City of Glen Eira

Storm and Flood Emergency

A Sub-Plan of the Municipal Emergency Management Plan

For the City of Glen Eira
And
VICSES Glen Eira Unit

Version 11.0
Reviewed February 2024

VICTORIA State Government

City of GLEN EIRA

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11	Controller	VICSES (Glen Eira Unit)	
12	Team Leader Hydrology & Flood Warnings	Melbourne Water	
13	Flood Warning Manager	Bureau of Meteorology (Flood Warning)	
14	Regional Emergency Management Officer	VicRoads	
15	EM Unit	Ambulance Victoria	
16	Emergency Management officer	Dept of Education (DEECD)	
17	Emergency Management Coordinator	Dept of Families, Fairness and Housing (DFFH)	
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Document Transmittal Form / Amendment Certificate

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

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
0 – draft V1	June 2012		Preparation and distribution of Version 1 of this MFEP
1 – draft V2	July 2012	Glen Eira City Council	Version 2
2 – draft V3	July 2012	MCA	Corrected flood / no-flood tool and evacuation check list inserted
3 – draft V4	November 2012	MCA	Incorporate GECC & VICSES comments
V5	June 2013	MP	Version 5 June 2013
V6	November 2013	MCA	Added description of all maps to 1st page of Appendix F plus section headings, removed table of vulnerable facilities and inserted reference to the MEMP, updated Section 3.14 (no sandbags from GECC), Section 3.16.2 (pit lids), Appendix C Section 6.4.1 (use of tool), minor edits including DSE and DPI to DEPI, version and date changed.
V7	November 2013	MCA	Section 3.16.2 (pit lids) edited, added SEW to list of acronyms, document version incremented.
V8	November 2014	VicSES / MCA	Minor edits, Appendix F mapping updated, Appendix G (Catchment Schematics) added and document version incremented. Disclaimer re mapping added to Appendix F. Plan has not been re-endorsed as edits not substantial. All edits accepted at MEMPC meeting on 12th November 2014.
V9	Sept 2015	VicSES / MCA	Edits to acronyms to accommodate organisational and SEMP changes and for internal consistency. Update of number of properties identified as subject to over-ground and over-floor flooding in Appendices A & C following updated studies and intel from MelbWater. Plan has not been re-endorsed as edits not considered substantial.
V9.1	November 2016	VicSES / MCA	Minor updates and edits following annual review. Inclusion of reference to downstream impacts and Elwood Canal.
V9.2	November 2017	VicSES / MCA	Added overview, consequences and timings associated with the 29th December 2016 event to Appendices A, B & C. Checked and adjusted SEMP references.
V9.3	March 2018	MCA	Added Flooding and Drainage FAQ Appendix as well as a text box with triggers and actions for Council's MEMOs inside the front cover.
V10	March 2021	VicSES	Changes and edits to accommodate Emergency Management Legislation Amendment Act 2018 amended the Emergency Management Act 2013 (EM Act 2013)changes and for internal consistency.
V11	February 2024	VICSES	Update of Agency and document references. Update of Appendix A, B, C, F & H

List of Abbreviations & Acronyms

The following abbreviations and acronyms are used in the Plan:

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AAR	After Action Review	IMS	Incident Management System
AEP	Annual Exceedance Probability	IEMT	Incident Emergency Management Team
AHD	Australian Height Datum (the height of a location above mean sea level in metres)	IMT	Incident Management Team
AIDR	Australian Institute of Disaster Resilience	LSIO	Land Subject to Inundation Overlay
AIIMS	Australasian Inter-service Incident Management System	MECC	Municipal Emergency Coordination Centre
AoCC	Area of Operations Control Centre / Command Centre	MEMO	Municipal Emergency Management Officer
ARI	Average Recurrence Interval	MEMP	Municipal Emergency Management Plan
AV	Ambulance Victoria	MEMPC	Municipal Emergency Management Planning Committee
BoM	Bureau of Meteorology	MERC	Municipal Emergency Response Coordinator
CEO	Chief Executive Officer	MRM	Municipal Recovery Manager
CERA	Community Emergency Risk Assessment	PMF	Probable Maximum Flood
CFA	Country Fire Authority	RAC	Regional Agency Commander
CMA	Catchment Management Authority	RCC	Regional Control Centre
DEECA	Department of Energy, Environment and Climate Action	RDO	Regional Duty Officer
DFFH	Department of Families, Fairness and Housing	RERC	Regional Emergency Response Coordinator
DH	Department of Health	RERCC	Regional Emergency Response Coordination Centre
DSIR	Department of Skills, Industry and Regions	SBO	Special Building Overlay
DoI	Department of Infrastructure	SCC	State Control Centre
DTP	Department of Transport and Planning	SEMP	State Emergency Management Plan
EMLO	Emergency Management Liaison Officer	SERP	State Emergency Response Plan
EMV	Emergency Management Victoria	SEWS	Standard Emergency Warning Signal
EO	Executive Officer	SHERP	State Health Emergency Response Plan
FO	Floodway Overlay	SOP	Standard Operating Procedure
FRV	Fire Rescue Victoria	VicPol	Victoria Police
FWS	Flood Warning System	VICSES	Victoria State Emergency Service
FZ	Floodway Zone		
IC	Incident Controller		
ICC	Incident Control Centre		

Glossary

Below are terms defined for the purpose of this plan:

Term	Definition
Annual Recurrence Interval (ARI)	The average, or expected, value of the period between exceedances of a given rainfall or flow total accumulated over a given duration
Annual Exceedance Probability (AEP)	The probability that a given total rainfall or flow is accumulated over a given duration will be exceeded in any one year
Flash flooding	Sudden unexpected flooding caused by local heavy rainfall or rainfall in another area. Often defined as flooding which occurs within six hours of the rain which causes flooding.
Flood mapping	The process where the extent of flooding is documented in mapping software based on flood studies and surface elevations
Floodplain	Area of land adjacent to a creek, river, estuary, lake, dam or artificial channel, which is subject to inundation.
Hot spot	A known flood problem area which has a history of repeat flooding of a road, crossing or property, often highlighted through anecdotal information and customer complaints. It is a localised issue which will vary from council to council.
Natural drainage system	Flow paths which are largely undeveloped by human sources, these include rivers, streams, natural depressions and wetlands. All-natural systems greater than 60 ha are managed by Melbourne Water.
Overland flooding	Flooding by local runoff caused by heavier than usual rainfall. Overland flooding can be caused by local flow exceeding the capacity of an urban stormwater drainage system or by the backwater effects of mainstream flooding causing urban stormwater drainage system to overflow. For local government areas this is over the 5-year ARI in residential or over 10yr ARI in commercial/industrial. For Melbourne Water catchment areas this is for all other ARIs up to the 100yr ARI.
Retarding Basin	A Retarding Basin is a large, open, free draining basin that temporarily stores collected stormwater runoff. These basins are normally maintained in a dry condition between storm events.
Stormwater drainage system	A series of drains and waterways into which surface and stormwater flows. Features of a stormwater drainage system can include underground pipe drains, open channels, retarding basins, floodways, waterway improvements, water sensitive urban design, integrated water management systems and environment protection measures. All drainage under 60 ha is maintained and operated by Glen Eira City Council
Stormwater Runoff	The amount of rainfall that enters the stormwater drainage system, (via pits, pipes, retarding basins, water sensitive structures, harvesting tanks and overland flow paths) after water which is not absorbed into the ground has been taken into account.

Part 1. INTRODUCTION

1.1 Municipal Endorsement

This Municipal Storm and Flood Emergency Plan (MSFEP) has been developed in conjunction with the Glen Eira City Council with the authority of the Glen Eira City Council MEMPC pursuant to Section 20 of the Emergency Management Act 1986 (as amended).

This MSFEP is a sub plan to the Glen Eira City Council MEMP. It is consistent with the SEMP and the Victorian Floodplain Management Strategy (DEECA, 2016), and takes into account the outcomes of the Community Emergency Risk Assessment (CERA) process undertaken by the MEMPC.

This MSFEP is consistent with the Regional Flood Emergency Plan and the State Flood Emergency Plan.

This MSFEP is a result of the cooperative efforts of the Glen Eira City Council MEMPC and its member agencies.

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

This Plan is endorsed by the Glen Eira MEMPC as a sub-plan to the MEMP.

1.2 Purpose and Scope of this Storm and Flood Emergency Plan

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

A flood event cannot occur in the Glen Eira area without the impact of a storm event. With the exception of tactical response to roof damage and trees down as a result of a storm, the planning and response arrangements will be the same for both Storm and Flood events.

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.

1.3 Municipal Flood Planning Committee (MFPC)

Within the City of Glen Eira, the functions of a MFPC will be undertaken by the MEMPC. Membership of the MEMPC is as detailed in the MEMP.

1.4 Responsibility for Planning, Review and Maintenance of this Plan

This MSFEP must be maintained in order to remain effective.

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

The MEMPC will meet as per the MEMP documented program for the year.

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

- Following any new flood or stormwater drainage 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.

1.5 Authority

In 2020, the Emergency Management Legislation Amendment Act 2018 amended the Emergency Management Act 2013 to provide for new integrated arrangements for emergency management planning in Victoria at the State, regional and municipal levels; and create an obligation for a Municipal Emergency Management Planning Committee (MEMPC) to be established in each of the municipal districts of Victoria. Each MEMPC is a multi-agency collaboration group whose members bring organisation, industry or personal expertise to the task of emergency management planning for the municipal district.

The MSFPC is a sub-committee of the MEMPC and is authorised to prepare and update this Storm and Flood Management Plan subject to the endorsement of any changes by the MEMPC.

Once endorsed and adopted by the Glen Eira MEMPC, this Storm and Flood Management Plan will become a Sub-Plan to the Municipal Emergency Management Plan and supersede any prior versions of the Municipal Fire Management Plan.

1.6 Plan Assurance and Approval

This Storm and Flood Management Plan has been prepared in accordance with and complies with the requirements of the EM Act 2013 including having regard to the guidelines issued under section 77, *Guidelines for Preparing State, Regional and Municipal Emergency Management Plans*.

A Statement of Assurance (including a checklist and certificate) has been prepared and submitted to the Southern Metro Regional Emergency Management Committee (SM REMPC) pursuant to EM Act 2013 (s60AG).

This Plan is approved by the SM REMPC. This Plan comes into effect when it is published on the Glen Eira City Council Website and remains in effect until superseded by an approved and published update.

Part 2. BEFORE: 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, VICSES community engagement programs, and websites (VICSES and the Municipality) upon formal adoption by Glen Eira City Council.

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

2.2 Structural Flood Mitigation Measures

Refer to **Appendix C** for detailed information of structural flood mitigation measures within the Municipality.

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 Severe Weather and Flood Warning

Arrangements for severe weather and flood warnings are contained within the State Flood Emergency Plan and State Storm Emergency Plan (ses.vic.gov.au/em-sector/VICSES-emergency-plans), the SEMP and on the Bureau of Meteorology (BoM) website (bom.gov.au).

Specific details of local severe weather and flood warning system arrangements are provided in **Appendix E**.

2.3.3 Local Knowledge

Community Observers provide local knowledge to VICSES and the Incident Control Centre regarding local insights and the potential impacts and consequences of an incident and may assist with the dissemination of information to community members.

There are no official community observers within the Boroondara Municipality however local knowledge is incorporated into this plan through consultation with local response agencies.

Previous event history and likely operational considerations are noted in the Flood Intelligence Cards in **Appendix C**. In line with the VICSES Local Knowledge Policy, reviews of this plan will be undertaken with input from multiple local sources to ensure appropriate local knowledge can be captured before, during and after incidents.

2.3.4 Other Measures

Refer to **Appendix C** for detailed information relating to other non-structural flood mitigation measures within the Municipality.

Part 3. DURING: RESPONSE ARRANGEMENTS

3.1 Introduction

3.1.1 Activation of Response

Storm and Flood response arrangements may be activated by the VICSES Regional Duty Officer (RDO) or Regional Agency Commander (RAC).

The VICSES RDO or RAC will activate agencies as required and documented in the VICSES Regional and State Storm and Flood Emergency Plans (ses.vic.gov.au/em-sector/VICSES-emergency-plans).

3.1.2 Responsibilities

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

The general roles and responsibilities of supporting agencies are as agreed within City of Glen Eira MEMP, the SEMP (Roles and Responsibilities), State Flood and Storm Emergency Plans and VICSES Central Region Storm and Flood Emergency Plans (ses.vic.gov.au/em-sector/VICSES-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 Glen Eira MEMP.

Liaison with the MECC will be through the VICSES RDO/ Incident Controller 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 the SEMP.

3.2 Strategic Control Priorities

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

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

3.3 Command, Control, Coordination, Consequences, Communication and Community

The Command, Control and Coordination arrangements in this Plan must be consistent with these detailed in State and Regional Storm and Flood Emergency Plans. For further information, refer to the SEMP.

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

Command, Control and Coordination are familiar and traditional mechanisms in emergency and incident management however over the past few years there has been a supplementary focus on Consequence, Communication and Community Connection.

This is an approach to emergency management and an approach that is inclusive and community focused. It is also one that supports resilience in communities and in the EM sector.

- **Command:** Overall direction of response activity in an emergency.
- **Control:** Internal direction of personnel and resources within an agency.
- **Coordination:** Bringing together agencies and resources to ensure effective preparation for response and recovery.
- **Consequence:** Management of the effect of emergencies on individuals, communities, infrastructure and the environment.
- **Communication:** Engagement and provision of information across agencies and proactively with the community around preparation, response and recovery in emergencies.

- **Community Connection:** Understanding and connecting with trusted networks, leaders and communities around resilience and decision making.

Specific details of arrangements for this plan are to be provided in **Appendix C**.

3.3.1 Control

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

Table 9 of the SEMP (Roles and Responsibilities) identifies VICSES as the Control Agency for storm and flood. It identifies the Department of Energy, Environment and Climate Action (DEECA)as the Control Agency responsible for dam safety, water and sewerage asset related incidents and other emergencies.

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

3.3.2 Incident Controller (IC)

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 the SEMP.

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
- Dandenong ICC
- Ferntree Gully ICC

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:

- Glen Eira Unit: 90 – 92 Bignell Road, East Bentleigh

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

- Knox SES - LHQ Lewis Road, Knox - Ph. 9298 8397
- Glen Eira SES - 92 Bignell Road, Bentleigh East - Ph. 9579 7041

3.3.5 Incident Management Team (IMT)

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

Refer to the SEMP for guidance on IMTs and Incident Management Systems (IMSs)

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 Glen Eira 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 the SEMP 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 Severe Weather and Flood Warnings

VICSES Region RDO/ IC 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.

Refer to JSOP J04.01- Public Information and Warnings.

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.

Responsibility for public information, including media briefings, rest with VICSES as the control agency. Council will assist VICSES to warn individuals within the community where practicable including activation of flood warning systems, where they exist. Other agencies such as CFA, DEECA and VICPOL may also be requested to assist VICSES with the communication of community storm and/or flood warnings.

Other agencies such as CFA, DEECA 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).

DH 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 RDO will manage all media communication. The City of Glen Eira will work with the Incident Controller to ensure that consistent and timely messaging occurs.

3.6 Impact assessment

Impact Assessments (IA) can be conducted in accordance with State doctrine and Standard Operating Procedures (SOPs) to assess and record the extent and nature of damage caused by storms and/or flooding. This information may then be used to provide the basis for further needs assessment and recovery planning by Glen Eira City Council, DFFH and other applicable recovery agencies.

The control agency is responsible for coordinating the collection, collation and dissemination of IA information on a whole of government basis during the emergency response.

The purpose, function and conduct of IA are outlined in the State Flood Emergency Plan and the State Storm Emergency Plan. All IA should be conducted in accordance with current State impact assessment doctrine and SOPs.

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 Glen Eira 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 Melbourne Metropolitan 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 the VicTraffic 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.

Evacuation operations should be consistent with the Joint Standard Operating Procedure on Evacuation (JSOP3.12). Guidelines for best practice for planning evacuations are provided in

Australian Institute for Disaster Resilience Handbook 4, available at: knowledge.aidr.org.au/resources/handbook-evacuation-planning/.

Refer to **Appendix D** of this Plan for detailed evacuation arrangements for City of Glen Eira.

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 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.

3.12 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 Glen Eira MEMP.

3.13 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 City of Glen Eira maintains a small stock of sandbags, and back-up 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. Other high priorities may include for example the protection of historic buildings.

Property may be protected by:

- Sandbagging to minimise entry of water into buildings
- Encouraging businesses and households to lift or move contents
- Construction of temporary levees in consultation with 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.

3.14 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 Glen Eira.

3.15 Road Closures

Glen Eira City Council, VicPol and the Department of Transport and Planning (DTP) 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 Glen Eira City Council and DTP of the need to erect warning signs and / or close roads and bridges under its jurisdiction. DTP are responsible for designated main roads and highways and Councils are responsible for the designated local and regional road network.

DTP, VicPol and the Glen Eira City Council will communicate community information regarding road closures as outlined in the Glen Eira MEMP.

3.16 Dam Spilling / Failure

DEECA 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.

The Moorabbin Reservoir (located at 673 Warrigal Rd Glen Eira) is the only reservoir located in the Glen Eira municipal area and is owned and operated by South East Water.

South East Water as the owner/operator have an up to date Contingency Plan that has been created to aid in the rapid response essential to control and mitigate damage caused by a failure in the dam.

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

3.17 Waste Water related Public Health Issues and Critical Sewerage Assets

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 Glen Eira 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 Glen Eira Environmental Health Officer to inspect and report to the MERO and the ICC on any water quality issues relating to flooding.

Sewerage assets at risk of inundation are identified in **Appendix C**.

3.18 Access to Technical Specialists

VICSES manages contracts with private technical specialists who can provide technical assistance in the event of flood operations or geotechnical expertise. Refer to VICSES SOP061 for the procedure to engage these specialists.

3.19 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. AFTER: EMERGENCY RELIEF AND RECOVERY ARRANGEMENTS

4.1 General

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

4.2 Emergency Relief

The IC determines the need for emergency relief services with advice from the emergency management team (such as the IEMT), including the MRM, in accordance with the SEMP Relief arrangements. The IC is responsible for ensuring that relief arrangements have been considered and implemented where required under the State Emergency Relief and Recovery Plan. This should be carried out in line with the Glen Eira MEMP.

The IC should ensure that the MERC, the Regional Recovery Coordinator and the MRM are kept informed of arrangements for relief.

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

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 DEECA, DSIR and Glen Eira Council.

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

4.4 Transition from Response to Recovery

VICSES as the Control Agency is responsible for ensuring effective transition from response to recovery. This transition will be conducted in accordance with existing arrangements as detailed in Part 4 of the SEMP.

APPENDIX A - FLOOD THREATS FOR CITY OF GLEN EIRA

General

The City of Glen Eira comprises the following suburbs:

- Bentleigh and Bentleigh East;
- Sections of Brighton East;
- Carnegie;
- Caulfield, Caulfield South, Caulfield North and Caulfield East;
- Elsternwick;
- Gardenvale
- Glenhuntly;
- McKinnon
- Murrumbeena;
- Ormond; and
- Parts of St Kilda East.

Most of the flooding that occurs within the City of Glen Eira is a result of a combination of:

- Drainage infrastructure with limited capacity: it was not designed to modern standards or for current development densities;
- Blocked or non-existent overland flow paths, a particular issue on the upstream side of some road and rail embankments: there is limited opportunity for stormwater in excess of drainage system capacity to flow above ground without impacting on properties or infrastructure;
- Infill development : increased development density and more impervious areas gives rise to more runoff for which the drainage network was not designed;
- Older areas without underground drainage pipes and pits: some of these areas are drained only by the kerb and channel of the road network;
- A lack of open waterways: there are now no open waterways (e.g. creeks) within the Municipality; and
- A build-up of debris in and on drainage system inlet pits and grates: generally results in localised flooding.
- The most frequent type of flooding in the City of Glen Eira is ‘flash flooding’ due to runoff from a storm being greater than the capacity of the existing underground stormwater drainage system.

Waterways within Glen Eira have undergone significant modification as the Municipality has been developed. This has resulting in all natural waterways being engineered into a constructed underground drainage network. There are now no open waterways (such as creeks) within the Municipality although there is a short section of the Elster Creek Main Drain. This Main Drain, which collects other Main Drain flows, along with others that either originate in or pass through the Municipality feeds into Elwood Canal – see the Elster Creek and Elwood Canal Catchment Schematic at Appendix G and Figure A1 below.

There are some areas in Glen Eira where there are no underground drainage pipes and pits. These areas (i.e. generally the older areas of Glen Eira) are drained either by private drainage pipes or by the kerbs and channels of the road network. When it rains heavily, the roads in these areas can carry a substantial flow of water. Water will also pond in lower lying areas creating a local flood hazard.

Some stormwater flows into Glen Eira from neighbouring Municipalities. Flooding within Glen Eira results from rain that falls on the Municipality as well as on catchments in the neighbouring municipalities. The catchments that flood due to the rainfall from the neighbouring municipalities are Murrumbeena, Moorabbin and Shakespeare.

All Council drains (generally in catchments of less than 60ha in area) connect into a network of larger Melbourne Water main drains. No Council drains discharge into an open waterway. These main drains are large underground pipes that flow (i.e. carry stormwater) out of the Municipality (see Figure A1) into downstream creeks or directly into Glen Eira Bay. However, the Melbourne Water main drains have limited capacity to accommodate flows arising from major storm events.

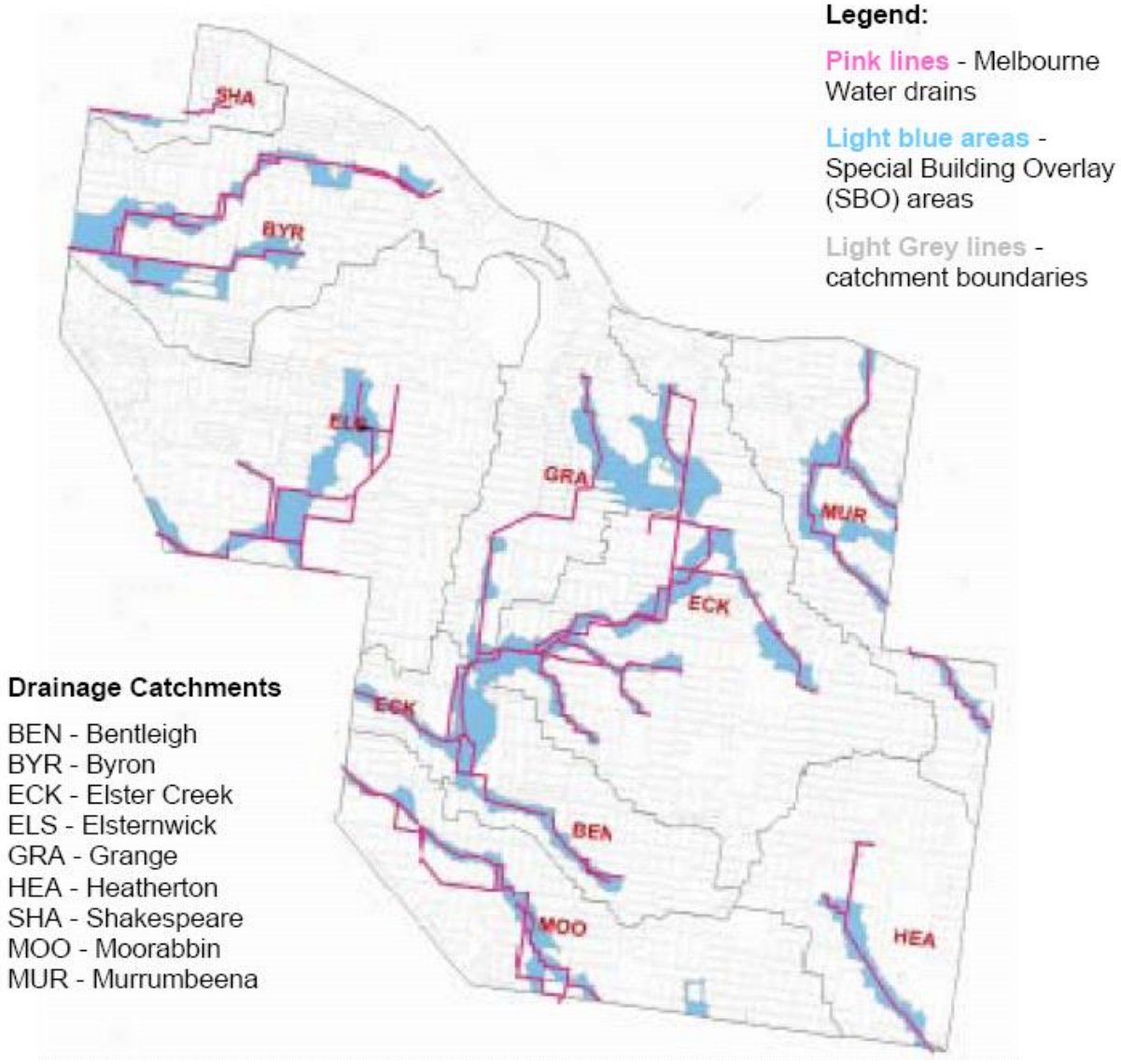


Figure A1 – location of main drains within Glen Eira, all of which flow out of the Municipality

Rain in excess of the 20% AEP (5-year ARI) event is likely to cause overland flows and local flooding. Stormwater flooding is an issue. The extent of that flooding will depend on the intensity and duration of rain. Note however that:

- Within the City of Glen Eira, the capacity of Melbourne Water drains is generally less than 20% AEP (5-year ARI) and there are currently no plans to upgrade that capacity.

