

City of Manningham

Storm and Flood Emergency Plan

A Sub-Plan of the Municipal Emergency Management Plan

For Manningham City Council
And
VICSES Unit Manningham

Version 7.2
Reviewed July 2020



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Distribution List

Copy No.	Issue To:		Date
	Name	Organisation	
Original	MEMP Committee Executive Officer	Manningham City Council	
1	Council Office Copy	Manningham City Council	
2	MEMP Committee Chairman	Manningham City Council	
3	MERO	Manningham City Council	
4	Deputy MERO	Manningham City Council	
5	MRM	Manningham City Council	
6	MERC	VICPOL	
7	RERC	VICPOL	
8	REMI	VICPOL	
9	Deputy MERC	VICPOL	
10	ROEM	VICSES Central RHQ	
11	VICSES Controller	VICSES (Manningham Unit)	
12	Team Leader Hydrology & Flood Warnings	Melbourne Water	
13	Flood Warning Manager	Bureau of Meteorology (Flood Warning)	
14	Regional Emergency Management Off	VicRoads	
15	Emergency Management Unit	Ambulance Victoria	
16	Emergency Management Officer	Department of Education (DEECD)	
17	Emergency Management Coordinator	Department of Health and Human Services	
18	Commander	MFB	
19	Operations Officer	CFA	
20	Manger Emergency Services	United Energy UED Network	
21	District Manager	DELWP District Office	
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Document Transmittal Form / Amendment Certificate

This Municipal Storm and Flood Emergency Plan will be amended, maintained and distributed as required by VICSES in consultation with the Manningham City Council

Suggestions for amendments to this Plan should be forwarded:

Regional Manager
Central Region
Victoria State Emergency Service
Unit 6, 3-5 Gilda Court
Mulgrave, Victoria 3170.

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

Amendment Number	Date of Amendment	Amendment Entered By	Summary of Amendment
Version 01	18/03/2011	John Chaplain	Population of template
Version 02	28/03/2011	John Chaplain	Population of template
Version 03	06/04/2011	John Chaplain	Population of template
Version 04	07/02/2012	Diana Ferguson	Population into New template Version 2.2
Version 04.1	28/04/2014	Ross Butler	Appendix A, B, C, F & G Updated
Version 05	1/08/2014	Diana Ferguson & SFEP Sub Committee	Review and Updated of Template
Version 06	14/06/2017	Ross Butler	Update of Appendix A, B, C, F & G
	20/07/2017	Diana Ferguson	Update legislative references, acronyms, inclusion of operational information
Version 06.1	Nov 2019	Diana Ferguson	Added Appendix H
Version 07	01/04/2020	Ross Butler	Application of new template. Updated parts of the body as well as appendices A, B, C, F & G
Version 07.1	April 2020	Diana Ferguson & SFEP Sub Committee	Review and Updated of Template
Version 0.7.2	23/07/2020	Ross Butler	Update of Appendix data based on CoM modelling and dams

This Plan will be maintained on the Manningham and SES website.

www.manningham.vic.gov.au and www.ses.vic.gov.au

List of Abbreviations & Acronyms

The following abbreviations and acronyms are used in the Plan:

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

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. Natural systems greater than 60 ha are typically 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 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.
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 has been prepared by Manningham City Council and with the authority of the Manningham MEMPC pursuant to Section 20 of the Emergency Management Act 1986 (as amended).

This MSFEP is a sub plan to the Manningham City Council MEMP. It is consistent with the EMMV and the Victoria Flood Management Strategy, and takes into account the outcomes of the CERA process undertaken by the MEMPC.

The MSFEP is consistent with the Regional Flood Emergency Plan, Regional Storm Emergency Plan and the State Flood Emergency Plan, and takes into account the outcomes of the Community Emergency Risk Assessment (CERA) process undertaken by the Municipal Emergency Management Planning Committee (MEMPC)

This MSFEP is a result of the cooperative efforts of the Manningham MFPC and its member agencies.

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

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

Endorsement

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

1.2 The Municipality

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

1.3 Purpose and Scope of this Storm and Flood Emergency Plan

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

As such, the scope of the Plan is to:

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

1.4 Municipal Storm and Flood Planning Committee (MSFPC)

Membership of the Manningham MSFPC will comprise of the following representatives from the following agencies and organisations:

- VICSES (i.e. Unit Controller and Regional Officer – Emergency Management) (**Chair**),
- Manningham City Council
- Victoria Police (i.e. Municipal Emergency Response Co-ordinator) (MERC),
- Catchment Management Authority,
- Department of Health and Human Services (DHHS) as required,
- Department of Environment and Primary Industry (DEPI) as required,
- Water Authorities as required,
- Other agencies as required

1.5 Responsibility for Planning, Review and Maintenance of this Plan

This MSFEP must be maintained in order to remain effective.

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

The MSFPC should meet at least once per year.

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

- Following any new flood or stormwater drainage studies;

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

1.6 Endorsement of the Plan

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

Part 2. 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 FloodSafe and StormSafe program and websites (VICSES and the Municipality) upon formal adoption by Manningham City Council.

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

A Community Education Plan (CEP) to support this Plan will be developed in conjunction with the VICSES local unit. The VICSES local unit will lead the delivery of the CEP with support from the Manningham City Council and VICSES Region.

2.2 Structural Flood Mitigation Measures

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

2.3 Non-structural Flood Mitigation Measures

2.3.1 Exercising the Plan

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

2.3.2 Storm and Flood Warning

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

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

2.3.3 Flood Wardens

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.

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 Central Region RDO or IC.

The VICSES Central Region RDO / IC will activate agencies as required and documented in the VICSES Central Region, State Storm Emergency Plan and the State Flood Emergency Plan (see <https://www.ses.vic.gov.au/em-sector/vicses-emergency-plans>).

3.1.2 Responsibilities

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

The general roles and responsibilities of supporting agencies are as agreed within the Manningham City Council MEMP, Part 7 of the EMMV, VICSES Central Region Flood Emergency Plan and State Flood and Storm Emergency Plans.(see <http://www.ses.vic.gov.au/prepare/em-planning/state-plans>).

3.1.3 Municipal Emergency Coordination Centre (MECC)

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

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

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

3.1.4 Escalation

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

3.2 State Emergency Management Priorities

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

1. Protection and preservation of life is paramount - this includes:
 - a. Safety of emergency services personnel, and;

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

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

3.3 The Six C's

Arrangements in this MSFEP must be consistent with the 6 C's detailed in State and Regional Storm and Flood Emergency Plans and the MEMP. For further information, refer to Part 3 of the EMMV.

- **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

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

Section 7.1 of the EMMV identifies VICSES as the Control Agency for storm and flood. It identifies DELWP as the Control Agency responsible for dam safety as well as water and waste water service disruption related incidents and other emergencies.

All flood response activities within the City of Manningham 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 their delegated representative.

3.3.2 Incident Controller (IC)

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

3.3.3 Incident Control Centre (ICC)

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

Pre-determined Incident Control Centre locations are:

- Dandenong ICC
- Sunshine ICC
- Ferntree Gully ICC
- Burnley ICC

3.3.4 Divisions and Sectors

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

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

3.3.5 Incident Management Team (IMT)

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

Refer to Section 3 of the EMMV for further guidance on IMTs.

3.3.6 Incident Emergency Management Team (IEMT)

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

Organisations required within the IEMT (including Manningham City Council) will provide an EMLO to the ICC if and as required as well as other staff and / or resources identified as being necessary, within the capacity of the organisation.

Refer to Section 3 of the EMMV for further guidance on IEMTs.

3.3.7 On Receipt of a Flood Watch / Severe Weather Warning

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

- Review storm and flood intelligence to assess likely storm and flood consequences
- Monitor weather and flood information (see 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, other emergency services through the IEMT;
- Assess ICC readiness (including staffing of IMT and IEMT) and open if required;
- Ensure flood bulletins and community information are prepared and issued to the community;
- Monitor watercourses and undertake reconnaissance of low-lying areas;
- Develop media and community information management strategy;
- Ensure storm and flood mitigation works are being checked by owners;
- Develop and issue incident action plan, if required;
- Develop and issue situation report, if required.

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

VICSES Central Region RDO/IC will undertake actions as defined within the flood intelligence cards (Appendix C). General considerations by the VICSES Central Region RDO/IC 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, sewerage, health, transport or emergency service infrastructure interruption;
- What areas may be at risk of building damage; and
 - 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 by 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; and
- Who to contact for emergency assistance.
- Liaise with relevant asset owners as appropriate (i.e. water and power utilities).
- Implement response strategies as required based upon storm and/or flood consequence assessment.
- Continue to monitor the storm/flood situation -www.bom.gov.au.
- Continue to conduct reconnaissance of low-lying areas.

3.4 Community Information and Warnings

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

Community information and warnings communication methods available include:

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

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

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

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

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

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

DHHS will coordinate information regarding public health and safety precautions.

3.5 Media Communication

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

3.6 Initial Impact assessment

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

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

3.7 Preliminary Deployments

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

3.8 Response to Flash Flooding

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

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

1. Determine if there are barriers to evacuation by considering warning time, safe routes and, resources available;

2. If evacuation is possible, then evacuation should be the adopted strategy and it must be supported by a public information capability and a rescue contingency plan; Contact MERC who liaises with MERO and MRM about activating ERC (see MEMP);
3. Where it is likely people will become trapped by floodwaters due to limited evacuation options safety advice needs to be provided to people at risk advising them not to attempt to flee by entering floodwater if they become trapped, and that it may be safer to seek the highest point within the building and to telephone 000 if they require rescue. This advice needs to be provided even when evacuation may be possible, due the likelihood that not all community members will evacuate;
4. For buildings known to be structurally unsuitable an earlier evacuation trigger will need to be established (return to step 1 of this cycle); and
5. If an earlier evacuation is not possible then specific preparations must be made to rescue occupants trapped in structurally unsuitable buildings either pre-emptively or as those people call for help.
6. Contact MERC and MERO at the earliest opportunity to allow relief preparation to commence.

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

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

3.9 Evacuation

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

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

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

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

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

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

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

3.10 Flood Rescue

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

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

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

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

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

3.11 Aircraft Management

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

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

3.12 Resupply

Communities, neighbourhoods or households can become isolated during storms and/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 and/or intelligence indicate that communities, neighbourhoods and/or households may become isolated, VICSES will advise businesses and/or households that they should stock up on essential items.

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

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

3.13 Essential Infrastructure and Property Protection

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

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

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

If VICSES sandbags are becoming limited in supply, then priority will be given to protection of Essential Infrastructure.

Property may be protected by:

- Sandbagging to minimise entry of water into buildings
- Encouraging businesses and households to lift or move contents; and
- Construction of temporary levees in consultation with Melbourne Water, local government and VICPOL and within appropriate approval frameworks.

