between 6 and 13km east of Melbourne in an established residential area. Gardiners Creek is the prominent watercourse in the area, flowing from the east through the Municipalities of Whitehorse and Monash. High Intensity, short duration rainfall events can cause flash flooding in and around the local residential roads, while prolonged rainfall may see Gardiners Creek flood. The area sees moderate to slow water movement as floodwaters make their way along the flat recreational reserves that sit on the banks of Gardiners Creek. See mapping in **Appendix F** for more insight into flooding in the area.

WARNING TIMES

Warnings are available for flooding expected along Gardiners Creek at Gardiner. For other hydrographic/telemetry (river gauges) within the Municipality, Melbourne Water does not provide any flood warning service at this point, due to the generally short warning times available.

Hydrographic Monitoring Station	Station No.	Location	Owner	Gauge Type	Melway Ref
Gardiners Creek at Glenferrie Rd, Hawthorn	229231A	North side of Channel at Glenferrie Road bridge under the Monash Fwy, Hawthorn	Melbourne Water	Stream Level	59 C2
Gardiners Creek at Gardiner	229624A	Southwest side of the creek at Great Valley Road bridge, Glen Iris	Melbourne Water	Stream Level & Rain	59 J7
Gardiners Creek at Ashwood	229625A	East side of the Creek adjacent to Hedley Hull Field, Ashwood	Melbourne Water	Stream Level & Rain	60 H11

Table C2.1 – Hydrographic Monitoring Stations within the Gardiners Creek catchment

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

AREAS OF FLOOD RISK

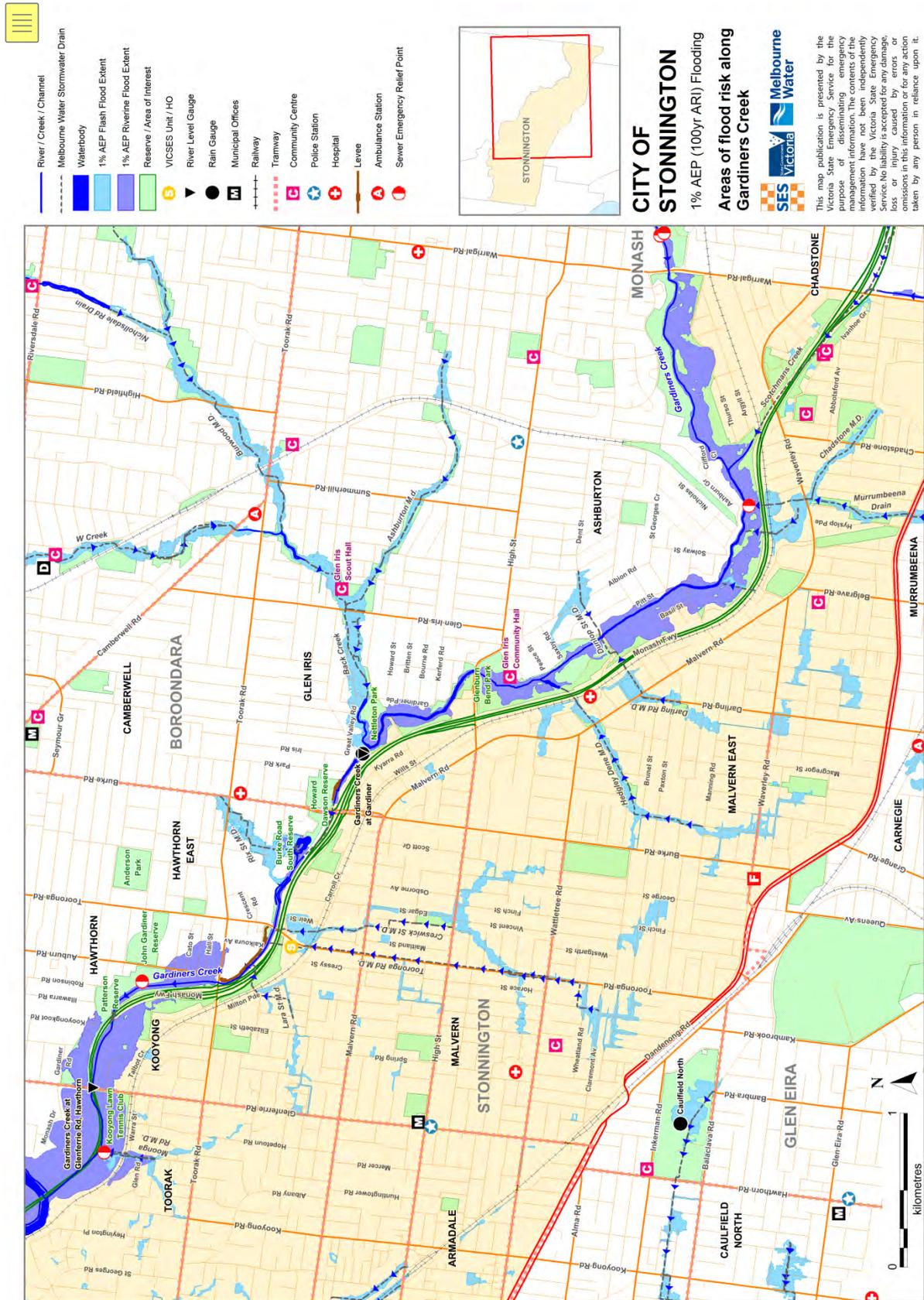


Figure C2 – Areas of flood risk around Gardiners Creek in the City of Stonnington

PROPERTIES AT FLOOD RISK

Properties listed in the table below are at risk from flooding along Gardiners Creek. As more intelligence becomes available, this list may change.

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

Property number in Street	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
3	Basil Street	Malvern East	Gardiners Creek	Riverine
1/4	Basil Street	Malvern East	Gardiners Creek	Riverine
5	Basil Street	Malvern East	Gardiners Creek	Riverine
1/6-8	Basil Street	Malvern East	Gardiners Creek	Riverine
2/6-8	Basil Street	Malvern East	Gardiners Creek	Riverine
7-11	Elm Road	Glen Iris	Gardiners Creek	Riverine
16	Glen Road	Toorak	Gardiners Creek	Riverine
18-20	Glen Road	Toorak	Gardiners Creek	Riverine
19	Glen Road	Toorak	Gardiners Creek	Riverine
21	Glen Road	Toorak	Gardiners Creek	Riverine
21A	Glen Road	Toorak	Gardiners Creek	Riverine
23	Glen Road	Toorak	Gardiners Creek	Riverine
25	Glen Road	Toorak	Gardiners Creek	Riverine
446-456	Glenferrie Road	Kooyong	Gardiners Creek	Riverine
21	Glyndebourne Avenue	Toorak	Gardiners Creek	Riverine
23	Glyndebourne Avenue	Toorak	Gardiners Creek	Riverine
1	Golfers Drive	Malvern East	Gardiners Creek	Riverine
1650	High Street	Glen Iris	Gardiners Creek	Riverine
20	Moonga Road	Toorak	Gardiners Creek	Riverine
25	Moonga Road	Toorak	Gardiners Creek	Riverine
31	Moonga Road	Toorak	Gardiners Creek	Riverine
489	Talbot Crescent	Kooyong	Gardiners Creek	Riverine
3/17	Talbot Crescent	Kooyong	Gardiners Creek	Riverine
2/19	Talbot Crescent	Kooyong	Gardiners Creek	Riverine
3/19	Talbot Crescent	Kooyong	Gardiners Creek	Riverine
2	Thornbury Crescent	Malvern East	Gardiners Creek	Riverine
1/4-6	Thornbury Crescent	Malvern East	Gardiners Creek	Riverine
2/4-6	Thornbury Crescent	Malvern East	Gardiners Creek	Riverine
3/4-6	Thornbury Crescent	Malvern East	Gardiners Creek	Riverine
1	Toorak Avenue	Toorak	Gardiners Creek	Riverine
2	Toorak Avenue	Toorak	Gardiners Creek	Riverine
2	Turnbull Avenue	Toorak	Gardiners Creek	Riverine
4	Turnbull Avenue	Toorak	Gardiners Creek	Riverine
6	Turnbull Avenue	Toorak	Gardiners Creek	Riverine
1/2-4	Warra Street	Toorak	Gardiners Creek	Riverine
2/2-4	Warra Street	Toorak	Gardiners Creek	Riverine
3/2-4	Warra Street	Toorak	Gardiners Creek	Riverine
4/2-4	Warra Street	Toorak	Gardiners Creek	Riverine
5/2-4	Warra Street	Toorak	Gardiners Creek	Riverine
6/2-4	Warra Street	Toorak	Gardiners Creek	Riverine
7/2-4	Warra Street	Toorak	Gardiners Creek	Riverine

Property number in Street	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
8/2-4	Warra Street	Toorak	Gardiners Creek	Riverine
9/2-4	Warra Street	Toorak	Gardiners Creek	Riverine
10/2-4	Warra Street	Toorak	Gardiners Creek	Riverine
6	Warra Street	Toorak	Gardiners Creek	Riverine
21	Winton Road	Malvern East	Gardiners Creek	Riverine
23	Winton Road	Malvern East	Gardiners Creek	Riverine
25	Winton Road	Malvern East	Gardiners Creek	Riverine
Totals				
48				

Table C2.2 – Properties at risk of flooding along the Gardiners Creek catchment in the City of Stonnington

ISOLATION

No major isolation risks exist for areas along Gardiners Creek in the City of Stonnington during a 1% AEP (100yr ARI) event. Some localised short-duration isolation may occur due to flash flooding.

ESSENTIAL INFRASTRUCTURE

- **Tram Services** along Route 16 may be cut at stops 66 and 67 on Glenferrie Road, Kooyong
- **Council Waste Depot** and **Malvern SES** Local Headquarters possibly affected by flooding

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. <http://ptv.vic.gov.au/live-travel-updates/>

Apart from the roads outlined below, all other essential infrastructure and services areas around Malvern East, Glen Iris, Kooyong & Toorak are expected to remain unaffected by flooding during a 1% AEP (100yr ARI) event.

ROAD CLOSURES

The following roads are subject to closure during flooding along Gardiners Creek in Malvern East, Glen Iris, Kooyong & Toorak. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
<ul style="list-style-type: none"> • Glenferrie Road at Gardiners Creek crossing

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

Stonnington City Council Roads flooded in a 1% AEP (100yr ARI) event	
GLEN IRIS	TOORAK
<ul style="list-style-type: none"> • Brixton Rise 	<ul style="list-style-type: none"> • Glen Road
<ul style="list-style-type: none"> • Elm Road 	<ul style="list-style-type: none"> • Moonga Road
MALVERN EAST	<ul style="list-style-type: none"> • Turnbull Avenue
<ul style="list-style-type: none"> • Basil Street 	
<ul style="list-style-type: none"> • Stanley Grose Drive 	
<ul style="list-style-type: none"> • Winton Road 	

Table C2.4 – Stonnington City Council Possible Road Closures during a flooding event

FLOOD MITIGATION

No formal Retarding Basins, Pumping Stations or Levees exist along Gardiners Creek in the City of Stonnington. A number of reserves and parklands along Gardiners Creek may hold a large amount of stormwater during an event. These include:

Reserve / Park	On Drain / Waterway	Location	Melway Reference
Darling Park	Gardiners Creek	Basil Street, Malvern East	60 A11
Glen Iris Park	Gardiners Creek	High Street, Glen Iris	59 K9
Kooyong Park	Gardiners Creek	Talbot Crescent, Kooyong	59 D3

Table C2.5 – Parks and Reserves along the Gardiners Creek in the City of Stonnington

SEWERAGE INFRASTRUCTURE

Sewerage Infrastructure of note during a severe flood event located along Gardiners Creek in the City of Stonnington is contained within the following table.

SEWER EMERGENCY RELIEF POINTS

On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Gardiners Creek	South East	The Harlequin Rugby Club, Ashwood Reserve, 106 High Street Road, Ashwood	60 G12
Gardiners Creek	South	Malvern Valley Public Golf Course, Golfers Drive, Malvern East	69 C1
Gardiners Creek	East	Patterson Reserve, Auburn Road, Hawthorn	59 E3
Gardiners Creek	South	Along Gardiners Creek Trail bordering St Kevins College and the Kooyong Lawn Tennis Club, Toorak	59 B3

Table C2.6 – Sewer Emergency Relief Points in the Gardiners Creek Catchment in the City of Stonnington

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) event. Refer to the following intelligence cards for Gardiner and Hawthorn for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	42
Business / Special Use	3
Industrial	0
Public Land	3
Rural	0
Total	48

Table C2.7 – Breakdown of likely land use flooded in the Gardiners Creek Catchment in the City of Stonnington during a 1% AEP event

FLOOD INTELLIGENCE CARD – GARDINER GAUGE, GARDINERS CREEK

Version 2 – May 2016



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

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LOCATION	Southwest side of the creek at Great Valley Road bridge, Glen Iris
MELWAY REFERENCE:	59 J7
STREAM:	Gardiners Creek
GAUGE NUMBER:	229624
GAUGE ZERO:	8.362m AHD
GAUGE TYPE	Stream Level & Rain

MINOR:	3.4m
MODERATE:	4.4m
MAJOR	4.8m
LEVEE HEIGHT:	6.0m (Toorak Rd to Tooronga Rd)
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	5.60m (5 th February 2011)

Creek Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
3.4m	MINOR FLOOD LEVEL		
4.14m		<ul style="list-style-type: none"> Bank Full at Gauging Location 	
4.4m	MODERATE FLOOD LEVEL		
4.77m	September 1984 Flood Level Peak		
4.8m	MAJOR FLOOD LEVEL		
5.60m	February 2011 Flood Level Peak	Event Summary <ul style="list-style-type: none"> Properties affected by flooding on Gardiner Parade, Glen Iris 	

Creek Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
5.72m	1% AEP (100yr ARI) Flood Level (Major)	<ul style="list-style-type: none"> Solway Pedestrian Bridge was washed away <p>Properties at Flood Risk</p> <p>48 Properties in Total</p> <ul style="list-style-type: none"> 1 Golfers Drive, Malvern East 2 & Units 1-3/4-6 Thornbury Crescent, Malvern East 21, 23 & 25 Winton Road, Malvern East 3, 1/4, 5, 1/6-8 & 2/6-8 Basil Street, Malvern East 1650 High Street, Glen Iris 7-11 Elm Road, Glen Iris 446-456 & 489 Glenferrie Road, Kooyong 3/17 & Units 2-3/19 Talbot Crescent, Kooyong Units 1-10/2-4 & 6 Warra Street, Toorak 20, 25 & 31 Moonga Road, Toorak 1 & 2 Toorak Avenue, Toorak 21 & 23 Glyndebourne Avenue, Toorak 16, 18-20, 19, 21, 21A, 23 & 25 Glen Road, Toorak 2, 4 & 6 Turnbull Avenue, Toorak <p>Community Infrastructure Flooded</p> <ul style="list-style-type: none"> Malvern Valley Public Golf Course flooded, Club Rooms and Reception Centre not expected to be affected Solway Street Pedestrian Bridge, Malvern East likely to be overtopped Gardiners Creek Trail flooded at various locations Darling Park, Malvern East Pedestrian Footbridge over Gardiners Creek at Darling Park flooded Glen Iris Park & Wetlands Pedestrian Footbridge over Gardiners Creek at the Glen Iris Wetlands flooded Access may be restricted to MECWA Care Aged Community Housing Estate at 7-11 Elm Road, Glen Iris Kooyong Park, Kooyong. Northern recreational grounds flooded Vision Australia Kooyong Lawn Tennis Club, Kooyong St Kevins College likely flooding to sporting grounds <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> Tram Services along Route 16 may be cut at stops 66 and 67 on Glenferrie Road, Kooyong 	

Creek Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> • Council Waste Depot and Malvern SES Local Headquarters possibly affected by flooding Water Over Road (over 300mm depth) • Winton Road, Malvern East • Stanley Grose Drive, Malvern East • Basil Street, Malvern East • Brixton Rise, Glen Iris • Elm Road, Glen Iris • Glenferrie Road, Kooyong at Gardiners Creek crossing • Moonga Road, Toorak • Glen Road, Toorak • Turnbull Avenue, Toorak 	
6.0m		<ul style="list-style-type: none"> • Levee Overtopped between Tooronga Road and Toorak Road, Hawthorn 	

FLOOD INTELLIGENCE CARD – GLENFERRIE GAUGE, GARDINERS CREEK

Version 2 – May 2016



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

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LOCATION	North side of Channel at Glenferrie Road bridge under the Monash Fwy, Hawthorn
MELWAY REFERENCE:	59 C2
STREAM:	Gardiners Creek
GAUGE NUMBER:	229231A
GAUGE ZERO:	2.59m AHD
GAUGE TYPE	Stream Level

MINOR:	Not Established
MODERATE:	Not Established
MAJOR	Not Established
LEVEE HEIGHT:	5.30m (Toorak Rd to Tooronga Rd)
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	Unknown

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
4.94m	4 th February 2011 Flood Level Peak		
5.01m	1% AEP (100yr ARI) Flood Level	<p>Properties at Flood Risk 33 Properties in Total</p> <ul style="list-style-type: none"> • 446-456 & 489 Glenferrie Road, Kooyong • 3/17 & Units 2-3/19 Talbot Crescent, Kooyong • Units 1-10/2-4 & 6 Warra Street, Toorak • 20, 25 & 31 Moonga Road, Toorak • 1 & 2 Toorak Avenue, Toorak • 21 & 23 Glyndebourne Avenue, Toorak • 16, 18-20, 19, 21, 21A, 23 & 25 Glen Road, Toorak • 2, 4 & 6 Turnbull Avenue, Toorak <p>Community Infrastructure Flooded</p>	

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> • Kooyong Park, Kooyong. Northern recreational grounds flooded • Vision Australia • Kooyong Lawn Tennis Club, Kooyong • St Kevins College likely flooding to sporting grounds <p>Essential Infrastructure at Risk</p> <ul style="list-style-type: none"> • Tram Services along Route 16 may be cut at stops 66 and 67 on Glenferrie Road, Hawthorn <p>Water Over Road (Over 300mm Depth)</p> <ul style="list-style-type: none"> • Glenferrie Road, Kooyong at Gardiners Creek crossing • Moonga Road, Toorak • Glen Road, Toorak • Turnbull Avenue, Toorak 	
5.30m		<ul style="list-style-type: none"> • Levee Overtopped between Tooronga Road and Toorak Road, Hawthorn 	

APPENDIX C3 – PRAHRAN MAIN DRAIN FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

South Yarra, Prahran, Toorak, Armadale & Windsor are located approximately 5km south-east of Melbourne in an established residential area with business precincts along Chapel Street, Toorak Road, Malvern Road & High Street. To the north, the Yarra River provides the border for South Yarra and the City of Stonnington and is the prominent watercourse in the area. Three large Melbourne Water stormwater drains service the area: The Prahran, Essex Street & Surrey Road Main Drains which flow from south to north, converging together south of Toorak Road in South Yarra where they travel north to join the Yarra River.