- There are no formalised overland flow paths within the Municipality.
- The City has identified that over 95km of drainage network within the Municipality cannot convey the peak 10-year ARI (10% AEP) flow.
- Council's current drainage practice is to aim to provide 10% AEP (10-year ARI) capacity within the underground drainage system for which it is responsible (i.e. in catchments of less than 60ha in area) when upgrades are being undertaken (although this cannot always be achieved) and conveyance within road reserves and open spaces for flows that are in excess of pipe capacity (including the 100-year ARI flow).

While there are no formal overland flow paths within the Municipality, roads, parks and both public and private property act as overland flow paths in areas where the capacity of the underground drainage system is not sufficient. Further, flooding is exacerbated in some areas where development and infrastructure cover areas that act as significant overland flow paths and in locations where open spaces used for the conveyance of overland flows are not channelled sufficiently.

Identified flood risk areas associated with Melbourne Water drains within the Municipality have been mapped and are delineated within the Planning Scheme as either Land Subject to Inundation (LSIO) or Special Building Overlay (SBO).

An updated flood risk analysis undertaken by Melbourne Water in conjunction with Glen Eira City Council for the nine (9) catchments within the City of Glen Eira (see Figure A1 above and map in Appendix F) was completed in 2015. The analysis identified around 8,800 properties as being subject to flooding during 1% AEP flood conditions. Within these catchments, six (6) areas are considered to be subject to extreme flood risk. These areas are:

- Caulfield South Main Drain within the Caulfield South Main Drain catchment;
- Crosbie Park Drain within the Koornang Road Main Drain catchment;
- Graham Avenue Main Drain within the Koornang Road Main Drain catchment;
- Koornang Road Main Drain within the Koornang Road Main Drain catchment;
- Murrumbeena Main Drain sub-catchment upstream of the railway line;
- Murrumbeena Main Drain sub-catchment downstream of the railway line.

Within these six areas there are 598 properties identified as being subject to over-floor flooding during 1% AEP flood conditions.

The updated flood modelling for the nine (9) catchments within the Municipality determined that:

- 8,800 properties are at risk of flooding during a 1% AEP (100-year ARI) storm;
- 1,288 properties are at risk of over-floor flooding during a 1% AEP (100-year ARI) storm;
- 1,953 properties are at risk of flooding during a 10% AEP (10-year ARI) storm;
- 127 properties are at risk of over-floor flooding during a 10% AEP (10-year ARI) storm.

The break-up is provided in the table below. Note that the counts for the 2009 modelling are also included as the mapping at Appendix F was produced in 2009 (and is consistent with those counts) and has not yet been updated.

Catchment	Number of properties subjected to over-floor flooding from capacity exceedance of Melbourne Water and Council stormwater drains			
	Results of 2009 flood modelling and consistent with maps at Appendix F.		Results from updated flood modelling completed in 2015. Mapping not yet available.	
	10%AEP (10-year ARI) storm	1%AEP (100-year ARI) storm	10%AEP (10-year ARI) storm	1%AEP (100-year ARI) storm
Bentleigh (BEN)	249	384	9	79
Byron (BYR)	110	267	17	151
Elster Creek (ECK)	178	449	7	238
Elsternwick (ELS)	445	988	26	288
Grange (GRA)	139	234	18	99
Heatherton (HEA)	75	172	0	50
Moorabbin (MOO)	75	353	36	311
Murrumbeena (MUR)	469	774	14	72
Shakespeare (SHA)	15	55	0	0
TOTALS	**1,755**	**3,676**	**127**	**1,288**

The criteria used to determine the number of properties subject to flooding during a 1% AEP rainfall event, noting that as actual floor levels are unknown it is assumed that over-floor flooding occurs when flood depth is greater than 300mm, is as follows:

Catchment	Total Area (Ha)	Number of properties subject to flooding in the Municipality (depth>0.1m and DxV>0.008)	Number of properties subject to flooding outside MW SBO (depth >0.1m and DxV>0.008)	Number of properties subject to flooding in the Municipality (depth>0.3m and DxV>0.008)	Number of properties subject to flooding outside MW SBO (depth >0.3m and DxV>0.008)
All	3,870	8,800	4,825	1,288	106

Maps in Appendix F show the main drains within the City of Glen Eira as well as areas subject to inundation under 1% AEP flood conditions, as modelled in 2009.

There are no buildings within the Municipality identified or highlighted as requiring flood proofing (i.e. such as underground car parks, retirement villages or buildings associated with critical infrastructure).

Description of Major Waterways and Drains

DRAIN	DESCRIPTION
Heatherton Drain	This drain starts from the intersection of Centre Road and Mackie Rd, runs towards south and falls on City of Kingston at South Road, Moorabbin
Murrumbeena Drain	This drain starts from City of Monash, runs towards north through Glen Eira City and falls on City of Stonnington at Princes HWY, Murrumbeena
Koornang Rd Main Drain	This drain starts from No. 19 Truganini Rd, Carnegie runs towards south and connected to Elster Creek at Beech St, Bentleigh
Grange Rd Main Drain	This drain starts from the intersection of Grange & Neerim Roads runs towards south and connected to Koornang Rd main drain at Wattle Grove, Bentleigh
Moorabbin Main Drain	This drain starts from City of Kingston, runs towards west and connected to Elster Creek
Caulfield South Main Drain	This drain start from Pyne St, Caulfield South runs towards south and connected to Brighton Cemetery Main Drain at Gardenvale Rd, Caulfield South
Yanakie Crescent Main Drain	This drain starts from Yanakie Crescent , Caulfield North, runs towards west and falls on City of Glen Eira
Byron Street Main Drain	This drain starts from Caulfield Park, runs towards west and connected to Yanakie Crescent main drain.

Historic Storms and Floods

December 2003

Overnight from the 2nd to the 3rd severe thunderstorms formed near Craigieburn around midnight. Very heavy rainfall was recorded in the northeast suburbs of Melbourne. Other suburbs also received heavy rainfall. Flooding occurred in many suburbs within a one to two hour period around 2:00am. The heaviest hourly rainfall rates were consistent with a 1% AEP (100-year ARI) event.

January 2004

On the 30th, severe thunderstorms developed over Glen Eira Bay then moved northward affecting Sandringham and Moorabbin before continuing over the city and inner suburbs. Rainfall totals from the early morning storms were around 50-70mm in an hour causing flash flooding and traffic chaos. The highest 24 hour rainfall totals to 9am in the vicinity of Glen Eira were: Brighton (69mm), Oakleigh South (56.2mm), St Kilda Marina (53mm), Sandringham (49.2mm), Hampton (45.4mm), and Cheltenham (43mm).

January 2005

On the 4th, severe thunderstorms developed in western and central districts early in the morning. Severe thunderstorms redeveloped during the afternoon resulting in some damage in the Melbourne metropolitan area.

4 February 2011

Tropical moisture from ex-Tropical Cyclone Yasi (and the remnants of Tropical Cyclone Anthony) interacted with a cold front, triggering extreme rainfall and convective thunderstorms across the Melbourne Metropolitan area and other parts of the State between late afternoon on the 4th and midday on the 6th. Daily rainfall totals between 100–200 mm were widespread in the eastern and south-eastern suburbs of Melbourne and were the equivalent of what most stations would usually observe in an entire summer season. The exceptionally high daily rainfall totals resulted in severe flash flooding across the Metropolitan area, particularly in the south-eastern suburbs during the evening of the 4th.

Moorabbin Airport and Glen Waverley Golf Course both recorded in excess of 140mm, their highest daily rainfall for any time of year, almost tripling their average monthly rainfall for February in just 24 hours.

Rainfall records indicate that the storm was in excess of the 1% AEP (100-year ARI) event.

In Glen Eira, the storm and subsequent flooding resulted in flooding of numerus streets, properties and houses and extensive damage to residential and commercial properties: more than 150 homes and businesses were damaged and around 200 properties affected. A number of residences were rendered uninhabitable.

Areas badly affected by flooding included:

Within the Koornang Road Main Drain catchment (south of North Road and Ormond Station on the Frankston line):

- Flooding along Cadby Avenue, Murray Road, Station Avenue, Wheeler Street, Prince Edward Avenue and Glen Orme Avenue (see Figure A2-1) was severe. Water levels exceeded the estimated 1% AEP (100-year ARI) flood levels upstream of the railway line by 200 to 250mm: water was up to 1.5m deep. 20 or so houses were flooded over-floor and 50 to 60 properties were flooded. Deep flooding occurred at the low point in front of 9 Glen Orme Avenue. Flooding at the southern end of Glen Orme Avenue closely matched 10% AEP (10-year ARI) flood extents (see Figure A2-2)

- Flooding occurred in Cadby Avenue in 1996 and 2004.

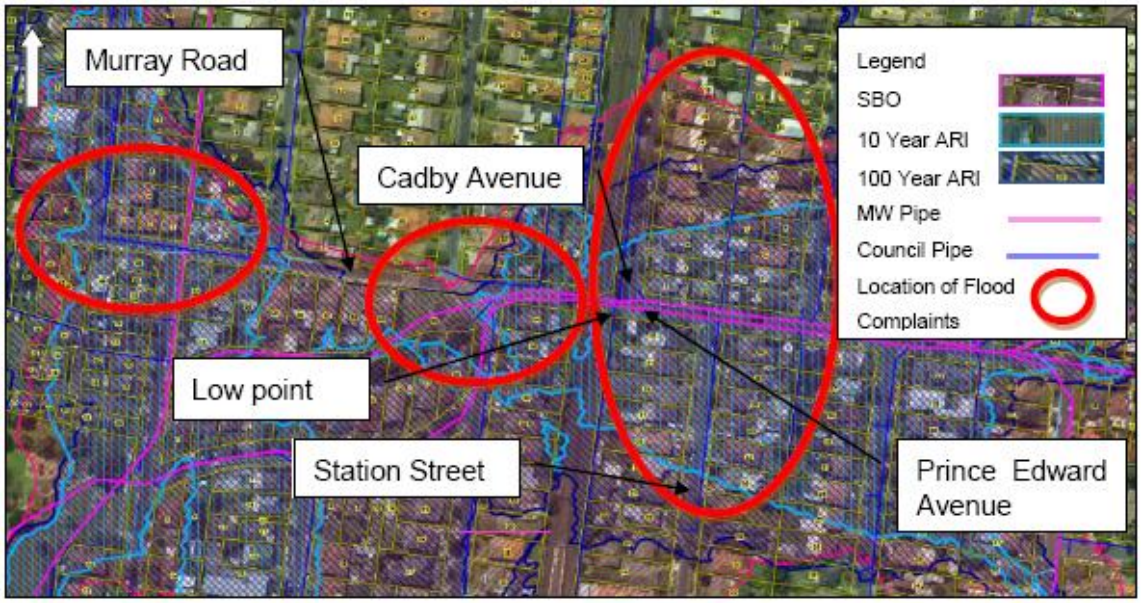


Figure A2-1: Flooding along the Koornang Road Main Drain

Figure A2-2: Flooding from the Koornang Road Main Drain at the southern end of Glen Orme Avenue

Within the Long Street Main Drain catchment:

- Severe flooding occurred at the low point in Alison Road near the intersection with Orrong Road (see Figure A3) and exceeded estimated 1% AEP (100-year ARI) flood levels. Several sheds, garages and carports were inundated.
- Flooding also occurred in this location in 2003 (February & December), January 2004, February 2006 and 2010 (February & March).

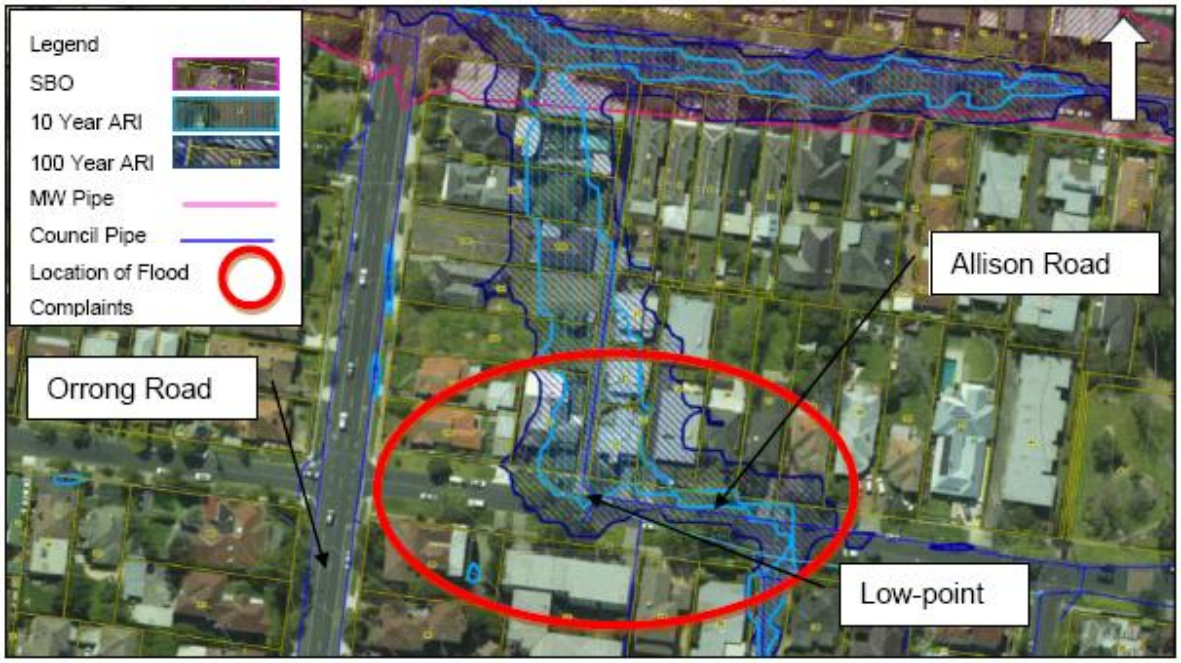


Figure A3: Flooding in Alison Road near Orrong Road

Within the Murrumbeena Main Drain catchment (near Murrumbeena Station on the Dandenong line):

- Properties along Railway Terrace, Bute Street and Toward Street upstream of the Railway line (see Figure A4-1) were flooded above floor. Flooding in Railway Terrace and Wilson Street was more than 2m deep. The low point along the Murrumbeena Main Drain upstream of Dandenong Road (see Figure A4-2) was also flooded to a depth of up to 4m. The house on the corner of Wilson Street and Dandenong Road was flooded over-floor. More than 15 other houses were flooded upstream of the railway line.

- Flooding occurred in Bute Street and Railway Terrace in (November) 2006.

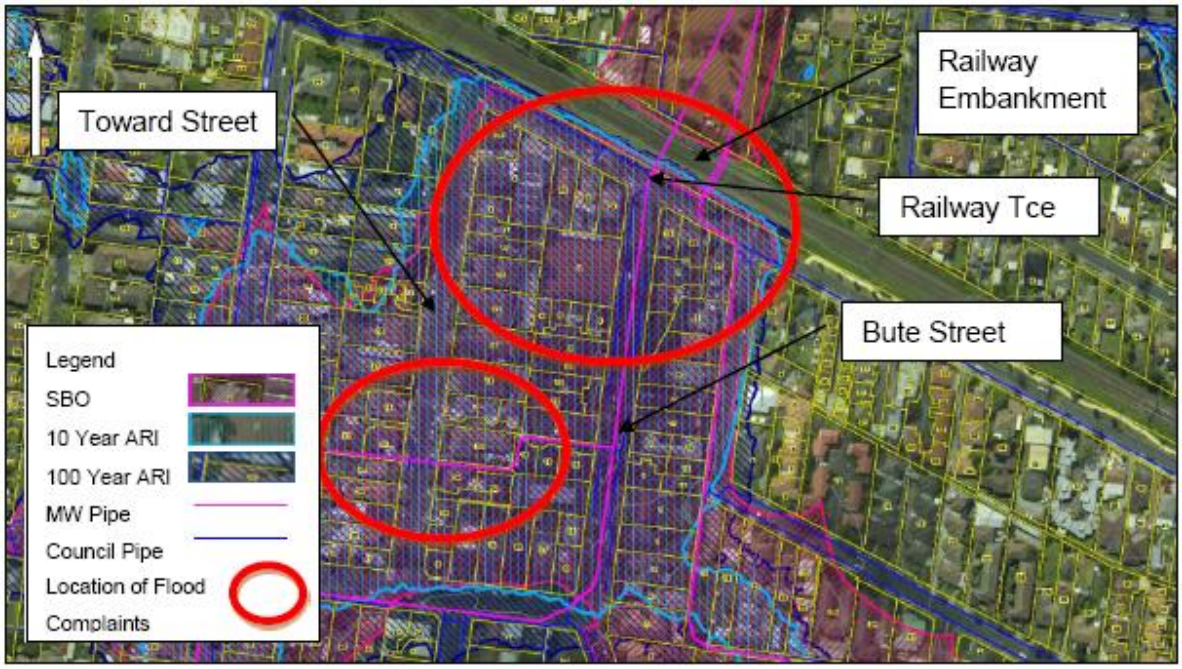


Figure A4-1: Flooding in and around Bute Street

Figure A4-2: Flooding in the vicinity of Dandenong Road and Wilson Street

Within the Yanakie Crescent Main Drain catchment

- Overland flows occurred through properties from Crotonhurst Avenue to Yanakie Crescent (see Figure A5) with deep and over-floor flooding in Yanakie Crescent.
- 3 properties flooded over-floor in Crotonhurst Avenue with additional properties in Rosemont Avenue.

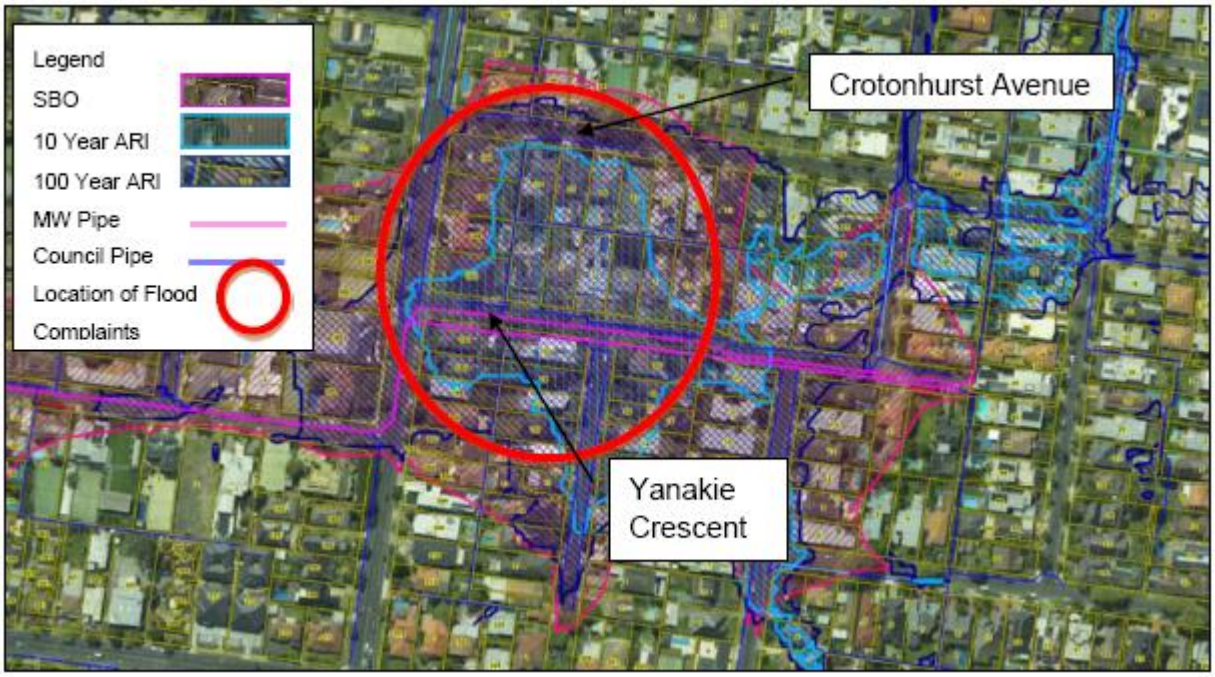


Figure A5: Flooding in the vicinity of Crotonhurst Avenue and Yanakie Crescent

Flash Flood Event – 29th December 2016

Grabs from news reports on the 29th and 30th December 2016.

Since about 2pm, a number of severe thunderstorms have come through, with damaging winds and particularly heavy rain. Some of these storms have generated intense rain rates of more than one millimetre per minute.

The Bureau of Meteorology recorded 18.4 millimetres of rain in 10 minutes at Oakleigh South and 14.6mm of rain in 10 minutes at St Kilda. The highest 24 hour rainfalls were recorded at Viewbank 83mm (54mm in 25 mins), Monbulk 67mm, Ferny Creek 64mm.

There was flash flooding in several Melbourne suburbs and the heavy rain caused flight delays and disrupted metropolitan and country rail services. The roof of a Frankston house collapsed and several motorists had to be rescued after attempting to drive across flooded roads. By 7pm the thunderstorms had already generated about 1400 requests for assistance to the SES.

Sections of the Western Ring Road (near Plenty Road due to flooding from Darebin Creek) and the Tullamarine Freeway were closed in both directions while services on all major rail and tram lines were delayed with the Pakenham and Stony Point lines suspended.

The most affected areas in Melbourne were Glen Iris, Glen Eira and Moorabbin. Drains struggled with the mass of water.

Flooding in Elwood caused "significant" damage with residents forced to wade along footpaths in water that was knee-deep. Wave Street was flooded after the Elwood Canal broke its banks (Elster Creek flows into the Elwood Canal), while Mitford Street was flooded by water from the sudden downpour. Water inundated verandahs and a number of homes.