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

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

3.14 Disruption to Services

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

3.15 Levees

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

3.16 Road Closures

City of Manningham and Department of Transport (DoT formerly VicRoads) will carry out their formal functions of road closures. This includes the observation and placement of warning signs, and road blocks to designated local and regional roads, bridges, walking and bike trails. VicPol may liaise with and advise City of Manningham and advise DoT as to the need or advisability of erecting warning signs and / or of closing roads and bridges. DoT are responsible for designated arterial roads and freeways and Councils are responsible for the designated local and regional road network.

DoT, VicPol and Manningham municipality will communicate community information regarding road closures as outlined in the Manningham MEMP.

3.17 Dam Failure/Spilling and Landslide

3.17.1 Dam Failure/Spilling

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

Major dams with potential to cause structural and community damage within the Municipality are contained in **Appendix A**. Refer also to the DELWP Dam Safety Plan or to the Melbourne Water Dam Safety Emergency Plan specific to each Dam.

3.17.2 Landslide

VICSES is the Control Agency for Landslide incidents; VICSES is the Control Agency for any flooding that may result.

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

3.18 Waste Water related Public Health Issues and Critical Sewerage Assets

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

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

It is the responsibility of the City of Manningham Environmental Health Officer to inspect and report on any water quality issues relating to flooding.

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

3.19 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/flood incident should be represented at the After-Action Review.

Part 4. AFTER: EMERGENCY RELIEF AND RECOVERY ARRANGEMENTS

4.1 General

Arrangements for emergency relief and recovery from any emergency, including storm/flood incident within the City of Manningham are detailed in the City of Manningham Part 6 of the MEMP - 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 IEMT) including the MRM in accordance with Part 4 of the EMMV. IC's are responsible for ensuring that relief arrangements have been considered and implemented where required under the State Emergency Relief and Recovery Plan (Part 4 of the EMMV). These should be carried out in line with the City of Manningham MEMP.

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

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

Details of the relief arrangements are available in the Manningham MEMP.

4.3 Animal Welfare

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

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

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

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

4.4 Transition from Response to Recovery

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

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

APPENDIX A – STORM AND FLOOD THREATS FOR MANNINGHAM

General

The City of Manningham covers an area of 114 square kilometres and is located between 10 kilometres and 32 kilometres north-east of Melbourne's CBD. It includes the suburbs of Bulleen, Doncaster, Doncaster East, Donvale, Park Orchards, Templestowe, Templestowe Lower, Warrandyte, South, Warrandyte and Wonga Park and small parts of Nunawading and Ringwood North.

The municipality's terrain consists of low-lying Yarra River flood plains in the north, and higher undulating landscape further to the south and east. The elevation of land within the municipality ranges between RL 10 m AHD next to the Yarra River in Bulleen, to in excess of RL 150 m AHD in some locations including Park Orchards and Warrandyte.

Development within the municipality is characteristically residential interspersed with pockets of commercial development. The development density generally reduces from west to east as the nature of the development changes from higher density residential and larger commercial areas in the south west to low density residential in the north east. The Estimated Resident Population (ERP) for 2015 was 119,442 with an average population density of 10.54 persons per hectare. In 2015, the highest population density was in the suburb of Doncaster East which was estimated to contain 24.34 people per hectare. The suburb with the lowest population density was Wonga Park with 1.45 people per hectare.

According to the 2016 Australian Bureau of Statistics Census, the total number of dwellings within the municipal area was 45,355 which included 30,872 separate houses and 9,021 units and apartments.

Description of Major Waterways and Drains

The Yarra River rises upstream of the Upper Yarra Reservoir flowing through the Yarra Ranges Shire and entering Manningham just upstream of the join with Brushy Creek. The Yarra flows along the northern border of the Municipality, leaving Manningham at the join of Koonung Creek. A schematic for the Yarra River can be found in **Appendix G**.

Mullum Mullum Creek flows through the City of Maroondah before entering Manningham at Loughnan/Deep Creek Rds. The Mullum Mullum then flows through the centre of the Municipality in a northerly direction to join the Yarra River in between Warrandyte and Templestowe. A schematic of Mullum Mullum Creek can be found in **Appendix G**.

For a description of the other main watercourses and drains within the City of Manningham, refer to the table below. To view their locations, see Map B in Appendix F.

Waterway or Drain	Description
Yarra River	The Yarra River is a major waterway and forms the northern boundary of the Municipality. All stormwater from the City of Manningham is discharged to the river, either directly or via the following tributary creeks. The most flood-prone land along the Yarra within the Municipality is adjacent to the river between Mullum Mullum Creek and Bulleen Park.
Brushy Creek	The creek rises in the Dandenong Ranges in the suburbs of Montrose and Mooroolbark. It flows through the Municipality downstream of Lower Homestead Road and joins the Yarra River near Wittons Reserve.
Jumping Creek	Jumping Creek has its headwaters in the City of Maroondah in Croydon Hills where a series of retarding basins have been constructed to compensate for urbanisation. Within the Municipality, the creek flows mainly through semi-rural Wonga Park and Warrandyte South before discharging into the Yarra River at Warrandyte.
Andersons Creek	Andersons Creek rises in Ringwood North within the City of Maroondah. The headwaters have been heavily modified: many tributaries have been piped and a number of retarding basins constructed. It flows in a north westerly direction through semi-rural Warrandyte South, Park Orchards and joins the Yarra River at Warrandyte. Sections of the creek have been piped underground in Manningham.
Mullum Mullum Creek	The creek originates in Croydon and flows through Ringwood. It has been heavily impacted by road infrastructure with sections of the creek enclosed by a culvert and other sections realigned within the City of Maroondah. The creek enters the Municipality through Donvale and flows through Park Orchards and Doncaster East to enter the Yarra River at Templestowe.
Ruffey Creek	The creek rises in Doncaster East. Upstream (east) of Victoria Road, the creek is piped underground. It flows through Doncaster to enter the Yarra River at Lower Templestowe.
Koonung Creek	Koonung Creek forms the southern boundary of the City of Manningham and rises in Nunawading near Springvale Road in the City of Whitehorse. It flows in a westerly direction along the Eastern Freeway corridor and discharges to the Yarra River in Bulleen, downstream of Bulleen Road. Sections of the creek have been piped underground.
Bulleen North Main Drain	The drain runs in a north westerly direction from near Thompsons Road in Bulleen under Templestowe Road to the Yarra River to the east of the Bulleen Golf Range. Part of the drain is natural channel.
Templestowe West Main Drain	The drain runs northwards from Lower Templestowe in the vicinity of Thompsons Road under Templestowe Road and through Finns Reserve to the Yarra River. Part of the drain is natural channel.
Montpellier Court Main Drain	The drain runs in a north easterly direction from Lynnwood Parade west of Williamsons Road in Lower Templestowe to Ruffey Creek. Part of the drain is natural channel.
Bonview Road Main Drain	The drain runs in a north easterly direction from George Street east of Williamsons Road in Doncaster through Ruffey Lake Park to Ruffey Creek. Part of the drain is natural channel.
Roseland Grove Main Drain	The drain runs northwards from George Street west of Victoria Road in Doncaster through Ruffey Lake Park to Ruffey Creek. Part of the drain is natural channel.
George Street Main Drain	The drain runs in a north westerly direction from south of George Street west of Blackburn Road in Doncaster East to the undergrounded section of Ruffey Creek.
Greenridge Avenue Main Drain	The drain runs in a westerly direction from Templestowe to the east of Church Road and north of King Street to Ruffey Creek. Part of the drain is natural channel.
Porter Street Main Drain	The drain runs in a north easterly direction from near Church Road north of Foote Street in Templestowe under Porter Street and Fitzsimmons Lane into Kestrel Creek (a natural channel) and the Yarra River.
Fitzsimmons Lane Main Drain	The drain is part of a natural watercourse that runs in a north easterly direction from north of Porter Street in Templestowe to the Yarra River upstream (east) of Fitzsimmons Land.
Templestowe East Main Drain	The drain runs northwards from south of Reynolds Road and west of Blackburn Road in Templestowe to Mullum Mullum Creek downstream from the Templestowe Electricity Terminal Station. Part of the drain is natural channel.
Dickenson Close Main Drain	The drain runs in a north westerly direction from west of Blackburn Road in Templestowe to the Templestowe East main drain.
Reynolds Road Main Drain	The drain runs in a north easterly direction from east of Andersons Creek Road in Donvale and under Springvale Road to Mullum Mullum Creek just upstream of Reynolds Road. Part of the drain is natural channel.
Hunt Street Main Drain	The drain runs a north easterly direction from north of Doncaster Road in Donvale under Springvale Road and joins Mullum Mullum Creek near Carey Grammar School's Donvale Campus. Part of the drain is natural channel.

Waterway or Drain	Description
Flora Road Main Drain	The drain runs a north easterly direction from south of Tindals Road in Donvale to Mullum Mullum Creek. Part of the drain is natural channel
Larne Avenue Main Drain	The drain runs a north easterly direction from east of Park Road in Donvale to Mullum Mullum Creek. Part of the drain is natural channel
Glenvale Road Main Drain	The drain runs in an approx westerly direction from Ringwood North in the City of Maroondah to join the Ennismore Court main drain upstream (to the east) of its confluence with Mullum Mullum Creek. Part of the drain is natural channel
Ennismore Court Main Drain	The drain runs in a south westerly direction from Park Orchards to Mullum Mullum Creek at the rear of Whitefriars Catholic College. Part of the drain is natural channel
Tindals Road Main Drain	The drain runs in an approx westerly direction from Park Orchards to where it joins Mullum Mullum Creek just upstream (to the south) of Tindals Road. Part of the drain is natural channel.
Frank Street Main Drain	The drain runs in an approx westerly direction from Warrandyte to the south of Warrandyte Road to Mullum Mullum Creek.
Ayre Street Main Drain	The drain runs in an approx westerly direction from west of High Street in Doncaster to the undergrounded section of Koonung Creek to the north of Doncaster Road.
Elms Grove Main Drain	The drain runs in a south westerly direction alongside the Eastern Golf Club at Doncaster to the undergrounded section of Koonung Creek immediately to the north of Doncaster Road. Part of the drain is natural channel.
Leeds Road Main Drain	The drain runs approximately south from Doncaster East near Leeds Road to Koonung Creek.
Blackburn Road Main Drain	The drain runs approximately south from Doncaster East to the west of Blackburn Road and through Boronia Grove Reserve to Koonung Creek.

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

Flood Mitigation Systems

Flood mitigation has predominantly been developed in the form of six major Retarding Basins noting there are numerous minor ones across Manningham. These flood mitigation systems are as follows in the table below. To view their locations and connecting waterway/drainage systems, see map B in **Appendix F**.