Flash flooding is the primary concern for the area, with areas of flat terrain not able to discharge stormwater quick enough in high rainfall events. Flash flooding along the Chapel Street retail precinct has the potential to impact on traffic, trams and inundate shops, while the Sandringham, Frankston and Pakenham/Cranbourne railway lines in the area are also susceptible to inundation at Windsor Station and between Toorak & Armadale Stations. See mapping in **Appendix F** for more insight into flooding in the area.

WARNING TIMES

Neither the Bureau of Meteorology nor Melbourne Water currently provides flood forecasts for the Prahran Main Drain. All flood response actions must therefore be driven by rainfall and / or river level observations. Telemetered rain gauges are located at Burnley, Glen Iris & Caulfield North.

Hydrographic Monitoring Station	Station No.	Location	Owner	Gauge Type	Melway Ref
Yarra River at Burnley	229621A	North side of River and Freeway at SP AusNet Richmond Terminal Station, Richmond	Melbourne Water	Tide Level & Rain	44 G12
Gardiners Creek at Gardiner	229624A	Southwest side of the creek at Great Valley Road bridge, Glen Iris	Melbourne Water	Stream Level & Rain	59 J7
Caulfield North	586194	Caulfield Park, Balaclava Road, Caulfield North	Melbourne Water	Rain	59 C12

Table C3.1 – Hydrographic Monitoring Stations surrounding the Prahran Main Drain catchment

These Gauges may provide some warning of expected flooding. See the Melbourne Water website for more information on these gauges: <http://www.melbournewater.com.au/waterdata/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 VicSES website <http://www.ses.vic.gov.au/> for any thunderstorm, flood or severe weather warnings present for their area.

AREAS OF FLOOD RISK

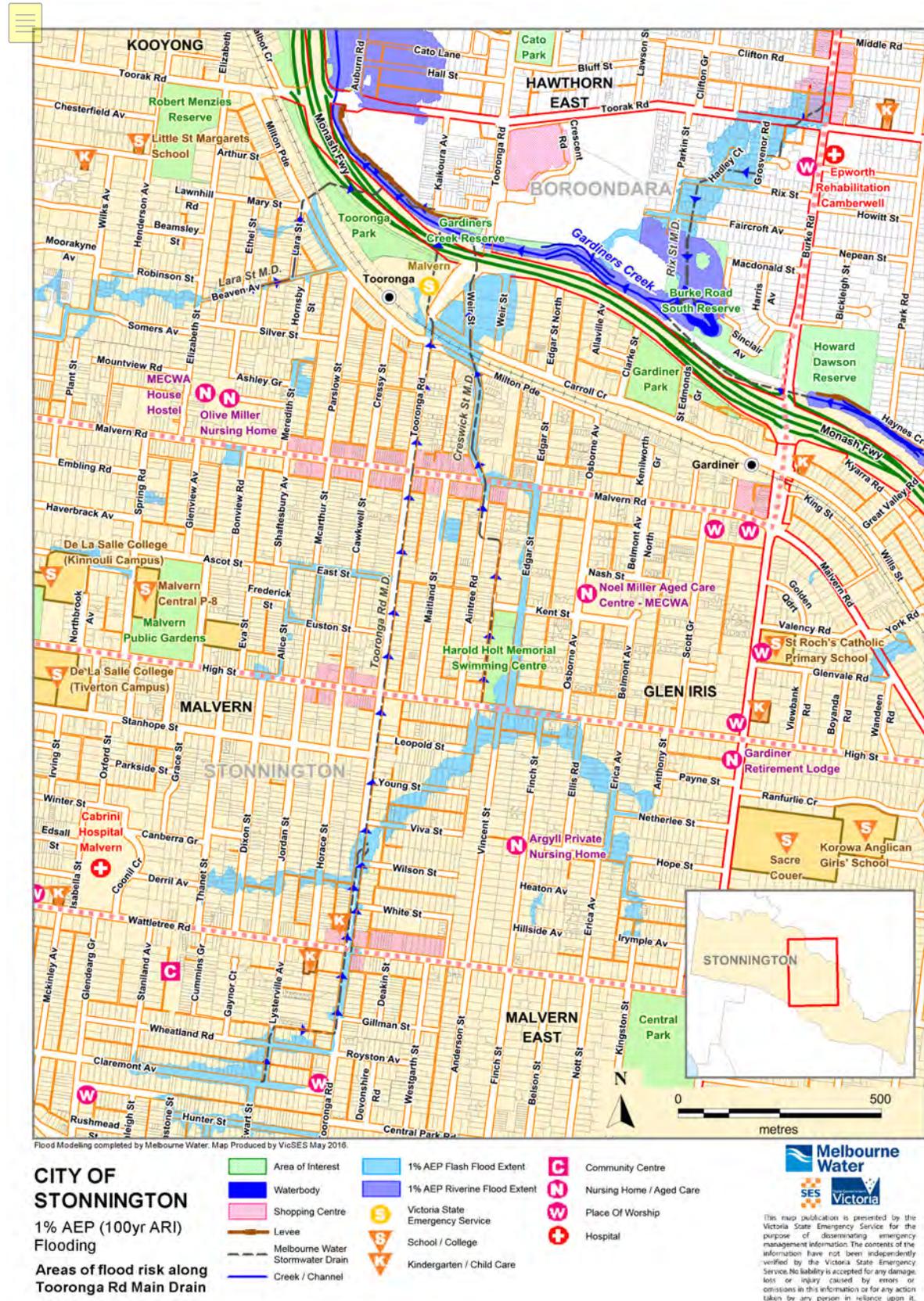


Figure C3 – Areas of flood risk around South Yarra, Prahran, Armadale & Toorak in the City of Stonnington

PROPERTIES AT FLOOD RISK

Properties listed in the table below are at risk from flooding over floor. As more intelligence becomes available, this list may change.