Elster Creek swelled, flooding the Elwood canal

Elwood was one of the worst affected by the storms

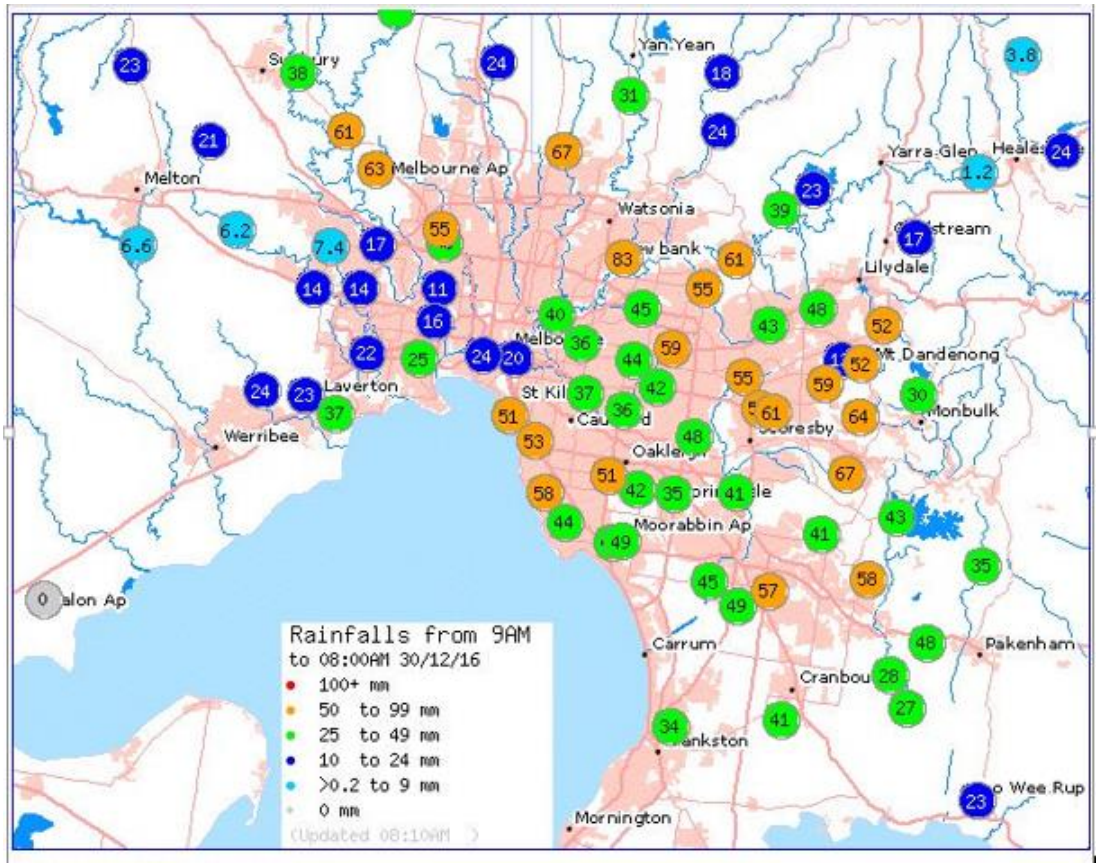
Photos: Penny Stephens

A low pressure system that originated over the Top End of the Northern Territory and absorbed the remnants of Tropical Cyclone *Yvette*, brought tropical conditions over a wide area of Australia in the final days of December 2016. These conditions included high temperatures, heavy rainfall at both short and longer durations, and exceptionally high levels of atmospheric moisture (i.e. humidity). Storms and heavy rain resulted across Melbourne on the afternoon of the 29th. These caused flash flooding when stormwater drainage systems were overloaded, some riverine flooding as creeks and the Elwood Canal broke their banks, and extensive storm and water damage along with disruptions to road and rail networks.

The Melbourne Water rain gauges at Caulfield South (56mm with 34mm in ~25 minutes followed by 20mm in ~15 minutes), Caulfield North (45mm) and Oakleigh South (47mm) recorded 2 periods of intense rain about 30 minutes apart with a 3rd period of only light rain. Each period lasted for about 30 minutes with the first beginning around 2pm, the second a little after 3pm and the third at around 4pm.

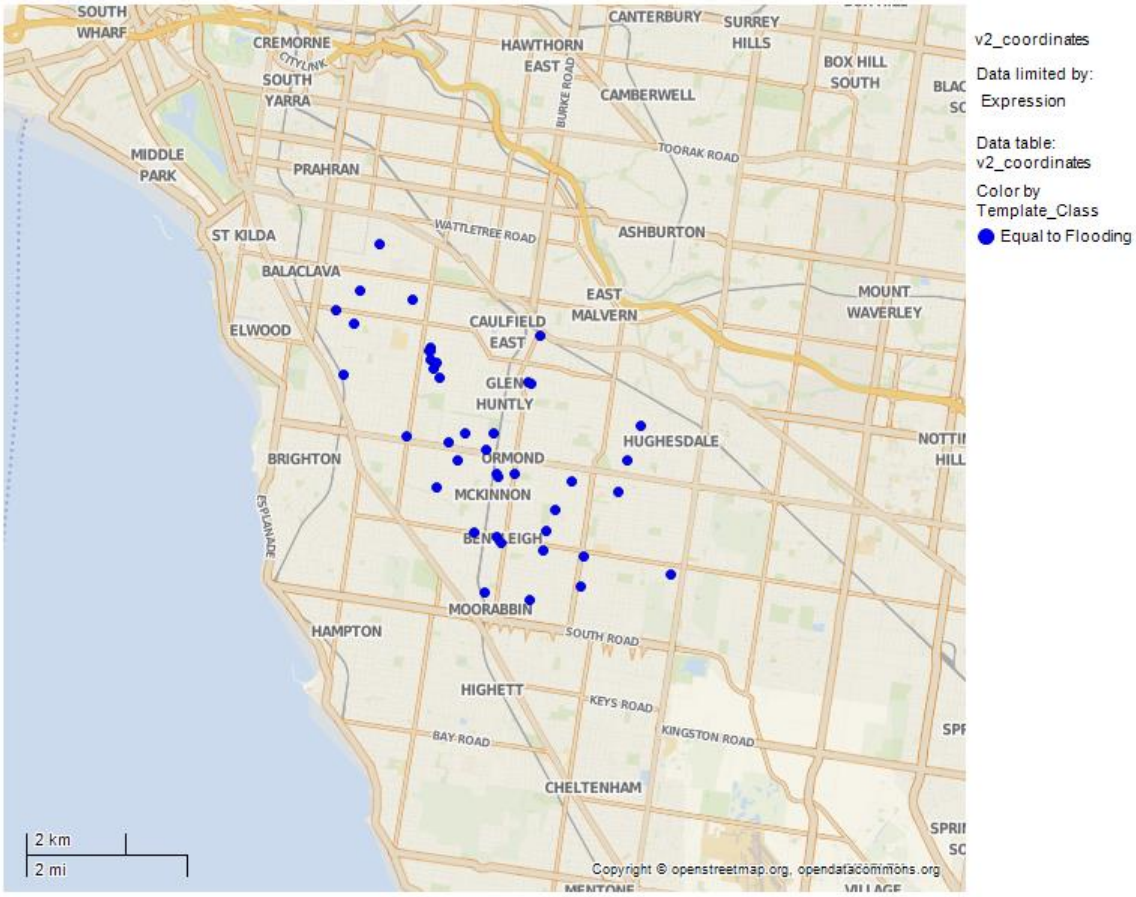
Flooding occurred about 1 hour to 1 hour 30 minutes after the start of heavy rain. Rises were rapid with peak levels reached within about 30 minutes. A second slightly lower peak occurred about 50 minutes after the first as a direct result of the second period of intense rain.

The addresses of properties where assistance was requested from VICSES are listed in Section 2.2 of Appendix C.



24 hour rainfall totals to 9am on 30th December 2016 (from bom.gov.au/vic/)

The VICSES Glen Eira unit responded to199 calls for assistance within a short period of time. Many of these came from the Caulfield South area where the heaviest rain occurred. 59 related to flash flooding – see map.



Map showing location of flood related requests for assistance on 29th December 2016

Infrastructure

Major Roads

The following is a list of major roads (VicRoads roads) that are likely to be inundated as a result of a storm of a particular return period. Note that many minor roads are also likely to be inundated – see maps at Appendix F.

10-year ARI storm event – VicRoads roads flooded by stormwater

- **Bentleigh** - intersection of South Road and Sandra Grove;
- **Bentleigh** - intersection of Penang Street and Jasper Road;
- **Bentleigh** - No.159 Jasper Road;
- **Bentleigh** - Jasper Road from Moretimore Street to McKittrick Road;
- **Bentleigh East** - from No.80 to No.86 East Boundary Road;
- **Bentleigh East** - East Boundary Road from Elizabeth Street to Caleb Street;
- **Bentleigh East** - intersection of East Boundary Road and Laurel Street;
- **Bentleigh East** - East Boundary Road from Parkmore Road to Shrewsbury Street;
- **Bentleigh East** - East Boundary Road from South Road to Denver Street;
- **Bentleigh East** - intersection of South Road and Nina Court;
- **Bentleigh East** - North Road from Jassa Street to Julis Street;
- **Bentleigh East** - North Road from Murray Street to Carey Street;
- **Bentleigh East** - intersection of North Road and Collin Street;
- **Caulfield North** - intersection of Leaburn Avenue and Balaclava Road;

- **Caulfield North** - intersection of Hotham Street and Balaclava Road;
- **Caulfield South** - Hawthorn Road from North Road to Birch Street;
- **Caulfield South** - North Road from Spring Road to Sussex Street;
- **Gardenvale** - North Road from Kooyong Road to Begonia Road;
- **Gardenvale** - intersection of Gardenvale Road and Nepean Highway;
- **Ormond** - intersection of Carcoola Court and Jasper Road;
- **Ormond** - intersection of North Road and Malane Street;
- **Elsternwick -** No.15 to 21 Nepean Highway;
- **Murrumbeena** - near the intersection of North Road and Crosbie Road.

100-year ARI storm event – VicRoads roads flooded by stormwater

- **Bentleigh** - intersection of Centre Road and Thomas Street;
- **Bentleigh** - intersection of Centre Road and Loranne Street;
- **Bentleigh East** - intersection of South Road and Chesterville Road**;**
- **Bentleigh East** - near the intersection of South Road and Blamey St Road;
- **Bentleigh East** - intersection of Warrigal Road and Clifton Street;
- **Bentleigh East** - intersection of Centre Road and Lilac Street;
- **Bentleigh East** - Centre Rd, from Derry Street to Dover Street;
- **Bentleigh East** - Centre Rd, from Mackie Road to Yarrala Road;
- **Bentleigh East** - intersection of Centre Road and Bignell Road;
- **Bentleigh East** - No.735 to 753 Warrigal Road;
- **Carnegie** - intersection of Neerim Road and Grange Road;
- **Carnegie** - intersection of Holywood Grove and Grange Road;
- **Caulfield North** - intersection of Bambra Road and Balaclava Road;
- **Caulfield North** - No.146 Hawthorn Road;
- **Caulfield South** - intersection of Snowdon Avenue and Hawthorn Road;
- **Elsternwick** - Glen Eira Road from Hotham Street to Orrong Road;
- **Glenhuntly** - intersection of Garden Avenue & Grange Road;
- **Murrumbeena** - intersection of Murrumbeena Rd and Churchill Close;
- **Murrumbeena** – No.520B Neerim Road;
- **Murrumbeena** – No.104 Murrumbeena Road to Railway Parade.

Dam Spilling or Failure

The Moorabbin Reservoir (located at 673 Warrigal Rd Glen Eira) is the only reservoir located in the Glen Eira municipal area and is owned and operated by South East Water.

South East Water have an up to date Contingency Plan that has been created to aid in the rapid response essential to control and mitigate damage caused by a failure in the dam. It applies to all incidents that cause disruption of service to customers, threats posed to South East Water's hydraulic system or community health and safety, threats posed to the environment.

This contingency plan is to be used in accordance with the Dam Safety Emergency Plan by the delegated Incident Controller. It provides the information needed to select action plans throughout the Incident.

This contingency plan includes:

- Specifications of the asset ;
- Strategy to be employed to lower the basin in the case of imminent dam failure.
- Equipment required when responding to a failure of the dam.
- Inundation maps.

Access to the Moorabbin Reservoir Contingency Plan will be made available to relevant response and recovery agencies in the event of it being activated.

Flood Inundation Mapping and Floor Levels

Melbourne Water and the Glen Eira City Council have prepared approximate flood inundation maps for the Municipality under a range of storm conditions (i.e. 10-year ARI to 100-year ARI). A subset of those maps is included in this SFEP at Appendix F. The full set of maps is available from the Glen Eira City Council. Detailed floor level information is not yet available for the Municipality.

Note that the Glen Eira Planning Scheme shows areas within the Municipality likely to be inundated by a 1% AEP (100-year ARI) flood event as a result of the surcharging of Melbourne Water Main Drains as SBO (Special Building Overlay). A proposed amendment to the Planning Scheme will identify areas flooded by a 1% AEP (100-year ARI) flood event as a result of surcharging of the Council drainage system. While it is not practical to reproduce the overlay as an attachment to this Plan, hard copies are available from the Glen Eira City Council. They are also available in hard copy form and as PDF digital copies at the Glen Eira City Council MECC and in digital form at the DEECA website http://services.land.vic.gov.au/maps/pmo.jsp.

Flood Photography

Aerial flood photography is not available for the Glen Eira City Council.

A selection of still photographs of the 4 February 2011 event is available from Council and also in the "Flooding Investigation Report" prepared for the Glen Eira City Council by Engeny in July 2011.

Flood Intelligence Cards – see Appendix C

All 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.

APPENDIX B - TYPICAL FLOOD PEAK TRAVEL TIMES

The City of Glen Eira is subject to flash flooding as a result of stormwater being unable to drain through the underground drainage system following heavy rainfall. While a number of drainage investigations have been completed, definitive information on the time it takes flooding to develop (I.e. arrive at a location) following the start of heavy rain and the time it takes for the maximum water depth / extent to be reached is not available. **Timing is however likely to be short: of order 30 minutes to an hour**.

The following table (or its successor) will be updated as data becomes available.

	Comments
From beginning of heavy rainfall	Typically flooding will start within 30 minutes to an hour after start of heavy rainfall. Refer to the flood / no flood tool in Appendix C to gain an appreciation of what denotes "heavy rainfall".
Time to Flood Peak (once 5mm of rain has fallen)	On 29th December 2016 severe thunderstorms delivered approx. 100 year ARI rainfall - Caulfield South (56mm with 34mm in ~25 minutes followed by 20mm in ~15 minutes), Caulfield North (45mm) and Oakleigh South (47mm) recorded in 2 periods about 30 minutes apart with a 3rd period of only light rain. Each period lasted for about 30 minutes. Flooding occurred about 1 hour to 11/2 hours after the start of heavy rain. Rises were rapid with peak levels reached within about 30 minutes. A second slightly lower peak occurred about 50 minutes after the first as a direct result of the second period of intense rain.

APPENDIX C – GLEN EIRA CITY COUNCIL COMMUNITY FLOOD EMERGENCY MANAGEMENT PLAN

Overview of Flooding Consequences

There are no open waterways within the City of Glen Eira. Riverine flooding is therefore not an issue.

Within the City of Glen Eira, the capacity of Melbourne Water drains is generally less than 20% AEP (5-year ARI) and there are currently no plans to upgrade that capacity. Further, there are no formalised overland flow paths within the Municipality. Stormwater flooding is an issue.

Intense rainfall over the Municipality often leads to flash flooding due to the resulting volume of runoff being greater than the capacity of the existing underground stormwater drainage system.

Very little stormwater flows into Glen Eira from neighbouring Municipalities. Flooding within Glen Eira results almost entirely from rain that falls on the Municipality. The exception is from a small part of the Murrumbeena catchment.

High intensity rainfall such as associated with severe thunderstorms or small scale weather systems that are locally intense and slow moving giving average rainfall rates of typically more than 20 mm in 30 minutes or so are likely to lead to flash flooding and / or overland flows, particularly in those areas of the Municipality serviced by the Council drain system.

Blocked or capacity impaired stormwater drains can also lead to overland flows and associated flooding: the drain surcharges and excess water flows above ground. The likely location of such flooding is hard to predict other than in cases where a drain has a past history of surcharging.

Gauges and Warnings

The City of Glen Eira is subject to flash flooding as a result of stormwater being unable to drain through the underground drainage system following heavy rainfall. While a number of drainage investigations have been completed, definitive information on the time it takes flooding to develop (i.e. arrive at a location) following the start of heavy rain and the time it takes for the maximum water depth / extent to be reached is not available. **Timing is however likely to be short: of order 30 minutes to an hour**. Thus, the time available to provide effective warnings of the occurrence of flash flooding is negligible: there is not enough time, even if it was possible to predict which storm events will cause flooding at particular locations.

Gauge	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Caulfield	586115	341 North Road, Caulfield		✓	68 B8
Caulfield North	586194	Caulfield Park, Balaclava Road, Caulfield North		✓	59 C12
Elsternwick Main Drain at Head St, Elsternwick	229660A	East side of the drain, Head Street, Brighton	✓	✓	67 F6
Oakleigh South	586185	Moorabbin Reservoir, Warrigal Road, Bentleigh East		✓	78 D1

Table C1.1 – Gauges within the City of Glen Eira

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. The Bureau of Meteorology's website also links a number of these gauges at: http://www.bom.gov.au/cgi-bin/wrap_fwo.pl?IDV60201.html. It is advised that residents monitor the Bureau of Meteorology's website http://www.bom.gov.au/vic/warnings/index.shtml?ref=hdr and the VicEmergency website https:/emergency.vic.gov.au/ for any thunderstorm, flood or severe weather warnings present for their area.

Areas of Flood Risk

Maps at Appendix F provide guidance on where flooding is likely in the event of heavy rainfall.

A flood risk analysis has been undertaken by Melbourne Water for the nine (9) catchments within the City of Glen Eira (see Figure A1 and maps in Appendix F). This work has identified 5,197 properties as being subject to flooding during 1% AEP flood conditions. Within these catchments, six (6) areas are considered to be subject to extreme flood risk. These areas are as follows:

- Caulfield South Main Drain within the Caulfield South Main Drain catchment;
- Crosbie Park Drain within the Koornang Road Main Drain catchment;
- Graham Avenue Main Drain within the Koornang Road Main Drain catchment;
- Koornang Road Main Drain within the Koornang Road Main Drain catchment;
- Murrumbeena Main Drain sub-catchment upstream of the railway line;
- Murrumbeena Main Drain sub-catchment downstream of the railway line.

Of significant concern are the following two extreme risk 'hot spots'. Both locations were affected by the flooding associated with the storm on 4th February 2011.

Bute Street (near Murrumbeena Station on the Dandenong line)

This location has been flooded 3 or 4 times in the past 10 years. In February 2011, flood waters were up to 2 metres deep within the railway easement and up to 4 metres deep at the lowest point in the road. Melbourne Water in collaboration with Council and VicTrack is investigating possible flood mitigation options.

Cadby Avenue (south of North Road and Ormond Station on the Frankston line)

In February 2011, flood waters backed up behind the railway line to a depth of approximately 1.5 metres. 50 to 60 properties were flooded. Approximately 20 of these properties were flooded over-floor. This location was flood mapped as part of the Elwood Canal catchment investigation. Flood mitigation options are being considered.

Other flood problem areas and known 'hot spots' of concern within the Municipality are located in parts of the following streets:

In **Murrumbeena**:

- Bute Street, Railway Parade, Toward Street, Ardyne Street, Innellan Road, Rosella Street & Howe Street.
- Wilson Street, Dandenong Road and Wahroonga Crescent.

In **Ormond**:

- Cadby Avenue, Station Avenue, McKinnon Road, Prince Edward Avenue, Wheeler Street, Murray Avenue, Glen Orme Avenue and North Road.

In **Caulfield**:

- Bambra Road and Caulfield South Main Drain areas.

In **Caulfield South**:

- Larch Street, Jasmine Street, Birch Street and Rosella Street.
- Pyne Street, Hawthorn Road, Glenhuntly Road and Masters Street.

In **Caulfield North**:

- Rosemont Street, Crotonhurst Avenue, Kooyong Road and Yanakie Crescent.

In **St Kilda East**:

- Bailey Avenue and Orrong Road.

Additional flooding 'hot spots', based on recent experience, are listed below.

LOCATION	CONSEQUENCE	FREQUENCY OF INUNDATION
Dandenong Road, Murrumbeena		Large storms
Cadby / Murray Avenue, Ormond	Houses flooded	Large storms including 4 Feb 2011 & 29 Dec 2017
North Road, Ormond	Waist-high water at some of the low-lying shops near the Shell Service Station on 29 Dec 2017	
Oakleigh Crescent, Ormond	No 28 flooded on 29 Dec 2017 – pit lids blew off – changed to gatic grates. Affected by Koonung Road Main Drain	
Alsten Grove near Greenmeadow Gardens (Park), St Kilda East	Overland flow	
Pyne and Masters Street, Caulfield		Large storms
Miami Court, Bentleigh East		Once a year

LOCATION	CONSEQUENCE	FREQUENCY OF INUNDATION
Florence Street, Bentleigh East	No 5 flooded on 29 Dec 2017 – pit lid blew off. Affected by Koonung Road Main Drain	
Stanley Street, Elsternwick		Once a year
Yanakie Crescent, Caulfield North		
Bailey Avenue, McKinnon		
Queen Street, Ormond	Viaduct frequently fills	
Aroona Road, Caulfield North	Lids surcharge	
Railway Parade, Murrumbeena	Lids surcharge	
London Street, Bentleigh East		
Moylan Street, Bentleigh East		
Jasmine Street, Caulfield South	Park and house flooded	
North Road, Dalmore	Road impassable	
McKinnon and Wheatly Road		
Ripon Grove, Elsternwick	Shops flooded	
Bute Street, Murrumbeena	See below	Flooded 3 times in last 2 years
Members car park		
Ricourt Avenue, Murrumbeena	Floods down William, over park into house	Once a year
Glen Orme Avenue, Ormond		
Parton Court, Carnegie	Houses flooded	4 Feb 2011 & 29 Dec 2017
Orrong Road, St Kilda East	No 187A flooded on 29 Dec 2017 – pit lid blew off.	
Upstream side of Dandenong railway line	Flooding of roads and properties	

Table C1.2 – Areas of flood risk within the City of Glen Eira

The 4th February 2011 storm and flooding provided additional guidance on areas likely to be impacted by severe flooding following heavy rainfall (see figures in Appendix A).

The April 2012 Flood Management Plan (FMP) prepared for Glen Eira City Council and Melbourne Water by Engeny refers to “several ‘hot spots’ incorporating VicRoads and Melbourne Water infrastructure where less severe flooding occurs”. These less severe ‘hot spots’ are also listed in Appendix D of the FMP.

The 29th December 2017 storms and flooding tended to confirm the flooding ‘hot spots’.

Properties at Flood Risk

An updated flood risk analysis undertaken by Melbourne Water in conjunction with Glen Eira City Council for the nine (9) catchments within the City of Glen Eira (see Appendix A and Figure A1 above and map in Appendix F) was completed in 2015. The analysis identified around 8,800 properties as being subject to flooding during 1% AEP flood conditions. Within these catchments, six (6) areas are considered to be subject to extreme flood risk. Within these six areas there are 598 properties identified as being subject to over-floor flooding during 1% AEP flood conditions.

The updated flood modelling for the nine (9) catchments within the Municipality determined that:

- 8,800 properties are at risk of flooding during a 1% AEP (100-year ARI) storm;
- 1,288 properties are at risk of over-floor flooding during a 1% AEP (100-year ARI) storm;
- 1,953 properties are at risk of flooding during a 10% AEP (10-year ARI) storm;
- 127 properties are at risk of over-floor flooding during a 10% AEP (10-year ARI) storm.

The following table reflects analyses conducted by Melbourne Water prior to 2015 and based on the pre-updated flood modelling (as per the maps at Appendix F).