Retarding Basins

Melbourne Water Retarding Basin	On Drain/ Waterway	Spillway Crest Level	Full Supply Level	1% AEP Flood Level	Embankment Crest Height	Storage Capacity	ANCOLD Hazard Rating	Houses in Flow Path (sunny day)	Melway Reference
Anderson Creek East, Warrandyte South	Anderson Creek East	95.3m AHD	96.0m AHD	Unavailable	12.0m (97.0m AHD)	74 ML	Low	1	35 J9
Buckingham Crescent, Bulleen	Ayr Street Drain	44.9m AHD	45.6m AHD	Unavailable	1.5m	1.4 ML	Low	Unavailable	32 K11
Irene Court, Bulleen	Ayr Street Drain	65.4m AHD	65.7m AHD	Unavailable	1.6m (65.8m AHD)	1.6 ML	High C	Unavailable	33 A10
Lynnwood Parade, Templestowe Lower	Montpellier Crescent Drain	50.8m AHD	50.8m AHD	50.4m AHD	2.5m (51.0m AHD)	10-15 ML	High C	20	33 D8
Ruffey Lake, Templestowe	Ruffeys Creek	56.7m AHD	56.7m AHD	55.1m AHD	6.0m (56.7m AHD)	177 ML	High A	105	33 G9
Tram Rd, Doncaster	Koonung Creek	Unavailable	60.1m AHD	55.5m AHD	4.0m	Unavailable	High C	Unavailable	47 F3

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

Historic Storms and Floods

The severe storms of 31st December 1991 and 18th and 19th November 1992 demonstrated that many drains within the City of Manningham lacked a continuous and unobstructed overland flow paths to cater for flows in excess of the capacity of the piped system. This was reiterated following the storms and heavy rainfall overnight on the 2nd-3rd December 2003. More recent flash flooding events occurred in November 2004, February 2005 and February 2011.

Significant floods to have occurred within the City of Manningham are as follows in the table below.

Event	Yarra River at Warrandyte (229200B)		Yarra River at Templestowe (229142A)	Yarra River at Heidelberg (229135A)		Mullum Mullum Creek at Doncaster East (229648A)	Koonung Creek at Bulleen (229229A)
	Rainfall at Gauge	River Level	River Level	Rainfall at Gauge	River Level	Creek Level	Creek Level
Normal Water Level		0.7m	0.5m		1.2m	0.2m	1.3m
Minor Flood Class		3.0m	3.5m		6.0m	-	-
Moderate Flood Class		4.5m	6.0m		8.3m	-	-
Major Flood Class		6.5m	8.0m		9.2m	-	-
1 st December 1934	-	10.82m	10.93m	-	13.13m	-	-
7 th October 1971	-	3.24m	-	-	-	-	-
9 th November 1971	-	6.78m	-	-	-	-	-
16 th May 1974	-	3.77m	-	-	-	-	-
26 th September 1974	-	3.20m	-	-	-	-	-
26 th October 1975	-	3.02m	4.97m	-	7.84m	-	-
30 th June 1977	-	3.05m	-	-	7.51m	-	-
31 st July 1977	-	3.25m	3.36m	-	-	-	-
19 th November 1978	-	2.17m	3.75m	-	7.20m	-	-
24 th December 1978	-	1.82m	2.03m	-	1.67m	-	5.30m
18 th September 1984	-	4.39m	6.01	-	7.94m	3.66m	-
29 th July 1987	-	3.13m	4.39m	-	8.05m	2.87m	-
11 th June 1989	-	3.11m	5.25m	-	-	2.22m	-
31 st October 1989	-	3.11m	3.16m	-	6.89m	-	-

Event	Yarra River at Warrandyte (229200B)		Yarra River at Templestowe (229142A)	Yarra River at Heidelberg (229135A)		Mullum Mullum Creek at Doncaster East (229648A)	Koonung Creek at Bulleen (229229A)
	Rainfall at Gauge	River Level	River Level	Rainfall at Gauge	River Level	Creek Level	Creek Level
Normal Water Level		0.7m	0.5m		1.2m	0.2m	1.3m
Minor Flood Class		3.0m	3.5m		6.0m	-	-
Moderate Flood Class		4.5m	6.0m		8.3m	-	-
Major Flood Class		6.5m	8.0m		9.2m	-	-
22 nd September 1991	-	3.33m	3.6m	-	7.45m	1.43m	-
11 th October 1992	-	3.55m	4.92m	-	8.00m	2.33m	-
18 th September 1993	-	3.18m	3.43m	-	7.10m	3.66m	-
24 th June 1996	32mm / 24hrs	2.10m	3.54m	-	7.55m	2.25m	-
1 st August 1996	16mm / 19hrs	4.29m	4.81m	-	8.00m	2.23m	-
6 th October 1996	17mm / 9hrs	2.91m	3.38m	-	7.04m	1.70m	-
27 th December 1999	89mm / 15hrs	1.09m	1.79m	29mm / 14hrs	3.86m	2.88m	4.63m
26 th October 2000	28mm / 18hrs	1.97m	2.98m	28mm / 16hrs	6.86m	1.75m	1.89m
3 rd December 2003	39mm / 12hrs	0.76m	1.85m	115mm / 13hrs	6.09m	3.51m	4.51m
13 th November 2004	42mm / 6hrs	3.42m	5.51m	34mm / 6hrs	8.38m	2.98m	2.93m
3 rd February 2005	135mm / 26hrs	2.73m	6.37m	125mm / 27hrs	8.53m	3.31m	4.49m
1 st November 2010	56mm / 18hrs	3.76m	4.01m	56mm / 21hrs	7.48m	2.85m	3.75m
5 th February 2011	115mm / 15hrs	3.60m	5.53m	83mm / 15hrs	8.30m	3.75m	4.08m
12 th April 2011	66mm / 9hrs	1.86m	2.97m	70mm / 9hrs	6.48m	2.78m	4.53m
27 th November 2011	77mm / 23hrs	1.99m	3.78m	64mm / 23hrs	7.75m	2.17m	4.14m
25 th December 2011	75mm / 7hrs	1.87m	4.11m	69mm / 5hrs	7.21m	2.61m	4.04m
1 st June 2013	82mm / 13hrs	1.27m	2.97m	97mm / 15hrs	6.69m	3.40m	4.23m
29 th December 2016	61mm / 2hrs	0.92m	2.20m	45mm / 2hrs	5.19m	2.73m	4.61m
1 st December 2017	13mm / 1hr	0.62m	1.25m	23mm / 1hr	2.48m	1.92m	4.28m
19 th December 2017	15mm / 1hr	0.64m	1.49m	9.2m / 1hr	2.85m	2.30m	3.31m
6 th November 2018	26mm / 6hrs	0.74m	1.55m	50mm / 6hrs	3.62m	2.59m	4.36m
19 th January 2020	34mm / 2hrs	0.64m	1.10m	18mm / 2 hrs	2.12m	1.32m	3.82m

Table A6 – Selection of Historical Flood Events along the Yarra River, & Mullum Mullum and Koonung Creeks in the City of Manningham

Dam Failure

Flooding resulting from failure of the following dams is likely to cause significant structural and community damage within the City of Manningham. See Dam Failure in **Section 3** of this plan for more information. Note that if the storage capacity is reached and water flows over the spillway, this is not to be referred to as a flow release or a storage breach or failure.

Melbourne Water Dam	Location	Watercourse	Dam Capacity (Live Storage)	Full Supply Level	Melway Reference
Maroondah Reservoir	Healesville	Watts River	22,145 ML	139.46m AHD	270 J4
Sugarloaf Reservoir	Christmas Hills	Yarra River	96,253 ML	178.00m AHD	273 B6
Upper Yarra Reservoir	Reefton	Yarra River	196,200 ML	366.53m AHD	X912 U2
Yan Yean Reservoir	Yan Yean	Plenty River	30,226 ML	183.19m AHD	391 D1

Table A7 – Melbourne Water Reservoirs that pose a risk to the City of Manningham from Dam Failure

A number of smaller dams are located within the Municipality and are listed below.

Dam	Catchment	Location	Type	Melway Reference
Arthur John Upton Reserve Lower	Jumping Creek	Arthur John Upton Reserve on Hartley Road, Wonga Park	Above Ground Water Storage	24 F11
Arthur John Upton Reserve Middle	Jumping Creek	Arthur John Upton Reserve on Hartley Road, Wonga Park	Above Ground Water Storage	24 F11
Arthur John Upton Reserve Upper	Jumping Creek	Arthur John Upton Reserve on Hartley Road, Wonga Park	Above Ground Water Storage	24 F11
Austin Dam	Andersons Creek	100 Acres Reserve on Knees Road, Park Orchards	Below Ground Habitat Wetland	35 F9
Brown Dam	Andersons Creek	100 Acres Reserve on Knees Road, Park Orchards	Below Ground Habitat Wetland	35 G10
Eastern Golf Course 1	Koonung Creek	Former Eastern Golf Club, Doncaster	Below Ground	35 B11
Eastern Golf Course 2	Koonung Creek	Former Eastern Golf Club, Doncaster	Below Ground	35 B11
Green Dam	Andersons Creek	100 Acres Reserve on Knees Road, Park Orchards	Below Ground Habitat Wetland	35 F10
Tadpole Dam	Andersons Creek	100 Acres Reserve on Knees Road, Park Orchards	Below Ground Habitat Wetland	35 F9
Tiffany Grove Dam	Porter Street Drain	Tiffany Grove, Templestowe	Below Ground Water Storage	33 K5

Table A8 – Dams within in the City of Manningham

APPENDIX B - TYPICAL FLOOD PEAK TRAVEL TIMES

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

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

Typical Travel Times

Location From (gauge)	Location To (gauge)	Typical Travel Time	Flood Class	Comments
YARRA RIVER				
Coldstream	Warrandyte	Between 29 and 62 hours	Moderate Flood at Coldstream	Inflows from Brushy Creek or Watsons Creek may impact on travel time.
Warrandyte	Templestowe	Between 3 and 6 hours	Minor Flood at Warrandyte	Inflows from Andersons Creek, Mullum Mullum Creek or Diamond Creek may impact on travel time.
	Heidelberg	Between 4 and 12 hours		Inflows from Andersons Creek, Mullum Mullum Creek, Diamond Creek or Plenty River may impact on travel time.
Templestowe	Heidelberg	Between 2 and 9 hours	Minor Flood at Templestowe	Inflows from Plenty River may impact on travel time
		Around 4 hours	Moderate Flood at Templestowe	

