Boroondara City Council

Storm and Flood Emergency Plan

A Sub-Plan of the Municipal Emergency Management Plan

De - Identified Document All names and contact details removed Approved for Public Distribution

For the City of Boroondara
and
VICSES Units Malvern & Whitehorse
Version 4.0

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10	ROEM	VICSES Central RHQ	
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13	Team Leader Hydrology & Flood Warnings	Melbourne Water	
14	Flood Warning Manager	Bureau of Meteorology (Flood Warning)	
15	Regional Emergency Management Officer	VicRoads	
16	ICC's Mulgrave and Sunshine	VICSES	
17	EM Unit	Ambulance Victoria	
18	Emergency Management	Department of Education and Early Childhood Development (DEECD)	
19	Emergency Management Coordinator	Department of Health and Human Services	
20	Senior Station Officer	MFB	

Document Transmittal Form / Amendment Certificate

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

Suggestions for amendments to this Plan should be forwarded to VICSES Regional Office via

MEMPC Chair
Private Bag 1
Camberwell Vic 3124

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
Draft 1.2	December 2012	Alan Barnard	Updated data
Draft 2.0	February 2102	Lesley Lord BCC	Updated data from Council
Final Version 3.0	March 2102	Alan Barnard	Updated data with SES amendments
Draft 4.0	November 2015	Ross Butler	Updated Appendix A, B, C, F and addition of Appendix G
Version 4.0	March 2016	Robin Gibney/Alan Barnard	Converted to Storm Flood Plan

This Plan will be maintained by the City of Boroondara as a sub plan of the MEMP using MECCCentral & Crisisworks.

List of Abbreviations & Acronyms

The following abbreviations and acronyms are used in the Plan:

AEP	Annual Exceedance Probability
AHD	Australian Height Datum (the height of a location above mean sea level in metres)
AIIMS	Australasian Inter-service Incident Management System
AoCC	Area of Operations Control Centre / Command Centre
ARI	Average Recurrence Interval
ARMCANZ	Agricultural & Resource Management Council of Australia & New Zealand
AV	Ambulance Victoria
BoM	Bureau of Meteorology
CEO	Chief Executive Officer
CERA	Community Emergency Risk Assessment
CFA	Country Fire Authority
CMA	Catchment Management Authority
RERC	Regional Emergency Response Coordinator
RERCC	Regional Emergency Response Coordination Centre
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DELWP	Department of Environment, Land, Water and Planning
DHHS	Department of Health and Human Services
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 Storm and Flood Emergency Plan (MSFEP) has been prepared by a subcommittee of the Boroondara Municipal Emergency Management Committee (MEMPC) and with the authority of the MEMPC pursuant to Section 20 of the Emergency Management Act 1986 (as amended).

This MFEP is a sub plan to the City of Boroondara Council 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 Assessment (CERA) process undertaken by the Municipal Emergency Management Planning Committee (MEMPC).

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

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

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

This Plan is endorsed by the City of Boroondara MEMPC as a sub plan of the MEMP.

The Municipality

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

1.3 Purpose and Scope of this Storm and Flood Emergency Plan

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

As such, the scope of the Plan is to:

- Identify the Storm and Flood Risk to the City of Boroondara
- Support the implementation of measures to minimise the causes and impacts of storm and flood incidents within the City of Boroondara;
- 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 Boroondara Council 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)**,
- MERO of the City of Boroondara,
- Victoria Police (i.e. Municipal Emergency Response Co-ordinator) (MERC),
- Catchment Management Authority,
- Department of Health and Human Services (DHHS) as required,
- Department of Environment, Land Water and Planning (DELWP) as required,
- Melbourne Water as required,
- Bureau of Meteorology as required,
- Local community representatives and
- Other agencies as required

1.5 Responsibility for Planning, Review and Maintenance of this Plan

This MSFEP must be maintained in order to remain effective.

VICSES through the Municipal Storm and Flood Planning Committee (MSFPC) has responsibility for preparing, reviewing, maintaining and distributing this plan.

The MSFPC will meet at least once per year or as required.

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

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

1.6 Endorsement of the Plan

The MSFEP is endorsed by the MEMPC as a sub-plan of the MEMPlan.

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

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

Part 2. PREVENTION PREPAREDNESS ARRANGEMENTS

2.1 Community Awareness for all Types of Storm and Flooding

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

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

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

2.2 Structural Flood Mitigation Measures

Refer to **Appendix A** and **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 and/or reviewed after a significant event.

2.3.2 Storm and Flood Warning

Arrangements for storm and flood warning are contained within the State Flood Emergency Plan and the EMMV (Part 3) and on the BoM website. http://www.bom.gov.au.

Specific details of local storm and 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.

There are no Flood Wardens within the Boroondara Municipality

Part 3. RESPONSE ARRANGEMENTS

3.1 Introduction

3.1.1 Activation of Response

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

The VICSES RDO/ IC will activate agencies as required and documented in the VICSES Central Region and State Storm Emergency Plan and the State Flood Emergency Plan.

3.1.2 Responsibilities

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

The general roles and responsibilities of supporting agencies are as agreed within the Boroondara MEMP, Part 7 of the EMMV, VICSES Central Region Flood Emergency Plan and State Flood and Storm Emergency Plans.

3.1.3 Municipal Emergency Coordination Centre (MECC)

The function, location, establishment and operation of the MECC will be as detailed in the Boroondara MEMP Liaison with the MECC will be through the VICSES Central Region RDO/ IC or established ICC.

3.1.4 Escalation

Most storm and 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 Part 3 of the EMMV.

3.2 Strategic Control Priorities

To provide guidance to the 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:
    - Safety of emergency services personnel, and;
    - Safety of community members including vulnerable community members and visitors/tourist located within the incident area.
2. Issuing of community information and community warnings detailing incident information that is timely, relevant and tailored to assist community members make informed decisions about their safety.;
3. Protection of critical infrastructure and community assets that supports community resilience;

4. Protection of residential property as a place of primary residence;

5. Protection of assets supporting individual livelihoods and economic production that supports individual and community financial sustainability

6. Protection of environmental and conservation values that considers the cultural, biodiversity, and social values of the environment;

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

3.3 Command, Control and Coordination

The Command, Control and Coordination arrangements in this plan must be consistent with those detailed in the VICSES Central Region Storm and Flood Emergency Plans and State Flood and Storm Emergency Plans. For further information, refer to Part 3 of the EMMV.

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

3.3.1 Control

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

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

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

3.3.2 Incident Controller (IC)

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

3.3.3 Incident Control Centre (ICC)

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

Pre-determined Incident Control Centre locations are

- Sunshine ICC
- Mulgrave ICC
- Dandenong ICC (CFA)

3.3.4 Divisions and Sectors

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

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

Whitehorse Unit: Council Depot, 1 Ailsa Street, Box Hill South.

Malvern Unit: Council Depot, 293 Tooronga Rd, Malvern East.

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

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3.3.5 Incident Management Team (IMT)

The IC will form an IMT in line with the AIIMS principles.

Refer to 3 of the EMMV for guidance on IMTs.

3.3.6 Emergency Management Team (EMT)

The IC will establish a multi-agency EMT to assist with the storm or 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 IC for consideration in developing incident management strategies.

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

Refer to Section 3.7 of the EMMV for guidance on EMTs.

3.3.7 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 storm and flood intelligence to assess likely storm or flood consequences
- Monitor weather and flood information – www.bom.gov.au
- Assess Command and Control requirements.
- Review local resources and consider needs for further resources regarding personnel, property protection, storm/flood rescue and air support
- Notify and brief appropriate officers. This includes RCC (if established), SCC (if established), Council and 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 storm and flood mitigation works are being checked by owners
- Develop and issue incident action plan, if required
- Develop and issue situation report, if required

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

VICSES Central Region RDO will undertake actions as defined within the Flood Intelligence Cards (**Appendix C**). General considerations by the VICSES Central Region RDO will be as follows:

- Develop an appreciation of current flood levels and predicted levels. Are floodwaters, rising, peaking or falling?
- Review flood intelligence to assess likely flood consequences. Consider:
  - What areas may be at risk of inundation
  - What areas may be at risk of isolation
  - What areas may be at risk of indirect affects as a consequence of power, gas, water, telephone, sewage, 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 storm and/or flood develops.
- Warn the at-risk community including ensuring that an appropriate warning and community information strategy is implemented. This includes:
  - The current storm and/or flood situation
  - Storm and/or Flood predictions
  - What the consequences of predicted activity and/or 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

3.4 Community Information and Warnings

Guidelines for the distribution of community information and warnings are contained in the VICSES Central Region Storm and Flood Emergency Plans and 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, including VicEmergency website ;
- 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, DELWP and VICPOL may be requested to assist VICSES with the communication of community storm and/or flood warnings.

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

DHHS will coordinate information regarding public health and safety precautions.

3.5 Media Communication

The IC, through the Public Information Unit established at the ICC will manage Media communication. If the ICC is not established, the VICSES Central Region RDO will manage all media communication. The City of Boroondara will work with the Incident Controller to ensure that consistent and timely messaging occurs.

3.6 Impact assessment

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

VicPol is responsible for coordinating the collection, collations and dissemination of IA information on a whole-of government basis. The IC is responsible for activation VicPol to undertake this function.

The purpose, function and conduct of IAs are outline in the State Flood Emergency Plan. All IAs should be conducted in accordance with Part 3 of the EMMV.

3.7 Preliminary Deployments

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

3.8 Response to Flash Flooding

Emergency management response to flash flooding should be consistent with the guideline for the emergency management of flash flooding contained within the VICSES Central Region Storm and Flood Emergency Plans and State 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. Should evacuation be the adopted strategy, it must be supported by public information capability and a rescue contingency plan;

3. Where it is likely people will become trapped by floodwaters, safety advice needs to be provided to people at risk advising them not to attempt to flee by entering floodwater if they become trapped, and that it may be safer to seek the highest point within the building and to telephone 000 if they require rescue

4. For buildings known to be structurally 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.

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

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

3.9 Evacuation

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

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

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

Once the decision is made, VicPol are responsible for the coordination of the evacuation process 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 3.11 of the EMMV and the Boroondara MEMP for guidance of evacuations for flood emergencies.

There are currently no detailed evacuation arrangements for the City of Boroondara.

3.10 Flood Rescue

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

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

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

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

3.11 Animal Welfare

Animal management guidelines are provided in the MEMP along with the location and contact details for appropriate animal welfare entities.
The requirement for animal management in Boroondara is not expected to be excessive or involve large livestock animals.
Matters relating to the welfare of livestock, companion animals and wildlife (including feeding and rescue) are referred to DEDJTR. This includes requests for emergency supply and / or delivery of fodder to stranded livestock or for livestock rescue.

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

The City of Boroondara is currently developing an animal management sub plan for the MEMP. This sub plan is expected to be finalised in 2014.

3.12 Aircraft Management

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

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

3.13 Resupply

Communities, neighbourhoods or households can become isolated during storms or 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, and if time permits, VICSES will advise businesses and/or households that they should stock up on essential items.

After the impact, VICSES assist with the transport of essential items to isolated communities and assist with logistics functions.

Resupply operations are to be included as part of the emergency relief arrangements as outlined in the Boroondara MEMP.

3.14 Essential Infrastructure and Property Protection

Essential Infrastructure and Property (e.g. roads, utilities and telecommunications etc.) may be affected in the event of a storm or flood.

The Incident Controller will ensure that owners of Essential Community Infrastructure are kept advised of the flood situation. Essential Community Infrastructure providers must keep the Incident Controller informed of their status and ongoing ability to provide service. The Boroondara City Council maintains no stock of sandbags, however sand supplies can be obtained from Yarra Trams at Riversdale Road, Hawthorn East and sandbags 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 Infrastructure. If time permits, requests for supplementary supply should be carried out in line with the Boroondara MEMP *and Appendix X, Sandbag Arrangements.*

Property may be protected by:

Sandbagging to minimise entry of water into buildings

Encouraging businesses and households to lift or move contents

Construction of temporary levees in consultation with Melbourne Water, Boroondara Council and VicPol and within appropriate approval frameworks.

Refer to **Appendix C** for further specific details of essential infrastructure requiring protection. Sandbag collection points will be established as needed.

3.15 Disruption to Services

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

3.16 Levee Management

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

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

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

- Several small levees identified in the City of Boroondara have been detailed in **Appendix A**.

3.17 Road Closures

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

VicRoads, VicPol and the Boroondara City Council will communicate community information regarding road closures as outlined in the Boroondara MEMP.

3.18 Dam Failure

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

Major dams with potential to cause structural and community damage within the Municipality are contained in **Appendix A**. Boroondara has no major dams identified; there are a number of storage reservoirs which could cause damage if they failed. These reservoirs are not directly affected by flash flooding as they are fed by pipelines and not local drains or affected by rainfall. The owners of these reservoirs have developed emergency response plans in the case of failure.

3.19 Waste Water related Public Health Issues and Critical Sewerage Assets

The vast majority of properties are connected with the Melbourne Water sewerage system. 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 and the Boroondara Council MERO 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 Boroondara Environmental Health Officer to inspect and report to the MERO and the ICC on any water quality issues relating to flooding.

3.20 After Action Review

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

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

Part 4. EMERGENCY RELIEF AND RECOVERY ARRANGEMENTS

4.1 General

An arrangement for recovery from a storm or flood incident within the City of Boroondara is detailed in the City of Boroondara MEMP and/or the Recovery Sub-plan.

4.2 Emergency Relief

The IC determines the need for Emergency Relief Services in accordance with Part 4 of the EMMV.. ICs 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 storm or flood event will be dependent upon the size, impact, and scale of the storm/flood. Refer to Part 4 of the EMMV for details of the range of emergency relief services that may be provided.

Details of the relief arrangements are available in the MEMPlan.

4.3 Animal Welfare

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

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

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

4.4 Transition from Response to Recovery

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

APPENDIX A - FLOOD THREATS FOR CITY OF BOROONDARA

GENERAL

The City of Boroondara is a metropolitan council area of just over 60km^2 located in inner eastern Melbourne, approximately 5km from the CBD. Adjoining municipalities include Banyule, Manningham, Yarra, Whitehorse, Stonnington and Monash. Boroondara is bounded by the Yarra River to the north and west and Gardiners Creek to the south. The suburbs of Boroondara include Ashburton, Balwyn, Balwyn North, Camberwell, Canterbury, Deepdene, Glen Iris, Hawthorn, Hawthorn East, Kew, Kew East, Mont Albert and Surrey Hills.

Boroondara has two major train lines, the Alamein and Belgrave/Lilydale lines, as well as six different tram routes.

The major waterways within the catchment are the Yarra River and Gardiners Creek. The headwaters of both these waterways are outside of Boroondara and flooding in the waterways is in part the result the larger upstream catchment.

The terrain throughout the municipality can be classified as dissected and undulating. Overland flow paths are typically through valley floors and the line of the path is generally clearly defined, although typically interrupted by roadways and buildings. These interruptions impede or redirect overland flow paths. Most of the drainage infrastructure in Boroondara is underground, although there are parts where open channel section or modified local creeks are utilised; these include sections of Hawthorn Main Drain, Glass Creek and Back Creek.

Areas of lower surface gradient that are prone to flooding within Boroondara typically occur around the Yarra River and Gardiners Creek. The valley floor of the Hawthorn Main Drain system, which is located west of Burke Road and south of Barkers Road, is an area of low surface gradient within the catchment that is prone to flooding.

There have been several historical flooding events throughout Boroondara since settlement. Large flood events have been the result of either large regional or localised rainfall events. Flooding from regional rainfall events is typically from the Yarra River and Gardiners Creek. Localised flooding occurs from rainfall events when the amount of runoff exceeds the capacity of the underground drainage system and established overland flow paths.

Many major roads and commercial centres exist within the catchment and are commonly at the centre of flooding issues and many of these are commonly inundated during floods. Within the inundation zone there are also schools, aged care facilities and child care centres.

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.

Flash flooding is the primary cause of flooding within the municipality. This is due to the small size of the catchments within Boroondara, and results in little time for warnings to be issued to prepare the community for flooding events.

DESCRIPTION OF MAJOR WATERWAYS & DRAINS

There are 48 km of waterways within Boroondara. The main waterways within the catchment are the Yarra River and Gardiners Creek. Within the municipality there are three minor waterways - Glass Creek, Back Creek and Koonung Creek. Koonung Creek, like Gardiners Creek has the majority of its catchment outside the municipality and is piped (to the 1% AEP level) within Boroondara with a small overland flow path.

The Yarra River headwaters are on the slopes of the Yarra Ranges. The Yarra River is highly regulated by reservoirs which capture a significant portion of the upper forested catchments runoff. Major reservoirs include Upper Yarra Reservoir, Maroondah Reservoir and O'Shannassy Reservoir. Variability in flow in the Yarra is typically a result of tributary inflows downstream of the reservoirs, which pose the largest flood risk to the major floodplain areas upstream of the Fairfield Valley constriction at Chandler Highway, Kew. This flooding could be regarded as a regional impact and will create tailwater conditions for Glass Creek and Kew Main Drain and Aquila Street. This means that water may flow up these drains, either causing flooding around the lower sections, or creating flooding along the drain as water running down these drains backs up. Flooding of the Eastern Freeway can occur from the Yarra River causing major disruptions to traffic.

Gardiners Creek meets with the Yarra River on the western boundary of Boroondara, where the Yarra River continues to flow towards the Melbourne CBD and then into Port Philip Bay.

Both main waterways extend far upstream of the council boundary, with the Yarra River flowing for 242km, and Gardiners Creek for 30km. Glass Creek, Back Creek and Koonung Creek are local catchments within Boroondara.

Given the varied size of catchments within Boroondara, there is varied event duration and response required by Melbourne Water, the City of Boroondara and emergency authorities. Drains within the catchment that are managed by the City of Boroondara typically experience flash flooding (half an

hour to two hours of rainfall) – these floods have very little warning time and it is difficult to pre-empt emergency response. Melbourne Water main drains within Boroondara including Gardiners Creek typically flood after about two hours of rain – giving slightly more warning time. The Yarra River has several hours to several days' notice of a flood given the large upstream catchment area – there is a longer warning time for these events and response can be planned and managed jointly by Melbourne Water and the City of Boroondara.

The Gardiners Creek catchment is fully urbanised, and being a smaller and steeper catchment it responds in a flashy nature to shorter duration rainfall, high intensity events as well as long duration events. This also poses a threat to the lower segments of Back Creek, Rix St Drain and localities around Tooronga. Similar to the Yarra River, back flooding events occur in the lower reaches of Gardiners Creek; this impacts Burke Road, Glenferrie Road, Toorak Road and Auburn Road, which could all be flooded.

Major drains (as managed by Melbourne Water) within the catchment include Hawthorn East, Hawthorn, Balwyn, Deepdene and Rix Street Main Drains along with W Creek, Glass Creek and Back Creek. Of these catchments, those with the largest catchment areas include W Creek (6.3km^2), Hawthorn Main Drain (5.2km^2) and Glass Creek (5.0 km^2). All other catchments have an area of less than 5.0 km^2.

Melbourne Water Drain Locations

Melbourne Water Drains & Waterways	Suburb/s	Melbourne Water Drains & Waterways	Suburb/s
Aquila St Main Drain	Balwyn North	Hawthorn East Main Drain	Hawthorn & Hawthorn East
Ashburton Main Drain	Glen Iris	Hawthorn Main Drain	Hawthorn & Hawthorn East
Ayr St Drain	Balwyn North	Hedgley Dene Main Drain	Ashburton
Back Creek	Glen Iris	Irvine Rd Drain	Ivanhoe
Balwyn Main Drain	Balwyn & Balwyn North	Kew Main Drain	Kew & Kew East
Burwood Main Drain	Camberwell & Glen Iris	Kew Mental Hospital Drain	Kew
Church St Main Drain	Hawthorn	Koonung Creek	Balwyn North
Darling Rd Main Drain	Ashburton	Linda Cres Main Drain	Hawthorn & Kew
Deepdene Main Drain	Balwyn, Balwyn North, Deepdene & Kew East	Locksley Rd Main Drain	Ivanhoe
Dunlop St Main Drain	Ashburton & Glen Iris	Minerva Ave Drain	Balwyn North
Elms Grove Drain	Balwyn North	Myrtle Rd Main Drain	Camberwell & Canterbury
Faversham Rd Main Drain	Balwyn, Canterbury & Surrey Hills	Nichollsdale Rd Drain	Camberwell & Surrey Hills
Gardenia Rd Drain	Balwyn North	Rix St Main Drain	Camberwell, Glen Iris & Hawthorn East
Gardiners Creek	Ashburton, Hawthorn, Hawthorn East & Glen Iris	W Creek	Camberwell, Canterbury, Glen Iris & Surrey Hills
Glass Creek	Balwyn North & Kew East	Yarra River	Balwyn North, Hawthorn, Kew & Kew East

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

FLOOD MITIGATION SYSTEMS

Flood mitigation has predominantly been developed in the form of 2 Retarding Basins and 2 Levees. These flood mitigation systems are as follows in the tables below. To view their locations and connecting waterway/drainage systems, see map B in **Appendix F**. There are no Melbourne Water Drainage Pumping Stations located within the Municipality.

RETARDING BASINS

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Level	ANCOLD Hazard Rating	Houses In Flow Path (dam breach)	Melway Reference
Hawthorn East	Hawthorn East Drain	0.18 ha	4.9 ML	52.5m AHD	52.5m AHD	53.1m AHD	Low	Unknown	45 H9
Rose Street	Hawthorn East Drain	2.20 ha	~ 10 – 20 ML	36.0m AHD	36.0m AHD	Unknown	High A	160	45 G12

Table A2 – Melbourne Water Retarding Basins within the City of Boroondara

Boroondara City Council Retarding Basin	Location	Storage Capacity	Melway Reference
Jacka Street Reserve	Jacka Street, Balwyn North	4.5 ML	46 F5
KRS – Kew Residential Subdivision	Hutchinson Drive, Kew	Unknown	45 C3

Table A3 – Boroondara City Council Retarding Basins

LEVEES

Levee	Reach	Side	Levee Height	Levee Length	Expected Level of Protection	ANCOLD Hazard Rating	Consequences of Failure	Melway Reference
Gardiners Creek	Burke Rd to Park Rd	North	1m	0.2km	100yr Event. Freeboard Unknown	Very Low	Unlikely due to double brick concrete filled wall. No impediment to water flowing around the levee however. Howard Dawson Reserve would flood as a result.	59 H6-J6
Gardiners Creek	Toorak Rd to Tooronga Rd	North	1.5 to 3m	0.3km	100yr Event with minimum 300mm freeboard	High A	Approx. 17 houses flooded	59 E5-F5

Table A4 – Levees within the City of Boroondara

For further information contact the Boroondara City Council Engineering & Transport Department.

SEWERAGE INFRASTRUCTURE

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

SEWER PUMPING STATIONS

Melbourne Water Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Dry Weather Pump Well	Yarra River	South	Corner Burke Road and Eastern Freeway, Kew East	31 K12
Wet Weather Pump Well	Yarra River	South	Corner Burke Road and Eastern Freeway, Kew East	31 K12

Table A5 – Sewer Pumping Stations within or close to the City of Boroondara

SEWER EMERGENCY RELIEF POINTS

On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Yarra River	South	Along Main Yarra Trail, near Pedestrian Bridge 100m west of Burke Road, Kew East	31 K11
Yarra River	South	Off Main Yarra Trail, 400m west of Burke Road, Kew East	31 J11
Darebin Creek	West	Near La Trobe Golf Club Clubhouse, Farm Road, Alphington	31 E12
Yarra River	North	La Trobe Golf Club, Alphington	45 D1
Yarra River	East	Denham Street, Hawthorn	2H H6
Gardiners Creek	South	Hungarian Rugby Club on Power Avenue, 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 A6 – Sewer Emergency Relief Points within or close to the City of Boroondara

FLOOD WARNING SYSTEM

Within the City of Boroondara, Melbourne Water has 7 hydrographic monitoring sites along the 2 major waterways in the Municipality. These are outlined in the table below. There are also monitors upstream of Boroondara, including Heidelberg & 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

Hydrographic Monitoring Station	Station No.	Owner	Gauge Type	Melway Reference
Gardiners Creek at Gardiner	229624A	Melbourne Water	Stream Level & Rain	59 J7
Gardiners Creek at Glenferrie Road, Kooyong	229231A	Melbourne Water	Stream Level	59 C2
Kew	586175	Melbourne Water	Rain	45 J7
Koonung Creek at Bulleen	229229A	Melbourne Water	Stream Level	32 D10
Yarra River at Chandler Hwy, Fairfield	229143A	Melbourne Water	Stream Level & Rain	31 B12
Yarra River at Johnston St, Abbotsford	229622A	Melbourne Water	Stream Level	2D C8
Yarra River at Wallen Rd, Hawthorn	229687A	Melbourne Water	Stream Level	45 A11

Table A7 – Hydrographic Monitoring Stations within the City of Boroondara

Other gauges located in adjoining Municipalities that may assist in flood warning for the Gardiners Creek and Yarra River catchments are outlined below.

Hydrographic Monitoring Station	Station No.	Owner	Gauge Type	Melway Reference
Caulfield North	586194	Melbourne Water	Rain	59 C12
Doncaster	586010	Melbourne Water	Rain	33 A12
Gardiners Creek at Ashwood	229625A	Melbourne Water	Stream Level & Rain	60 H11
Gardiners Creek at Middleborough Road Retarding Basin, Box Hill	229637A	Melbourne Water	Stream Level	47 F12
Surrey Hills	586176	Melbourne Water	Rain	47 A12
Yarra River at Banksia Street, Heidelberg	229135A	Melbourne Water	Stream Level & Rain	32 C5
Yarra River at Fitzsimons Lane, Templestowe	229142A	Melbourne Water	Stream Level	21 G12
Yarra River at Burnley	229621A	Melbourne Water	Stream Level & Rain	2M C1

Table A8 – Hydrographic Monitoring Stations within adjacent Municipalities to the City of Boroondara

Melbourne Water has assigned Flood Class Levels at several stream flow gauges along the Yarra River. The Chandler Highway at Fairfield gauge is within Boroondara, as is the Johnston St gauge in Abbotsford, and the Banksia Street at Heidelberg gauge is just outside (North) of the municipal boundary.

The Bureau does not issue formal flood warnings for Gardiners Creek due to its rapid response to rainfall. This is due to the urban surrounds which quickly direct stormwater into drains and waterways. This results in rapid stream rises during thunderstorms and heavy rainfall creating a short lead time for response.

There are currently three Melbourne Water flood warning gauges on Gardiners Creek that could be used to assist with public safety. These are at Ashwood, Great Valley Road, Glen Iris (Gardiner) and Glenferrie Road, Hawthorn (Kooyong). 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
Gardiners Creek at Gardiner	3.4m	4.4m	4.8m
Yarra River at Banksia St, Heidelberg	6.0m	8.3m	9.2m
Yarra River at Chandler Hwy, Fairfield	3.0m	6.0m	8.7m
Yarra River at Johnston St, Abbotsford	2.7m	6.7m	8.9m

Table A9 – Hydrographic Monitoring Stations with established Flood Class Levels for the City of Boroondara

At these sites, 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 Boroondara monitors these warnings in times of high rainfall, there are no specific guidelines to advise how these situations should be responded to.

HISTORIC FLOODS

There have been many floods in the Boroondara municipality area since its settlement. The most significant recorded flood events (with high flood gauge levels and likely flooding consequences to property and infrastructure) include:

- 1891 – a major regional rainfall and flooding event, where outside the Boroondara municipality the Yarra River recorded flood levels up to 14m
- 1914 – local flooding in Hawthorn, Kew and Camberwell
- 1934 – a major regional flooding event – Yarra catchment had 350mm of rainfall in 48 hours which caused flooding at Kew and Hawthorn East. Water in the Yarra River was approximately 1m below the Chandler Highway Bridge, and inundation was experienced along Punt Road northwards to Richmond Railway Station and the Cricketers Arms Hotel.
- 1974 – major 48 hour rainfall event across all catchments. Regional and local flooding occurred in Boroondara, receiving 110mm of rain in 48 hours, 70mm of that within 17 hours
- December 2003 - 75 year recurrent interval flood
- December 2004 – Kew and Hawthorn were heavily impacted having 70 mm of rainfall in about 90 minutes
- February 2004 - 500 year recurrent interval flood occurring in Kew. (Ref. City of Boroondara)
- December 2010 – significant rainfall event with minor flooding. The major impact of this event was significant hail damage across all of Melbourne.
- February 4 2011 – Kew, Hawthorn, Camberwell, Glen Iris and Ashburton greatly impacted by a significant storm, where some of Melbourne Water area experienced rainfall intensities of between a 5% and 0.2% annual exceedance probability. Kew recorded 99mm of rainfall in 24 hours. Camberwell junction was completely flooded, including the Rivoli cinema complex and surrounding restaurants. Gardiners creek experienced significant damage, including Solway pedestrian bridge being washed away.

The 1891 flood was the worst on record. However the more recent high intensity storms of 2004 and 2011 caused the most damage as the areas impacted were highly settled and occupied. No lives were lost in these events however there was significant transport and social disruption, including property damage.

Note that the table below is only a selection of the flooding events to have occurred within the Municipality.

Event	Yarra River at Chandler Hwy		Yarra River at Abbotsford	Yarra River at Hawthorn	Gardiners Creek at Gardiner		Koonung Creek at Bulleen	Kew Rain Gauge
	Rainfall at Gauge	River Height	River Height	River Height	Rainfall at Gauge	Creek Height	Creek Height	Rainfall at Gauge
Normal Water Level	-	0.5m	0.9m	0.6m	-	0.2m	1.29m	-
Minor Flood Class	-	3.0m	2.7m	-	-	3.4m	-	-
Moderate Flood Class	-	6.0m	6.7m	-	-	4.4m	-	-
Major Flood Class	-	8.7m	8.9m	-	-	4.8m	-	-
13th July 1891	-	12.38m	**12.60m**	-	-	-	-	-
20th October 1901	-	9.14m	9.53m	-	-	-	-	-
14th June 1911	-	7.48m	-	-	-	-	-	-
27th March 1914	-	-	-	-	-	-	-	-
23rd September 1916	-	8.58m	9.37m	-	-	-	-	-
23rd October 1920	-	6.02m	-	-	-	-	-	-
11th October 1923	-	9.76m	-	-	-	-	-	-
28th August 1924	-	-	-	-	-	-	-	-
1st December 1934	-	**13.05m**	12.55m	-	-	5.41m	-	-
18th October 1937	-	8.17m	7.98m	-	-	3.22m	-	-
13th July 1952	-	9.45m	9.75m	-	-	3.90m	-	-
22nd September 1952	-	9.40m	9.23m	-	-	-	-	-
10th November 1954	-	-	-	-	-	3.30m	-	-
26th January 1963	-	-	-	-	-	4.75m	-	-
9th November 1971	-	8.44m	-	-	-	-	-	-
14th May 1974	-	8.87m	-	-	-	-	-	-
26th October 1975	-	5.44m	-	-	-	-	-	-
16th October 1976	-	3.46m	-	-	-	-	-	-
8th April 1977	-	4.58m	-	-	-	3.50m	-	-
19th June 1977	-	4.67m	-	-	-	-	-	
1st July 1977	-	4.94m	-	-	-	-	-	-
10th August 1978	-	3.69m	4.23m	-	-	3.24m	-	-
20th November 1978	-	4.28m	5.19m	-	-	-	-	-

Event	Yarra River at Chandler Hwy		Yarra River at Abbotsford	Yarra River at Hawthorn	Gardiners Creek at Gardiner		Koonung Creek at Bulleen	Kew Rain Gauge
	Rainfall at Gauge	River Height	River Height	River Height	Rainfall at Gauge	Creek Height	Creek Height	Rainfall at Gauge
Normal Water Level	-	0.5m	0.9m	0.6m	-	0.2m	1.29m	-
Minor Flood Class	-	3.0m	2.7m	-	-	3.4m	-	-
Moderate Flood Class	-	6.0m	6.7m	-	-	4.4m	-	-
Major Flood Class	-	8.7m	8.9m	-	-	4.8m	-	-
25th December 1978	-	2.44m	-	-	-	4.76m	-	-
6th October 1979	-	2.28m	2.75m	-	-	3.41m	-	-
19th September 1984	69mm/ 50hrs	5.33m	-	-	-	4.77m	-	-
30th July 1987	47mm/ 35hrs	5.15m	6.02m	3.14m	-	2.89m	-	-
22nd November 1988	-	-	4.11m	2.99m	-	4.42m	-	-
11th June 1989	40mm/ 20hrs	5.39m	5.94m	3.09m	28mm/ 20hrs	1.46m	-	-
18th July 1990	42mm/ 7hrs	3.42m	4.47m	2.39m	51mm/ 7hrs	2.76m	-	-
12th October 1990	45mm/ 28hrs	3.25m	3.87m	2.04m	60mm/ 29hrs	1.92m	-	-
22nd March 1991	33mm/ 11hrs	1.15m	2.01m	1.49m	75mm/ 11hrs	3.80m	-	-
19th September 1991	60mm/ 8days	3.91m	3.35m	1.99m	62mm/ 8days	1.40m	-	58mm/ 8days
26th September 1992	33mm/ 3days	4.00m	3.99m	2.02m	37mm/ 3days	1.69m	-	36mm/ 3days
11th October 1992	61mm/ 6days	4.95m	5.13m	2.67m	75mm/ 6days	2.05m	-	69mm/ 6days
19th September 1993	97mm/ 14days	3.68m	3.59m	1.96m	117mm/ 14days	2.11m	-	110mm/ 14days
27th December 1993	87mm/ 40hrs	3.40m	4.83m	2.72m	85mm/ 40hrs	3.96m	-	89mm/ 40hrs
8th March 1995	46mm/ 5hrs	1.63m	3.03m	2.12m	48mm/ 5hrs	3.48m	-	54mm/ 5hrs
19th April 1996	84mm/ 8days	3.34m	3.42m	-	81mm/ 8days	2.86m	-	118mm/ 8days
25th June 1996	48mm/ 26hrs	3.94m	4.32m	-	42mm/ 26hrs	1.74m	-	40mm/ 26hrs
1st August 1996	36mm/ 36hrs	4.90m	4.92m	2.58m	49mm/ 36hrs	0.83m	-	40mm/ 36hrs
27th December 1999	62mm/ 26hrs	2.95m	3.93m	2.09m	32mm/ 26hrs	3.25m	**4.63m**	38mm/ 26hrs
26th October 2000	73mm/ 51hrs	3.33m	3.85m	1.85m	65mm/ 51hrs	1.69m	1.89m	57mm/ 51hrs
3rd December 2003	98mm/ 2hrs	3.62m	5.38m	3.43m	-	3.35m	4.51m	52mm/ 2hrs
13th November 2004	125mm/ 10days	5.01m	5.52m	2.82m	135mm/ 10days	2.75m	2.93m	87mm/ 10days
3rd February 2005	124mm/ 29hrs	5.70m	6.50m	**4.46m**	132mm/ 29hrs	4.15m	4.49m	116mm/ 29hrs

Event	Yarra River at Chandler Hwy		Yarra River at Abbotsford	Yarra River at Hawthorn	Gardiners Creek at Gardiner		Koonung Creek at Bulleen	Kew Rain Gauge
	Rainfall at Gauge	River Height	River Height	River Height	Rainfall at Gauge	Creek Height	Creek Height	Rainfall at Gauge
Normal Water Level	-	0.5m	0.9m	0.6m	-	0.2m	1.29m	-
Minor Flood Class	-	3.0m	2.7m	-	-	3.4m	-	-
Moderate Flood Class	-	6.0m	6.7m	-	-	4.4m	-	-
Major Flood Class	-	8.7m	8.9m	-	-	4.8m	-	-
25th February 2006	-	1.29m	2.76m	2.13m	56mm/ 3hrs	4.49m	2.39m	66mm/ 3hrs
20th December 2007	34mm/ 12hrs	1.60m	2.20m	1.47m	36mm/ 12hrs	3.53m	2.58m	41mm/ 12hrs
1st November 2010	67mm/ 33hrs	3.42m	3.25m	1.49m	62mm/ 35hrs	1.60m	2.52m	69mm/ 35hrs
5th February 2011	85mm/ 15hrs	4.55m	4.53m	2.35m	146mm/ 15hrs	**5.60m**	-	98mm/ 15hrs
12th April 2011	61mm/ 12hrs	3.30m	3.71m	1.99m	55mm/ 13hrs	3.63m	4.53m	66mm/ 12hrs
27th November 2011	24mm/ 8hrs	3.82m	3.46m	1.72m	32mm/ 7hrs	1.64m	4.14m	27mm/ 8hrs
26th December 2011	43mm/ 5hrs	3.63m	4.19m	1.96m	28mm/ 7hrs	2.24m	4.04m	40mm/ 6hrs
1st June 2013	77mm/ 17hrs	3.98m	5.25m	2.84m	65mm/ 17hrs	2.41m	4.23m	75mm/ 17hrs

Table A10 – Selection of Historical Flood Events along the Yarra River, Gardiners Creek and Koonung Creek

DAM FAILURE

Flooding resulting from failure of the following dams is likely to cause significant structural and community damage within the City of Boroondara. See Dam Failure in Section 3.18 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 at Full Supply Level	Full Supply Level	Melway Reference
Maroondah Reservoir	Healesville	Melbourne Water	21,821 ML	139.46m AHD	270J4
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	X912 U2

Table A11 – Melbourne Water Reservoirs that pose a risk to the City of Boroondara from Dam Failure

Service Reservoirs located within the Municipality are listed below.

Service Reservoir	Location	Owner	Material	Reservoir Capacity	Melway Reference
Kew	370-374 Cotham Road, Kew	Yarra Valley Water	Unknown	Unknown	45 J7

Table A12 –Service Reservoirs in the City of Boroondara

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.

Flood Travel Times along the Yarra River vary considerably at the point where the river enters the City of Boroondara. This is because of the large and variable inflows that are possible where Diamond Creek; the Plenty River; & Darebin Creek join with the Yarra just before or along Boroondara's Municipal border. It is therefore only possible to give a broad time range of expectant travel times as this correlates with historical events.

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 tributaries entering the river between the two gauges which may be carrying significant flood waters.