Catchment	Sub catchment	Commercial	Residential	Total number of properties	Risk Rating
Elwood Canal	Caulfield South MD Catchment Bambra Road Main Drain	12	124	136	High
Elwood Canal	Caulfield South MD Catchment Brighton Cemetery Main Drain	3	50	53	High
Elwood Canal	Caulfield South MD Catchment Caulfield South Main Drain	30	794	824	Extreme
Elwood Canal	Caulfield South MD Catchment Mars Street Main Drain	0	344	344	High
Elwood Canal	Grange Road Main Drain	88	669	712	High
Elwood Canal	Koornang Rd MD Catchment Crosbie Park Drain	2	41	80	Extreme
Elwood Canal	Koornang Road MD Catchment Draper Street Main Drain	8	179	180	High
Elwood Canal	Koornang Rd MD Catchment Graham Avenue Main Drain	43	145	161	Extreme
Elwood Canal	Koornang Road MD Catchment Koornang Road Main Drain	72	1358	1478	Extreme
Heatherton Drain(Moorabbin)	Heatherton Drain (Moorabbin)	39	354	414	High
Murrumbeena	Murrumbeena MD Sub-Catchment (Upstream of railway line)	1	666	669	Extreme

Catchment	Sub catchment	Commercial	Residential	Total number of properties	Risk Rating
Murrumbeena	Murrumbeena MD Sub-Catchment (Downstream of railway line)	16	133	146	Extreme

Table C1.3 – Properties at risk of flooding along Gardiners Creek in the City of Boroondara

The table below identifies properties likely to be affected by 1% AEP flooding within the SBO and SBO1 areas identified within the City.

ogr_fid	Property Address	SBO/SBO1
32	Shop 2 332-338 Centre Road BENTLEIGH VIC 3204	SBO
50	7A Mortimore Street BENTLEIGH VIC 3204	SBO
58	187 Orrong Road ST KILDA EAST VIC 3183	SBO
62	187A Orrong Road ST KILDA EAST VIC 3183	SBO
78	1256 Dandenong Road MURRUMBEENA VIC 3163	SBO
89	7 Nangana Road MURRUMBEENA VIC 3163	SBO
113	14A Kangaroo Road MURRUMBEENA VIC 3163	SBO
119	5 Spark Street MURRUMBEENA VIC 3163	SBO
148	Unit 4 4 Pelling Road MURRUMBEENA VIC 3163	SBO
167	Unit 1 9 Moonya Road CARNEGIE VIC 3163	SBO
198	Unit 1 116-118 Orrong Road ELSTERNWICK VIC 3185	SBO
206	378-380 Centre Road BENTLEIGH VIC 3204	SBO
210	11 Moira Avenue CARNEGIE VIC 3163	SBO
216	435 North Road ORMOND VIC 3204	SBO
229	Unit 3 20-24 Moonya Road CARNEGIE VIC 3163	SBO
231	Unit 1 40 Wamba Road BENTLEIGH EAST VIC 3165	SBO
258	121 Oakleigh Road CARNEGIE VIC 3163	SBO
266	1058 North Road BENTLEIGH EAST VIC 3165	SBO
284	182 Bignell Road BENTLEIGH EAST VIC 3165	SBO
300	28 Greendale Road BENTLEIGH EAST VIC 3165	SBO
303	6 Hilary Grove BENTLEIGH EAST VIC 3165	SBO
305	8 Hilary Grove BENTLEIGH EAST VIC 3165	SBO
308	1 Hilton Court BENTLEIGH EAST VIC 3165	SBO
315	2 Lois Court BENTLEIGH EAST VIC 3165	SBO
324	68 Pasadena Crescent BENTLEIGH EAST VIC 3165	SBO
339	3 Waldorf Court BENTLEIGH EAST VIC 3165	SBO
343	4 Geer Court BENTLEIGH EAST VIC 3165	SBO
379	Unit 1 6 Vine Grove CARNEGIE VIC 3163	SBO
429	41 Aroona Road CAULFIELD NORTH VIC 3161	SBO
430	2A Attley Grove ST KILDA EAST VIC 3183	SBO
431	20 Attley Grove ST KILDA EAST VIC 3183	SBO
447	10 Howitt Road CAULFIELD NORTH VIC 3161	SBO
452	7 Howitt Road CAULFIELD NORTH VIC 3161	SBO
464	22 Kambea Grove CAULFIELD NORTH VIC 3161	SBO

ogr_fid	Property Address	SBO/SBO1
469	72 Lumeah Road CAULFIELD NORTH VIC 3161	SBO
473	15-23 Mayfield Street ST KILDA EAST VIC 3183	SBO
475	30 Morrice Street CAULFIELD NORTH VIC 3161	SBO
485	1 Myrtle Street ST KILDA EAST VIC 3183	SBO
494	8 Wootton Grove CAULFIELD NORTH VIC 3161	SBO
498	19 Otira Road CAULFIELD NORTH VIC 3161	SBO
500	36 Otira Road CAULFIELD NORTH VIC 3161	SBO
508	31 Crotonhurst Avenue CAULFIELD NORTH VIC 3161	SBO
543	35 Crotonhurst Avenue CAULFIELD NORTH VIC 3161	SBO
567	74 Rosemont Avenue CAULFIELD NORTH VIC 3161	SBO
619	863 Glen Huntly Road CAULFIELD VIC 3162	SBO
644	4 Masters Street CAULFIELD VIC 3162	SBO
646	8 Masters Street CAULFIELD VIC 3162	SBO
649	34 Pyne Street CAULFIELD VIC 3162	SBO
655	Flat 1 40 Pyne Street CAULFIELD VIC 3162	SBO
711	195-197 Nepean Hwy GARDENVALE VIC 3185	SBO
714	169 North Road GARDENVALE VIC 3185	SBO
751	7 Brooklyn Avenue CAULFIELD SOUTH VIC 3162	SBO
755	56 Filbert Street CAULFIELD SOUTH VIC 3162	SBO
769	858 Glen Huntly Road CAULFIELD SOUTH VIC 3162	SBO
775	480 Hawthorn Road CAULFIELD SOUTH VIC 3162	SBO
787	20 Larch Street CAULFIELD SOUTH VIC 3162	SBO
788	25 Larch Street CAULFIELD SOUTH VIC 3162	SBO
792	26 Larch Street CAULFIELD SOUTH VIC 3162	SBO
832	544 Hawthorn Road CAULFIELD SOUTH VIC 3162	SBO
913	45 Dalmor Avenue ORMOND VIC 3204	SBO
916	46 Dalmor Avenue ORMOND VIC 3204	SBO
921	48 Dalmor Avenue ORMOND VIC 3204	SBO
926	46 Malane Street ORMOND VIC 3204	SBO
934	50 Malane Street ORMOND VIC 3204	SBO
938	453 North Road ORMOND VIC 3204	SBO
967	1310 Glen Huntly Road CARNEGIE VIC 3163	SBO
972	38 Mernda Avenue CARNEGIE VIC 3163	SBO
978	79 Truganini Road CARNEGIE VIC 3163	SBO
979	9 Vine Grove CARNEGIE VIC 3163	SBO
982	38 Hunter Street CARNEGIE VIC 3163	SBO
996	14 Moira Avenue CARNEGIE VIC 3163	SBO
998	37 Morgan Street CARNEGIE VIC 3163	SBO
1000	45 Morgan Street CARNEGIE VIC 3163	SBO
1010	26 Rosanna Street CARNEGIE VIC 3163	SBO
1017	Unit 1 1 Blair Street BENTLEIGH VIC 3204	SBO
1036	23 Carlton Street MCKINNON VIC 3204	SBO

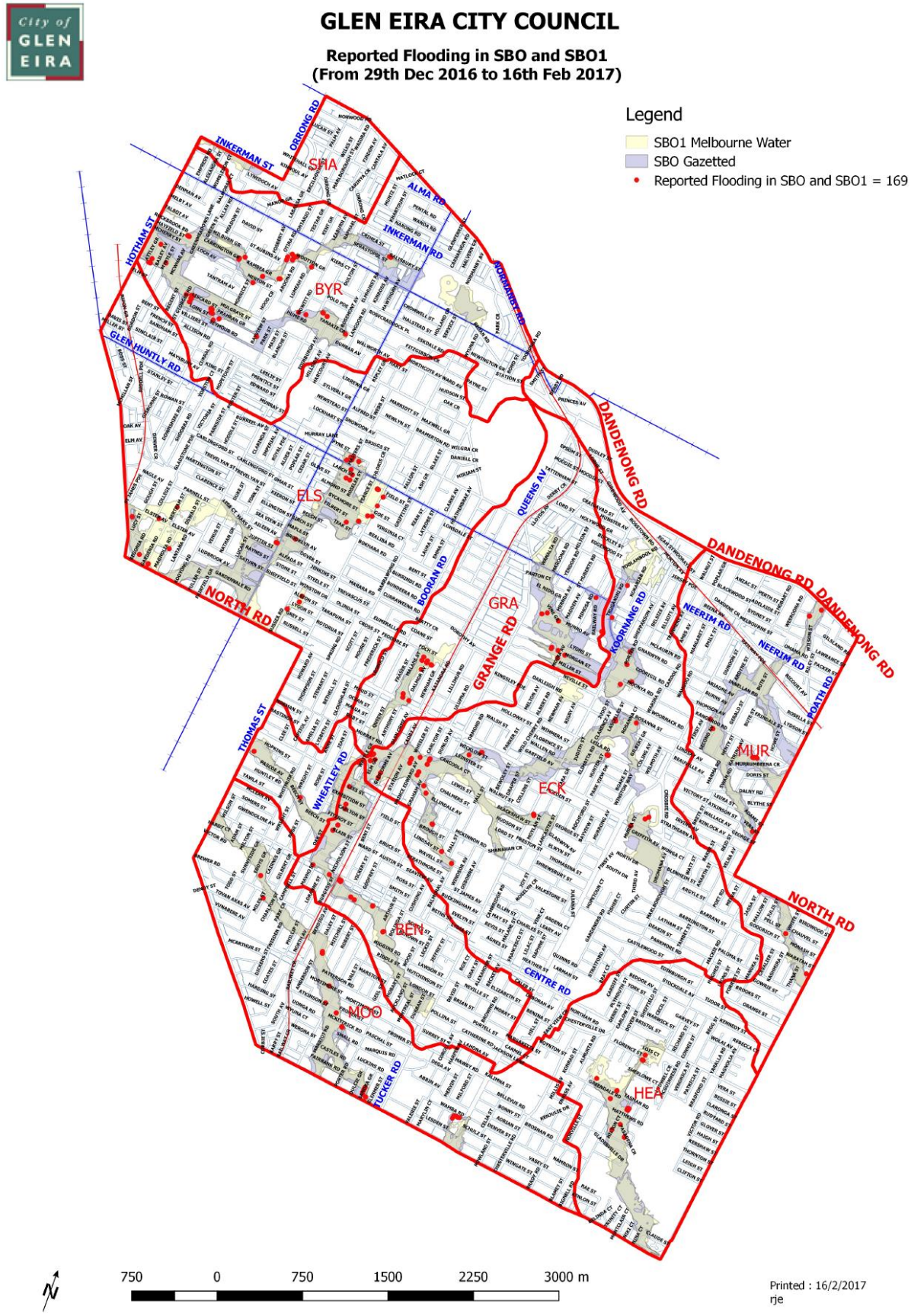
ogr_fid	Property Address	SBO/SBO1
1046	20 Exhibition Street MCKINNON VIC 3204	SBO
1048	4 Fitzroy Street BENTLEIGH VIC 3204	SBO
1051	9 Glen Orme Avenue MCKINNON VIC 3204	SBO
1053	13 Glen Orme Avenue MCKINNON VIC 3204	SBO
1066	3 Hawthorn Grove MCKINNON VIC 3204	SBO
1068	4 Hawthorn Grove MCKINNON VIC 3204	SBO
1074	Reserve 15B Wattle Grove MCKINNON VIC 3204	SBO
1081	21 Lees Street MCKINNON VIC 3204	SBO
1084	1 Tyrone Street ORMOND VIC 3204	SBO
1104	29 Lindsay Street MCKINNON VIC 3204	SBO
1107	48 Lindsay Street BENTLEIGH VIC 3204	SBO
1110	2 Malacca Street MCKINNON VIC 3204	SBO
1115	1 Oakleigh Crescent ORMOND VIC 3204	SBO
1120	2 Oakleigh Crescent ORMOND VIC 3204	SBO
1125	7 Penang Street MCKINNON VIC 3204	SBO
1132	32 Prince Edward Avenue MCKINNON VIC 3204	SBO
1135	36 Prince Edward Avenue MCKINNON VIC 3204	SBO
1142	40 Station Avenue MCKINNON VIC 3204	SBO
1153	3 Wheeler Street ORMOND VIC 3204	SBO
1155	10 Wheeler Street ORMOND VIC 3204	SBO
1160	Unit 1 274 McKinnon Road MCKINNON VIC 3204	SBO
1200	928 North Road BENTLEIGH EAST VIC 3165	SBO
1256	10 Eddys Grove BENTLEIGH VIC 3204	SBO
1287	Unit 2 36 Wamba Road BENTLEIGH EAST VIC 3165	SBO
1320	42 Wamba Road BENTLEIGH EAST VIC 3165	SBO
1325	400 Centre Road BENTLEIGH VIC 3204	SBO
1328	Unit 1 49 Gilmour Road BENTLEIGH VIC 3204	SBO
1332	Unit 1 30 Daley Street BENTLEIGH VIC 3204	SBO
1335	410 Centre Road BENTLEIGH VIC 3204	SBO
1341	28 Daley Street BENTLEIGH VIC 3204	SBO
1344	88 Daley Street BENTLEIGH VIC 3204	SBO
1347	6 Fromer Street BENTLEIGH VIC 3204	SBO
1350	161 Jasper Road BENTLEIGH VIC 3204	SBO
1359	Reserve 1 Arthur Street BENTLEIGH VIC 3204	SBO
1363	71 Jasper Road BENTLEIGH VIC 3204	SBO
1390	1 Sandra Grove BENTLEIGH VIC 3204	SBO
1392	3 Sandra Grove BENTLEIGH VIC 3204	SBO
1398	5 Sandra Grove BENTLEIGH VIC 3204	SBO
1400	Unit 1 7 Sandra Grove BENTLEIGH VIC 3204	SBO
1402	Unit 2 7 Sandra Grove BENTLEIGH VIC 3204	SBO
1411	559 South Road BENTLEIGH VIC 3204	SBO
1415	Flat 1 85 Mitchell Street BENTLEIGH VIC 3204	SBO

ogr_fid	Property Address	SBO/SBO1
1434	18 Bayview Street ELSTERNWICK VIC 3185	SBO
1467	121 Orrong Road ELSTERNWICK VIC 3185	SBO
1469	129 Orrong Road ELSTERNWICK VIC 3185	SBO
1473	4 Prahran Grove ELSTERNWICK VIC 3185	SBO
1483	68 St Georges Road ELSTERNWICK VIC 3185	SBO
1489	72 St Georges Road ELSTERNWICK VIC 3185	SBO
1497	73 St Georges Road ELSTERNWICK VIC 3185	SBO
1500	76 St Georges Road ELSTERNWICK VIC 3185	SBO
1539	6 The Crossover CARNEGIE VIC 3163	SBO
1559	8 Wicklow Street ORMOND VIC 3204	SBO
1561	1A Sandra Grove BENTLEIGH VIC 3204	SBO
1567	1 Hawthorn Grove MCKINNON VIC 3204	SBO
1603	Unit 1 2 Malane Street ORMOND VIC 3204	SBO
1631	Flat 1 25 Truganini Road CARNEGIE VIC 3163	SBO
1644	2A Vera Street MURRUMBEENA VIC 3163	SBO
1652	3B Kangaroo Road MURRUMBEENA VIC 3163	SBO
1673	Reserve 821 North Road MURRUMBEENA VIC 3163	SBO
1679	Unit 1 42 Wright Street MCKINNON VIC 3204	SBO
1689	140-146 Glen Eira Road ELSTERNWICK VIC 3185	SBO
1697	Unit 1 30 Pell Street BENTLEIGH EAST VIC 3165	SBO
1704	282 Tucker Road ORMOND VIC 3204	SBO
1708	284 Tucker Road ORMOND VIC 3204	SBO
1710	8 Coorigil Road CARNEGIE VIC 3163	SBO
1720	Unit 2 755 Warrigal Road BENTLEIGH EAST VIC 3165	SBO
1726	Unit 1 12 Begonia Road GARDENVALE VIC 3185	SBO
1730	1 Pascoe Avenue BENTLEIGH VIC 3204	SBO
1738	Unit 1 36 Wamba Road BENTLEIGH EAST VIC 3165	SBO
1740	Unit 1 38 Wamba Road BENTLEIGH EAST VIC 3165	SBO
1744	14 Railway Road CARNEGIE VIC 3163	SBO
1766	17 Miles Street BENTLEIGH VIC 3204	SBO
55	Unit 1 25 Bertram Street ELSTERNWICK VIC 3185	SBO 1
66	24A Albion Street CAULFIELD SOUTH VIC 3162	SBO 1
155	Unit 4 179-181 Bambra Road CAULFIELD SOUTH VIC 3162	SBO 1
161	Unit 4 198 Orrong Road CAULFIELD NORTH VIC 3161	SBO 1
221	218 Bambra Road CAULFIELD SOUTH VIC 3162	SBO 1
286	3 Bovec Court BENTLEIGH EAST VIC 3165	SBO 1
339	3 Waldorf Court BENTLEIGH EAST VIC 3165	SBO 1
350	78 Gardenvale Road GARDENVALE VIC 3185	SBO 1
502	3 Wootton Grove CAULFIELD NORTH VIC 3161	SBO 1
522	18 Edith Street CAULFIELD NORTH VIC 3161	SBO 1
694	2 College Street ELSTERNWICK VIC 3185	SBO 1
742	21 Albion Street CAULFIELD SOUTH VIC 3162	SBO 1

ogr_fid	Property Address	SBO/SBO1
744	213 Bambra Road CAULFIELD SOUTH VIC 3162	SBO 1
758	65 Filbert Street CAULFIELD SOUTH VIC 3162	SBO 1
795	35 Lygon Street CAULFIELD SOUTH VIC 3162	SBO 1
841	188 Bambra Road CAULFIELD SOUTH VIC 3162	SBO 1
846	198 Bambra Road CAULFIELD SOUTH VIC 3162	SBO 1
910	36 Dalmor Avenue ORMOND VIC 3204	SBO 1
1044	21 Elm Grove MCKINNON VIC 3204	SBO 1
1149	1 Wheeler Street ORMOND VIC 3204	SBO 1
1455	148 Glen Eira Road ELSTERNWICK VIC 3185	SBO 1
1483	68 St Georges Road ELSTERNWICK VIC 3185	SBO 1
1545	Unit 3 1-3 Pearce Street CAULFIELD SOUTH VIC 3162	SBO 1

Table C1.4 – Properties located within the Special Building Overlays within the City of Glen Eira

Location of reports of property flooding between 29th December 2016 and 16th February 2017



Properties requested assistance with flooding from November 2010 to 29th December 2016

ADDRESS	CITY	MMM/YYY WHEN VICSES ASSISTANCE REQUESTED
ALMOND STREET	CAULFIELD SOUTH 3162	NOV 2010, FEB 2011 AND DEC 2016
ANDERSON STREET	CAULFIELD 3162	MAR 2014 & DEC 2016
BAMBRA ROAD	CAULFIELD SOUTH 3162	FEB 2011 & DEC 2016
BRIGGS STREET	CAULFIELD 3162	One Unit only in DEC 2011 & DEC 2016
CADBY AVENUE	ORMOND 3204	DEC 2016
CARCOOLA COURT	ORMOND 3204	FEB 2011 & DEC 2016
CARLYON STREET	ORMOND 3204	FEB 2011 & DEC 2016
DALMOR AVENUE	ORMOND 3204	FEB 2011 & DEC 2016
DRAPER STREET	MCKINNON 3204	FEB 2011 & DEC 2016
EL NIDO GROVE	CARNEGIE 3163	FEB 2011 & DEC 2016
ELIZABETH CRESCENT	CARNEGIE 3163	FEB 2011 & DEC 2016
ELM GROVE	MCKINNON 3204	FEB 2011 & DEC 2016
FILBERT STREET	CAULFIELD SOUTH 3162	FEB 2011 & DEC 2016
GLEN HUNTLY ROAD	CAULFIELD 3162	FEB 2011 & DEC 2016
GLEN HUNTLY ROAD	CAULFIELD SOUTH 3162	FEB 2011 & DEC 2016
GLEN HUNTLY ROAD	CARNEGIE 3163	FEB 2011
GLEN ORME AVENUE	MCKINNON 3204	FEB 2011 & DEC 2016
GRAHAM AVENUE	MCKINNON 3204	FEB 2011 & DEC 2016
HAWTHORN ROAD	CAULFIELD SOUTH 3162	FEB 2011
HEMINGFORD ROAD	BENTLEIGH EAST 3165	FEB 2011 & DEC 2016
HOWARD AVENUE	ORMOND 3204	FEB 2011
JASPER ROAD	MCKINNON 3204	FEB 2011 and DEC 2016
LARCH STREET	CAULFIELD SOUTH 3162	FEB 2011 & NOV 2013 and DEC 2016
LEINSTER STREET	ORMOND 3204	DEC 2016
MADDEN AVENUE	CARNEGIE 3163	FEB 2011
MALANE STREET	ORMOND 3204	FEB 2011 & DEC 2016
MASTERS STREET	CAULFIELD 3162	NOV 2011
MCKINNON ROAD	MCKINNON 3204	FEB 2011 and DEC 2016
MOORE STREET	CAULFIELD SOUTH 3162	DEC 2016
MURRAY ROAD	ORMOND 3204	OCT 2011
NORTH ROAD	ORMOND 3204	DEC 2016
OLIVE STREET	CAULFIELD SOUTH 3162	FEB 2011
PARTON COURT	CARNEGIE 3163	FEB 2011 & DEC 2016
PENANG STREET	MCKINNON 3204	DEC 2016
PRINCE EDWARD AVENUE	MCKINNON 3204	FEB 2011
PYNE STREET	CAULFIELD 3162	FEB 2011 AND DEC 2016
QUEEN STREET	ORMOND 3204	FEB 2011
RAYMOND GROVE	CAULFIELD SOUTH 3162	DEC 2016
REMUERA STREET	CAULFIELD SOUTH 3162	DEC 2016
SCOTT STREET	CAULFIELD SOUTH 3162	DEC 2016

ADDRESS	CITY	MMM/YYY WHEN VICSES ASSISTANCE REQUESTED
SNOWDON AVENUE	CAULFIELD 3162	FEB 2011 AND DEC 2016
STATION AVENUE	MCKINNON 3204	One Unit only in FEB 2011
STEWART STREET	ORMOND 3204	FEB 2011
SYCAMORE STREET	CAULFIELD SOUTH 3162	FEB 2011 AND DEC 2016
VALKSTONE STREET	BENTLEIGH EAST 3165	FEB 2011 and DEC 2016
WANALTA ROAD	CARNEGIE 3163	NOV 2011
WHEELER STREET	ORMOND 3204	FEB 2011
WICKLOW STREET	ORMOND 3204	NOV 2011 AND DEC 2016

Table C1.5 – Properties reporting flooding assistance to VICSES during severe weather events

In addition to the above, the following additional roads were flooded during the 29th December 2016 event:

- Almond Street, Caulfield South
- Attley Grove, St Kilda East
- Blair Street, Bentleigh
- Centre Road – between Marlo and Loranne Streets
- Murray Road, Ormond
- Olive Street, Caulfield South
- Teak Street, Caulfield South
- Tyrone Street, Ormond

Isolation

While access to pockets of the City of Glen Eira may be compromised for short periods of time during major storm / flash flood events (i.e. 100-year ARI or similar), flood waters will not remain for an extended period. Major isolation is unlikely to be a significant issue. Refer to the VicRoads website for information on road closures (http://alerts.vicroads.vic.gov.au).

Vulnerable Establishments

Vulnerable establishments (e.g. hospitals, aged care facilities, schools, etc) within the City of Glen Eira are detailed in the MEMP. **Note** that a list is not provided herein in order to avoid issues relating to the maintenance of identical lists in multiple locations.

Essential Infrastructure

The Dandenong and Frankston railway lines run through the Municipality. While flood waters do back up against the railway embankment, both lines are expected to remain dry and serviceable during a major storm / flash flood event (i.e. 100-year ARI or similar).

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/. A map of Public Transport routes within the City of Boroondara is available via the website at: https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/530ff88eaa/4_Boroondara_LAM.pdf

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.

Flood Mitigation

General

Flood intelligence MUST have regard for changes within catchments that modify likely flood behaviour (e.g. mitigation works that reduce the severity of flood risk).

Flood Protection Levees

There are no flood protection levees within the City of Glen Eira.

Stormwater Retarding Basins

There are no stormwater retarding basins within the City of Glen Eira.

Drainage Works

Where possible, Council is upgrading the existing drainage system in order to increase its capacity so that it is equal or greater than the 10% AEP design flow.

Underground Flood Storage

On a priority basis and where possible, Council is upgrading the capacity of the existing drainage system to accommodate the 10% AEP (10-year ARI) flow. In cases where the Council drainage systems discharge into a Melbourne Water Main Drain and that Main Drain is under capacity (i.e. where upgrading Council's existing drainage system would transfer the flooding problem from upstream to downstream),Council works to install under-street stormwater detention systems (this is the most practical solution given the city's very limited open space) such that outflows for a 10% AEP design event are equal to or less than the capacity of the downstream drainage systems.

Since 2010, Council has installed 10 detention systems in streets.

Additional Measures

Additional flood mitigation measures are being considered by Melbourne Water, VicTrack and Council following flooding in February 2011 and the completion of relevant drainage studies.

Control, Command and Coordination

VICSES will assume overall control of the response to flood incidents. Control and coordination of a flood incident shall be carried out at the lowest effective level and in accordance with the SEMP. During significant events, VICSES will conduct incident management using multi-agency resources.

Flood Impacts and Operational Considerations (Intelligence Cards)

Refer to following action table.

Note that:

- Users of the action table should consider rainfall depth and rates at locations across the Municipality and use the graph at Figure C1 in order to better appreciate likely flood impacts within the Municipality.
- In Flash Flood areas without gauges, it will only be possible to provide a general description of likely flood impacts.