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

Historical Travel Times

Flood Event	Location From (gauge)	Location To (gauge)	Flood Peak Travel Time	Flood Class at
YARRA RIVER				
26 th October 1975	Templestowe	Heidelberg	5 hours	Templestowe
19 th November 1978	Templestowe	Heidelberg	12 hours	Templestowe
18 th September 1984	Coldstream	Warrandyte	55 hours	Coldstream
	Warrandyte	Templestowe	3 hours	Templestowe
	Templestowe	Heidelberg	4 hours	Templestowe
29 th July 1987	Warrandyte	Templestowe	4 hours	Warrandyte
	Templestowe	Heidelberg	8 hours	Templestowe
11 th June 1989	Warrandyte	Templestowe	6 hours	Warrandyte
31 st October 1989	Coldstream	Warrandyte	51 hours	Coldstream
	Warrandyte	Templestowe	4 hours	Warrandyte
	Templestowe	Heidelberg	7 hours	Heidelberg
22 nd September 1991	Coldstream	Warrandyte	62 hours	Coldstream
	Warrandyte	Templestowe	3 hours	Warrandyte
	Templestowe	Heidelberg	5 hours	Templestowe
11 th October 1992	Coldstream	Warrandyte	29 hours	Coldstream
	Warrandyte	Templestowe	6 hours	Warrandyte
	Templestowe	Heidelberg	2 hours	Templestowe
18 th September 1993	Coldstream	Warrandyte	35 hours	Coldstream
	Warrandyte	Templestowe	5 hours	Warrandyte
	Templestowe	Heidelberg	9 hours	Heidelberg
1 st August 1996	Coldstream	Warrandyte	33 hours	Coldstream
	Warrandyte	Templestowe	9 hours	Warrandyte
	Templestowe	Heidelberg	2 hours	Templestowe
13 th November 2004	Warrandyte	Templestowe	5 hours	Warrandyte
	Templestowe	Heidelberg	4 hours	Templestowe
3 rd February 2005	Warrandyte	Templestowe	4 hours	Templestowe
	Templestowe	Heidelberg	4 hours	Templestowe
5 th February 2011	Coldstream	Warrandyte	48 hours	Coldstream
	Warrandyte	Templestowe	3 hours	Warrandyte
	Templestowe	Heidelberg	7 hours	Templestowe
27 th November 2011	Templestowe	Heidelberg	7 hours	Templestowe
25 th December 2011	Templestowe	Heidelberg	4 hours	Templestowe

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

APPENDIX C1 – YARRA RIVER FLOOD EMERGENCY PLAN

Overview of Flooding Consequences

This Summary table is generated from Victorian Government data. The State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons that access this information should make appropriate enquiries to assess the currency of the data.

Summary of Consequences in a 1% AEP (100yr ARI) flood along the Yarra River in Manningham

Property					
Properties	46				
Residential	18				
Commercial	9	Including Veneto Club at 191 Bulleen Road, Bulleen			
Industrial	8				
Public Land	5				
Rural	6				
Community Infrastructure					
Schools / Colleges	3	Carey Baptist Grammar Sports Centre; Marcellin College Sports Grounds; Trinity Grammar School Sporting Complex			
Essential Infrastructure					
Major Roads	5	Bulleen Road; Manningham Road West (Banksia Street); Ringwood-Warrandyte Road near Kangaroo Ground-Warrandyte Road; Templestowe Road; and Yarra Street			
Bus Routes	3	280, 282, 364 & 903			
Sewerage Facilities	23	17 Unsewered Properties; and 6 Emergency Relief Points			
Tourism / Recreation					
Sports Facilities	2	Freeway Public Golf Course; Yarra Valley Country Club			
Recreation Facilities	3	Birrarrung Park; Bulleen Park; Main Yarra Trail			
Government Boundaries					
Local Gov't Areas	1	Manningham	CMA	1	Port Phillip & Westernport
Adjacent LGAs	4	Yarra Ranges; Nillumbik; Banyule; and Boroondara	CFA District	1	District 13
SES Unit Area	1	Manningham	MFB District	1	Eastern

Table C1.1 – Consequence Summary of 1% AEP flood along the Yarra River in Manningham

The Yarra River and its adjoining suburbs of Wonga Park, Warrandyte, Templestowe, Templestowe Lower & Bullen are located between 10-30km North East of Melbourne moving from a semi-rural environment around Wonga Park & Warrandyte to a more urban landscape through Templestowe & Bulleen. The Yarra River being the prominent water course in the area flows from the east through the Municipalities of Yarra Ranges, Manningham, Nillumbik & Banyule. Bulleen Road, Bulleen is a known flooding issue in the municipality from Yarra River flooding. Riverine flooding from the Yarra may last for up to 48 hours. See mapping in **Appendix F** for more insight into flooding in the area.

Gauges and Warnings

Warnings are available for flooding expected along the Yarra River at Warrandyte, Templestowe & Bulleen. For other water level / flood gauges within the Municipality, Melbourne Water does not provide any flood warning service at this point, due to the generally short warning times available.

Melbourne Water Gauges	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Yarra River at Christmas Hills	229270A	300m south of Melb Water Yarra Gorge Pumping Stations, Skyline Rd, Christmas Hills	✓	✓	273 H12
Yarra River at Warrandyte	229200B	South bank of river at end of Police Street, Warrandyte	✓	✓	23 D12
Yarra River at Templestowe	229142A	Northern bank of River, 80m east of Fitzsimons Lane, Eltham	✓		21 G12
Yarra River at Heidelberg	229135A	East bank of River on Northern side of Banksia Street Bridge, Bulleen	✓	✓	32 C5
Watsons Creek at Kangaroo Ground South	229608A	South bank of the creek at the Oxley Bridge, Henley Road, Bend of Islands	✓	✓	24 F1
Diamond Creek at Eltham	229618A	East bank of Creek, northern side of Bridge St Bridge, Eltham	✓		21 H6
Plenty River at Lower Plenty	229614A	East bank of River on Northern side of Main Road	✓		20 K9
Viewbank	86068	Southern side of Country Lane, Viewbank		✓	20 H12

Table C1.2 – Hydrographic Monitoring Stations along the Yarra River at Manningham

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/rainfallandriverleveledata/Pages/Rainfall-and-river-level-new.aspx>. It is advised that residents monitor the Bureau of Meteorology's website <http://www.bom.gov.au/> and the VicEmergency website <https://emergency.vic.gov.au/> for any thunderstorm, flood or severe weather warnings present for their area.

There are currently three Melbourne Water flood warning gauges on the Yarra River that could be used to assist with public safety. These are at Warrandyte, Templestowe & Heidelberg. Those gauges with flood class levels established are outlined in the table below.

Gauge	River / Creek Flood Class Level		
	Minor	Moderate	Major
Yarra River at Warrandyte	3.0m	4.5m	6.5m
Yarra River at Templestowe	3.5m	6.0m	8.0m
Yarra River at Heidelberg	6.0m	8.3m	9.2m

Table C1.3 – Level Gauges with established Flood Class Levels for the City of Manningham

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

Areas of Flood Risk

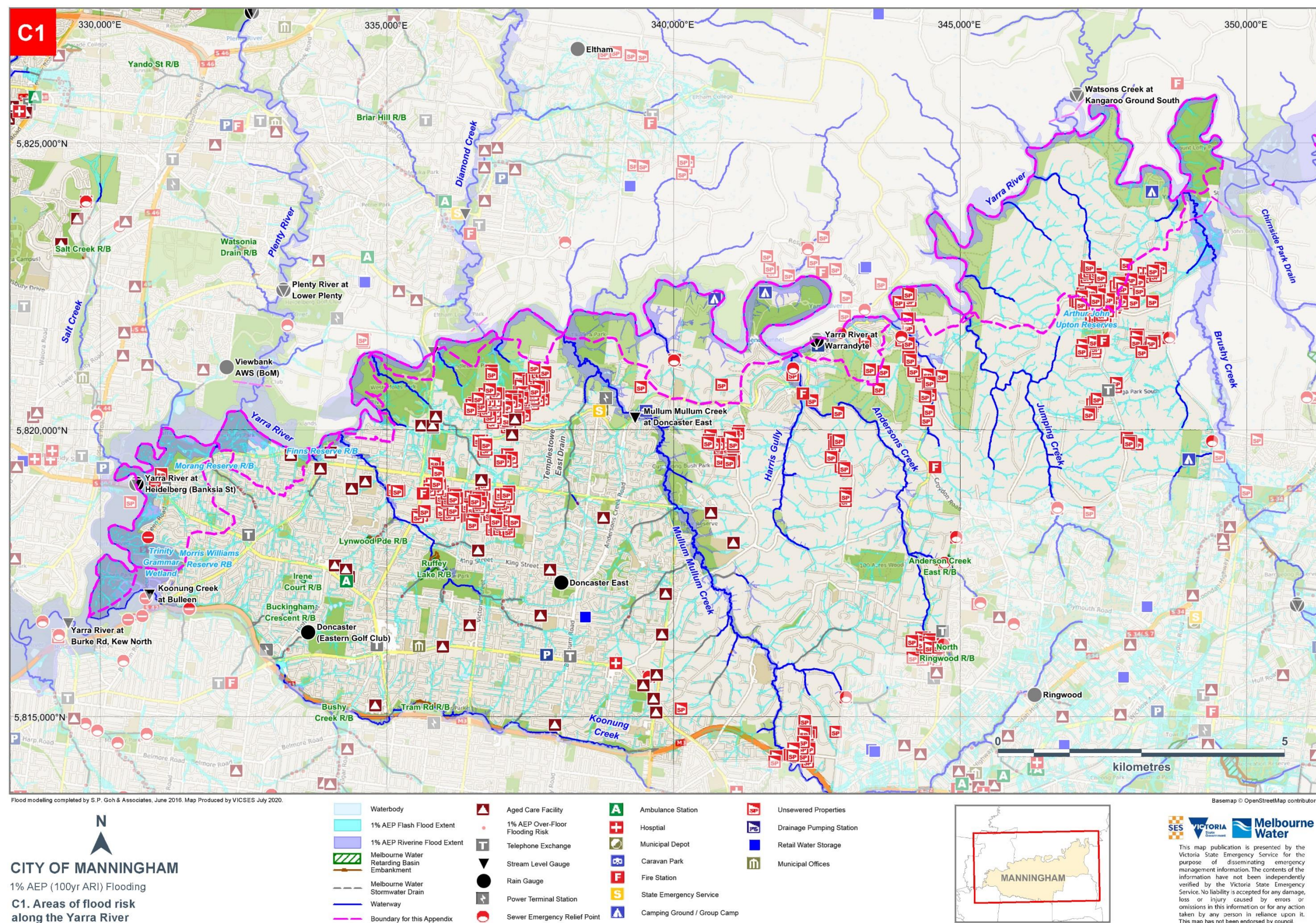


Figure C1 – Areas of flood risk along the Yarra River in the City of Manningham

Properties at Flood Risk

Properties listed in the table below are at risk from flooding along the Yarra River in Manningham. As more intelligence becomes available, this list may change. This table has been populated based on modelling work as part of the Yarra River (Melbourne Water and S.P. Goh & Associates, November 2010) flood mapping and risk assessment program. Note that any multi-lot properties situated above ground floor likely impacted by isolation only with flooding on ground floor impacting access to common areas and/or carpark and storage facilities. Information on above ground-floor properties is not available in this list.