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
20% AEP	5% AEP	1% AEP				
-	-	22	Anchor Place	Prahran	Essex Street Main Drain	Flash
-	-	24	Anchor Place	Prahran	Essex Street Main Drain	Flash
-	-	6	Bangs Street	Prahran	Essex Street Main Drain	Flash
-	-	8	Bangs Street	Prahran	Essex Street Main Drain	Flash
-	-	8	Bangs Street	Prahran	Essex Street Main Drain	Flash
-	-	8	Bangs Street	Prahran	Essex Street Main Drain	Flash
-	-	8	Bangs Street	Prahran	Essex Street Main Drain	Flash
-	-	8	Bangs Street	Prahran	Essex Street Main Drain	Flash
-	-	8	Bangs Street	Prahran	Essex Street Main Drain	Flash
-	-	32	Bangs Street	Prahran	Essex Street Main Drain	Flash
-	-	44-46	Bangs Street	Prahran	Essex Street Main Drain	Flash
-	42	42	Bendigo Street	Prahran	Essex Street Main Drain	Flash
44	44	44	Bendigo Street	Prahran	Essex Street Main Drain	Flash
46	46	46	Bendigo Street	Prahran	Essex Street Main Drain	Flash
-	-	48	Bendigo Street	Prahran	Essex Street Main Drain	Flash
-	-	50	Bendigo Street	Prahran	Essex Street Main Drain	Flash
-	67	67	Bendigo Street	Prahran	Essex Street Main Drain	Flash
-	-	3	Bunalbo Avenue	South Yarra	Prahran Main Drain	Flash
-	-	5	Bunalbo Avenue	South Yarra	Prahran Main Drain	Flash
-	-	7	Bunalbo Avenue	South Yarra	Prahran Main Drain	Flash
-	-	9	Bunalbo Avenue	South Yarra	Prahran Main Drain	Flash
-	-	11	Bunalbo Avenue	South Yarra	Prahran Main Drain	Flash
-	-	13	Bunalbo Avenue	South Yarra	Prahran Main Drain	Flash
-	-	23	Canterbury Road	Toorak	Prahran Main Drain	Flash
-	-	33	Canterbury Road	Toorak	Prahran Main Drain	Flash
-	35	35	Canterbury Road	Toorak	Prahran Main Drain	Flash
-	37	37	Canterbury Road	Toorak	Prahran Main Drain	Flash
-	6/37A	6/37A	Canterbury Road	Toorak	Prahran Main Drain	Flash
-	-	43	Canterbury Road	Toorak	Prahran Main Drain	Flash
-	45	45	Canterbury Road	Toorak	Prahran Main Drain	Flash
-	47	47	Canterbury Road	Toorak	Prahran Main Drain	Flash
-	49	49	Canterbury Road	Toorak	Prahran Main Drain	Flash
-	-	53	Canterbury Road	Toorak	Prahran Main Drain	Flash
-	-	55	Canterbury Road	Toorak	Prahran Main Drain	Flash
-	22	22	Cecil Place	Prahran	Essex Street Main Drain	Flash
-	2/22	2/22	Cecil Place	Prahran	Essex Street Main Drain	Flash
-	3/22	3/22	Cecil Place	Prahran	Essex Street Main Drain	Flash
-	-	256	Chapel Street	Prahran	Essex Street Main Drain	Flash
-	-	258	Chapel Street	Prahran	Essex Street Main Drain	Flash
-	-	260	Chapel Street	Prahran	Essex Street Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	-	286	Chapel Street	Prahran	Essex Street Main Drain	Flash
-	-	288	Chapel Street	Prahran	Essex Street Main Drain	Flash
-	-	289	Chapel Street	Prahran	Essex Street Main Drain	Flash
-	-	290	Chapel Street	Prahran	Essex Street Main Drain	Flash
-	-	291	Chapel Street	Prahran	Essex Street Main Drain	Flash
-	-	292-300	Chapel Street	Prahran	Essex Street Main Drain	Flash
-	-	303	Chapel Street	Prahran	Essex Street Main Drain	Flash
-	-	346	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	348	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	350	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	380	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	382	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	386-390	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	392A	392A	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	392B	392B	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	392	392	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	394	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	394A	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	396	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	398	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	400	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	426-428	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	1/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	2/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	3/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	4/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	5/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	6/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	7/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	8/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	9/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	10/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	11/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	12/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	13/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	14/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	15/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	16/430-436	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	438	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	1/450-460	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	2/450-460	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	3/450-460	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	4/450-460	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	5/450-460	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	6/450-460	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	7/450-460	Chapel Street	South Yarra	Essex Street Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	-	466	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	469	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	471	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	473	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	475	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	477	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	1-2/478	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	3/478	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	4/478	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	5/478	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	6/478	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	7/478	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	481	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	483	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	491	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	493A	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	493	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	495	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	497	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	499	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	1/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	2/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	3/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	4/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	5/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	6/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	7/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	8/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	9/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	10/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	12/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	21/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	35/500	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	501	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	503	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	505	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	507	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	509	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	511	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	513	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	1/513	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	515	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	517A	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	517	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	519	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	521-523	Chapel Street	South Yarra	Essex Street Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	-	525	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	-	527	Chapel Street	South Yarra	Essex Street Main Drain	Flash
-	58	58	Clara Street	South Yarra	Prahran Main Drain	Flash
-	60	60	Clara Street	South Yarra	Prahran Main Drain	Flash
-	62	62	Clara Street	South Yarra	Prahran Main Drain	Flash
-	-	2	Clendon Road	Armadale	Prahran Main Drain	Flash
-	-	7	Clifton Street	Prahran	Essex Street Main Drain	Flash
-	-	9	Clifton Street	Prahran	Essex Street Main Drain	Flash
-	-	17	Clifton Street	Prahran	Essex Street Main Drain	Flash
-	-	45	Clifton Street	Prahran	Essex Street Main Drain	Flash
-	-	76	Cromwell Road	South Yarra	Prahran Main Drain	Flash
-	-	78	Cromwell Road	South Yarra	Prahran Main Drain	Flash
-	-	78A	Cromwell Road	South Yarra	Prahran Main Drain	Flash
-	-	1/80	Cromwell Road	South Yarra	Prahran Main Drain	Flash
-	-	2/80	Cromwell Road	South Yarra	Prahran Main Drain	Flash
-	-	3/80	Cromwell Road	South Yarra	Prahran Main Drain	Flash
-	-	4/80	Cromwell Road	South Yarra	Prahran Main Drain	Flash
-	-	1/82	Cromwell Road	South Yarra	Prahran Main Drain	Flash
-	-	2/82	Cromwell Road	South Yarra	Prahran Main Drain	Flash
-	-	3/82	Cromwell Road	South Yarra	Prahran Main Drain	Flash
-	-	4/82	Cromwell Road	South Yarra	Prahran Main Drain	Flash
-	-	49E	Cromwell Road	South Yarra	Essex Street Main Drain	Flash
-	49D	49D	Cromwell Road	South Yarra	Essex Street Main Drain	Flash
-	49C	49C	Cromwell Road	South Yarra	Essex Street Main Drain	Flash
-	-	49B	Cromwell Road	South Yarra	Essex Street Main Drain	Flash
-	-	49A	Cromwell Road	South Yarra	Essex Street Main Drain	Flash
-	-	51C	Cromwell Road	South Yarra	Essex Street Main Drain	Flash
-	-	51B	Cromwell Road	South Yarra	Essex Street Main Drain	Flash
-	-	15	Davison Place	South Yarra	Essex Street Main Drain	Flash
-	-	3	Eileen Street	Armadale	Prahran Main Drain	Flash
-	-	5	Eileen Street	Armadale	Prahran Main Drain	Flash
-	16	16	Erica Street	Windsor	Essex Street Main Drain	Flash
-	-	24	Fairbairn Road	Toorak	Prahran Main Drain	Flash
-	26	26	Fairbairn Road	Toorak	Prahran Main Drain	Flash
-	28	28	Fairbairn Road	Toorak	Prahran Main Drain	Flash
-	45	45	Fairbairn Road	Toorak	Prahran Main Drain	Flash
-	-	57	Fairbairn Road	Toorak	Prahran Main Drain	Flash
-	-	55-57	Garden Street	South Yarra	Essex Street Main Drain	Flash
-	-	101/60	Garden Street	South Yarra	Essex Street Main Drain	Flash
-	-	102/60	Garden Street	South Yarra	Essex Street Main Drain	Flash
-	-	103/60	Garden Street	South Yarra	Essex Street Main Drain	Flash
-	-	104/60	Garden Street	South Yarra	Essex Street Main Drain	Flash
-	-	105/60	Garden Street	South Yarra	Essex Street Main Drain	Flash
-	-	106/60	Garden Street	South Yarra	Essex Street Main Drain	Flash
-	66	66	Garden Street	South Yarra	Essex Street Main Drain	Flash
-	68	68	Garden Street	South Yarra	Essex Street Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	-	1/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	2/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	3/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	4/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	5/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	6/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	7/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	8/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	9/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	10/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	11/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	12/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	13/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	14/7	Gordon Street	Toorak	Prahran Main Drain	Flash
-	19	19	Gordon Street	Toorak	Prahran Main Drain	Flash
-	21	21	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	22	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	23	Gordon Street	Toorak	Prahran Main Drain	Flash
-	24	24	Gordon Street	Toorak	Prahran Main Drain	Flash
-	25	25	Gordon Street	Toorak	Prahran Main Drain	Flash
-	26	26	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	27	Gordon Street	Toorak	Prahran Main Drain	Flash
-	28	28	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	29	Gordon Street	Toorak	Prahran Main Drain	Flash
-	-	9	Hawksburn Close	South Yarra	Prahran Main Drain	Flash
-	-	46	Hawksburn Road	South Yarra	Prahran Main Drain	Flash
-	-	48	Hawksburn Road	South Yarra	Prahran Main Drain	Flash
-	-	49	Hawksburn Road	South Yarra	Prahran Main Drain	Flash
-	-	921-923	High Street	Armadale	Prahran Main Drain	Flash
-	-	926	High Street	Armadale	Prahran Main Drain	Flash
-	-	928	High Street	Armadale	Prahran Main Drain	Flash
-	-	930	High Street	Armadale	Prahran Main Drain	Flash
-	-	203	High Street	Prahran	Essex Street Main Drain	Flash
-	235	235	High Street	Prahran	Essex Street Main Drain	Flash
-	-	293-295	High Street	Prahran	Essex Street Main Drain	Flash
-	-	305	High Street	Prahran	Essex Street Main Drain	Flash
-	-	322	High Street	Windsor	Essex Street Main Drain	Flash
-	-	1/324	High Street	Windsor	Essex Street Main Drain	Flash
-	2/324	2/324	High Street	Windsor	Essex Street Main Drain	Flash
-	3/324	3/324	High Street	Windsor	Essex Street Main Drain	Flash
-	-	4/324	High Street	Windsor	Essex Street Main Drain	Flash
-	-	5/324	High Street	Windsor	Essex Street Main Drain	Flash
-	1/330	1/330	High Street	Windsor	Essex Street Main Drain	Flash
-	2/330	2/330	High Street	Windsor	Essex Street Main Drain	Flash
-	3/330	3/330	High Street	Windsor	Essex Street Main Drain	Flash
-	4/330	4/330	High Street	Windsor	Essex Street Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	5/330	5/330	High Street	Windsor	Essex Street Main Drain	Flash
-	6/330	6/330	High Street	Windsor	Essex Street Main Drain	Flash
-	7/330	7/330	High Street	Windsor	Essex Street Main Drain	Flash
-	8/330	8/330	High Street	Windsor	Essex Street Main Drain	Flash
-	9/330	9/330	High Street	Windsor	Essex Street Main Drain	Flash
-	10/330	10/330	High Street	Windsor	Essex Street Main Drain	Flash
-	11/330	11/330	High Street	Windsor	Essex Street Main Drain	Flash
-	12/330	12/330	High Street	Windsor	Essex Street Main Drain	Flash
-	-	338	High Street	Windsor	Essex Street Main Drain	Flash
-	348	348	High Street	Windsor	Essex Street Main Drain	Flash
-	-	1A	King Street	Prahran	Essex Street Main Drain	Flash
-	-	1B	King Street	Prahran	Essex Street Main Drain	Flash
-	-	3	King Street	Prahran	Essex Street Main Drain	Flash
-	-	5	King Street	Prahran	Essex Street Main Drain	Flash
-	-	101/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	102/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	103/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	104/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	105/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	106/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	107/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	108/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	109/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	110/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	111/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	112/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	113/7	King Street	Prahran	Essex Street Main Drain	Flash
-	-	9	King Street	Prahran	Essex Street Main Drain	Flash
-	-	11	King Street	Prahran	Essex Street Main Drain	Flash
-	-	13	King Street	Prahran	Essex Street Main Drain	Flash
-	44	44	King Street	Prahran	Essex Street Main Drain	Flash
-	-	8-14	King Street	Prahran	Essex Street Main Drain	Flash
-	-	62	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	64	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	70A	70A	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	70B	70B	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	70C	70C	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	70D	70D	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	1/71	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	2/71	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	3/71	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	4/71	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	5/71	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	6/71	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	7/71	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	8/71	Lewisham Road	Windsor	Essex Street Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	72	72	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	74	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	76	Lewisham Road	Windsor	Essex Street Main Drain	Flash
-	-	717	Malvern Road	Toorak	Prahran Main Drain	Flash
-	741	741	Malvern Road	Toorak	Prahran Main Drain	Flash
-	-	778	Malvern Road	Armadale	Prahran Main Drain	Flash
-	-	243	Malvern Road	South Yarra	Essex Street Main Drain	Flash
-	-	245	Malvern Road	South Yarra	Essex Street Main Drain	Flash
-	-	249	Malvern Road	South Yarra	Essex Street Main Drain	Flash
-	-	294	Malvern Road	Prahran	Essex Street Main Drain	Flash
-	-	320-324	Malvern Road	Prahran	Essex Street Main Drain	Flash
-	-	6-36	Mandeville Crescent	Toorak	Prahran Main Drain	Flash
-	-	15	Mandeville Crescent	Toorak	Prahran Main Drain	Flash
-	-	17	Mandeville Crescent	Toorak	Prahran Main Drain	Flash
-	-	58	Mathoura Road	Toorak	Prahran Main Drain	Flash
-	58A	58A	Mathoura Road	Toorak	Prahran Main Drain	Flash
-	2/60	2/60	Mathoura Road	Toorak	Prahran Main Drain	Flash
-	1/71	1/71	Mathoura Road	Toorak	Prahran Main Drain	Flash
-	2/71	2/71	Mathoura Road	Toorak	Prahran Main Drain	Flash
-	3/71	3/71	Mathoura Road	Toorak	Prahran Main Drain	Flash
-	4/71	4/71	Mathoura Road	Toorak	Prahran Main Drain	Flash
-	5/71	5/71	Mathoura Road	Toorak	Prahran Main Drain	Flash
-	73	73	Mathoura Road	Toorak	Prahran Main Drain	Flash
-	1	1	Newry Lane	Windsor	Essex Street Main Drain	Flash
-	-	1A	Newry Lane	Windsor	Essex Street Main Drain	Flash
-	3	3	Newry Lane	Windsor	Essex Street Main Drain	Flash
-	39	39	Newry Street	Windsor	Essex Street Main Drain	Flash
-	-	51	Newry Street	Windsor	Essex Street Main Drain	Flash
-	-	53	Newry Street	Windsor	Essex Street Main Drain	Flash
-	-	55	Newry Street	Windsor	Essex Street Main Drain	Flash
-	65	65	Newry Street	Windsor	Essex Street Main Drain	Flash
-	67	67	Newry Street	Windsor	Essex Street Main Drain	Flash
-	-	69	Newry Street	Windsor	Essex Street Main Drain	Flash
-	-	24	Normanby Place	Windsor	Essex Street Main Drain	Flash
-	-	2	Northcote Road	Armadale	Prahran Main Drain	Flash
-	-	4	Northcote Road	Armadale	Prahran Main Drain	Flash
-	-	6	Northcote Road	Armadale	Prahran Main Drain	Flash
-	-	27	Northcote Road	Armadale	Prahran Main Drain	Flash
-	-	48	Northcote Road	Armadale	Prahran Main Drain	Flash
-	-	61	Northcote Road	Armadale	Prahran Main Drain	Flash
-	-	63	Northcote Road	Armadale	Prahran Main Drain	Flash
-	-	65	Northcote Road	Armadale	Prahran Main Drain	Flash
-	-	35	Oban Street	South Yarra	Prahran Main Drain	Flash
-	-	39	Oban Street	South Yarra	Prahran Main Drain	Flash
-	41	41	Oban Street	South Yarra	Prahran Main Drain	Flash
-	-	50	Oban Street	South Yarra	Prahran Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	-	54	Oban Street	South Yarra	Prahran Main Drain	Flash
-	-	56	Oban Street	South Yarra	Prahran Main Drain	Flash
-	-	60	Oban Street	South Yarra	Prahran Main Drain	Flash
-	-	62	Oban Street	South Yarra	Prahran Main Drain	Flash
-	-	64	Oban Street	South Yarra	Prahran Main Drain	Flash
-	-	66	Oban Street	South Yarra	Prahran Main Drain	Flash
-	4	4	Palfreyman Street	South Yarra	Essex Street Main Drain	Flash
-	10	10	Palfreyman Street	South Yarra	Essex Street Main Drain	Flash
-	12	12	Palfreyman Street	South Yarra	Essex Street Main Drain	Flash
-	-	6	Regent Street	Prahran	Essex Street Main Drain	Flash
-	-	12-16	Regent Street	Prahran	Essex Street Main Drain	Flash
-	24-26	24-26	Regent Street	Prahran	Essex Street Main Drain	Flash
-	-	25	Regent Street	Prahran	Essex Street Main Drain	Flash
-	-	101/30	Regent Street	Prahran	Essex Street Main Drain	Flash
-	-	102/30	Regent Street	Prahran	Essex Street Main Drain	Flash
-	-	103/30	Regent Street	Prahran	Essex Street Main Drain	Flash
-	-	32	Regent Street	Prahran	Essex Street Main Drain	Flash
-	-	35	Regent Street	Prahran	Essex Street Main Drain	Flash
-	-	37	Regent Street	Prahran	Essex Street Main Drain	Flash
-	-	2A	River Street	South Yarra	Prahran Main Drain	Flash
-	2-4	2-4	River Street	South Yarra	Prahran Main Drain	Flash
-	-	8	River Street	South Yarra	Prahran Main Drain	Flash
-	10	10	River Street	South Yarra	Prahran Main Drain	Flash
-	12	12	River Street	South Yarra	Prahran Main Drain	Flash
-	24-30	24-30	River Street	South Yarra	Prahran Main Drain	Flash
-	32-34	32-34	River Street	South Yarra	Prahran Main Drain	Flash
-	36	36	River Street	South Yarra	Prahran Main Drain	Flash
-	38-40	38-40	River Street	South Yarra	Prahran Main Drain	Flash
-	-	42-44	River Street	South Yarra	Prahran Main Drain	Flash
-	-	46	River Street	South Yarra	Prahran Main Drain	Flash
-	-	48-50	River Street	South Yarra	Prahran Main Drain	Flash
-	-	6	Rocky Lane	South Yarra	Essex Street Main Drain	Flash
-	-	8	Rocky Lane	South Yarra	Essex Street Main Drain	Flash
-	-	13A	Rose Street	Armadale	Prahran Main Drain	Flash
-	-	26	Rose Street	Armadale	Prahran Main Drain	Flash
-	-	28	Rose Street	Armadale	Prahran Main Drain	Flash
-	-	34A	Rose Street	Armadale	Prahran Main Drain	Flash
-	-	34B	Rose Street	Armadale	Prahran Main Drain	Flash
-	-	34C	Rose Street	Armadale	Prahran Main Drain	Flash
-	-	34D	Rose Street	Armadale	Prahran Main Drain	Flash
-	-	34E	Rose Street	Armadale	Prahran Main Drain	Flash
-	-	128	Surrey Road	South Yarra	Prahran Main Drain	Flash
-	-	130	Surrey Road	South Yarra	Prahran Main Drain	Flash
-	-	132	Surrey Road	South Yarra	Prahran Main Drain	Flash
-	-	134	Surrey Road	South Yarra	Prahran Main Drain	Flash
-	-	136	Surrey Road	South Yarra	Prahran Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	-	138	Surrey Road	South Yarra	Prahran Main Drain	Flash
-	-	140	Surrey Road	South Yarra	Prahran Main Drain	Flash
-	-	141	Surrey Road	South Yarra	Prahran Main Drain	Flash
-	-	142	Surrey Road	South Yarra	Prahran Main Drain	Flash
-	-	143	Surrey Road	South Yarra	Prahran Main Drain	Flash
-	145A	145A	Surrey Road	South Yarra	Prahran Main Drain	Flash
-	-	65	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	33	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	35	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	39	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	43	43	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	45	45	Surrey Road	South Yarra	Essex Street Main Drain	Flash
49	49	49	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	53	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	57	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	80A	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	80B	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	82A	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	86A	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	86B	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	88A	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	89	89	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	90A	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	90B	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	90C	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	90D	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	90E	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	1/91	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	2/91	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	93	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	94	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	96	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	97	97	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	98	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	99	99	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	100	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	101	101	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	102	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	103	103	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	104	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	105	105	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	106	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	107-109	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	108	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	110	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	112	Surrey Road	South Yarra	Essex Street Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	113	113	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	114	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	115	115	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	116	116	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	117	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	118	118	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	119	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	120	120	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	121	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	122	122	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	123	123	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	124	124	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	125	125	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	126	126	Surrey Road	South Yarra	Essex Street Main Drain	Flash
127	127	127	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	129	129	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	131	131	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	-	133	Surrey Road	South Yarra	Essex Street Main Drain	Flash
-	55	55	The Avenue	Windsor	Essex Street Main Drain	Flash
57	57	57	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	1/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	2/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	3/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	4/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	5/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	6/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	7/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	8/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	9/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	10/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	11/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	12/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	13/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	14/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	15/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	16/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	17/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	18/58	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	19/58	The Avenue	Windsor	Essex Street Main Drain	Flash
59	59	59	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	60	The Avenue	Windsor	Essex Street Main Drain	Flash
61	61	61	The Avenue	Windsor	Essex Street Main Drain	Flash
63	63	63	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	75	The Avenue	Windsor	Essex Street Main Drain	Flash
-	-	77	The Avenue	Windsor	Essex Street Main Drain	Flash
-	79	79	The Avenue	Windsor	Essex Street Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	81	81	The Avenue	Windsor	Essex Street Main Drain	Flash
-	83	83	The Avenue	Windsor	Essex Street Main Drain	Flash
85	85	85	The Avenue	Windsor	Essex Street Main Drain	Flash
87	87	87	The Avenue	Windsor	Essex Street Main Drain	Flash
89	89	89	The Avenue	Windsor	Essex Street Main Drain	Flash
-	1/8	1/8	Time Lane	South Yarra	Prahran Main Drain	Flash
-	2/8	2/8	Time Lane	South Yarra	Prahran Main Drain	Flash
-	10	10	Time Lane	South Yarra	Prahran Main Drain	Flash
-	2	2	Tivoli Road	South Yarra	Prahran Main Drain	Flash
-	-	3	Tivoli Road	South Yarra	Prahran Main Drain	Flash
-	-	3A	Tivoli Road	South Yarra	Prahran Main Drain	Flash
-	-	5	Tivoli Road	South Yarra	Prahran Main Drain	Flash
-	-	7	Tivoli Road	South Yarra	Prahran Main Drain	Flash
-	-	17	Tivoli Road	South Yarra	Prahran Main Drain	Flash
-	-	19	Tivoli Road	South Yarra	Prahran Main Drain	Flash
-	1-3/300	1-3/300	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	4/300	4/300	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	5-6/300	5-6/300	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	7-8/300	7-8/300	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	9-10/300	9-10/300	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	11-15/300	11-15/300	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	-	303	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	-	2/303-305	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	-	305	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	307	307	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	309	309	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	-	310	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	311	311	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	1-2/312	1-2/312	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	3-5/312	3-5/312	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	-	6/312	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	7/312	7/312	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	8-9/312	8-9/312	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	313	313	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	315	315	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	-	1/316-320	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	-	2/316-320	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	-	3/316-320	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	-	322	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	-	324	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	326	326	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	328	328	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	329	329	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	330	330	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	331	331	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	336	336	Toorak Road	South Yarra	Prahran Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	336	336	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	333	333	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	335	335	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	336	336	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	336A	336A	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	337	337	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	339	339	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	341-345	341-345	Toorak Road	South Yarra	Prahran Main Drain	Flash
-	-	230B	Williams Road	Toorak	Prahran Main Drain	Flash
-	231	231	Williams Road	South Yarra	Prahran Main Drain	Flash
-	232	232	Williams Road	Toorak	Prahran Main Drain	Flash
-	233	233	Williams Road	South Yarra	Prahran Main Drain	Flash
-	235	235	Williams Road	South Yarra	Prahran Main Drain	Flash
-	238	238	Williams Road	Toorak	Prahran Main Drain	Flash
-	240	240	Williams Road	Toorak	Prahran Main Drain	Flash
-	-	1/241	Williams Road	Toorak	Prahran Main Drain	Flash
-	-	2/241	Williams Road	Toorak	Prahran Main Drain	Flash
-	-	3/241	Williams Road	Toorak	Prahran Main Drain	Flash
-	-	4/241	Williams Road	Toorak	Prahran Main Drain	Flash
-	-	5/241	Williams Road	Toorak	Prahran Main Drain	Flash
-	242	242	Williams Road	Toorak	Prahran Main Drain	Flash
-	244	244	Williams Road	Toorak	Prahran Main Drain	Flash
-	246	246	Williams Road	Toorak	Prahran Main Drain	Flash
-	248	248	Williams Road	Toorak	Prahran Main Drain	Flash
-	-	49A	Williams Road	Windsor	Essex Street Main Drain	Flash
-	-	51	Williams Road	Windsor	Essex Street Main Drain	Flash
-	-	58-60	Wilson Street	South Yarra	Essex Street Main Drain	Flash
-	-	55	Wilson Street	South Yarra	Essex Street Main Drain	Flash
-	-	55A	Wilson Street	South Yarra	Essex Street Main Drain	Flash
-	-	57	Wilson Street	South Yarra	Essex Street Main Drain	Flash
-	61	61	Wilson Street	South Yarra	Essex Street Main Drain	Flash
-	62	62	Wilson Street	South Yarra	Essex Street Main Drain	Flash
-	-	64	Wilson Street	South Yarra	Essex Street Main Drain	Flash
-	64A	64A	Wilson Street	South Yarra	Essex Street Main Drain	Flash
-	-	65	Wilson Street	South Yarra	Essex Street Main Drain	Flash
-	-	4	Woodside Crescent	Toorak	Prahran Main Drain	Flash
-	6	6	Woodside Crescent	Toorak	Prahran Main Drain	Flash
-	8	8	Woodside Crescent	Toorak	Prahran Main Drain	Flash
-	10	10	Woodside Crescent	Toorak	Prahran Main Drain	Flash
-	-	1/12	Woodside Crescent	Toorak	Prahran Main Drain	Flash
-	-	2/12	Woodside Crescent	Toorak	Prahran Main Drain	Flash
-	-	3/12	Woodside Crescent	Toorak	Prahran Main Drain	Flash
-	-	4/12	Woodside Crescent	Toorak	Prahran Main Drain	Flash
-	-	5/12	Woodside Crescent	Toorak	Prahran Main Drain	Flash
-	-	20	Woodside Crescent	Toorak	Prahran Main Drain	Flash
-	-	22	Woodside Crescent	Toorak	Prahran Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	26	26	Woodside Crescent	Toorak	Prahran Main Drain	Flash
-	-	13	York Street	Prahran	Essex Street Main Drain	Flash
-	-	15	York Street	Prahran	Essex Street Main Drain	Flash
-	-	37	York Street	Prahran	Essex Street Main Drain	Flash
-	-	49	York Street	Prahran	Essex Street Main Drain	Flash
-	51	51	York Street	Prahran	Essex Street Main Drain	Flash
Totals						
11	166	552				

Table C3.2 – Properties at risk of flooding along the Prahran Main Drain catchment in the City of Stonnington

ISOLATION

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

ESSENTIAL INFRASTRUCTURE

- Sandringham Railway Line affected by flooding at Windsor Station
- Tram Services along Routes 78 & 79 may be affected by flooding along Chapel Street between outside the Jam Factory in South Yarra. Stops 48 & 49 affected. Depths of 300mm – 800mm in road possible.
- Stonnington Council Depot, Surrey Road, South Yarra may experience some property flooding near Surrey Road entrance
- Frankston & Pakenham/Cranbourne Railway Lines affected by flooding with depths of 300mm-800mm between Armadale & Hawksburn Railway Stations
- Tram Services along Route 8 may be affected by flooding along Toorak Road between River Street and Rockley Road between stops 31 and 32. Depths of 300mm – 800mm in road possible

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. <http://ptv.vic.gov.au/live-travel-updates/>

Apart from the roads outlined below, all other essential infrastructure and services areas around South Yarra, Prahran, Toorak & Armadale 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 South Yarra, Prahran, Toorak & Armadale. Check the VicRoads website for more details: [alerts.vicroads.vic.gov.au](https://www.vicroads.vic.gov.au/alerts)

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
• High Street, Armadale at Northcote Road
• Malvern Road at Little Chapel Street, Prahran
• Toorak Road, South Yarra between Rockley Road and River Street

Table C3.3 – VicRoads Possible Road Closures during a flooding event

Stonnington City Council Roads flooded in a 1% AEP (100yr ARI) event			
ARMADALE	• Hawksburn Close	• Surrey Road North	• Mathoura Road
• Elm Grove	• Inglis Way	• Time Lane	• Mandeville Lane
• Northcote Road	• Matthews Lane	• Tivoli Road	WINDSOR
PRAHRAN	• Oban Street	• Wilson Street	• Erica Street
• King Street	• Palfreyman Street	TOORAK	• Lewisham Road
SOUTH YARRA	• River Street	• Canterbury Road	• Newry Lane
• Bray Street	• Simmons Street	• Fairbairn Road	• Newry Street
• Chapel Street	• Surrey Road	• Gordon Street	
• Clara Street	• Surrey Road North	• Lambert Road	

Table C3.4 – Stonnington City Council Possible Road Closures during a flooding event

FLOOD MITIGATION

There are no formal retarding basins, levees or pumping stations in the City of Stonnington. A number of reserves and parklands act as retarding basins during flooding events. These include:

Reserve / Park	On Drain / Waterway	Location	Melway Reference
Como Park	Williams Road Diversion Drain & Yarra River	Williams Road, South Yarra	2M C3
Princes Gardens	Essex Street Drain	Malvern Road, South Yarra	2L K10

Table C3.5 – Parks and Reserves along the Prahran Main Drain in the City of Stonnington

SEWERAGE INFRASTRUCTURE

There is no sewerage Infrastructure expected to be within the vicinity of floodwaters during severe flood events around South Yarra, Prahran, Toorak & Armadale.