FLOOD INTELLIGENCE CARD – CITY OF GLEN EIRA (UNGAUGED)

Version 2 – February 2024

As there are no water level / flood gauges within the City of Glen Eira and the BoM does not currently provide area specific flash flood forecasts, all flood related response actions must be driven by rainfall observations and / or on-ground observations of overland flows and rising stormwater on roads and along overland flow paths.

It is suggested that data from the following rainfall stations (**Caulfield South, Oakleigh South and / or Caulfield North** - see BoM and Melbourne Water websites or FloodZoom for most recent data[1]) are used to determine an appropriate rainfall depth for use in the Flood / No Flood guidance tool provided at following this table.

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.

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	**Annual Exceedance Probability (% AEP)**	**Consequence / Impact**	**Operational Considerations**
8.5mm in 20 mins to 18mm in 2 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.	100% AEP (1-year ARI)	Likely to be nuisance flooding only (e.g. shallow water over roads etc)	
18mm in 20 minutes to 36mm in 2 hours Note: rainfall depths are a very rough method of	10% AEP (10-year ARI)	Some ponding of stormwater in low lying parts of roads and some overland flows. Water not deep but may need local management to reduce inconvenience.	Check 'hot spots' for flooding: ○ **Bentleigh East**: Miami Court, Moylan Street and London Street ○ **Caulfield North**: Rosemont Street, Crotonhurst Avenue, Kooyong Road and Yanakie Crescent

[1] Note that if rainfall data is not available from these stations, consider using data from the rain gauges at **Hampton; Elsternwick Drain at Head Street; Gardiners Creek at Gardiners**; **Gardiners Creek at Ashwood.**

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.			○ **Caulfield South**: Larch Street, Jasmine Street, Birch Street and Rosella Street as well as Pyne Street, Hawthorn Road, Glenhuntly Road and Masters Street ○ **Elsternwick**: Stanley Street ○ **McKinnon**: Bailey Avenue ○ **Murrumbeena**: Bute Street, Railway Parade, Toward Street, Ardyne Street, Innellan Road, Rosella Street and Howe Street as well as Wilson Street, Dandenong Road, Ricourt Avenue and Wahroonga Crescent ○ **Ormond**: Cadby Avenue, Station Avenue, McKinnon Road, Prince Edward Avenue, Wheeler Street, Murray Avenue, Glen Orme Avenue and North Road ○ **St Kilda East**: Bailey Avenue and Alsten Grove near Greenmeadow Gardens (Park**).** 1,500 properties subject to flooding more than 300mm deep.
		Shallow flooding likely to increase in 'hot spots' in Council drainage areas.	
21mm in 20 mins to 42mm in 2 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)		
		Deeper flooding likely in all 'hot spots' and some roads flooded.	
26mm in 20 mins to 51mm in 2 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the	2% AEP (50-year ARI)		Check 'hot spots' for flooding: ○ **Dalmore** : North Road ○ **McKinnon**: Wheatly Road ○ **Elsternwick**: Ripon Grove Upstream of Dandenong rail line

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
catchment. This should be used as a guide only.			
		Some flooding likely in areas shown on 1% AEP flood maps in Appendix F, particularly in Council drainage areas	
31mm in 20 mins to 59mm in 2 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)	Severe deep flooding likely similar to what was experienced on 4 February 2011 with many houses flooded over-floor. On 29 December 2016, severe thunderstorms delivered 34mm in ~25 minutes and half an hour later another 20mm in ~15 minutes.	5,197 properties identified as being subject to flooding. 3,358 properties subject to over-floor flooding (see maps at Appendix F) from: ○ Caulfield South Main Drain within the Caulfield South Main Drain catchment ○ Crosbie Park Drain within the Koornang Road Main Drain catchment ○ Graham Avenue Main Drain within the Koornang Road Main Drain catchment ○ Koornang Road Main Drain within the Koornang Road Main Drain catchment ○ Murrumbeena Main Drain sub-catchment upstream of the railway line ○ Murrumbeena Main Drain sub-catchment downstream of the railway line Elster Creek Main Drain including Elwood Canal within the City of Glen Eira

Table C1.6 – Breakdown of possible consequences at various rainfall intensities around the City of Glen Eira with operational considerations

List of Vulnerable Facilities for Evacuation in the Case of Flooding

Vulnerable establishments (e.g. hospitals, aged care facilities, schools, etc) within the City of Glen Eira are detailed in the MEMP. **Note** that a list is not provided herein in order to avoid issues relating to the maintenance of identical lists in multiple locations.

Flood / No flood Guidance Tool

In the lead up to a flood event

It is suggested that data from the following rainfall stations (**Caulfield South, Oakleigh South and / or Caulfield North** - see BoM and Melbourne Water websites or FloodZoom for most recent data[2]) are used to determine an appropriate rainfall depth for use in the following Flood / No Flood guidance tool. It is further suggested that either an average value is used to drive the tool or, for a more conservative approach, the maximum depth from appropriate gauges. This approach will work reasonably well as the IFD gradient across the Municipality and adjacent areas is minimal.

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

Approach 1: Using the total rainfall depth obtained from the start of the event (discount early drizzle or very light rain), plot the rainfall depth against elapsed time on a copy of the tool. A new plot should be started on receipt of data for each new time step and existing plots should be extended using the new data. Assess the likelihood and expected severity of flooding from the curves with due regard for included notes. A crossing of the curves by any of the plots indicates that flooding of around that severity is likely.

Approach 2: Discount the early lighter rain from consideration (i.e. begin calculating rainfall depth from start of heavy rain) and plot rainfall depth against time on a copy of the tool. A new plot should be started on receipt of data for each new time step and existing plots should be extended using the new data. Assess the likelihood and expected severity of flooding from the curves with due regard for included notes. A crossing of the curves by any of the plots indicates that flooding is likely.

A word of caution. The tool is based on a number of gross assumptions and generalisations. A strength of the tool is that it does provide a quick ball-park answer to questions such as “will we flood” and “how bad will it be”. However, the tool is indicative only and while it will not always indicate the expected severity of flooding correctly, it will usually give a heads-up to severe flooding and thus of likely consequences. The tool is not location specific and does not enable accurate predictions of expected flooding, peak flood heights, the time of flood peak, the severity of expected flooding or the likely consequences

After a flood event

After a flood event, plot the event rainfall depth with a date on the tool and include an overview of the event, including antecedent conditions, in Appendix A of this SFEP.

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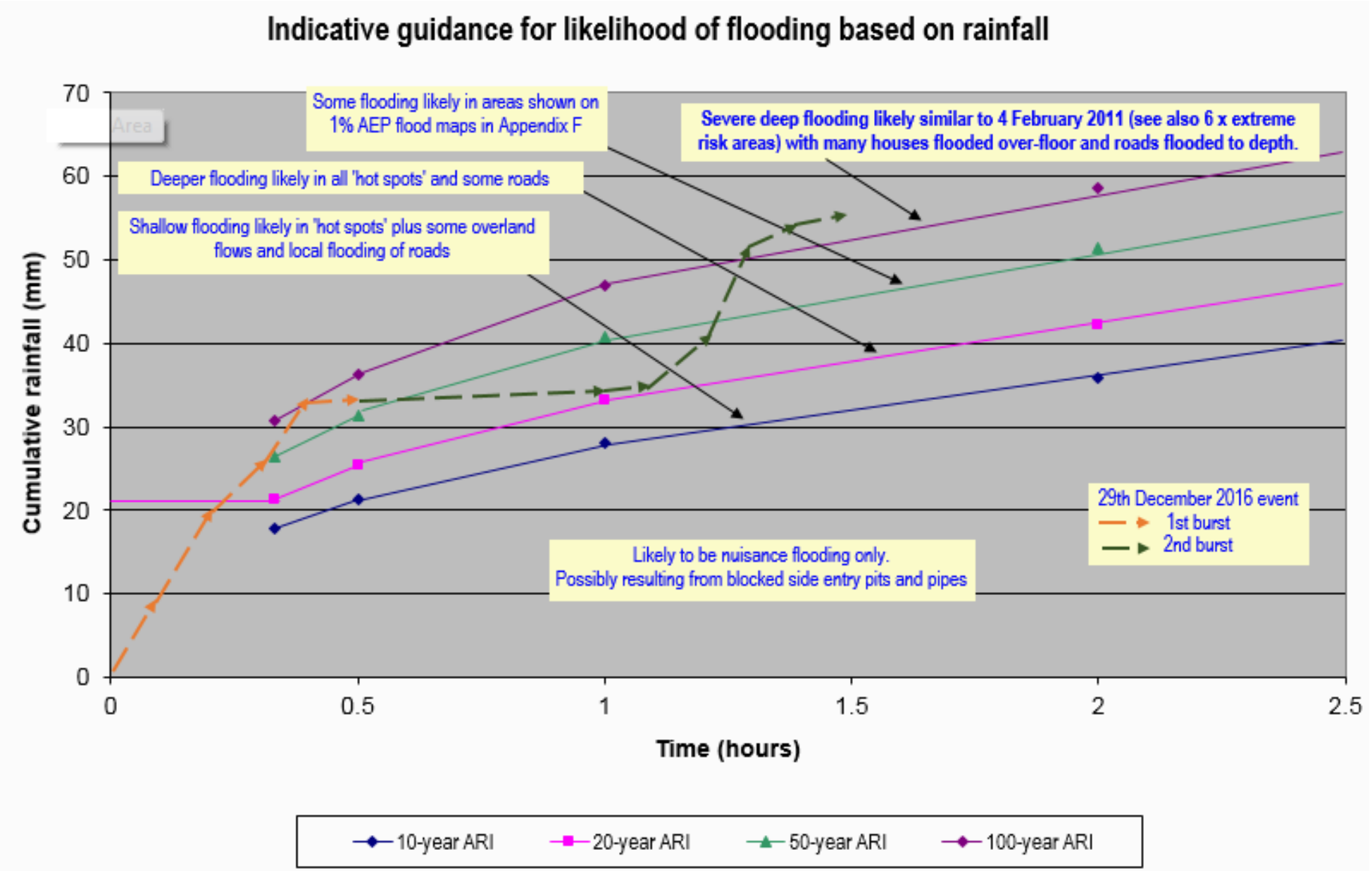
[2] Note that if rainfall data is not available from these stations, consider using data from the rain gauges at **Hampton; Elsternwick Drain at Head Street; Gardiners Creek at Gardiner**s; **Gardiners Creek at Ashwood.**


Indicative guidance for likelihood of flooding based on rainfall
Some flooding likely in areas shown on 1% AEP flood maps in Appendix F
Severe deep flooding likely similar to 4 February 2011 (see also 6 x extreme risk areas) with many houses flooded over-floor and roads flooded to depth.
Deeper flooding likely in all 'hot spots' and some roads
Shallow flooding likely in 'hot spots' plus some overland flows and local flooding of roads
29th December 2016 event
1st burst
2nd burst
Likely to be nuisance flooding only.
Possibly resulting from blocked side entry pits and pipes
Cumulative rainfall (mm)
Time (hours)
0
10
20
30
40
50
60
70
0
0.5
1
1.5
2
2.5
10-year ARI
20-year ARI
50-year ARI
100-year ARI

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

Animal shelter compounds will be established for domestic pets and companion animals of evacuees. Animal shelters will be determined dependent on the location and the size of the event.

The requirement for animal management in Glen Eira is not expected to be excessive or involve large livestock animals.

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

Caravans

No arrangements exist for the evacuated of caravans.

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.

If residents wish to purchase sandbags for use during small scale events, sandbags can be purchased from Bunnings or other hardware stores. For larger scale events sandbag collection points and filling points will be determined by the IC if considered appropriate. Community members will be informed of these points depending on the nature and proximity of the event. **Note** that as floodwaters are likely to rise quickly within the City of Glen Eira, sandbags are unlikely to be an effective flood protection measure unless used or placed in position ahead of rain.

Rescue

The following resources are available within the City of Glen Eira 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

Public Information and Warnings

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

VICSES uses EM-COP Public Publishing to distribute warnings in Victoria. The platform enables automatic publishing to the VicEmergency app, website and hotline (1800 226 226). Communities can also access this information through VICSES social media channels (Victoria State Emergency Service on Facebook and VICSES News on Twitter) and emergency broadcasters, such as Sky News TV and various radio stations (current list available via the EMV website).

VICSES Regions (or ICCs where established) lead the issuing of warnings for riverine flood events when pre-determined triggers are met (issuing of a BOM Flood Watch or Warning), and share locally tailored information via the standard VICSES communication channels (social media, traditional media, web and face to face). These activities are coordinated by the VICSES RDO and approved by the VICSES RAC, or the PIO and IC respectively (when an ICC is active).

If verified reports are received of flash flooding posing, or resulting in, a significant threat to life or property, VICSES Regions (or ICCs) will issue a flash flood warning product via EM-COP.

VICSES at the state tier (or SCC Public Information Section) lead the issuing of warnings for severe weather and storm when pre-determined triggers are met and plays an important role in sharing riverine and flash flood information via state-based standard communication channels.

During some emergencies, VICSES may alert communities by sounding a local siren, or by using the Emergency Alert (EA) platform to send an SMS to mobile phones or a voice message to landlines. The use of sirens for higher-end warnings has been pre-determined, and mapped to relevant warning templates in EM-COP.

EM-COP Public Publishing Business Rules are available in the **Public Information section of the IMT Toolbox,** providing further guidance on specific triggers, roles and responsibilities. VICSES SOP057 and JSOP 04.01 also provide further guidance.

Local Flood Warning System Arrangements

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

APPENDIX F – MAPS & SCHEMATICS

Disclaimer

The information is provided as guidance only and Council cannot guarantee the accuracy or completeness of the information. Council will not be liable for any loss or damage sustained by you or any third party in relying on the information in this Appendix and the associated maps. If you provide the information to any third party you must also provide the contents of this disclaimer. Note also that information about flood levels is separate to, and does not take into account, Council's planning controls or policies.

Overview

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

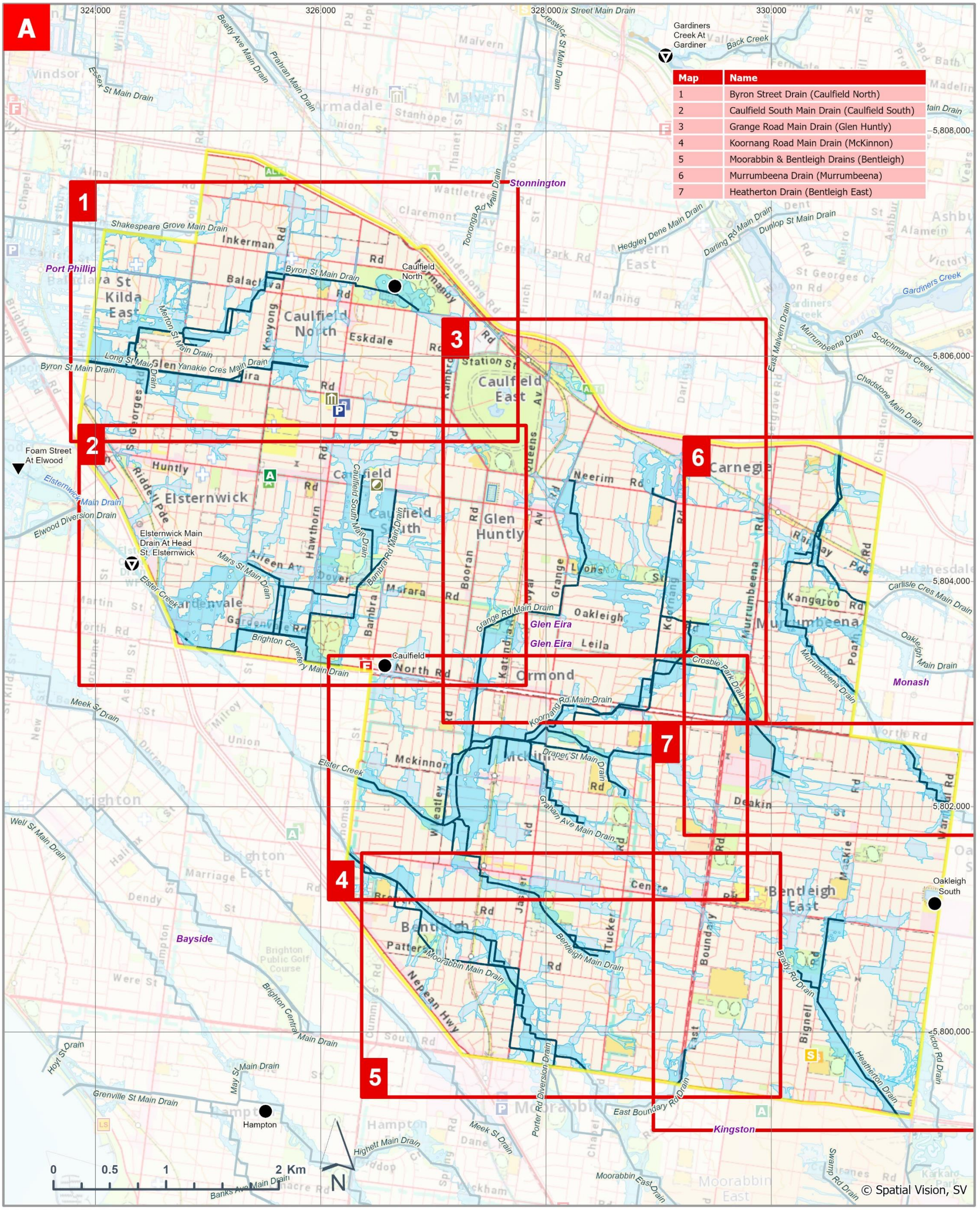
- A map showing the Municipal boundary together with the extent of the catchment for each of the nine (9) drains within the City of Glen Eira (sourced from the Flood Management Plan, April 2012 prepared by Engeny Pty Ltd for Glen Eira City Council and Melbourne Water).
- A set of three maps showing the underground stormwater drainage pipe network within the City of Glen Eira together with the 1% AEP (100-year ARI) flood extents from all drains (sourced from the Flood Management Plan, April 2012 prepared by Engeny Pty Ltd for Glen Eira City Council and Melbourne Water).
- A set of three maps showing flooding hot spots within the City of Glen Eira together with the 1% AEP (100-year ARI) flood extents from all drains (sourced from the Flood Management Plan, April 2012 prepared by Engeny Pty Ltd for Glen Eira City Council and Melbourne Water).
- A single map showing flooding hot spots within the City of Glen Eira together with the Main Drains 1% AEP (100-year ARI) flood extents (prepared by Melbourne Water for VICSES using VICSES data).
- A single map showing the Main Drains 1% AEP (100-year ARI) flood extents within the City of Glen Eira (prepared by Melbourne Water for VICSES).
- A single map showing the location of historical flood event impacts: 1916 to 2011 (prepared by Melbourne Water for VICSES).
- A set of twenty-four maps (prepared by Melbourne Water for VICSES) that show:
    - The Main Drains 5%, 2% and 1% AEP (20-year, 50-year and 100-year ARI) flood extents;
    - Properties likely to be flooded over-floor by the Main Drains 5%, 2% and 1% AEP (20-year, 50-year and 100-year ARI) flood events; and
    - The likely depth of flooding on all roads during a 1% AEP (100-year ARI) flood event in the Main Drains.
- Schematics detailing the drainage catchments relevant for this municipality.
    - 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:

- 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 Transport & Planning website https://mapshare.vic.gov.au/vicplan/.
- Maps showing floodways are shown at DEECA's mapshare website: https://mapshare.vic.gov.au/mapsharevic/
- 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.

City of Glen Eira Municipal Maps (sourced Melbourne Water GIS)



Map	Name
1	Byron Street Drain (Caulfield North)
2	Caulfield South Main Drain (Caulfield South)
3	Grange Road Main Drain (Glen Huntly)
4	Koornang Road Main Drain (McKinnon)
5	Moorabbin & Bentleigh Drains (Bentleigh)
6	Murrumbeena Drain (Murrumbeena)
7	Heatherton Drain (Bentleigh East)

Map produced by VICSES January 2024.

Waterbody
1% AEP Riverine Flood Extent
1% AEP Flash Flood Extent
Waterway
Melbourne Water Stormwater Drain
Levee
Embankment

VICSES Unit
Ambulance Station
Municipal Depot
Fire Station
Lifesaving Club
Municipal Offices / Civic Centre
Police Station

Stream Level & Rain Gauge
Stream Level Gauge
Rain Gauge
Glen Eira Mask
Glen Eira Boundary
Map Border

LAND USE
Residential
Commercial and Business
Industrial
Public Parks / Cemeteries / Recreation
Utilities and Local Government Facilities
Education

CITY OF GLEN EIRA

1% AEP (100yr ARI) Flooding

A. Municipal Flood Index Map (1% AEP (100yr ARI) Extent)

SES
VICTORIA State Government
Melbourne Water

B

Flood Study Details

Bambra Road Main Drain (Elwood Canal, GHD, March 2010)
Bentleigh Main Drain (Elwood Canal, GHD, March 2010)
Byron Street Main Drain (Elwood Canal, GHD, March 2010)
Caulfield South Main Drain (Elwood Canal, GHD, March 2010)
Elster Creek (Elwood Canal, GHD, March 2010)
Grange Road Main Drain (Elwood Canal, GHD, March 2010)
Heatherton Drain (Mordialloc Settlement Drain Flood Mapping, GHD, May 2013)
Koornang Road Main Drain (Elwood Canal, GHD, March 2010)
Moorabbin Main Drain (Elwood Canal, GHD, March 2010)
Murrumbeena Drain (GHD, January 2013)

© Spatial Vision, SV

Map produced by VICSES January 2024.