Typical Travel Times

Location From (gauge)	Location To (gauge)	Typical Travel Time	Flood Class	Comments
YARRA RIVER				
Fitzsimons La, Templestowe	Chandler Hwy, Fairfield	Between 2 and 18 hours	Minor Flood at Fairfield	Inflows from Diamond Creek & Plenty River may impact on travel time.
	Johnston St, Abbotsford	Between 2 and 19 hours	Minor Flood at Fairfield	Inflows from Diamond Creek & Plenty River may impact on travel time, as well as tides flowing up the Yarra
Banksia St, Heidelberg	Chandler Hwy, Fairfield	Between 0 and 8 hours	Minor Flood at Fairfield	Inflows from Darebin Creek may impact on travel time.
	Johnston St, Abbotsford	Between 0 and 9 hours	Minor Flood at Fairfield	Inflows from Darebin Creek may impact on travel time, as well as tides flowing up the Yarra
GARDINERS CREEK				
Ashwood	Gardiner	Between 1 min to 2 hours	Minor Flood at Gardiner	
Ashwood	Gardiner	Between 1 min to 1 hour	Moderate Flood at Gardiner	
Ashwood	Gardiner	Between 1 min to 1 hour	Major Flood at Gardiner	

Historical Travel Times

Flood Event	Location From (gauge)	Location To (gauge)	Flood Peak Travel Time	Flood Class at
YARRA RIVER				**Fairfield**
10th August 1978	Templestowe	Fairfield	6 hours	Minor
		Abbotsford	Less than 1 hour	
	Heidelberg	Fairfield	Fairfield peaked 3 hours before Heidelberg	
		Abbotsford	Abbotsford peaked 9 hours before Heidelberg	
20th November 1978	Templestowe	Fairfield	17 hours	Minor
		Abbotsford	11 hours	
	Heidelberg	Fairfield	5 hours	
		Abbotsford	Abbotsford peaked 1 hour before Heidelberg	
30th July 1987	Templestowe	Fairfield	11 hours	Minor
		Abbotsford	13 hours	
	Heidelberg	Fairfield	3 hours	
		Abbotsford	5 hours	
19th September 1991	Templestowe	Fairfield	10 hours	Minor
		Abbotsford	12 hours	
	Heidelberg	Fairfield	3 hours	
		Abbotsford	5 hours	
26th September 1992	Templestowe	Fairfield	11 hours	Minor
		Abbotsford	16 hours	
	Heidelberg	Fairfield	3 hours	
		Abbotsford	8 hours	
11th October 1992	Templestowe	Fairfield	8 hours	Minor
		Abbotsford	8 hours	
	Heidelberg	Fairfield	6 hours	
		Abbotsford	6 hours	
19th September 1993	Templestowe	Fairfield	31 hours	Minor
		Abbotsford	27 hours	
	Heidelberg	Fairfield	22 hours	
		Abbotsford	18 hours	
25th June 1996	Templestowe	Fairfield	16 hours	Minor
		Abbotsford	16 hours	
	Heidelberg	Fairfield	8 hours	
		Abbotsford	8 hours	
1st August 1996	Templestowe	Fairfield	18 hours	Minor
		Abbotsford	16 hours	
	Heidelberg	Fairfield	6 hours	
		Abbotsford	4 hours	
26th October 2000	Templestowe	Fairfield	8 hours	Minor
		Abbotsford	5 hours	
	Heidelberg	Fairfield	2 hours	
		Abbotsford	Abbotsford peaked 1 hour before Heidelberg	
3rd December 2003	Templestowe	Fairfield	Fairfield peaked 2 hours before Templestowe	Minor
		Abbotsford	Abbotsford peaked 2 hours before	

Flood Event	Location From (gauge)	Location To (gauge)	Flood Peak Travel Time	Flood Class at
			Templestowe	
	Heidelberg	Fairfield	Fairfield peaked 1 hour before Heidelberg	
		Abbotsford	Abbotsford peaked 1 hour before Heidelberg	
13th November 2004	Templestowe	Fairfield	10 hours	Minor
		Abbotsford	13 hours	
	Heidelberg	Fairfield	6 hours	
		Abbotsford	9 hours	
3rd February 2005	Templestowe	Fairfield	8 hours	Minor
	Heidelberg	Fairfield	4 hours	
1st November 2010	Templestowe	Fairfield	22 hours	Minor
		Abbotsford	19 hours	
	Heidelberg	Fairfield	10 hours	
		Abbotsford	7 hours	
5th February 2011	Templestowe	Fairfield	12 hours	Minor
		Abbotsford	13 hours	
	Heidelberg	Fairfield	7 hours	
		Abbotsford	8 hours	
12th April 2011	Templestowe	Fairfield	6 hours	Minor
		Abbotsford	5 hours	
	Heidelberg	Fairfield	1 hour	
		Abbotsford	Less than 1 hour	
27th November 2011	Templestowe	Fairfield	12 hours	Minor
		Abbotsford	13 hours	
	Heidelberg	Fairfield	5 hours	
		Abbotsford	6 hours	
26th December 2011	Templestowe	Fairfield	2 hours	Minor
		Abbotsford	2 hours	
	Heidelberg	Fairfield	Fairfield peaked 2 hours before Heidelberg	
		Abbotsford	Abbotsford peaked 2 hours before Heidelberg	
1st June 2013	Templestowe	Fairfield	2 hours	Minor
		Abbotsford	2 hours	
	Heidelberg	Fairfield	Less than 1 hour	
		Abbotsford	Less than 1 hour	
GARDINERS CREEK				**Gardiner**
25th December 1978	Ashwood	Gardiner	1 hour	Moderate
6th October 1979	Ashwood	Gardiner	Less than 1 hour	Minor
18th September 1984	Ashwood	Gardiner	1 hour	Moderate
22nd November 1988	Ashwood	Gardiner	1 hour	Moderate
22nd March 1991	Ashwood	Gardiner	1 hour	Minor
27th December 1993	Ashwood	Gardiner	Less than 1 hour	Minor
8th March 1995	Ashwood	Gardiner	Less than 1 hour	Minor
3rd February 2005	Ashwood	Gardiner	2 hours	Minor
25th February 2006	Ashwood	Gardiner	Less than 1 hour	Moderate
20th December 2007	Ashwood	Gardiner	1 hour	Minor
5th February 2011	Ashwood	Gardiner	1 hour	Major

Flood Event	Location From (gauge)	Location To (gauge)	Flood Peak Travel Time	Flood Class at
12th April 2011	Ashwood	Gardiner	2 hours	Minor

Level Correlation – Yarra River

The tables below display the results of a correlation analyses carried out between the Chandler Hwy, Fairfield; Fitzsimons La, Templestowe; & Johnston St, Abbotsford gauges along the Yarra River. The analysis was carried out using a number of historical flooding events. This correlation aims to provide a preliminary estimate of an expected peak flood level at a one of these three gauges along the Yarra River based on the peak level at an upstream location. The full analysis can be viewed in "Yarra River – Level Correlation" (Melbourne Water, 2005)

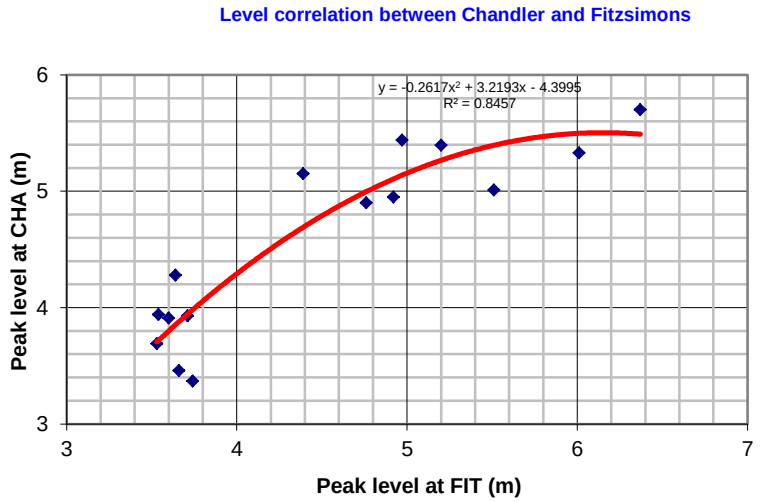

Figure 1: Plot of peak river levels at Fitzsimons La, Templestowe & Chandler Hwy, Fairfield (1975-2005)

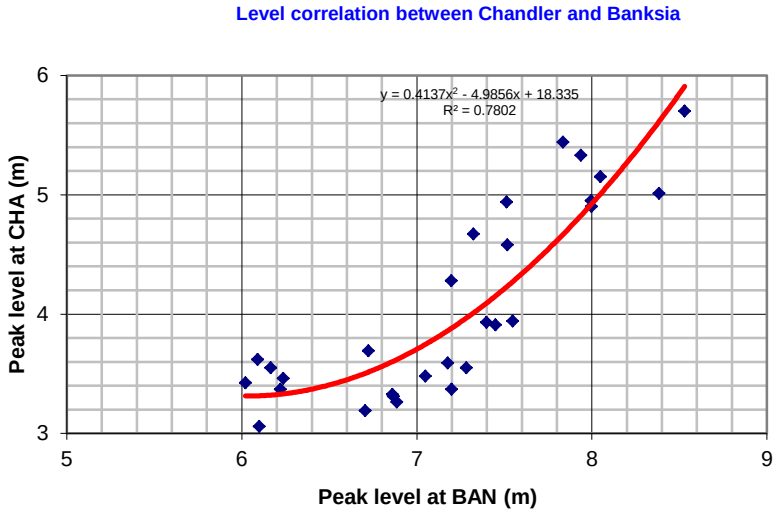

Figure 2: Plot of peak river levels at Banksia St, Heidelberg & Chandler Hwy, Fairfield (1975-2005)

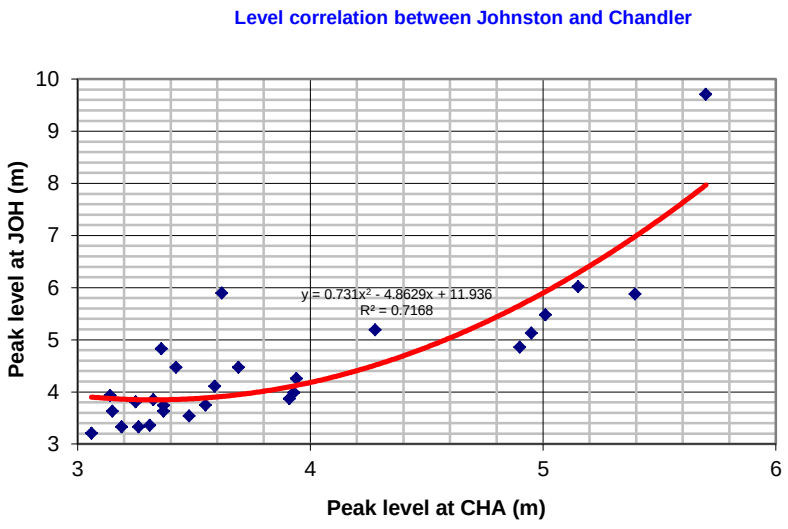

Figure 3: Plot of peak river levels at Chandler Hwy, Fairfield & Johnston St, Abbotsford (1978-2005)

APPENDIX C1 – GARDINERS CREEK FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Gardiners Creek and its adjoining suburbs of Ashburton, Glen Iris, Hawthorn East & Hawthorn are located between 6km 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

Neither the Bureau of Meteorology nor Melbourne Water currently provides flood forecasts for Gardiners Creek. All flood response actions must therefore be driven by rainfall and / or river level observations. Telemetered water level / flood gauges are located at Ashwood & Gardiner. See **Appendix B** for typical flood travel times for Gardiners Creek.

Hydrographic/Telemetry Station	Station No.	Owner	Gauge Type	Melway Reference
Gardiners Creek at Ashwood	229625	Melbourne Water	Level & Rain	60H11
Gardiners Creek at Gardiner	229624A	Melbourne Water	Level & Rain	59J7

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 around Gardiners Creek in the City of Boroondara

PROPERTIES AT FLOOD RISK

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

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

Street No. at Risk	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
441	Auburn Road	Hawthorn	Gardiners Creek	Riverine
443-447	Auburn Road	Hawthorn	Gardiners Creek	Riverine
455-459	Auburn Road	Hawthorn	Gardiners Creek	Riverine
1/461-465	Auburn Road	Hawthorn	Gardiners Creek	Riverine
2/461-465	Auburn Road	Hawthorn	Gardiners Creek	Riverine
465	Bourke Road	Camberwell	Rix Street Drain	Flash
467	Bourke Road	Camberwell	Rix Street Drain	Flash
1/469	Bourke Road	Camberwell	Rix Street Drain	Flash
2/469	Bourke Road	Camberwell	Rix Street Drain	Flash
471	Bourke Road	Camberwell	Rix Street Drain	Flash
473	Bourke Road	Camberwell	Rix Street Drain	Flash
475	Bourke Road	Camberwell	Rix Street Drain	Flash
1/477	Bourke Road	Camberwell	Rix Street Drain	Flash
2/477	Bourke Road	Camberwell	Rix Street Drain	Flash
479	Bourke Road	Camberwell	Rix Street Drain	Flash
1	Cato Street	Hawthorn East	Gardiners Creek	Riverine
2-4	Cato Street	Hawthorn East	Gardiners Creek	Riverine
1/2-4	Cato Street	Hawthorn East	Gardiners Creek	Riverine
3	Cato Street	Hawthorn East	Gardiners Creek	Riverine
5	Cato Street	Hawthorn East	Gardiners Creek	Riverine
8	Cato Street	Hawthorn East	Gardiners Creek	Riverine
10	Cato Street	Hawthorn East	Gardiners Creek	Riverine
1/12	Cato Street	Hawthorn East	Gardiners Creek	Riverine
2/12	Cato Street	Hawthorn East	Gardiners Creek	Riverine
3/12	Cato Street	Hawthorn East	Gardiners Creek	Riverine
4/12	Cato Street	Hawthorn East	Gardiners Creek	Riverine
5/12	Cato Street	Hawthorn East	Gardiners Creek	Riverine
6/12	Cato Street	Hawthorn East	Gardiners Creek	Riverine
7/12	Cato Street	Hawthorn East	Gardiners Creek	Riverine
8/12	Cato Street	Hawthorn East	Gardiners Creek	Riverine
5	Clifford Close	Ashburton	Gardiners Creek	Riverine
7	Clifford Close	Ashburton	Gardiners Creek	Riverine
9	Clifford Close	Ashburton	Gardiners Creek	Riverine
23	Donald Street	Ashburton	Gardiners Creek	Riverine
2A	Faircroft Avenue	Glen Iris	Gardiners Creek	Riverine
2B	Faircroft Avenue	Glen Iris	Gardiners Creek	Riverine
3	Faircroft Avenue	Glen Iris	Rix Street Drain	Flash
5	Faircroft Avenue	Glen Iris	Rix Street Drain	Flash
43	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine

Street No. at Risk	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
45	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine
47	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine
49	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine
51	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine
53	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine
55	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine
57	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine
59	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine
61	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine
63	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine
65	Gardiner Parade	Glen Iris	Gardiners Creek	Riverine
22	Glen Road	Ashburton	Gardiners Creek	Riverine
24	Glen Road	Ashburton	Gardiners Creek	Riverine
26	Glen Road	Ashburton	Gardiners Creek	Riverine
20	Great Valley Road	Glen Iris	Gardiners Creek	Riverine
2/24	Great Valley Road	Glen Iris	Gardiners Creek	Riverine
6	Grosvenor Road	Glen Iris	Rix Street Drain	Flash
8	Grosvenor Road	Glen Iris	Rix Street Drain	Flash
10	Grosvenor Road	Glen Iris	Rix Street Drain	Flash
12	Grosvenor Road	Glen Iris	Rix Street Drain	Flash
4	Hadley Court	Glen Iris	Rix Street Drain	Flash
5	Hadley Court	Glen Iris	Rix Street Drain	Flash
6	Hadley Court	Glen Iris	Rix Street Drain	Flash
8	Hadley Court	Glen Iris	Rix Street Drain	Flash
9	Hadley Court	Glen Iris	Rix Street Drain	Flash
1-5	Hall Street	Hawthorn East	Gardiners Creek	Riverine
2	Hall Street	Hawthorn East	Gardiners Creek	Riverine
7	Hall Street	Hawthorn East	Gardiners Creek	Riverine
8-14	Hall Street	Hawthorn East	Gardiners Creek	Riverine
9	Hall Street	Hawthorn East	Gardiners Creek	Riverine
9A	Hall Street	Hawthorn East	Gardiners Creek	Riverine
11	Hall Street	Hawthorn East	Gardiners Creek	Riverine
13	Hall Street	Hawthorn East	Gardiners Creek	Riverine
16	Hall Street	Hawthorn East	Gardiners Creek	Riverine
20	Hall Street	Hawthorn East	Gardiners Creek	Riverine
22-24	Hall Street	Hawthorn East	Gardiners Creek	Riverine
2A	High Street	Glen Iris	Gardiners Creek	Riverine
1/107	Kooyongkoot Road	Hawthorn	Gardiners Creek	Riverine
1/109	Kooyongkoot Road	Hawthorn	Gardiners Creek	Riverine
1/111	Kooyongkoot Road	Hawthorn	Gardiners Creek	Riverine
2/111	Kooyongkoot Road	Hawthorn	Gardiners Creek	Riverine
3/111	Kooyongkoot Road	Hawthorn	Gardiners Creek	Riverine
19	Maxwell Street	Ashburton	Gardiners Creek	Riverine
1	Morrison Street	Hawthorn	Gardiners Creek	Riverine
23	Parkin Street	Glen Iris	Gardiners Creek	Riverine
26	Parkin Street	Glen Iris	Gardiners Creek	Riverine

Street No. at Risk	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
28	Parkin Street	Glen Iris	Gardiners Creek	Riverine
30	Parkin Street	Glen Iris	Gardiners Creek	Riverine
17	Parkin Street	Glen Iris	Rix Street Drain	Flash
19	Parkin Street	Glen Iris	Rix Street Drain	Flash
21	Parkin Street	Glen Iris	Rix Street Drain	Flash
2	Pitt Street	Ashburton	Gardiners Creek	Riverine
2	Rix Street	Glen Iris	Rix Street Drain	Flash
1/15	Rix Street	Glen Iris	Rix Street Drain	Flash
2/15	Rix Street	Glen Iris	Rix Street Drain	Flash
3/15	Rix Street	Glen Iris	Rix Street Drain	Flash
4/15	Rix Street	Glen Iris	Rix Street Drain	Flash
19	Rix Street	Glen Iris	Rix Street Drain	Flash
9	Saxby Road	Ashburton	Gardiners Creek	Riverine
747-755	Toorak Road	Hawthorn East	Gardiners Creek	Riverine
757	Toorak Road	Hawthorn East	Gardiners Creek	Riverine
759	Toorak Road	Hawthorn East	Gardiners Creek	Riverine
761	Toorak Road	Hawthorn East	Gardiners Creek	Riverine
763	Toorak Road	Hawthorn East	Gardiners Creek	Riverine
765	Toorak Road	Hawthorn East	Gardiners Creek	Riverine
767	Toorak Road	Hawthorn East	Gardiners Creek	Riverine
769	Toorak Road	Hawthorn East	Gardiners Creek	Riverine
771	Toorak Road	Hawthorn East	Gardiners Creek	Riverine
773	Toorak Road	Hawthorn East	Gardiners Creek	Riverine
775	Toorak Road	Hawthorn East	Gardiners Creek	Riverine
1/864	Toorak Road	Hawthorn East	Rix Street Drain	Flash
Totals				
110				

ISOLATION

No major isolation risks exist for Ashburton, Glen Iris, Hawthorn East & Hawthorn along Gardiners Creek 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 become affected by flooding along Glenferrie Road, Hawthorn at **stops 66 & 67** during a Major flood event along Gardiners Creek.

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 along Gardiners Creek 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 Gardiners Creek. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
• Glenferrie Road, Hawthorn at Citylink Underpass
• Toorak Road, Hawthorn East east of Auburn Road
• Toorak Road, Hawthorn East west of Burke Road

Boroondara City Council Roads flooded in a 1% AEP (100yr ARI) event			
ASHBURTON	**GLEN IRIS**	**HAWTHORN**	**HAWTHORN EAST**
• Clifford Close	• Faircroft Avenue	• Auburn Road	• Cato Lane North
• Pitt Street	• Hadley Court	• Gardiner Road	• Cato Lane South
• Winton Road	• Gardiner Parade	• Reserve Road	• Cato Street
	• Grosvenor Road		• Hall Street
	• Rix Street		

FLOOD MITIGATION

LEVEES

Levee	Reach	Side	Levee Height	Levee Length	Expected Level of Protection	ANCOLD Hazard Rating	Consequences of Failure	Melway Reference
Gardiners Creek	Burke Rd to Park Rd	North	1m	0.2km	100yr Event. Freeboard Unknown	Very Low	Unlikely due to double brick concrete filled wall. No impediment to water flowing around the levee however. Howard Dawson Reserve would flood as a result.	59 H6-J6
Gardiners Creek	Toorak Rd to Tooronga Rd	North	1.5 to 3m	0.3km	100yr Event with minimum 300mm freeboard	High A	Approx. 17 houses flooded	59 E5-F5

Protected by the Levee near Toorak Road and Tooronga Rd sits a block of **103** residential properties along Kaikoura Avenue, Maraquita Grove, Kooyong Close, Tooronga Road & Toorak Road. These properties were badly affected in the December 1934 floods.

The Levee between Burke Road and Park Road protects Howard Dawson Reserve and recreational grounds and also holds back floodwaters from overtopping Burke Road.

No formal Retarding Basins or Pumping Stations exist around Gardiners Creek.

SEWERAGE INFRASTRUCTURE

SEWER EMERGENCY RELIEF POINTS

On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Gardiners Creek	South	Hungarian Rugby Club on Power Avenue, 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

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/s for Gardiner for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	55
Business	53
Industrial	0
Public Land	2
Rural	0
Total	**110**

FLOOD INTELLIGENCE CARD – GARDINER GAUGE, GARDINERS CREEK

Version 2 – October 2015

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	**Great Valley Road, Glen Iris**
MELWAY REFERENCE:	**59 J7**
STREAM:	**Gardiners Creek**
GAUGE NUMBER:	**229624A**
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 (5th February 2011)**

Creek Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
3.4m	**MINOR FLOOD LEVEL**		Respond to RFA as normal
4.14m		• Bank Full at Gauging Location	
4.4m	**MODERATE FLOOD LEVEL**		** Unit to begin monitoring of creek- Liaise with CTDO to contact BoM
4.8m	**MAJOR FLOOD LEVEL**		
5.60m	4th February 2011 Flood Level Peak	**Event Summary** • Properties affected by flooding on Gardiner Parade, Glen Iris • Solway Pedestrian Bridge was washed away	During the latter half of 2011 the bridge was completely replaced and was opened to the Public unofficially on 22 December 2011.

Creek Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
5.72m	1% AEP (100yr ARI) Flood Level (Major)	**Properties at Flood Risk** **78 Properties in Total** • 5, 7 & 9 Clifford Close, Ashburton • 22, 24 & 26 Glen Road, Ashburton • 2 Pitt Street, Ashburton • 23 Donald Street, Ashburton • 19 Maxwell Street, Ashburton • 9 Saxby Road, Ashburton • 2A High Street, Glen Iris • 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63 & 65 Gardiner Parade, Glen Iris • 20 & 2/24 Great Valley Road, Glen Iris • 23, 26, 28 & 30 Parkin Street, Glen Iris • 2A & 2B Faircroft Avenue, Glen Iris • 747-755, 757, 759, 761, 763, 765, 767, 769, 771, 773 & 775 Toorak Road, Hawthorn East • 441, 443-447, 455-459, 1/461-465 & 2/461-465 Auburn Road, Hawthorn • 1-5, 2, 7, 8-14, 9, 9A, 11, 13, 16, 20 & 22-24 Hall Street, Hawthorn East • 1, 2-4, 1/2-4, 3, 5, 8, 10 & 1/12, 2/12, 3/12, 4/12, 5/12, 6/12, 7/12, 8/12 Cato Street, Hawthorn East • 1/107, 1/109, 1/111, 2/111 & 3/111 Kooyongkoot Road, Hawthorn **Community Infrastructure Flooded** • Gardiners Creek Trail Inundated at various locations • Access across the Solway Pedestrian Bridge, Ashburton cut • Scouts Hall on Saxby Road, Glen Iris affected by flooding to property • Eric Raven Reserve, Glen Iris flooded Cricket club house and pavilion next to gardiners creek looks to be built up and flood proofed • Glen Iris Community Hall at Eric Raven Reserve likely flooded • Burke Road South Reserve on Sinclair Avenue, Glen Iris flooded • Scotch College experiencing flooding to sports grounds with floodwaters possibly reaching some buildings **Essential Infrastructure at Risk** • Tram Services along Route 16 may be cut at stops 66 and 67 on Glenferrie Road, Hawthorn. Tram company would manage service continuation. **Water Over Road (Over 300mm Depth)**	*** Continue to monitor water level and respond as required Advise tenants. ** Contact Council to determine If trail/bridge closures are in place or required. ???Check with CoB that they do checks /closures ???Check not listed as ERC's **Yarra Trams** In any location that has more than 10 centimetres of water over tracks services will stop and operate either side of it. Track personnel will attend to see if the blockage can be cleared. Affected services would be terminated at shunting points either side of the flooding until deemed safe to resume by an attending operations office Latest Tram disruptions can be monitored by https://twitter.com/yarratrams Check with VicPol what plans do they have as above with VicRoads

Creek Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Clifford Close, Ashburton • Winton Road, Ashburton • Pitt Street, Ashburton • Gardiner Parade, Glen Iris • Toorak Road, Hawthorn East, east of Auburn Road • Auburn Road, Hawthorn near Toorak Road Intersection • Hall Street, Hawthorn East • Cato Street, Hawthorn East • Cato Lane South, Hawthorn East • Cato Lane North, Hawthorn East • Reserve Road, Hawthorn • Gardiner Road, Hawthorn • Glenferrie Road, Hawthorn at Citylink Underpass	
6.0m		• Levee Overtopped between Tooronga Road and Toorak Road, Hawthorn	Additional properties on Kaikoura Avenue, Kooyong Close and Maraquita Grove are likely to flooded

FLOOD INTELLIGENCE CARD – GLENFERRIE GAUGE, GARDINERS CREEK

Version 2 – October 2015

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	**Glenferrie Road, 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	**Manual**
HIGHEST RECORDED FLOOD:	**Unknown**

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
4.94m	4th February 2011 Flood Level Peak		
5.01m	1% AEP (100yr ARI) Flood Level	**Properties at Flood Risk** **47 Properties in Total** • 747-755, 757, 759, 761, 763, 765, 767, 769, 771, 773 & 775 Toorak Road, Hawthorn East • 441, 443-447, 455-459, 1/461-465 & 2/461-465 Auburn Road, Hawthorn • 1-5, 2, 7, 8-14, 9, 9A, 11, 13, 16, 20 & 22-24 Hall Street, Hawthorn East • 1, 2-4, 1/2-4, 3, 5, 8, 10 & 1/12, 2/12, 3/12, 4/12, 5/12, 6/12, 7/12, 8/12 Cato Street, Hawthorn East • 1/107, 1/109, 1/111, 2/111 & 3/111 Kooyongkoot Road, Hawthorn **Community Infrastructure Flooded** • Scotch College experiencing flooding to sports grounds with floodwaters possibly reaching some buildings	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commanderwill maintain operational awareness and form an appropriate response arrangement to suit the level of incident.

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Essential Infrastructure at Risk • Tram Services along Route 16 may be cut at stops 66 and 67 on Glenferrie Road, Hawthorn **Water Over Road (Over 300mm Depth)** • Toorak Road, Hawthorn East east of Auburn Road • Auburn Road, Hawthorn near Toorak Road Intersection • Hall Street, Hawthorn East • Cato Street, Hawthorn East • Cato Lane South, Hawthorn East • Cato Lane North, Hawthorn East • Reserve Road, Hawthorn • Gardiner Road, Hawthorn • Glenferrie Road, Hawthorn at Citylink Overpass	Tram services to implement flood plan when water level reaches 10cm Council to provide road closure signage if required.
5.30m		• Levee Overtopped between Tooronga Road and Toorak Road, Hawthorn	Additional properties on Kaikoura Avenue, Kooyong Close and Maraquita Grove are likely to flooded

FLOOD INTELLIGENCE CARD – RIX STREET MAIN DRAIN (UNGAUGED)

Version 2 – October 2015

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	**Great Valley Road, Glen Iris**
MELWAY REF:	**59 J7**

GAUGE NUMBER	**229624A**
GAUGE TYPE	**Stream Level & Rain**
TELEMETRIC/MANUAL	**Telemetric**

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; 82mm 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)** **31 Properties in Total** • 465, 467, 1/469, 2/469, 471, 473, 475, 1/477, 2/477 & 479 Bourke Road, Camberwell (Businesses) • 3 & 5 Faircroft Avenue, Glen Iris • 6, 8, 10 & 12 Grosvenor Road, Glen Iris • 4, 5, 6, 8 & 9 Hadley Court, Glen Iris • 17, 19 & 21 Parkin Street, Glen Iris • 2, 1/15, 2/15, 3/15, 4/15 & 19 Rix Street, Glen Iris • 1/864 Toorak Road, Hawthorn East **Community Infrastructure Flooded** • Burke Road South Reserve on Sinclair Avenue, Glen Iris flooded **Water Over Road** • Toorak Road, Hawthorn East, west of Burke Road • Grosvenor Road, Glen Iris • Hadley Court, Glen Iris	VicSES to respond to requests on case by case basis Council to provide road closure signage if required.. Check U3a and sewerage pump station

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Rix Street, Glen Iris • Faircroft Avenue, Glen Iris	

APPENDIX C2 – YARRA RIVER FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

The Yarra River and its adjoining suburbs of Balwyn North, Kew East, Kew and Hawthorn are located between 6 and 10km east of Melbourne in an established residential area.

The Yarra River is the prominent watercourse in the area, flowing from the east through the Municipalities of Yarra Ranges, Manningham, Nillumbik and Boroondara. High Intensity, short duration rainfall events can cause flash flooding in and around the area as was experienced in 2003. In this event the Yarra River only reached minor levels, while many properties and roads, including the Eastern Freeway became inundated.

Prolonged rainfall may see the Yarra flood, spilling out onto the parklands, golf-courses and further to residential properties and streets. The area sees moderate to slow water movement on the flood-plains adjacent to the Yarra River around North Balwyn and Kew East. Quicker flood waters are more likely around Kew and Hawthorn where the steeper river banks contain all but major flooding events. Flooding may last a number of days around the floodplains of Balwyn North and Kew East. See mapping in **Appendix F** for more insight into flooding in the area.

WARNING TIMES

Warnings are available for flooding expected along the Yarra River at Banksia St, Heidelberg; Chandler Hwy, Fairfield; and Johnston St, Abbotsford. Accurate warning times of flooding along the Yarra River in the City of Boroondara cannot be given due to the large inflows possible from Plenty River, Darebin Creek & Merri Creek. These inflows can significantly affect the size and speed of floodwaters travelling down the Yarra River. Below is a table detailing the Stream & Rain gauges along the Yarra River in or adjacent to the City of Boroondara.

Hydrographic/Telemetry Station	Station No.	Owner	Gauge Type	Melway Reference
Yarra River at Banksia Street, Heidelberg	229135A	Melbourne Water	Stream Level & Rain	32 C5
Yarra River at Chandler Hwy, Fairfield	229143A	Melbourne Water	Stream Level & Rain	31 B12
Yarra River at Johnston St, Abbotsford	229622A	Melbourne Water	Stream Level	2D C8
Yarra River at Wallen Rd, Hawthorn	229687A	Melbourne Water	Stream Level	45 A11

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

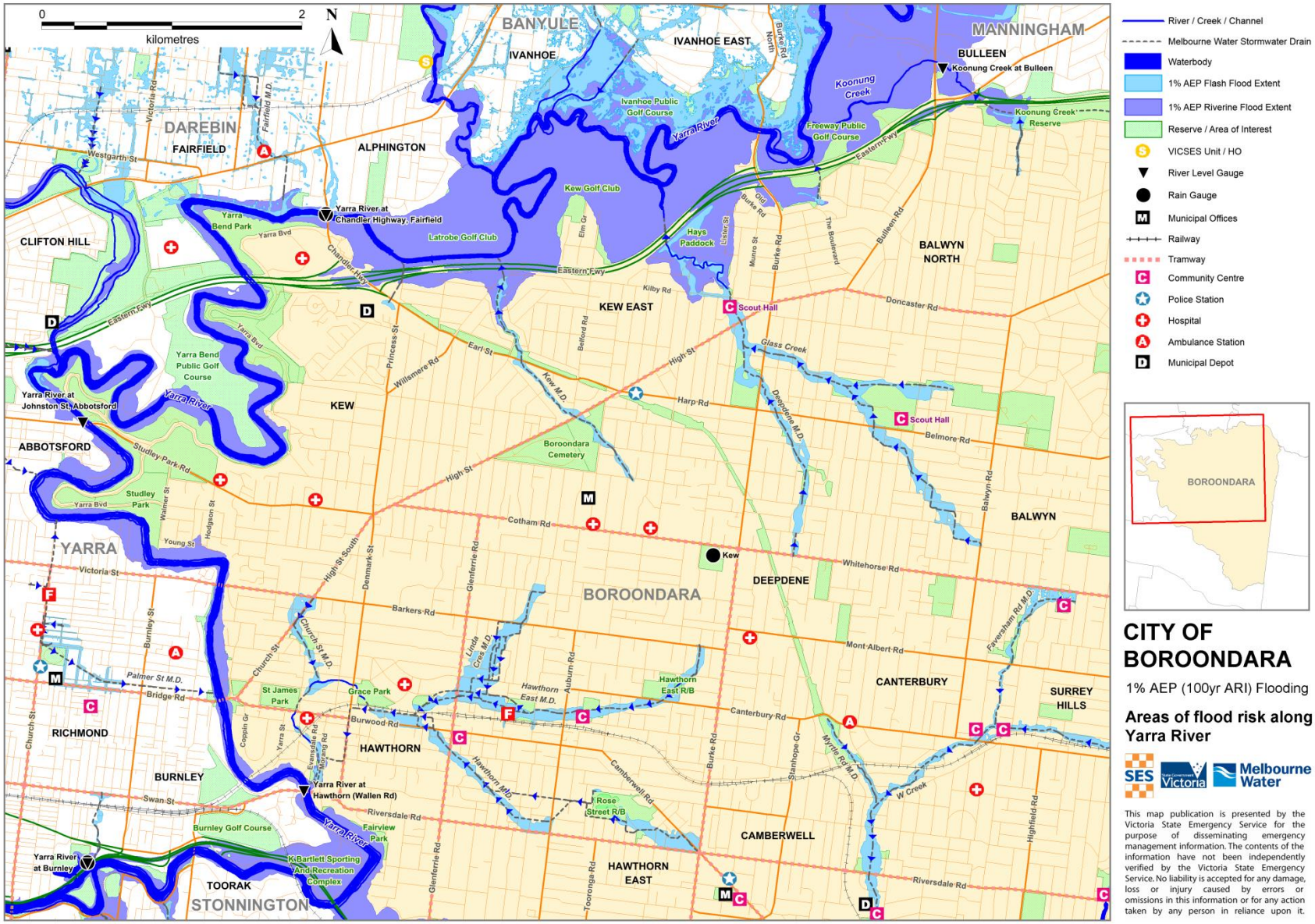

Figure C2 – Areas of flood risk along the Yarra River in the City of Boroondara

PROPERTIES AT FLOOD RISK

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

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

Street No. at Flood Risk	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
64	Aquila Street	Balwyn North	Yarra River	Riverine
66	Aquila Street	Balwyn North	Yarra River	Riverine
1/1	Arden Court	Kew East	Yarra River	Riverine
2/1	Arden Court	Kew East	Yarra River	Riverine
1B	Arden Court	Kew East	Yarra River	Riverine
3	Arden Court	Kew East	Yarra River	Riverine
7	Arden Court	Kew East	Yarra River	Riverine
9	Arden Court	Kew East	Yarra River	Riverine
9	Arden Court	Kew East	Yarra River	Riverine
a	Arden Court	Kew East	Yarra River	Riverine
11	Arden Court	Kew East	Yarra River	Riverine
15	Arden Court	Kew East	Yarra River	Riverine
17	Arden Court	Kew East	Yarra River	Riverine
48	Barnard Grove	Kew	Yarra River	Riverine
50	Barnard Grove	Kew	Yarra River	Riverine
52	Barnard Grove	Kew	Yarra River	Riverine
181	Belford Road	Kew East	Yarra River	Riverine
1	Boathouse Road	Kew	Yarra River	Riverine
1575	Burke Road	Kew East	Yarra River	Riverine
2	Burwood Road	Hawthorn	Yarra River	Riverine
6	Chandler Highway	Kew	Yarra River	Riverine
8	Chandler Highway	Kew	Yarra River	Riverine
24	Coppin Grove	Hawthorn	Yarra River	Riverine
32	Coppin Grove	Hawthorn	Yarra River	Riverine
26	Creswick Street	Hawthorn	Yarra River	Riverine
30	Creswick Street	Hawthorn	Yarra River	Riverine
32	Creswick Street	Hawthorn	Yarra River	Riverine
34	Creswick Street	Hawthorn	Yarra River	Riverine
36	Creswick Street	Hawthorn	Yarra River	Riverine
2/28	Creswick Street	Hawthorn	Yarra River	Riverine
2/40	Creswick Street	Hawthorn	Yarra River	Riverine
1/42	Creswick Street	Hawthorn	Yarra River	Riverine
62	Elm Grove	Kew East	Yarra River	Riverine
64	Elm Grove	Kew East	Yarra River	Riverine
1/12	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
2/12	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
3/12	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
4/12	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
5/12	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
6/12	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine

Street No. at Flood Risk	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
1/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
2/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
3/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
4/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
5/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
6/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
7/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
8/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
9/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
10/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
11/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
12/42	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
1/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
2/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
3/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
4/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
5/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
6/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
7/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
8/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
9/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
10/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
11/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
12/45	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
1/45A	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
2/45A	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
3/45A	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
1/47	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
2/47	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
3/47	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
4/47	Evansdale Road	Hawthorn	Hawthorn Main Drain	Riverine
6	Fairview Street	Hawthorn	Yarra River	Riverine
8	Fairview Street	Hawthorn	Yarra River	Riverine
6	Garden Terrace	Kew	Yarra River	Riverine
1	Hambledon Road	Hawthorn	Yarra River	Riverine
1A	Hambledon Road	Hawthorn	Yarra River	Riverine
2	Hambledon Road	Hawthorn	Yarra River	Riverine
3A	Hambledon Road	Hawthorn	Yarra River	Riverine
4	Hambledon Road	Hawthorn	Yarra River	Riverine
2A	Harrison Crescent	Hawthorn	Yarra River	Riverine
1/2	Hodgson Street	Kew	Yarra River	Riverine
2/2	Hodgson Street	Kew	Yarra River	Riverine
3/2	Hodgson Street	Kew	Yarra River	Riverine
2	Kellett Grove	Kew	Yarra River	Riverine
4	Kellett Grove	Kew	Yarra River	Riverine
6	Kellett Grove	Kew	Yarra River	Riverine
8	Kellett Grove	Kew	Yarra River	Riverine

Street No. at Flood Risk	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
10	Kellett Grove	Kew	Yarra River	Riverine
12	Kellett Grove	Kew	Yarra River	Riverine
14	Kellett Grove	Kew	Yarra River	Riverine
16	Kellett Grove	Kew	Yarra River	Riverine
20	Kellett Grove	Kew	Yarra River	Riverine
22	Kellett Grove	Kew	Yarra River	Riverine
24	Kellett Grove	Kew	Yarra River	Riverine
26	Kellett Grove	Kew	Yarra River	Riverine
28	Kellett Grove	Kew	Yarra River	Riverine
30	Kellett Grove	Kew	Yarra River	Riverine
32	Kellett Grove	Kew	Yarra River	Riverine
34	Kellett Grove	Kew	Yarra River	Riverine
36	Kellett Grove	Kew	Yarra River	Riverine
38	Kellett Grove	Kew	Yarra River	Riverine
40	Kellett Grove	Kew	Yarra River	Riverine
41	Kellett Grove	Kew	Yarra River	Riverine
1/42	Kellett Grove	Kew	Yarra River	Riverine
43	Kellett Grove	Kew	Yarra River	Riverine
45	Kellett Grove	Kew	Yarra River	Riverine
46	Kellett Grove	Kew	Yarra River	Riverine
47	Kellett Grove	Kew	Yarra River	Riverine
21	Keystone Crescent	Kew East	Yarra River	Riverine
23	Keystone Crescent	Kew East	Yarra River	Riverine
25	Keystone Crescent	Kew East	Yarra River	Riverine
27	Keystone Crescent	Kew East	Yarra River	Riverine
29	Keystone Crescent	Kew East	Yarra River	Riverine
33	Keystone Crescent	Kew East	Yarra River	Riverine
2-4	Kilby Road	Kew East	Yarra River	Riverine
139	Kilby Road	Kew East	Yarra River	Riverine
141	Kilby Road	Kew East	Yarra River	Riverine
143	Kilby Road	Kew East	Yarra River	Riverine
145	Kilby Road	Kew East	Yarra River	Riverine
147	Kilby Road	Kew East	Yarra River	Riverine
1/149	Kilby Road	Kew East	Yarra River	Riverine
2/149	Kilby Road	Kew East	Yarra River	Riverine
153	Kilby Road	Kew East	Yarra River	Riverine
155	Kilby Road	Kew East	Yarra River	Riverine
1	Laver Street	Kew	Yarra River	Riverine
2	Laver Street	Kew	Yarra River	Riverine
3	Laver Street	Kew	Yarra River	Riverine
5	Laver Street	Kew	Yarra River	Riverine
1	Leason Street	Kew East	Yarra River	Riverine
2/3	Leason Street	Kew East	Yarra River	Riverine
2-8	Leason Street	Kew East	Yarra River	Riverine
2	Lister Street	Kew East	Yarra River	Riverine
4	Lister Street	Kew East	Yarra River	Riverine
6	Lister Street	Kew East	Yarra River	Riverine