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 over-floor in a 1% AEP (100yr ARI) event. Refer to the following intelligence cards for Prahran & Essex St Main Drains for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	314
Business	235
Industrial	0
Public Land	3
Rural	0
Total	552

Table C3.6 – Breakdown of likely land use flooded in the Prahran Main Drain Catchment in Stonnington during a 1% AEP event

FLOOD INTELLIGENCE CARD – ESSEX ST MAIN DRAIN, PRAHRAN (UNGAUGED)

Version 2 – May 2016



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.

CLOSEST RAIN GAUGE	Yarra River at Burnley
LOCATION	North side of River and Freeway at SP AusNet Richmond Terminal Station, Richmond
MELWAY REF:	44 G12

GAUGE NUMBER	229621A
GAUGE TYPE	Tide Level & Rain
TELEMETRIC/MANUAL	Telemetric

Design Rainfall Depths (mm) – <i>Indication of Possible Flooding</i>	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
11mm in 10 mins; 18mm in 30 mins; 24mm in 1 hour; 32mm in 2 hours; 47mm in 6 hours; or 60mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	20% AEP (5 year ARI)	Properties at Flood Risk (Over-Floor) 11 Properties in Total <ul style="list-style-type: none"> 44 & 46 Bendigo Street, Prahran 49 Surrey Road, South Yarra 127 Surrey Road North, South Yarra 57, 59, 61, 63, 85, 87 & 89 The Avenue, Windsor Water Over Road (over 300mm depth) <ul style="list-style-type: none"> Newry Lane, Windsor King Street, Prahran between Mount Street and Bangs Street Palfreyman Street, South Yarra Surrey Road, South Yarra at railway underpass Surrey Road North, South Yarra 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>13mm in 10 mins; 21mm in 30 mins; 28mm in 1 hour; 36mm in 2 hours; 53mm in 6 hours; or 67mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>10% AEP (10 year ARI)</p>	<p>Properties at Flood Risk (Over-Floor) 34 Properties in Total</p> <ul style="list-style-type: none"> • 44, 46 & 67 Bendigo Street, Prahran • 66 & 68 Garden Street, South Yarra • 348 High Street, Windsor • 70A, 70B, 70C, 70D & 72 Lewisham Road, Windsor • 1 & 3 Newry Lane, Windsor • 67 Newry Street, Windsor • 4 Palfreyman Street, South Yarra • 24-26 Regent Street, Prahran • 49 Surrey Road, South Yarra • 101, 103, 120, 124, 126, 127, 129 & 131 Surrey Road North, South Yarra • 55, 57, 59, 61, 63, 81, 83, 85, 87 & 89 The Avenue, Windsor <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> • Stonnington Council Depot, Surrey Road, South Yarra may experience some property flooding near Surrey Road entrance <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Newry Lane, Windsor • King Street, Prahran between Mount Street and Bangs Street • Palfreyman Street, South Yarra • Surrey Road, South Yarra at railway underpass • Surrey Road North, South Yarra 	
<p>15mm in 10 mins; 25mm in 30 mins; 33mm in 1 hour; 42mm in 2 hours; 61mm in 6 hours; or 78mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of</p>	<p>5% AEP (20 year ARI)</p>	<p>Properties at Flood Risk (Over-Floor) 83 Properties in Total</p> <ul style="list-style-type: none"> • 42, 44, 46 & 67 Bendigo Street, Prahran • Shops 1-3/22 Cecil Place, Prahran • 392, 392A & 392B Chapel Street, South Yarra • 49C, 49D Cromwell Road, South Yarra • 16 Erica Street, Windsor • 66 & 68 Garden Street, South Yarra • 235 Units 2-3/324, Units 1-12/330 & 348 High Street, Windsor • 44 King Street, Prahran • 70A, 70B, 70C, 70D & 72 Lewisham Road, Windsor • 1 & 3 Newry Lane, Windsor 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>the catchment. This should be used as a guide only.</p>		<ul style="list-style-type: none"> • 39, 65 & 67 Newry Street, Windsor • 4, 10 & 12 Palfreyman Street, South Yarra • 24-26 Regent Street, Prahran • 43, 45 & 49 Surrey Road, South Yarra • 89, 97, 99, 101, 103, 105, 113, 115, 116, 118, 120, 122, 123, 124, 125, 126, 127, 129 & 131 Surrey Road North, South Yarra • 55, 57, 59, 61, 63, 79, 81, 83, 85, 87 & 89 The Avenue, Windsor • 61, 62 & 64A Wilson Street, South Yarra • 51 York Street, Prahran <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> • Stonnington Council Depot, Surrey Road, South Yarra may experience some property flooding near Surrey Road entrance <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Newry Street, Windsor • Newry Lane, Windsor • King Street, Prahran between Mount Street and Bangs Street • Simmons Street, South Yarra • Palfreyman Street, South Yarra • Surrey Road, South Yarra at railway underpass • Surrey Road North, South Yarra 	
<p>19mm in 10 mins; 31mm in 30 mins; 40mm in 1 hour; 51mm in 2 hours; 73mm in 6 hours; or 92mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a</p>	<p>2% AEP (50 year ARI)</p>	<p>Properties at Flood Risk (Over-Floor)</p> <p>195 Properties in Total</p> <ul style="list-style-type: none"> • 6, Shops 101-106/8 & 44-46 Bangs Street, Prahran • 42, 44, 46, 48, 50 & 67 Bendigo Street, Prahran • Shops 1-3/22 Cecil Place, Prahran • 256, 258, 260, 286, 288, 290, 292-300, 382, 386-390, 392, 392A, 392B, 394, 394A, 396, 497, 499, 501, 503, 511, 513, 1/513, 515, 517, 517A & 519 Chapel Street, South Yarra • 49A, 49B, 49C, 49D Cromwell Road, South Yarra • 15 Davison Place, South Yarra • 16 Erica Street, Windsor • 55-57, Shops 101-106/60, 66 & 68 Garden Street, South Yarra • 235, 322, Units 2-5/324, Units 1-12/330 & 348 High Street, Windsor • 1A, 1B, 3, 5, Shops 101-113/7, 9, 11, 13 & 44 King Street, Prahran • 64, 70A, 70B, 70C, 70D, Units 1-8/71 & 72 Lewisham Road, Windsor 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
guide only.		<ul style="list-style-type: none"> • 294 Malvern Road, Prahran • 1 & 3 Newry Lane, Windsor • 39, 51, 53, 65 & 67 Newry Street, Windsor • 24 Normanby Place, Windsor • 4, 10 & 12 Palfreyman Street, South Yarra • 6, 12-16, 24-26, 35 & 37 Regent Street, Prahran • 43, 45, 49, 53, 57 & 65 Surrey Road, South Yarra • 80A, 80B, 82A, 86A, 89, 90A, 90B, 90D, 90E, Units1-2/91, 93, 94, 96, 97, 98, 99, 101, 102, 103, 104, 105, 106, 107-109, 110, 112, 113, 114, 115, 116, 118, 120, 121, 122, 123, 124, 125, 126, 127, 129 & 131 Surrey Road North, South Yarra • 55, 57, 59, 60, 61, 63, 79, 81, 83, 85, 87 & 89 The Avenue, Windsor • 51 Williams Road, Windsor • 58-60, 61, 62, 64 & 64A Wilson Street, South Yarra • 49 & 51 York Street, Prahran <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> • Sandringham Railway Line affected by flooding at Windsor Station • Tram Services along Routes 78 & 79 may be affected by flooding along Chapel Street between outside the Jam Factory in South Yarra. Stops 48 & 49 affected. Depths of 300mm – 800mm in road possible. • Stonnington Council Depot, Surrey Road, South Yarra may experience some property flooding near Surrey Road entrance <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Erica Street, Windsor • Newry Street, Windsor • Newry Lane, Windsor • Lewisham Road, Windsor • King Street, Prahran between Mount Street and Bangs Street • Simmons Street, South Yarra • Chapel Street, South Yarra outside Jam Factory and also near Windsor Railway Station at Union St, Windsor • Palfreyman Street, South Yarra • Surrey Road, South Yarra at railway underpass • Surrey Road North, South Yarra 	
22mm in 10 mins;	1% AEP (100 year ARI)	<p>Properties at Flood Risk (Over-Floor)</p> <p>340 Properties in Total</p>	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>36mm in 30 mins; 46mm in 1 hour; 58mm in 2 hours; 83mm in 6 hours; or 103mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>		<ul style="list-style-type: none"> • 22 & 24 Anchor Place, Prahran • 6, Shops 101-106/8, 32 & 44-46 Bangs Street, Prahran • 42, 44, 46, 48, 50 & 67 Bendigo Street, Prahran • Shops 1-3/22 Cecil Place, Prahran • 256, 258, 260, 286, 288, 289, 290, 291, 292-300, 303, 346, 348, 350, 380, 382, 386-390, 392, 392A, 392B, 394, 394A, 396, 398, 400, 426-428, Shops 1-16/430-436, 438, Shops 1-7/450-460, 466, 469, 471, 473, 475, 477, Shops 1-7/478, 481, 483, 491, 493, 493A, 495, 497, 499, Shops 1-12/500, 21/500, 35/500, 501, 503, 505, 507, 509, 511, 513, 1/513, 515, 517, 517A, 519, 521-523, 525 & 527 Chapel Street, South Yarra • 7, 9, 17 & 45 Clifton Street, Prahran • 49A, 49B, 49C, 49D, 49E, 51B & 51C Cromwell Road, South Yarra • 15 Davison Place, South Yarra • 16 Erica Street, Windsor • 55-57, Shops 101-106/60, 66 & 68 Garden Street, South Yarra • 203, 235, 293-295, 305, 322, Units 1-5/324, Units 1-12/330, 338 & 348 High Street, Windsor • 1A, 1B, 3, 5, Shops 101-113/7, 8-14, 9, 11, 13 & 44 King Street, Prahran • 62, 64, 70A, 70B, 70C, 70D, Units 1-8/71, 72, 74 & 76 Lewisham Road, Windsor • 243, 245, 249, 294 & 320-324 Malvern Road, Prahran • 1, 1A & 3 Newry Lane, Windsor • 39, 51, 53, 55, 65, 67 & 69 Newry Street, Windsor • 24 Normanby Place, Windsor • 4, 10 & 12 Palfreyman Street, South Yarra • 6, 12-16, 24-26, 25, Shops 101-103/30, 32, 35 & 37 Regent Street, Prahran • 6 & 8 Rocky Lane, South Yarra • 33, 35, 39, 43, 45, 49, 53, 57 & 65 Surrey Road, South Yarra • 80A, 80B, 82A, 86A, 86B, 88A, 89, 90A, 90B, 90C, 90D, 90E, Units 1-2/91, 93, 94, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107-109, 108, 110, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 129, 131 & 133 Surrey Road North, South Yarra • 55, 57, Units 1-19/58, 59, 60, 61, 63, 75, 77, 79, 81, 83, 85, 87 & 89 The Avenue, Windsor • 49A & 51 Williams Road, Windsor • 55, 55A, 57, 58-60, 61, 62, 64, 64A & 65 Wilson Street, South Yarra • 13, 15, 37, 49 & 51 York Street, Prahran 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<p>Community Infrastructure Flooded</p> <ul style="list-style-type: none"> The Victoria Clinic Hospital, Malvern Road, Prahran affected by minor property flooding <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> Sandringham Railway Line affected by flooding at Windsor Station Tram Services along Routes 78 & 79 may be affected by flooding along Chapel Street between outside the Jam Factory in South Yarra. Stops 48 & 49 affected. Depths of 300mm – 800mm in road possible. Pakenham/Cranbourne Railway Lines may be affected by flooding with depths of 300mm-800mm south of South Yarra Station at the Chapel Street bridge Stonnington Council Depot, Surrey Road, South Yarra may experience some property flooding near Surrey Road entrance <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> Erica Street, Windsor Newry Street, Windsor Newry Lane, Windsor Lewisham Road, Windsor King Street, Prahran between Mount Street and Bangs Street Malvern Road at Little Chapel Street, Prahran Bray Street, South Yarra near Malvern Road Intersection Simmons Street, South Yarra Chapel Street, South Yarra outside Jam Factory and also near Windsor Railway Station at Union St, Windsor Palfreyman Street, South Yarra Wilson Street, South Yarra between Palfreyman Street and Surrey Road Surrey Road, South Yarra at railway underpass Surrey Road North, South Yarra 	

FLOOD INTELLIGENCE CARD – PRAHRAN MAIN DRAIN, TOORAK (UNGAUGED)

Version 2 – May 2016



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.

CLOSEST RAIN GAUGE	Yarra River at Burnley
LOCATION	North side of River and Freeway at SP AusNet Richmond Terminal Station, Richmond
MELWAY REF:	44 G12