- Waterbody
- 1% AEP Riverine Flood Extent
- 1% AEP Flash Flood Extent
- Waterway
- Melbourne Water Stormwater Drain
- Levee
- Embankment
- VICSES Unit
- Ambulance Station
- Municipal Depot
- Fire Station
- Lifesaving Club
- Municipal Offices / Civic Centre
- Police Station
- Stream Level & Rain Gauge
- Stream Level Gauge
- Rain Gauge
- Glen Eira Mask
- Glen Eira Boundary

LAND USE

- Residential
- Commercial and Business
- Industrial
- Public Parks / Cemeteries / Recreation
- Utilities and Local Government Facilities
- Education

CITY OF GLEN EIRA

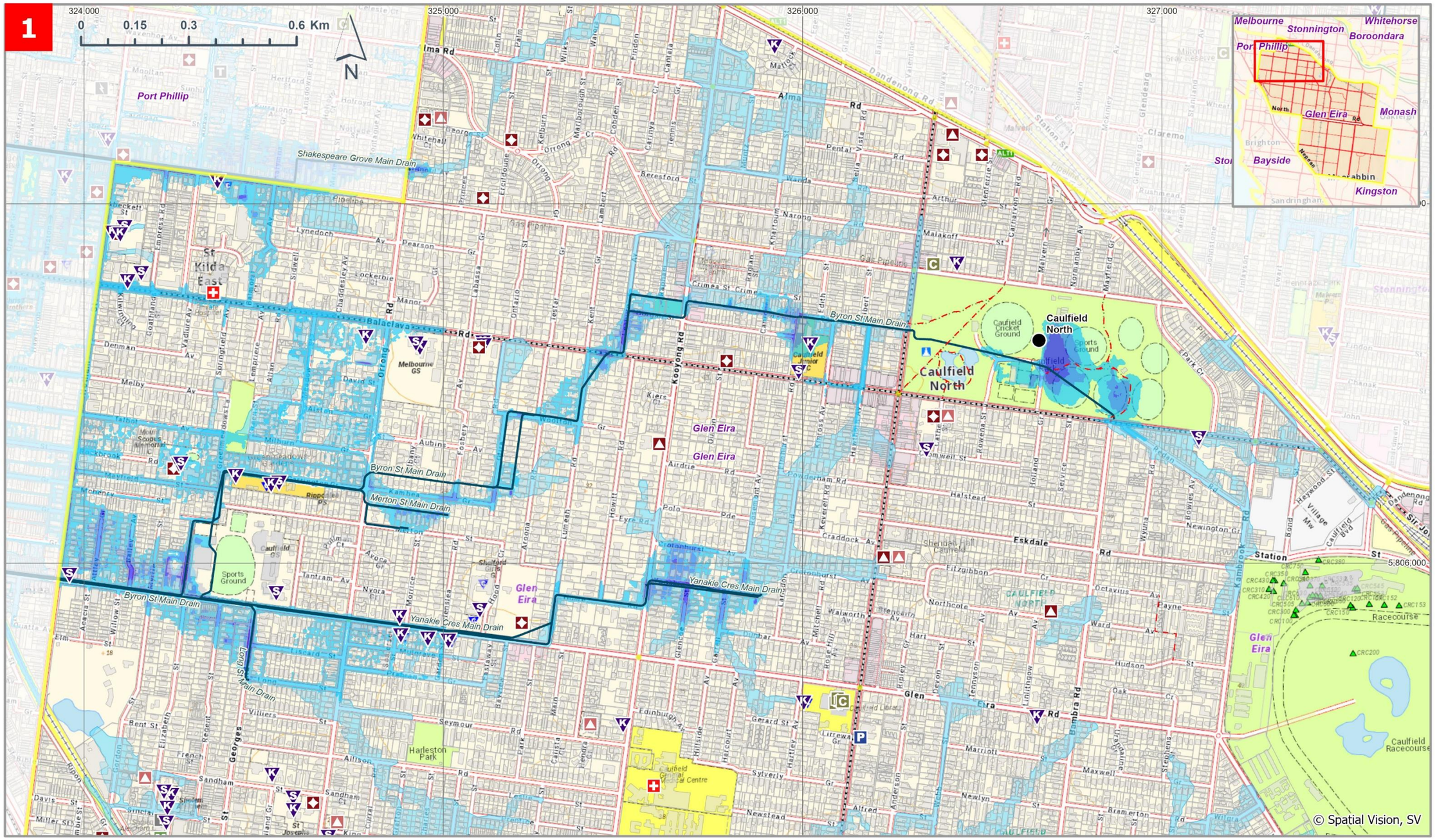
1% AEP (100yr ARI) Flooding

B. Municipal Flood Map (1% AEP (100yr ARI) Extent)

SES VICTORIA State Government

Melbourne Water

Flood Extent Maps (sourced Melbourne Water GIS)



Flood modelling completed by Melbourne Water. Map produced by VICSES 24/01/2024 11:58 AM

CITY OF GLEN EIRA

1% AEP (100yr ARI) Flooding

1. Byron Street Drain (Caulfield North)

1% AEP Flood Depth

Flood Depth

- Up to 30cm
- Between 30cm and 60cm
- Greater than 60cm

- Building
- Property
- 1% AEP Flash Flood Extent (Council) (Depth Unavailable)
- Glen Eira Boundary
- Melbourne Water Stormwater Drain
- Bicycle / Walking Trail
- Rain Gauge
- MWC Drainage Pump Station
- MWC Sewer Pump Station
- Aged Care / Disability Support
- Child Care / Kindergarten
- Community Venue
- Education Facility
- Hospital / Day Procedure
- Municipal Offices / Civic Centre
- Place Of Worship
- Museum
- Police Station
- Telephone Exchange
- Power Facility
- Retirement Village

LAND USE

- Residential
- Commercial and Business
- Industrial
- Public Parks / Cemeteries / Recreation
- Utilities and Local Government Facilities
- Education

SES Melbourne Water Victoria State Government

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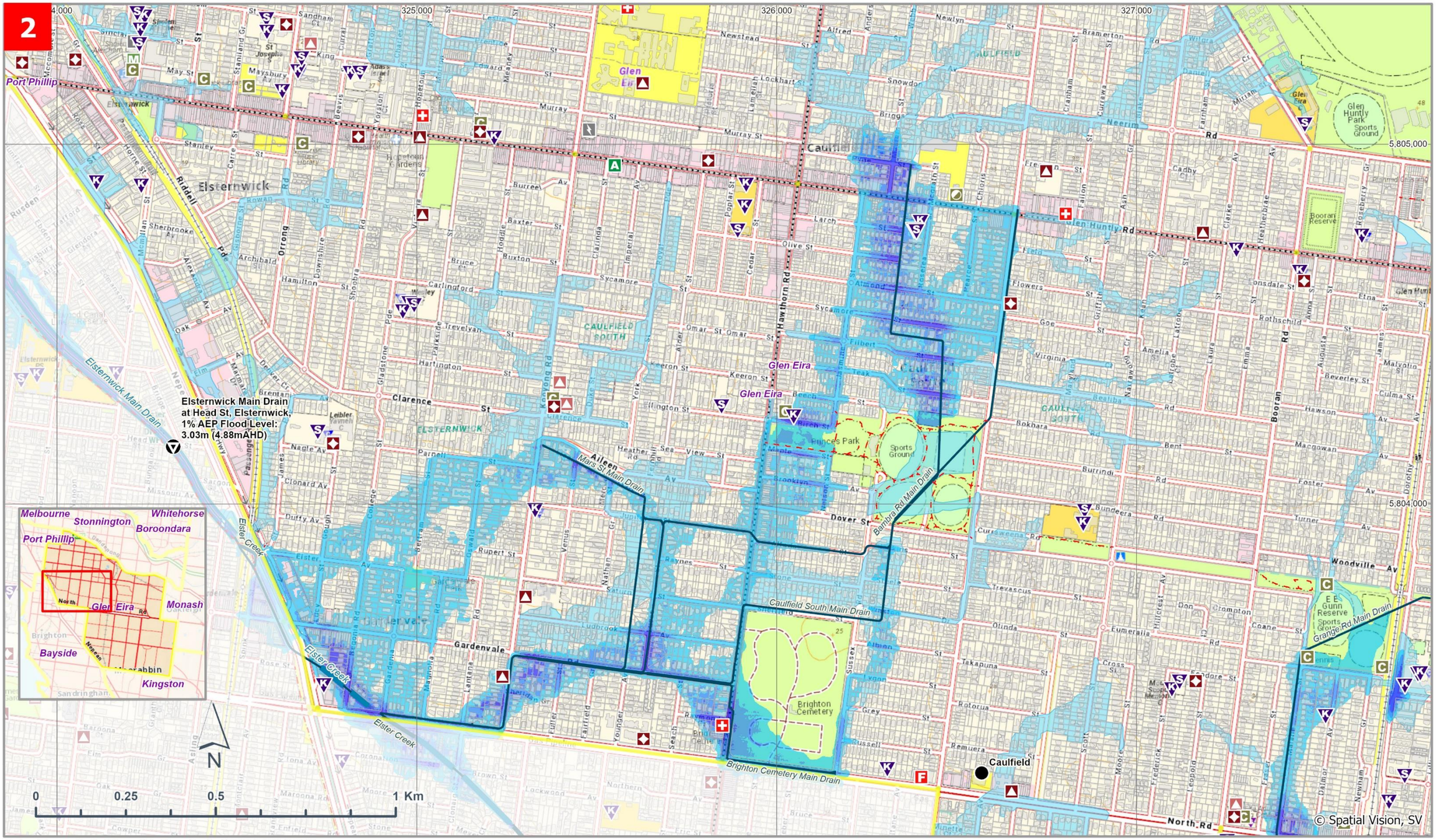

Flood modelling completed by Melbourne Water. Map produced by VICSES 6/02/2024 11:06 AM

CITY OF GLEN EIRA

1% AEP (100yr ARI) Flooding

2. Caulfield South Main Drain (Caulfield South)

- Building
- Property
- 1% AEP Flood Extent (Council)
- Glen Eira Boundary
- Melbourne Water Stormwater Drain
- Bicycle / Walking Trail
- Stream Level & Rain Gauge
- Rain Gauge
- MWC Drainage Pump Station
- MWC Sewer Pump Station
- Aged Care / Disability Support
- Ambulance Station
- Child Care / Kindergarten
- Community Venue
- Municipal Depot
- Education Facility
- Fire Station
- Hospital / Day Procedure
- Place Of Worship
- Museum
- Telephone Exchange
- Power Facility
- Retirement Village

1% AEP Flood Depth

Flood Depth
- Up to 30cm
- Between 30cm and 60cm
- Greater than 60cm

LAND USE
- Residential
- Commercial and Business
- Industrial
- Public Parks / Cemeteries / Recreation
- Utilities and Local Government Facilities
- Education

SES Melbourne Water VICTORIA State Government

3

328,000 329,000 0 0.25 0.5 1 Km N 5,806,000 5,805,000 5,804,000 5,803,000

Melbourne Boroondara Whitehorse Stonnington Port Phillip Glen Eira Monash Brighton Bayside Moorabbin Kingston Sandringham

Station St Caulfield East Racecourse CAULFIELD EAST Caulfield Racecourse Glen Huntly Park Sports Ground East Caulfield Reserve Sports Ground Sir John Monash Dr Dandenong Rd Waverley Rd Neerim Rd Koornang Rd Main Drain Grange Rd Main Drain Crosbie Park Drain Glen Eira Huntly Carnegie Carnegie Swimming Centre Sports Ground Koornang Park Carnegie PS CARNEGIE E E Gunn Reserve Sports Ground Booran Reserve Glen Huntly Park English Language Ormond North Rd Leila Rd Woodville Av Morgan St Neville St Oakleigh Rd Murrumbeena Rd Packer Park Sports Ground Mallanbool Park Tennis

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Flood modelling completed by Melbourne Water Corporation. Map produced by VICSES: 25/01/2024 10:39 AM

- Building
- Property
- 1% AEP Flood Extent (Council)
- Melbourne Water Stormwater Main
- Bicycle / Walking Trail
- Aged Care / Disability Support
- Child Care / Kindergarten
- Community Venue
- Education Facility
- Place Of Worship
- Telephone Exchange
- Retirement Village
- MWC Drainage Pump Station
- MWC Sewer Pump Station
- Retail Sewer Pump Station

1% AEP Flood Depth

Flood Depth

- Up to 30cm
- Between 30cm and 60cm
- Greater than 60cm
- Glen Eira Boundary

LAND USE

- Residential
- Commercial and Business
- Industrial
- Public Parks / Cemeteries / Recreation
- Utilities and Local Government Facilities
- Education

CITY OF GLEN EIRA

1% AEP (100yr ARI) Flooding

3. Grange Road Main Drain (Glen Huntly)

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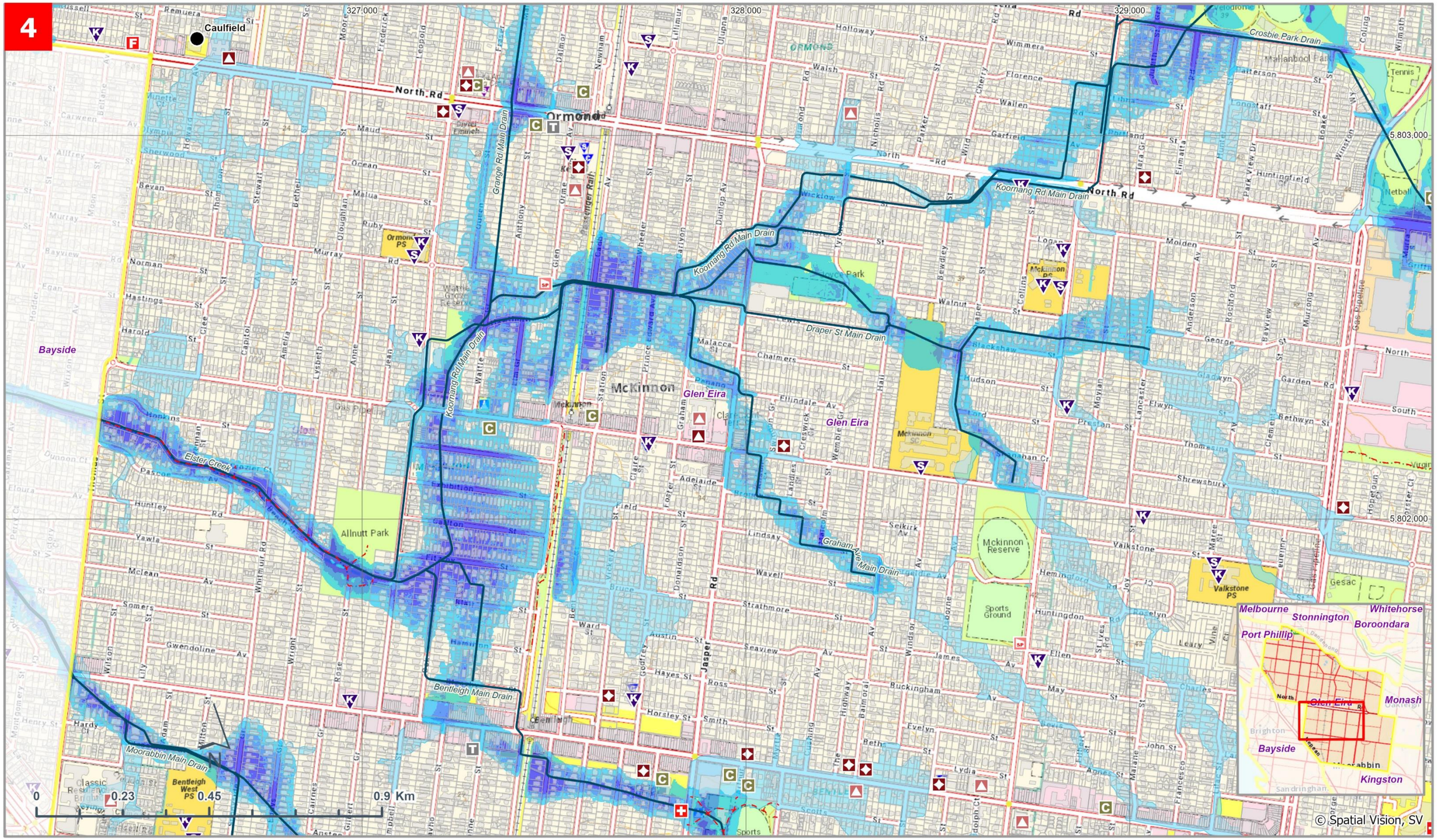

Flood modelling completed by Melbourne Water. Map produced by VICSES 25/01/2024 8:25 AM

CITY OF GLEN EIRA

1% AEP (100yr ARI) Flooding

4. Koornang Road Main Drain (McKinnon)

- Building
- Property
- 1% AEP Flood Extent (Council)
- Glen Eira Boundary
- Melbourne Water Stormwater Drain
- Bicycle / Walking Trail
- Rain Gauge
- MWC Drainage Pump Station
- MWC Sewer Pump Station
- Retail Pump Station
- Aged Care / Disability Support
- Child Care / Kindergarten
- Community Venue
- Education Facility
- Fire Station
- Hospital / Day Procedure
- Place Of Worship
- Telephone Exchange
- Retirement Village

1% AEP Flood Depth

Flood Depth

- Up to 30cm
- Between 30cm and 60cm
- Greater than 60cm

LAND USE

- Residential
- Commercial and Business
- Industrial
- Public Parks / Cemeteries / Recreation
- Utilities and Local Government Facilities
- Education

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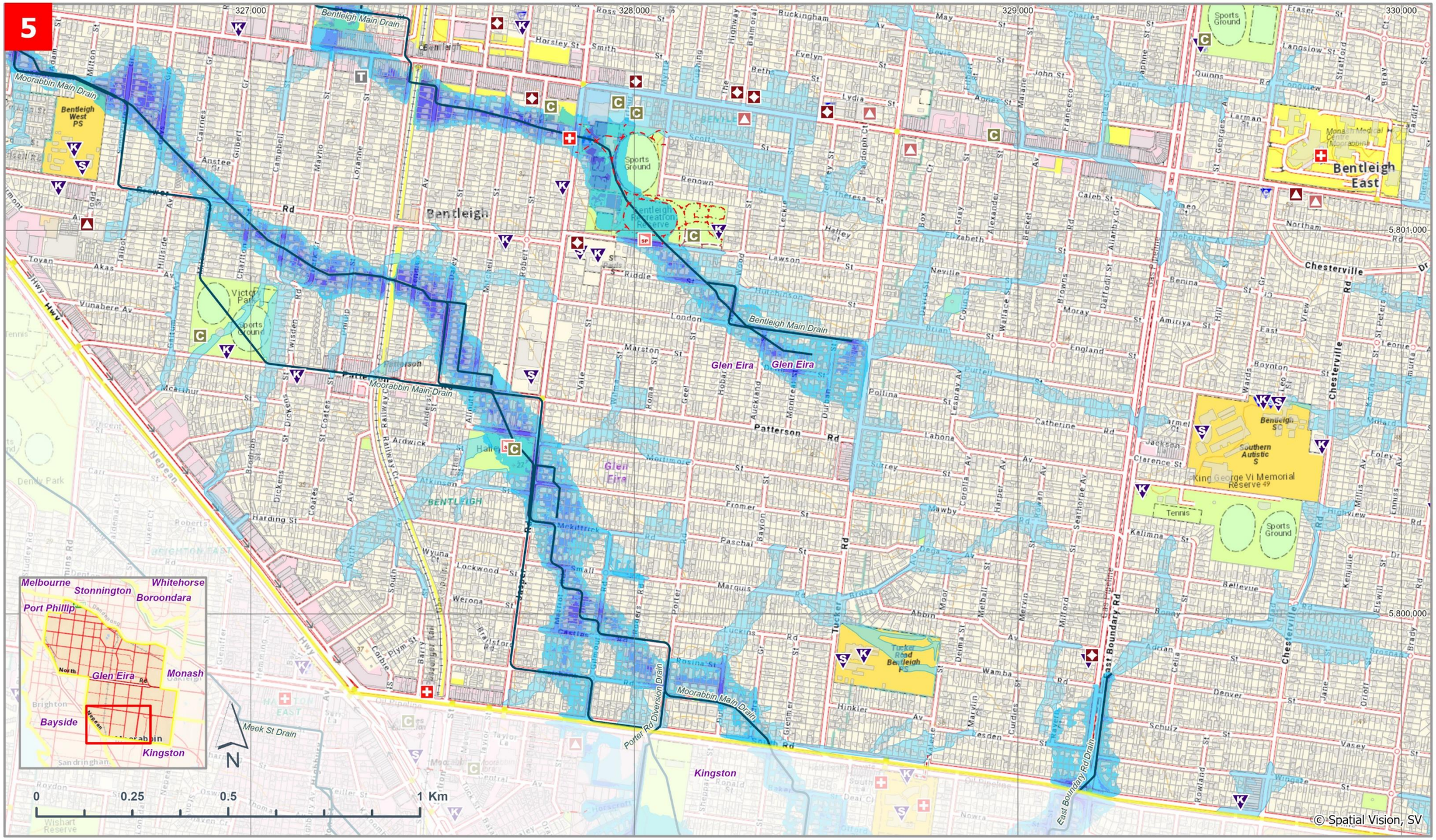
5



Flood modelling completed by Melbourne Water. Map produced by VICSES 25/01/2024 8:40 AM

CITY OF GLEN EIRA

1% AEP (100yr ARI) Flooding

5. Moorabbin & Bentleigh Drains (Bentleigh)

- Building
- Property
- 1% AEP Flood Extent (Council)
- Glen Eira Boundary
- Melbourne Water Stormwater Drain
- Bicycle / Walking Trail

- MWC Drainage Pump Station
- MWC Sewer Pump Station
- Retail Pump Station
- Aged Care / Disability Support
- Child Care / Kindergarten
- Community Venue

- Education Facility
- Hospital / Day Procedure
- Place Of Worship
- Telephone Exchange
- Power Facility
- Retirement Village

1% AEP Flood Depth

Flood Depth

- Up to 30cm
- Between 30cm and 60cm
- Greater than 60cm

LAND USE

- Residential
- Commercial and Business
- Industrial
- Public Parks / Cemeteries / Recreation
- Utilities and Local Government Facilities
- Education

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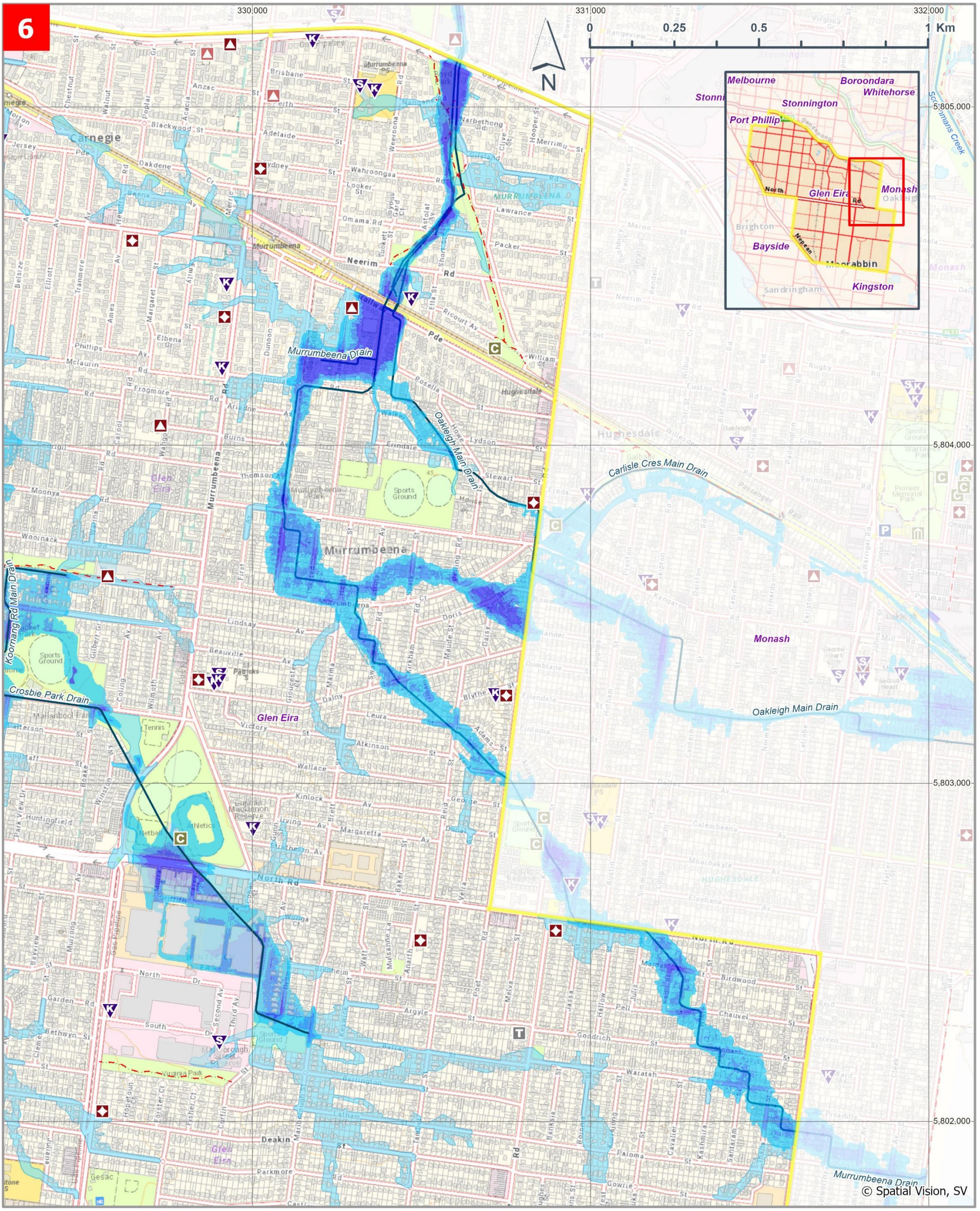
6



Flood modelling completed by Melbourne Water Corporation. Map produced by VICSES: 25/01/2024 10:29 AM

- Building
- Property
- 1% AEP Flash Flood Extent (MWC) (Depth Unavailable)
- 1% AEP Flood Extent (Council)
- Melbourne Water Stormwater Main
- Bicycle / Walking Trail
- Aged Care / Disability Support
- Child Care / Kindergarten
- Community Venue
- Education Facility
- Municipal Offices / Civic Centre
- Place Of Worship
- Police Station
- Telephone Exchange
- Retirement Village
- MWC Drainage Pump Station
- MWC Sewer Pump Station

1% AEP Flood Depth
Flood Depth
- Up to 30cm
- Between 30cm and 60cm
- Greater than 60cm
- Glen Eira Boundary

LAND USE
- Residential
- Commercial and Business
- Industrial
- Public Parks / Cemeteries / Recreation
- Utilities and Local Government Facilities
- Education