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

Properties (Residences & Businesses) at risk from Flooding during a 1% AEP event					
Residential		Commercial	Industrial	Rural	Public Use
Street No. at Risk	Street	Suburb	Over-Floor Flooding Risk	Along Melbourne Water Watercourse	Flood Risk Type
160	Bulleen Road	Bulleen		Yarra River	Riverine
162-168	Bulleen Road	Bulleen		Yarra River	Riverine
167	Bulleen Road	Bulleen		Yarra River	Riverine
169-173	Bulleen Road	Bulleen	✓	Yarra River	Riverine
175-189	Bulleen Road	Bulleen		Yarra River	Riverine
191	Bulleen Road	Bulleen	✓	Yarra River	Riverine
6-10	Everard Drive	Warrandyte		Yarra River	Riverine
17	Everard Drive	Warrandyte	✓	Yarra River	Riverine
21	Everard Drive	Warrandyte		Yarra River	Riverine
9	First Street	Warrandyte	✓	Yarra River	Riverine
11	First Street	Warrandyte	✓	Yarra River	Riverine
45	Greenaway Street	Bulleen		Yarra River	Riverine
47	Greenaway Street	Bulleen		Yarra River	Riverine
9	Kim Close	Bulleen		Yarra River	Riverine
6-8	Manningham Road West	Bulleen		Yarra River	Riverine
10-12	Manningham Road West	Bulleen		Yarra River	Riverine
14-16	Manningham Road West	Bulleen		Yarra River	Riverine
18-20	Manningham Road West	Bulleen		Yarra River	Riverine
22-24	Manningham Road West	Bulleen		Yarra River	Riverine
26-28	Manningham Road West	Bulleen		Yarra River	Riverine
321	Ringwood-Warrandyte Road	Warrandyte		Yarra River	Riverine
324	Ringwood-Warrandyte Road	Warrandyte		Yarra River	Riverine
24	Riverwood Lane	Templestowe Lower		Yarra River	Riverine
26	Riverwood Lane	Templestowe Lower	✓	Yarra River	Riverine
31	Ruffey Street	Templestowe Lower		Yarra River	Riverine
25	Taroona Avenue	Warrandyte	✓	Yarra River	Riverine
3	Templestowe Road	Templestowe Lower		Yarra River	Riverine
9-15	Templestowe Road	Bulleen		Yarra River	Riverine
249	Templestowe Road	Templestowe Lower	✓	Yarra River	Riverine
251-275	Templestowe Road	Templestowe Lower		Yarra River	Riverine

Properties (Residences & Businesses) at risk from Flooding during a 1% AEP event					
Residential		Commercial	Industrial	Rural	Public Use
Street No. at Risk	Street	Suburb	Over-Floor Flooding Risk	Along Melbourne Water Watercourse	Flood Risk Type
23-31	Tills Drive	Warrandyte		Yarra River	Riverine
33-35	Tills Drive	Warrandyte		Yarra River	Riverine
92	Tills Drive	Warrandyte		Yarra River	Riverine
1	Wood Street	Templestowe	✓	Yarra River	Riverine
24	Wood Street	Templestowe	✓	Yarra River	Riverine
26	Wood Street	Templestowe	✓	Yarra River	Riverine
57-59	Yarra Street	Warrandyte	✓	Yarra River	Riverine
81	Yarra Street	Warrandyte		Yarra River	Riverine
93	Yarra Street	Warrandyte	✓	Yarra River	Riverine
95	Yarra Street	Warrandyte	✓	Yarra River	Riverine
97	Yarra Street	Warrandyte	✓	Yarra River	Riverine
98	Yarra Street	Warrandyte		Yarra River	Riverine
163	Yarra Street	Warrandyte	✓	Yarra River	Riverine
183-187	Yarra Street	Warrandyte		Yarra River	Riverine
193-197	Yarra Street	Warrandyte		Yarra River	Riverine
207	Yarra Street	Warrandyte	✓	Yarra River	Riverine
Totals					
46					

Table C1.4 – Properties at risk of flooding along the Yarra River in the City of Manningham

Isolation

No major isolation risks exist for areas around Wonga Park, Warrandyte, Templestowe, Templestowe Lower & Bulleen from the Yarra River during a 1% AEP (100yr ARI) event. Access across the Yarra River may be cut with flooding to Banksia Street, Bulleen during a 1% AEP event. Some localised short-duration isolation may occur due to flash flooding.

Essential Infrastructure

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. <http://ptv.vic.gov.au/live-travel-updates/>. A map of Public Transport routes within the City of Manningham is available via the website at: https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/fc42bcf06d/27_Manningham_LAM.pdf

Apart from the roads outlined below, all other essential infrastructure and services areas around Wonga Park, Warrandyte, Templestowe, Templestowe Lower & Bullen are expected to remain unaffected by flooding during a 1% AEP (100yr ARI) event.

Road Closures

The following roads are subject to closure during flooding around Wonga Park, Warrandyte, Templestowe, Templestowe Lower & Bullen. Check the VicRoads website for more details: <http://alerts.vicroads.vic.gov.au/>

VicRoads Roads flooded in a 1% AEP event	
- Bulleen Road, Bulleen between the Eastern Freeway and Manningham Road - Manningham Road West (Banksia Street), Bulleen - Templestowe Road, Templestowe Lower near Thompsons Road - Yarra Street, Warrandyte - Ringwood-Warrandyte Road, Warrandyte near Kangaroo Ground-Warrandyte Road	

Table C1.5 – Department of Transport Possible Road Closures during a flooding event

Manningham City Council Roads flooded in a 1% AEP event	
TEMPLESTOWE LOWER	WARRANDYTE
- Riverwood Lane - Ruffey Street	- Everard Drive - First Street - Police Street - Taroona Avenue - Tills Drive - Whipstick Gully Road

Table C1.6 – Manningham City Council Possible Road Closures during a flooding event

Flood Mitigation

A retarding basin is located along the Yarra River in the City of Manningham.

Retarding Basin	Location	Type	Melway Reference
Finns Reserve	Finns Reserve on Union Street, Templestowe Lower	Below Ground	33 B4

Table C1.7 – Retarding Basins within the Yarra River catchment in the City of Manningham

Waterbodies located along the Yarra River may also hold extra water storage during a rain event:

Wetland	Location	Type	Melway Reference
Trinity Grammar Wetland	Trinity Grammar School Sporting Complex	Below Ground Wetland	32 E9

Table C1.8 – Parks and Reserves along the Yarra River in the City of Manningham

A number of Parks and Golf Courses act as flood zones during an event.

Sewerage Infrastructure

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

Sewer Pumping Stations

Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Yarra Valley Water Pumping Station	Local Drainage	-	Research-Warrandyte Road, North Warrandyte	23 E9
Yarra Valley Water Pumping Station	Yarra River	North	Cooks Crescent, North Warrandyte	23 B9
Yarra Valley Water Pumping Station	Yarra River	North	Lomatia Court, North Warrandyte	23 E11
Yarra Valley Water Pumping Station	Stony Creek	West	Professors Lane, North Warrandyte	23 D8
Yarra Valley Water Pumping Station	Yarra River Tributary	West	2-6 Tills Drive, Warrandyte	23 H12
Yarra Valley Water Pumping Station	Yarra River	South	23-31 Tills Drive, Warrandyte	23 H11
Yarra Valley Water Pumping Station	Yarra River	South	33-35 Tills Drive, Warrandyte	23 H11
Yarra Valley Water Pumping Station	Yarra River	South	76-80 Tills Drive, Warrandyte	23 H10
Yarra Valley Water Pumping Station	Yarra River	South	77-89 Tills Drive, Warrandyte	23 H10

Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Location	Melway Reference
Yarra Valley Water Pumping Station	Yarra River	South	82-84 Tills Drive, Warrandyte	23 H10
Yarra Valley Water Pumping Station	Yarra River	South	86-90 Tills Drive, Warrandyte	23 H10
Yarra Valley Water Pumping Station	Yarra River	South	231 Yarra Street, Warrandyte	23 H11
Yarra Valley Water Pumping Station	Yarra River Tributary	West	339 Ringwood-Warrandyte Road, Warrandyte	23 H12
Yarra Valley Water Pumping Station	Yarra River Tributary	West	343 Ringwood-Warrandyte Road, Warrandyte	23 H12
Yarra Valley Water Pumping Station	Yarra River Tributary	West	Russell Road, Warrandyte	23 H12
Yarra Valley Water Pumping Station	Andersons Creek	West	Warrandyte Reserve, Warrandyte	35 C1
Yarra Valley Water Pumping Station	Homewood Drain	East	Alexander Reserve, Warrandyte	22 H12

Table C1.9 – Sewer Pumping Stations within the Yarra River Catchment in the City of Nillumbik and City of Manningham

Sewer Emergency Relief Points

There are Sewer Emergency Relief Points along the Yarra River that will likely affect floodwater conditions should they be activated. Contact the Infrastructure Operator EMLO/Duty Officer for information on any recent or planned releases at a Sewer Emergency Relief Point as part of a Dynamic Risk Assessment (DRA) if work is to be conducted at or downstream of the outlet.

On Drain / Waterway	Bank / Side of Waterway	Owner	Location	Melway Reference
Stony Creek	West	Yarra Valley Water	Professors Lane, North Warrandyte	23 D8
Yarra River	North	Yarra Valley Water	Research-Warrandyte Road, North Warrandyte	23 F10
Yarra River Tributary	West	Yarra Valley Water	Yarra Street, Warrandyte	23 H12
Yarra River	South	Yarra Valley Water	97-99 Yarra Street, Warrandyte	23 E11
Andersons Creek	West	Yarra Valley Water	12-28 Taroona Avenue, Warrandyte	35 C1
Homewood Drain	East	Yarra Valley Water	Alexander Reserve, Warrandyte	22 H12

Table C1.10 – Sewer Emergency Relief Points in the Yarra River Catchment in the City of Manningham and Shire of Nillumbik

Command, Control and Coordination

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

Flood Impacts & Operational Considerations (Intelligence Cards)

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

Intelligence Cards have been included for the following locations:

- Yarra River at Warrandyte
- Yarra River at Templestowe
- Yarra River at Heidelberg

FLOOD INTELLIGENCE CARD – WARRANDYTE GAUGE, YARRA RIVER

Version 4 – April 2020



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

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LOCATION	South bank of river at end of Police Street, Warrandyte
MELWAY REFERENCE:	23 D12
STREAM:	Yarra River
GAUGE NUMBER:	229200B
GAUGE ZERO:	24.03m AHD
GAUGE TYPE	Stream Level & Rain

MINOR:	3.0m
MODERATE:	4.5m
MAJOR	6.5m
LEVEE HEIGHT:	N/A
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	10.82m (1 st December 1934)

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
3.0m	MINOR FLOOD LEVEL		
3.60m	5 th February Flood Level Peak		
4.5m	MODERATE FLOOD LEVEL	Properties at Flood Risk (over floor) 1 Property in Total The Dairy at 93 Yarra Street, Warrandyte	
6.5m	MAJOR FLOOD LEVEL		
6.78m	9 th November Flood Level Peak		
6.87m		Properties at Flood Risk (over floor) 1 New at Level; 2 Properties in Total 17 Everard Drive, Warrandyte Water Over Road - Everard Drive, Warrandyte	
7.78m		Properties at Flood Risk (over floor)	