GAUGE NUMBER	229621A
GAUGE TYPE	Tide Level & Rain
TELEMETRIC/MANUAL	Telemetric

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
11mm in 10 mins; 18mm in 30 mins; 24mm in 1 hour; 32mm in 2 hours; 47mm in 6 hours; or 60mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	20% AEP (5 year ARI)	Water Over Road (over 300mm depth) <ul style="list-style-type: none"> Surrey Road North, South Yarra 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>13mm in 10 mins; 21mm in 30 mins; 28mm in 1 hour; 36mm in 2 hours; 53mm in 6 hours; or 67mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>10% AEP (10 year ARI)</p>	<p>Properties at Flood Risk (Over-Floor) 35 Properties in Total</p> <ul style="list-style-type: none"> • 35, 6/37A & 45 Canterbury Road, Toorak • 58, 60 & 62 Clara Street, South Yarra • 26 Fairbairn Road, Toorak • 19 Gordon Street, Toorak • 58A & Units 1-5/71 Mathoura Road, Toorak • 2-4, 32-34 & 36 River Street, South Yarra • 10 Time Lane, South Yarra • 3-5/312, 8-9/312, 326, 328, 332, 332A, 336, 336A, 337, 339 & 341-345 Toorak Road, South Yarra • 238, 240 & 244 Williams Road, Toorak • 6, 8 & 26 Woodside Crescent, Toorak <p>Community Infrastructure Flooded</p> <ul style="list-style-type: none"> • Brookville Kindergarten on Canterbury Road, Toorak affected by property flooding at rear of premises <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Fairbairn Road, Toorak • Gordon Street, Toorak • Surrey Road North, South Yarra • Time Lane, South Yarra • River Street, South Yarra between Toorak Road and Malcolm Street 	
<p>15mm in 10 mins; 25mm in 30 mins; 33mm in 1 hour; 42mm in 2 hours; 61mm in 6 hours; or 78mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of</p>	<p>5% AEP (20 year ARI)</p>	<p>Properties at Flood Risk (Over-Floor) 83 Properties in Total</p> <ul style="list-style-type: none"> • 35, 37, 6/37A, 45, 47 & 49 Canterbury Road, Toorak • 58, 60 & 62 Clara Street, South Yarra • 26, 28 & 45 Fairbairn Road, Toorak • 19, 21, 24, 25, 26 & 28 Gordon Street, Toorak • 9 Hawksburn Road, South Yarra • 741 Malvern Road, Toorak • 58A, 2/60, Units 1-5/71 & 73 Mathoura Road, Toorak • 41 Oban Street, South Yarra • 2-4, 10, 12, 24-30, 32-34, 36 & 38-40 River Street, South Yarra • 145A Surrey Road North, South Yarra 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>the catchment. This should be used as a guide only.</p>		<ul style="list-style-type: none"> • 1/8, 2/8 & 10 Time Lane, South Yarra • 2 Tivoli Road, South Yarra • 1-3/300, 4/300, 5-6/300, 7-8/300, 9-10/300, 11-15/300, 307, 309, 311, 1-2/312, 3-5/312, 7/312, 8-9/312, 313, 315, 326, 328, 329, 330, 331, 332, 332A, 333, 335, 336, 336A, 337, 339 & 341-345 Toorak Road, South Yarra • 231, 232, 233, 235, 238, 240, 242, 244, 246 & 248 Williams Road, Toorak • 6, 8, 10 & 26 Woodside Crescent, Toorak <p>Community Infrastructure Flooded</p> <ul style="list-style-type: none"> • Brookville Kindergarten on Canterbury Road, Toorak affected by property flooding at rear of premises <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> • Tram Services along Route 8 may be affected by flooding along Toorak Road between River Street and Rockley Road between stops 31 and 32. Depths of 300mm – 800mm in road possible <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Mandeville Lane, Toorak • Lambert Road, Toorak • Canterbury Road, Toorak at Lambert Road • Fairbairn Road, Toorak • Mathoura Road, Toorak at Gordon Street • Gordon Street, Toorak • Matthews Lane, South Yarra north of Cassell Street • Surrey Road North, South Yarra • Clara Street, South Yarra between Toorak Road and Oxford Street • Toorak Road, South Yarra between Rockley Road and River Street • Tivoli Road, South Yarra near Toorak Road Intersection • Time Lane, South Yarra • River Street, South Yarra between Toorak Road and Malcolm Street 	
<p>19mm in 10 mins; 31mm in 30 mins; 40mm in 1 hour; 51mm in 2 hours; 73mm in 6 hours; or 92mm in 12 hours</p>	<p>2% AEP (50 year ARI)</p>	<p>Properties at Flood Risk (Over-Floor)</p> <p>135 Properties in Total</p> <ul style="list-style-type: none"> • 33, 35, 37, 6/37A, 45, 47 & 49 Canterbury Road, Toorak • 58, 60 & 62 Clara Street, South Yarra • 24, 26, 28, 45 & 57 Fairbairn Road, Toorak • 19, 21, 23, 24, 25, 26 & 28 Gordon Street, Toorak • 9 Hawksburn Road, South Yarra 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>		<ul style="list-style-type: none"> • 741 & 778 Malvern Road, Toorak • 6-36 & 17 Mandeville Crescent, Toorak • 58, 58A, 2/60, Units 1-5/71 & 73 Mathoura Road, Toorak • 2, 4, 61, 63 & 65 Northcote Road, Armadale • 41 & 62 Oban Street, South Yarra • 2-4, 2A, 10, 12, 24-30, 32-34, 36, 38-40, 46 & 48-50 River Street, South Yarra • 26, 28, 34A, 34B, 34C, 34D & 34E Rose Street, Armadale • 128, 130, 132, 134, 136, 138, 140, 141, 142 & 145A Surrey Road North, South Yarra • 1/8, 2/8 & 10 Time Lane, South Yarra • 2, 3, 3A, 5, 7 & 19 Tivoli Road, South Yarra • 1-3/300, 4/300, 5-6/300, 7-8/300, 9-10/300, 11-15/300, 303, 2/303-305, 305, 307, 309, 311, 1-2/312, 3-5/312, 6/312, 7/312, 8-9/312, 313, 315, Shops 1-3/316-320, 322, 324, 326, 328, 329, 330, 331, 332, 332A, 333, 335, 336, 336A, 337, 339 & 341-345 Toorak Road, South Yarra • 231, 232, 233, 235, 238, 240, 242, 244, 246 & 248 Williams Road, Toorak • 4, 6, 8, 10, Units 1-5/12, 22 & 26 Woodside Crescent, Toorak <p>Community Infrastructure Flooded</p> <ul style="list-style-type: none"> • Brookville Kindergarten on Canterbury Road, Toorak affected by property flooding at rear of premises <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> • Frankston & Pakenham/Cranbourne Railway Lines affected by flooding with depths of 300mm-800mm between Armadale & Toorak Railway Stations • Tram Services along Route 8 may be affected by flooding along Toorak Road between River Street and Rockley Road between stops 31 and 32. Depths of 300mm – 800mm in road possible <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Northcote Road, Armadale • Elm Grove, Armadale near Northcote Road roundabout • Mandeville Lane, Toorak • Lambert Road, Toorak • Canterbury Road, Toorak at Lambert Road • Fairbairn Road, Toorak • Mathoura Road, Toorak at Gordon Street • Gordon Street, Toorak • Matthews Lane, South Yarra north of Cassell Street • Surrey Road North, South Yarra 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> • Clara Street, South Yarra between Toorak Road and Oxford Street • Toorak Road, South Yarra between Rockley Road and River Street • Tivoli Road, South Yarra near Toorak Road Intersection • Time Lane, South Yarra • River Street, South Yarra between Toorak Road and Malcolm Street 	
<p>22mm in 10 mins; 36mm in 30 mins; 46mm in 1 hour; 58mm in 2 hours; 83mm in 6 hours; or 103mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	1% AEP (100 year ARI)	<p>Properties at Flood Risk (Over-Floor) 212 Properties in Total</p> <ul style="list-style-type: none"> • 3, 5, 7, 9, 11 & 13 Bunalbo Avenue, South Yarra • 23, 33, 35, 37, 6/37A, 43, 45, 47, 49, 53 & 55 Canterbury Road, Toorak • 58, 60 & 62 Clara Street, South Yarra • 2 Clendon Road, Armadale • 76, 78, 78A, Units 1-4/80 & Units 1-4/82 Cromwell Road, South Yarra • 3 & 5 Eileen Street, Armadale • 24, 26, 28, 45 & 57 Fairbairn Road, Toorak • Units 1-14/7, 19, 21, 22, 23, 24, 25, 26, 28 & 29 Gordon Street, Toorak • 9, 46, 48 & 49 Hawksburn Road, South Yarra • 921-923, 926, 928 & 930 High Street, Armadale • 717, 741 & 778 Malvern Road, Toorak • 6-36, 15 & 17 Mandeville Crescent, Toorak • 58, 58A, 2/60, Units 1-5/71 & 73 Mathoura Road, Toorak • 2, 4, 6, 27, 48, 61, 63 & 65 Northcote Road, Armadale • 35, 39, 41, 50, 54, 56, 60, 62, 64 & 66 Oban Street, South Yarra • 2-4, 2A, 8, 10, 12, 24-30, 32-34, 36, 38-40, 42-44, 46 & 48-50 River Street, South Yarra • 13A, 26, 28, 34A, 34B, 34C, 34D & 34E Rose Street, Armadale • 128, 130, 132, 134, 136, 138, 140, 141, 142, 143 & 145A Surrey Road North, South Yarra • 1/8, 2/8 & 10 Time Lane, South Yarra • 2, 3, 3A, 5, 7, 17 & 19 Tivoli Road, South Yarra • 1-3/300, 4/300, 5-6/300, 7-8/300, 9-10/300, 11-15/300, 303, 2/303-305, 305, 307, 309, 310, 311, 1-2/312, 3-5/312, 6/312, 7/312, 8-9/312, 313, 315, Shops 1-3/316-320, 322, 324, 326, 328, 329, 330, 331, 332, 332A, 333, 335, 336, 336A, 337, 339 & 341-345 Toorak Road, South Yarra • 230B, 231, 232, 233, 235, 238, 240, Units 1-5/241, 242, 244, 246 & 248 Williams Road, Toorak 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> • 4, 6, 8, 10, Units 1-5/12, 20, 22 & 26 Woodside Crescent, Toorak <p>Community Infrastructure Flooded</p> <ul style="list-style-type: none"> • Armadale Primary School, Densham Road, Armadale has access restricted via rear entrance on Northcote Road • Brookville Kindergarten on Canterbury Road, Toorak affected by property flooding at rear of premises <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> • Frankston & Pakenham/Cranbourne Railway Lines affected by flooding with depths of 300mm-800mm between Armadale & Hawksburn Railway Stations • Tram Services along Route 8 may be affected by flooding along Toorak Road between River Street and Rockley Road between stops 31 and 32. Depths of 300mm – 800mm in road possible <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • High Street, Armadale at Northcote Road • Northcote Road, Armadale • Elm Grove, Armadale near Northcote Road roundabout • Mandeville Lane, Toorak • Lambert Road, Toorak • Canterbury Road, Toorak at Lambert Road • Fairbairn Road, Toorak • Mathoura Road, Toorak at Gordon Street • Gordon Street, Toorak • Matthews Lane, South Yarra north of Cassell Street • Oban Street, South Yarra north of Cassell Street • Inglis Way, South Yarra • Hawksburn Close, South Yarra • Surrey Road North, South Yarra • Clara Street, South Yarra between Toorak Road and Oxford Street • Toorak Road, South Yarra between Rockley Road and River Street • Tivoli Road, South Yarra near Toorak Road Intersection • Time Lane, South Yarra • River Street, South Yarra between Toorak Road and Malcolm Street 	

APPENDIX C4 – TOORONGA MAIN DRAIN FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Malvern & Glen Iris are located approximately 10km south-east of Melbourne in an established residential area with commercial zones along Malvern Road, High Street and Wattletree Road and an industrial precinct to the north near Tooronga Road. Gardiners Creek is the prominent watercourse in the area, flowing along the north and eastern boundaries of the two suburbs and the Municipality. Three Melbourne Water stormwater drains service the area flowing from south to north where they connect with Gardiners Creek. These drains are the Tooronga Road; Creswick Street; and Lara Street Main Drains.

Flash Flooding may occur around these stormwater drains as well as the council drainage network which feeds them when high rainfall occurs over a relatively short period. See mapping in **Appendix F** for more insight into flooding in the area.

WARNING TIMES

Neither the Bureau of Meteorology nor Melbourne Water currently provides flood forecasts for the Tooronga Main Drain. All flood response actions must therefore be driven by rainfall and / or river level observations. Telemetered rain gauges are located at Gardiner and Caulfield North.

Hydrographic Monitoring Station	Station No.	Location	Owner	Gauge Type	Melway Ref
Gardiners Creek at Gardiner	229624A	Southwest side of the creek at Great Valley Road bridge, Glen Iris	Melbourne Water	Stream Level & Rain	59 J7
Caulfield North	586194	Caulfield Park, Balaclava Road, Caulfield North	Melbourne Water	Rain	59 C12

Table C4.1 – Hydrographic Monitoring Stations surrounding the Tooronga Main Drain

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/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 VicSES website <http://www.ses.vic.gov.au/> for any thunderstorm, flood or severe weather warnings present for their area.

AREAS OF FLOOD RISK



Flood Modeling completed by Melbourne Water. Map Produced by VicSES May 2016.

CITY OF STONNINGTON	Area of Interest	1% AEP Flash Flood Extent	Community Centre
1% AEP (100yr ARI) Flooding	Waterbody	1% AEP Riverine Flood Extent	Nursing Home / Aged Care
Areas of flood risk along Tooronga Rd Main Drain	Shopping Centre	Victoria State Emergency Service	Place Of Worship
	Levee	School / College	Hospital
	Melbourne Water Stormwater Drain	Kindergarten / Child Care	
	Creek / Channel		

Melbourne Water
SES Victoria

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

Figure C4 – Areas of flood risk around the Tooronga Road Main Drain in the City of Stonnington

PROPERTIES AT FLOOD RISK

Properties listed in the table below are at risk from flooding over floor. As more intelligence becomes available, this list may grow.

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				
-	34B	34B	Aintree Road	Glen Iris	Creswick Street Main Drain	Flash
-	-	95	Claremont Avenue	Malvern	Tooronga Road Main Drain	Flash
1/37	1/37	1/37	Edgar Street	Glen Iris	Creswick Street Main Drain	Flash
39	39	39	Edgar Street	Glen Iris	Creswick Street Main Drain	Flash
1/41	1/41	1/41	Edgar Street	Glen Iris	Creswick Street Main Drain	Flash
2/41	2/41	2/41	Edgar Street	Glen Iris	Creswick Street Main Drain	Flash
1/43-45	1/43-45	1/43-45	Edgar Street	Glen Iris	Creswick Street Main Drain	Flash
6/43-45	6/43-45	6/43-45	Edgar Street	Glen Iris	Creswick Street Main Drain	Flash
-	-	1484	High Street	Glen Iris	Creswick Street Main Drain	Flash
-	20	20	Leopold Street	Glen Iris	Creswick Street Main Drain	Flash
-	-	1382	Malvern Road	Malvern	Tooronga Road Main Drain	Flash
1384	1384	1384	Malvern Road	Malvern	Tooronga Road Main Drain	Flash
1386	1386	1386	Malvern Road	Glen Iris	Tooronga Road Main Drain	Flash
1388	1388	1388	Malvern Road	Glen Iris	Tooronga Road Main Drain	Flash
1390	1390	1390	Malvern Road	Glen Iris	Tooronga Road Main Drain	Flash
-	-	1432-1436	Malvern Road	Glen Iris	Creswick Street Main Drain	Flash
-	1/126A	1/126A	Tooronga Road	Malvern East	Tooronga Road Main Drain	Flash
-	2/126A	2/126A	Tooronga Road	Malvern East	Tooronga Road Main Drain	Flash
-	3/126A	3/126A	Tooronga Road	Malvern East	Tooronga Road Main Drain	Flash
-	4/126A	4/126A	Tooronga Road	Malvern East	Tooronga Road Main Drain	Flash
-	5/126A	5/126A	Tooronga Road	Malvern East	Tooronga Road Main Drain	Flash
-	6/126A	6/126A	Tooronga Road	Malvern East	Tooronga Road Main Drain	Flash
256	256	256	Tooronga Road	Glen Iris	Tooronga Road Main Drain	Flash
258	258	258	Tooronga Road	Glen Iris	Tooronga Road Main Drain	Flash
260	260	260	Tooronga Road	Glen Iris	Tooronga Road Main Drain	Flash
262	262	262	Tooronga Road	Glen Iris	Tooronga Road Main Drain	Flash
264	264	264	Tooronga Road	Glen Iris	Tooronga Road Main Drain	Flash
266	266	266	Tooronga Road	Glen Iris	Tooronga Road Main Drain	Flash
268	268	268	Tooronga Road	Glen Iris	Tooronga Road Main Drain	Flash
270	270	270	Tooronga Road	Glen Iris	Tooronga Road Main Drain	Flash
272	272	272	Tooronga Road	Glen Iris	Tooronga Road Main Drain	Flash
276	276	276	Tooronga Road	Glen Iris	Tooronga Road Main Drain	Flash
-	330-340	330-340	Tooronga Road	Glen Iris	Tooronga Road Main Drain	Flash
57	57	57	Vincent Street	Glen Iris	Creswick Street Main Drain	Flash
59	59	59	Vincent Street	Glen Iris	Creswick Street Main Drain	Flash
61	61	61	Vincent Street	Glen Iris	Creswick Street Main Drain	Flash
-	3B	3B	Viva Street	Glen Iris	Tooronga Road Main Drain	Flash
3A	3A	3A	Viva Street	Glen Iris	Tooronga Road Main Drain	Flash
-	-	5	Viva Street	Glen Iris	Tooronga Road Main Drain	Flash
-	276	276	Wattletree Road	Malvern East	Tooronga Road Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
5% AEP	2% AEP	1% AEP				
1-3	1-3	1-3	Weir Street	Glen Iris	Creswick Street Main Drain	Flash
5-7	5-7	5-7	Weir Street	Glen Iris	Creswick Street Main Drain	Flash
-	-	12	Weir Street	Glen Iris	Creswick Street Main Drain	Flash
-	14	14	Weir Street	Glen Iris	Creswick Street Main Drain	Flash
15	15	15	Weir Street	Glen Iris	Creswick Street Main Drain	Flash
16	16	16	Weir Street	Glen Iris	Creswick Street Main Drain	Flash
-	18	18	Weir Street	Glen Iris	Creswick Street Main Drain	Flash
-	20	20	Weir Street	Glen Iris	Creswick Street Main Drain	Flash
-	22-26	22-26	Weir Street	Glen Iris	Creswick Street Main Drain	Flash
-	28	28	Weir Street	Glen Iris	Creswick Street Main Drain	Flash
32	32	32	Weir Street	Malvern	Tooronga Road Main Drain	Flash
-	6	6	Young Street	Glen Iris	Creswick Street Main Drain	Flash
8	8	8	Young Street	Glen Iris	Creswick Street Main Drain	Flash
10	10	10	Young Street	Glen Iris	Creswick Street Main Drain	Flash
17	17	17	Young Street	Glen Iris	Creswick Street Main Drain	Flash
19	19	19	Young Street	Glen Iris	Creswick Street Main Drain	Flash
-	-	21	Young Street	Glen Iris	Creswick Street Main Drain	Flash
Totals						
33	50	57				

Table C4.2 – Properties at risk of flooding along the Tooronga Road Main Drain catchment in the City of Stonnington

ISOLATION

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

ESSENTIAL INFRASTRUCTURE

- **Tram Services** on Route 72 may be impacted by flooding along Malvern Road east of Tooronga Road at stops 47 & 48
- **Glen Waverley Railway Line** overtopped by 0.2m-0.5m east of Tooronga Station
- **Council Waste Depot and Malvern SES** Local Headquarters possibly affected by property flooding and may have access restricted along Weir Street

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. <http://ptv.vic.gov.au/live-travel-updates/>

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

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
<ul style="list-style-type: none">Malvern Road, Glen Iris at Creswick Street
<ul style="list-style-type: none">Tooronga Road, Glen Iris at Wilson Street

Table C4.3 – VicRoads possible road closures during a flooding event

Stonnington City Council Roads flooded in a 1% AEP (100yr ARI) event	
GLEN IRIS	MALVERN
<ul style="list-style-type: none">Aintree Road	<ul style="list-style-type: none">Childers Road
<ul style="list-style-type: none">Bellman Lane	<ul style="list-style-type: none">Claremont Avenue
<ul style="list-style-type: none">Carroll Crescent	<ul style="list-style-type: none">Ewart Street
<ul style="list-style-type: none">Creswick Street	<ul style="list-style-type: none">Finlayson Street
<ul style="list-style-type: none">Edgar Street	<ul style="list-style-type: none">Hunter Street
<ul style="list-style-type: none">Milton Parade	<ul style="list-style-type: none">Lysterville Avenue
<ul style="list-style-type: none">Vincent Street	<ul style="list-style-type: none">Wheatland Road
<ul style="list-style-type: none">Viva Street	
<ul style="list-style-type: none">Weir Street	
<ul style="list-style-type: none">Young Street	

Table C4.4 – Stonnington City Council possible road closures during a flooding event

FLOOD MITIGATION

There are no formal retarding basins, levees or pumping stations in the City of Stonnington. A number of reserves and parklands act as retarding basins during flooding events. However none are located in Malvern or Glen Iris away from Gardiners Creek.

SEWERAGE INFRASTRUCTURE

There is no sewerage Infrastructure expected to be within the vicinity of floodwaters during severe flood events around Malvern & Glen Iris away from Gardiners Creek.