Street No. at Flood Risk	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
10	Lister Street	Kew East	Yarra River	Riverine
12	Lister Street	Kew East	Yarra River	Riverine
14	Lister Street	Kew East	Yarra River	Riverine
16	Lister Street	Kew East	Yarra River	Riverine
18	Lister Street	Kew East	Yarra River	Riverine
20	Lister Street	Kew East	Yarra River	Riverine
22	Lister Street	Kew East	Yarra River	Riverine
24	Lister Street	Kew East	Yarra River	Riverine
28	Lister Street	Kew East	Yarra River	Riverine
30	Lister Street	Kew East	Yarra River	Riverine
32	Lister Street	Kew East	Yarra River	Riverine
34	Lister Street	Kew East	Yarra River	Riverine
36	Lister Street	Kew East	Yarra River	Riverine
38	Lister Street	Kew East	Yarra River	Riverine
17	Longstaff Street	Kew East	Yarra River	Riverine
20	Longstaff Street	Kew East	Yarra River	Riverine
22	Longstaff Street	Kew East	Yarra River	Riverine
24	Longstaff Street	Kew East	Yarra River	Riverine
25-27	Longstaff Street	Kew East	Yarra River	Riverine
26	Longstaff Street	Kew East	Yarra River	Riverine
28	Longstaff Street	Kew East	Yarra River	Riverine
4	Mason Street	Hawthorn	Yarra River	Riverine
11	Meldrum Street	Kew East	Yarra River	Riverine
8	Minogue Street	Kew East	Yarra River	Riverine
9	Minogue Street	Kew East	Yarra River	Riverine
11	Minogue Street	Kew East	Yarra River	Riverine
1/21	Minogue Street	Kew East	Yarra River	Riverine
4/21	Minogue Street	Kew East	Yarra River	Riverine
25	Minogue Street	Kew East	Yarra River	Riverine
27	Minogue Street	Kew East	Yarra River	Riverine
29	Minogue Street	Kew East	Yarra River	Riverine
31	Minogue Street	Kew East	Yarra River	Riverine
1/44	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
2/44	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
3/44	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
4/44	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
5/44	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
6/44	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
1/48	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
2/48	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
3/48	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
4/48	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
5/48	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
1/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
2/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
3/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
4/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine

Street No. at Flood Risk	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
5/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
6/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
7/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
8/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
9/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
10/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
11/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
12/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
13/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
14/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
15/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
16/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
17/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
18/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
19/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
20/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
21/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
22/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
23/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
24/50	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
55	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
57	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
59	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
61	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
63	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
73	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
75	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
77	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
79	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
96-98	Morang Road	Hawthorn	Hawthorn Main Drain	Riverine
19/1	Muir Street	Hawthorn	Yarra River	Riverine
2	Muir Street	Hawthorn	Yarra River	Riverine
1	Newbury Street	Kew East	Yarra River	Riverine
3	Newbury Street	Kew East	Yarra River	Riverine
5	Newbury Street	Kew East	Yarra River	Riverine
7	Newbury Street	Kew East	Yarra River	Riverine
1222	Old Bourke Road	Kew East	Yarra River	Riverine
1224A	Old Bourke Road	Kew East	Yarra River	Riverine
1226	Old Bourke Road	Kew East	Yarra River	Riverine
1228	Old Bourke Road	Kew East	Yarra River	Riverine
1/1230	Old Bourke Road	Kew East	Yarra River	Riverine
3/1232	Old Bourke Road	Kew East	Yarra River	Riverine
1234	Old Bourke Road	Kew East	Yarra River	Riverine
5/1236-1238	Old Bourke Road	Kew East	Yarra River	Riverine
6/1236-1238	Old Bourke Road	Kew East	Yarra River	Riverine
4/1240	Old Bourke Road	Kew East	Yarra River	Riverine
5/1240	Old Bourke Road	Kew East	Yarra River	Riverine

Street No. at Flood Risk	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
1547	Old Bourke Road	Kew East	Yarra River	Riverine
1/1549	Old Bourke Road	Kew East	Yarra River	Riverine
15	Osborne Court	Hawthorn	Yarra River	Riverine
15A	Osborne Court	Hawthorn	Yarra River	Riverine
17	Osborne Court	Hawthorn	Yarra River	Riverine
248	Princess Street	Kew	Yarra River	Riverine
1	Railway Place	Hawthorn	Hawthorn Main Drain	Riverine
2	Railway Place	Hawthorn	Yarra River	Riverine
2	River Retreat	Kew	Yarra River	Riverine
3	River Retreat	Kew	Yarra River	Riverine
4	River Retreat	Kew	Yarra River	Riverine
5	River Retreat	Kew	Yarra River	Riverine
6-7	River Retreat	Kew	Yarra River	Riverine
8-9	River Retreat	Kew	Yarra River	Riverine
5/6	Riversdale Road	Hawthorn	Yarra River	Riverine
2	Scotsburn Street	Hawthorn	Yarra River	Riverine
1	Spruzen Avenue	Kew East	Yarra River	Riverine
3	Spruzen Avenue	Kew East	Yarra River	Riverine
5	Spruzen Avenue	Kew East	Yarra River	Riverine
7	Spruzen Avenue	Kew East	Yarra River	Riverine
9	Spruzen Avenue	Kew East	Yarra River	Riverine
11	Spruzen Avenue	Kew East	Yarra River	Riverine
15	Spruzen Avenue	Kew East	Yarra River	Riverine
17	Spruzen Avenue	Kew East	Yarra River	Riverine
19	Spruzen Avenue	Kew East	Yarra River	Riverine
21	Spruzen Avenue	Kew East	Yarra River	Riverine
23	Spruzen Avenue	Kew East	Yarra River	Riverine
25	Spruzen Avenue	Kew East	Yarra River	Riverine
27	Spruzen Avenue	Kew East	Yarra River	Riverine
25	The Boulevard	Balwyn North	Yarra River	Riverine
42	White Avenue	Kew East	Yarra River	Riverine
43	White Avenue	Kew East	Yarra River	Riverine
2/44	White Avenue	Kew East	Yarra River	Riverine
45	White Avenue	Kew East	Yarra River	Riverine
47	White Avenue	Kew East	Yarra River	Riverine
49	White Avenue	Kew East	Yarra River	Riverine
52	White Avenue	Kew East	Yarra River	Riverine
54	White Avenue	Kew East	Yarra River	Riverine
56	White Avenue	Kew East	Yarra River	Riverine
58	White Avenue	Kew East	Yarra River	Riverine
60	White Avenue	Kew East	Yarra River	Riverine
62	White Avenue	Kew East	Yarra River	Riverine
64	White Avenue	Kew East	Yarra River	Riverine
27	Willow Grove	Kew East	Yarra River	Riverine
136	Willsmere Road	Kew	Yarra River	Riverine
138	Willsmere Road	Kew	Yarra River	Riverine
177-183	Willsmere Road	Kew	Yarra River	Riverine

Street No. at Flood Risk	Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
2	Yarra Grove	Hawthorn	Yarra River	Riverine
4	Yarra Grove	Hawthorn	Yarra River	Riverine
6	Yarra Grove	Hawthorn	Yarra River	Riverine
10-12	Yarra Grove	Hawthorn	Yarra River	Riverine
14	Yarra Grove	Hawthorn	Yarra River	Riverine
16	Yarra Grove	Hawthorn	Yarra River	Riverine
3/20	Yarra Grove	Hawthorn	Yarra River	Riverine
30	Yarra Street	Hawthorn	Yarra River	Riverine
28	Young Street	Kew	Yarra River	Riverine
30	Young Street	Kew	Yarra River	Riverine
32	Young Street	Kew	Yarra River	Riverine
36	Young Street	Kew	Yarra River	Riverine
38	Young Street	Kew	Yarra River	Riverine
40	Young Street	Kew	Yarra River	Riverine
46	Young Street	Kew	Yarra River	Riverine
48	Young Street	Kew	Yarra River	Riverine
52	Young Street	Kew	Yarra River	Riverine
54	Young Street	Kew	Yarra River	Riverine

Totals
293

ISOLATION

No major isolation risks exist for Balwyn North, Kew East, Kew and Hawthorn along the Yarra River. The six main River crossings in the area, being Burke Road, Chandler Hwy, Johnston Street & Barkers Road in Kew; and Bridge & Wallan Roads in Hawthorn are expected to remain passable in a 1% AEP event. Some localised short-duration isolation along drains entering the Yarra River 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. Yarra Trams Live Info Apart from the roads outlined below, all other essential infrastructure and services areas along the Yarra River in Balwyn North, Kew East, Kew & Hawthorn 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 Balwyn North, Kew East, Kew and Hawthorn. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
Eastern Freeway at Bulleen Road Bridge, Balwyn North
Eastern Freeway at Burke Road Bridge, Kew East
Eastern Freeway at Kilby Road Pedestrian Underpass, Kew East
Eastern Freeway east of Chandler Hwy Bridge, Kew

Boroondara City Council Roads flooded in a 1% AEP (100yr ARI) event	
HAWTHORN	**KEW EAST**
Glan Avon Road	Connor Street
Morang Road	Keystone Crescent
Scotsburn Street	Kilby Street
Lister Street	Leason Street
KEW	Lister Street
Laver Street	Longstaff Street
River Retreat	Minogue Street
Young Street	Newbury Street
	White Avenue

FLOOD MITIGATION

No formal Retarding Basins, Pumping Stations or Levees exist along the Yarra River in Boroondara.

SEWERAGE INFRASTRUCTURE

Sewerage Infrastructure of note during a severe flood event located along the Yarra River is contained within the following two tables.

SEWER PUMPING STATIONS

Melbourne Water Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Dry Weather Pump Well	Yarra River	South	Corner Burke Road and Eastern Freeway, Kew East	31 K12
Wet Weather Pump Well	Yarra River	South	Corner Burke Road and Eastern Freeway, Kew East	31 K12

SEWER EMERGENCY RELIEF POINTS

On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Yarra River	South	Along Main Yarra Trail, near Pedestrian Bridge 100m west of Burke Road, Kew East	31 K11
Yarra River	South	Off Main Yarra Trail, 400m west of Burke Road, Kew East	31 J11
Darebin Creek	West	Near La Trobe Golf Club Clubhouse, Farm Road, Alphington	31 E12
Yarra River	North	La Trobe Golf Club, Alphington	45 D1
Yarra River	East	Denham Street, Hawthorn	2H H6

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/s for Fairfield & Abbotsford for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	282
Business	0
Industrial	0
Public Land	6
Urban Flood Zone	5
Total	**293**

FLOOD INTELLIGENCE CARD – CHANDLER HWY, FAIRFIELD GAUGE, YARRA RIVER

Version 2 – November 2015

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	**Chandler Highway, Alphington**
MELWAY REFERENCE:	**31 B12**
STREAM:	**Yarra River**
GAUGE NUMBER:	**229143A**
GAUGE ZERO:	**4.750m AHD**
GAUGE TYPE	**Stream Level & Rain**

MINOR:	**3.0m**
MODERATE:	**6.0m**
MAJOR	**8.7m**
LEVEE HEIGHT:	**N/A**
TELEMETRIC/MANUAL	**Telemetric**
HIGHEST RECORDED FLOOD:	**13.05m (1st December 1934)**

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
3.0m	**MINOR FLOOD LEVEL**		
3.62m	December 2003 Flood Level Peak	**Event Summary** • 98mm of rain over 2 hours created flash flooding conditions (>100yr ARI intensity) • Motorists stranded on Eastern Freeway at the Bulleen Road Bridge with water chest height and 500m wide. Impacts more likely caused by flash flooding in area than riverine flooding from Yarra River. • North Balwyn Bowl Club flooded over-floor • Balwyn High School flooded over-floor by 0.5m of water • Greythorn Shopping Centre shops flooded over-floor • Nursing Home evacuated • Underground electrical substation in Beatrice St, Kew flooded	Vehicles were driving through 2-3 hours after event - water level was dropping after 1 hour SES did rescue – Doncaster Unkown ssues with substation

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
3.7m	(Minor)	• Breakout Level of south bank of river at Green Acres Golf Club, Kew East **Community Infrastructure Flooded** • Green Acres Golf Club on Elm Grove, Kew East starts flooding	
4.55m	(Minor)	• Bank Full Level at Gauge Location **Community Infrastructure Flooded** • Freeway Public Golf Course, Balwyn North starts flooding • Kew Golf Club, Kew East starts flooding	
5.9m	(Minor)	**Community Infrastructure Flooded** • The 'Boat House', Boathouse Rd in Studley Park, Kew likely flooded	Advise only
6.0m	**MODERATE FLOOD LEVEL**		
6.2m	(Moderate)	**Community Infrastructure** • The 'Boat House', Boathouse Rd in Studley Park, Kew likely flooded over-floor	Ses to monitor as before
8.7m	**MAJOR FLOOD LEVEL**		
12.9m	1% AEP (100yr ARI) Flood Level (Major)	**Properties at Flood Risk** **153 Properties in Total** • 64 & 66 Aquila Street, Balwyn North • 25 The Boulevard, Balwyn North • 1575 Burke Road, Kew East • 1222, 1224A, 1226, 1228, 1/1230, 3/1232, 1234, 5/1236-1238, 6/1236-1238, 4/1240, 5/1240, 1547 & 1/1549 Old Bourke Road, Kew East • 21, 23, 25, 27, 29 & 33 Keystone Crescent, Kew East • 2, 4, 6, 10, 12, 14, 16, 18, 20, 22, 24, 28, 30, 32, 34, 36 & 38 Lister Street, Kew East • 1, 3, 5 & 7 Newbury Street, Kew East • 1/1, 2/1, 1B, 3, 7, 9, 9A, 11, 15 & 17 Arden Court, Kew East • 2-4, 139, 141, 143, 145, 147, 1/149, 2/149, 153 & 155 Kilby Road, Kew East • 1, 2/3 & 2-8 Leason Street, Kew East • 17, 20, 22, 24, 25-27, 26 & 28 Longstaff Street, Kew East • 8, 9, 11, 1/21, 4/21, 25, 27, 29 & 31 Minogue Street, Kew East • 11 Meldrum Street, Kew East • 181 Belford Road, Kew East • 62 & 64 Elm Grove, Kew East • 27 Willow Grove, Kew East	

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 42, 43, 2/44, 45, 47, 49, 52, 54, 56, 58, 60, 62 & 64 White Avenue, Kew East • 1, 3, 5, 7, 9, 11, 15, 17, 19, 21, 23, 25 & 27 Spruzen Avenue, Kew East • 136, 138 & 177-183 Willsmere Road, Kew • 2, 4, 6, 8, 10, 12, 14, 16, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 41, 1/42, 43, 45, 46 & 47 Kellett Grove, Kew • 48, 50 & 52 Barnard Grove, Kew • 248 Princess Street, Kew • 6 & 8 Chandler Highway, Kew • 2, 3, 4, 5, 6-7 & 8-9 River Retreat, Kew **Community Infrastructure Flooded *** Check these** • Boroondara Tennis Centre, Burke Road, Balwyn North flooded • Yarra River Trail flooded at various locations • Hays Paddock and sports grounds flooded • Willsmere Chandler Park flooded • Jack O'Toole Reserve & North Kew Tennis Courts flooded • Kate Campbell Reserve flooded • Guide Dogs Victoria on Chandler Hwy, Kew flooded • Boathouse Road Footbridge in Studley Park flooded Whose bridge is it this Parks vic? **Essential Infrastructure at Risk** • Sewerage Pumping Stations located near intersection of Bourke Road and the Eastern Freeway in the vicinity of floodwaters MW what happens Pollys **Water Over Road (Over 300mm Depth)** • Eastern Freeway at Bulleen Road Bridge, Balwyn North • Eastern Freeway at Burke Road Bridge, Kew East • Eastern Freeway at Kilby Road Pedestrian Underpass, Kew East • Eastern Freeway east of Chandler Hwy Bridge, Kew • Lister Street, Kew East • Newbury Street, Kew East • Keystone Crescent, Kew East • Leason Street, Kew East • Longstaff Street, Kew East • Minogue Street, Kew East • Kilby Street, Kew East at Oswin Street • Kilby Street and Willsmere Road intersection • White Avenue, Kew East	

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Connor Street, Kew East • River Retreat, Kew	
13.05m	1st December 1934 Flood Level Peak		

FLOOD INTELLIGENCE CARD – JOHNSTON ST, ABBOTSFORD GAUGE, YARRA RIVER

Version 2 – November 2015

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	**Johnston Street, Abbotsford**
MELWAY REFERENCE:	**2D C8**
STREAM:	**Yarra River**
GAUGE NUMBER:	**229622A**
GAUGE ZERO:	**0.00m AHD**
GAUGE TYPE	**Stream Level**

MINOR:	**2.7m**
MODERATE:	**6.7m**
MAJOR	**8.9m**
LEVEE HEIGHT:	**N/A**
TELEMETRIC/MANUAL	**Telemetric**
HIGHEST RECORDED FLOOD:	**12.6m (July 1891)**

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
2.4m		**Community Infrastructure Flooded** • Bicycle Trail near Johnston Street Bridge becomes flooded	_ BoM MW Flood watch issued- SES Region packages warning for website and media outlets
2.7m	**MINOR FLOOD LEVEL**		BoM MW warnings issued
6.7m	**MODERATE FLOOD LEVEL**		BoM MW warnings issued CTDO to advise Units of Flood warning via pager ICC formed if required
7.9m		**Properties at Flood Risk** **2 Properties in Total** • 57 & 59 Morang Road, Hawthorn **Community Infrastructure Flooded** • Morang Reserve on Morang Road, Hawthorn flooded	Council to monitor conditions and respond as required SES to respond to RFA's as requested Council to advise user groups of reserve not useable

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Water Over Road (over 300mm Depth) • Glan Avon Road, Hawthorn • Morang Road, Hawthorn	
8.9m	**MAJOR FLOOD LEVEL**	**Properties at Flood Risk** **80 New at Level; 82 Properties in Total** • Units 1-6/12, Units 1-12/42, Units 1-12/45, Units 1-3/45A & Units 1-4/47 Evansdale Road, Hawthorn • Units1-6/44, Units 1-5/48, Units 1-24/50, 55, 61, 63, 73, 75, 77, 79 & 96-98 Morang Road, Hawthorn	BoM MW warnings issued CTDO to advise Units of Flood warning via pager ICC formed Consideration to forming Division/sector structure
12.1m	1% AEP (100yr ARI) Flood Level (Major)	**Properties at Flood Risk** **47 New at Level; 129 Properties in Total** • 6 Garden Terrace, Kew • 28, 30, 32, 36, 38, 40, 46, 48, 50, 52 & 54 Young Street, Kew • 1, 2, 3 & 5 Laver Street, Kew • 1/2, 2/2 & 3/2 Hodgson Street, Kew • 2A Harrison Crescent, Hawthorn • 19/1 & 2 Muir Street, Hawthorn • 15, 15A & 17 Osborne Court, Hawthorn • 4 Mason Street, Hawthorn • 26, 30, 32, 34, 36, 2/38, 2/40 & 1/42 Creswick Street, Hawthorn • 2 Burwood Road, Hawthorn • 24 & 32 Coppin Grove, Hawthorn • 30 Yarra Street, Hawthorn • 2, 4, 6, 10-12, 14, 16 & 3/20 Yarra Grove, Hawthorn • 1 & 2 Railway Place, Hawthorn **Community Infrastructure Flooded** • Yarra River Trail flooded at various locations between Studley Park and Gardiners Creek • Gipps Street Footbridge in Yarra Bend Park flooded ** Parks Vic to monitor situation and place warning signs as required. Not confirmed • Walmer Street Foot path under bridge in Kew flooded ** Parks Vic to monitor situation and place warning signs as required. • • Hawthorn Rowing club on Isabella Grove, Hawthorn **Club to monitor • Strathcona Baptist Girls Grammar School with flooding to sports and recreation areas ** School to monitor	Council to monitor conditions and respond as required SES to respond to RFA's as requested Council to advise user groups of reserve not useable

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• • Fairview Park flooded NAR Scotch Boat Shed & Tennis Courts, Hawthorn flooded ** College to monitor as required **Essential Infrastructure to Note** Emergency Relief Waste Water Outlet may be in operation at Denham Street, ** What happens ? EHO's notified? Who notifies whom. Do community or SES get notified. Hawthorn affecting downstream areas including Creswick Reserve ** **Water Over Road (Over 300mm Depth)** • Young Street, Kew • Laver Street, Kew	
12.6m	July 1891 Flood Level Peak		

FLOOD INTELLIGENCE CARD – HAWTHORN GAUGE, YARRA RIVER

Version 2 – November 2015

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	**Wallen Road, Hawthorn**
MELWAY REFERENCE:	**45 A11**
STREAM:	**Yarra River**
GAUGE NUMBER:	**229687A**
GAUGE ZERO:	**0.00m AHD**
GAUGE TYPE	**Tide Level**

MINOR:	**Not Established**
MODERATE:	**Not Established**
MAJOR	**Not Established**
LEVEE HEIGHT:	**N/A**
TELEMETRIC/MANUAL	**Telemetric**
HIGHEST RECORDED FLOOD:	**Unknown**

River Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
8.9m	1% AEP (100yr ARI) Flood Level	**Properties at Flood Risk** **9 Properties in Total** • 5/6 Riversdale Road, Hawthorn • 6 & 8 Fairview Street, Hawthorn • 2 Scotsburn Street, Hawthorn • 1, 1A, 2, 3A, 4 Hambledon Road, Hawthorn **Community Infrastructure Flooded** • Yarra River Trail flooded between Morang Reserve and Fairview Park, Hawthorn • Wallen Road Reserve, Wallen Road, Hawthorn • Fairview Park on Fairview Street, Hawthorn • Scotch College Boat Shed and Tennis Courts, Hawthorn flooded **Water Over Road (Over 300mm Depth)** • Scotsburn Street, Hawthorn	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident. Council to provide road closure signage if required.

APPENDIX C3 – HAWTHORN & HAWTHORN EAST FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Hawthorn & Hawthorn East are located approximately 6km east of Melbourne in a mixture of established residential, retail and dense business zones. Four main stormwater drains service the area flowing from the east and north and discharge into the Yarra River at Wallen Road, Hawthorn. High Intensity, short duration rainfall events are the primary concern and cause of flash flooding in and around the area. Prolonged rainfall affecting the Yarra River may see adjacent parts of Hawthorn including Morang Road flood. Glenferrie Road and Camberwell Junction shopping precincts are both susceptible to flash flooding, affecting businesses, traffic and tram services. 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 Hawthorn and Hawthorn East Main Drains. All flood response actions must therefore be driven by rainfall observations. A telemetered rain gauge is located on Cotham Road in Kew within the Hawthorn Main Drain catchment. See Figure C3 for the gauge location.

Hydrographic/Telemetry Station	Station No.	Owner	Gauge Type	Melway Reference
Kew	586175	Melbourne Water	Rain	45 J7

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

CITY OF BOROONDARA

1% AEP (100yr ARI) Flooding

Areas of flood risk along Hawthorn Main Drain

Figure C3 – Areas of flood risk around Hawthorn & Hawthorn East in the City of Boroondara

PROPERTIES AT FLOOD RISK

Properties listed in the table below are at risk from flooding over-floor level. 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				
-	3	3	Allen Street	Hawthorn	Hawthorn East Main Drain	Flash
-	5	5	Allen Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	11	Allen Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	13	Allen Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	15	Allen Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	23	Allen Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	73	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
75-79	75-79	75-79	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	86	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
87	87	87	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	88	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
-	90	90	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	92	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
96	96	96	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
-	1/98	1/98	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
-	2/98	2/98	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
-	100	100	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
-	102	102	Auburn Road	Hawthorn	Hawthorn East Main Drain	Flash
-	1/260	1/260	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	2/260	2/260	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	3/260	3/260	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	4/260	4/260	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	5/260	5/260	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	6/260	6/260	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	8/260	8/260	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	9/260	9/260	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	264-266	264-266	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	280	280	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	284	284	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	286	286	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
288	288	288	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
290	290	290	Auburn Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	60	Barkers Road	Hawthorn	Church Street Main Drain	Flash
-	-	74-82	Barkers Road	Hawthorn	Church Street Main Drain	Flash
84	84	84	Barkers Road	Hawthorn	Church Street Main Drain	Flash
-	1/265	1/265	Barkers Road	Kew	Linda Crescent Main Drain	Flash
-	-	2/265	Barkers Road	Kew	Linda Crescent Main Drain	Flash
-	-	2/274	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	1/284	1/284	Barkers Road	Hawthorn	Linda Crescent 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				
-	2/284	2/284	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	3/284	3/284	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	4/284	4/284	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	5/284	5/284	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	6/284	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	7/284	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	9/284	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	11/284	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	13/284	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	14/284	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	15/284	15/284	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	286	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	288	288	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	302	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	304	Barkers Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	544	Barkers Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	546	546	Barkers Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	3	Barton Street	Hawthorn	Church Street Main Drain	Flash
-	1	1	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	1A	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
3	3	3	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	4	4	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
5	5	5	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
6	6	6	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	1/8	1/8	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	2/8	2/8	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	3/8	3/8	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	4/8	4/8	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	5/8	5/8	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	6/8	6/8	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	7/8	7/8	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	11	11	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
12	12	12	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	14	14	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
16	16	16	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
18	18	18	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	20	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	22	22	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	24	Belgrave Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	10	Bell Street	Hawthorn	Linda Crescent Main Drain	Flash
-	16	16	Bell Street	Hawthorn	Linda Crescent Main Drain	Flash
-	18	18	Bell Street	Hawthorn	Linda Crescent Main Drain	Flash
-	20	20	Bell Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	26	Bell Street	Hawthorn	Linda Crescent Main Drain	Flash
-	1/46	1/46	Bell Street	Hawthorn	Linda Crescent Main Drain	Flash
-	2/46	2/46	Bell Street	Hawthorn	Linda Crescent 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				
-	3/46	3/46	Bell Street	Hawthorn	Linda Crescent Main Drain	Flash
-	4/46	4/46	Bell Street	Hawthorn	Linda Crescent Main Drain	Flash
-	5/46	5/46	Bell Street	Hawthorn	Linda Crescent Main Drain	Flash
-	6/46	6/46	Bell Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	2	Bowen Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	2A	Bowen Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	6	Bowen Street	Hawthorn	Linda Crescent Main Drain	Flash
721A	721A	721A	Burke Road	Hawthorn East	Hawthorn Main Drain	Flash
721B	721B	721B	Burke Road	Hawthorn East	Hawthorn Main Drain	Flash
-	723	723	Burke Road	Camberwell	Hawthorn Main Drain	Flash
-	725	725	Burke Road	Camberwell	Hawthorn Main Drain	Flash
-	727	727	Burke Road	Camberwell	Hawthorn Main Drain	Flash
-	731	731	Burke Road	Camberwell	Hawthorn Main Drain	Flash
-	733	733	Burke Road	Camberwell	Hawthorn Main Drain	Flash
735-737	735-737	735-737	Burke Road	Camberwell	Hawthorn Main Drain	Flash
-	1/169	2/169	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	2/169	1/169	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	3/169	3/169	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	179	179	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	229	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	231	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	233-235	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	237-239	237-239	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	241	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	243	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	247	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	275	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	3/283-285	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	1/283-285	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	2/283-285	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	300	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	302-320	Burwood Road	Hawthorn	Hawthorn Main Drain	Flash
-	171A	171A	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
-	171-193	171-193	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
199A	199A	199-203	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
1/199-203	1/199-203	2/199-203	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
2/199-203	2/199-203	3/199-203	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
3/199-203	3/199-203	4/199-203	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
4/199-203	4/199-203	5/199-203	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
5/199-203	5/199-203	10/199-203	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
10/199-203	10/199-203	199A	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
-	200	200	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
201-203	201-203	201-203	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
202-204	202-204	202-204	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
-	205	205	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
1/206	1/206	1/206	Camberwell Road	Hawthorn East	Hawthorn 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				
2/206	2/206	2/206	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
207	207	207	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
-	208	208	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
-	209	209	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
-	210	210	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
211	211	211	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
-	212	212	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
213-215	213-215	213-215	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
217-219	217-219	217-219	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
-	218	218	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
-	220	220	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
221	221	221	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
222	222	222	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
224	224	224	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
225-229	225-229	225-229	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
226	226	226	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
231-233	231-233	231-233	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
235	235	235	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
235A	235A	235A	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
237	237	237	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
239	239	239	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
241	241	241	Camberwell Road	Hawthorn East	Hawthorn Main Drain	Flash
-	-	12/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	13/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	8/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	7/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	16/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	2/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	14/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	11/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	5/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	3/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	9/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	6/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	4/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	15/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	10/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	1/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	17/2A	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	6	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	8	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	10	Carrington Street	Hawthorn	Linda Crescent Main Drain	Flash
-	2	2	Church Street	Hawthorn	Church Street Main Drain	Flash
3	3	3	Church Street	Hawthorn	Church Street Main Drain	Flash
-	4	4	Church Street	Hawthorn	Church Street Main Drain	Flash
5	5	5	Church Street	Hawthorn	Church 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				
-	6	6	Church Street	Hawthorn	Church Street Main Drain	Flash
1/7	1/7	3/7	Church Street	Hawthorn	Church Street Main Drain	Flash
2/7	2/7	1/7	Church Street	Hawthorn	Church Street Main Drain	Flash
3/7	3/7	2/7	Church Street	Hawthorn	Church Street Main Drain	Flash
-	8	8	Church Street	Hawthorn	Church Street Main Drain	Flash
-	1/8	1/8	Church Street	Hawthorn	Church Street Main Drain	Flash
-	1/9	1/9	Church Street	Hawthorn	Church Street Main Drain	Flash
-	2/9	2/9	Church Street	Hawthorn	Church Street Main Drain	Flash
-	3/9	3/9	Church Street	Hawthorn	Church Street Main Drain	Flash
-	4/9	4/9	Church Street	Hawthorn	Church Street Main Drain	Flash
-	5/9	5/9	Church Street	Hawthorn	Church Street Main Drain	Flash
-	6/9	6/9	Church Street	Hawthorn	Church Street Main Drain	Flash
-	12	12	Church Street	Hawthorn	Church Street Main Drain	Flash
14	14	14	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	16	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	2/27	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	1/27	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	29	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	33	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	37	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	40	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	41-43	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	42	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	44	Church Street	Hawthorn	Church Street Main Drain	Flash
-	1/45	19/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	2/45	1/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	3/45	2/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	4/45	3/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	5/45	4/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	6/45	5/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	7/45	6/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	8/45	7/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	9/45	8/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	10/45	9/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	11/45	10/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	12/45	11/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	13/45	12/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	14/45	13/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	15/45	14/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	16/45	15/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	17/45	16/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	18/45	17/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	19/45	18/45	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	46	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	48	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	50	Church Street	Hawthorn	Church 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				
-	-	1/50	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	52	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	53-55	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	54	Church Street	Hawthorn	Church Street Main Drain	Flash
-	59	59	Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	2	College Street	Hawthorn	Church Street Main Drain	Flash
-	-	1/18	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	2/18	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	3/18	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	4/18	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	5/18	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	6/18	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	7/18	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	8/18	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	9/18	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	20-22	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	1/22	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	2/22	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	3/22	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	4/22	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	5/22	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	6/22	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	7/22	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	8/22	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	9/22	Connell Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	1	Cook Street	Hawthorn	Hawthorn Main Drain	Flash
-	20	1/A20	Council Street	Hawthorn East	Hawthorn Main Drain	Flash
-	1/A20	20	Council Street	Hawthorn East	Hawthorn Main Drain	Flash
-	1/20	1/20	Council Street	Hawthorn East	Hawthorn Main Drain	Flash
-	1/B20	1/B20	Council Street	Hawthorn East	Hawthorn Main Drain	Flash
-	2/20	3/20	Council Street	Hawthorn East	Hawthorn Main Drain	Flash
-	3/20	2/20	Council Street	Hawthorn East	Hawthorn Main Drain	Flash
-	-	3/22	Council Street	Hawthorn East	Hawthorn Main Drain	Flash
-	-	1/22	Council Street	Hawthorn East	Hawthorn Main Drain	Flash
-	-	2/22	Council Street	Hawthorn East	Hawthorn Main Drain	Flash
-	-	4/22	Council Street	Hawthorn East	Hawthorn Main Drain	Flash
-	-	5/48	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	6/48	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	3/48	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	2/48	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	4/48	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	1/48	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	50	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	1/75	6/75	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	2/75	4/75	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	3/75	5/75	Denham Street	Hawthorn	Hawthorn 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				
-	4/75	1/75	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	5/75	3/75	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	6/75	2/75	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	1/77-83	1/77-83	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	2/77-83	2/77-83	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	3/77-83	3/77-83	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	4/77-83	4/77-83	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	5/77-83	5/77-83	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	6/77-83	6/77-83	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	7/77-83	7/77-83	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	8/77-83	8/77-83	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	9/77-83	9/77-83	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	83	83	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	1/85	Denham Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	11	Edge vale Road	Kew	Linda Crescent Main Drain	Flash
-	-	15	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
-	-	19	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
-	-	3/40-44	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
-	-	5/40-44	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
-	-	7/40-44	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
-	-	8/40-44	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
-	51	51	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
68	68	68	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
70	70	70	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
-	72	72	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
-	74	74	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
-	76	76	Edgevale Road	Kew	Linda Crescent Main Drain	Flash
-	-	52-54	Fitzwilliam Street	Kew	Linda Crescent Main Drain	Flash
-	-	53	Fitzwilliam Street	Kew	Linda Crescent Main Drain	Flash
-	600	600	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	605	605	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	606	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	607	607	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	608	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	609	609	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	611-613	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	2/615	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	3/615	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	1/615	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	2/617	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	1/617	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	623	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	625-627	Glenferrie Road	Hawthorn	Hawthorn Main Drain	Flash
-	673	673	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	675A	675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	675B	1S/S675	Glenferrie Road	Hawthorn	Hawthorn East 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				
-	675	2/675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	1S/S675	3/675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	2/675	4/675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	3/675	5S/S675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	4/675	6S/S675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	5S/S675	7S/S675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	6S/S675	8/675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	7/S675	9/675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	8/675	10/675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	9/675	11S/S675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	10/675	12S/S675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	11S/S675	13S/S675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	12S/S675	14S/S675	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	13S/S675	675A	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	14S/S675	675B	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	677	677	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	679	679	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	R/681	R/681	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	681	681	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	683	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	685	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	687	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	689-699	689-699	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	1/694	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	694	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	8/696	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	696	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	4/696	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	7/696	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	698	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	1/698	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	-	700	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	702	702	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	704A	704A	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	704	1/704	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	1/704	704	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	706	706	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	708	708	Glenferrie Road	Hawthorn	Hawthorn East Main Drain	Flash
-	710	710	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	712	712	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	714	714	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	716	716	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	718	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	720	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	722	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	724	Glenferrie Road	Hawthorn	Linda Crescent 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				
-	-	726	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	728	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	732	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	734	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	736	736	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	738	738	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	740	740	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	744	744	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	746	746	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	748	748	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	750	750	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	754	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	1/756	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	756	Glenferrie Road	Hawthorn	Linda Crescent Main Drain	Flash
-	-	2	Haines Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	69	Harcourt Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	71	Harcourt Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	75	Harcourt Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	94	Harcourt Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	96	Harcourt Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	98	98	Harcourt Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	33	33	Henry Street	Hawthorn	Hawthorn East Main Drain	Flash
-	1/37	1/37	Henry Street	Hawthorn	Hawthorn East Main Drain	Flash
-	2/37	2/37	Henry Street	Hawthorn	Hawthorn East Main Drain	Flash
-	39	39	Henry Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	41	Henry Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	2	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	3	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	5	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	7	7	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	8	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	1/23	11/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	2/23	6/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	3/23	10/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	4/23	2/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	5/23	8/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	6/23	12/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	7/23	7/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	8/23	3/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	9/23	5/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	10/23	1/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	11/23	4/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	12/23	9/23	Hull Street	Hawthorn	Linda Crescent Main Drain	Flash
-	1	1	Hunter Street	Hawthorn	Hawthorn Main Drain	Flash
2	2	2	Hunter Street	Hawthorn	Hawthorn Main Drain	Flash
-	3	3	Hunter Street	Hawthorn	Hawthorn 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				
-	-	4	Hunter Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	5	Hunter Street	Hawthorn	Hawthorn Main Drain	Flash
-	6	6	Hunter Street	Hawthorn	Hawthorn Main Drain	Flash
-	7-9	7-9	Hunter Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	25	Johnson Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	29	Johnson Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	31	Johnson Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	17	Lawes Street	Hawthorn	Church Street Main Drain	Flash
-	-	2	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	3	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	9	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	1/10	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	2/10	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	3/10	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	4/10	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	5/10	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	6/10	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	7/10	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	8/10	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	9/10	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	11	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	19	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	20	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	20A	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	21	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	22	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	22A	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	23	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	24	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	26	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	26A	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	1/28	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	2/28	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	3/28	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	4/28	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	5/28	Liddiard Street	Hawthorn	Linda Crescent Main Drain	Flash
-	6	6	Little Church Street	Hawthorn	Church Street Main Drain	Flash
-	8	8	Little Church Street	Hawthorn	Church Street Main Drain	Flash
-	-	6	Luton Lane	Hawthorn	Hawthorn Main Drain	Flash
-	8	8	Luton Lane	Hawthorn	Hawthorn Main Drain	Flash
-	34	34	Lynch Street	Hawthorn	Hawthorn Main Drain	Flash
-	G06/36	G06/36	Lynch Street	Hawthorn	Hawthorn Main Drain	Flash
-	G03/36	G03/36	Lynch Street	Hawthorn	Hawthorn Main Drain	Flash
-	G02/36	G02/36	Lynch Street	Hawthorn	Hawthorn Main Drain	Flash
-	G01/36	G01/36	Lynch Street	Hawthorn	Hawthorn Main Drain	Flash
-	G04/36	G04/36	Lynch Street	Hawthorn	Hawthorn 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				
-	G05/36	G05/36	Lynch Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	40-42	Lynch Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	44	Lynch Street	Hawthorn	Hawthorn Main Drain	Flash
-	46	46	Lynch Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	48	Lynch Street	Hawthorn	Hawthorn Main Drain	Flash
-	56	56	Lynch Street	Hawthorn	Hawthorn Main Drain	Flash
-	6	6	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	12	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
-	14	14	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	16	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
-	18	18	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	20	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
22	22	22	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
26	26	26	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
28	28	28	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	29	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
-	30	30	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	2/33	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
-	3/33	3/33	Malmsbury Street	Hawthorn	Hawthorn East Main Drain	Flash
-	9	9	Manchester Street	Hawthorn	Hawthorn Main Drain	Flash
-	11	11	Manchester Street	Hawthorn	Hawthorn Main Drain	Flash
13	13	13	Manchester Street	Hawthorn	Hawthorn Main Drain	Flash
15	15	15	Manchester Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	17	Manchester Street	Hawthorn	Hawthorn Main Drain	Flash
19	19	19	Manchester Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	9/95	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	10/95	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	11/95	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	1/95	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	2/95	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	3/95	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	4/95	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	5/95	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	6/95	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	7/95	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	8/95	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	99A	99A	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	99B	99B	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	101	Manningtree Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	1/2	Melville Street	Hawthorn	Church Street Main Drain	Flash
-	-	2/2	Melville Street	Hawthorn	Church Street Main Drain	Flash
-	-	3/2	Melville Street	Hawthorn	Church Street Main Drain	Flash
-	-	4/2	Melville Street	Hawthorn	Church Street Main Drain	Flash
-	-	5/2	Melville Street	Hawthorn	Church Street Main Drain	Flash
-	-	6/2	Melville Street	Hawthorn	Church Street Main Drain	Flash
-	-	7/2	Melville Street	Hawthorn	Church 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				
-	-	8/2	Melville Street	Hawthorn	Church Street Main Drain	Flash
-	-	4	Melville Street	Hawthorn	Church Street Main Drain	Flash
-	-	6	Melville Street	Hawthorn	Church Street Main Drain	Flash
-	-	3	Moir Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	57	Morang Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	59	Morang Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	61	Morang Road	Hawthorn	Hawthorn Main Drain	Flash
-	-	34	Park Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	36	Park Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	48	Park Street	Hawthorn	Hawthorn East Main Drain	Flash
-	50	50	Park Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	2	Percy Street	Hawthorn	Linda Crescent Main Drain	Flash
-	4	4	Percy Street	Hawthorn	Linda Crescent Main Drain	Flash
-	6	6	Percy Street	Hawthorn	Linda Crescent Main Drain	Flash
-	8	8	Percy Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	10A	Percy Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	10	Percy Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	18	Percy Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	20	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	-	21	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	-	25	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	27	27	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	29	29	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	-	31	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	33	33	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	35	35	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	-	1/37	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	2/37	2/37	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	3/37	3/37	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	4/37	4/37	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	5/37	5/37	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	6/37	6/37	Pine Street	Hawthorn	Church Street Main Drain	Flash
-	1	1	Railway Place	Hawthorn	Hawthorn Main Drain	Flash
-	-	95	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	112	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	114	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	116	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	118	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	1/126-128	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	2/126-128	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	3/126-128	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	4/126-128	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	5/126-128	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	6/126-128	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	7/126-128	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	8/126-128	Rathmines Road	Hawthorn East	Hawthorn East 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				
-	-	9/126-128	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	10/126-128	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	11/126-128	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	1/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	3/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	4/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	5/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	6/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	7/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	8/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	9/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	10/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	11/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	12/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	13/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	14/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	15/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	2/130-132	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	134	134	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	136	136	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	169	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	171	171	Rathmines Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	16-20	16-20	Redfern Road	Hawthorn East	Hawthorn Main Drain	Flash
22	22	22	Redfern Road	Hawthorn East	Hawthorn Main Drain	Flash
6/26	6/26	12/26	Redfern Road	Hawthorn East	Hawthorn Main Drain	Flash
-	12/26	6/26	Redfern Road	Hawthorn East	Hawthorn Main Drain	Flash
37	37	37	Redfern Road	Hawthorn East	Hawthorn Main Drain	Flash
-	1/183	1/183	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	2/183	2/183	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	3/183	3/183	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	4/183	4/183	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	5/183	5/183	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	6/183	6/183	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	7/183	7/183	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	8/183	8/183	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	185-189	185-189	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	1/191-195	1/191-195	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	2/191-195	2/191-195	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	3/191-195	3/191-195	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	4/191-195	5/191-195	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	5/191-195	4/191-195	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
1/197-199	1/197-199	1/197-199	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
2/197-199	2/197-199	2/197-199	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
3/197-199	3/197-199	3/197-199	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	1/201	2/201	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	2/201	1/201	Riversdale Road	Hawthorn	Hawthorn 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				
-	203	203	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
205	205	205	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
101/207	101/207	102/207	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
102/207	102/207	101/207	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	211	211	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	213	213	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
1/217	1/217	1/217	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
2/219	2/219	2/219	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
3/221	3/221	3/221	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
4/223	4/223	4/223	Riversdale Road	Hawthorn	Hawthorn Main Drain	Flash
-	419	419	Riversdale Road	Hawthorn East	Hawthorn Main Drain	Flash
-	421	421	Riversdale Road	Hawthorn East	Hawthorn Main Drain	Flash
481	481	481	Riversdale Road	Hawthorn East	Hawthorn Main Drain	Flash
483	483	483	Riversdale Road	Hawthorn East	Hawthorn Main Drain	Flash
485	485	485	Riversdale Road	Hawthorn East	Hawthorn Main Drain	Flash
487A	487A	487A	Riversdale Road	Hawthorn East	Hawthorn Main Drain	Flash
487B	487B	487B	Riversdale Road	Hawthorn East	Hawthorn Main Drain	Flash
489-491	489-491	489-491	Riversdale Road	Hawthorn East	Hawthorn Main Drain	Flash
1	1	1	Rose Street	Hawthorn East	Hawthorn Main Drain	Flash
-	-	1	Russell Street	Hawthorn East	Hawthorn Main Drain	Flash
-	3	3	Russell Street	Hawthorn East	Hawthorn Main Drain	Flash
5	5	5	Russell Street	Hawthorn East	Hawthorn Main Drain	Flash
7	7	7	Russell Street	Hawthorn East	Hawthorn Main Drain	Flash
1/9	1/9	1/9	Russell Street	Hawthorn East	Hawthorn Main Drain	Flash
2/9	2/9	2/9	Russell Street	Hawthorn East	Hawthorn Main Drain	Flash
-	1/1	1/1	Ryeburne Avenue	Hawthorn East	Hawthorn East Main Drain	Flash
-	2/1	2/1	Ryeburne Avenue	Hawthorn East	Hawthorn East Main Drain	Flash
-	3	3	Ryeburne Avenue	Hawthorn East	Hawthorn East Main Drain	Flash
5	5	5	Ryeburne Avenue	Hawthorn East	Hawthorn East Main Drain	Flash
-	7	7	Ryeburne Avenue	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	5/5	Spencer Street	Hawthorn	Church Street Main Drain	Flash
-	7A	7A	Stanley Avenue	Hawthorn East	Hawthorn East Main Drain	Flash
-	9	9	Stanley Avenue	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	12	Stanley Avenue	Hawthorn East	Hawthorn East Main Drain	Flash
25	25	25	Station Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	27	27	Station Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	28	Station Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	30	Station Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	32	32	Station Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	34A	Station Street	Hawthorn East	Hawthorn East Main Drain	Flash
36	36	36	Station Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	G01/2	G01/2	Tweed Street	Hawthorn	Hawthorn Main Drain	Flash
-	G02/2	G02/2	Tweed Street	Hawthorn	Hawthorn Main Drain	Flash
-	G03/2	G03/2	Tweed Street	Hawthorn	Hawthorn Main Drain	Flash
-	G04/2	G04/2	Tweed Street	Hawthorn	Hawthorn Main Drain	Flash
-	G05/2	G05/2	Tweed Street	Hawthorn	Hawthorn 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				
-	G06/2	G06/2	Tweed Street	Hawthorn	Hawthorn Main Drain	Flash
-	G07/2	G07/2	Tweed Street	Hawthorn	Hawthorn Main Drain	Flash
-	G08/2	G08/2	Tweed Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	5	Tweed Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	21	Urquhart Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	23	Urquhart Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	36	Urquhart Street	Hawthorn	Hawthorn Main Drain	Flash
-	-	11	Victoria Grove	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	13	Victoria Grove	Hawthorn East	Hawthorn East Main Drain	Flash
-	13	5	Victoria Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	13	13	Victoria Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	15	15	Victoria Road	Hawthorn East	Hawthorn East Main Drain	Flash
-	-	9A	Westley Street	Hawthorn East	Hawthorn East Main Drain	Flash
-	28	28	William Street	Hawthorn	Hawthorn East Main Drain	Flash
-	-	13	York Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	17	York Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	19	York Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	21	York Street	Hawthorn	Linda Crescent Main Drain	Flash
-	-	25	York Street	Hawthorn	Linda Crescent Main Drain	Flash
Totals						
83	**358**	**656**				

ISOLATION

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

ESSENTIAL INFRASTRUCTURE

- **Hawthorn MFB Station** may experience some level of property flooding at rear during a 1% AEP event. Access to facility expected to remain clear travelling south bound on William St. Access likely to be cut northbound on William Street. ** History of relocates?
- **Tram Services along Glenferrie Road**, Hawthorn expected to be disrupted by flooding in road just north of Glenferrie Railway Station and at Oxley Road Intersection during a 1% AEP event. Trams on Route 16 to be affected.
- **Tram Services along Riversdale Road**, Hawthorn expected to be disrupted by flooding in road just west of Auburn Road intersection and at Camberwell Junction during a 1% AEP event. Trams on route 70 to be affected.
- **Tram Services along Burke Road**, Camberwell expected to be disrupted by flooding in road at Camberwell Junction during a 1% AEP event. Trams on route 72 to be affected.