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		1 New at Level; 3 Properties in Total 25 Taroona Avenue, Warrandyte Water Over Road - Taroona Avenue, Warrandyte	
8.35m		Properties at Flood Risk (over floor) 3 New at Level; 6 Properties in Total 11 First Street, Warrandyte 95 & 97 Yarra Street, Warrandyte Water Over Road - First Street, Warrandyte	
8.72m		Community Infrastructure Flooded 1 New at Level; 7 Properties in Total - Chapel at 57-59 Yarra Street, Warrandyte flooded Water Over Road - Police Street, Warrandyte	
8.87m	2% AEP (50-year ARI flow) (Major)		
9.18m		Properties at Flood Risk (over floor) 2 New at Level; 9 Properties in Total 163 & 207 Yarra Street, Warrandyte	
9.82m	1% AEP (100-year ARI flow) (Major)	Properties at Flood Risk (over floor) 1 New at Level; 10 Properties in Total 9 First Street, Warrandyte Property at Flood Risk (below floor) 11 Properties in Total 23-31, 33-35 & 92 Tills Drive, Warrandyte 321 & 324 Ringwood-Warrandyte Road, Warrandyte 81, 98, 183-187 & 193-197 Yarra Street, Warrandyte Road, Warrandyte 6-10 & 21 Everard Drive, Warrandyte Essential Infrastructure Likely Impacted - Bus Route 364 along Ringwood-Warrandyte Road, Warrandyte Water Over Road - Ringwood-Warrandyte Road, Warrandyte - Tills Drive, Warrandyte - Yarra Street, Warrandyte at Whipstick Gully Road - Whipstick Gully Road, Warrandyte	

Table C1.11 – Breakdown of likely consequences at various Warrandyte gauge level heights along the Yarra River with operational considerations

FLOOD INTELLIGENCE CARD – TEMPLESTOWE GAUGE, YARRA RIVER

Version 4 – April 2020



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

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LOCATION	Northern bank of River, 80m east of Fitzsimons Lane, Eltham
MELWAY REFERENCE:	21 G12
STREAM:	Yarra River
GAUGE NUMBER:	229142A
GAUGE ZERO:	13.070m AHD
GAUGE TYPE	Stream Level

MINOR:	3.5m
MODERATE:	6.0m
MAJOR	8.0m
LEVEE HEIGHT:	N/A
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	10.93m (1 st December 1934)

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
2.55m		River reaches bank full level at Banksia Park	
3.5m	MINOR FLOOD LEVEL	Community Infrastructure Flooded Main Yarra Trail begins flooding at various sections between Warrandyte & Bulleen	
4.0m		Community Infrastructure Flooded - Yarra Valley Country Club at 9-15 Templestowe Road, Bulleen - Birrarrung Park at 3 Templestowe Road, Templestowe Lower starts flooding	
5.53m	5 th February 2011 Flood Level Peak		
6.0m	MODERATE FLOOD LEVEL	Community Infrastructure Flooded - Trinity Grammar School Sporting Complex at 162-168 Bulleen Road, Bulleen - Marcellin College Sports Grounds at 160 Bulleen Road, Bulleen - Carey Baptist Grammar Sports Centre at 169-173 Bulleen Road, Bulleen	
6.37m	3 rd February 2005 Flood Level Peak		
6.7m		Properties at Flood Risk (over floor) 1 Properties in Total	

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		169-173 Bulleen Road, Bulleen Community Infrastructure Flooded - Stand at Carey Baptist Grammar Sports Centre at 169-173 Bulleen Road, Bulleen	
8.0m	MAJOR FLOOD LEVEL	Community Infrastructure Flooded Finns Reserve at 251-275 Templestowe Road, Templestowe Lower	
8.1m		Properties at Flood Risk (over floor) 1 New at Level; 2 Properties in Total Veneto Club at 191 Bulleen Road, Bullen	
8.6m		Properties at Flood Risk (over floor) 10 New at Level; 12 Properties in Total 249 Templestowe Road, Templestowe Lower 1, 24 & 26 Wood Street, Templestowe 26 Riverwood Lane, Templestowe Lower Properties at Flood Risk (below floor) 2 New at Level; 6 Properties in Total 24 Riverwood Lane, Templestowe Lower 31 Ruffey Street, Templestowe Lower Water Over Road - Riverwood Lane, Templestowe Lower - Ruffey Street, Templestowe Lower	
10.28m	1% AEP Flood Level (100yr ARI)	Essential Infrastructure Likely Impacted - Bus Routes 280 and 282 along Templestowe Road, Templestowe Lower Water Over Road - Intersection of Union Street & Templestowe Road, Templestowe Lower	

Table C1.12 – Breakdown of likely consequences at various Templestowe gauge level heights along the Yarra River with operational considerations

FLOOD INTELLIGENCE CARD – HEIDELBERG GAUGE, YARRA RIVER

Version 4 – April 2020



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

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LOCATION	Banksia Street, Heidelberg
MELWAY REFERENCE:	32 D5
STREAM:	Yarra River
GAUGE NUMBER:	229135A
GAUGE ZERO:	5,770m AHD
GAUGE TYPE	Stream Level & Rain

MINOR:	6.0m
MODERATE:	8.3m
MAJOR	9.2m
LEVEE HEIGHT:	N/A
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	13.13m (1 st December 1934)

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
6.00m	MINOR FLOOD LEVEL		
7.21m	25 th December 2011 Flood Level Peak		
7.90m		Properties at Flood Risk (below floor) 1 Property in Total - Veneto Club at 191 Bulleen Road, Bulleen Community Infrastructure Flooded - Bulleen Park at 175-189 Bulleen Road, Bulleen - Freeway Public Golf Course at 167 Bulleen Road, Balwyn North Water Over Road - Bulleen Road, Bulleen flooded	
8.30m	MODERATE FLOOD LEVEL 5 th February 2011 Flood Level Peak	Community Infrastructure Flooded - Trinity Grammar School Sporting Complex at 162-168 Bulleen Road, Bulleen - Marcellin College Sports Grounds at 160 Bulleen Road, Bulleen - Carey Baptist Grammar Sports Centre at 169-173 Bulleen Road, Bulleen	
8.53m	3 rd February 2005 Flood Level Peak		

River Height	Flood Class or Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
9.00m		Properties at Flood Risk (over floor) 1 Properties in Total 169-173 Bulleen Road, Bulleen Community Infrastructure Flooded - Stand at Carey Baptist Grammar Sports Centre at 169-173 Bulleen Road, Bulleen	
9.20m	MAJOR FLOOD LEVEL		
9.30m		Properties at Flood Risk (over floor) 1 New at Level; 2 Properties in Total Veneto Club at 191 Bulleen Road, Bullen	
12.58m	1% AEP (100-year ARI flow)	Properties at Flood Risk (below floor) 9 New at Level; 10 Property in Total 6-8, 10-12, 14-16, 18-20, 22-24 & 26-28 Manningham Road West, Bulleen 9 Kim Close, Bulleen 45 & 47 Greenaway Street, Bulleen Essential Infrastructure Likely Impacted - Bus Route 903 along Manningham West Road, Bulleen Water Over Road - Manningham West Road, Bulleen	

Table C1.13 – Breakdown of likely consequences at various Heidelberg gauge level heights along the Yarra River with operational considerations

APPENDIX C2 – MULLUM MULLUM CREEK, ANDERSON CREEK AND BRUSHY CREEK FLOOD EMERGENCY PLAN

Overview of Flooding Consequences

These Summary tables are generated from Victorian Government data. The State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons that access this information should make appropriate enquiries to assess the currency of the data.

Summary of Consequences in a 1% AEP (100yr ARI) flood within the Mullum Mullum Creek Catchment in Manningham

Property					
Properties	40				
Residential	27				
Commercial	3	SPAustNet Templestowe Terminal Station			
Industrial	0				
Public Land	1	Mullum Mullum Reserve			
Rural	9				
Community Infrastructure					
Retirement Villages	1	Stockland Donvale Retirement Village			
Essential Infrastructure					
Major Roads	1	Heidelberg-Warrandyte Road			
Bus Routes	2	364; and 906			
Sewerage Facilities	53	50 Unsewered Properties; 2 Pumping Stations; and 1 Emergency Relief Point			
Power Facility	1	SPAustNet Templestowe Terminal Station			
Tourism / Recreation					
Caravan Parks	1	Crystal Brook Tourist Caravan Park			
Recreation Facilities	2	Mullum Mullum Creek Trail; and Mullum Mullum Reserve Camping Grounds			
Government Boundaries					
Local Gov't Areas	1	Manningham	CMA	1	Port Phillip & Westernport
Adjacent LGAs	2	Whitehorse; and Maroondah	CFA District	1	District 13
SES Unit Area	1	Manningham	MFB District	1	Eastern

Table C2.1 – Consequence Summary of 1% AEP flood within the Mullum Mullum Creek catchment in Manningham

Summary of Consequences in a 1% AEP (100yr ARI) flood within the Andersons Creek & Brushy Creek catchments

Property					
Properties	22				
Residential	7				
Commercial	0				
Industrial	0				
Public Land	0				
Rural	15				
Essential Infrastructure					
Major Roads	2	Heidelberg-Warrandyte Road; and Ringwood-Warrandyte Road			
Bus Routes	4	364; 578; 579; and 906			
Sewerage Facilities	58	55 Unsewered Properties; 3 Pumping Stations; and 6 Emergency Relief Points			
Tourism / Recreation					
Recreation Facilities	2	Taroona Reservoir; & Warrandyte Reserve			
Government Boundaries					
Local Gov't Areas	1	Manningham	CMA	1	Port Phillip & Westernport
Adjacent LGAs	1	Maroondah	CFA District	1	District 13
SES Unit Area	1	Manningham	MFB District	0	

Table C2.2 – Consequence Summary of 1% AEP flood around Harris Gully and Andersons Creek

Mullum Mullum Creek, Anderson Creek and Brushy Creek and the surrounding suburbs of Park Orchards, Donvale, Doncaster East, Warrandyte, Templestowe and Wonga Park are located approximately 20km north east of Melbourne in a mixed residential and low-density residential area. Mullum Mullum Creek flows from the south through the City of Maroondah, entering Manningham at Park Orchards. The Creek flows through Manningham in a northerly direction, joining up with the Yarra River at Templestowe. There is one gauge on the Creek that measures water levels at Doncaster East. The catchment size of Mullum Mullum Creek is relatively small for an open waterway so flooding will most likely occur during a High Intensity, short Duration rainfall event. A number of stormwater drains feed into the Mullum Mullum, Anderson and Brushy Creeks with flash flooding possible along fast flowing narrow overland flow paths as a result of the hilly terrain. Flood Waters are likely to rise and fall over a few hours during a flood event. See mapping in Appendix F for more insight into flooding in the area.