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 over-floor in a 1% AEP (100yr ARI) event. Refer to the following intelligence card/s for Toorong Rd Main Drain for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	32
Business	13
Industrial	11
Public Land	1
Rural	0
Total	57

Table C4.5 – Breakdown of likely land use flooded in the Toorong Rd Main Drain Catchment in Stonnington during a 1% AEP event

FLOOD INTELLIGENCE CARD – TOORONGA & CRESWICK MAIN DRAINS, MALVERN & GLEN IRIS (UNGAUGED)

Version 2 – May 2016



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

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CLOSEST RAIN GAUGE	Gardiners Creek at Gardiner
LOCATION	Southwest side of the creek at Great Valley Road bridge, Glen Iris
MELWAY REF:	59 J7

GAUGE NUMBER	229624A
GAUGE TYPE	Rain
TELEMETRIC/MANUAL	Telemetric

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>15mm in 10 mins; 25mm in 30 mins; 33mm in 1 hour; 42mm in 2 hours; 61mm in 6 hours; or 78mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungauged nature of the catchment. This should be used as a guide only.</p>	5% AEP (20 year ARI)	<p>Properties at Flood Risk (Over-Floor)</p> <p>33 Properties in Total</p> <ul style="list-style-type: none"> 1/37, 39, 1/41, 2/41, 1/43-45 & 6/43-45 Edgar Street, Glen Iris 1384, 1386, 1388 & 1390 Malvern Road, Glen Iris 256, 258, 260, 262, 264, 266, 268, 270, 272 & 276 Tooronga Road, Glen Iris 57, 59 & 61 Vincent Street, Glen Iris 3A Viva Street, Glen Iris 1-3, 5-7, 15, 16 & 32 Weir Street, Glen Iris 8, 10, 17 & 19 Young Street, Glen Iris <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> Tram Services on Route 72 may be impacted by flooding along Malvern Road east of Tooronga Road at stops 47 & 48 Council Waste Depot and Malvern SES Local Headquarters possibly affected by property flooding <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> Lysterville Avenue, Malvern between Claremont Avenue & Wheatland Road Wheatland Road, Malvern 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> • Tooronga Road, Glen Iris at Wilson Street • Viva Street, Glen Iris • Young Street, Glen Iris • Vincent Street, Glen Iris at High Street • Edgar Street, Glen Iris • Malvern Road, Glen Iris at Creswick Street • Creswick Street, Glen Iris with significant depths possible along most of road • Milton Parade, Glen Iris at Creswick Street • Carroll Crescent, Glen Iris at Tooronga Road • Weir Street, Glen Iris 	
<p>19mm in 10 mins; 31mm in 30 mins; 40mm in 1 hour; 51mm in 2 hours; 73mm in 6 hours; or 92mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	2% AEP (50 year ARI)	<p>Properties at Flood Risk (Over-Floor)</p> <p>50 Properties in Total</p> <ul style="list-style-type: none"> • 348 Aintree Road, Glen Iris • 1/37, 39, 1/41, 2/41, 1/43-45 & 6/43-45 Edgar Street, Glen Iris • 20 Leopold Street, Glen Iris • 1384, 1386, 1388 & 1390 Malvern Road, Glen Iris • Shops 1-6/126A, 256, 258, 260, 262, 264, 266, 268, 270, 272, 276 & 330-340 Tooronga Road, Glen Iris • 57, 59 & 61 Vincent Street, Glen Iris • 3A & 3B Viva Street, Glen Iris • 276 Wattletree Road, Malvern East • 1-3, 5-7, 14, 15, 16, 18, 20, 22-26, 28 & 32 Weir Street, Glen Iris • 6, 8, 10, 17 & 19 Young Street, Glen Iris <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> • Tram Services on Route 72 may be impacted by flooding along Malvern Road east of Tooronga Road at stops 47 & 48 • Council Waste Depot and Malvern SES Local Headquarters possibly affected by property flooding and may have access restricted along Weir Street <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Lysterville Avenue, Malvern between Claremont Avenue & Wheatland Road • Wheatland Road, Malvern • Tooronga Road, Glen Iris at Wilson Street • Viva Street, Glen Iris • Young Street, Glen Iris 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> • Vincent Street, Glen Iris at High Street • Edgar Street, Glen Iris • Malvern Road, Glen Iris at Creswick Street • Creswick Street, Glen Iris with significant depths possible along most of road • Milton Parade, Glen Iris at Creswick Street • Carroll Crescent, Glen Iris at Tooronga Road • Weir Street, Glen Iris 	
<p>22mm in 10 mins; 36mm in 30 mins; 46mm in 1 hour; 58mm in 2 hours; 83mm in 6 hours; or 103mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	1% AEP (100 year ARI)	<p>Properties at Flood Risk (Over-Floor)</p> <p>57 Properties in Total</p> <ul style="list-style-type: none"> • 348 Aintree Road, Glen Iris • 95 Claremont Avenue, Malvern • 1/37, 39, 1/41, 2/41, 1/43-45 & 6/43-45 Edgar Street, Glen Iris • 1484 High Street, Glen Iris • 20 Leopold Street, Glen Iris • 1382, 1384, 1386, 1388, 1390 & 1432-1436 Malvern Road, Glen Iris • Shops 1-6/126A, 256, 258, 260, 262, 264, 266, 268, 270, 272, 276 & 330-340 Tooronga Road, Glen Iris • 57, 59 & 61 Vincent Street, Glen Iris • 3A, 3B & 5 Viva Street, Glen Iris • 276 Wattletree Road, Malvern East • 1-3, 5-7, 12, 14, 15, 16, 18, 20, 22-26, 28 & 32 Weir Street, Glen Iris • 6, 8, 10, 17, 19 & 21 Young Street, Glen Iris <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> • Tram Services on Route 72 may be impacted by flooding along Malvern Road east of Tooronga Road at stops 47 & 48 • Glen Waverley Railway Line overtopped by 0.2m-0.5m east of Tooronga Station • Council Waste Depot and Malvern SES Local Headquarters possibly affected by property flooding and may have access restricted along Weir Street <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Childers Road, Malvern • Ewart Street, Malvern • Finlayson Street, Malvern • Hunter Street, Malvern • Claremont Avenue, Malvern 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> • Lysterville Avenue, Malvern between Claremont Avenue & Wheatland Road • Wheatland Road, Malvern • Tooronga Road, Glen Iris at Wilson Street • Viva Street, Glen Iris • Young Street, Glen Iris • Vincent Street, Glen Iris at High Street • Edgar Street, Glen Iris • Bellman Lane, Glen Iris • Aintree Road, Glen Iris • Malvern Road, Glen Iris at Creswick Street • Creswick Street, Glen Iris with significant depths possible along most of road • Milton Parade, Glen Iris at Creswick Street • Carroll Crescent, Glen Iris at Tooronga Road • Weir Street, Glen Iris 	

APPENDIX C5 – MALVERN EAST FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Malvern East is located approximately 12km south-east of Melbourne in an established residential zone. Gardiners Creek is the prominent watercourse in the area, flowing along the northern border of the suburb and Municipality. A number of Melbourne Water stormwater drains service the area flowing generally from south to north where they connect with Gardiners Creek. These include the Hedgley Dene; Darling Road; Murrumbeena; & Chadstone Main Drains.

Flash Flooding may occur around these stormwater drains as well as the council drainage network which feeds them when high rainfall occurs over a relatively short period. See mapping in **Appendix F** for more insight into flooding in the area.

WARNING TIMES

Neither the Bureau of Meteorology nor Melbourne Water currently provides flood forecasts for the Murrumbeena & Chadstone Main Drains in Malvern East. All flood response actions must therefore be driven by rainfall and / or river level observations. Telemetered water level / rain gauges are located at Ashwood & Gardiner within the Gardiners Creek catchment.

Hydrographic Monitoring Station	Station No.	Location	Owner	Gauge Type	Melway Ref
Gardiners Creek at Ashwood	229625A	East side of the Creek adjacent to Hedley Hull Field, Ashwood	Melbourne Water	Stream Level & Rain	60 H11
Gardiners Creek at Gardiner	229624A	Southwest side of the creek at Great Valley Road bridge, Glen Iris	Melbourne Water	Stream Level & Rain	59 J7

Table C5.1 – Hydrographic Monitoring Stations near Malvern East

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 VicSES website <http://www.ses.vic.gov.au/> for any thunderstorm, flood or severe weather warnings present for their area.

AREAS OF FLOOD RISK

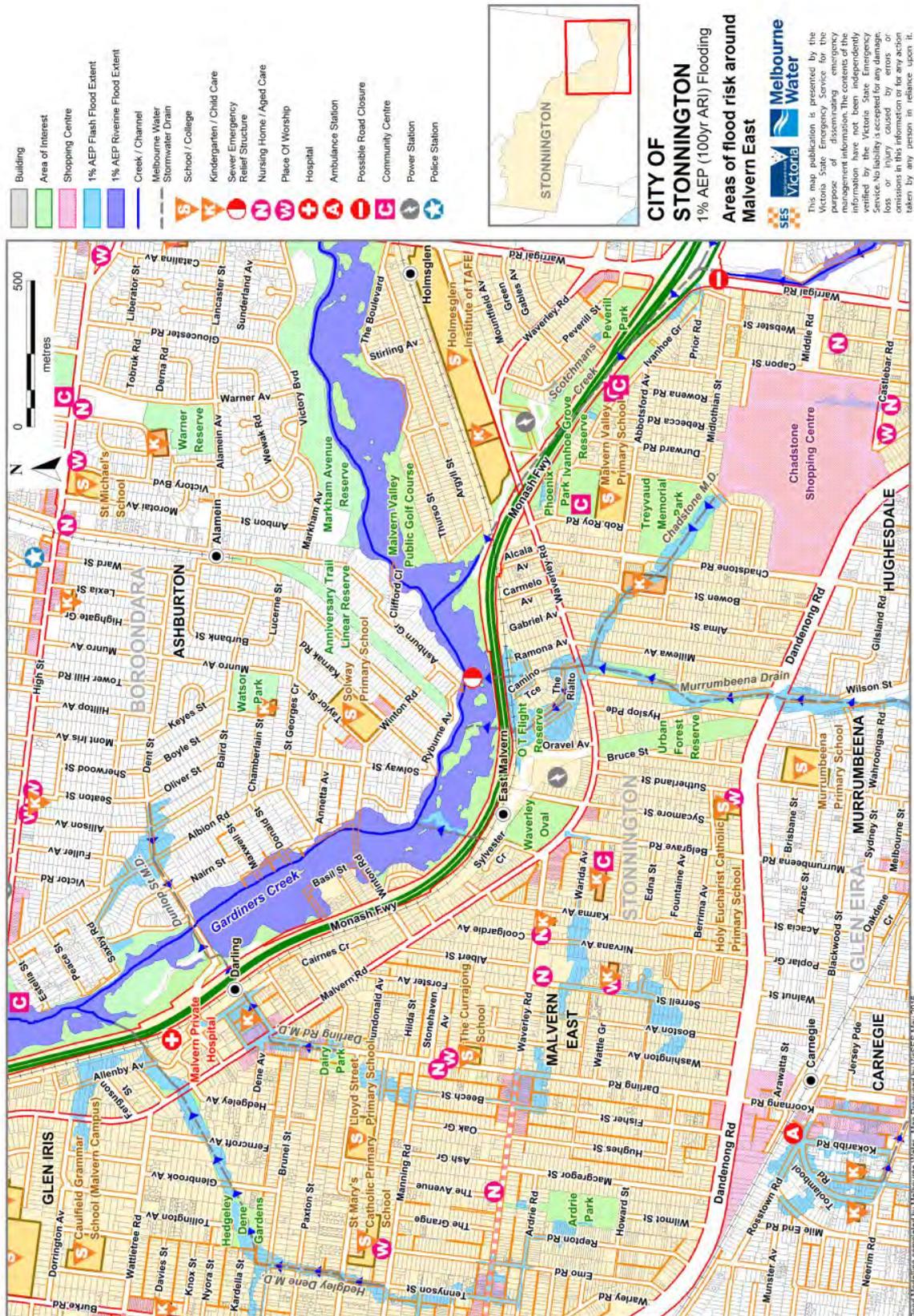


Figure C5 – Areas of flood risk around Malvern East in the City of Stonnington

PROPERTIES AT FLOOD RISK

Properties listed in the table below are at risk from flooding over floor. As more intelligence becomes available, this list may grow.

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
20% AEP	5% AEP	1% AEP				
-	-	35	Allenby Avenue	Malvern East	Hedgeley Dene Main Drain	Flash
-	-	37	Allenby Avenue	Malvern East	Hedgeley Dene Main Drain	Flash
-	-	68	Alma Street	Malvern East	Chadstone Main Drain	Flash
-	-	70-72	Alma Street	Malvern East	Chadstone Main Drain	Flash
-	-	24	Brunel Street	Malvern East	Hedgeley Dene Main Drain	Flash
-	-	25	Brunel Street	Malvern East	Hedgeley Dene Main Drain	Flash
-	-	61-67	Chadstone Road	Malvern East	Chadstone Main Drain	Flash
-	-	69	Chadstone Road	Malvern East	Chadstone Main Drain	Flash
-	-	13	Chapman Street	Malvern East	Chadstone Main Drain	Flash
-	-	14	Ferncroft Avenue	Malvern East	Hedgeley Dene Main Drain	Flash
-	6-10	6-10	Fernwick Street	Malvern East	Chadstone Main Drain	Flash
-	-	1869	Malvern Road	Malvern East	Hedgeley Dene Main Drain	Flash
73	73	73	Millewa Avenue	Malvern East	Chadstone Main Drain	Flash
-	76	76	Millewa Avenue	Malvern East	Chadstone Main Drain	Flash
-	-	5	Oravel Avenue	Malvern East	Murrumbeena Drain	Flash
-	-	6	Oravel Avenue	Malvern East	Murrumbeena Drain	Flash
-	-	8	Oravel Avenue	Malvern East	Murrumbeena Drain	Flash
-	-	10	Oravel Avenue	Malvern East	Murrumbeena Drain	Flash
-	12	12	Oravel Avenue	Malvern East	Murrumbeena Drain	Flash
-	14	14	Oravel Avenue	Malvern East	Murrumbeena Drain	Flash
-	16	16	Oravel Avenue	Malvern East	Murrumbeena Drain	Flash
-	-	18	Ramona Avenue	Malvern East	Murrumbeena Drain	Flash
-	-	43	Tennyson Street	Malvern East	Hedgeley Dene Main Drain	Flash
-	-	1/2	The Rialto	Malvern East	Murrumbeena Drain	Flash
-	-	2/2	The Rialto	Malvern East	Murrumbeena Drain	Flash
-	-	2A	The Rialto	Malvern East	Murrumbeena Drain	Flash
-	-	4	The Rialto	Malvern East	Murrumbeena Drain	Flash
-	-	6	The Rialto	Malvern East	Murrumbeena Drain	Flash
-	-	28	The Rialto	Malvern East	Murrumbeena Drain	Flash
-	-	1	The Rialto West	Malvern East	Murrumbeena Drain	Flash
-	-	3	The Rialto West	Malvern East	Murrumbeena Drain	Flash
-	-	1/5	The Rialto West	Malvern East	Murrumbeena Drain	Flash
-	-	2/5	The Rialto West	Malvern East	Murrumbeena Drain	Flash
-	7	7	The Rialto West	Malvern East	Murrumbeena Drain	Flash
-	9	9	The Rialto West	Malvern East	Murrumbeena Drain	Flash
-	11	11	The Rialto West	Malvern East	Murrumbeena Drain	Flash
-	-	13	The Rialto West	Malvern East	Murrumbeena Drain	Flash
-	-	489	Waverley Road	Malvern East	Murrumbeena Drain	Flash
-	-	495	Waverley Road	Malvern East	Murrumbeena Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	-	501	Waverley Road	Malvern East	Murrumbeena Drain	Flash
-	-	503	Waverley Road	Malvern East	Murrumbeena Drain	Flash
-	-	566	Waverley Road	Malvern East	Murrumbeena Drain	Flash
566A	566A	566A	Waverley Road	Malvern East	Murrumbeena Drain	Flash
Totals						
2	10	43				

Table C5.2 – Properties at risk of flooding around Malvern East catchment in the City of Stonnington

ISOLATION

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

ESSENTIAL INFRASTRUCTURE

- **Glen Waverley Railway Line** east of East Malvern Station affected by flooding with depth in excess of 300mm during a 1% AEP (100yr ARI) event.

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. <http://ptv.vic.gov.au/live-travel-updates/>

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

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
• Burke Road, Malvern East at Vickery Street
• Malvern Road, Malvern East south of Wattletree Road and also between Hurstmon Street and Illowa Street
• Waverley Road, Malvern East at Sydare Avenue and also at Tennyson Street

Table C5.3 – VicRoads possible road closures during a flooding event

Stonnington City Council Roads flooded in a 1% AEP (100yr ARI) event			
MALVERN EAST	• Chapman Street	• Hyslop Parade	• Summerhill Avenue
• Allenby Avenue	• Clynden Avenue	• Illowa Street	• Sydare Avenue
• Alma Street	• Darling Road	• Manning Road	• Tennyson Street
• Bowen Street	• Fenwick Street	• Millewa Avenue	• The Rialto
• Brunel Street	• Ferncroft Avenue	• Oravel Avenue	• The Rialto West
• Camino Terrace	• Glenbrook Avenue	• Rothesay Avenue	• Vickery Street
• Chadstone Road	• Hurstmon Street	• Steele Street	

Table C5.4 – Stonnington City Council Possible Road Closures during a flooding event

FLOOD MITIGATION

There are no formal retarding basins, levees or pumping stations in the City of Stonnington. A reserve in the area acts as retarding basin during flooding events:

Reserve / Park	On Drain / Waterway	Location	Melway Reference
Treyvaud Memorial Park	Chadstone Main Drain	Chadstone Road, Malvern East	69 D3

Table C5.5 – Parks and Reserves around Malvern East in the City of Stonnington

SEWERAGE INFRASTRUCTURE

Sewerage Infrastructure of note during a severe flood event located around Malvern East is contained within the following table.