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 Hawthorn & Hawthorn 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 Hawthorn & Hawthorn East. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
• Auburn Road, Hawthorn at Malmsbury Street
• Barkers Road, Hawthorn near Haines Street
• Burke Road, Camberwell north of Camberwell Junction
• Camberwell Road, Hawthorn East near Camberwell Junction
• Church Street, Hawthorn south of Barkers Road Intersection
• Glenferrie Road, Hawthorn outside Coles Supermarket
• Rathmines Road, Hawthorn East at Rathmines Road Reserve
• Riversdale Road, Hawthorn west of Auburn Road

Boroondara City Council Roads flooded in a 1% AEP (100yr ARI) event			
HAWTHORN	• Luton Lane	**HAWTHORN EAST**	• Victoria Grove
• Belgrave Street	• Lynch Street	• Camberwell Road	• Westley Street
• Bowen Street	• Malmsbury Street	• Council Street	**KEW**
• Denham Street	• Manningtree Road	• Redfern Road	• Edgevale Road
• Henry Street	• Morang Road	• Rose Street	• Fitzwilliam Street
• Hull Street	• Park Street	• Russell Street	
• Hunter Street	• Percy Street	• Stanley Avenue	
• Liddiard Street	• Swinburne Avenue	• Station Street	
• Little Church Street	• The Boulevard		

FLOOD MITIGATION

RETARDING BASINS

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Level	ANCOLD Hazard Rating	Houses In Flow Path (dam breach)	Melway Reference
Hawthorn East	Hawthorn East Drain	0.18 ha	4.9 ML	52.5m AHD	52.5m AHD	53.1m AHD	Low	Unknown	45 H9
Rose Street	Hawthorn East Drain	2.20 ha	~ 10 – 20 ML	36.0m AHD	36.0m AHD	Unknown	High A	160	45 G12

No formal Pumping Stations or Levees exist around Hawthorn or Hawthorn East.

SEWERAGE INFRASTRUCTURE

There is no sewerage Infrastructure expected to be within the vicinity of floodwaters during severe flood events around Hawthorn or Hawthorn 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 in a 1% AEP (100yr ARI) event. Refer to the following intelligence card/s for Hawthorn & Hawthorn East for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	813
Business	318
Industrial	0
Public Land	97
Urban Flood Zone	1
Total	**1229**

FLOOD INTELLIGENCE CARD – HAWTHORN & HAWTHORN EAST (UNGAUGED)

Version 2 – November 2015

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	**Kew**
LOCATION	**Yarra Valley Water Service Reservoir, Cotham Road, Kew**
MELWAY REF:	**45 J7**

GAUGE NUMBER	**586175**
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 ungagged nature of the catchment. This should be used as a guide only.	20% AEP (5 year ARI)	**Properties at Flood Risk (Over-Floor)** **83 Properties in Total** • 75-79, 87, 96, 288 & 290 Auburn Road, Hawthorn • 84 Barkers Road, Hawthorn • 3, 5, 6, 12, 14, 16 & 18 Belgrave Street, Hawthorn • 721A, 721B & 735-737 Burke Road, Camberwell • Offices 1-5/199-203, 10/199-203, 199A, 201-203, 202-204, Units 1-2/206, 207, 211, 213-215, 217-219, 221, 222, 224, 225-229, 226, 231-233, 235, 235A, 237, 239 & 241 Camberwell Road, Hawthorn East • 3, 5, Units 1-3/7 & 14 Church Street, Hawthorn • 68 & 70 Edgevale Road, Kew • 2 Hunter Street, Hawthorn • 13, 15 & 19 Manchester Street, Hawthorn • 22, 6/26 & 37 Redfern Road, Hawthorn East • Offices 1-3/197-199, 205, 101/207, 102/207, 1/217, 2/219, 3/221, 4/223, 481, 483, 485, 487A, 487B & 489-491 Riversdale Road, Hawthorn • 1 Rose Street, Hawthorn East	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident. VicSES to respond to requests on case by case basis.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 5, 7 & Offices 1-2/9 Russell Street, Hawthorn East • 5 Ryeburne Avenue, Hawthorn East • 25 & 36 Station Street, Hawthorn East **Water Over Road (Over 300mm depth)** • Station Street, Hawthorn East • Malmsbury Street, Hawthorn • Russell Street, Hawthorn East	Council to provide road closure signage if required.
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 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.	10% AEP (10 year ARI)	**Properties at Flood Risk (Over-Floor)** **140 Properties in Total** • 75-79, 87, 96, 264-266, 280, 284, 286, 288 & 290 Auburn Road, Hawthorn • 84 & 1/265 Barkers Road, Hawthorn • 1, 3, 4, 5, 6, Units 1-7/8, 11, 12, 14, 16 & 18 Belgrave Street, Hawthorn • 721A, 721B, 723, 725, 731, 733 & 735-737 Burke Road, Camberwell • Offices 1-5/199-203, 10/199-203, 199A, 201-203, 202-204, Units 1-2/206, 207, 208, 209, 210, 211, 212, 213-215, 217-219, 218, 220, 221, 222, 224, 225-229, 226, 231-233, 235, 235A, 237, 239 & 241 Camberwell Road, Hawthorn East • 3, 5, Units 1-3/7, Units 1-6/9 & 14 Church Street, Hawthorn • 68, 70, 72 & 76 Edgevale Road, Kew • 1/37 Henry Street, Hawthorn • 2 & 3 Hunter Street, Hawthorn • 22, 26 & 28 Malmsbury Street, Hawthorn • 13, 15 & 19 Manchester Street, Hawthorn • 171 Rathmines Road, Hawthorn East • 22, 6/26, 12/26 & 37 Redfern Road, Hawthorn East • Units 1-8/183, Offices 1-5/191-195, Offices 1-3/197-199, 205, 101/207, 102/207, 211, 213, 1/217, 2/219, 3/221, 4/223, 481, 483, 485, 487A, 487B & 489-491 Riversdale Road, Hawthorn • 1 Rose Street, Hawthorn East • 3, 5, 7 & Offices 1-2/9 Russell Street, Hawthorn East • 2/1, 5 & 7 Ryeburne Avenue, Hawthorn East • 25 & 36 Station Street, Hawthorn East • 28 William Street, Hawthorn **Water Over Road (Over 300mm depth)** • Station Street, Hawthorn East	VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Malmsbury Street, Hawthorn • Russell Street, Hawthorn East • Hunter Street, Hawthorn	Council to provide road closure signage if required.
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 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.	5% AEP (20 year ARI)	**Properties at Flood Risk (Over-Floor)** **358 Properties in Total *** Relief agencies called ERC's set up DHHS notified by now.** • 3 & 5 Allen Street, Hawthorn • 75-79, 87, 90, 96, Units 1- 2/98, 100, 102, Units 1- 6/260, 8/260, 9/260, 264-266, 280, 284, 286, 288 & 290 Auburn Road, Hawthorn • 84, 1/265, Units 1-5/284, 15/284, 288 & 546 Barkers Road, Hawthorn • 1, 3, 4, 5, 6, Units 1-7/8, 11, 12, 14, 16, 18 & 22 Belgrave Street, Hawthorn • 16, 18, 20 & Units 1-6/46 Bell Street, Hawthorn • 721A, 721B, 723, 725, 727, 731, 733 & 735-737 Burke Road, Camberwell • Offices 1-3/169, 179 & 237-239 Burwood Road, Hawthorn • 171-193, 171A, Offices 1-5/199-203, 10/199-203, 199A, 200, 201-203, 202-204, 205, Units 1-2/206, 207, 208, 209, 210, 211, 212, 213-215, 217-219, 218, 220, 221, 222, 224, 225-229, 226, 231-233, 235, 235A, 237, 239 & 241 Camberwell Road, Hawthorn East • 2, 3, 4, 5, 6, Units 1-3/7, 8, 1/8, Units 1-6/9, 12, 14, Units 1-19/45 & 59 Church Street, Hawthorn • 20, Units 1-3/20, 1A/20 & 1B/20 Council Street, Hawthorn • Units 1-6/75 & Units 1-9/77-83 & 83 Denham Street, Hawthorn • 51, 68, 70, 72, 74 & 76 Edgevale Road, Kew • 600, 605, 607, 609, 673, 675, 1S/675, Shops 2-4/675, Shops 5S-7S/675, Shops 8-10/675, Shops 11S-14S/675, 675A, 675B, 677, 679, R/681, 681, 689-699, 702, 704, 704A, 1/704, 706, 708, 710, 712, 714, 716, 736, 738, 740, 744, 746, 748 & 750 Glenferrie Road, Hawthorn • 98 Harcourt Street, Hawthorn East • 33, Units 1-2/37 & 39 Henry Street, Hawthorn • 7 & Units 1-12/23 Hull Street, Hawthorn • 1, 2, 3, 6 & 7-9 Hunter Street, Hawthorn • 6 & 8 Little Church Street, Hawthorn • 8 Luton Lane, Hawthorn • 34, Offices G01-G06/36, 46 & 56 Lynch Street, Hawthorn • 6, 14, 18, 22, 26, 28, 30 & 3/33 Malmsbury Street, Hawthorn • 9, 11, 13, 15 & 19 Manchester Street, Hawthorn	VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 99A & 99B Manningtree Road, Hawthorn • 50 Park Street, Hawthorn • 4, 6 & 8 Percy Street, Hawthorn • 27, 29, 33, 35 & Units 2-6/37 Pine Street, Hawthorn • 1 Railway Place, Hawthorn • 134, 136 & 171 Rathmines Road, Hawthorn East • 16-20, 22, 6/26, 12/26 & 37 Redfern Road, Hawthorn East • Units 1-8/183, 185-189, Offices 1-5/191-195, Offices 1-3/197-199, Shops 1-2/201, 203, 205, 101/207, 102/207, 211, 213, 1/217, 2/219, 3/221, 4/223, 419, 421, 481, 483, 485, 487A, 487B & 489-491 Riversdale Road, Hawthorn • 1 Rose Street, Hawthorn East • 3, 5, 7 & Offices 1-2/9 Russell Street, Hawthorn East • Units 1-2/1, 3, 5 & 7 Ryeburne Avenue, Hawthorn East • 7A & 9 Stanley Avenue, Hawthorn East • 25, 27, 32 & 36 Station Street, Hawthorn East • Offices G01-G08/2 Tweed Street, Hawthorn • 13 Victoria Grove, Hawthorn East • 13 & 15 Victoria Road, Hawthorn East • 28 William Street, Hawthorn **Community Infrastructure Flooded** • Auburn Kindergarten & Child Care Centre, Station Street, Hawthorn East likely flooded over-floor What happens to kiddies • Hawthorn Community House, William Street, Hawthorn likely flooded What is this? • Swinburne University likely flooded, which may flood the ground floors of some buildings along Park, William and Wakefield Streets. ** Talk to Swinny These are all new buildings -AB **Water Over Road (Over 300mm Depth)** • Westley Street, Hawthorn East • Station Street, Hawthorn East • Malmsbury Street, Hawthorn • Henry Street, Hawthorn • Liddiard Street, Hawthorn near Glenferrie Road • Edgevale Road, Kew • Russell Street, Hawthorn East • Redfern Road, Hawthorn East	Kindergarten to implement emergency evacuation plan id required Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Hunter Street, Hawthorn • Belgrave Street, Hawthorn • The Boulevard, Hawthorn • Swinburne Avenue, Hawthorn • Little Church Street, Hawthorn • Morang Road, Hawthorn	
19mm in 10 mins; 36mm in 30 mins; 40mm in 1 hour; 51mm in 2 hours; 73mm in 6 hours; or 92mm 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.	2% AEP (50 year ARI)	**Properties at Flood Risk (Over-Floor)** **481 Properties in Total** • 3, 5, 11 & 23 Allen Street, Hawthorn • 75-79, 86, 87, 88, 90, 92, 96, Units 1- 2/98, 100, 102, Units 1- 6/260, 8/260, 9/260, 264-266, 280, 284, 286, 288 & 290 Auburn Road, Hawthorn • 84, Units 1-2/265, 2/274, Units 1-6/284, 11/284, Units 13-15/284, 286, 288, 302, 304 & 546 Barkers Road, Hawthorn • 1, 3, 4, 5, 6, Units 1-7/8, 11, 12, 14, 16, 18, 20 & 22 Belgrave Street, Hawthorn • 16, 18, 20, 26 & Units 1-6/46 Bell Street, Hawthorn • 2 & 2A Bowen Street Hawthorn • 721A, 721B, 723, 725, 727, 731, 733 & 735-737 Burke Road, Camberwell • Offices 1-3/169, 179, 229, 237-239, 275, 300 & 302-320 Burwood Road, Hawthorn • 171-193, 171A, Offices 1-5/199-203, 10/199-203, 199A, 200, 201-203, 202-204, 205, Units 1-2/206, 207, 208, 209, 210, 211, 212, 213-215, 217-219, 218, 220, 221, 222, 224, 225-229, 226, 231-233, 235, 235A, 237, 239 & 241 Camberwell Road, Hawthorn East • 8 & 10 Carrington Street, Hawthorn • 2, 3, 4, 5, 6, Units 1-3/7, 8, 1/8, Units 1-6/9, 12, 14, 41-43, Units 1-19/45, 50, 1/50, 52, 54 & 59 Church Street, Hawthorn • 20, Units 1-3/20, 1A/20, 1B/20 & Units 1-4/22 Council Street, Hawthorn • Units 1-6/75 & Units 1-9/77-83 & 83 Denham Street, Hawthorn • 19, 7/40-44, 51, 68, 70, 72, 74 & 76 Edgevale Road, Kew • 600, 605, 606, 607, 609, 611-613, Shops 1-3/615, Shops 1-2/617, 623, 625-627, 673, 675, 1S/675, Shops 2-4/675, Shops 5S-7S/675, Shops 8-10/675, Shops 11S-14S/675, 675A, 675B, 677, 679, R/681, 681, 689-699, 698, 1/698, 700, 702, 704, 704A, 1/704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 732, 734, 736, 738, 740, 744, 746, 748, 750 & 754 Glenferrie Road, Hawthorn • 69, 71, 75, 94, 96 & 98 Harcourt Street, Hawthorn East • 33, Units 1-2/37 & 39 Henry Street, Hawthorn • 5, 7, 8 & Units 1-12/23 Hull Street, Hawthorn	VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 1, 2, 3, 6 & 7-9 Hunter Street, Hawthorn • 25, 29 & 31 Johnson Street, Hawthorn • 17 Lawes Street, Hawthorn • 9, 11, 20, 20A, 21, 22, 22A, 23, 24, 26, 26A & Units 1-5/28 Liddiard Street, Hawthorn • 6 & 8 Little Church Street, Hawthorn • 6 & 8 Luton Lane, Hawthorn • 34, Offices G01-G06/36, 40-42, 44, 46, 48 & 56 Lynch Street, Hawthorn • 6, 14, 18, 22, 26, 28, 30, 2/33 & 3/33 Malmsbury Street, Hawthorn • 9, 11, 13, 15, 17 & 19 Manchester Street, Hawthorn • 99A, 99B & 101 Manningtree Road, Hawthorn • 4 Melville Street, Hawthorn • 3 Moir Street, Hawthorn • 57 & 59 Morang Road, Hawthorn • 34, 36, 48 & 50 Park Street, Hawthorn • 2, 4, 6, 8, 10, 10A & 18 Percy Street, Hawthorn • 21, 25, 27, 29, 31, 33, 35 & Units 2-6/37 Pine Street, Hawthorn • 1 Railway Place, Hawthorn • Units 1-15/130-132, 134, 136 & 171 Rathmines Road, Hawthorn East • 16-20, 22, 6/26, 12/26 & 37 Redfern Road, Hawthorn East • Units 1-8/183, 185-189, Offices 1-5/191-195, Offices 1-3/197-199, Shops 1-2/201, 203, 205, 101/207, 102/207, 211, 213, 1/217, 2/219, 3/221, 4/223, 419, 421, 481, 483, 485, 487A, 487B & 489-491 Riversdale Road, Hawthorn • 1 Rose Street, Hawthorn East • 1, 3, 5, 7 & Offices 1-2/9 Russell Street, Hawthorn East • Units 1-2/1, 3, 5 & 7 Ryeburne Avenue, Hawthorn East • 5/5 Spencer Street, Hawthorn • 7A & 9 Stanley Avenue, Hawthorn East • 25, 27, 32 & 36 Station Street, Hawthorn East • Offices G01-G08/2 Tweed Street, Hawthorn • 11 & 13 Victoria Grove, Hawthorn East • 13 & 15 Victoria Road, Hawthorn East • 9A Westley Street, Hawthorn East • 28 William Street, Hawthorn • 13, 17, 19 & 21 York Street, Hawthorn	

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Community Infrastructure Flooded • Auburn Kindergarten & Child Care Centre, Station Street, Hawthorn East likely flooded over-floor • Hawthorn Community House, William Street, Hawthorn likely flooded (Low end of street at rail overpass and next to reserve) • Swinburne University likely flooded which may flood the ground floors of some buildings along Park, William and Wakefield Streets. • West Hawthorn Preschool, Hawthorn likely flooded	Kindergarten to implement emergency evacuation plan if required
		Water Over Road (Over 300mm Depth) • Westley Street, Hawthorn East • Stanley Avenue, Hawthorn East • Victoria Grove, Hawthorn East • Station Street, Hawthorn East • Malmsbury Street, Hawthorn • Henry Street, Hawthorn • William Street, Hawthorn • Wakefield Street, Hawthorn • Liddiard Street, Hawthorn near Glenferrie Road • Edgevale Road, Kew • Fitzwilliam Street, Kew near Edgevale Road • Barkers Road, Hawthorn near Haines Street • Percy Street, Hawthorn • Bowen Street, Hawthorn • Camberwell Road, Hawthorn East • Council Street, Hawthorn East • Russell Street, Hawthorn East • Redfern Road, Hawthorn East • Rose Street, Hawthorn East • Hunter Street, Hawthorn • Belgrave Street, Hawthorn • The Boulevard, Hawthorn • Swinburne Avenue, Hawthorn • Manningtree Road, Hawthorn • Luton Lane, Hawthorn • Lynch Street, Hawthorn with significant depths	Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Denham Street, Hawthorn, east of Barton Street • Little Church Street, Hawthorn • Morang Road, Hawthorn with significant depths	
13mm 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)** **656 Properties in Total** • 3, 5, 11, 13, 15 & 23 Allen Street, Hawthorn • 73, 75-79, 86, 87, 88, 90, 92, 96, Units 1- 2/98, 100, 102, Units 1- 6/260, 8/260, 9/260, 264-266, 280, 284, 286, 288 & 290 Auburn Road, Hawthorn • 60, 74-82, 84, Units 1-2/265, 2/274, Units 1-7/284, 9/284, 11/284, Units 13-15/284, 286, 288, 302, 304, 544 & 546 Barkers Road, Hawthorn • 3 Barton Street, Hawthorn • 1, 1A, 3, 4, 5, 6, Units 1-7/8, 11, 12, 14, 16, 18, 20, 22 & 24 Belgrave Street, Hawthorn • 10, 16, 18, 20, 26 & Units 1-6/46 Bell Street, Hawthorn • 2, 2A & 6 Bowen Street Hawthorn • 721A, 721B, 723, 725, 727, 731, 733 & 735-737 Burke Road, Camberwell • Offices 1-3/169, 179, 229, 231, 233-235, 237-239, 241, 243, 247, 275, Units 1-3/283-285, 300 & 302-320 Burwood Road, Hawthorn • 171-193, 171A, Offices 1-5/199-203, 10/199-203, 199A, 200, 201-203, 202-204, 205, Units 1-2/206, 207, 208, 209, 210, 211, 212, 213-215, 217-219, 218, 220, 221, 222, 224, 225-229, 226, 231-233, 235, 235A, 237, 239 & 241 Camberwell Road, Hawthorn East • Units 1-17/2A, 6, 8 & 10 Carrington Street, Hawthorn • 2, 3, 4, 5, 6, Units 1-3/7, 8, 1/8, Units 1-6/9, 12, 14, 16, Units 1-2/27, 29, 33, 37, 40, 41-43, 42, 44, Units 1-19/45, 46, 48, 50, 1/50, 52, 53-55, 54 & 59 Church Street, Hawthorn • 2 College Street, Hawthorn • Units 1-9/18, 20-22 & Units 1-9/22 Connell Street, Hawthorn • 1 Cook Street, Hawthorn • 20, Units 1-3/20, 1A/20, 1B/20 & Units 1-4/22 Council Street, Hawthorn • Units 1-6/48, 50, Units 1-6/75 & Units 1-9/77-83, 83 & 1/85 Denham Street, Hawthorn • 11, 15, 19, 3/40-44, 5/40-44, Units 7-8/40-44, 51, 68, 70, 72, 74 & 76 Edgevale Road, Kew • 52-54 & 53 Fitzwilliam Street, Kew • 600, 605, 606, 607, 608, 609, 611-613, Shops 1-3/615, Shops 1-2/617, 623, 625-	VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		627, 673, 675, 1S/675, Shops 2-4/675, Shops 5S-7S/675, Shops 8-10/675, Shops 11S-14S/675, 675A, 675B, 677, 679, R/681, 681, 683, 685, 687, 689-699, 694, 1/694, 696, 4/696, Shops 7-8/696, 698, 1/698, 700, 702, 704, 704A, 1/704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 732, 734, 736, 738, 740, 744, 746, 748, 750, 754, 756 & 1/756 Glenferrie Road, Hawthorn • 2 Haines Street, Hawthorn • 69, 71, 75, 94, 96 & 98 Harcourt Street, Hawthorn East • 33, Units 1-2/37, 39 & 41 Henry Street, Hawthorn • 2, 3, 5, 7, 8 & Units 1-12/23 Hull Street, Hawthorn • 1, 2, 3, 4, 5, 6 & 7-9 Hunter Street, Hawthorn • 25, 29 & 31 Johnson Street, Hawthorn • 17 Lawes Street, Hawthorn • 2, 3, 9, Units1-9/10, 11, 19, 20, 20A, 21, 22, 22A, 23, 24, 26, 26A & Units 1-5/28 Liddiard Street, Hawthorn • 6 & 8 Little Church Street, Hawthorn • 6 & 8 Luton Lane, Hawthorn • 34, Offices G01-G06/36, 40-42, 44, 46, 48 & 56 Lynch Street, Hawthorn • 6, 12, 14, 16, 18, 20, 22, 26, 28, 29, 30, 2/33 & 3/33 Malmsbury Street, Hawthorn • 9, 11, 13, 15, 17 & 19 Manchester Street, Hawthorn • Units 1-11/95, 99A, 99B & 101 Manningtree Road, Hawthorn • Units 1-8/2, 4 & 6 Melville Street, Hawthorn • 3 Moir Street, Hawthorn • 57, 59 & 61 Morang Road, Hawthorn • 34, 36, 48 & 50 Park Street, Hawthorn • 2, 4, 6, 8, 10, 10A & 18 Percy Street, Hawthorn • 20, 21, 25, 27, 29, 31, 33, 35 & Units 1-6/37 Pine Street, Hawthorn • 1 Railway Place, Hawthorn • 95, 112, 114, 116, 118, Units 1-11/126-128, Units 1-15/130-132, 134, 136, 169 & 171 Rathmines Road, Hawthorn East • 16-20, 22, 6/26, 12/26 & 37 Redfern Road, Hawthorn East • Units 1-8/183, 185-189, Offices 1-5/191-195, Offices 1-3/197-199, Shops 1-2/201, 203, 205, 101/207, 102/207, 211, 213, 1/217, 2/219, 3/221, 4/223, 419, 421, 481, 483, 485, 487A, 487B & 489-491 Riversdale Road, Hawthorn • 1 Rose Street, Hawthorn East • 1, 3, 5, 7 & Offices 1-2/9 Russell Street, Hawthorn East • Units 1-2/1, 3, 5 & 7 Ryeburne Avenue, Hawthorn East	

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 5/5 Spencer Street, Hawthorn • 7A, 9 & 12 Stanley Avenue, Hawthorn East • 25, 27, 28, 30, 32, 34A & 36 Station Street, Hawthorn East • Offices G01-G08/2 & 5 Tweed Street, Hawthorn • 21, 23 & 36 Urquhart Street, Hawthorn • 11 & 13 Victoria Grove, Hawthorn East • 5, 13 & 15 Victoria Road, Hawthorn East • 9A Westley Street, Hawthorn East • 28 William Street, Hawthorn • 13, 17, 19, 21 & 25 York Street, Hawthorn **Community Infrastructure Flooded** • Cara Armstrong Kindergarten, Rathmines Road, Hawthorn East likely flooded • Auburn Kindergarten & Child Care Centre, Station Street, Hawthorn East likely flooded over-floor • Hawthorn Community House, William Street, Hawthorn likely flooded • Swinburne University likely flooded which may flood the ground floors of some buildings along Park, William and Wakefield Streets. • Glenferrie Early Childhood Centre, Glenferrie Road, Hawthorn expected to be flooded at rear • West Hawthorn Preschool, Hawthorn likely flooded **Essential Infrastructure at Flood Risk** • Hawthorn MFB Station may experience some level of property flooding at rear. Access to facility expected to remain clear travelling south bound on William St. Access likely to be cut northbound on William Street. • Tram Services along Glenferrie Road, Hawthorn expected to be disrupted by flooding in road just north of Glenferrie Railway Station and at Oxley Road Intersection. Trams on Route 16 to be affected. • Tram Services along Riversdale Road, Hawthorn expected to be disrupted by flooding in road just west of Auburn Road intersection and at Camberwell Junction. Trams on route 70 to be affected. • Tram Services along Burke Road, Camberwell expected to be disrupted by flooding in road at Camberwell Junction. Trams on route 72 to be affected. **Water Over Road (over 300mm Depth)** • Westley Street, Hawthorn East • Rathmines Road, Hawthorn East at Rathmines Road Reserve • Stanley Avenue, Hawthorn East	Kindergarten to implement emergency evacuation plan if required Tram services to implement 10cm flood plan Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Victoria Grove, Hawthorn East • Station Street, Hawthorn East • Auburn Road, Hawthorn at Malmsbury Street • Malmsbury Street, Hawthorn • Henry Street, Hawthorn • William Street, Hawthorn • Wakefield Street, Hawthorn • Park Street, Hawthorn • Glenferrie Road, Hawthorn outside Coles Supermarket • Liddiard Street, Hawthorn near Glenferrie Road • Edgevale Road, Kew • Fitzwilliam Street, Kew near Edgevale Road • Barkers Road, Hawthorn near Haines Street • Percy Street, Hawthorn • Hull Street, Hawthorn • Bowen Street, Hawthorn • Burke Road, Camberwell north of Camberwell Junction • Camberwell Road, Hawthorn East • Council Street, Hawthorn East • Russell Street, Hawthorn East • Redfern Road, Hawthorn East • Rose Street, Hawthorn East • Riversdale Road, Hawthorn west of Auburn Road • Hunter Street, Hawthorn • Belgrave Street, Hawthorn • The Boulevard, Hawthorn • Swinburne Avenue, Hawthorn • Manningtree Road, Hawthorn • Luton Lane, Hawthorn • Lynch Street, Hawthorn with Significant depths • Denham Street, Hawthorn, east of Barton Street • Church Street, Hawthorn south of Barkers Road Intersection • Little Church Street, Hawthorn • Morang Road, Hawthorn with Significant depths	

APPENDIX C4 – BACK CREEK FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Canterbury, Surrey Hills, Camberwell & Glen Iris are located approximately 12km east of Melbourne in a mixture of established residential and business zones. Three main stormwater drains service the area flowing from the north and east. The three drains converge in Glen Iris before discharging into Gardiners Creek at the Gardiner Telemetry Gauge.

High Intensity, short duration rainfall events are the primary concern and cause flash flooding in and around the area. Prolonged rainfall along Gardiners Creek may see areas adjacent to the lower end of the stormwater network flood. Major traffic thoroughfares in Canterbury Road, Riversdale Road, Toorak Road and Glen Iris Road are all susceptible to flash flooding at the stormwater drainage overpasses. Toorak Road shopping precinct east of Camberwell Road in Camberwell is also a concern, affecting businesses and tram services. 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 Back Creek catchment. All flood response actions must therefore be driven by rainfall and / or river level observations. Telemetered water level / flood gauges are located at Surrey Hills and Gardiner.

Hydrographic/Telemetry Station	Station No.	Owner	Gauge Type	Melway Reference
Gardiners Creek at Gardiner	229624A	Melbourne Water	Stream Level & Rain	59 J7
Surrey Hills	586176	Melbourne Water	Rain	47 A12

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 C4 – Areas of flood risk around Back Creek in the City of Boroondara