CITY OF GLEN EIRA

1% AEP (100yr ARI) Flooding

6. Murrumbeena Drain (Murrumbeena)

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Melbourne Water

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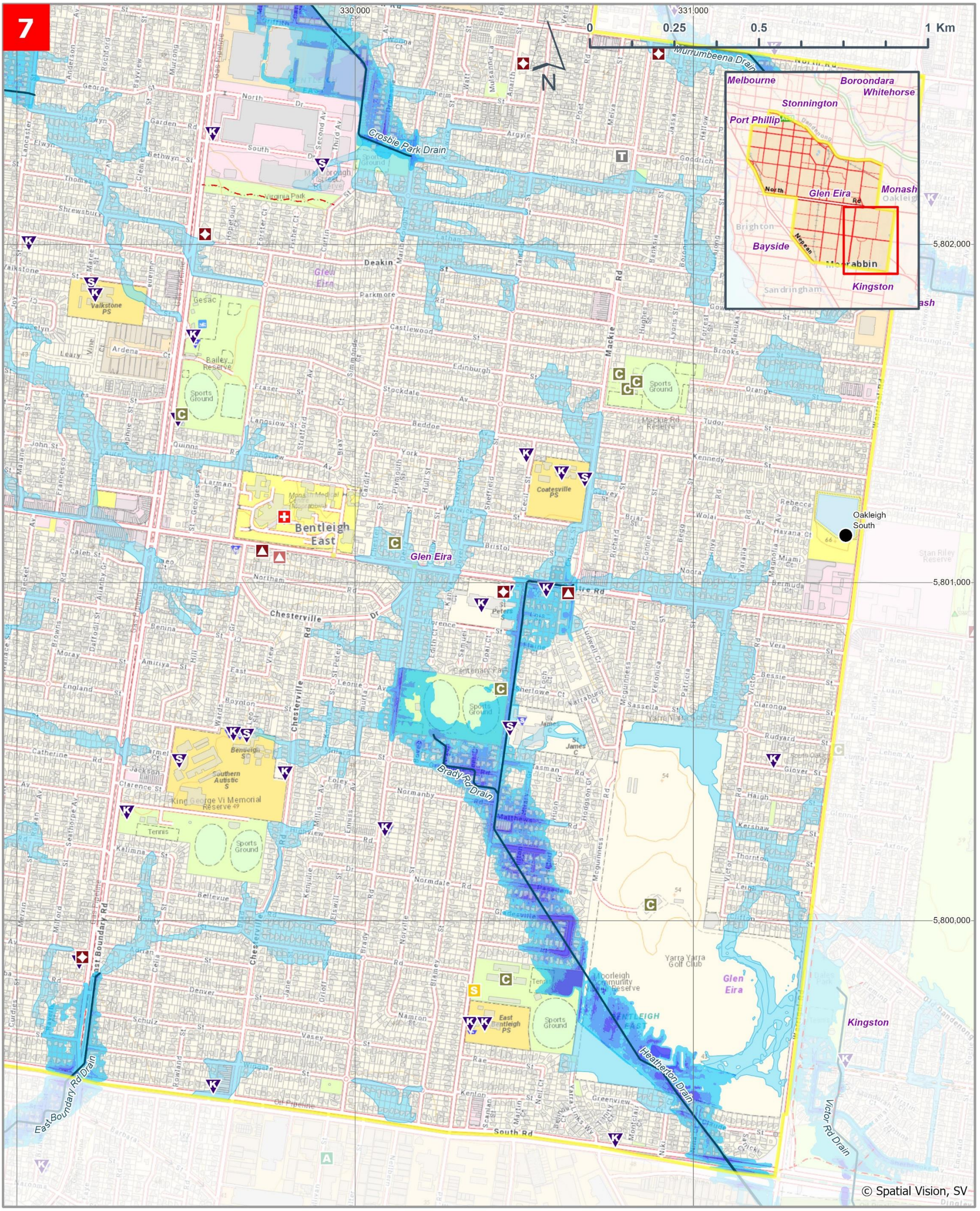

Flood modelling completed by Melbourne Water Corporation. Map produced by VICSES: 25/01/2024 10:18 AM

CITY OF GLEN EIRA

1% AEP (100yr ARI) Flooding

7. Heatherton Drain (Bentleigh East)

- Building
- Property
- 1% AEP Flood Extent (Council)
- Melbourne Water Stormwater Main
- Bicycle / Walking Trail
- VICSES Unit
- Aged Care / Disability Support
- Ambulance Station
- Child Care / Kindergarten
- Community Venue
- Education Facility
- Hospital / Day Procedure
- Place Of Worship
- Telephone Exchange
- Retirement Village
- MWC Drainage Pump Station
- MWC Sewer Pump Station
- Rain Gauge

1% AEP Flood Depth

Flood Depth

- Up to 30cm
- Between 30cm and 60cm
- Greater than 60cm
- Glen Eira Boundary

LAND USE

- Residential
- Commercial and Business
- Industrial
- Public Parks / Cemeteries / Recreation
- Utilities and Local Government Facilities
- Education

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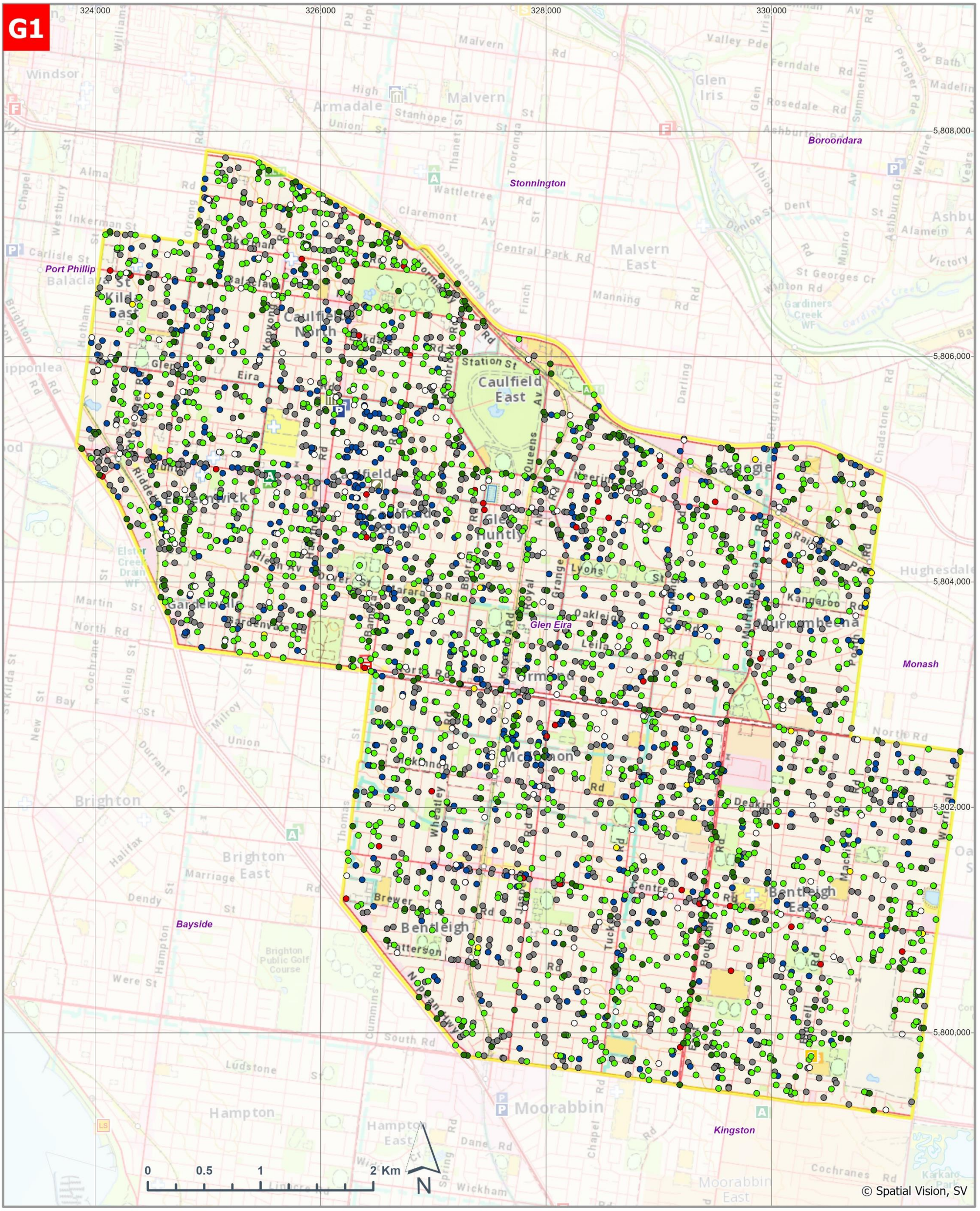
VICSES Severe Weather Request for Assistance Maps



Map produced by VICSES January 2024.

Waterbody
VICSES Unit
Ambulance Station
Municipal Depot
Fire Station
Lifesaving Club
Municipal Offices / Civic Centre
Police Station

Glen Eira Boundary

Severe Weather RFAs (Storm or Flood)

- Building Damage (1,731)
- Flooding (685)
- Loose Debris / Object / Fence (25)
- Rescue (43)
- Tree Down (1,528)
- Tree Down Traffic Hazard (456)
- Other (190)

LAND USE

- Residential
- Commercial and Business
- Industrial
- Public Parks / Cemeteries / Recreation
- Utilities and Local Government Facilities
- Education

CITY OF GLEN EIRA

1% AEP (100yr ARI) Flooding

G1. Severe Weather Requests for Assistance (RFA) by Job Type, July 2009 - November 2023

SES
VICTORIA State Government
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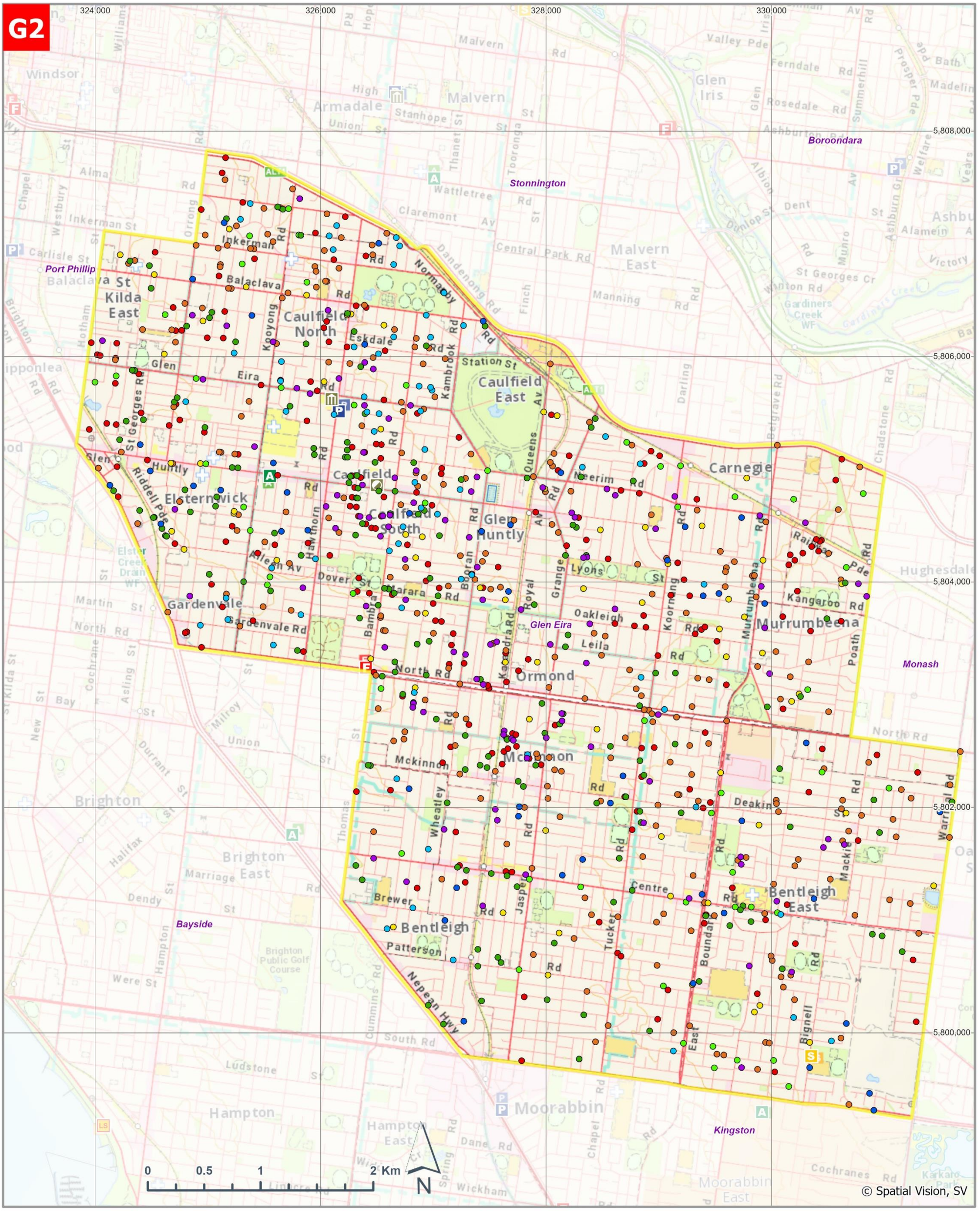
G2



Map produced by VICSES January 2024.

CITY OF GLEN EIRA

1% AEP (100yr ARI) Flooding

G2. Severe Weather Requests for Assistance (RFA) by Event, July 2009 - November 2023

- Waterbody
- VICSES Unit
- Ambulance Station
- Municipal Depot
- Fire Station
- Lifesaving Club
- Municipal Offices / Civic Centre
- Police Station
- Glen Eira Boundary

VICSES Severe Weather RFAs (Storm or Flood)
By Event > 45 Requests Received

- 5th-6th February 2011 (256)
- 1st-3rd October 2013 (304)
- 24th-25th June 2014 (69)
- 10th October 2016 (55)
- 30th December 2016 (185)
- 20th-21st January 2020 (74)
- 29th-30th October 2021 (49)
- 29th January 2022 (216)

LAND USE

- Residential
- Commercial and Business
- Industrial
- Public Parks / Cemeteries / Recreation
- Utilities and Local Government Facilities
- Education

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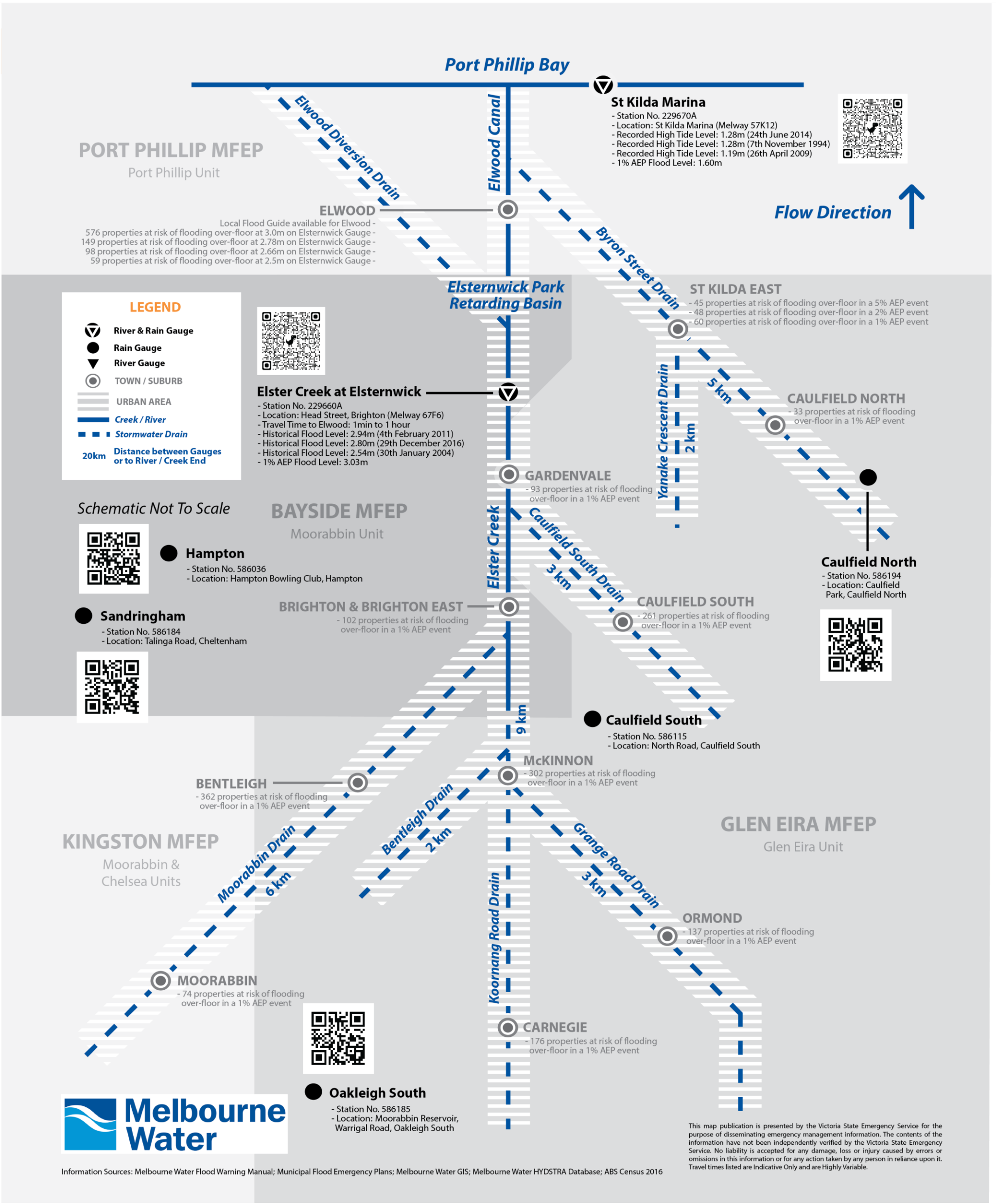
Melbourne Water

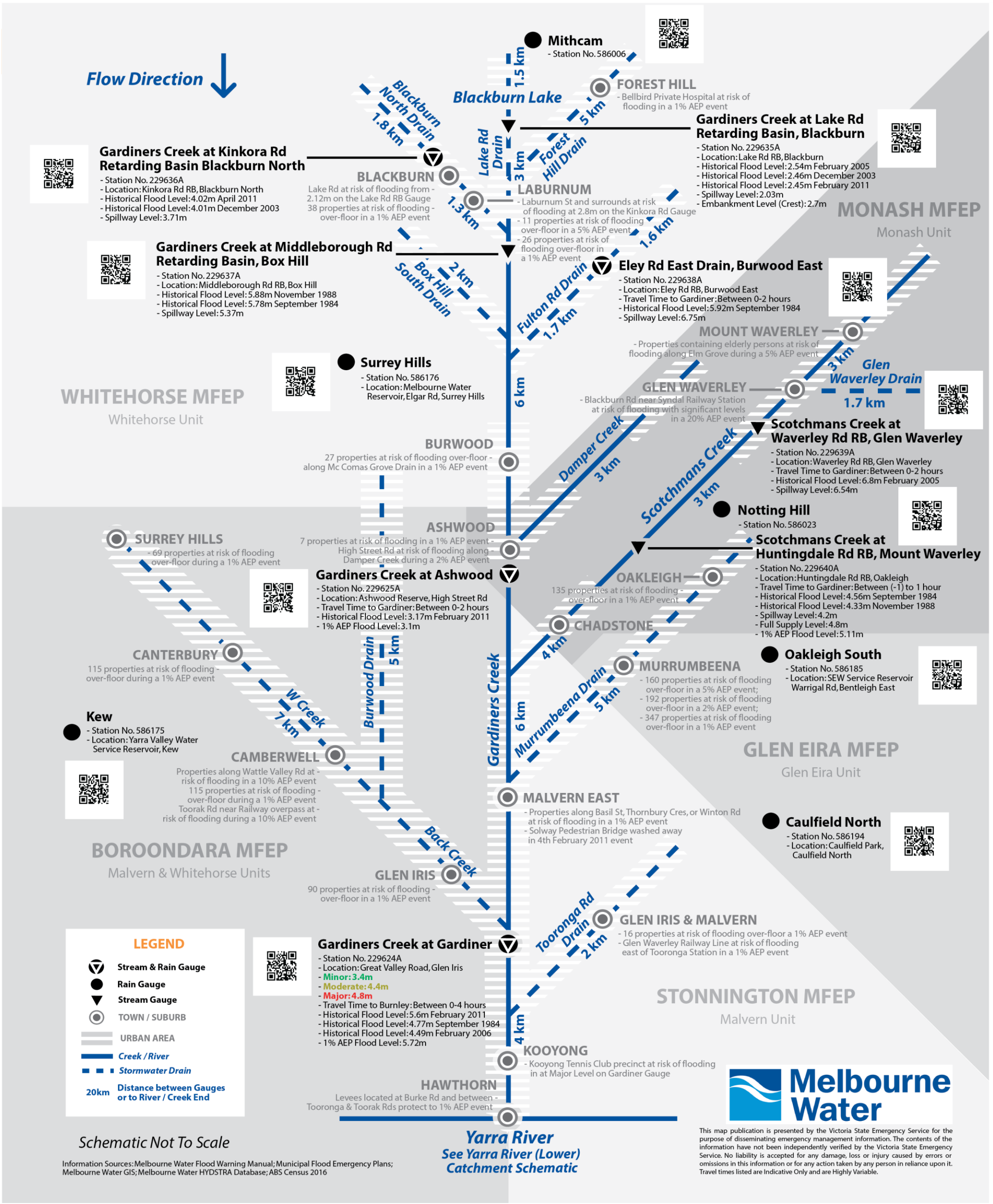
Elster Creek & Elwood Canal Catchment Schematic

Version 4 - June 2022



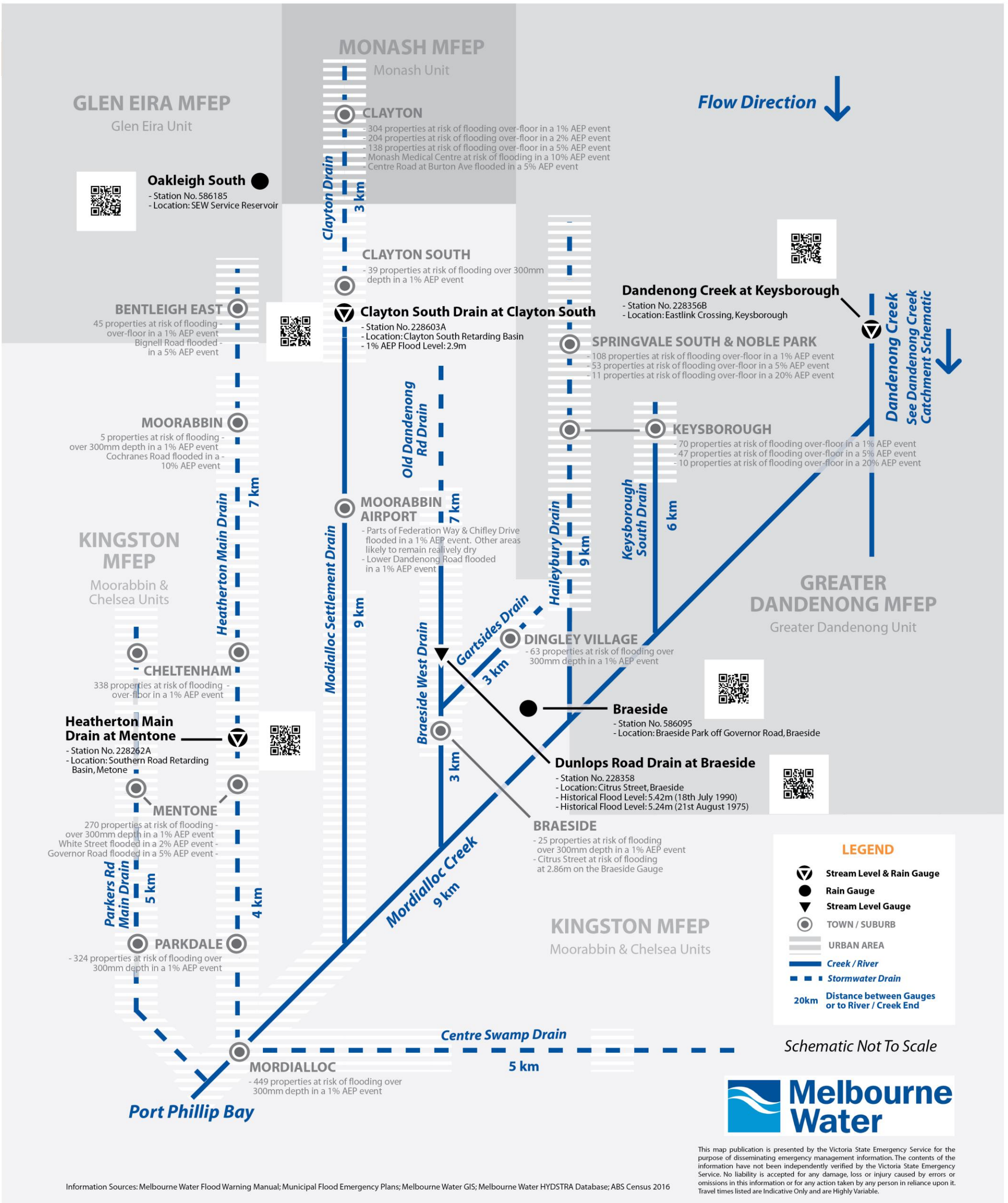
Gardiners Creek & Scotchmans Creek Catchment Schematic

Version 7 - October 2023



Mordialloc Creek Catchment Schematic

Version 6 - March 2021



Information Sources: Melbourne Water Flood Warning Manual; Municipal Flood Emergency Plans; Melbourne Water GIS; Melbourne Water HYDSTRA Database; ABS Census 2016

APPENDIX G – SEVERE WEATHER (STORM & FLOOD) EVENTS

Overview

The large number of mature trees and built up nature of the City of Glen Eira 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).