SEWER EMERGENCY RELIEF POINTS

On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Gardiners Creek	South	Malvern Valley Public Golf Course, Golfers Drive, Malvern East	69 C1

Table C5.6 – Sewer Emergency Relief Points around Malvern East

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 over floor in a 1% AEP (100yr ARI) event. Refer to the following intelligence card for the Murrumbeena & Chadstone Main Drains for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	41
Business	1
Industrial	0
Public Land	1
Rural	0
Total	43

Table C5.7 – Breakdown of likely land use flooded in the Around Malvern East in the City of Stonnington during a 1% AEP event

FLOOD INTELLIGENCE CARD – MURRUMBEENA & CHADSTONE DRAINS, MALVERN EAST (UNGAUGED)

Version 2 – May 2016



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

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CLOSEST RAIN GAUGE	Gardiners Creek at Gardiner
LOCATION	Southwest side of the creek at Great Valley Road bridge, Glen Iris
MELWAY REF:	59 J7

GAUGE NUMBER	229624A
GAUGE TYPE	Rain
TELEMETRIC/MANUAL	Telemetric

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
11mm in 10 mins; 18mm in 30 mins; 24mm in 1 hour; 32mm in 2 hours; 47mm in 6 hours; or 60mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungaged nature of the catchment. This should be used as a guide only.	20% AEP (5 year ARI)	Properties at Flood Risk (Over-Floor) 2 Properties in Total <ul style="list-style-type: none"> 73 Millewa Avenue, Malvern East 566A Waverley Road, Malvern East Water Over Road (over 300mm depth) <ul style="list-style-type: none"> Alma Street, Malvern East south of Waverley Road Millewa Avenue, Malvern East south of Waverley Road Sydare Avenue, Malvern East The Rialto, Malvern East Oravel Avenue, Malvern East 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>13mm in 10 mins; 21mm in 30 mins; 28mm in 1 hour; 36mm in 2 hours; 53mm in 6 hours; or 67mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>10% AEP (10 year ARI)</p>	<p>Properties at Flood Risk (Over-Floor) 7 Properties in Total</p> <ul style="list-style-type: none"> • 6-10 Fenwick Street, Malvern East • 73 & 76 Millewa Avenue, Malvern East • 16 Oravel Avenue, Malvern East • 9 & 11 The Rialto West, Malvern East • 566A Waverley Road, Malvern East <p>Community Infrastructure Flooded</p> <ul style="list-style-type: none"> • Fenwick Street Kindergarten on Fenwick Street, Malvern East at risk of over-floor flooding <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Alma Street, Malvern East south of Waverley Road • Millewa Avenue, Malvern East south of Waverley Road • Sydare Avenue, Malvern East • The Rialto, Malvern East • The Rialto West, Malvern East • Oravel Avenue, Malvern East 	
<p>15mm in 10 mins; 25mm in 30 mins; 33mm in 1 hour; 42mm in 2 hours; 61mm in 6 hours; or 78mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>5% AEP (20 year ARI)</p>	<p>Properties at Flood Risk (Over-Floor) 10 Properties in Total</p> <ul style="list-style-type: none"> • 6-10 Fenwick Street, Malvern East • 73 & 76 Millewa Avenue, Malvern East • 12, 14 & 16 Oravel Avenue, Malvern East • 7, 9 & 11 The Rialto West, Malvern East • 566A Waverley Road, Malvern East <p>Community Infrastructure Flooded</p> <ul style="list-style-type: none"> • Fenwick Street Kindergarten on Fenwick Street, Malvern East at risk of over-floor flooding <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Bowen Street, Malvern East near Armstrong Court • Alma Street, Malvern East south of Waverley Road • Millewa Avenue, Malvern East south of Waverley Road • Sydare Avenue, Malvern East • The Rialto, Malvern East • The Rialto West, Malvern East 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>19mm in 10 mins; 31mm in 30 mins; 40mm in 1 hour; 51mm in 2 hours; 73mm in 6 hours; or 92mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>2% AEP (50 year ARI)</p>	<ul style="list-style-type: none"> • Oravel Avenue, Malvern East <p>Properties at Flood Risk (Over-Floor) 22 Properties in Total</p> <ul style="list-style-type: none"> • 70-72 Alma Street, Malvern East • 13 Chapman Street, Malvern East • 6-10 Fenwick Street, Malvern East • 73 & 76 Millewa Avenue, Malvern East • 10, 12, 14 & 16 Oravel Avenue, Malvern East • 1/2, 4, 6 & 28 The Rialto, Malvern East • 3, 1/5, 2/5, 7, 9, 11 & 13 The Rialto West, Malvern East • 495, 566 & 566A Waverley Road, Malvern East <p>Community Infrastructure Flooded</p> <ul style="list-style-type: none"> • Fenwick Street Kindergarten on Fenwick Street, Malvern East at risk of over-floor flooding <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Fenwick Street, Malvern East at Chadstone Road • Bowen Street, Malvern East near Armstrong Court • Alma Street, Malvern East south of Waverley Road • Millewa Avenue, Malvern East south of Waverley Road • Sydare Avenue, Malvern East • The Rialto, Malvern East • The Rialto West, Malvern East • Oravel Avenue, Malvern East 	
<p>22mm in 10 mins; 36mm in 30 mins; 46mm in 1 hour; 58mm in 2 hours; 83mm in 6 hours; or 103mm in 12 hours</p> <p>Note: rainfall depths are a very rough method of estimating</p>	<p>1% AEP (100 year ARI)</p>	<p>Properties at Flood Risk (Over-Floor) 36 Properties in Total</p> <ul style="list-style-type: none"> • 68 & 70-72 Alma Street, Malvern East • 61-67 & 69 Chadstone Road, Malvern East • 13 Chapman Street, Malvern East • 6-10 Fenwick Street, Malvern East • 73 & 76 Millewa Avenue, Malvern East • 5, 6, 8, 10, 12, 14 & 16 Oravel Avenue, Malvern East • 18 Ramona Avenue, Malvern East • 1/2, 2/2, 2A, 4, 6 & 28 The Rialto, Malvern East 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>		<ul style="list-style-type: none"> • 1, 3, 1/5, 2/5, 7, 9, 11 & 13 The Rialto West, Malvern East • 489, 495, 501, 503, 566 & 566A Waverley Road, Malvern East <p>Community Infrastructure Flooded</p> <ul style="list-style-type: none"> • Treyvaud Memorial Park • Fenwick Street Kindergarten on Fenwick Street, Malvern East at risk of over-floor flooding <p>Essential Infrastructure Impacted</p> <ul style="list-style-type: none"> • Glen Waverley Railway Line east of East Malvern Station affected by flooding <p>Water Over Road (over 300mm depth)</p> <ul style="list-style-type: none"> • Fenwick Street, Malvern East at Chadstone Road • Bowen Street, Malvern East near Armstrong Court • Alma Street, Malvern East south of Waverley Road • Millewa Avenue, Malvern East south of Waverley Road • Sydare Avenue, Malvern East • Hyslop Parade, Malvern East • The Rialto, Malvern East • The Rialto West, Malvern East • Oravel Avenue, Malvern East • Camino Terrace, Malvern East 	

FLOOD INTELLIGENCE CARD – HEDGELEY DENE & DARLING ROAD DRAINS, MALVERN EAST (UNGAUGED)

Version 2 – May 2016



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

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CLOSEST RAIN GAUGE	Gardiners Creek at Gardiner
LOCATION	Southwest side of the creek at Great Valley Road bridge, Glen Iris
MELWAY REF:	59 J7

GAUGE NUMBER	229624A
GAUGE TYPE	Rain
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Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
22mm in 10 mins; 36mm in 30 mins; 46mm in 1 hour; 58mm in 2 hours; 83mm in 6 hours; or 103mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	1% AEP (100 year ARI)	Properties at Flood Risk (Over-Floor) 7 Properties in Total <ul style="list-style-type: none"> 35 & 37 Allenby Avenue, Malvern East 24 & 25 Brunel Street, Malvern East 14 Ferncroft Avenue, Malvern East 1869 Malvern Road, Malvern East 43 Tennyson Street, Malvern East Community Infrastructure Affected <ul style="list-style-type: none"> East Malvern Child Care Centre, Illowa Street, Malvern East Water Over Road Hedgeley Dene Drain <ul style="list-style-type: none"> Burke Road, Malvern East at Vickery Street Vickery Street, Malvern East Tennyson Street, Malvern East Waverley Road, Malvern East at Tennyson Street Manning Road, Malvern East at Tennyson Street 	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> • Steele Street, Malvern East • Brunel Street, Malvern East at Steele Street • Glenbrook Avenue, Malvern East at low point • Ferncroft Avenue, Malvern East at low point • Malvern Road, Malvern East south of Wattletree Road • Allenby Avenue, Malvern East Darling Road Drain • Manning Road, Malvern East at Beech Street • Summerhill Avenue, Malvern East • Rothesay Avenue, Malvern East • Darling Road, Malvern East between Malvern Road and Paxton Street • Malvern Road, Malvern East between Hurstmon Street and Illowa Street • Illowa Street, Malvern East • Hurstmon Street, Malvern East • Clynden Avenue, Malvern East 	

APPENDIX D - FLOOD EVACUATION ARRANGEMENTS

Phase 1 - Decision to Evacuate

The Incident Controller 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 Health Emergency Response Plan (SHERP) 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 in consultation with the MERO, MERC, DHS, Health Commander and other key agencies and expert advice (CMA's and Flood Intelligence specialists).

No triggers for evacuation have been identified.

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, DHS and other key agencies and expert advice (Melbourne Water 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 via the EMT. No predefined evacuation routes have been determined by the City of Stonnington. Evacuation routes will be subject to the location and severity of the event.

Designated landing zones for helicopters are located at:

- Moorabbin Airport
- Essendon Airport

VicPol will determine additional landing sites if road blocks are required.

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.

Further information on Council's "residents at risk" register can be obtained from City of Stonnington MEMPlan, MECC Central or by contacting the MRM.

Phase 4 – Shelter

Relief Centres and/or assembly areas which cater for people's basic needs for floods may be established to meet the immediate needs of people affected by flooding. The flood relief centres and/or Assembly Areas are listed in the MEMPlan:

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

Animal Shelter

Animal shelter compounds will be established for domestic pets and companion animals of evacuees. Refer to MEMPlan for further arrangements.

Phase 5 – Return

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

The Incident Controller 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 evacuate include:

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

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.

Essential Community Infrastructure and Property Protection

Essential Community Infrastructure and properties (e.g. residences, businesses, roads, power supply etc.) that require protection are to be listed in future plans

Stonnington City Council will establish a sandbag collection point if required at a location to be determined by the Incident Controller and MERO.

Rescue

The following resources are available within City of Stonnington to assist with rescue operations:

- VICSES resources
- VicPol through Search and Rescue
- MFB

Refer to Section 3.10 for Rescue arrangements

APPENDIX E - FLOOD WARNING SYSTEMS

Flood Warning

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

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 Region Headquarters or the established ICC will normally be responsible for drafting, authorizing and issuing issue Flood Bulletins, using the One Source, One Message 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.

APPENDIX F – MAPS

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 Stonnington.
- A map showing the Municipal boundary together with the open waterways and underground stormwater drainage pipe network within the City of Stonnington and the 1% AEP (100-year ARI) flood extents (sourced from Melbourne Water GIS).
- A set of 6 maps showing flooding hot spots within the City of Stonnington together with the 1% AEP (100-year ARI) flood extents (sourced from the Melbourne Water GIS).

Note that:

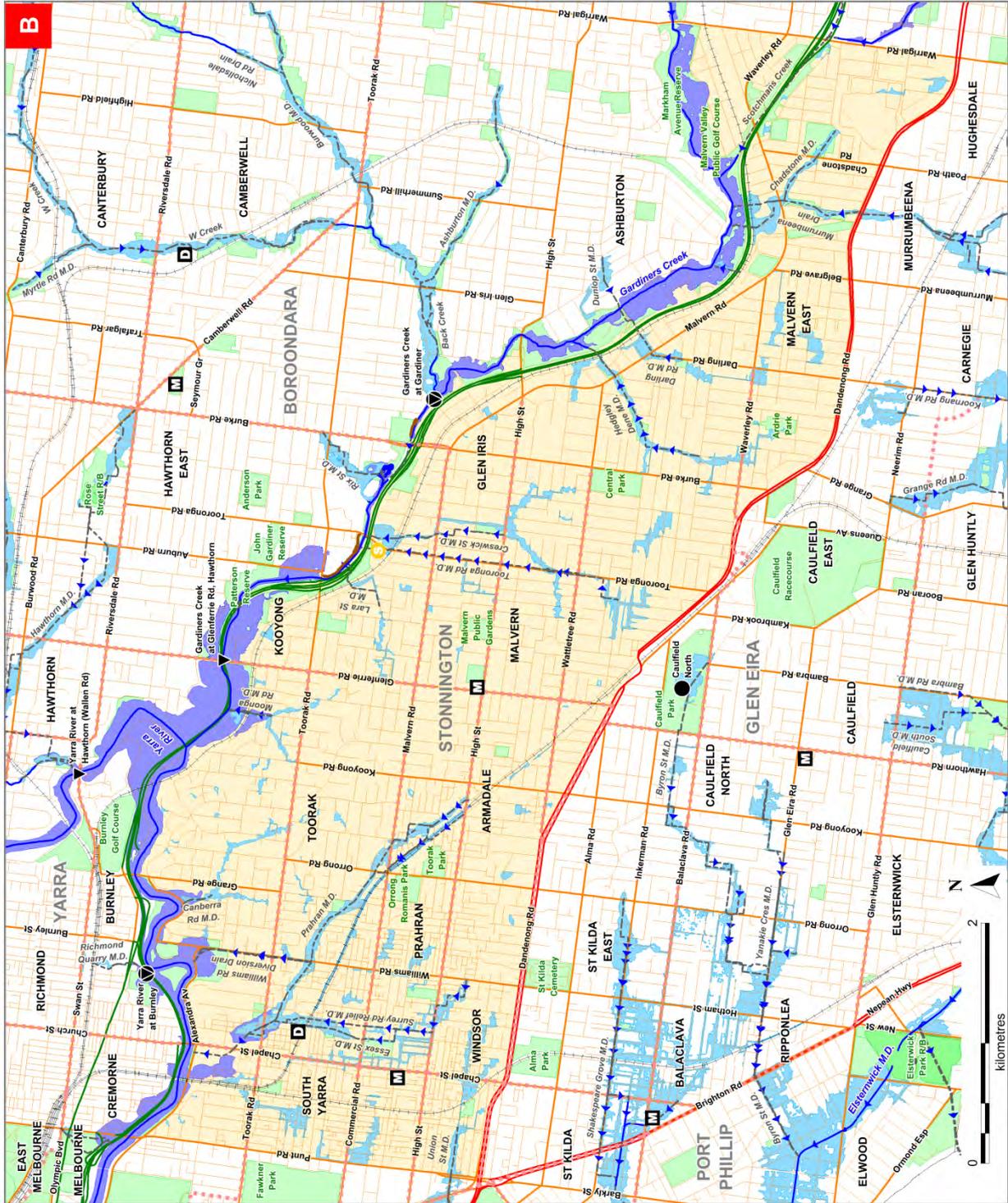
- The mapping/data provided in this Appendix has been developed from Melbourne Water and other sources and taken from historical records and flood modelling. It may not include more recent data or local anecdotal information. It is planned that the mapping/data be updated as further studies or modelling is completed and other Information obtained.
- Maps showing the Special Building Overlay and Land Subject to Inundation Overlay are included in the Stonnington 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>.

- River / Creek / Channel
- Melbourne Water Stormwater Drain
- Waterbody
- 1% AEP Flash Flood Extent
- 1% AEP Riverine Flood Extent
- Melbourne Water Relanding Basin
- Reserve / Area of Interest
- VICES Unit / HO
- River Level Gauge
- Rain Gauge
- Municipal Offices
- Municipal Depot
- Railway
- Tramway
- Embankment / Levee

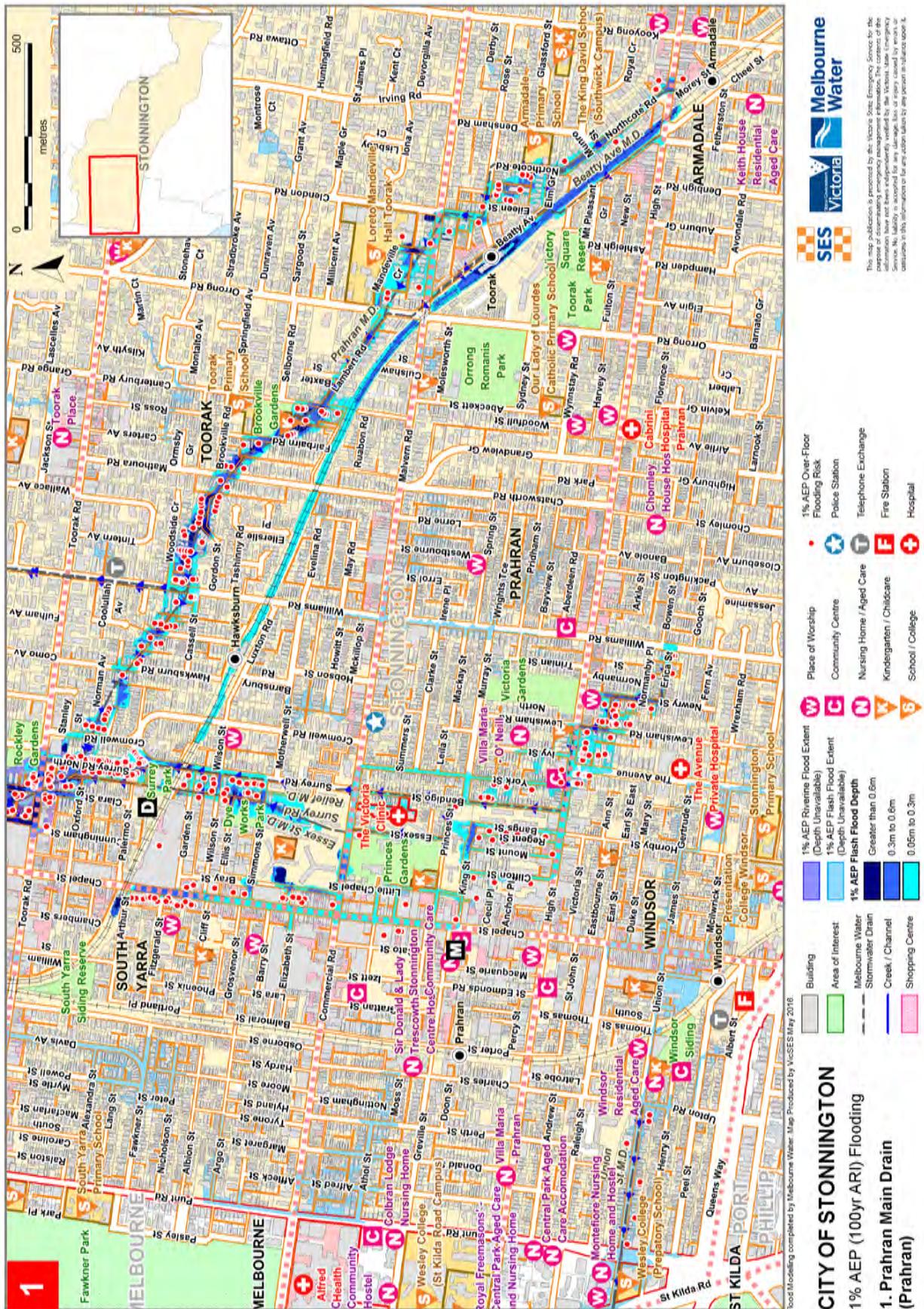
CITY OF STONNINGTON
 Version 2: May 2016
B - 1% AEP (100yr ARI) Flood Extent