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 (5yr)	5% AEP (20yr)	1% AEP (100yr)				
-	-	1	Bedford Avenue	Surrey Hills	W Creek	Flash
-	-	3	Bedford Avenue	Surrey Hills	W Creek	Flash
-	-	2	Blackburn Street	Surrey Hills	W Creek	Flash
-	1/581	1/581	Camberwell Road	Camberwell	W Creek	Flash
-	2/581	2/581	Camberwell Road	Camberwell	W Creek	Flash
-	3/581	3/581	Camberwell Road	Camberwell	W Creek	Flash
-	-	583	Camberwell Road	Camberwell	W Creek	Flash
-	-	585	Camberwell Road	Camberwell	W Creek	Flash
-	590	590	Camberwell Road	Camberwell	W Creek	Flash
-	192	192	Canterbury Road	Canterbury	W Creek	Flash
-	194	194	Canterbury Road	Canterbury	W Creek	Flash
-	198	198	Canterbury Road	Canterbury	W Creek	Flash
-	-	219	Canterbury Road	Canterbury	W Creek	Flash
-	-	2/219	Canterbury Road	Canterbury	W Creek	Flash
-	-	221	Canterbury Road	Canterbury	W Creek	Flash
-	-	223	Canterbury Road	Canterbury	W Creek	Flash
-	225	225	Canterbury Road	Canterbury	W Creek	Flash
-	227	227	Canterbury Road	Canterbury	W Creek	Flash
-	229	229	Canterbury Road	Canterbury	W Creek	Flash
-	2/229	2/229	Canterbury Road	Canterbury	W Creek	Flash
-	231	231	Canterbury Road	Canterbury	W Creek	Flash
-	2/231	2/231	Canterbury Road	Canterbury	W Creek	Flash
-	-	233	Canterbury Road	Canterbury	W Creek	Flash
235	235	235	Canterbury Road	Canterbury	W Creek	Flash
1/235	1/235	1/235	Canterbury Road	Canterbury	W Creek	Flash
2/235	2/235	2/235	Canterbury Road	Canterbury	W Creek	Flash
237	237	237	Canterbury Road	Canterbury	W Creek	Flash
237A	237A	237A	Canterbury Road	Canterbury	W Creek	Flash
239	239	239	Canterbury Road	Canterbury	W Creek	Flash
241	241	241	Canterbury Road	Canterbury	W Creek	Flash
G01/241	G01/241	G01/241	Canterbury Road	Canterbury	W Creek	Flash
-	243	243	Canterbury Road	Canterbury	W Creek	Flash
-	245	245	Canterbury Road	Canterbury	W Creek	Flash
-	-	22	Chaleyer Street	Glen Iris	Ashburton Main Drain	Flash
-	24	24	Chaleyer Street	Glen Iris	Ashburton Main Drain	Flash
-	4	4	Chatham Road	Canterbury	W Creek	Flash
-	8	8	Clyde Street	Surrey Hills	Faversham Road Main Drain	Flash
1/1	1/1	1/1	Conway Crescent	Balwyn	Faversham Road Main Drain	Flash
2/1	2/1	2/1	Conway Crescent	Balwyn	Faversham Road Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP (5yr)	5% AEP (20yr)	1% AEP (100yr)				
3/1	3/1	3/1	Conway Crescent	Balwyn	Faversham Road Main Drain	Flash
4/1	4/1	4/1	Conway Crescent	Balwyn	Faversham Road Main Drain	Flash
5/1	5/1	5/1	Conway Crescent	Balwyn	Faversham Road Main Drain	Flash
6/1	6/1	6/1	Conway Crescent	Balwyn	Faversham Road Main Drain	Flash
7/1	7/1	7/1	Conway Crescent	Balwyn	Faversham Road Main Drain	Flash
8/1	8/1	8/1	Conway Crescent	Balwyn	Faversham Road Main Drain	Flash
-	-	88	Croydon Road	Surrey Hills	W Creek	Flash
-	90	90	Croydon Road	Surrey Hills	W Creek	Flash
96	96	96	Croydon Road	Surrey Hills	W Creek	Flash
-	98	98	Croydon Road	Surrey Hills	W Creek	Flash
100	100	100	Croydon Road	Surrey Hills	W Creek	Flash
-	-	102	Croydon Road	Surrey Hills	W Creek	Flash
-	104	104	Croydon Road	Surrey Hills	W Creek	Flash
106	106	106	Croydon Road	Surrey Hills	W Creek	Flash
-	-	108	Croydon Road	Surrey Hills	W Creek	Flash
-	112	112	Croydon Road	Surrey Hills	W Creek	Flash
-	8B	8B	Culliton Road	Camberwell	W Creek	Flash
-	8A	8A	Culliton Road	Camberwell	W Creek	Flash
-	8	8	Culliton Road	Camberwell	W Creek	Flash
-	10A	10A	Culliton Road	Camberwell	W Creek	Flash
-	10	10	Culliton Road	Camberwell	W Creek	Flash
-	43	43	Culliton Road	Camberwell	W Creek	Flash
5	5	5	East Court	Camberwell	Burwood Main Drain	Flash
-	-	4/9	Eddy Street	Camberwell	W Creek	Flash
-	-	5/9	Eddy Street	Camberwell	W Creek	Flash
-	6/9	6/9	Eddy Street	Camberwell	W Creek	Flash
-	-	45	Fairmont Avenue	Camberwell	W Creek	Flash
2	2	2	Faversham Road	Canterbury	W Creek	Flash
-	149	149	Fordham Avenue	Camberwell	Burwood Main Drain	Flash
-	25	25	Fordham Avenue	Camberwell	W Creek	Flash
-	-	3/25	Gardiner Parade	Glen Iris	Back Creek	Flash
-	6	6	Gilbert Parade	Camberwell	W Creek	Flash
-	8	8	Gilbert Parade	Camberwell	W Creek	Flash
104	104	104	Glen Iris Road	Glen Iris	Back Creek	Flash
-	106	106	Glen Iris Road	Glen Iris	Back Creek	Flash
-	1/108	1/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	2/108	2/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	3/108	3/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	4/108	4/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	5/108	5/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	6/108	6/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	7/108	7/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	8/108	8/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	9/108	9/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	101/108	101/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	102/108	102/108	Glen Iris Road	Glen Iris	Back Creek	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP (5yr)	5% AEP (20yr)	1% AEP (100yr)				
-	103/108	103/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	104/108	104/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	105/108	105/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	106/108	106/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	107/108	107/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	108/108	108/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	109/108	109/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	110/108	110/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	111/108	111/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	112/108	112/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	113/108	113/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	114/108	114/108	Glen Iris Road	Glen Iris	Back Creek	Flash
-	116	116	Glen Iris Road	Glen Iris	Back Creek	Flash
-	-	118	Glen Iris Road	Glen Iris	Back Creek	Flash
-	-	15	Glencairn Avenue	Camberwell	Burwood Main Drain	Flash
-	1/17	1/17	Glencairn Avenue	Camberwell	Burwood Main Drain	Flash
-	2/17	2/17	Glencairn Avenue	Camberwell	Burwood Main Drain	Flash
-	-	3/17	Glencairn Avenue	Camberwell	Burwood Main Drain	Flash
-	1/21	1/21	Glencairn Avenue	Camberwell	Burwood Main Drain	Flash
-	-	2/21	Glencairn Avenue	Camberwell	Burwood Main Drain	Flash
-	-	3/21	Glencairn Avenue	Camberwell	Burwood Main Drain	Flash
-	22	22	Glencairn Avenue	Camberwell	Burwood Main Drain	Flash
-	24	24	Glencairn Avenue	Camberwell	Burwood Main Drain	Flash
-	-	11	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	15A	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	15	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	1/24	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	30	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	32	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	40	Great Valley Road	Glen Iris	Back Creek	Flash
-	42	42	Great Valley Road	Glen Iris	Back Creek	Flash
-	44	44	Great Valley Road	Glen Iris	Back Creek	Flash
-	53	53	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	55	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	60	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	64	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	66	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	67	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	68	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	72	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	1/74	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	2/74	Great Valley Road	Glen Iris	Back Creek	Flash
-	76	76	Great Valley Road	Glen Iris	Back Creek	Flash
-	78	78	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	80	Great Valley Road	Glen Iris	Back Creek	Flash
-	84	84	Great Valley Road	Glen Iris	Back Creek	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP (5yr)	5% AEP (20yr)	1% AEP (100yr)				
-	86	86	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	88	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	90	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	92	Great Valley Road	Glen Iris	Back Creek	Flash
-	100	100	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	102	Great Valley Road	Glen Iris	Back Creek	Flash
-	104	104	Great Valley Road	Glen Iris	Back Creek	Flash
-	106	106	Great Valley Road	Glen Iris	Back Creek	Flash
-	108	108	Great Valley Road	Glen Iris	Back Creek	Flash
-	110	110	Great Valley Road	Glen Iris	Back Creek	Flash
-	112	112	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	114	Great Valley Road	Glen Iris	Back Creek	Flash
-	116-118	116-118	Great Valley Road	Glen Iris	Back Creek	Flash
-	-	216	Highfield Road	Camberwell	Burwood Main Drain	Flash
-	218	218	Highfield Road	Camberwell	Burwood Main Drain	Flash
219	219	219	Highfield Road	Camberwell	Burwood Main Drain	Flash
-	220	220	Highfield Road	Camberwell	Burwood Main Drain	Flash
221	221	221	Highfield Road	Camberwell	Burwood Main Drain	Flash
-	223	223	Highfield Road	Camberwell	Burwood Main Drain	Flash
225	225	225	Highfield Road	Camberwell	Burwood Main Drain	Flash
-	226	226	Highfield Road	Camberwell	Burwood Main Drain	Flash
-	227	227	Highfield Road	Camberwell	Burwood Main Drain	Flash
-	2/229	2/229	Highfield Road	Camberwell	Burwood Main Drain	Flash
-	-	3	Jickell Avenue	Glen Iris	Burwood Main Drain	Flash
-	4	4	Jickell Avenue	Glen Iris	Burwood Main Drain	Flash
-	1	1	Joffre Street	Camberwell	Burwood Main Drain	Flash
-	6	6	Junction Road	Surrey Hills	W Creek	Flash
-	1	1	Kingston Road	Surrey Hills	W Creek	Flash
-	28	28	Kingston Road	Surrey Hills	W Creek	Flash
-	-	30	Kingston Road	Surrey Hills	W Creek	Flash
-	-	34	Kingston Road	Surrey Hills	W Creek	Flash
-	-	36	Kingston Road	Surrey Hills	W Creek	Flash
-	-	40	Kingston Road	Surrey Hills	W Creek	Flash
-	42A	42A	Kingston Road	Surrey Hills	W Creek	Flash
-	-	1/44	Kingston Road	Surrey Hills	W Creek	Flash
-	-	2/44	Kingston Road	Surrey Hills	W Creek	Flash
-	-	3/44	Kingston Road	Surrey Hills	W Creek	Flash
-	-	4/44	Kingston Road	Surrey Hills	W Creek	Flash
-	-	5/44	Kingston Road	Surrey Hills	W Creek	Flash
-	-	6/44	Kingston Road	Surrey Hills	W Creek	Flash
-	-	7/44	Kingston Road	Surrey Hills	W Creek	Flash
-	-	48	Kingston Road	Surrey Hills	W Creek	Flash
-	-	15	Kirkwood Drive	Camberwell	W Creek	Flash
-	-	20	Kirkwood Drive	Camberwell	W Creek	Flash
-	2/19	2/19	Lodge Road	Camberwell	Burwood Main Drain	Flash
-	-	3/25	Matlock Street	Canterbury	W Creek	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP (5yr)	5% AEP (20yr)	1% AEP (100yr)				
-	-	27	Matlock Street	Canterbury	W Creek	Flash
-	11	11	Moresby Street	Canterbury	W Creek	Flash
-	-	18	Nerissa Street	Glen Iris	Ashburton Main Drain	Flash
-	19	19	Nerissa Street	Glen Iris	Ashburton Main Drain	Flash
-	20	20	Nerissa Street	Glen Iris	Ashburton Main Drain	Flash
-	21	21	Nerissa Street	Glen Iris	Ashburton Main Drain	Flash
1/58	1/58	1/58	Northcote Avenue	Balwyn	Faversham Road Main Drain	Flash
2/58	2/58	2/58	Northcote Avenue	Balwyn	Faversham Road Main Drain	Flash
3/58	3/58	3/58	Northcote Avenue	Balwyn	Faversham Road Main Drain	Flash
4/58	4/58	4/58	Northcote Avenue	Balwyn	Faversham Road Main Drain	Flash
5/58	5/58	5/58	Northcote Avenue	Balwyn	Faversham Road Main Drain	Flash
6/58	6/58	6/58	Northcote Avenue	Balwyn	Faversham Road Main Drain	Flash
7/58	7/58	7/58	Northcote Avenue	Balwyn	Faversham Road Main Drain	Flash
8/58	8/58	8/58	Northcote Avenue	Balwyn	Faversham Road Main Drain	Flash
-	-	109	Prospect Hill Road	Camberwell	W Creek	Flash
-	41	41	Renwick Street	Glen Iris	Back Creek	Flash
-	-	43	Renwick Street	Glen Iris	Back Creek	Flash
-	44	44	Renwick Street	Glen Iris	Back Creek	Flash
-	47	47	Renwick Street	Glen Iris	Back Creek	Flash
-	48	48	Renwick Street	Glen Iris	Back Creek	Flash
-	50	50	Renwick Street	Glen Iris	Back Creek	Flash
-	-	14	Richards Avenue	Glen Iris	Back Creek	Flash
-	-	661	Riversdale Road	Camberwell	W Creek	Flash
-	-	666	Riversdale Road	Camberwell	W Creek	Flash
-	-	670	Riversdale Road	Camberwell	W Creek	Flash
-	17	17	Robinson Road	Surrey Hills	W Creek	Flash
-	-	4	Ruyton Street	Camberwell	Burwood Main Drain	Flash
-	-	25	Shierlaw Avenue	Canterbury	W Creek	Flash
-	1/5	1/5	Somerset Road	Glen Iris	Burwood Main Drain	Flash
-	2/5	2/5	Somerset Road	Glen Iris	Burwood Main Drain	Flash
-	3/5	3/5	Somerset Road	Glen Iris	Burwood Main Drain	Flash
-	4/5	4/5	Somerset Road	Glen Iris	Burwood Main Drain	Flash
-	-	2A	Spencer Road	Camberwell	W Creek	Flash
-	-	1/6	Spencer Road	Camberwell	W Creek	Flash
-	-	2/6	Spencer Road	Camberwell	W Creek	Flash
-	-	2/67	Staughton Road	Glen Iris	Back Creek	Flash
-	-	68	Staughton Road	Glen Iris	Back Creek	Flash
-	-	3	Summerhill Road	Glen Iris	Burwood Main Drain	Flash
-	1	1	Sunbury Crescent	Surrey Hills	W Creek	Flash
-	6/35	6/35	Talbot Avenue	Balwyn	Faversham Road Main Drain	Flash
2/44	2/44	2/44	Talbot Avenue	Balwyn	Faversham Road Main Drain	Flash
3/44	3/44	3/44	Talbot Avenue	Balwyn	Faversham Road Main Drain	Flash
-	2/48	2/48	Talbot Avenue	Balwyn	Faversham Road Main Drain	Flash
-	-	1140	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	-	1145	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	-	1146	Toorak Road	Camberwell	Burwood Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP (5yr)	5% AEP (20yr)	1% AEP (100yr)				
-	1147	1147	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	2/1147	2/1147	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1149	1149	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1150	1150	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1152	1152	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1154	1154	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1155	1155	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1156	1156	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1158	1158	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1159	1159	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1160	1160	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1161	1161	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1162	1162	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1163	1163	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1164	1164	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1165	1165	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1166	1166	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1168	1168	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1170	1170	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1172	1172	Toorak Road	Camberwell	Burwood Main Drain	Flash
1/1175	1/1175	1/1175	Toorak Road	Camberwell	Burwood Main Drain	Flash
2/1175	2/1175	2/1175	Toorak Road	Camberwell	Burwood Main Drain	Flash
2S/1175	2S/1175	2S/1175	Toorak Road	Camberwell	Burwood Main Drain	Flash
3/1175	3/1175	3/1175	Toorak Road	Camberwell	Burwood Main Drain	Flash
4/1175	4/1175	4/1175	Toorak Road	Camberwell	Burwood Main Drain	Flash
5/1175	5/1175	5/1175	Toorak Road	Camberwell	Burwood Main Drain	Flash
6/1175	6/1175	6/1175	Toorak Road	Camberwell	Burwood Main Drain	Flash
7/1175	7/1175	7/1175	Toorak Road	Camberwell	Burwood Main Drain	Flash
8/1175	8/1175	8/1175	Toorak Road	Camberwell	Burwood Main Drain	Flash
9/1175	9/1175	9/1175	Toorak Road	Camberwell	Burwood Main Drain	Flash
1180	1180	1180	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	-	1/1183	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	-	2/1183	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	-	3/1183	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	-	4/1183	Toorak Road	Camberwell	Burwood Main Drain	Flash
-	1	1	Tyne Street	Camberwell	Burwood Main Drain	Flash
-	-	3	Tyne Street	Camberwell	Burwood Main Drain	Flash
-	5	5	Tyne Street	Camberwell	Burwood Main Drain	Flash
-	-	8	Tyrone Street	Camberwell	W Creek	Flash
-	-	10	Tyrone Street	Camberwell	W Creek	Flash
-	-	1/19	Tyrone Street	Camberwell	W Creek	Flash
-	21	21	Tyrone Street	Camberwell	W Creek	Flash
131	131	131	Union Road	Surrey Hills	W Creek	Flash
133	133	133	Union Road	Surrey Hills	W Creek	Flash
135	135	135	Union Road	Surrey Hills	W Creek	Flash
137	137	137	Union Road	Surrey Hills	W Creek	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP (5yr)	5% AEP (20yr)	1% AEP (100yr)				
-	-	138	Union Road	Surrey Hills	W Creek	Flash
1/139	1/139	1/139	Union Road	Surrey Hills	W Creek	Flash
2/139	2/139	2/139	Union Road	Surrey Hills	W Creek	Flash
3/139	3/139	3/139	Union Road	Surrey Hills	W Creek	Flash
4/139	4/139	4/139	Union Road	Surrey Hills	W Creek	Flash
140-142	140-142	140-142	Union Road	Surrey Hills	W Creek	Flash
140-148	140-148	140-148	Union Road	Surrey Hills	W Creek	Flash
1/140-148	1/140-148	1/140-148	Union Road	Surrey Hills	W Creek	Flash
143	143	143	Union Road	Surrey Hills	W Creek	Flash
144-146	144-146	144-146	Union Road	Surrey Hills	W Creek	Flash
-	-	147	Union Road	Surrey Hills	W Creek	Flash
-	-	151	Union Road	Surrey Hills	W Creek	Flash
-	-	14	Valley Parade	Glen Iris	Back Creek	Flash
-	-	11	Wallis Avenue	Glen Iris	Ashburton Main Drain	Flash
-	-	18	Wallis Avenue	Glen Iris	Ashburton Main Drain	Flash
-	-	21A	Warburton Road	Camberwell	Myrtle Road Main Drain	Flash
-	-	2/54	Warburton Road	Canterbury	W Creek	Flash
-	-	3/54	Warburton Road	Canterbury	W Creek	Flash
-	-	60	Warburton Road	Canterbury	W Creek	Flash
-	-	2/6	Water Street	Camberwell	W Creek	Flash
-	1/195	1/195	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
-	2/195	2/195	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
-	197	197	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
199	199	199	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
-	201A	201A	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
-	201	201	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
-	-	203	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
-	1/205	1/205	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
-	2/205	2/205	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
-	1/212	1/212	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
2/212	2/212	2/212	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
-	-	214A	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
214	214	214	Wattle Valley Road	Camberwell	Burwood Main Drain	Flash
-	45	45	Welfare Parade	Glen Iris	Ashburton Main Drain	Flash
-	-	1/4	West Road	Surrey Hills	W Creek	Flash
-	-	2/4	West Road	Surrey Hills	W Creek	Flash
-	-	3/4	West Road	Surrey Hills	W Creek	Flash
-	-	344	Whitehorse Road	Balwyn	Faversham Road Main Drain	Flash
1/402	1/402	1/402	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
2/402	2/402	2/402	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
3/402	3/402	3/402	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
4/402	4/402	4/402	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
5/402	5/402	5/402	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
6/402	6/402	6/402	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
7/402	7/402	7/402	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
8/402	8/402	8/402	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP (5yr)	5% AEP (20yr)	1% AEP (100yr)				
1/404	1/404	1/404	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
2/404	2/404	2/404	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
3/404	3/404	3/404	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
4/404	4/404	4/404	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
5/404	5/404	5/404	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
6/404	6/404	6/404	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
7/404	7/404	7/404	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
8/404	8/404	8/404	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
406	406	406	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
424A	424A	424A	Whitehorse Road	Surrey Hills	Faversham Road Main Drain	Flash
-	-	3/7	Willow Grove	Canterbury	W Creek	Flash
-	-	4/7	Willow Grove	Canterbury	W Creek	Flash
-	-	2/9	Willow Grove	Canterbury	W Creek	Flash
-	-	3/9	Willow Grove	Canterbury	W Creek	Flash
-	-	11	Woodlands Avenue	Camberwell	W Creek	Flash
-	-	24	Woodlands Avenue	Camberwell	W Creek	Flash
26	26	26	Woodlands Avenue	Camberwell	W Creek	Flash
Totals						
81	**220**	**332**				

ISOLATION

No major isolation risks exist for areas around W and Back Creek in Canterbury, Surrey Hills, Camberwell & Glen Iris during a 1% AEP (100yr ARI) event. Some localised short-duration isolation may occur due to flash flooding.

ESSENTIAL INFRASTRUCTURE

- Tram Services along Toorak Road, Camberwell expected to be disrupted by flooding in road just east of Camberwell Road. Trams on Route 75 affected in a 1% AEP event.
- Riversdale Road Council Depot experiences property flooding in parts during a 5% AEP 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 Back Creek in Canterbury, Surrey Hills, Camberwell & 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 W and Back Creek in Canterbury, Surrey Hills, Camberwell & Glen Iris. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
• Canterbury Road, Canterbury east of Balwyn Road Intersection
• Riversdale Road, Camberwell east of Riversdale Station
• Toorak Road, Camberwell east of Camberwell Road Intersection

Boroondara City Council Roads flooded in a 1% AEP (100yr ARI) event			
BALWYN	• Murdoch Street	• Matlock Street	• Nerissa Street
• Talbot Avenue	• Prospect Hill Road	• Mont Albert Road	• Summerhill Road
CAMBERWELL	• Ruyton Street	• Moresby Street	• Wallis Avenue
• Culliton Road	• Shalless Drive	• Myrtle Road	• Welfare Parade
• Fairmont Avenue	• Through Road	• Warburton Road	**SURREY HILLS**
• Fordham Avenue	• Tyne Street	• Winson Green Road	• Bedford Avenue
• Gilbert Parade	• Tyrone Street	**GLEN IRIS**	• Chatham Road
• Glencairn Avenue	• Wattle Valley Road	• Chaleyer Street	• Croydon Road
• Highfield Road	• Woodlands Avenue	• Dawson Drive	• Kingston Road
• Joffre Street	**CANTERBURY**	• Denman Avenue	• Robinson Road
• Kirkwood Drive	• Beaumont Street	• Ferndale Road	• Union Road
• Love Street	• Chaucer Crescent	• Glen Iris Road	
• Lynden Street	• Faversham Road	• Great Valley Road	
• Morey Street	• Kendall Street	• Liston Street	

FLOOD MITIGATION

No formal Retarding Basins, Pumping Stations or Levees exist around W and Back Creek in Canterbury, Surrey Hills, Camberwell & Glen Iris.

SEWERAGE INFRASTRUCTURE

There is no sewerage Infrastructure expected to be within the vicinity of floodwaters during severe flood events around W and Back Creeks in Canterbury, Surrey Hills, Camberwell & Glen Iris.

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/s for W Creek and Back Creek for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	499
Business	91
Industrial	0
Public Land	16
Rural	0
Total	**606**

FLOOD INTELLIGENCE CARD – W CREEK, CANTERBURY (UNGAUGED)

Version 2 – November 2015

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	**Surrey Hills**
LOCATION	**Surrey Hills Service Reservoir, Elgar Road, Surrey Hills**
MELWAY REF:	**47 A12**

GAUGE NUMBER	**586176**
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 ungagged nature of the catchment. This should be used as a guide only.	20% AEP (5 year ARI)	**Properties at Flood Risk (Over-Floor)** **62 Properties in Total** • 235, Shops 1-2/235, 237, 237A, 239, 241 & G01/241Canterbury Road, Canterbury • Units 1-8/1 Conway Crescent, Balwyn • 96, 100 & 106 Croydon Road, Surrey Hills • 8, 8A, 8B, 10, 10A & 43 Culliton Road, Camberwell • 2 Faversham Road, Canterbury • Units 1-8/58 Northcote Avenue, Balwyn • Units 2-3/44 Talbot Avenue, Balwyn • 131, 133, 135, 137, Shops 1-4/139, 140-142, 140-148, 1/140-148, 143 & 144-146 Union Road, Surrey Hills • Units 1-8/402, Units 1-8/404, 406 & 424A Whitehorse Road, Surrey Hills • 26 Woodlands Avenue, Camberwell **Community Infrastructure Flooded** • Balwyn Community Centre, Whitehorse Road, Surrey Hills likely flooded near entrance via Whitehorse Road- Accessibility the issue	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident. VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Canterbury Gardens flooded • Camberwell East Tennis Courts and rear section of Riversdale Park are likely flooded • Fordham Gardens, Camberwell Road, Camberwell flooded- Minimal impact **Water Over Road (over 300mm depths)** • Bedford Avenue, Surrey Hills • Robins Road, Surrey Hills • Kingston Road, Surrey Hills (significant depths) • Chaucer Crescent, Canterbury • Beaumont Street, Canterbury • Woodlands Avenue, Camberwell	Council to provide road closure signage if required.
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 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.	10% AEP (10 year ARI)	**Properties at Flood Risk (Over-Floor)** **92 Properties in Total** • 192, 194, 198, 227, 229, 2/229, 231, 2/231, 235, Shops 1-2/235, 237, 237A, 239, 241, G01/241 & 243 Canterbury Road, Canterbury • Units 1-8/1 Conway Crescent, Balwyn • 96, 100, 104 & 106 Croydon Road, Surrey Hills • 8, 8A, 8B, 10, 10A & 43 Culliton Road, Camberwell • 2 Faversham Road, Canterbury • 25 Fordham Avenue, Camberwell • 6 & 8 Gilbert Parade, Camberwell • 6 Junction Road, Surrey Hills • Units 1-7/44 & 48 Kingston Road, Surrey Hills • Units 1-8/58 Northcote Avenue, Balwyn • 17 Robinson Road, Surrey Hills • 1 Sunbury Crescent, Surrey Hills • Units 2-3/44 Talbot Avenue, Balwyn • 131, 133, 135, 137, Shops 1-4/139, 140-142, 140-148, 1/140-148, 143 & 144-146 Union Road, Surrey Hills • Units 1-8/402, Units 1-8/404, 406 & 424A Whitehorse Road, Surrey Hills • 26 Woodlands Avenue, Camberwell **Community Infrastructure Flooded** • Colville Reserve, Shierlaw Ave, Canterbury flooded • Balwyn Community Centre, Whitehorse Road, Surrey Hills likely flooded near	VicSES to respond to requests on case by case basis Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		entrance via Whitehorse Road • Canterbury Gardens flooded • Camberwell High School likely flooded along its western edge • Camberwell East Tennis Courts and rear section of Riversdale Park are likely flooded • Fordham Gardens, Camberwell Road, Camberwell flooded **Water Over Road (over 300mm depths)** • Bedford Avenue, Surrey Hills • Robins Road, Surrey Hills • Kingston Road, Surrey Hills with significant depths • Chaucer Crescent, Canterbury • Beaumont Street, Canterbury • Prospect Hill Road, Camberwell between Railway Line and Mailing Road • Woodlands Avenue, Camberwell • Culliton Road, Camberwell • Gilbert Parade, Camberwell	
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 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.	5% AEP (20 year ARI)	**Properties at Flood Risk (Over-Floor)** **103 Properties in Total** • Units 1-3/581 & 590 Camberwell Road, Camberwell • 192, 194, 198, 225, 227, 229, 2/229, 231, 2/231, 235, Shops 1-2/235, 237, 237A, 239, 241, G01/241, 243 & 245 Canterbury Road, Canterbury • 4 Chatham Road, Canterbury • 8 Clyde Street, Surrey Hills • Units 1-8/1 Conway Crescent, Balwyn • 90, 96, 98, 100, 104, 106 & 112 Croydon Road, Surrey Hills • 8, 8A, 8B, 10, 10A & 43 Culliton Road, Camberwell • 6/9 Eddy Street, Camberwell • 2 Faversham Road, Canterbury • 25 Fordham Avenue, Camberwell • 6 & 8 Gilbert Parade, Camberwell • 6 Junction Road, Surrey Hills • 1, 28, 42A, Units 1-7/44 & 48 Kingston Road, Surrey Hills • 11 Moresby Street, Canterbury • Units 1-8/58 Northcote Avenue, Balwyn	VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 17 Robinson Road, Surrey Hills • 1 Sunbury Crescent, Surrey Hills • 6/35, Units 2-3/44 & 2/48 Talbot Avenue, Balwyn • 21 Tyrone Street, Camberwell • 131, 133, 135, 137, Shops 1-4/139, 140-142, 140-148, 1/140-148, 143 & 144-146 Union Road, Surrey Hills • Units 1-8/402, Units 1-8/404, 406 & 424A Whitehorse Road, Surrey Hills • 26 Woodlands Avenue, Camberwell **Community Infrastructure Flooded** • Colville Reserve, Shierlaw Ave, Canterbury flooded • Balwyn Community Centre, Whitehorse Road, Surrey Hills likely flooded near entrance via Whitehorse Road • Playstation Childcare Centre, Canterbury Road, Canterbury likely flooded • Canterbury Gardens flooded • Camberwell High School likely flooded along its western edge • Camberwell East Tennis Courts and Riversdale Park are likely flooded • Fordham Gardens, Camberwell Road, Camberwell flooded with significant depths • RAAF Air Training Facility, Kingston Road, Surrey Hills likely flooded **Essential Infrastructure at Flood Risk** • Riversdale Road Council Depot likely flooded in parts Affect operational responses **Water Over Road (over 300mm depths)** • Bedford Avenue, Surrey Hills • Union Road, Surrey Hills • Croydon Road, Surrey Hills • Robins Road, Surrey Hills • Kingston Road, Surrey Hills with significant depths • Talbot Avenue, Balwyn • Canterbury Road, Canterbury • Chaucer Crescent, Canterbury • Beaumont Street, Canterbury • Matlock Street, Canterbury • Prospect Hill Road, Camberwell between Railway Line and Mailing Road • Woodlands Avenue, Camberwell • Shalless Drive, Camberwell	Childcare centre to implement emergency evacuation plan if required Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Culliton Road, Camberwell • Murdoch Street, Camberwell • Gilbert Parade, Camberwell • Tyrone Street, Camberwell	
19mm in 10 mins; 36mm in 30 mins; 40mm in 1 hour; 51mm in 2 hours; 73mm in 6 hours; or 92mm 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.	2% AEP (50 year ARI)	**Properties at Flood Risk (Over-Floor)** **140 Properties in Total** • 3 Bedford Avenue, Surrey Hills • 2 Blackburn Street, Surrey Hills • Units 1-3/581, 583, 585 & 590 Camberwell Road, Camberwell • 192, 194, 198, 221, 223, 225, 227, 229, 2/229, 231, 2/231, 233, 235, Shops 1-2/235, 237, 237A, 239, 241, G01/241, 243 & 245 Canterbury Road, Canterbury • 4 Chatham Road, Canterbury • 8 Clyde Street, Surrey Hills • Units 1-8/1 Conway Crescent, Balwyn • 90, 96, 98, 100, 102, 104, 106 & 112 Croydon Road, Surrey Hills • 8, 8A, 8B, 10, 10A & 43 Culliton Road, Camberwell • Units 5-6/9 Eddy Street, Camberwell • 2 Faversham Road, Canterbury • 25 Fordham Avenue, Camberwell • 6 & 8 Gilbert Parade, Camberwell • 6 Junction Road, Surrey Hills • 1, 28, 30, 36, 40, 42A, Units 1-7/44 & 48 Kingston Road, Surrey Hills • 20 Kirkwood Drive, Camberwell • 3/25 & 27 Matlock Street, Canterbury • 11 Moresby Street, Canterbury • Units 1-8/58 Northcote Avenue, Balwyn • 109 Prospect Hill Road, Camberwell • 661 Riversdale Road, Camberwell • 17 Robinson Road, Surrey Hills • 2A Spencer Road, Camberwell • 1 Sunbury Crescent, Surrey Hills • 6/35, Units 2-3/44 & 2/48 Talbot Avenue, Balwyn • 8, 10, 1/19 & 21 Tyrone Street, Camberwell • 131, 133, 135, 137, Shops 1-4/139, 140-142, 140-148, 1/140-148, 143, 144-146 &	VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		151 Union Road, Surrey Hills • 21A, Units 2-3/54 & 60 Warburton Road, Canterbury • 2/6 Water Street, Camberwell • 1/4 West Road, Surrey Hills • Units 1-8/402, Units 1-8/404, 406 & 424A Whitehorse Road, Surrey Hills • Units 3-4/7 & 3/9 Willow Grove, Canterbury • 24 & 26 Woodlands Avenue, Camberwell **Community Infrastructure Flooded** • Colville Reserve, Shierlaw Ave, Canterbury flooded with significant depths • Harcourt Nursing Home flooded to entrance via Shierlaw Ave • Balwyn Community Centre, Whitehorse Road, Surrey Hills likely flooded near entrance via Whitehorse Road • John August Reserve flooded • Playstation Childcare Centre, Canterbury Road, Canterbury likely flooded • Canterbury Gardens flooded with significant depths • Camberwell High School likely flooded • Camberwell East Tennis Courts and Riversdale Park are likely flooded with significant depths • Frog Hollow Reserve and Recreation Area flooded • Willison Park and Recreation Area flooded • Fordham Gardens, Camberwell Road, Camberwell flooded with significant depths • RAAF Air Training Facility, Kingston Road, Surrey Hills likely flooded * Still there? **Essential Infrastructure at Flood Risk** • Riversdale Road Council Depot likely flooded in parts **Water Over Road (over 300mm depths)** • Bedford Avenue, Surrey Hills • Union Road, Surrey Hills • Croydon Road, Surrey Hills • Robins Road, Surrey Hills • Kingston Road, Surrey Hills with significant depths • Talbot Avenue, Balwyn • Canterbury Road, Canterbury • Chaucer Crescent, Canterbury • Kendall Street, Canterbury • Warburton Road, Canterbury	Childcare centre to implement emergency evacuation plan if required. Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Myrtle Road, Canterbury at Railway underpass • Beaumont Street, Canterbury • Matlock Street, Canterbury • Moresby Street, Canterbury • Prospect Hill Road, Camberwell between Railway Line and Mailing Road • Woodlands Avenue, Camberwell • Shalless Drive, Camberwell • Culliton Road, Camberwell, at railway underpass and adjacent to Willison Park ** Vic rail Maybe a road underpass check • Murdoch Street, Camberwell • Kirkwood Drive, Camberwell • Gilbert Parade, Camberwell • Tyrone Street, Camberwell • Love Street, Camberwell	
23mm 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)** **164 Properties in Total** • 1 & 3 Bedford Avenue, Surrey Hills • 2 Blackburn Street, Surrey Hills • Units 1-3/581, 583, 585 & 590 Camberwell Road, Camberwell • 192, 194, 198, 219, 2/219, 221, 223, 225, 227, 229, 2/229, 231, 2/231, 233, 235, Shops 1-2/235, 237, 237A, 239, 241, G01/241, 243 & 245 Canterbury Road, Canterbury • 4 Chatham Road, Canterbury • 8 Clyde Street, Surrey Hills • Units 1-8/1 Conway Crescent, Balwyn • 88, 90, 96, 98, 100, 102, 104, 106, 108 & 112 Croydon Road, Surrey Hills • 8, 8A, 8B, 10, 10A & 43 Culliton Road, Camberwell • Units 4-6/9 Eddy Street, Camberwell • 45 Fairmont Avenue, Camberwell • 2 Faversham Road, Canterbury • 25 Fordham Avenue, Camberwell • 6 & 8 Gilbert Parade, Camberwell • 6 Junction Road, Surrey Hills • 1, 28, 30, 34, 36, 40, 42A, Units 1-7/44 & 48 Kingston Road, Surrey Hills	VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 15 & 20 Kirkwood Drive, Camberwell • 3/25 & 27 Matlock Street, Canterbury • 11 Moresby Street, Canterbury • Units 1-8/58 Northcote Avenue, Balwyn • 109 Prospect Hill Road, Camberwell • 661, 666 & 670 Riversdale Road, Camberwell • 17 Robinson Road, Surrey Hills • 25 Shierlaw Avenue, Canterbury • 2A & Units 1-2/6 Spencer Road, Camberwell • 1 Sunbury Crescent, Surrey Hills • 6/35, Units 2-3/44 & 2/48 Talbot Avenue, Balwyn • 8, 10, 1/19 & 21 Tyrone Street, Camberwell • 131, 133, 135, 137, 138, Shops 1-4/139, 140-142, 140-148, 1/140-148, 143, 144-146, 147 & 151 Union Road, Surrey Hills • 21A, Units 2-3/54 & 60 Warburton Road, Canterbury • 2/6 Water Street, Camberwell • Units 1-3/4 West Road, Surrey Hills • 344 Whitehorse Road, Balwyn • Units 1-8/402, Units 1-8/404, 406 & 424A Whitehorse Road, Surrey Hills • Units 3-4/7 & Units 2-3/9 Willow Grove, Canterbury • 11, 24 & 26 Woodlands Avenue, Camberwell **Community Infrastructure Flooded** • Colville Reserve, Shierlaw Ave, Canterbury flooded with significant depths • Harcourt Nursing Home flooded to entrance via Shierlaw Ave • Balwyn Community Centre, Whitehorse Road, Surrey Hills likely flooded near entrance via Whitehorse Road • John August Reserve flooded • Playstation Childcare Centre, Canterbury Road, Canterbury likely flooded • Canterbury Gardens flooded with significant depths • Camberwell High School likely flooded • Camberwell East Tennis Courts and Riversdale Park are likely flooded with significant depths • Frog Hollow Reserve and Recreation Area flooded • Willison Park and Recreation Area flooded	Nursing home to implement their emergency evacuation plan Childcare centre to implement evacuation plan if required Council to provide closure signage where required

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Fordham Gardens, Camberwell Road, Camberwell flooded with significant depths • RAAF Air Training Facility, Kingston Road, Surrey Hills likely flooded **Essential Infrastructure at Flood Risk** • Riversdale Road Council Depot likely flooded in parts **Water Over Road (over 300mm depths)** • Bedford Avenue, Surrey Hills • Union Road, Surrey Hills • Croydon Road, Surrey Hills • Robins Road, Surrey Hills • Kingston Road, Surrey Hills with significant depths • Chatham Road, Canterbury near Shierlaw Avenue • Faversham Road, Canterbury • Talbot Avenue, Balwyn • Mont Albert Road, Canterbury near John August Reserve • Winson Green Road, Canterbury • Canterbury Road, Canterbury • Chaucer Crescent, Canterbury with significant depths • Kendall Street, Canterbury with significant depths • Warburton Road, Canterbury • Myrtle Road, Canterbury at Railway underpass • Beaumont Street, Canterbury • Matlock Street, Canterbury • Moresby Street, Canterbury • Prospect Hill Road, Camberwell between Railway Line and Mailing Road • Woodlands Avenue, Camberwell • Shalless Drive, Camberwell • Culliton Road, Camberwell, at railway underpass and adjacent to Willison Park • Murdoch Street, Camberwell • Kirkwood Drive, Camberwell • Fairmont Avenue, Camberwell • Gilbert Parade, Camberwell with significant depths • Tyrone Street, Camberwell • Love Street, Camberwell	Council to provide road closure signage if required.

FLOOD INTELLIGENCE CARD – BACK CREEK, CAMBERWELL (UNGAUGED)

Version 2 – November 2015

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	**Gardiners Creek at Gardiner**
LOCATION	**Great Valley Road, 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 ungagged nature of the catchment. This should be used as a guide only.	20% AEP (5 year ARI)	**Properties at Flood Risk (Over-Floor)** **19 Properties in Total** • 5 East Court, Camberwell • 104 Glen Iris Road, Glen Iris • 219, 221 & 225 Highfield Road, Camberwell • Offices 1-9/1175, 2S/1175 & 1180 Toorak Road, Camberwell • 199, 2/212 & 214 Wattle Valley Road Extension, Camberwell **Community Infrastructure Flooded** • Lynden Park flooded Structures Camberwell Petanque Club, lynden scout hall, lynden cricket club Ferndale Park flooded Structures football club & scout hall **Water Over Road (over 300mm depths)** • Lynden Street, Camberwell • Fordham Avenue, Camberwell	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident. VicSES to respond to requests on case by case basis Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
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 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.	10% AEP (10 year ARI)	**Properties at Flood Risk (Over-Floor)** **79 Properties in Total** • 24 Chaleyer Street, Glen Iris • 5 East Court, Camberwell • 104, 106, Offices 1-9/108 & Offices 101-114/108 Glen Iris Road, Glen Iris • 22 & 24 Glencairn Avenue, Camberwell • 42, 53, 84, 100 & 110 Great Valley Road, Glen Iris • 219, 220, 221, 223, 225 & 2/229 Highfield Road, Camberwell • 2/19 Lodge Road, Camberwell • 21 Nerissa Street, Glen Iris • 47, 48 & 50 Renwick Street, Glen Iris • 1150, 1152, 1154, 1156, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1168, Offices 1-9/1175, 2S/1175 & 1180 Toorak Road, Camberwell • 1 Tyne Street, Camberwell • Units 1-2/195, 197, 199, Units 1-2/205, Units 1-2/212 & 214 Wattle Valley Road Extension, Camberwell **Community Infrastructure Flooded** • South Surrey Park flooded • Lynden Park flooded • Glen Iris Scout Hall likely flooded • Ferndale Park flooded **Water Over Road (over 300mm depths)** • Lynden Street, Camberwell with significant depths • Highfield Road, Camberwell at Tyne Street Intersection • Glencairn Avenue, Camberwell • Wattle Valley Road, Camberwell • Fordham Avenue, Camberwell with significant depths • Toorak Road, Camberwell between Camberwell Road and Railway Bridge • Denman Avenue, Glen Iris • Renwick Street, Glen Iris • Welfare Parade, Glen Iris opposite Summerhill Park • Great Valley Road, Glen Iris	VicSES to respond to requests on case by case basis Council to provide closure signs as needed Council to provide road closure signage if required.
15mm in 10 mins;	5% AEP (20 year ARI)	**Properties at Flood Risk (Over-Floor)** **117 Properties in Total**	

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
25mm in 30 mins; 33mm in 1 hour; 42mm in 2 hours; 61mm in 6 hours; or 78mm 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.		• 24 Chaleyer Street, Glen Iris • 5 East Court, Camberwell • 149 Fordham Avenue, Camberwell • 104, 106, Offices 1-9/108, Offices 101-114/108 & 116 Glen Iris Road, Glen Iris • Units 1-2/17, Units 1/21, 22 & 24 Glencairn Avenue, Camberwell • 42, 44, 53, 76, 78, 84, 86, 100, 104, 106, 108, 110, 112 & 116-118 Great Valley Road, Glen Iris • 218, 219, 220, 221, 223, 225, 226, 227 & 2/229 Highfield Road, Camberwell • 4 Jickell Avenue, Glen Iris • 1 Joffre Street, Camberwell • 2/19 Lodge Road, Camberwell • 19, 20 & 21 Nerissa Street, Glen Iris • 41, 44, 47, 48 & 50 Renwick Street, Glen Iris • Units 1-4/5 Somerset Road, Glen Iris • 1147, 2/1147, 1149, 1150, 1152, 1154, 1155, 1156, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1168, 1170, 1172, Offices 1-9/1175, 2S/1175 & 1180 Toorak Road, Camberwell • 1 & 5 Tyne Street, Camberwell • Units 1-2/195, 197, 199, 201, 201A, Units 1-2/205, Units 1-2/212 & 214 Wattle Valley Road Extension, Camberwell • 45 Welfare Parade, Glen Iris **Community Infrastructure Flooded** • South Surrey Park flooded • Lynden Park flooded • Toorak Road Shopping Strip, Hartwell flooded • Glen Iris Scout Hall likely flooded • Ferndale Park flooded **Essential Infrastructure at Flood Risk** • Tram Services along Toorak Road, Camberwell expected to be disrupted by flooding in road just east of Camberwell Road. Trams on Route 75 affected **Water Over Road (over 300mm depths)** • Lynden Street, Camberwell with significant depths • Ruyton Street, Camberwell • Highfield Road, Camberwell at Tyne Street Intersection • Glencairn Avenue, Camberwell	VicSES to respond to requests on case by case basis Council to provide closure signage if required Tram services to implement flood procedure at a depth of 10cm Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Wattle Valley Road, Camberwell with significant depths • Fordham Avenue, Camberwell with significant depths • Toorak Road, Camberwell between Camberwell Road and Railway Bridge • Summerhill Road, Glen Iris at Toorak Road Intersection • Denman Avenue, Glen Iris • Renwick Street, Glen Iris • Glen Iris Road, Glen Iris near Valley Parade • Chaleyer Street, Glen Iris • Welfare Parade, Glen Iris opposite Summerhill Park with significant depths • Great Valley Road, Glen Iris with significant depths • Dawson Drive, Glen Iris	
19mm in 10 mins; 36mm in 30 mins; 40mm in 1 hour; 51mm in 2 hours; 73mm in 6 hours; or 92mm 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.	2% AEP (50 year ARI)	**Properties at Flood Risk (Over-Floor)** **156 Properties in Total** • 22 & 24 Chaleyer Street, Glen Iris • 5 East Court, Camberwell • 149 Fordham Avenue, Camberwell • 104, 106, Offices 1-9/108, Offices 101-114/108 & 116 Glen Iris Road, Glen Iris • Units 1-3/17, Units 1-2/21, 22 & 24 Glencairn Avenue, Camberwell • 11, 15, 15A, 30, 32, 42, 44, 53, 55, 64, 72, 2/74, 76, 78, 84, 86, 88, 90, 92, 100, 102, 104, 106, 108, 110, 112, 114 & 116-118 Great Valley Road, Glen Iris • 216, 218, 219, 220, 221, 223, 225, 226, 227 & 2/229 Highfield Road, Camberwell • 3 & 4 Jickell Avenue, Glen Iris • 1 Joffre Street, Camberwell • 2/19 Lodge Road, Camberwell • 19, 20 & 21 Nerissa Street, Glen Iris • 41, 43, 44, 47, 48 & 50 Renwick Street, Glen Iris • 14 Richards Avenue, Glen Iris • 4 Ruyton Street, Camberwell • Units 1-4/5 Somerset Road, Glen Iris • 2/67 & 68 Staughton Road, Glen Iris • 1140, 1145, 1147, 2/1147, 1149, 1150, 1152, 1154, 1155, 1156, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1168, 1170, 1172, Offices 1-9/1175, 2S/1175, 1180 & Offices 1-4/1183 Toorak Road, Camberwell • 1, 3 & 5 Tyne Street, Camberwell	VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 14 Valley Parade, Glen Iris • 11 Wallis Avenue, Glen Iris • Units 1-2/195, 197, 199, 201, 201A, 203, Units 1-2/205, Units 1-2/212 & 214 Wattle Valley Road Extension, Camberwell • 45 Welfare Parade, Glen Iris	
		Community Infrastructure Flooded • South Surrey Park flooded • Lynden Park flooded • Toorak Road Shopping Strip, Hartwell flooded • Glen Iris Scout Hall likely flooded • Ferndale Park flooded with significant depths	Council to provide closure signage if required
		Essential Infrastructure at Flood Risk • Tram Services along Toorak Road, Camberwell expected to be disrupted by flooding in road just east of Camberwell Road. Trams on Route 75 affected	Tram services to implement flood procedure at a depth of 10cm
		Water Over Road (over 300mm depths) • Morey Street, Camberwell • Through Road, Camberwell near Netherway Street intersection • Joffre Street, Camberwell • Lynden Street, Camberwell with significant depths • Ruyton Street, Camberwell • Highfield Road, Camberwell at Tyne Street Intersection • Glencairn Avenue, Camberwell with significant depths • Wattle Valley Road, Camberwell with significant depths • Fordham Avenue, Camberwell with significant depths • Toorak Road, Camberwell between Camberwell Road and Railway Bridge with significant depths • Summerhill Road, Glen Iris at Toorak Road Intersection • Denman Avenue, Glen Iris with significant depths • Renwick Street, Glen Iris • Glen Iris Road, Glen Iris near Valley Parade • Liston Street, Glen Iris • Chaleyer Street, Glen Iris • Nerissa Street, Glen Iris • Welfare Parade, Glen Iris opposite Summerhill Park with significant depths • Wallis Avenue, Glen Iris	Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Great Valley Road, Glen Iris with significant depths • Dawson Drive, Glen Iris	
23mm 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)** **168 Properties in Total** • 22 & 24 Chaleyer Street, Glen Iris • 5 East Court, Camberwell • 149 Fordham Avenue, Camberwell • 3/25 Gardiner Parade, Glen Iris • 104, 106, Offices 1-9/108, Offices 101-114/108, 116 & 118 Glen Iris Road, Glen Iris • 15, Units 1-3/17, Units 1-3/21, 22 & 24 Glencairn Avenue, Camberwell • 11, 15, 15A, 1/24, 30, 32, 40, 42, 44, 53, 55, 60, 64, 66, 67, 68, 72, Units 1-2/74, 76, 78, 80, 84, 86, 88, 90, 92, 100, 102, 104, 106, 108, 110, 112, 114 & 116-118 Great Valley Road, Glen Iris • 216, 218, 219, 220, 221, 223, 225, 226, 227 & 2/229 Highfield Road, Camberwell • 3 & 4 Jickell Avenue, Glen Iris • 1 Joffre Street, Camberwell • 2/19 Lodge Road, Camberwell • 18, 19, 20 & 21 Nerissa Street, Glen Iris • 41, 43, 44, 47, 48 & 50 Renwick Street, Glen Iris • 14 Richards Avenue, Glen Iris • 4 Ruyton Street, Camberwell • Units 1-4/5 Somerset Road, Glen Iris • 2/67 & 68 Staughton Road, Glen Iris • 3 Summerhill Road, Glen Iris • 1140, 1145, 1146, 1147, 2/1147, 1149, 1150, 1152, 1154, 1155, 1156, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1168, 1170, 1172, Offices 1-9/1175, 2S/1175, 1180 & Offices 1-4/1183 Toorak Road, Camberwell • 1, 3 & 5 Tyne Street, Camberwell • 14 Valley Parade, Glen Iris • 11 & 18 Wallis Avenue, Glen Iris • Units 1-2/195, 197, 199, 201, 201A, 203, Units 1-2/205, Units 1-2/212, 214 & 214A Wattle Valley Road Extension, Camberwell • 45 Welfare Parade, Glen Iris **Community Infrastructure Flooded** • South Surrey Park flooded	VicSES to respond to requests on case by case basis Council to provide closure signage if required

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Lynden Park flooded • Toorak Road Shopping Strip, Hartwell flooded • Glen Iris Scout Hall likely flooded • Ferndale Park flooded **Essential Infrastructure at Flood Risk** • Tram Services along Toorak Road, Camberwell expected to be disrupted by flooding in road just east of Camberwell Road. Trams on Route 75 affected **Water Over Road (over 300mm depths)** • Morey Street, Camberwell • Through Road, Camberwell near Netherway Street intersection • Joffre Street, Camberwell • Lynden Street, Camberwell with significant depths • Ruyton Street, Camberwell with significant depths • Highfield Road, Camberwell at Tyne Street Intersection • Tyne Street, Camberwell • Glencairn Avenue, Camberwell with significant depths • Wattle Valley Road, Camberwell with significant depths • Fordham Avenue, Camberwell with significant depths • Toorak Road, Camberwell between Camberwell Road and Railway Bridge with significant depths • Summerhill Road, Glen Iris at Toorak Road Intersection and near Ferndale Road • Denman Avenue, Glen Iris with significant depths • Renwick Street, Glen Iris • Glen Iris Road, Glen Iris near Valley Parade • Liston Street, Glen Iris • Chaleyer Street, Glen Iris • Nerissa Street, Glen Iris • Welfare Parade, Glen Iris opposite Summerhill Park with significant depths • Ferndale Road, Glen Iris • Wallis Avenue, Glen Iris • Great Valley Road, Glen Iris with significant depths • Dawson Drive, Glen Iris	Tram services to implement flood procedure at a depth of 10cm Council to provide road closure signage if required.