VICSES Requests for Assistance (RFAs)

VICSES records Requests for Assistance (RFAs) made by the public during severe weather events. Table G1 below is a breakdown of requests by suburb and request type during the period July 2009 and November 2023.

VICSES Request for Assistance (July 2009 – November 2023)							
Suburb	Building Damage	Flooding	Rescue	Tree Down	Tree Down Traffic Hazard	Other *	Total
Bentleigh	176	60	3	120	49	15	**423**
Bentleigh East	325	103	10	334	119	36	**927**
Carnegie	184	65	5	132	42	17	**445**
Caulfield	91	59	3	49	30	11	**243**
Caulfield East	14	4	0	17	11	2	**48**
Caulfield North	216	64	4	237	82	24	**627**
Caulfield South	192	99	5	138	49	17	**500**
Elsternwick	168	50	2	117	39	15	**391**
Gardenvale	20	6	0	13	4	1	**44**
Glen Huntly	55	13	1	43	17	6	**135**
Mckinnon	67	40	2	61	12	10	**192**
Murrumbeena	94	44	2	84	32	14	**270**
Ormond	114	61	3	64	38	16	**296**
St Kilda East	40	19	2	34	13	6	**114**

Table G1 – Breakdown of severe weather RFAs received by VICSES Glen Eira Unit by suburb

*Assist Agency, Fence Down, Landslide, Loose Debris/Objects, Sandbag Request and Incident Other

Table G2 is a breakdown of requests for assistance by year and request type. High figures are predominantly from years where a La-Nina has occurred..

VICSES Request for Assistance (July 2009 – November 2023)							
Year	Building Damage	Flooding	Rescue	Tree Down	Tree Down Traffic Hazard	Other*	Total
2009	49	9	4	0	32	10	**104**
2010	133	29	5	1	105	32	**305**
2011	159	197	44	3	59	27	**489**
2012	95	8	14	5	126	26	**274**
2013	237	6	21	1	239	69	**573**
2014	119	8	14	5	115	26	**287**
2015	82	16	11	3	66	21	**199**
2016	207	110	16	4	102	46	**485**
2017	107	45	17	6	49	21	**245**
2018	105	17	18	7	112	46	**305**
2019	53	6	5	3	74	27	**168**
2020	145	32	6	3	119	38	**343**
2021	81	21	3	2	129	52	**288**
2022	150	162	5	0	76	56	**449**
2023	34	23	4	4	41	42	**148**

Table G2 – Breakdown of severe weather RFAs received by VICSES Glen Eira Unit by year

*Assist Agency, Fence Down, Landslide, Loose Debris/Objects, Sandbag Request and Incident Other

Activation Triggers

Triggers for activation in flood and storm have been identified as follows:

VICSES Flood Readiness and Activation Trigger Considerations - V4.0 - August 2019

CD/19/34926

Readiness Level	RL 1 - Low to Moderate	RL 2 -High	RL 3(A) - Very High	RL 3 (B) - VERY HIGH	RL 4 - SEVERE	RL 5 - EXTREME
Activation Considerations	**Minor**		**Moderate**		**Moderate to Major (high end event)**	
Flood Prediction	Flood watch issued and/or minor flood warning issued.	Minor flood warning issued.	Low to mid range moderate flood warning issued. 0-1 other rivers in minor flood. Low consequences for built environment based on risk.	Mid to high range moderate flood warning issued. 2+ other rivers in minor flood. Moderate consequences for built environment based on risk.	Major flood warning issued. 2+ other rivers in moderate flood. Moderate risks and consequences for built environment, and economic impacts.	2+ major flood warnings issued. 2+ other rivers in moderate flood. Significant risks and consequences to built environment, and economic impacts. Forecast to exceed 1 in 100 year riverine event. Dam failure considered very likely.
Flood Behaviour	Anticipated continued light rain. Catchments able to absorb predicted rain for consecutive days but may lead to flooding. Nil impacts or consequences predicted unless identified.	Anticipated continued rain. Catchments able to absorb predicted rain for consecutive days with minor flooding occurring. Low lying areas next to water courses are inundated. Minor roads may be closed and low level bridges submerged. In urban areas inundation may affect some backyards and buildings below the floor level as well as bicycle and pedestrian paths. In rural areas removal of stock and equipment may be required.	Anticipated continued rain. Catchments likely to be saturated and unable to absorb continued rain. Areas of inundation are more substantial in size but consequence is low. Main traffic routes may be affected. Unlikely for buildings to be affected above the floor level. Evacuation of flood affected areas may start to be considered. In rural areas, removal of stock is required.	Anticipated continued rain. Catchments are saturated and unable to absorb continued rain. Areas of inundation are more substantial. Main traffic routes may be affected. Some buildings may be affected above the floor level. Evacuation of flood affected areas may be planned for. In rural areas removal of stock is required. Impact assessment may be required.	Anticipated continued heavy rain. Catchments are saturated and unable to absorb continued rain and runoff. Extensive rural areas and/or urban areas are inundated. Many buildings may be affected above floor level. Properties and towns are likely to be isolated. Major rail and traffic routes closed. Evacuation of flood affected areas likely. Utility services likely to be impacted. Impact assessment required.	Anticipated significant extreme weather event that will lead to rapidly rising river conditions. Catchments are saturated and unable to absorb current or additional runoff. Extensive rural areas and/or urban areas are inundated. Many buildings may be affected above the floor level. Properties and towns are likely to be isolated. Major rail and traffic routes closed. Evacuation of flood affected areas likely. Utility services will be impacted. Impact assessment required.
Readiness and Activation	**VICSES - Business As Usual - Operations**			**Multi Agency Operations under JSOP 2.03**		
State	SCC Monitoring (white)	SCC Monitoring (white)	SCC Monitoring (white) / Tier 1 (blue)	SCC Tier 1 (blue) Where 1 level 2 ICC is activated.	SCC Tier 2 (orange) Where 2+ Level 2 ICCs, or 1 Level 3 ICC is activated.	SCC Tier 3 (red) Where 3+ Level 2 ICCs, or 2+ Level 3 ICC is activated.
	SDO monitoring SAC aware	SDO monitoring SAC aware	SDO and SAC - 60 minute recall or in place.	SDO and SAC - in place. SOCC - 60 minute recall or in place.	SDO and SAC - in place. SOCC - in place. Night shift on standby, or remote SDO, SAC and SOCC to be rostered.	SDO and SAC - in place for day and night shifts. SOCC - in place for day and night shifts at multiple ESTA locations.
Region			Regional Command - 60 minute recall or in place	Rural - Regional Command in place at RCC or Regional Office, RC notified. Metro - RCC open with base RCT in place.	RCC open - RCT in place, other relevant agencies available on immediate recall.	RCC open - Full RCT in place.
	RDO monitoring RAC aware	RDO actively monitoring RAC monitoring	RAC and RDO - 60 minute recall or in place	Rural - RDO and RAC in place at RCC or Regional Office. Metro - RC, RAC and RDO in place at RCC.	RC, RAC and RDO in place at RCC. Night shift on standby, or remote RDO and RAC to be rostered.	RC, RAC and RDO in place at RCC for day and night shifts.
Incident			Base IMT on 60 minute recall.	Base IMT in place	Rural - Base IMT in place, with Core IMT on 60 minute recall. Metro - Core IMT in place.	Rural - Core IMT in place, with Full IMT on 60 minute recall. Metro - Full IMT in place.
Effect	**Potential Consequences**					
People	Some minor inconvenience around local roads.		Increased number of roads being impacted. Traffic management plan should be considered.		Significant number of roads impacted. Traffic management plan is required. Some major roads closed with isolation or evacuation possible.	
Remote Communities	Inconvenience only.		Some minor isolation and loss of utilities of individual properties or remote communities is likely.		Community isolation likely with resupply requirements as well as evacuation considerations needed.	
Health	Little impact expected. Some local issues might be encountered, but managed locally within own facility plans.		Consideration for review and familiarisation with facility plans. VICPOL and DHHS to review Vulnerable persons list.		Highly likely some hospitals and vulnerable people will become isolated and require evacuation.	
Critical Infrastructure	Nil impact.		May require some preparatory work and discussion with owner of infrastructure.		Significant work likely to be required to protect critical infrastructure. Contingency plans put in place if loss of the infrastructure occurs.	
Public Infrastructure **Essential Community Infrastructure**	Limited impact.		Some disruption to access to parks and low lying community areas and infrastructure. Some minor damage to community infrastructure built on floodplains.		Significant damage to road infrastructure and community facilities. Long term closure of key community facilities likely.	
Power	Possible power disruptions.		Likely short term power disruptions.		Power disruptions likely, with some substations impacted and potential long term outages.	
Water Utilities	Little impact expected some local issues might be encountered but managed locally.		Increased potential but still managed locally. May be minor sewerage overflow issues in isolated areas.		Highly likely that some infrastructure will be impacted. Water authorities should develop or initiate their plans to address issues. Significant potential for pollutants including sewerage in water.	
Telecommunications	Nil impact.		Minimal impact to individual premises only.		Significant impact with loss of landlines and mobile powers which will affect people's capacity to receive warnings and information.	
Gas	Little impact expected Some local issues might be encountered but managed locally.		Increased potential for infrastructure damage and disruption but still managed locally.		Likely that some infrastructure will be impacted, supply authorities should develop or initiate their plans to address issues.	
Road Network	Unlikely to impact.		Some minor roads may be impacted with possible disruption to critical needs supplies such as milk.		Highly likely for roads to be cut and egress and access impacted. Major roads potentially cut in some locations, traffic diversions in place. Potential rescue of trapped persons in vehicles. Expected impact on rail routes. Economic impact likely with loss of commercial transport routes.	
Public Transport	Limited impact on public transport routes.		Impact to public transport routes may occur but likely to be minimal with diversions possible.		Public transport impacts will occur with roads and rail lines cut and no alternative route available. Significant disruption to people movement likely.	
Education	Unlikely impact.		Some impact expected. Traffic management plan for school buses should be considered.		Some school and preschools may be inundated. School bus routes closures.	
Public Events	Maybe cancelled due to weather conditions only.		Some public events may need to be cancelled or rescheduled due to safety of patrons either whilst at event or travelling to/from the event.		Likely cancellation of major events due to risk, and potential flooding impact on venue or ability to attend or leave event.	
Tourism	Unlikely that event(s) will be impacted but consideration must be given to any event occurring to ensure it is safe to continue.		Potential impact on tourist locations if area not safe to visit or isolated due to road closures.		May impact on high value tourist locations and facilities with long term impacts in the social and economic environment of communities.	
Agriculture **Animal welfare**	No impact likely with landowners managing any localised issues.		Potential impact with losses to live stock, fencing and crops including high intensive farming of produce and tree farms.		Substantial impact to live stock, fencing (widespread), farm machinery and crops. Short and long term impacts to high intensive produce farming due to loss of soil and erosion. Highly likely need for stock movement support and fodder resupply for isolated stock	
Environmental	Minimal impact, some minor watercourse erosion.		Stream erosion and loss of vegetation around watercourses.		Significant disturbance to soil and vegetation.	
Cultural Heritage	Minimal impact likely.		Some disturbance along watercourses may occur but likely to be minimal.		Potential for significant disturbance especially of flood of significance in area and flood of record height.	
Relief and Recovery	Relief and recovery activity unlikely, may be some local issues.		Increased potential for relief and recovery activity but likely to be managed locally by LGA with support of DHHS.		Formal arrangements put in place for relief and recovery activity. Regional Recovery Commander appointed. Health Commander in place. Demands on relief and recovery to be substantial and potentially long term.	

Regional Agency Commander (VICSES) provides advice to the Regional Controller - State Agency Commander (VICSES) provides advice to State Response Controller re: forecast, impacts, and consideration for varying the actual number, distribution and level of IMT required.

VICSES Storm Readiness and Activation Trigger Considerations - V4.0 - August 2019

CD/19/34926

Readiness Level	RL 1 - Low to Moderate	RL 2 -High	RL 3(A) - Very High	RL 3 (B) - VERY HIGH	RL 4 - SEVERE	RL 5 - EXTREME
Activation Considerations	**Thunderstorm Forecast Chart (TFC), issued daily**			**Severe Weather Intelligence Briefing (SWIB), issued Tuesday & Friday**		
Storm Prediction or Warning	SWIB - no colour. No thunderstorms. No severe weather.	SWIB - no colour. TFC shows thunderstorms possible. No severe weather warning (SWW). No severe thunderstorm warning (STW).	SWIB - no colour. TFC - severe thunderstorms possible. SWW - issued for winds and/or possible heavy rainfall. STW - issued for wind and/or heavy rainfall and/or hail. Storm surge - forecast with minimal impacts.	SWIB - coloured yellow. TFC - shows severe thunderstorms likely. SWW - issued for wind* and/or heavy rainfall. STW - issued for wind* and/or heavy rainfall and/or hail. Storm surge - forecast with greater impacts.	SWIB - coloured orange for winds* and/or rainfall. TFC - shows severe thunderstorms likely; including potential for large hail, damaging winds*, and heavy rainfall leading to flash flooding. SWW - issued for damaging winds* and/or heavy rainfall. STW - issued for wind* and/or heavy rainfall and/or hail. Storm tide (normal tide) - forecast.	SWIB - coloured red for damaging to destructive winds* and/or very heavy rainfall. TFC - shows severe thunderstorms likely including potential for giant hail, damaging/destructive winds, heavy rainfall leading to flash flooding. SWW - issued for damaging or destructive winds* or heavy rainfall. STW - issued for super cells possible, heavy rain and/or very dangerous thunderstorm warning issued. Storm tide (high tide) - forecast.
Storm Behaviour	No thunderstorms. No severe weather.	Wind - gusts < 90km/h Rain - rates not conducive to flash flooding. Hail - small (<2cm).	SWIB - 50km/hr+ average winds*, gusts* reaching 90-100 km/hr for prolonged periods. TFC - possibility of thunderstorms may or may not include small hail (<3cm). SWW / STW - chance of flash flooding and damaging winds considered possible.	SWIB - 60km/hr+ average winds*, gusts* reaching over 100km/hr (101-109 km/hr) for 6 or more hour period. TFC - severe thunderstorms possible, high possibility of 3 or 4cm hail, wind gusts* over 100km/hr. SWW - heavy rainfall leading to flash flooding across districts considered possible. STW - localised flash flooding rates of >20mm per 30mins likely.	SWIB - 70km/hr+ average winds*, damaging gusts* reaching over 110km/hr (110-120 km/hr) for 3 or more hour period. TFC - severe thunderstorms likely. SWW - heavy rainfall leading to flash and/or riverine flooding across districts considered likely. STW - possibility of hail of 4-5cm, wind gusts* >110km/hr. Potential for super cell, squall or tornado. Localised flash flooding rates of >30mm per 30mins likely.	SWIB - very unstable weather conditions including 80km/hr+ average winds*, damaging (120km/hr) to destructive (>125km/hr) gusts* for 3 or more hour period certain. TFC - severe thunderstorms likely. SWW - heavy rainfall leading to flash and/or riverine flooding across districts considered very likely. STW - super cells including hail >5cm, wind gusts* >120km/hr. Localised flash flooding rates of >40mm per 30mins. Squalls or tornado likely.
	**Consideration: Add 10km/hr to average winds and/or gusts when considering Alpine district predictions and/or warnings based on time of day, time of year, altitude, and area of prediction.*					
Storm Activity	Local level Unit response Active RFAs per Unit: Rural 1 - 20 Urban/Metro 1 - 60	Local level Unit response Active RFAs per Unit: Rural 20 - 30 Urban/Metro 60 - 75	Local level Unit response with additional local agency support Active RFAs per Unit: Rural 20 - 30 Urban/Metro 60 - 75 Active RFAs per Region: Rural 60 - 100 Urban/Metro 200 - 250	Multi-unit response with increasing multi-agency response. Active RFAs per Region: Rural 100 - 250 Urban/Metro 250 - 400 ESTA - Critical Incident Response Plan (CIRP) Level 1 activated.	Multi-unit response with multi-agency support and high level of multi-agency response activity (e.g. fire alarms). Active RFAs per Region: Rural 250 - 500 Urban/Metro 400 - 1,000 ESTA - Critical Incident Response Plan (CIRP) Level 2 activated. Event creation has increased to 2-4 per minute. <15 calls waiting.	Multi-unit response and high level of multi-agency response activity with significant impacts across municipalities. Active RFAs per Region: Rural 500+ Urban/Metro 1,000+ ESTA - Critical Incident Response Plan (CIRP) Level 3 activated. Event creation has increased to 4+ per minute. 15+ calls waiting.
Readiness and Activation	**VICSES - Business As Usual - Operations**			**Multi Agency Operations under JSOP 2.03**		
State	SCC Monitoring (white)	SCC Monitoring (white)	SCC Monitoring (white) / Tier 1 (blue)	SCC Tier 1 (blue) Where 1 level 2 ICC is activated.	SCC Tier 2 (orange) Where 2+ Level 2 ICCs, or 1 Level 3 ICC is activated.	SCC Tier 3 (red) Where 3+ Level 2 ICCs, or 2+ Level 3 ICC is activated.
	SDO monitoring SAC aware	SDO monitoring SAC aware	SDO and SAC - 60 minute recall or in place. SOCC - 60 minute recall or in place.	SDO and SAC - in place. SOCC - in place.	SDO and SAC - in place. SOCC - in place. Night shift on standby, or remote SDO, SAC and SOCC to be rostered.	SDO and SAC - in place for day and night shifts. SOCC - in place for day and night shifts at multiple ESTA locations.
Region			Regional Command - 60 minute recall or in place	Rural - Regional Command in place at RCC or Regional Office, RC notified. Metro - RCC open with base RCT in place.	RCC open - RCT in place, other relevant agencies available on immediate recall.	RCC open - Full RCT in place.
	RDO monitoring RAC aware	RDO actively monitoring RAC monitoring	RAC and RDO - 60 minute recall or in place	Rural - RDO and RAC in place at RCC or Regional Office. Metro - RC, RAC and RDO in place at RCC.	RC, RAC and RDO in place at RCC. Night shift on standby, or remote RDO and RAC to be rostered.	RC, RAC and RDO in place at RCC for day and night shifts.
Incident			RAC and RDO - 60 minute recall or in place at RCC or Regional Office. Optional support form: Resource Officer Management Support Officer Warnings & Advice Officer Intelligence Officer	Rural - Base IMT on 60 minute recall. Metro - Base IMT in place	Rural - Base IMT in place, with Core IMT on 60 minute recall. Metro - Core IMT in place.	Rural - Core IMT in place, with Full IMT on 60 minute recall. Metro - Full IMT in place.
Effect	**Potential Consequences**					
People	Some minor inconvenience around local roads.		Increased number of roads being impacted. Traffic management plan should be considered.		Significant number of roads impacted. Traffic management plan is required. Some major roads closed with tree blockages or flash flooding impacts.	
Remote Communities	Inconvenience only.		Some minor isolation and loss of utilities of individual properties or remote communities is likely.		Community isolation and loss of food/supplies potential with resupply requirements dependant on time of power or access outages.	
Health	Little impact expected. Some local issues might be encountered, but managed locally within own facility plans.		Consideration for review and familiarisation with facility plans. VICPOL and DHHS to review Vulnerable persons list.		Highly likely vulnerable people impacted by power outage will require relocation. Communities without power for days needing support.	
Critical Infrastructure	Nil impact.		May require some preparatory work and discussion with owner of infrastructure.		Significant work likely to be required to protect critical infrastructure. Contingency plans put in place if lose of the infrastructure occurs.	
Public Infrastructure Essential Community Infrastructure	Limited impact.		Some disruption to access to parks and vegetated community areas and infrastructure. Some minor damage to community infrastructure.		Significant damage to community infrastructure and community facilities. Long term closure of key community facilities likely.	
Power	Possible power disruptions.		Likely short term power disruptions.		Power disruptions almost guaranteed, with potential long term outages.	
Water Utilities	Little impact expected some local issues might be encountered but managed locally.		Increased potential but still managed locally. May be minor sewerage overflow issues in isolated areas.		Highly likely that some infrastructure will be impacted, water authorities should develop or initiate their plans to address issues. Significant potential for pollutants including sewerage in water and loss of power will exasperate the impacts.	
Telecommunications	Unlikely impacts.		Minimal impact to individual premises only.		Significant impact with loss of landlines and mobile powers which will affect peoples capacity to receive warnings and information. Commercial Business impacts with loss of phone services.	
Gas	Little impact expected Some local issues might be encountered but managed locally.		Increased potential for infrastructure damage and disruption but still managed locally.		Likely that some infrastructure will be impacted, supply authorities should develop or initiate their plans to address issues.	
Road Network	Unlikely impacts.		Some minor roads may be impacted with possible disruption to critical needs supplies such as milk.		Highly likely for roads to be cut and egress and access impacted. Major roads potentially cut in some locations traffic diversions in place. Potential rescue of trapped persons in vehicles highly likely. Expected impact on rail routes. Economic impact likely with loss of power and utilities supply for lengthy period.	
Public Transport	Limited impact on public transport routes.		Impact to public transport routes may occur but likely to be minimal with diversions possible		Public transport impacts will occur with roads and rail lines cut and no alterative route available Significant disruption to people movement likely.	
Education	Unlikely impacts.		Some impact expected. Traffic management plan for school buses should be considered.		Some school and preschools may be impacted by utilities loss and damage to infrastructure. School bus routes closed for period of time	
Public Events	May be cancelled due to weather conditions only.		Some public events may need to be cancelled or rescheduled due to safety of patrons either whilst at event or travelling to/from the event.		Public events impacted likely cancellation of major events due to wind impacts and risk, and potential flooding impact on venue or ability to attend or leave event.	
Tourism	Unlikely that event(s) will be impacted but consideration must be given to any event occurring to ensure it is safe to continue.		Potential impact on tourist locations if area not safe to visit or isolated due to road closures.		May impact on high value tourist locations and facilities with long term impacts in the social and economic environment of communities.	
Agriculture Animal welfare	No impact likely with landowners managing any localised issues.		Potential impact with losses to live stock, fencing and crops including high intensive farming of produce and tree farms.		Substantial impact to crops, including high intensive produce farming (vegetables and fruit) and tree farms with short and long term impacts due to loss of crops. Economic impact to area.	
Environmental	Minimal impact.		Potential for stream erosion and loss of vegetation around watercourses. Minor tree damage.		Significant disturbance to vegetation with some areas heavily impacted.	
Cultural Heritage	Minimal impact likely.		Some disturbance along watercourses may occur, but likely to be minimal.		Potential for impact on historical structures and features.	
Relief and Recovery	Relief and recovery activity unlikely may be some local issues.		Increased potential for relief and recovery activity, but likely to be managed locally by LGA with support of DHHS.		Formal arrangements put in place for relief and recovery activity. Regional Recovery Commander appointed. Health Commander in place Demands on relief and recovery to be substantial and potentially long term.	

Regional Agency Commander (VICSES) provides advice to the Regional Controller - State Agency Commander (VICSES) provides advice to State Response Controller re: forecast, impacts, and consideration for varying the actual number, distribution and level of IMT required.