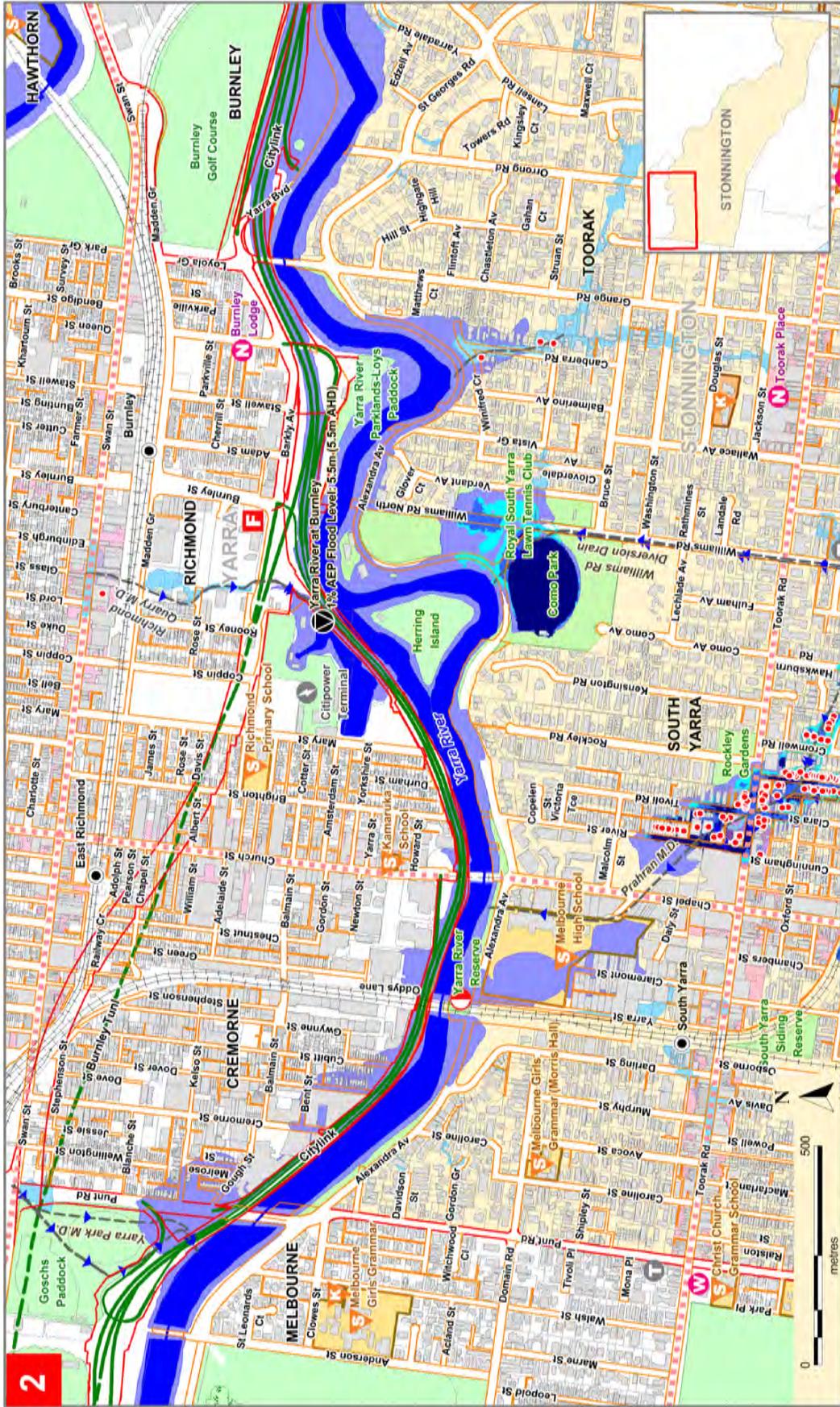


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Flood Extent Maps (sourced Melbourne Water GIS)





Flood Modelling compiled by Melbourne Water. Map Produced by VicSES May 2016.

CITY OF STONNINGTON
1% AEP (100yr ARI) Flooding
2. Yarra River (South Yarra)

SES Victoria **Melbourne Water**

1% AEP Over-Floor Flooding Risk
 Power Station
 Telephone Exchange
 Fire Station
 Place of Worship

Stream Level Gauge & 1% AEP Flood Level
 Rain Gauge

1% AEP Riverine Flood Extent (Depth Unavailable)
 1% AEP Flash Flood Extent (Depth Unavailable)
 1% AEP Flash Flood Depth
 Greater than 0.6m
 0.3m to 0.6m
 0.05m to 0.3m

Building
 Area of Interest
 Melbourne Water
 Stormwater Drain
 Creek / Channel
 Shopping Centre

Waterbody
 Sewer Emergency Relief Structure
 Nursing Home / Aged Care
 Kindergarten / Childcare
 School / College

WATERBODY
 SEWER EMERGENCY RELIEF STRUCTURE
 NURSING HOME / AGED CARE
 KINDERGARTEN / CHILD CARE
 SCHOOL / COLLEGE

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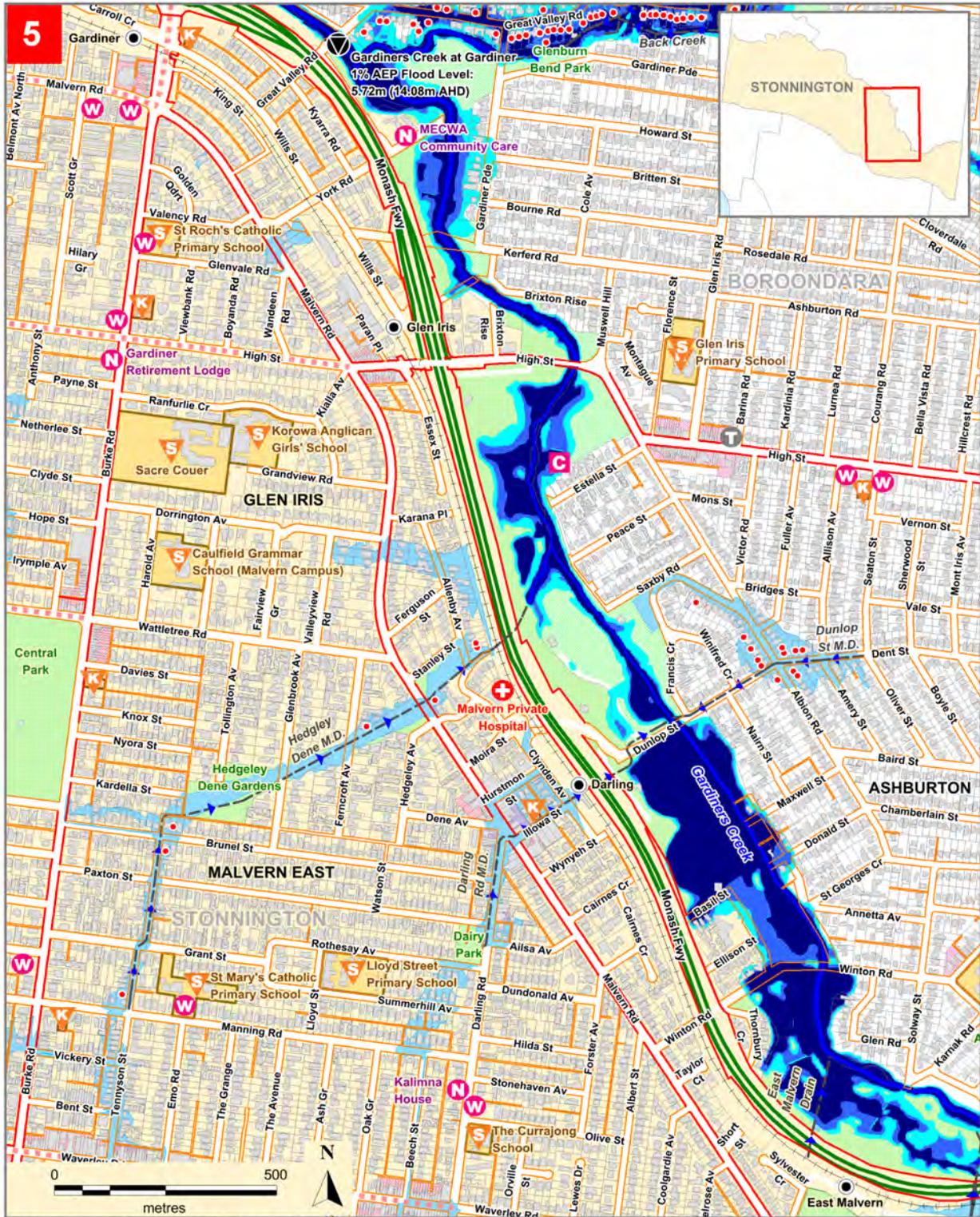
Flood Modelling completed by Melbourne Water. Map Produced by VicSES May 2016.

CITY OF STONNINGTON
1% AEP (100yr ARI) Flooding
4. Tooronga Road Main Drain (Glen Iris)

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Flood Modelling completed by Melbourne Water. Map Produced by VicSES May 2016.

CITY OF STONNINGTON
1% AEP (100yr ARI) Flooding
5. Gardiners Creek (Glen Iris)

- | | | |
|----------------------------------|-----------------------------------------------|-----------------------------------------|
| Building | 1% AEP Flash Flood Extent (Depth Unavailable) | School / College |
| Area of Interest | 1% AEP Gardiners Creek Depth | Kindergarten / Child Care |
| Shopping Centre | Greater than 0.6m | Community Centre |
| Melbourne Water Stormwater Drain | 0.3m to 0.6m | Nursing Home / Aged Care |
| Creek / Channel | 0.05m to 0.3m | Stream Level Gauge & 1% AEP Flood Level |
| Place Of Worship | 1% AEP Over-Floor Flooding Risk | Rain Gauge |
| Hospital | Telephone Exchange | |



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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.

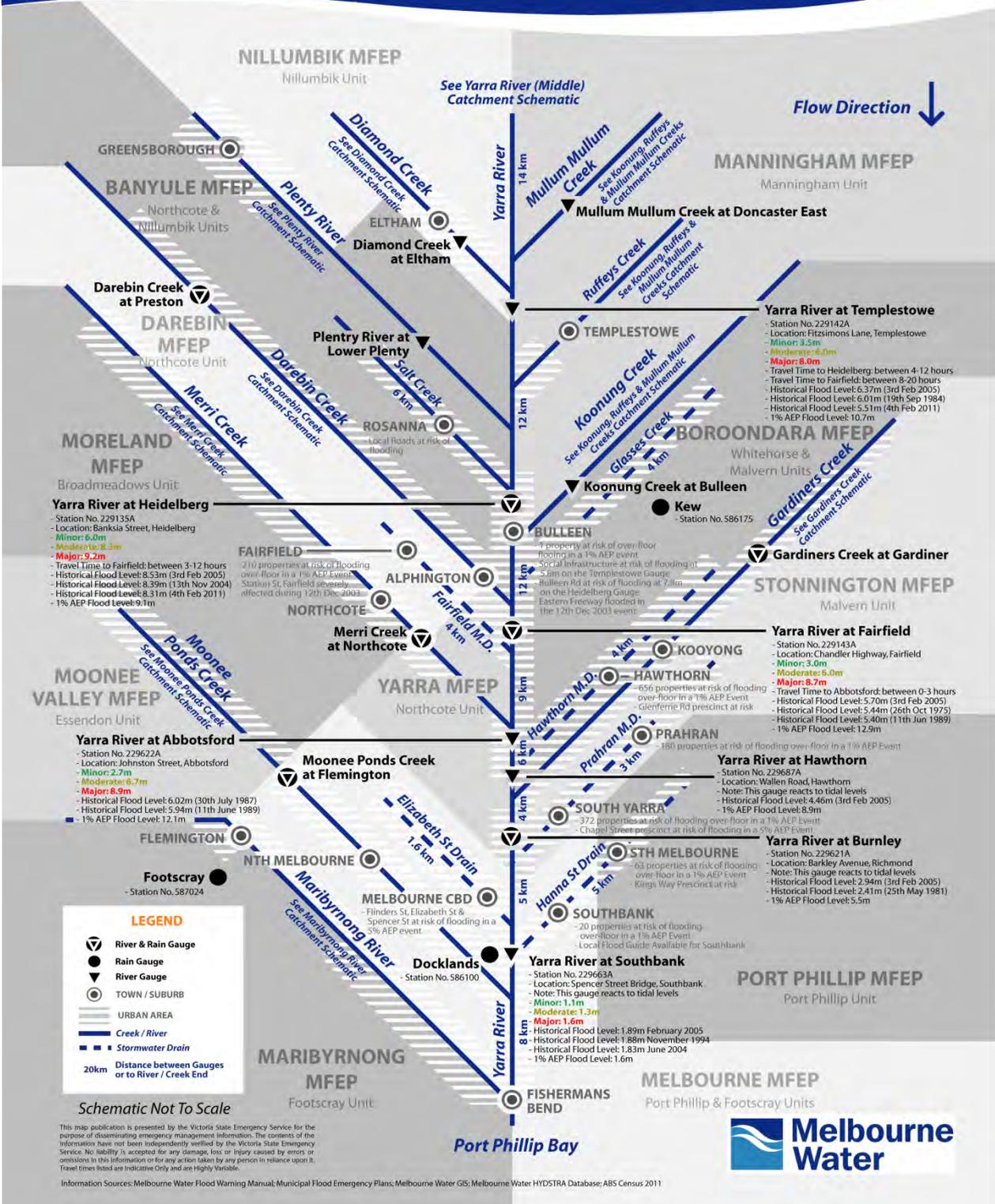
Details within these Catchment Schematics reflect those contained within either other sections of this Municipal Flood Emergency Plan or refer to other Municipal Flood Emergency Plans. These details have been filtered to contain only key facts. For more information on a gauge, drainage system or town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



Yarra River (Lower) Catchment Schematic

Version 2 - November 2015

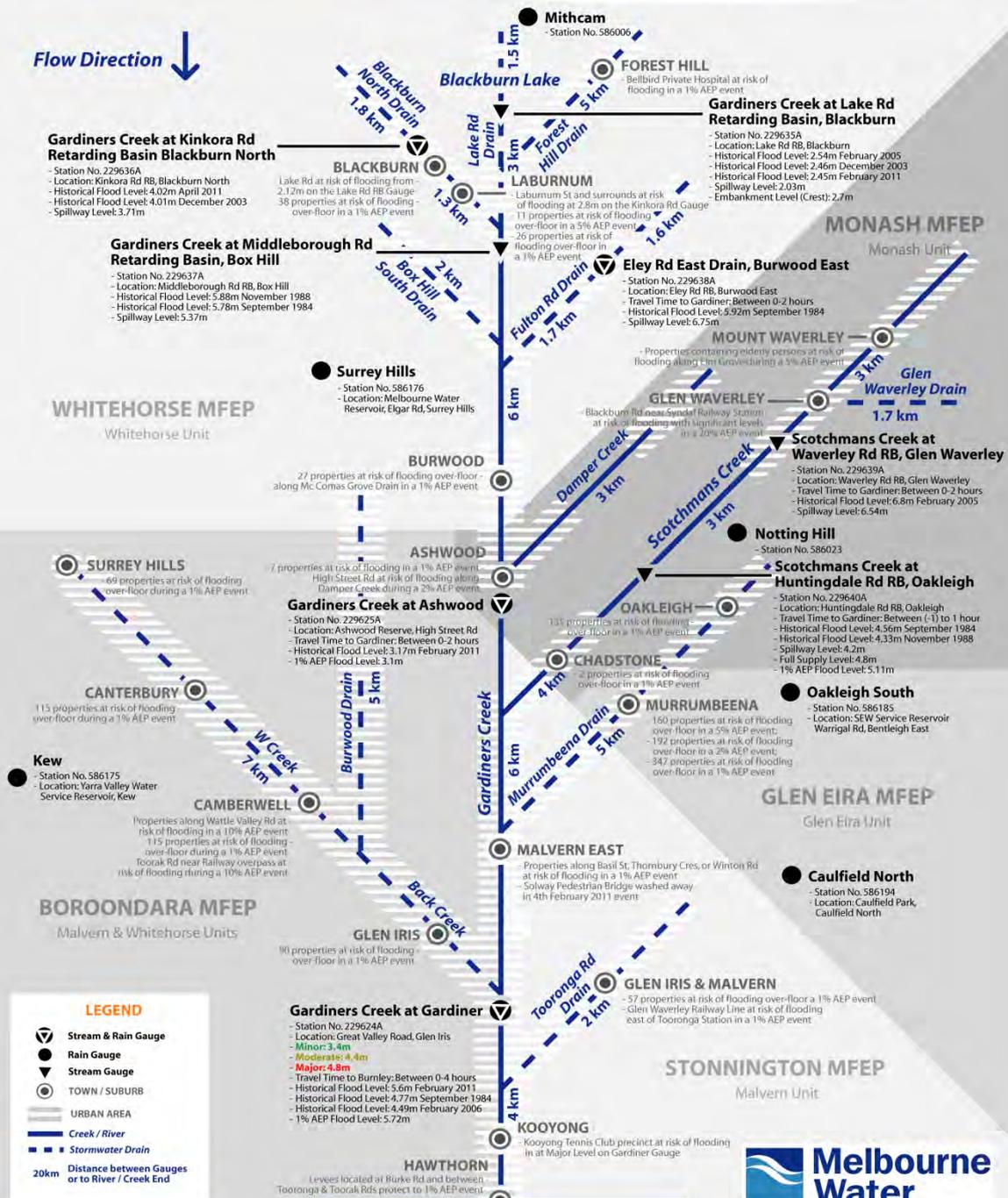




Gardiners Creek & Scotchmans Creek Catchment Schematic

Version 3 - April 2016

Flow Direction ↓



Schematic Not To Scale

Information Sources: Melbourne Water Flood Warning Manual; Municipal Flood Emergency Plans; Melbourne Water GIS; Melbourne Water HYDSTRA Database; ABS Census 2011

Yarra River See Yarra River (Lower) Catchment Schematic

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