APPENDIX C5 – GLASS CREEK & KEW MAIN DRAIN FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Kew, Kew East, Balwyn & Balwyn North are located approximately 7km north east of Melbourne in an established residential area. Four main stormwater drains service the area flowing from south to north. Three of the drains: Deepdene Drain; Balwyn Drain & Glass Creek converge in Kew East just west of Burke Road at Kew High School before discharging into the Yarra River. The fourth drain, Kew Main Drain connects directly with the Yarra River to the West of Glass Creek. High intensity, short duration rainfall events are a concern for the area away from the Yarra River, while prolonged rainfall may see the Yarra River flood affecting areas to the north. See **Appendix C2** for more information on Yarra Flooding. The area sees moderate to fast water movement due to its hilly terrain. Flooding as a result is likely to rise and fall quickly with water velocity a safety risk. 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 Glass Creek or Kew Main Drain. All flood response actions must therefore be driven by rainfall and / or river level observations. Telemetered water level / flood gauges are located at Kew.

Hydrographic/Telemetry Station	Station No.	Owner	Gauge Type	Melway Reference
Kew	586175	Melbourne Water	Rain	45 J7
Yarra River at Chandler Hwy, Fairfield	229143A	Melbourne Water	Stream Level & Rain	31B12

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

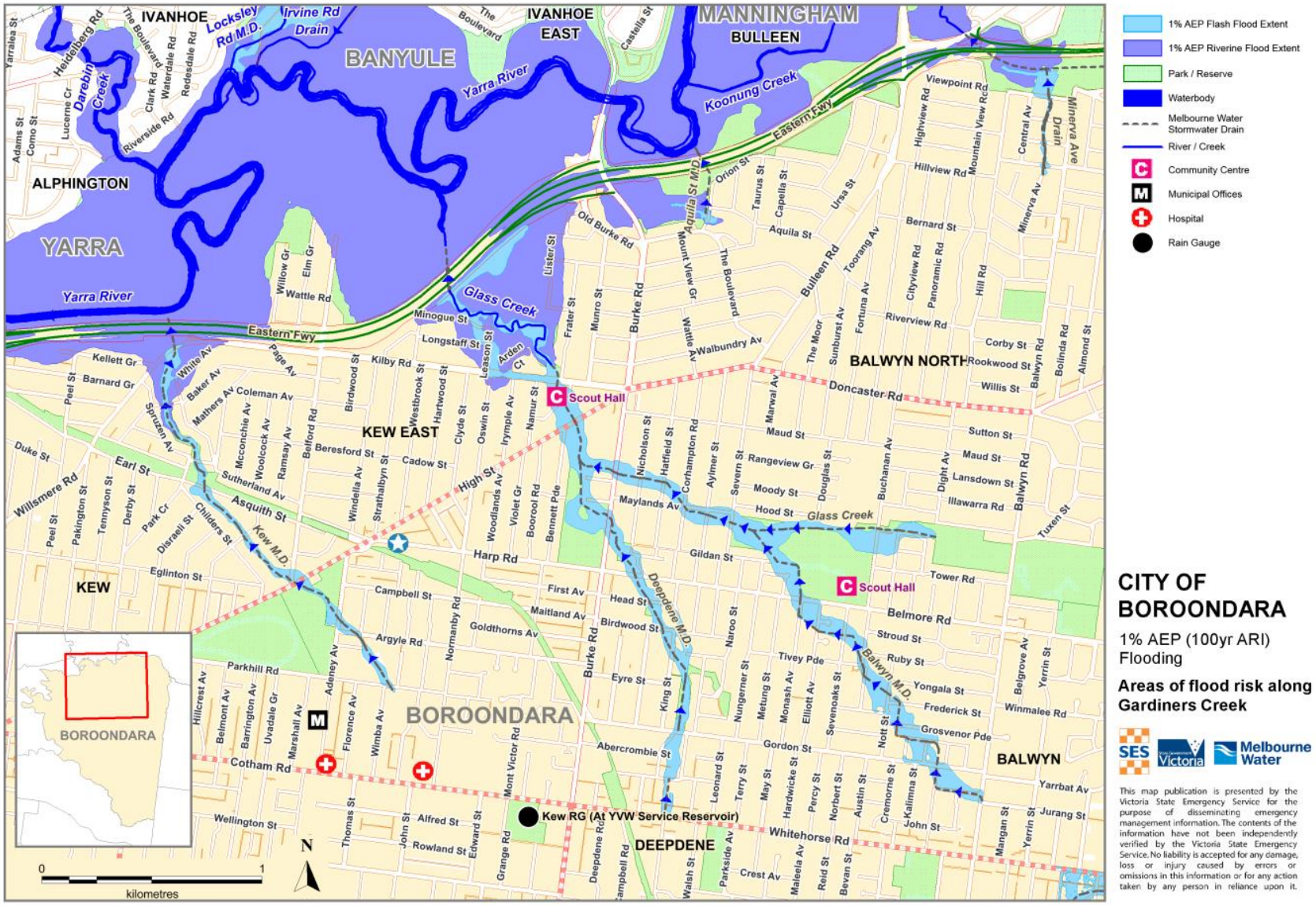

Figure C5 – Areas of flood risk around Glass Creek & the Kew Main Drain in the City of Boroondara

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				
70	70	70	Adeney Avenue	Kew	Kew Main Drain	Flash
-	-	72	Adeney Avenue	Kew	Kew Main Drain	Flash
-	-	6	AIF Street	Balwyn	Balwyn Main Drain	Flash
-	56	56	Aylmer Street	Balwyn North	Glass Creek	Flash
-	58A	58A	Aylmer Street	Balwyn North	Glass Creek	Flash
-	58	58	Aylmer Street	Balwyn North	Glass Creek	Flash
-	-	59	Aylmer Street	Balwyn North	Glass Creek	Flash
-	-	61	Aylmer Street	Balwyn North	Glass Creek	Flash
3	3	3	Belford Road	Kew	Kew Main Drain	Flash
69	69	69	Belmore Road	Balwyn North	Balwyn Main Drain	Flash
80	80	80	Belmore Road	Balwyn	Balwyn Main Drain	Flash
1/84	1/84	1/84	Belmore Road	Balwyn	Balwyn Main Drain	Flash
2/84	2/84	2/84	Belmore Road	Balwyn	Balwyn Main Drain	Flash
7	7	7	Bennett Street	Deepdene	Deepdene Main Drain	Flash
2/9	2/9	2/9	Bennett Street	Deepdene	Deepdene Main Drain	Flash
-	9	9	Bernborough Avenue	Balwyn	Balwyn Main Drain	Flash
-	67	67	Buchanan Avenue	Balwyn North	Glass Creek	Flash
69	69	69	Buchanan Avenue	Balwyn North	Glass Creek	Flash
1/1074	1/1074	1/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
2/1074	2/1074	2/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
3/1074	3/1074	3/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
4/1074	4/1074	4/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
5/1074	5/1074	5/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
6/1074	6/1074	6/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
7/1074	7/1074	7/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
8/1074	8/1074	8/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
9/1074	9/1074	9/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
10/1074	10/1074	10/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
11/1074	11/1074	11/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
12/1074	12/1074	12/1074	Burke Road	Balwyn North	Deepdene Main Drain	Flash
1/1078	1/1078	1/1078	Burke Road	Balwyn North	Deepdene Main Drain	Flash
2/1078	2/1078	2/1078	Burke Road	Balwyn North	Deepdene Main Drain	Flash
3/1078	3/1078	3/1078	Burke Road	Balwyn North	Deepdene Main Drain	Flash
4/1078	4/1078	4/1078	Burke Road	Balwyn North	Deepdene Main Drain	Flash
5/1078	5/1078	5/1078	Burke Road	Balwyn North	Deepdene Main Drain	Flash
6/1078	6/1078	6/1078	Burke Road	Balwyn North	Deepdene Main Drain	Flash
7/1078	7/1078	7/1078	Burke Road	Balwyn North	Deepdene Main Drain	Flash
8/1078	8/1078	8/1078	Burke Road	Balwyn North	Deepdene Main Drain	Flash
-	42	42	Corhampton Road	Balwyn North	Glass Creek	Flash

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
5% AEP	2% AEP	1% AEP				
-	44	44	Corhampton Road	Balwyn North	Glass Creek	Flash
5	5	5	Ellen Street	Balwyn	Balwyn Main Drain	Flash
-	-	12	Ellen Street	Balwyn	Balwyn Main Drain	Flash
-	-	53	Elliott Avenue	Balwyn	Balwyn Main Drain	Flash
55	55	55	Elliott Avenue	Balwyn	Balwyn Main Drain	Flash
-	-	57	Elliott Avenue	Balwyn	Balwyn Main Drain	Flash
-	11	11	Glass Street	Kew East	Glass Creek	Flash
-	-	14	Glass Street	Kew East	Glass Creek	Flash
-	16	16	Glass Street	Kew East	Glass Creek	Flash
-	-	37	Gordon Street	Balwyn	Deepdene Main Drain	Flash
158	158	158	Gordon Street	Balwyn	Deepdene Main Drain	Flash
-	160	160	Gordon Street	Balwyn	Deepdene Main Drain	Flash
32	32	32	Grosvenor Parade	Balwyn	Balwyn Main Drain	Flash
33	33	33	Grosvenor Parade	Balwyn	Balwyn Main Drain	Flash
35	35	35	Grosvenor Parade	Balwyn	Balwyn Main Drain	Flash
36A	36A	36A	Grosvenor Parade	Balwyn	Balwyn Main Drain	Flash
38	38	38	Grosvenor Parade	Balwyn	Balwyn Main Drain	Flash
2	2	2	Hamilton Street	Balwyn	Balwyn Main Drain	Flash
44	44	44	Hartington Street	Kew	Kew Main Drain	Flash
-	-	32B	Hatfield Street	Balwyn North	Glass Creek	Flash
-	-	32A	Hatfield Street	Balwyn North	Glass Creek	Flash
-	34	34	Hatfield Street	Balwyn North	Glass Creek	Flash
-	-	35	Hatfield Street	Balwyn North	Glass Creek	Flash
-	-	35A	Hatfield Street	Balwyn North	Glass Creek	Flash
-	20	20	Head Street	Balwyn	Deepdene Main Drain	Flash
3	3	3	Hender Court	Balwyn	Balwyn Main Drain	Flash
-	817-823	817-823	High Street	Kew East	Glass Creek	Flash
533	533	533	High Street	Kew	Kew Main Drain	Flash
535	535	535	High Street	Kew	Kew Main Drain	Flash
559	559	559	High Street	Kew East	Kew Main Drain	Flash
-	563	563	High Street	Kew East	Kew Main Drain	Flash
-	26	26	Hilda Street	Balwyn	Balwyn Main Drain	Flash
-	-	26A	Hilda Street	Balwyn	Balwyn Main Drain	Flash
-	27	27	Hilda Street	Balwyn	Balwyn Main Drain	Flash
2/29	2/29	2/29	Hilda Street	Balwyn	Balwyn Main Drain	Flash
-	-	5	Kendari Avenue	Balwyn North	Balwyn Main Drain	Flash
-	7	7	Kendari Avenue	Balwyn North	Balwyn Main Drain	Flash
-	-	147	Kilby Road	Kew East	Glass Creek	Flash
-	-	177	Kilby Road	Kew East	Glass Creek	Flash
-	-	1/186	Kilby Road	Kew East	Glass Creek	Flash
-	-	2/186	Kilby Road	Kew East	Glass Creek	Flash
-	3/186	3/186	Kilby Road	Kew East	Glass Creek	Flash
-	188-190	188-190	Kilby Road	Kew East	Glass Creek	Flash
41	41	41	King Street	Balwyn	Deepdene Main Drain	Flash
-	-	31	Marion Avenue	Balwyn	Balwyn 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				
-	-	6/9	Maylands Avenue	Balwyn North	Glass Creek	Flash
-	-	7/9	Maylands Avenue	Balwyn North	Glass Creek	Flash
-	-	21	Maylands Avenue	Balwyn North	Glass Creek	Flash
-	22	22	Maylands Avenue	Balwyn North	Glass Creek	Flash
-	24	24	Maylands Avenue	Balwyn North	Glass Creek	Flash
-	26	26	Maylands Avenue	Balwyn North	Glass Creek	Flash
-	-	31	Maylands Avenue	Balwyn North	Glass Creek	Flash
-	32	32	Maylands Avenue	Balwyn North	Glass Creek	Flash
34	34	34	Maylands Avenue	Balwyn North	Glass Creek	Flash
36	36	36	Maylands Avenue	Balwyn North	Glass Creek	Flash
-	38	38	Maylands Avenue	Balwyn North	Glass Creek	Flash
-	67	67	Monash Avenue	Balwyn	Balwyn Main Drain	Flash
-	-	69	Monash Avenue	Balwyn	Balwyn Main Drain	Flash
18	18	18	Morris Street	Balwyn North	Glass Creek	Flash
-	-	24	Morris Street	Balwyn North	Glass Creek	Flash
17	17	17	Nott Street	Balwyn	Balwyn Main Drain	Flash
-	19	19	Nott Street	Balwyn	Balwyn Main Drain	Flash
21	21	21	Nott Street	Balwyn	Balwyn Main Drain	Flash
10	10	10	Oxford Street	Kew East	Deepdene Main Drain	Flash
-	1/41	1/41	Power Street	Balwyn	Balwyn Main Drain	Flash
-	-	6	Pretoria Street	Deepdene	Deepdene Main Drain	Flash
-	56A	56A	Severn Street	Balwyn North	Glass Creek	Flash
-	-	61	Sutherland Avenue	Kew East	Kew Main Drain	Flash
1	1	1	Wishart Street	Kew	Kew Main Drain	Flash
Totals						
52	**80**	**108**				

ISOLATION

No major isolation risks exist for areas around Glass Creek and the Kew Main Drain in Balwyn & Kew East during a 1% AEP (100yr ARI) event. Some localised short-duration isolation may occur due to flash flooding.

ESSENTIAL INFRASTRUCTURE

- Trams travelling along High Street, Kew may be impacted by flooding in Road at stop 38. Trams on Routes 24 and 48 affected.

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 Glass Creek and the Kew Main Drain in Balwyn & Kew 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 Glass Creek and the Kew Main Drain in Balwyn & Kew East. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
• Asquith Street, Kew east of Park Crescent
• Belmore Road, Balwyn east of Burke Road and near Boroondara Netball Centre
• Burke Road, Kew East at Stradbroke Park
• High Street, Kew at Victoria Park

Boroondara City Council Roads flooded in a 1% AEP (100yr ARI) event			
BALWYN	• Nott Street	• Morris Street	• Connor Street
• Bemborough Avenue	• Palmer Avenue	• Nicholson Street	• Harrington Street
• Birdwood Street	• Percy Street	• Severn Street	• Parkhill Drive
• Elliott Avenue	• Ropley Avenue	• Uplands Road	• Parkhill Road
• Head Street	**BALWYN NORTH**	**DEEPDENE**	• Willsmere Road
• Hilda Street	• Aylmer Street	• Kitchener Street	**KEW EAST**
• King Street	• Corhampton Road	• Wolseley Crescent	• Bennett Parade
• Metung Street	• Hatfield Street	**KEW**	• Lawrence Street
• Monash Avenue	• Kendari Avenue	• Adeney Avenue	• Oxford Street
• Naroo Street	• Lloyd Street	• Argyle Road	
• Norbert Street	• Maylands Avenue	• Belford Road	

FLOOD MITIGATION

No formal Retarding Basins, Pumping Stations or Levees exist around Glass Creek and the Kew Main Drain in Balwyn & Kew East.

SEWERAGE INFRASTRUCTURE

There is no sewerage Infrastructure expected to be within the vicinity of floodwaters during severe flood events around Glass Creek and the Kew Main Drain in Balwyn & Kew 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 in a 1% AEP (100yr ARI) event. Refer to the following intelligence card/s for Glass Creek and Kew Main Drain for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	392
Business	20
Industrial	0
Public Land	8
Rural	0
Total	**420**

FLOOD INTELLIGENCE CARD – GLASS CREEK, KEW EAST (UNGAUGED)

Version 2 – November 2015

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	**Kew**
LOCATION	**Yarra Valley Water Service Reservoir, Cotham Road, Kew**
MELWAY REF:	**45 J7**

GAUGE NUMBER	**586175**
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; 19mm in 30 mins; 25mm in 1 hour; 32mm in 2 hours; 46mm in 6 hours; or 59mm 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)** • Nil. Some streets with minor flooding	

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
13mm in 10 mins; 22mm in 30 mins; 29mm in 1 hour; 36mm in 2 hours; 53mm in 6 hours; or 66mm 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.	10% AEP (10 year ARI)	**Water Over Road (over 300mm depth)** • Bernborough Avenue, Balwyn • Burke Road, Kew East opposite Stradbroke Park • King Street, Balwyn • Birdwood Street, Balwyn • Head Street, Balwyn • Uplands Road, Balwyn North	Council to provide road closure signage if required.
16mm in 10 mins; 26mm in 30 mins; 34mm in 1 hour; 43mm in 2 hours; 61mm in 6 hours; or 77mm 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.	5% AEP (20 year ARI)	**Properties at Flood Risk (Over-Floor)** **45 Properties in Total** • 69 Belmore Road, Balwyn North • 80 & Units 1-2/84 Belmore Road, Balwyn • 7 & 2/9 Bennett Street, Deepdene • 69 Buchanan Avenue, Balwyn North • Units 1-12/1074 & Units 1-8/1078 Burke Road, Balwyn North • 5 Ellen Street, Balwyn • 55 Elliott Avenue, Balwyn • 158 Gordon Street, Balwyn • 32, 33, 35, 36A & 38 Grosvenor Parade, Balwyn • 2 Hamilton Street, Balwyn • 3 Hender Court, Balwyn • 2/29 Hilda Street, Balwyn • 41 King Street, Balwyn • 34 & 36 Maylands Avenue, Balwyn North • 18 Morris Street, Balwyn North • 17 & 21 Nott Street, Balwyn • 10 Oxford Street, Kew East	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident. VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Community Infrastructure Flooded • North Balwyn Bowl Club flooded • Stradbroke Park flooded in parts • Kew High School likely flooded along western and southern edges **Water Over Road (over 300mm depth)** • Hilda Street, Balwyn • Bernborough Avenue, Balwyn • Monash Avenue, Balwyn • Belmore Road, Balwyn East of Burke Road • Morris Street, Balwyn North • Severn Street, Balwyn North • Aylmer Street, Balwyn North • Burke Road, Kew East opposite Stradbroke Park • Ropley Avenue, Balwyn • Palmer Avenue, Balwyn • King Street, Balwyn • Birdwood Street, Balwyn • Head Street, Balwyn • Uplands Road, Balwyn North • Glass Street, Kew East	Council to provide road closure signage if required.
19mm in 10 mins; 32mm in 30 mins; 42mm in 1 hour; 52mm in 2 hours; 73mm in 6 hours; or 91mm 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	2% AEP (50 year ARI)	**Properties at Flood Risk (Over-Floor)** **72 Properties in Total** • 56, 58 & 58A Aylmer Street, Balwyn North • 69 Belmore Road, Balwyn North • 80 & Units 1-2/84 Belmore Road, Balwyn • 7 & 2/9 Bennett Street, Deepdene • 9 Bernborough Avenue, Balwyn • 67 & 69 Buchanan Avenue, Balwyn North • Units 1-12/1074 & Units 1-8/1078 Burke Road, Balwyn North • 42 & 44 Corhampton Road, Balwyn North • 5 Ellen Street, Balwyn • 55 Elliott Avenue, Balwyn • 11 & 16 Glass Street, Kew East • 158 & 160 Gordon Street, Balwyn	VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
guide only.		• 32, 33, 35, 36A & 38 Grosvenor Parade, Balwyn • 2 Hamilton Street, Balwyn • 34 Hatfield Street, Balwyn North • 20 Head Street, Balwyn • 3 Hender Court, Balwyn • 817-823 High Street, Kew East • 26, 27 & 2/29 Hilda Street, Balwyn • 7 Kendari Avenue, Balwyn North • 3/186 & 188-190 Kilby Road, Kew East • 41 King Street, Balwyn • 22, 24, 26, 32, 34, 36 & 38 Maylands Avenue, Balwyn North • 67 Monash Avenue, Balwyn • 18 Morris Street, Balwyn North • 17, 19 & 21 Nott Street, Balwyn • 10 Oxford Street, Kew East • 1/41 Power Street, Balwyn • 56A Severn Street, Balwyn North **Community Infrastructure Flooded** • North Balwyn Bowl Club flooded • Myrtle Park & Baseball Field flooded • Naroo Learning Centre, Naroo Street, Balwyn likely flooded • Stradbroke Park flooded in parts • Kew High School likely flooded along western and southern edges • Glass Street Kindergarten likely flooded with significant depths • Harrison Reserve, High Street, Kew East flooded with significant depths **Water Over Road (over 300mm depth)** • Nott Street, Balwyn • Hilda Street, Balwyn • Bernborough Avenue, Balwyn • Elliott Avenue, Balwyn • Monash Avenue, Balwyn • Belmore Road, Balwyn East of Burke Road • Kendari Avenue, Balwyn North • Morris Street, Balwyn North	Council to provide closure signage if required Learning centre to implement evacuation plan if required Kindergarten to implement evacuation plan if required Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Severn Street, Balwyn North • Aylmer Street, Balwyn North (significant depth) • Corhampton Road, Balwyn North (significant depth) • Maylands Avenue, Balwyn North • Hatfield Street, Balwyn North • Nicholson Street, Balwyn North • Burke Road, Kew East opposite Stradbroke Park • Norbert Street, Balwyn • Ropley Avenue, Balwyn • Palmer Avenue, Balwyn • Wolseley Crescent, Deepdene • King Street, Balwyn • Birdwood Street, Balwyn • Head Street, Balwyn • Uplands Road, Balwyn North • Lawrence Street, Kew East • Oxford Street, Kew East • Bennett Parade, Kew East at High Street Intersection • Glass Street, Kew East (significant depth)	
22mm in 10 mins; 37mm in 30 mins; 48mm in 1 hour; 60mm in 2 hours; 83mm in 6 hours; or 102mm 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)** **98 Properties in Total** • 6 AIF Street, Balwyn • 56, 58, 58A, 59 & 61 Aylmer Street, Balwyn North • 69 Belmore Road, Balwyn North • 80 & Units 1-2/84 Belmore Road, Balwyn • 7 & 2/9 Bennett Street, Deepdene • 9 Bernborough Avenue, Balwyn • 67 & 69 Buchanan Avenue, Balwyn North • Units 1-12/1074 & Units 1-8/1078 Burke Road, Balwyn North • 42 & 44 Corhampton Road, Balwyn North • 5 & 12 Ellen Street, Balwyn • 53, 55 & 57 Elliott Avenue, Balwyn • 11, 14 & 16 Glass Street, Kew East • 37, 158 & 160 Gordon Street, Balwyn	VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 32, 33, 35, 36A & 38 Grosvenor Parade, Balwyn • 2 Hamilton Street, Balwyn • 32A, 32B, 34, 35 & 35A Hatfield Street, Balwyn North • 20 Head Street, Balwyn • 3 Hender Court, Balwyn • 817-823 High Street, Kew East • 26, 26A, 27 & 2/29 Hilda Street, Balwyn • 5 & 7 Kendari Avenue, Balwyn North • 147, 177, Units 1-3/186 & 188-190 Kilby Road, Kew East • 41 King Street, Balwyn • 31 Marion Avenue, Balwyn • Units 6-7/9, 21, 22, 24, 26, 31, 32, 34, 36 & 38 Maylands Avenue, Balwyn North • 67 & 69 Monash Avenue, Balwyn • 18 & 24 Morris Street, Balwyn North • 17, 19 & 21 Nott Street, Balwyn • 10 Oxford Street, Kew East • 1/41 Power Street, Balwyn • 6 Pretoria Street, Deepdene • 56A Severn Street, Balwyn North **Community Infrastructure Flooded** • Yongala Kindergarten, Nott Street, Balwyn likely flooded • North Balwyn Tennis Club flooded • North Balwyn Bowl Club flooded • Macleay Park flooded • Myrtle Park & Baseball Field flooded • Naroo Learning Centre, Naroo Street, Balwyn likely flooded • Stradbroke Park flooded in parts • Kew High School likely flooded along western and southern edges • Glass Street Kindergarten likely flooded with significant depths • Harrison Reserve, High Street, Kew East flooded with significant depths **Water Over Road (over 300mm depth)** • Nott Street, Balwyn • Hilda Street, Balwyn • Bernborough Avenue, Balwyn	Council to provide closure signage if required Learning centre to implement evacuation plan if required Kindergarten to implement evacuation plan if required Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Elliott Avenue, Balwyn • Monash Avenue, Balwyn • Belmore Road, Balwyn near Boroondara Netball Centre and East of Burke Road • Kendari Avenue, Balwyn North • Morris Street, Balwyn North • Lloyd Street, Balwyn North • Severn Street, Balwyn North (significant depth) • Aylmer Street, Balwyn North (significant depth) • Corhampton Road, Balwyn North (significant depth) • Maylands Avenue, Balwyn North (significant depth) • Hatfield Street, Balwyn North (significant depth) • Nicholson Street, Balwyn North • Burke Road, Kew East opposite Stradbroke Park • Norbert Street, Balwyn • Percy Street, Balwyn • Metung Street, Balwyn • Naroo Street, Balwyn • Ropley Avenue, Balwyn • Palmer Avenue, Balwyn • Kitchener Street, Deepdene • Wolseley Crescent, Deepdene • King Street, Balwyn • Birdwood Street, Balwyn • Head Street, Balwyn • Uplands Road, Balwyn North • Lawrence Street, Kew East • Oxford Street, Kew East (significant depth at end of road) • Bennett Parade, Kew East at High Street Intersection • Glass Street, Kew East (significant depth)	

FLOOD INTELLIGENCE CARD – KEW MAIN DRAIN, KEW (UNGAUGED)

Version 2 – November 2015

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	**Kew**
LOCATION	**Yarra Valley Water Service Reservoir, Cotham Road, Kew**
MELWAY REF:	**45 J7**

GAUGE NUMBER	**586175**
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; 19mm in 30 mins; 25mm in 1 hour; 32mm in 2 hours; 46mm in 6 hours; or 59mm 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)** **1 Properties in Total** • 1 Wishart Street, Kew **Water Over Road (over 300mm depth)** • Argyle Road, Kew near Adeney Avenue	VicSES to respond to requests on case by case basis Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
13mm in 10 mins; 22mm in 30 mins; 29mm in 1 hour; 36mm in 2 hours; 53mm in 6 hours; or 66mm 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.	10% AEP (10 year ARI)	**Properties at Flood Risk (Over-Floor)** **5 Properties in Total** • 3 Belford Road, Kew • 533, 535 & 559 High Street, Kew East • 1 Wishart Street, Kew **Water Over Road (over 300mm depth)** • Argyle Road, Kew near Adeney Avenue (significant depth) • Adeney Avenue, Kew	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Controller will maintain operational awareness and form an appropriate response arrangement to suit the level of incident. VicSES to respond to requests on case by case basis Council to provide road closure signage if required.
16mm in 10 mins; 26mm in 30 mins; 34mm in 1 hour; 43mm in 2 hours; 61mm in 6 hours; or 77mm 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.	5% AEP (20 year ARI)	**Properties at Flood Risk (Over-Floor)** **7 Properties in Total** • 70 Adeney Avenue, Kew • 3 Belford Road, Kew • 44 Hartington Street, Kew • 533, 535 & 559 High Street, Kew East • 1 Wishart Street, Kew **Community Infrastructure Flooded** • Belford Oaks Community Children's Centre, Belford Road, Kew likely flooded **Water Over Road (over 300mm depth)** • Argyle Road, Kew near Adeney Avenue (significant depth) • Adeney Avenue, Kew	VicSES to respond to requests on case by case basis Child care centre to implement emergency evacuation as required Registered for 35 children Council to provide road closure signage if required.
19mm in 10 mins; 32mm in 30 mins; 42mm in 1 hour;	2% AEP (50 year ARI)	**Properties at Flood Risk (Over-Floor)** **8 Properties in Total** • 70 Adeney Avenue, Kew • 3 Belford Road, Kew	VicSES to respond to requests on case by case basis

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
52mm in 2 hours; 73mm in 6 hours; or 91mm 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.		• 44 Hartington Street, Kew • 533, 535, 559 & 563 High Street, Kew East • 1 Wishart Street, Kew **Community Infrastructure Flooded** • Belford Oaks Community Children's Centre, Belford Road, Kew likely flooded **Water Over Road (over 300mm depth)** • Argyle Road, Kew near Adeney Avenue (significant depth) • Adeney Avenue, Kew • Asquith Street, Kew near Park Crescent	Child care centre to implement emergency evacuation as required Council to provide road closure signage if required.
22mm in 10 mins; 37mm in 30 mins; 48mm in 1 hour; 60mm in 2 hours; 83mm in 6 hours; or 102mm 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)** **10 Properties in Total** • 70 & 72 Adeney Avenue, Kew • 3 Belford Road, Kew • 44 Hartington Street, Kew • 533, 535, 559 & 563 High Street, Kew East • 61 Sutherland Avenue, Kew East • 1 Wishart Street, Kew **Community Infrastructure Flooded** • Victoria Park and Tennis Courts flooded • Belford Oaks Community Children's Centre, Belford Road, Kew likely flooded • Hyde Park partially flooded **Essential Infrastructure at Flood Risk** • Trams travelling along High Street, Kew may be impacted by flooding in Road at stop 38. Trams on Routes 24 and 48 affected **Water Over Road (over 300mm depth)** • Parkhill Road, Kew at Parkhill Drive • Parkhill Drive, Kew • Argyle Road, Kew near Adeney Avenue (significant depth) • Adeney Avenue, Kew • High Street, Kew next to Victoria Park • Belford Road, Kew near High Street • Harrington Street, Kew	VicSES to respond to requests on case by case basis Child care centre to implement emergency evacuation as required Tram services to implement flood procedures if water level reached 10cm Council to provide road closure signage if required.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Asquith Street, Kew near Park Crescent (significant depth) • Connor Street, Kew • Willsmere Road, Kew at Kilby Road join	

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 by the IC in consultation with the MERO, MERC, DHHS, Health Commander and other key agencies and expert advice (CMA's and Flood Intelligence specialists).

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 (CMA's and Flood Intelligence specialists).

Phase 3 – Withdrawal

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

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

VicPol will control security of evacuated areas.

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

Special needs groups will be/are identified in Council's 'vulnerable people' register. This can be done through community network organisations. Further information on Council's 'vulnerable people' register can be obtained from the MERO.

Phase 4 – Shelter

Relief Centres and/or assembly areas which cater for people's basic needs may be established to meet the immediate needs of people affected by flooding. Relief Centres will be determined dependant on the location and size of the event. Relief Centres and/or Assembly Areas that could be utilised are listed in the Municipal Emergency Management Plan.

Animal Shelter

The need for animal shelter compounds will be determined dependant on the location and size of the event. These will be coordinated by the City Of Boroondara AMO - Animal Management Officer may be located at the identified relief centres or as listed in the Boroondara MEMP.

Caravans

There are no established caravan parks in the City of Boroondara. There are privately owned caravan parks in Wantirna and Springvale in the Cities of Knox and Greater Dandenong.

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 or storm. This may include road closures affecting school bus routes, water treatment plant affecting potable water supplies etc.

Essential Infrastructure and Property Protection

No significant essential infrastructure or properties that require protection have been identified.

Rescue

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

Aircraft are available through State Aircraft Unit. Boats available through VICSES RDO. VicPol resources available via RERC.

No High risk areas/communities (i.e. low-lying islands where rescues might be required have been identified, other than the occurrence of flash flooding over roadways.

APPENDIX E - FLOOD WARNING SYSTEMS

Flood and Storm Warning

Flood and Storm Warning products and Flood Class Levels can be found on the BoM website. 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.