Gauges and Warnings

Whilst there are hydrographic/telemetry stations (river gauges) within the municipality, Melbourne Water does not provide any flood warning service at this point, due to the generally short warning times available.

Melbourne Water Gauges	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Mullum Mullum Creek at Doncaster East	229648A	Eastern side of the Heidelberg-Warrandyte Road bridge, Doncaster East	✓		34 F3
Doncaster East	586037	Zerbes Reserve, Nedlands Ct, Doncaster East		✓	34 B10
Ringwood	586065	Burnt Bridge Tennis Club, Maroondah Hwy, Ringwood		✓	50 C3

Table C2.3 – Gauges within the Mullum Mullum Creek catchment

These Gauges may provide some warning of expected flooding. See the Melbourne Water website for more information on these gauges:

<http://www.melbournewater.com.au/waterdata/rainfallandriverleveldata/Pages/Rainfall-and-river-level-new.aspx>. It is advised that residents monitor the Bureau of Meteorology's website <http://www.bom.gov.au/> and the VicEmergency website <https://emergency.vic.gov.au/> for any thunderstorm, flood or severe weather warnings present for their area.

Areas of Flood Risk

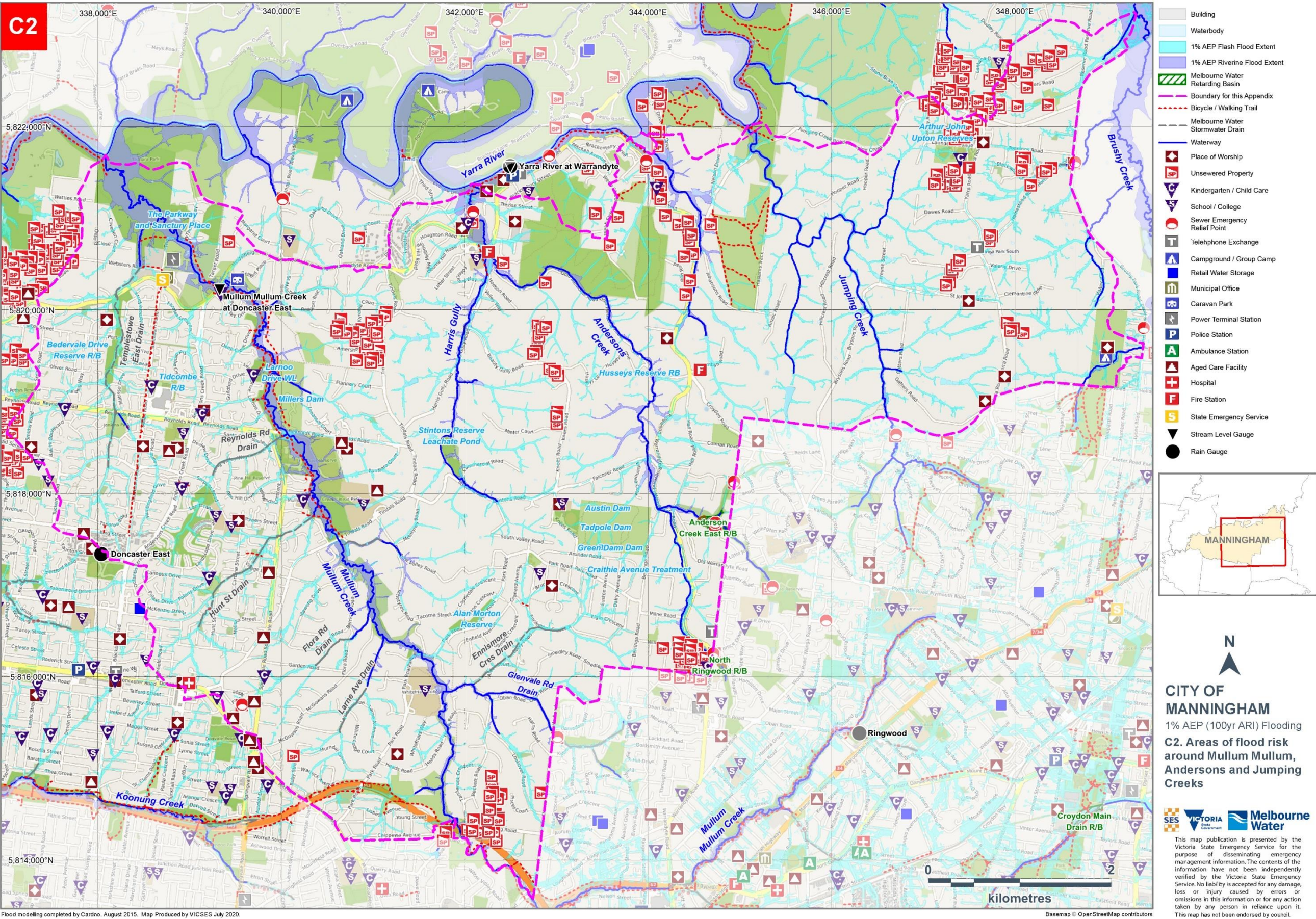


Figure C2 – Areas of flood risk around Mullum Mullum Creek, Harris Gully, Andersons Creek and Jumping Creek in the City of Manningham.

Properties at Flood Risk

Properties listed in the table below are at risk from flooding within the Mullum Mullum Creek, Anderson Creek and Brushy Creek catchments. As more intelligence becomes available, this list may change. This table has been populated based on modelling work as part of the Mullum Mullum Creek and Andersons Creek (Cardno, August 2015) flood mapping and risk assessment programs. Note that any multi-lot properties situated above ground floor likely impacted by isolation only with flooding on ground floor impacting access to common areas and/or carpark and storage facilities.

Properties listed in the table below are at risk from flooding within the Harris Gully and Andersons Creek catchments. As more intelligence becomes available, this list may change. This table has been populated based on modelling work as part of the Mullum Mullum Creek, Harris Gully and Andersons Creek (Cardno, August 2015) flood mapping and risk assessment programs.

Hazard criteria is defined as being where flooding is equal to or greater than 180m² and the depth of flooding is greater than 100mm or the product of velocity and depth is equal to or greater than 0.008.

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Properties at risk from Flooding exceeding Hazard Criteria or where 20% AEP flood depth is greater than 100mm					
Residential		Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event	Address		Suburb	Within Catchment	Flood Risk Type
	20% AEP	1% AEP			
✓	✓	17 Everard Drive	Warrandyte	Andersons Creek	Flash
	✓	66 Knees Road	Park Orchards	Andersons Creek	Flash
	✓	79 Melbourne Hill Road	Warrandyte	Andersons Creek	Flash
✓	✓	83 Melbourne Hill Road	Warrandyte	Andersons Creek	Flash
✓	✓	85 Melbourne Hill Road	Warrandyte	Andersons Creek	Flash
	✓	321 Ringwood-Warrandyte Road	Warrandyte	Andersons Creek	Flash
	✓	323 Ringwood-Warrandyte Road	Warrandyte	Andersons Creek	Flash
✓	✓	324 Ringwood-Warrandyte Road	Warrandyte	Andersons Creek	Flash
✓	✓	373-383 Ringwood-Warrandyte Road	Warrandyte	Andersons Creek	Flash
	✓	583 Ringwood-Warrandyte Road	Warrandyte South	Andersons Creek	Flash
	✓	1-21 Tills Drive	Warrandyte	Andersons Creek	Flash
	✓	12-14 Wattleblossom Road	Warrandyte	Andersons Creek	Flash
✓	✓	16 Wattleblossom Road	Warrandyte	Andersons Creek	Flash
✓	✓	3 Barry Court	Wonga Park	Brushy Creek	Flash
	✓	22 Blackwood Drive	Wonga Park	Brushy Creek	Flash
	✓	155 Brysons Road	Wonga Park	Brushy Creek	Flash
	✓	41 Gatters Road	Wonga Park	Brushy Creek	Flash
✓	✓	77-79 Homestead Road	Wonga Park	Brushy Creek	Flash
✓	✓	7 Moser Road	Wonga Park	Brushy Creek	Flash
✓	✓	7 Sky View	Wonga Park	Brushy Creek	Flash
✓	✓	33 Toppings Road	Wonga Park	Brushy Creek	Flash
	✓	383 Yarra Road	Wonga Park	Brushy Creek	Flash
✓	✓	24 Arawata Drive	Doncaster East	Mullum Mullum Creek	Flash
✓	✓	28 Beckett Road	Donvale	Mullum Mullum Creek	Flash

Properties at risk from Flooding exceeding Hazard Criteria or where 20% AEP flood depth is greater than 100mm					
Residential		Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event		Address	Suburb	Within Catchment	Flood Risk Type
20% AEP	1% AEP				
	✓	106 Bellevue Avenue	Doncaster East	Mullum Mullum Creek	Flash
	✓	108 Bellevue Avenue	Doncaster East	Mullum Mullum Creek	Flash
	✓	630-658 Blackburn Road	Templestowe	Mullum Mullum Creek	Riverine
	✓	4 Burge Court	Doncaster East	Mullum Mullum Creek	Flash
	✓	10 Burge Court	Doncaster East	Mullum Mullum Creek	Flash
	✓	1/5 Callistemon Court	Doncaster East	Mullum Mullum Creek	Flash
	✓	5-7 Curry Road	Park Orchards	Mullum Mullum Creek	Flash
	✓	17-19 Curry Road	Park Orchards	Mullum Mullum Creek	Flash
	✓	4 Edmonton Place	Doncaster East	Mullum Mullum Creek	Flash
✓	✓	14-16 Elgin Crescent	Park Orchards	Mullum Mullum Creek	Flash
✓	✓	7 Eva Court	Donvale	Mullum Mullum Creek	Flash
✓	✓	8 Eva Court	Donvale	Mullum Mullum Creek	Flash
	✓	9 Eva Court	Donvale	Mullum Mullum Creek	Flash
✓	✓	83 Glenvale Road	Donvale	Mullum Mullum Creek	Flash
	✓	157-179 Heidelberg-Warrandyte Road	Warrandyte	Mullum Mullum Creek	Riverine
	✓	182-190 Heidelberg-Warrandyte Road	Warrandyte	Mullum Mullum Creek	Riverine
✓	✓	3 Hillhouse Road	Templestowe	Mullum Mullum Creek	Flash
	✓	8 Hollywood Close	Templestowe	Mullum Mullum Creek	Flash
	✓	120 Landscape Drive	Doncaster East	Mullum Mullum Creek	Flash
	✓	4/3 Leslie Street	Donvale	Mullum Mullum Creek	Flash
	✓	5/3 Leslie Street	Donvale	Mullum Mullum Creek	Flash
✓	✓	5 Lookover Road	Donvale	Mullum Mullum Creek	Flash
✓	✓	15 Lookover Road	Donvale	Mullum Mullum Creek	Flash
✓	✓	11 Niagara Road	Donvale	Mullum Mullum Creek	Flash
	✓	13 Niagara Road	Donvale	Mullum Mullum Creek	Flash
✓	✓	15 Niagara Road	Donvale	Mullum Mullum Creek	Flash
✓	✓	42-48 Park Road	Donvale	Mullum Mullum Creek	Flash
✓	✓	10 Princeton Place	Templestowe	Mullum Mullum Creek	Flash
✓	✓	11 Princeton Place	Templestowe	Mullum Mullum Creek	Flash
✓	✓	Basement Carpark of 181 Reynolds Rd	Doncaster East	Mullum Mullum Creek	Flash
✓	✓	ATM 5/181 Reynolds Road	Doncaster East	Mullum Mullum Creek	Flash
✓	✓	9 Robertswood Close	Doncaster East	Mullum Mullum Creek	Flash
	✓	3 Shelley Court	Templestowe	Mullum Mullum Creek	Flash
✓	✓	12 Snow Gum Road	Doncaster East	Mullum Mullum Creek	Flash
	✓	290-292 Springvale Road	Donvale	Mullum Mullum Creek	Flash
	✓	9 Thomas Hardy Drive	Templestowe	Mullum Mullum Creek	Flash
	✓	9A Thomas Hardy Drive	Templestowe	Mullum Mullum Creek	Flash
✓	✓	51 Woodhouse Road	Doncaster East	Mullum Mullum Creek	Flash
Totals					
30	62				