Local Flood Warning System Arrangements

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

APPENDIX F – MAPS

Overview

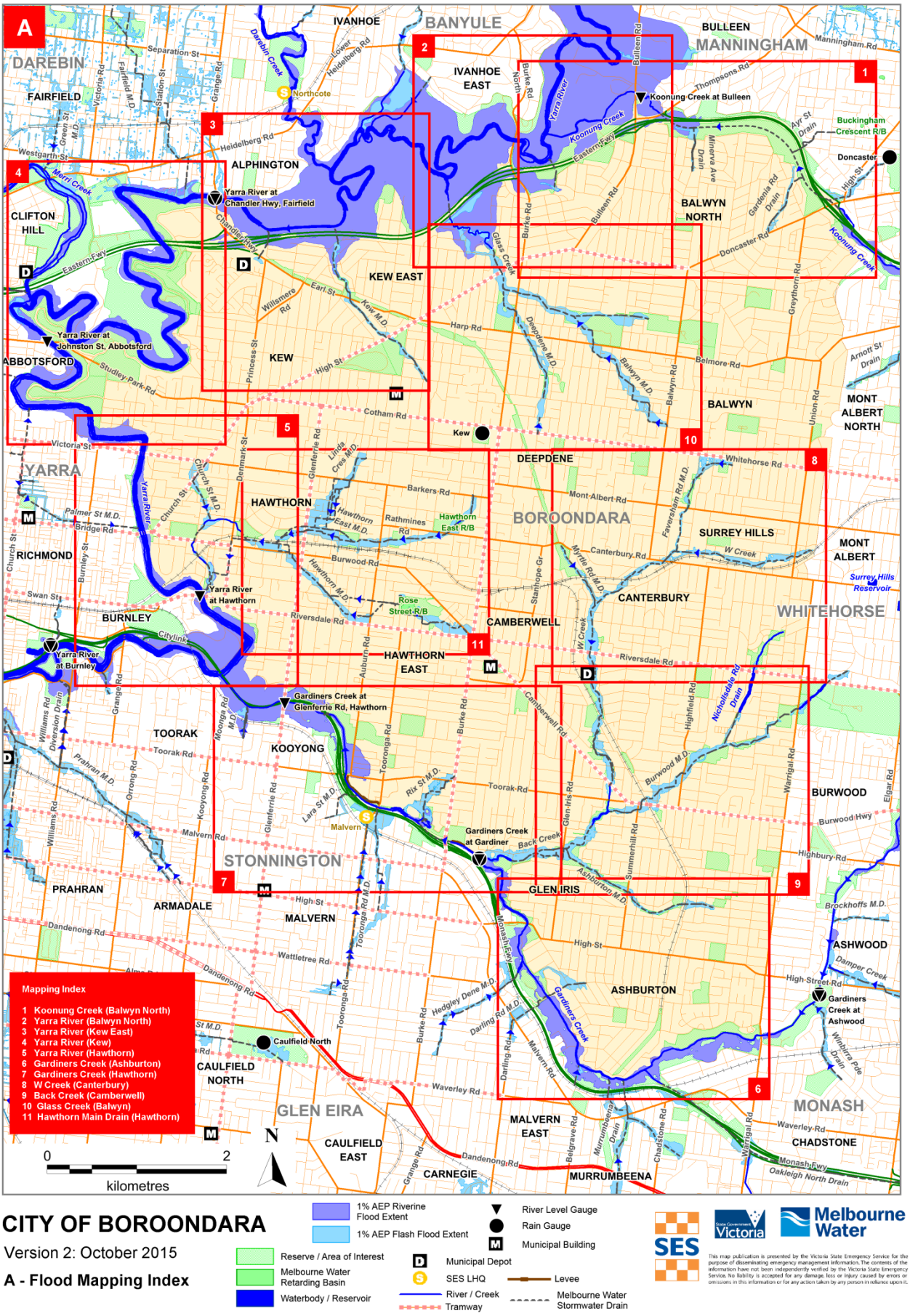
Maps considered useful to flood response are included in this Appendix. They include:

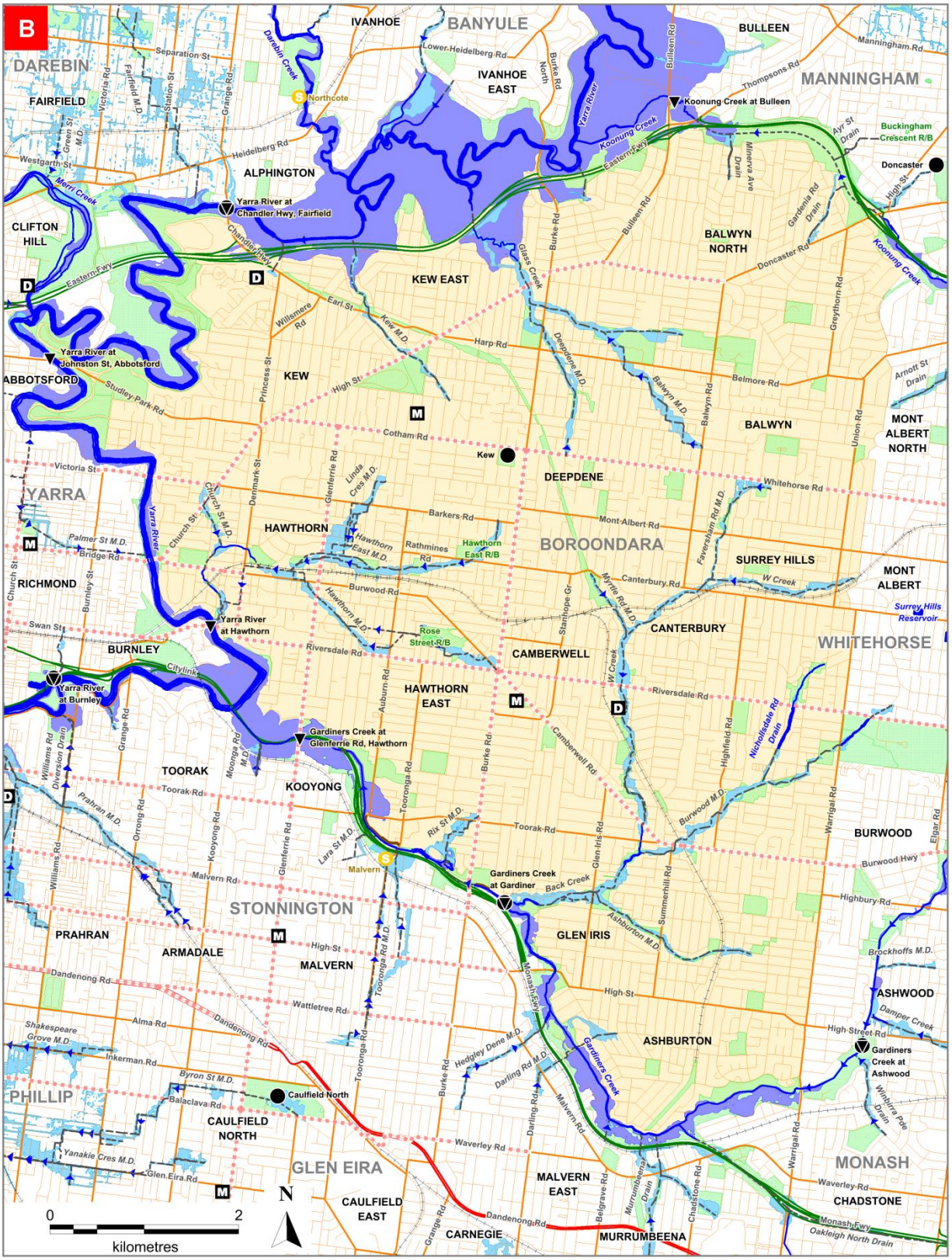
- A map outlining a series of flooding hot spot maps within the City of Boroondara.
- A map showing the Municipal boundary together with the open waterways and underground stormwater drainage pipe network within the City of Boroondara and the 1% AEP (100-year ARI) flood extents (sourced from Melbourne Water GIS).
- A set of 11 maps showing flooding hot spots within the City of Boroondara 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 Boroondara 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.

City of Boroondara Municipal Maps (sourced Melbourne Water GIS)





CITY OF BOROONDARA

Version 2: October 2015

B - 1% AEP (100yr ARI) Flood Extent

1% AEP Riverine Flood Extent
1% AEP Flash Flood Extent
Reserve / Area of Interest
Melbourne Water Retarding Basin
Waterbody / Reservoir
River Level Gauge
Rain Gauge
Municipal Building
Municipal Depot
SES LHQ
River / Creek
Tramway
Levee
Melbourne Water Stormwater Drain

SES
State Government Victoria
Melbourne Water

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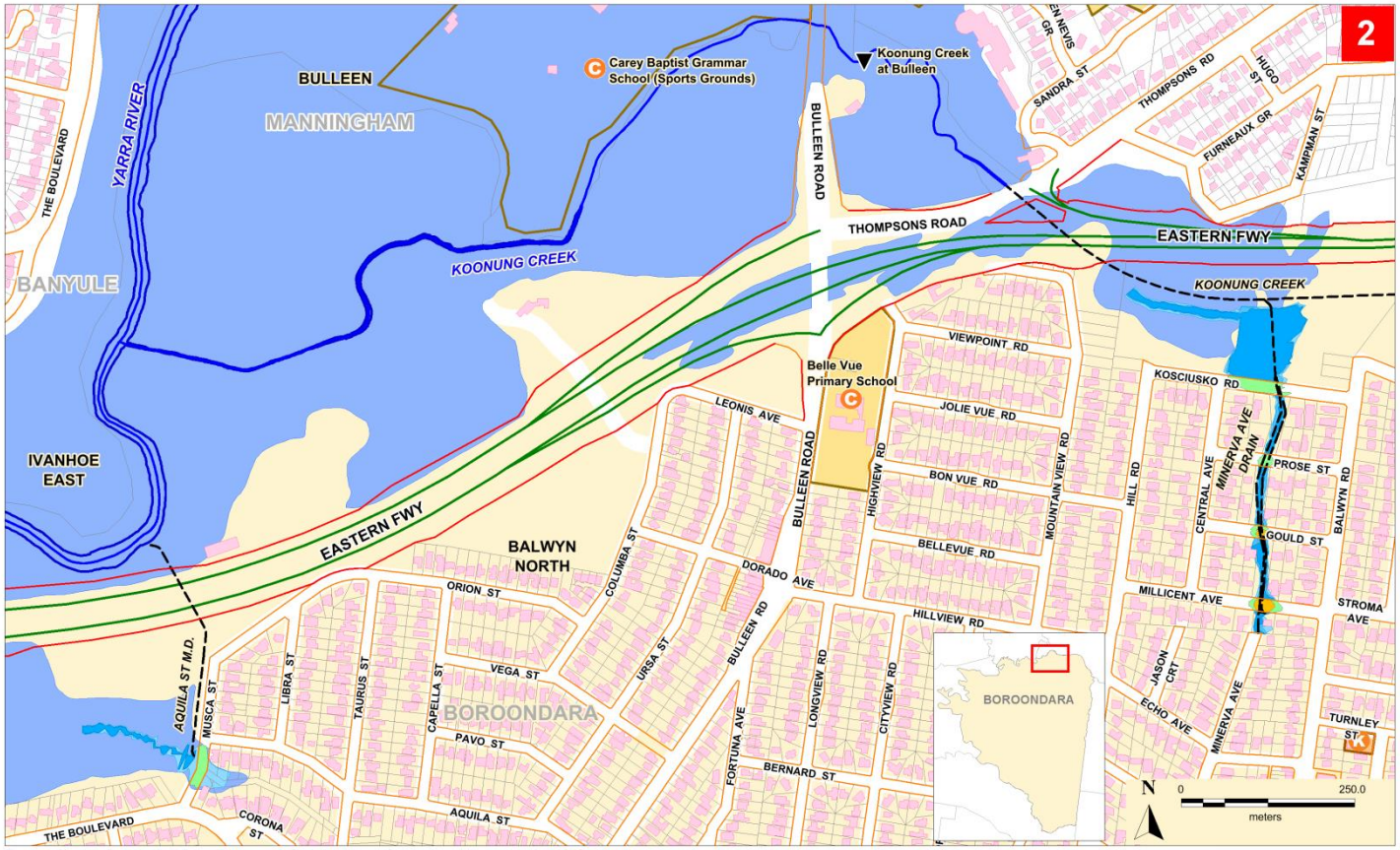
Flood Extent Maps (sourced Melbourne Water GIS)



Please note: Map shows flood extent for Melbourne Water assets only. Flood extent does not reflect council owned drains or assets. August 2012

CITY OF BOROONDARA

Riverine Flooding

2. Koonung Creek (Balwyn North)

- Building
- 20yr ARI Flash Flood Extent
- 50yr ARI Flash Flood Extent
- 100yr ARI Flash Flood Extent
- Melbourne Water Drain
- 100yr ARI Riverine Flood Extent
- College / School
- Kindergarten / Childcare
- Level Gauge

Road Flood Depth (100yr ARI)

- – 0.4m
- 0.4m –0.8m
- 0.8m +

Melbourne Water

SES

State Government Victoria

DISCLAIMER
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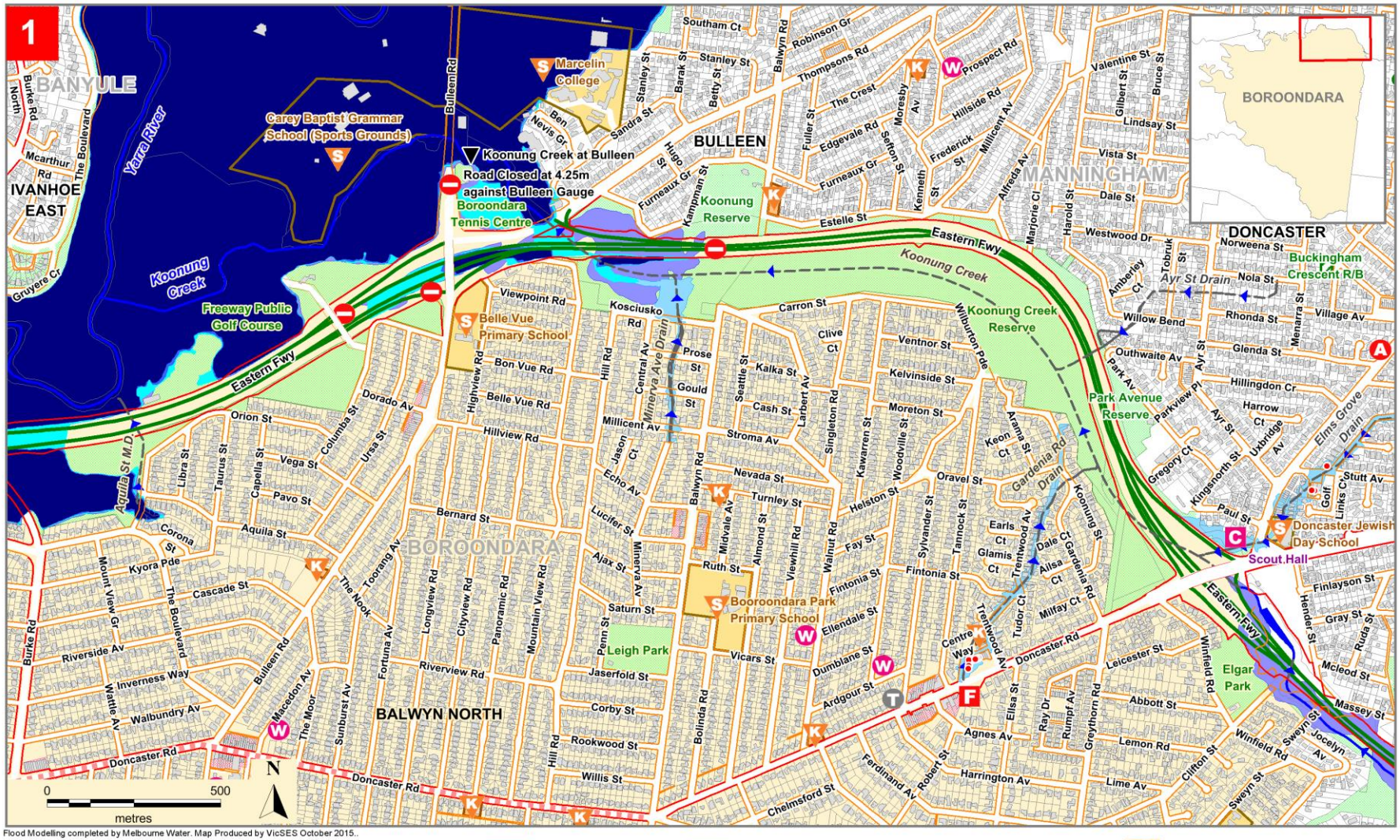

Flood Modelling completed by Melbourne Water. Map Produced by VicSES October 2015..

CITY OF BOROONDARA

1% AEP (100yr ARI) Flooding

1. Koonung Creek (Balwyn North)

- Building
- Area of Interest
- Melbourne Water Stormwater Drain
- Creek / Channel
- Shopping Centre
- 1% AEP Flash Flood Extent (Depth Unavailable)
- 1% AEP Koonung Creek Flood Extent (Depth Unavailable)

1% AEP Yarra River Flood Extent

- 0.6m >
- 0.3m-0.6m
- 0.05m-0.3m

- Melbourne Water Retarding Basin
- Tramway
- Kindergarten / Childcare
- School / College
- Stream Level Gauge & 1% AEP Flood Level
- 1% AEP Over-Floor Flooding Risk
- Place of Worship
- Community Centre
- Ambulance Station
- Road Closure against Gauge

SES Victoria Melbourne Water

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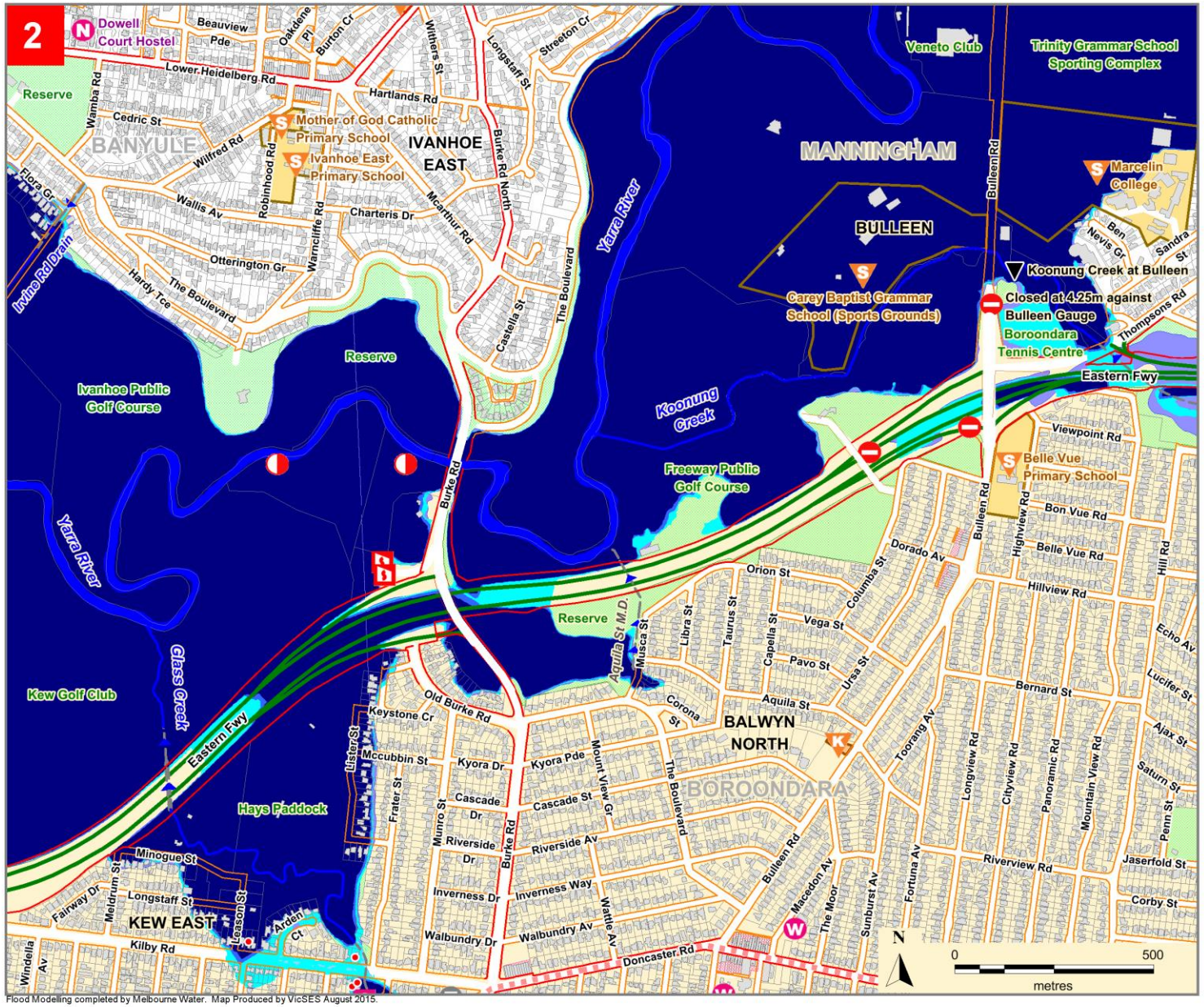

Flood Modelling completed by Melbourne Water. Map Produced by VicSES August 2015.

Flood Modelling completed by Melbourne Water. Map Produced by VicSES September 2015.

CITY OF BOROONDARA

1% AEP (100yr ARI) Flooding

3. Yarra River (Kew East)

- Building
- Area of Interest
- Shopping Centre

1% AEP Flood Depth

- 0.6m >
- 0.3m-0.6m
- 0.05m-0.3m
- Creek / Channel
- Waterbody
- Melbourne Water Stormwater Drain
- 1% AEP Over-Floor Flooding Risk
- Stream Level Gauge & 1% AEP Flood Level
- Rain Gauge
- Municipal Depot
- School / College
- Kindergarten / Child Care
- Nursing Home / Aged Care
- Place of Worship
- Hospital
- Sewer Emergency Relief Point

Melbourne Water

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Flood Modelling completed by Melbourne Water. Map Produced by VicSES September 2015.

CITY OF BOROONDARA

1% AEP (100yr ARI) Flooding

4. Yarra River (Kew)

- Building
- Area of Interest
- Shopping Centre

1% AEP Flood Depth

- 0.6m >
- 0.3m-0.6m
- 0.05m-0.3m
- Creek / Channel
- Waterbody
- Melbourne Water Stormwater Drain
- 1% AEP Over-Floor Flooding Risk
- Stream Level Gauge & 1% AEP Flood Level
- Rain Gauge
- Municipal Depot
- School / College
- Kindergarten / Child Care
- Nursing Home / Aged Care
- Place of Worship
- Hospital

Melbourne Water

SES

State Government Victoria

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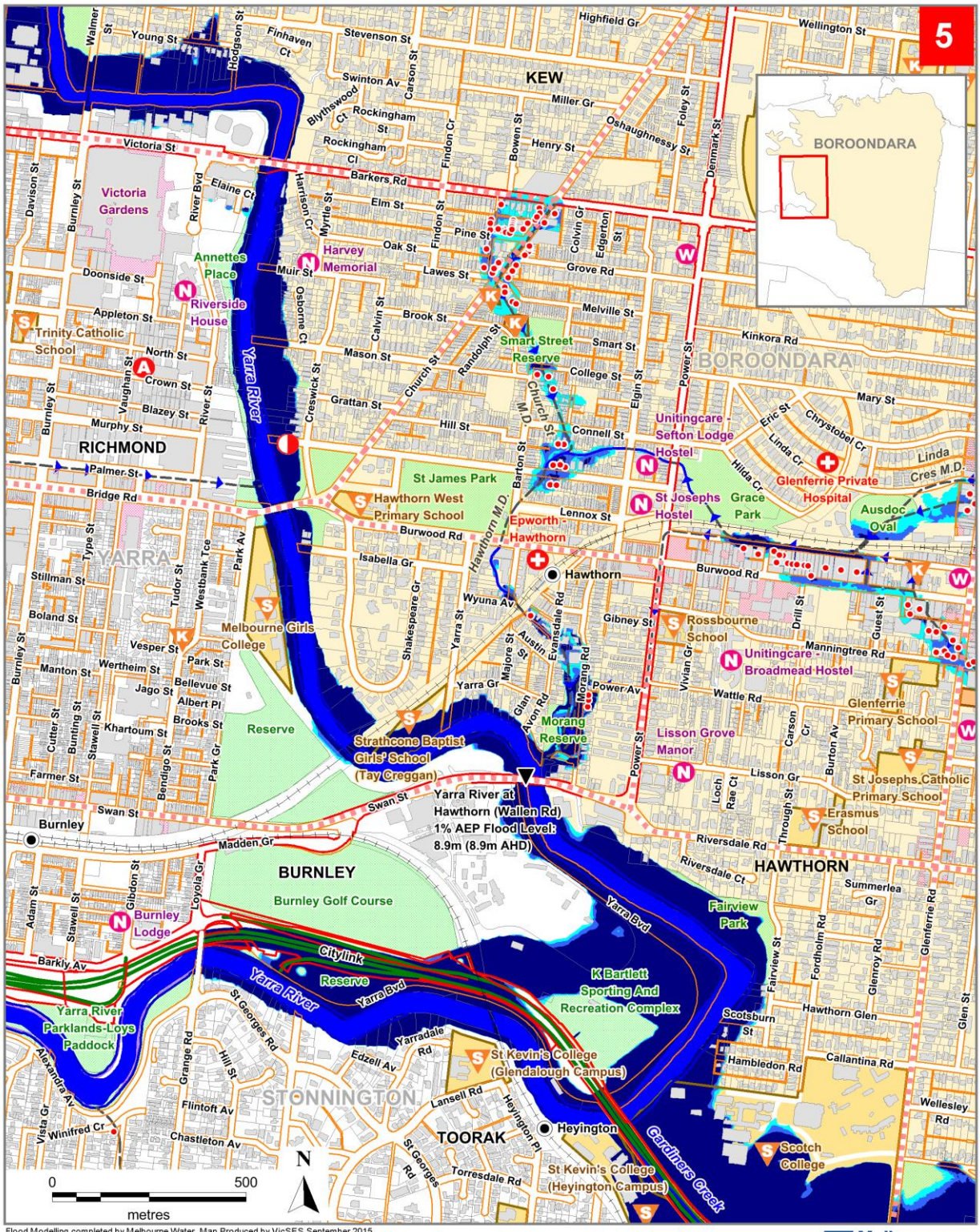

Flood Modelling completed by Melbourne Water. Map Produced by VicSES September 2015.

CITY OF BOROONDARA

1% AEP (100yr ARI) Flooding

5. Yarra River (Hawthorn)

- Building
- Area of Interest
- Shopping Centre

1% AEP Flood Depth

- 0.6m >
- 0.3m-0.6m
- 0.05m-0.3m
- Creek / Channel
- Waterbody
- Melbourne Water Stormwater Drain
- Sewer Emergency Relief Point
- 1% AEP Over-Floor Flooding Risk
- Stream Level Gauge & 1% AEP Flood Level
- Ambulance Station
- School / College
- Kindergarten / Child Care
- Nursing Home / Aged Care
- Place of Worship
- Hospital

Melbourne Water

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6
0
500
metres
N
GLEN IRIS
Hill N Dale Park
Summerhill Park
Liston Street Reserve
Glen Iris Primary School
Glen Iris Community
Ashburton
Ashburton Primary School
Ashburton Park
Ascot Manor Aged Care
St Michael's School
Samarinda Lodge
Rosewood Gardens
BOROONDARA
ASHBURTON
Warner Reserve
Alamein
Watson Park
Malvern Private Hospital
Darling
Gardiners Creek
Anniversary Trail Linear Reserve
Solway Primary School
Markham Avenue Reserve
Malvern Valley Public Golf Course
STONNINGTON
Kalimna House
The Currajong School
MALVERN EAST
East Malvern
Waverley Oval
O T Flight Reserve
Malvern East Terminal Station
Building
Area of Interest
1% AEP Flash Flood Extent (Depth Unavailable)
1% AEP Flood Depth
0.6m >
0.3m-0.6m
0.05m-0.3m
Shopping Centre
Melbourne Water Stormwater Drain
Creek / Channel
Nursing Home / Aged Care
School / College
Kindergarten / Child Care
Hospital
Community Centre
Police Station
Place Of Worship
Telephone Exchange
1% AEP Over-Floor Flooding Risk
Sewer Emergency Relief Point
CITY OF BOROONDARA
1% AEP (100yr ARI) Flooding
6. Gardiners Creek (Ashburton)
SES
Victoria
Melbourne Water
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Flood Modelling completed by Melbourne Water. Map Produced by VicSES August 2015.

Flood Modelling completed by Melbourne Water. Map Produced by VicSES August 2015..

CITY OF BOROONDARA

1% AEP (100yr ARI) Flooding

7. Gardiners Creek (Hawthorn)

Building
Area of Interest
Melbourne Water Stormwater Drain
Creek / Channel
Levee

1% AEP Flash Flood Extent (Depth Unavailable)

1% AEP Flood Depth
0.6m >
0.3m-0.6m
0.05m-0.3m
Shopping Centre

Lake / Waterbody
Kindergarten / Childcare
School / College
Nursing Home / Aged Care
Place of Worship

Stream Level Gauge & 1% AEP Flood Level
Rain Gauge
Sewer Emergency Relief Point
1% AEP Over-Floor Flooding Risk
VicSES Unit

Tramway
Hospital

SES
State Government Victoria
Melbourne Water

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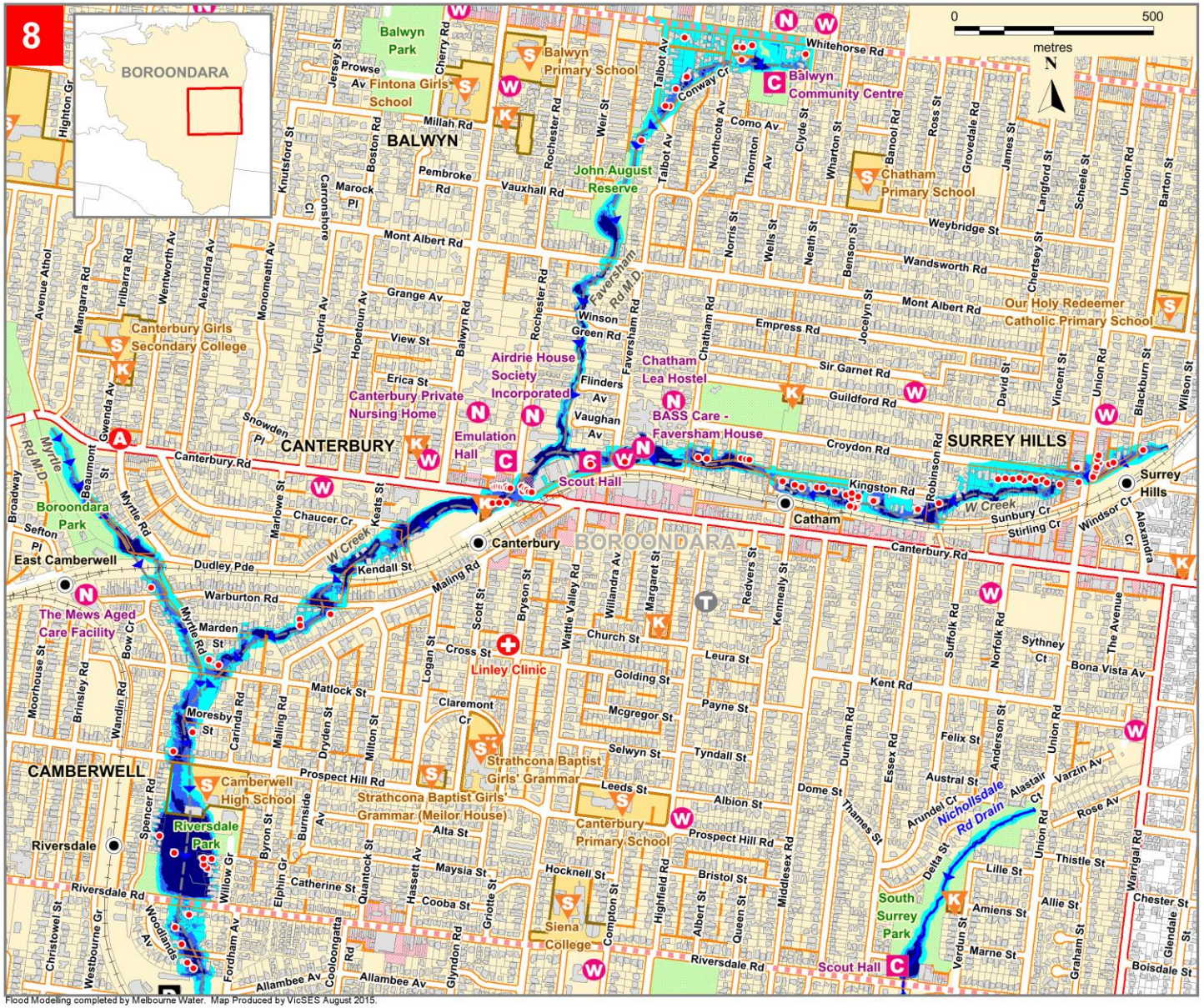

Flood Modelling completed by Melbourne Water. Map Produced by VicSES August 2015.

CITY OF BOROONDARA

1% AEP (100yr ARI) Flooding

8. W Creek (Canterbury)

SES Victoria Melbourne Water

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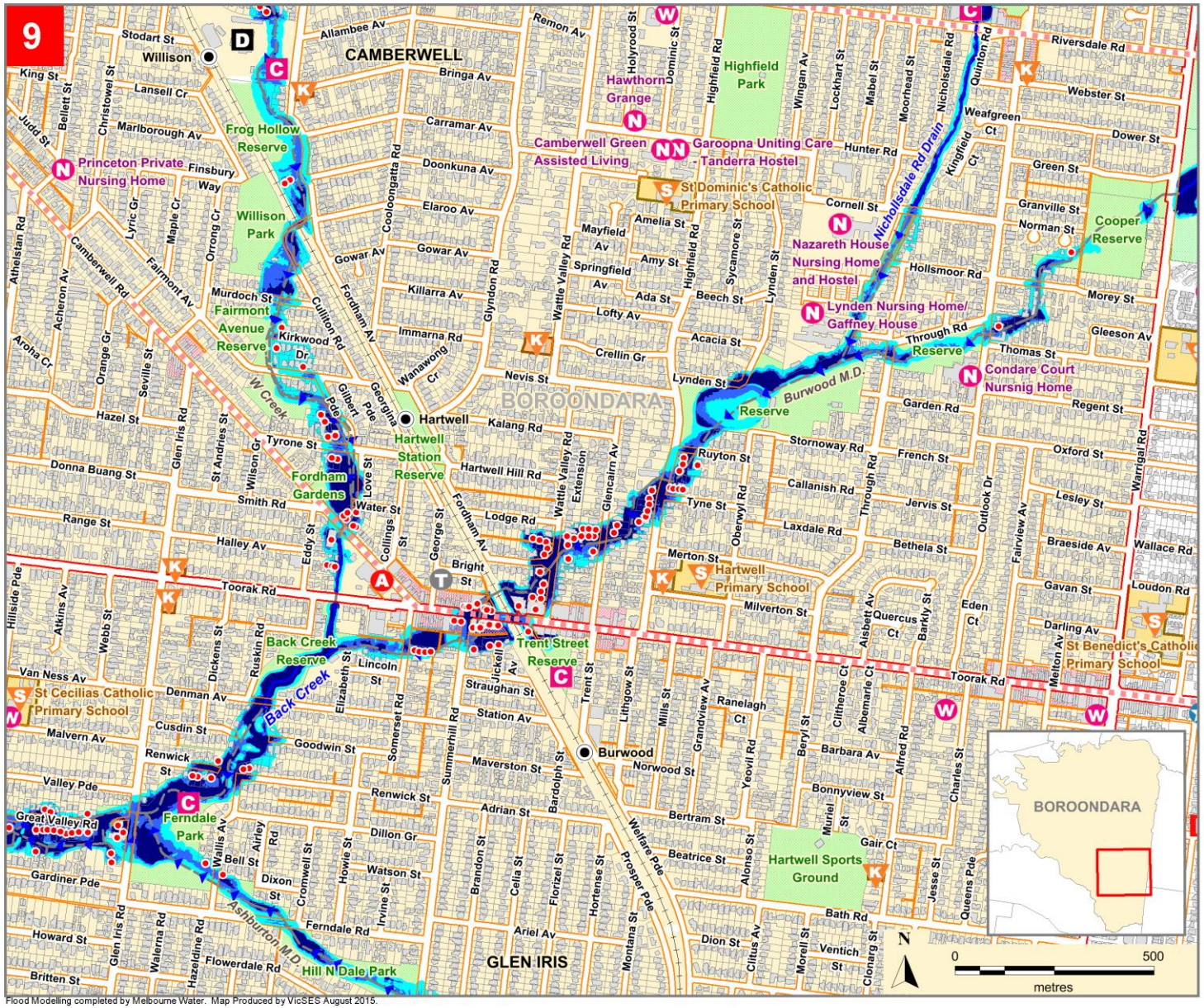

Flood Modelling completed by Melbourne Water. Map Produced by VicSES August 2015.

CITY OF BOROONDARA

1% AEP (100yr ARI) Flooding

9. Back Creek (Camberwell)

SES Victoria Melbourne Water

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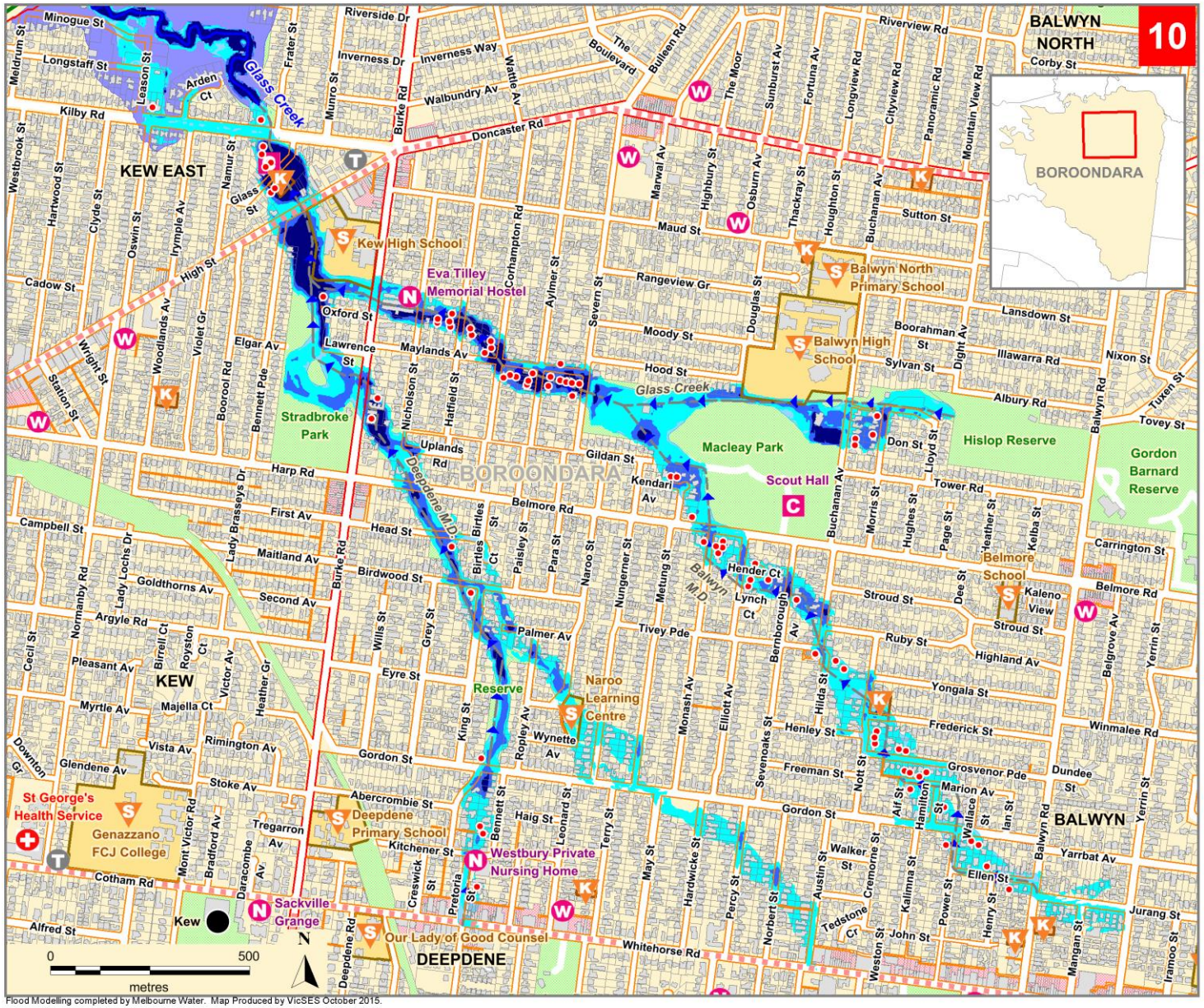

Flood Modelling completed by Melbourne Water. Map Produced by VicSES October 2015.

CITY OF BOROONDARA

1% AEP (100yr ARI) Flooding

10. Glass Creek (Balwyn)

SES Victoria Melbourne Water

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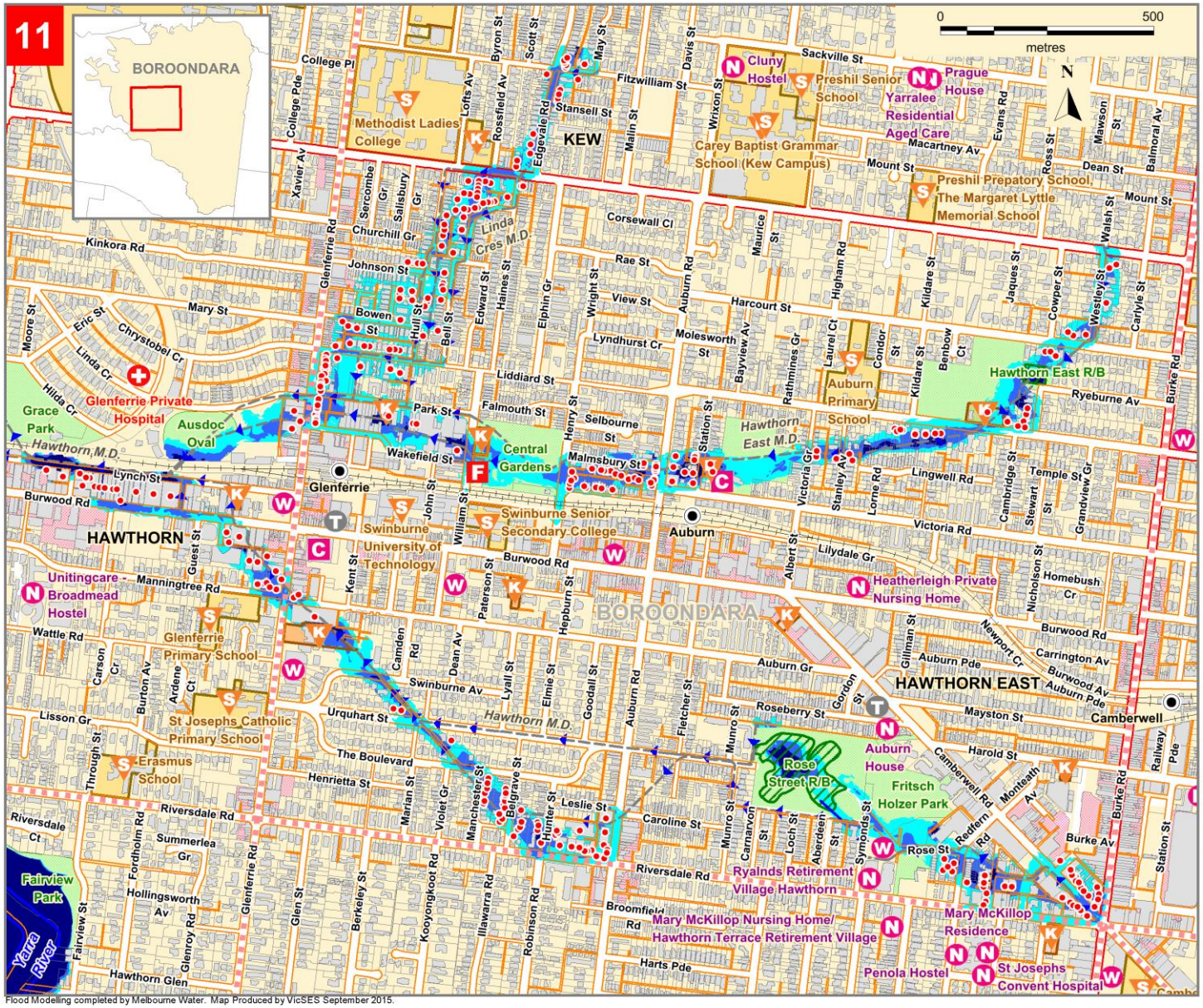

CITY OF BOROONDARA

1% AEP (100yr ARI) Flooding

11. Hawthorn Main Drain (Hawthorn)

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APPENDIX G – CATCHMENT SCHEMATICS

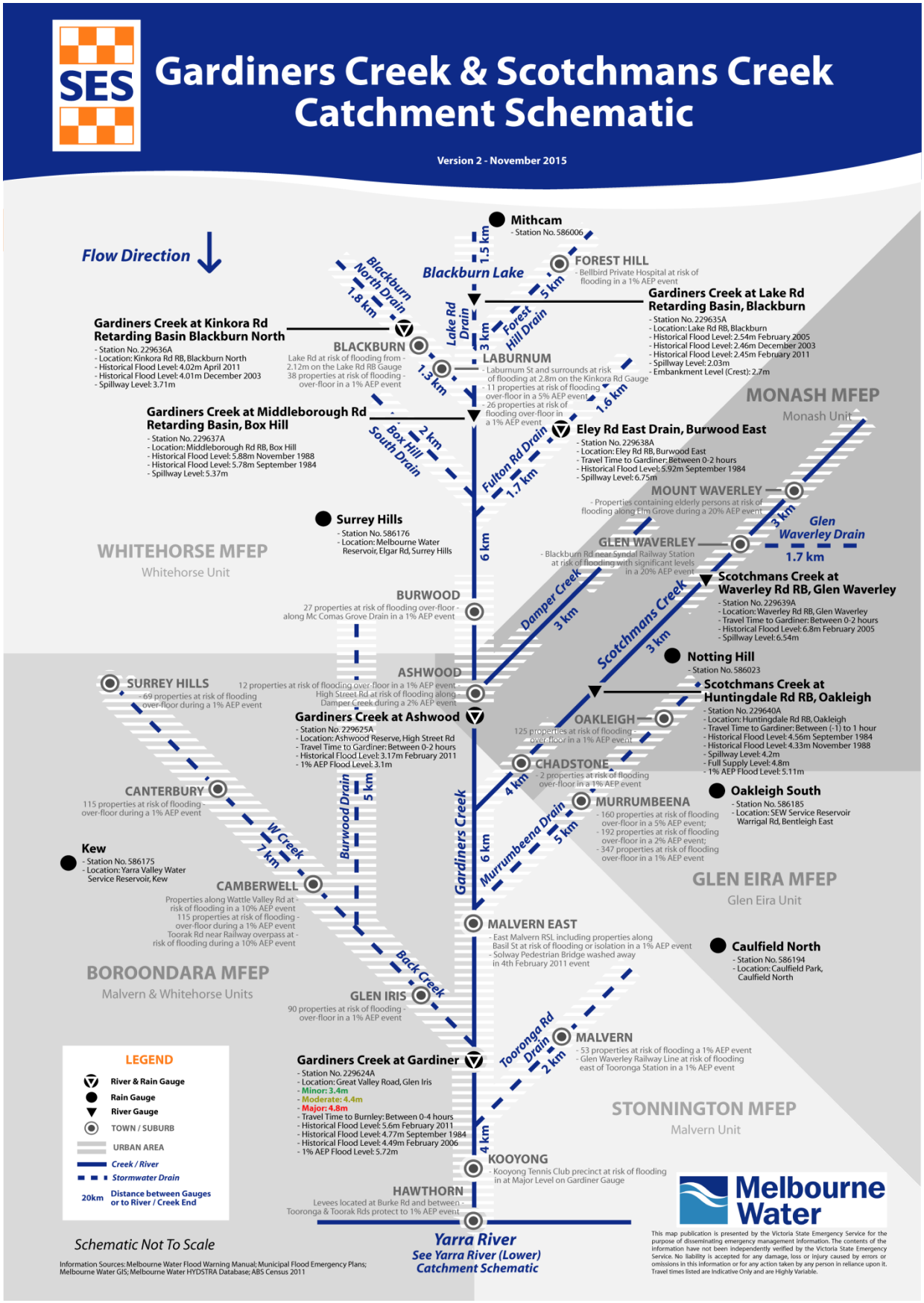
Schematics detailing the drainage catchments relevant for this municipality have been included in this Appendix. Each Schematic outlines the drainage system comprising of rivers, creeks or storm-water drains contained within one of the major catchments in the Port Phillip & Westernport Region.

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.


SES
Gardiners Creek & Scotchmans Creek Catchment Schematic
Version 2 - November 2015
Flow Direction
Mithcam
- Station No. 586006
1.5 km
Blackburn Lake
FOREST HILL
- Bellbird Private Hospital at risk of flooding in a 1% AEP event
5 km
Gardiners Creek at Lake Rd Retarding Basin, Blackburn
- Station No. 229635A
- Location: Lake Rd RB, Blackburn
- Historical Flood Level: 2.54m February 2005
- Historical Flood Level: 2.46m December 2003
- Historical Flood Level: 2.45m February 2011
- Spillway Level: 2.03m
- Embankment Level (Crest): 2.7m
Blackburn North Drain
1.8 km
Lake Rd Drain
3 km
Forest Hill Drain
Gardiners Creek at Kinkora Rd Retarding Basin Blackburn North
- Station No. 229636A
- Location: Kinkora Rd RB, Blackburn North
- Historical Flood Level: 4.02m April 2011
- Historical Flood Level: 4.01m December 2003
- Spillway Level: 3.71m
BLACKBURN
Lake Rd at risk of flooding from 2.12m on the Lake Rd RB Gauge
38 properties at risk of flooding over-floor in a 1% AEP event
1.3 km
LABURNUM
Laburnum St and surrounds at risk of flooding at 2.8m on the Kinkora Rd Gauge
- 11 properties at risk of flooding over-floor in a 5% AEP event
- 26 properties at risk of flooding over-floor in a 1% AEP event
1.6 km
MONASH MFEP
Monash Unit
Gardiners Creek at Middleborough Rd Retarding Basin, Box Hill
- Station No. 229637A
- Location: Middleborough Rd RB, Box Hill
- Historical Flood Level: 5.88m November 1988
- Historical Flood Level: 5.78m September 1984
- Spillway Level: 5.37m
2 km
Box Hill South Drain
Fulton Rd Drain
1.7 km
Eley Rd East Drain, Burwood East
- Station No. 229638A
- Location: Eley Rd RB, Burwood East
- Travel Time to Gardiner: Between 0-2 hours
- Historical Flood Level: 5.92m September 1984
- Spillway Level: 6.75m
MOUNT WAVERLEY
- Properties containing elderly persons at risk of flooding along Elm Grove during a 20% AEP event
3 km
Glen Waverley Drain
1.7 km
Surrey Hills
- Station No. 586176
- Location: Melbourne Water Reservoir, Elgar Rd, Surrey Hills
6 km
WHITEHORSE MFEP
Whitehorse Unit
GLEN WAVERLEY
- Blackburn Rd near Syndal Railway Station at risk of flooding with significant levels in a 20% AEP event
Damper Creek
3 km
Scotchmans Creek
3 km
Scotchmans Creek at Waverley Rd RB, Glen Waverley
- Station No. 229639A
- Location: Waverley Rd RB, Glen Waverley
- Travel Time to Gardiner: Between 0-2 hours
- Historical Flood Level: 6.8m February 2005
- Spillway Level: 6.54m
BURWOOD
27 properties at risk of flooding over-floor along Mc Comas Grove Drain in a 1% AEP event
Notting Hill
- Station No. 586023
ASHWOOD
12 properties at risk of flooding over-floor in a 1% AEP event
High Street Rd at risk of flooding along Damper Creek during a 2% AEP event
SURREY HILLS
- 69 properties at risk of flooding over-floor during a 1% AEP event
Scotchmans Creek at Huntingdale Rd RB, Oakleigh
- Station No. 229640A
- Location: Huntingdale Rd RB, Oakleigh
- Travel Time to Gardiner: Between (-1) to 1 hour
- Historical Flood Level: 4.56m September 1984
- Historical Flood Level: 4.33m November 1988
- Spillway Level: 4.2m
- Full Supply Level: 4.8m
- 1% AEP Flood Level: 5.11m
Gardiners Creek at Ashwood
- Station No. 229625A
- Location: Ashwood Reserve, High Street Rd
- Travel Time to Gardiner: Between 0-2 hours
- Historical Flood Level: 3.17m February 2011
- 1% AEP Flood Level: 3.1m
OAKLEIGH
125 properties at risk of flooding over-floor in a 1% AEP event
CHADSTONE
- 2 properties at risk of flooding over-floor in a 1% AEP event
4 km
Oakleigh South
- Station No. 586185
- Location: SEW Service Reservoir Warrigal Rd, Bentleigh East
CANTERBURY
115 properties at risk of flooding over-floor during a 1% AEP event
Burwood Drain
5 km
MURRUMBEENA
- 160 properties at risk of flooding over-floor in a 5% AEP event;
- 192 properties at risk of flooding over-floor in a 2% AEP event;
- 347 properties at risk of flooding over-floor in a 1% AEP event
Murrumbeena Drain
5 km
Gardiners Creek
6 km
Kew
- Station No. 586175
- Location: Yarra Valley Water Service Reservoir, Kew
W Creek
7 km
CAMBERWELL
Properties along Wattle Valley Rd at risk of flooding in a 10% AEP event
115 properties at risk of flooding over-floor during a 1% AEP event
Toorak Rd near Railway overpass at risk of flooding during a 10% AEP event
GLEN EIRA MFEP
Glen Eira Unit
MALVERN EAST
- East Malvern RSL including properties along Basil St at risk of flooding or isolation in a 1% AEP event
- Solway Pedestrian Bridge washed away in 4th February 2011 event
Caulfield North
- Station No. 586194
- Location: Caulfield Park, Caulfield North
BOROONDARA MFEP
Malvern & Whitehorse Units
Back Creek
GLEN IRIS
90 properties at risk of flooding over-floor in a 1% AEP event
Tooronga Rd Drain
2 km
MALVERN
- 53 properties at risk of flooding a 1% AEP event
- Glen Waverley Railway Line at risk of flooding east of Tooronga Station in a 1% AEP event
LEGEND
River & Rain Gauge
Rain Gauge
River Gauge
TOWN / SUBURB
URBAN AREA
Creek / River
Stormwater Drain
20km Distance between Gauges or to River / Creek End
Gardiners Creek at Gardiner
- Station No. 229624A
- Location: Great Valley Road, Glen Iris
- Minor: 3.4m
- Moderate: 4.4m
- Major: 4.8m
- Travel Time to Burnley: Between 0-4 hours
- Historical Flood Level: 5.6m February 2011
- Historical Flood Level: 4.77m September 1984
- Historical Flood Level: 4.49m February 2006
- 1% AEP Flood Level: 5.72m
STONNINGTON MFEP
Malvern Unit
4 km
KOOYONG
- Kooyong Tennis Club precinct at risk of flooding in at Major Level on Gardiner Gauge
HAWTHORN
Levees located at Burke Rd and between Tooronga & Toorak Rds protect to 1% AEP event
Melbourne Water
Schematic Not To Scale
Yarra River
See Yarra River (Lower) Catchment Schematic
Information Sources: Melbourne Water Flood Warning Manual; Municipal Flood Emergency Plans; Melbourne Water GIS; Melbourne Water HYDSTRA Database; ABS Census 2011
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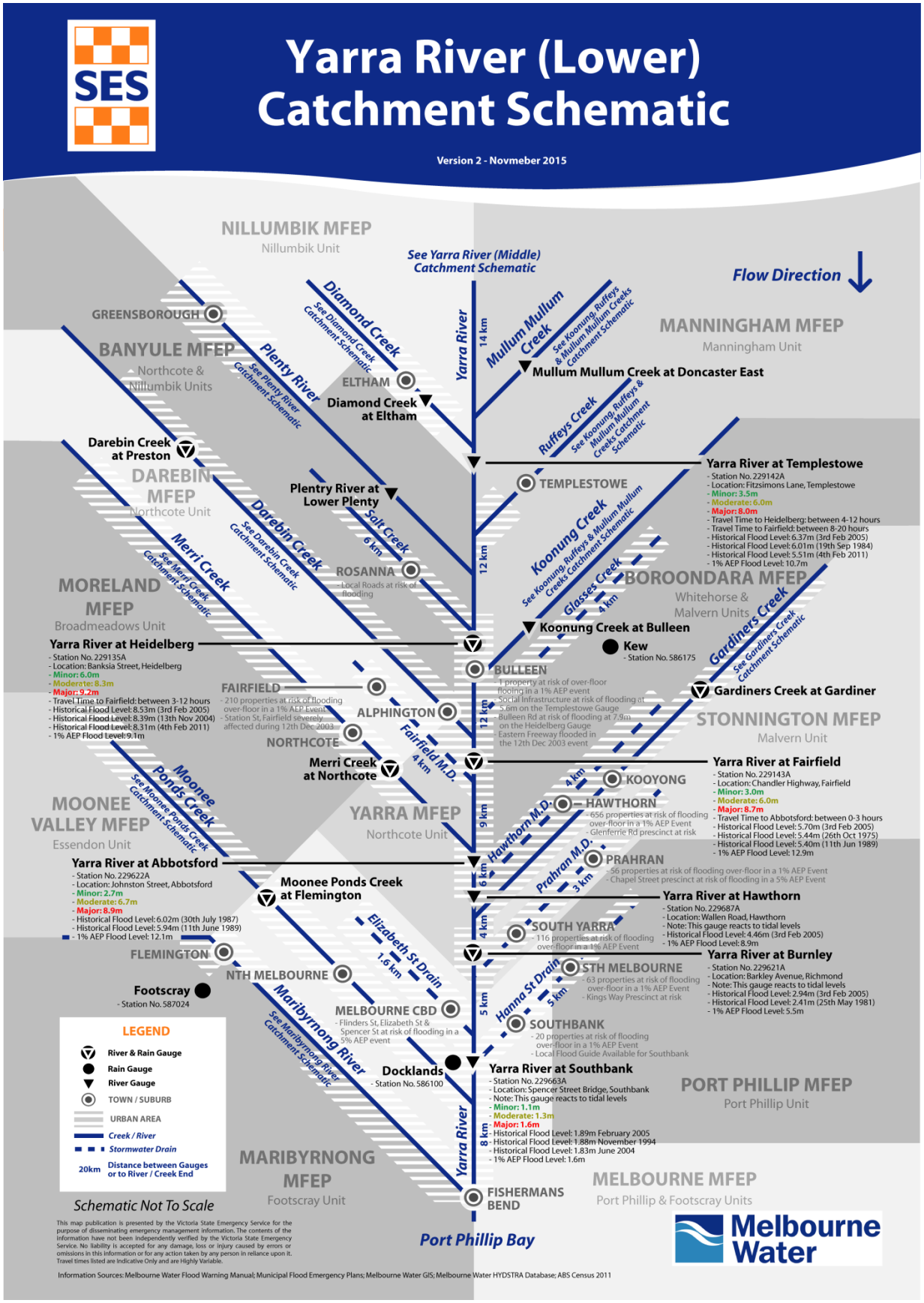
Yarra River (Lower) Catchment Schematic
Version 2 - Novmeber 2015
SES
NILLUMBIK MFEP
Nillumbik Unit
See Yarra River (Middle) Catchment Schematic
Flow Direction
GREENSBOROUGH
BANYULE MFEP
Northcote & Nillumbik Units
Diamond Creek
See Diamond Creek Catchment Schematic
Plenty River
See Plenty River Catchment Schematic
ELTHAM
Diamond Creek at Eltham
Yarra River
14 km
Mullum Mullum Creek
See Koonung, Ruffeys & Mullum Mullum Creeks Catchment Schematic
MANNINGHAM MFEP
Manningham Unit
Mullum Mullum Creek at Doncaster East
Ruffeys Creek
See Koonung, Ruffeys & Mullum Mullum Creeks Catchment Schematic
Darebin Creek at Preston
DAREBIN MFEP
Northcote Unit
Plentry River at Lower Plenty
Salt Creek
6 km
Darebin Creek
See Darebin Creek Catchment Schematic
Merri Creek
See Merri Creek Catchment Schematic
ROSANNA
- Local Roads at risk of flooding
TEMPLESTOWE
Yarra River at Templestowe
- Station No. 229142A
- Location: Fitzsimons Lane, Templestowe
- Minor: 3.5m
- Moderate: 6.0m
- Major: 8.0m
- Travel Time to Heidelberg: between 4-12 hours
- Travel Time to Fairfield: between 8-20 hours
- Historical Flood Level: 6.37m (3rd Feb 2005)
- Historical Flood Level: 6.01m (19th Sep 1984)
- Historical Flood Level: 5.51m (4th Feb 2011)
- 1% AEP Flood Level: 10.7m
12 km
Koonung Creek
See Koonung, Ruffeys & Mullum Mullum Creeks Catchment Schematic
Glasses Creek
4 km
BOROONDARA MFEP
Whitehorse & Malvern Units
Gardiners Creek
See Gardiners Creek Catchment Schematic
MORELAND MFEP
Broadmeadows Unit
Koonung Creek at Bulleen
Kew
- Station No. 586175
Yarra River at Heidelberg
- Station No. 229135A
- Location: Banksia Street, Heidelberg
- Minor: 6.0m
- Moderate: 8.3m
- Major: 9.2m
- Travel Time to Fairfield: between 3-12 hours
- Historical Flood Level: 8.53m (3rd Feb 2005)
- Historical Flood Level: 8.39m (13th Nov 2004)
- Historical Flood Level: 8.31m (4th Feb 2011)
- 1% AEP Flood Level: 9.1m
BULLEEN
- 1 property at risk of over-floor flooding in a 1% AEP event
- Social Infrastructure at risk of flooding at 5.6m on the Templestowe Gauge
- Bulleen Rd at risk of flooding at 7.9m on the Heidelberg Gauge
- Eastern Freeway flooded in the 12th Dec 2003 event
Gardiners Creek at Gardiner
FAIRFIELD
- 210 properties at risk of flooding over-floor in a 1% AEP Event
- Station St, Fairfield severely affected during 12th Dec 2003
ALPHINGTON
12 km
NORTHCOTE
Fairfield M.D.
4 km
STONNINGTON MFEP
Malvern Unit
Merri Creek at Northcote
Yarra River at Fairfield
- Station No. 229143A
- Location: Chandler Highway, Fairfield
- Minor: 3.0m
- Moderate: 6.0m
- Major: 8.7m
- Travel Time to Abbotsford: between 0-3 hours
- Historical Flood Level: 5.70m (3rd Feb 2005)
- Historical Flood Level: 5.44m (26th Oct 1975)
- Historical Flood Level: 5.40m (11th Jun 1989)
- 1% AEP Flood Level: 12.9m
4 km
KOOYONG
Moonee Ponds Creek
See Moonee Ponds Creek Catchment Schematic
MOONEE VALLEY MFEP
Essendon Unit
YARRA MFEP
Northcote Unit
9 km
Hawthorn M.D.
HAWTHORN
- 656 properties at risk of flooding over-floor in a 1% AEP Event
- Glenferrie Rd prescinct at risk
Prahran M.D.
3 km
PRAHRAN
- 56 properties at risk of flooding over-floor in a 1% AEP Event
- Chapel Street prescinct at risk of flooding in a 5% AEP Event
Yarra River at Abbotsford
- Station No. 229622A
- Location: Johnston Street, Abbotsford
- Minor: 2.7m
- Moderate: 6.7m
- Major: 8.9m
- Historical Flood Level: 6.02m (30th July 1987)
- Historical Flood Level: 5.94m (11th June 1989)
- 1% AEP Flood Level: 12.1m
6 km
Moonee Ponds Creek at Flemington
Yarra River at Hawthorn
- Station No. 229687A
- Location: Wallen Road, Hawthorn
- Note: This gauge reacts to tidal levels
- Historical Flood Level: 4.46m (3rd Feb 2005)
- 1% AEP Flood Level: 8.9m
Elizabeth St Drain
1.6 km
4 km
SOUTH YARRA
- 116 properties at risk of flooding over-floor in a 1% AEP Event
FLEMINGTON
NTH MELBOURNE
Yarra River at Burnley
- Station No. 229621A
- Location: Barkley Avenue, Richmond
- Note: This gauge reacts to tidal levels
- Historical Flood Level: 2.94m (3rd Feb 2005)
- Historical Flood Level: 2.41m (25th May 1981)
- 1% AEP Flood Level: 5.5m
STH MELBOURNE
- 63 properties at risk of flooding over-floor in a 1% AEP Event
- Kings Way Prescinct at risk
Hanna St Drain
5 km
Footscray
- Station No. 587024
Maribyrnong River
See Maribyrnong River Catchment Schematic
MELBOURNE CBD
- Flinders St, Elizabeth St & Spencer St at risk of flooding in a 5% AEP event
5 km
SOUTHBANK
- 20 properties at risk of flooding over-floor in a 1% AEP Event
- Local Flood Guide Available for Southbank
Docklands
- Station No. 586100
Yarra River at Southbank
- Station No. 229663A
- Location: Spencer Street Bridge, Southbank
- Note: This gauge reacts to tidal levels
- Minor: 1.1m
- Moderate: 1.3m
- Major: 1.6m
- Historical Flood Level: 1.89m February 2005
- Historical Flood Level: 1.88m November 1994
- Historical Flood Level: 1.83m June 2004
- 1% AEP Flood Level: 1.6m
PORT PHILLIP MFEP
Port Phillip Unit
Yarra River
8 km
MARIBYRNONG MFEP
Footscray Unit
MELBOURNE MFEP
Port Phillip & Footscray Units
FISHERMANS BEND
Port Phillip Bay
LEGEND
River & Rain Gauge
Rain Gauge
River Gauge
TOWN / SUBURB
URBAN AREA
Creek / River
Stormwater Drain
20km Distance between Gauges or to River / Creek End
Schematic Not To Scale
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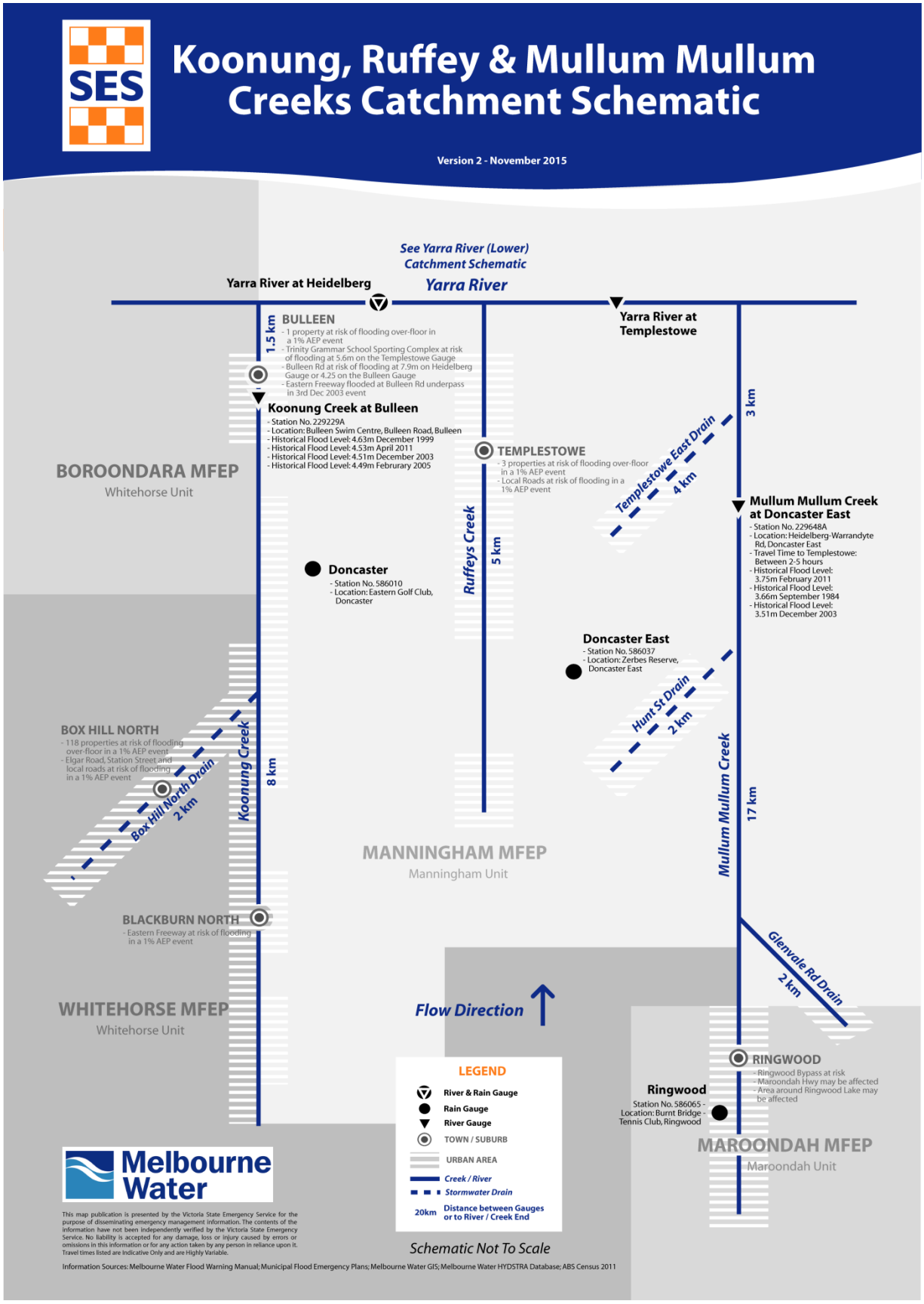
Melbourne Water
Information Sources: Melbourne Water Flood Warning Manual; Municipal Flood Emergency Plans; Melbourne Water GIS; Melbourne Water HYDSTRA Database; ABS Census 2011


SES
Koonung, Ruffey & Mullum Mullum Creeks Catchment Schematic
Version 2 - November 2015
See Yarra River (Lower) Catchment Schematic
Yarra River
Yarra River at Heidelberg
Yarra River at Templestowe
BULLEEN
- 1 property at risk of flooding over-floor in a 1% AEP event
- Trinity Grammar School Sporting Complex at risk of flooding at 5.6m on the Templestowe Gauge
- Bulleen Rd at risk of flooding at 7.9m on Heidelberg Gauge or 4.25 on the Bulleen Gauge
- Eastern Freeway flooded at Bulleen Rd underpass in 3rd Dec 2003 event
1.5 km
Koonung Creek at Bulleen
- Station No. 229229A
- Location: Bulleen Swim Centre, Bulleen Road, Bulleen
- Historical Flood Level: 4.63m December 1999
- Historical Flood Level: 4.53m April 2011
- Historical Flood Level: 4.51m December 2003
- Historical Flood Level: 4.49m Februrary 2005
TEMPLESTOWE
- 3 properties at risk of flooding over-floor in a 1% AEP event
- Local Roads at risk of flooding in a 1% AEP event
Templestowe East Drain
4 km
3 km
Mullum Mullum Creek at Doncaster East
- Station No. 229648A
- Location: Heidelberg-Warrandyte Rd, Doncaster East
- Travel Time to Templestowe: Between 2-5 hours
- Historical Flood Level: 3.75m February 2011
- Historical Flood Level: 3.66m September 1984
- Historical Flood Level: 3.51m December 2003
BOROONDARA MFEP
Whitehorse Unit
Ruffeys Creek
5 km
Doncaster
- Station No. 586010
- Location: Eastern Golf Club, Doncaster
Doncaster East
- Station No. 586037
- Location: Zerbes Reserve, Doncaster East
Hunt St Drain
2 km
BOX HILL NORTH
- 118 properties at risk of flooding over-floor in a 1% AEP event
- Elgar Road, Station Street and local roads at risk of flooding in a 1% AEP event
Box Hill North Drain
2 km
Koonung Creek
8 km
Mullum Mullum Creek
17 km
MANNINGHAM MFEP
Manningham Unit
BLACKBURN NORTH
- Eastern Freeway at risk of flooding in a 1% AEP event
Glenvale Rd Drain
2 km
WHITEHORSE MFEP
Whitehorse Unit
Flow Direction
RINGWOOD
- Ringwood Bypass at risk
- Maroondah Hwy may be affected
- Area around Ringwood Lake may be affected
Ringwood
Station No. 586065 - Location: Burnt Bridge - Tennis Club, Ringwood
MAROONDAH MFEP
Maroondah Unit
LEGEND
River & Rain Gauge
Rain Gauge
River Gauge
TOWN / SUBURB
URBAN AREA
Creek / River
Stormwater Drain
20km Distance between Gauges or to River / Creek End
Melbourne Water
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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

APPENDIX H – SEVERE WEATHER (STORM) EVENTS

1. Overview

The undulating terrain and built up nature of the City of Boroondara makes it susceptible in Severe Weather Events. Roads and building interrupting overland flow paths will divert floodwaters putting property at risk. Mature trees located within the municipality may also create traffic hazards or building damage in storm events. This Appendix details areas of risk from severe weather events by requests for assistance to the Victoria State Emergency Service (VICSES).

2. VICSES Requests for Assistance

VICSES records Requests for Assistance (RFAs) made by the public during severe weather events. Table 1 below is a breakdown of requests by suburb and damage type during the period July 2009 and September 2014.

Table 1 – Breakdown of severe weather RFAs received by VICSES Malvern and Whitehorse Units by suburb

	VicSES Request for Assistance (July 2009 – August 2014)					
Suburb	Building Damage	Flooding	Rescue Persons Trapped	Tree Down	Tree Down Traffic Hazard	Other*
Ashburton	41	0	0	35	13	0
Balwyn	38	3	0	49	24	0
Balwyn North	56	1	0	138	41	1
Camberwell	87	5	0	117	43	2
Canterbury	32	1	0	55	26	0
Deepdene	6	0	0	10	2	1
Glen Iris	71	4	0	73	28	2
Hawthorn	48	6	0	51	28	0
Hawthorn East	30	6	0	41	11	4
Kew	60	1	1	108	33	6
Kew East	17	0	0	21	9	1
Surrey Hills	16	0	0	35	15	0

* Assist fire service, Assist police, Message, Rescue structure collapse, SES incident other

Table 2 is a breakdown of requests for assistance by Date (Month) and damage type. High figures are predominantly from smaller, very intense storm events causing flash flooding.

Table 2 – Breakdown of severe weather RFAs received by VICSES Malvern and Whitehorse Units by date

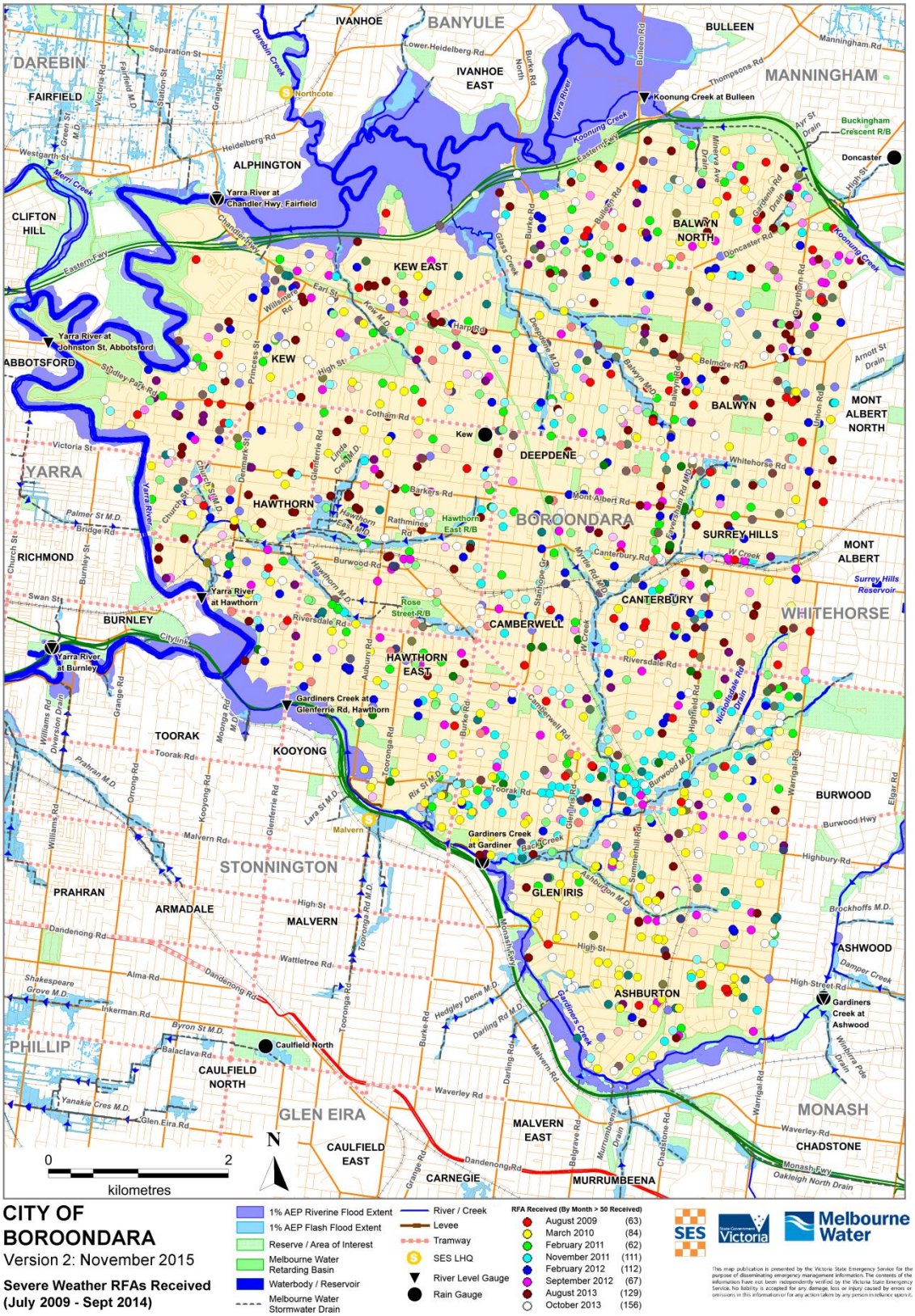
	VicSES Request for Assistance (July 2009 – September 2014)					
Date	Building Damage	Flooding	Rescue Persons Trapped	Tree Down	Tree Down Traffic Hazard	Other*
Jul 2009		5	0	3	0	0
Aug 2009	26	0	0	25	10	1
Sep 2009	1	0	0	0	2	0
Oct 2009	0	1	0	1	0	0
Nov 2009	12	0	0	8	1	0
Dec 2009	0	1	0	3	0	0
Jan 2010	2	1	0	10	0	0
Feb 2010	1	0	0	11	0	0
Mar 2010	69	0	0	10	1	0
Apr 2010	2	0	0	3	1	0
May 2010	0	0	0	1	0	0
Jun 2010	15	1	0	21	7	0
Jul 2010	1	0	0	4	1	0
Aug 2010	4	0	0	11	2	1
Sep 2010	10	0	0	11	4	0
Oct 2010	25	2	0	8	1	0
Nov 2010	9	0	0	8	5	1
Dec 2010	6	0	0	15	4	0
Jan 2011	2	1	0	5	4	0
Feb 2011	21	0	0	22	10	0
Apr 2011	5	0	0	1	2	2
May 2011	1	0	0	2	1	0
Jun 2011	4	0	0	17	1	0
Jul 2011	2	0	0	1	2	0
Sep 2011	12	0	0	3	1	1
Oct 2011	2	0	0	2	0	0
Nov 2011	41	0	0	44	24	2
Dec 2011	10	0	0	6	2	0
Jan 2012	8	0	0	19	11	0
Feb 2012	8	0	0	79	24	0
Mar 2012	5	0	0	8	2	1
Apr 2012	5	0	0	8	5	0
May 2012	2	0	0	0	0	0
Jun 2012	0	0	0	6	0	0
Aug 2012	0	0	0	1	0	1
Sep 2012	22	0	0	28	15	0
Nov 2012	2	0	0	1	1	0
Dec 2012	7	0	0	13	7	2
Jan 2013	2	0	0	2	4	0
Feb 2013	4	0	0	3	4	0
Mar 2013	6	0	1	15	14	0
May 2013	2	0	0	1	0	0
Jun 2013	6	0	0	4	0	0
Jul 2013	4	0	0	6	3	0
Aug 2013	26	0	0	69	22	1
Sep 2013	8	0	0	21	6	1
Oct 2013	27	0	0	80	38	1
Nov 2013	4	0	0	0	2	0
Dec 2013	4	0	0	14	5	0
Jan 2014	2	0	0	26	12	0
Feb 2014	2	0	0	13	6	0
Mar 2014	0	0	0	1	0	0
Apr 2014	2	0	0	1	0	0
Jun 2014	26	0	0	44	6	1
Jul 2014	1	0	0	5	1	0
Aug 2014	2		0	3	0	0
Sep 2014	4	0	0	6	0	1

* Assist fire service, Assist police, Message, Rescue structure collapse, SES incident other

3. VicSES Requests for Assistance Mapping

Figure 1 – Breakdown of severe weather RFAs received by VICSES Malvern and Whitehorse Units within Boroondara by request type

Figure 2 – Breakdown of severe weather RFAs received by VICSES Malvern and Whitehorse Units within Boroondara by date (Where over 50 RFAs Received per Event)



APPENDIX I – SANDBAG ARRANGEMENTS

4.5 GENERAL

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

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

If VICSES sandbags are becoming limited in supply, then priority will be given to protection of Essential Infrastructure. If time permits, requests for supplementary supply should be carried out in line with the Boroondara MEMP.

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

Boroondara Council MERO will liaise with the VICSES Central Region RDO/ IC (as appropriate) to ensure effective coordination of listed resources.

Sandbags will be filled in accordance with the VICSES Sandbag Quick Reference Guide and the VICSES Statewide Guideline- Sandbags. A short video depicting the filling procedures and the correct usage of sandbags is available at

https://www.youtube.com/watch?v=-_T--I3b-34&list=PL428FCA686837ADED

(Sandbagging demonstration- vicsesTV on YouTube).

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

4.6 OPERATIONAL

4.6.1 Sandbag Storage Locations

Sandbags may be obtained from any of the locations as noted below.

Organisation	Location	Number of Sandbags	Estimated Response Time	Contact
	Information removed from Public Distribution Copy			
Other				

Table H1- Sandbag storage locations within the City of Boroondara and adjoining locations

4.6.2 Sand Suppliers

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

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

Organisation	Location	Delivery Capability	Restrictions	Contact
	Information removed from Public Distribution Copy			

Table H2- Sand Suppliers and locations within the City of Boroondara and adjoining locations

4.6.3 Sandbag Collection Points

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

Location	Address	Area	Operational Restrictions
	Information removed from Public Distribution Copy		

Table H3- Boroondara City Council potential Sandbag Collection Points

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

- Bunnings
- Blackwoods
- Masters

Machinery Supply

Appliances documented below will be required when undertaking sandbagging operations

Organisation	Asset	Location	Estimated deployment time	Contact
	Information removed from Public Distribution Copy			

Table H4- Machinery/ Vehicles required for Sand Supply in Boroondara

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

- Backhoe
- Forklift
- Large Tipper

POST OPERATIONAL

Clean up and Disposal

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