Table C2.4 – Properties at risk of flooding over hazard criteria within the Mullum Mullum, Andersons and Brushy Creeks catchments in the City of Manningham

Isolation

No major isolation risks exist for areas around Mullum Mullum Creek in Park Orchards, Donvale, Doncaster East, Warrandyte & Templestowe. Some localised short-duration isolation may occur due to flash flooding.

Essential Infrastructure

- The SPAusNet Templestowe Terminal Station on The Parkway, Templestowe is likely to have floodwaters within compound during a 1% AEP flood along Mullum Mullum Creek

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. <http://ptv.vic.gov.au/live-travel-updates/>. A map of Public Transport routes within the City of Manningham is available via the website at: https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/fc42bcf06d/27_Manningham_LAM.pdf

Apart from the roads outlined below, all other essential infrastructure and services areas around Mullum Mullum Creek in Park Orchards, Donvale, Doncaster East, Warrandyte & Templestowe. are expected to remain predominantly dry during an intense rainfall event.

Road Closures

The following roads are subject to closure during flooding around Mullum Mullum Creek in Park Orchards, Donvale, Doncaster East, Warrandyte & Templestowe. Check the DoT website for more details: alerts.vicroads.vic.gov.au

Department of Transport Roads flooded in a 1% AEP (100yr ARI) event	
• Heidelberg-Warrandyte Road, Doncaster East at Mullum Mullum Creek	
• Heidelberg-Warrandyte Road, Warrandyte at Andersons Creek	
• Ringwood-Warrandyte Road, Park Orchards between Falconer Road and Milne Road	
• Ringwood-Warrandyte Road, Warrandyte at Tills Drive	
• Ringwood-Warrandyte Road, Warrandyte at Harding Road	

Table C2.6 – VicRoads Possible Road Closures during a flooding event

Manningham City Council Roads flooded in a 1% AEP (100yr ARI) event			
DONCASTER EAST	DONVALE		
• Bellevue Avenue	• Aroonah Close	• Ennismore Crescent	• Serpells Road
• Burge Court	• Flora Road	• Rainbow Valley Road	• Shakespeare Drive
• Edmonton Place	• Larne Avenue	• Raymond Elliot Court	• Spring Valley Drive
• Habitat Park Drive	• Murndal Drive	• Tralee Court	WARRANDYTE
• Landscape Drive	• Oban Road	• Villanova Court	• Everard Drive
• Larnoo Drive	• Park Road	TEMPLESTOWE	• Gold Memorial Road
• Laurie Road	• Serpells Terrace	• Bronte Rise	• Harris Gully Road
• Long Valley Way	• Sowter Court	• Browning Drive	• Oakland Drive
• Sanders Road	• Valepark Drive	• Cliveden Court	• Reynolds Road
• Serpells Road	PARK ORCHARDS	• Glendarragh Road	• St Muir Drive
• Snow Gum Road	• Alder Court	• Hadley Court	• Taroon Avenue
		• Orama Court	

Table C2.7 – Manningham City Council Possible Road Closures during a flooding event

Flood Mitigation

Dam or Retarding Basin	Catchment	Location	Type	Melway Reference
Arthur John Upton Reserve Lower	Jumping Creek	Arthur John Upton Reserve on Hartley Road, Wonga Park	Above Ground Water Storage Dam	24 F11
Arthur John Upton Reserve Middle	Jumping Creek	Arthur John Upton Reserve on Hartley Road, Wonga Park	Above Ground Water Storage Dam	24 F11
Arthur John Upton Reserve Upper	Jumping Creek	Arthur John Upton Reserve on Hartley Road, Wonga Park	Above Ground Water Storage Dam	24 F11
Austin Dam	Andersons Creek	100 Acres Reserve on Knees Road, Park Orchards	Below Ground Habitat Wetland Dam	35 F9
Bedervale Drive Reserve R/B	Templestowe East Drain	Bedervale Drive, Templestowe	Below Ground Drainage Retarding Basin	34 B4
Brown Dam	Andersons Creek	100 Acres Reserve on Knees Road, Park Orchards	Below Ground Habitat Wetland Dam	35 G10
Green Dam	Andersons Creek	100 Acres Reserve on Knees Road, Park Orchards	Below Ground Habitat Wetland Dam	35 F10
Habitat Drive R/B	Mullum Mullum Creek	Habitat Park Drive, Doncaster East	Below Ground Drainage Retarding Basin	34 F3
Husseys Reserve R/B	Andersons Creek	Husseys Reserve on Husseys Lane, Warrandyte	Below Ground Drainage Retarding Basin	35 H5
Lawsons Court Wetland	Templestowe East Drain	Lawsons Court, Templestowe	Below Ground Drainage Retarding Basin	34 C5
Porter Street R/B	Templestowe East Drain	Porter Street at Clendon Court, Templestowe	Below Ground Drainage Retarding Basin	34 B4
Tadpole Dam	Andersons Creek	100 Acres Reserve on Knees Road, Park Orchards	Below Ground Habitat Wetland Dam	35 F9
The Parkway and Sanctuary Place 1	Mullum Mullum Creek	SP AusNet Templestowe Terminal Station on The Parkway, Templestowe	Below Ground Drainage Wetland Retarding Basin	34 E2
The Parkway and Sanctuary Place 2	Mullum Mullum Creek	Sanctuary Place, Templestowe	Above Ground Habitat Wetland Retarding Basin	34 E2
The Parkway and Sanctuary Place 3	Mullum Mullum Creek	Domain Wetlands on The Parkway, Templestowe	Below Ground Drainage Wetland Retarding Basin	34 E1
The Parkway and Sanctuary Place 4	Mullum Mullum Creek	Domain Wetlands on The Parkway, Templestowe	Below Ground Drainage Wetland Retarding Basin	34 E1
Tidcombe R/B	Mullum Mullum Creek	The Pines Reserve at Ashton Rise, Doncaster East	Below Ground Drainage Wetland Retarding Basin	34 D5

Table C2.8 – Dams and Retarding Basins within the Mullum Mullum, Andersons & Jumping Creeks catchments in the City of Manningham

Sewerage Infrastructure

Sewerage Infrastructure of note during a severe flood event located around Doncaster East, Donvale, Park Orchards and Warrandyte is contained within the following two tables.

Sewer Pumping Stations

Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Operator	Location	Melway Reference
1 Unsewered Property	Local Drainage		Yarra Valley Water	Speers Court, Warrandyte	34 F2
27 Unsewered Properties	Local Drainage		Yarra Valley Water	Aylesbury Way and Amersham Crescent, Warrandyte	34 K4
Shirvington Place	Local Drainage		Yarra Valley Water	Shirvington Place, Donvale	48 F2
1 Unsewered Property	Local Drainage		Yarra Valley Water	Ruby Street, Donvale	48 H3
1 Unsewered Property	Mullum Mullum Creek Tributary	East	Yarra Valley Water	Huggins Road, Donvale	49 B6
20 Unsewered Properties	Local Drainage		Yarra Valley Water	Craig Road, Warner Court, Donvale	49 C5
Glenvale Road	Local Drainage		Yarra Valley Water	Glenvale Road, Donvale	49 D5
20 Unsewered Properties	Andersons Creek	West	Yarra Valley Water	North of Williams Road, Park Orchards	49 J1
Glynne Road	Andersons Creek East Branch	South	Yarra Valley Water	Landau Drive Reserve, Ringwood North	35 J9
Landau Drive North	Local Drainage		Yarra Valley Water	Landau Drive Reserve, Warrandyte South	35 K8
3 Unsewered Properties	Local Drainage		Yarra Valley Water	Knees Road, Park Orchards	35 E6
11 Unsewered Properties	Local Drainage		Yarra Valley Water	Beauty Gully Road and Grandview Road	35 E5
Taroona Avenue	Andersons Creek	West	Yarra Valley Water	Warrandyte Reserve, Warrandyte	35 C1
2 Unsewered Properties	Andersons Creek		Yarra Valley Water	Gold Memorial Road	35 E3
19 Unsewered Properties	Yarra River Tributary	West	Yarra Valley Water	Along Ringwood-Warrandyte Road, Warrandyte	23 H12

Table C2.8 – Sewer Pumping Stations within the Mullum Mullum Creek, Harris Gully / Andersons Creek and Jumping Creek Catchments in the City of Manningham

Sewer Emergency Relief Points

There are Sewer Emergency Relief Points along Mullum Mullum Creek, Harris Gully and Andersons Creek and their stormwater drainage tributaries that will likely affect floodwater conditions should they be activated. Contact the Infrastructure Operator EMLO/Duty Officer for information on any recent or planned releases at a Sewer Emergency Relief Point as part of a Dynamic Risk Assessment (DRA) if work is to be conducted at or downstream of the outlet.

On Drain / Waterway	Bank / Side of Waterway	Operator	Location	Melway Reference
Andersons Creek	West	Yarra Valley Water	Warrandyte Reserve, Warrandyte	35 C1
Andersons Creek	East	Yarra Valley Water	Tortice Drive, Park Orchards	49 J1

On Drain / Waterway	Bank / Side of Waterway	Operator	Location	Melway Reference
Andersons Creek East Branch	South	Yarra Valley Water	Landau Drive Reserve, Ringwood North	35 J9
Glenvale Road Drain	South	Yarra Valley Water	Glenvale Road, Ringwood North	49 E3
Local Drainage		Yarra Valley Water	Landau Drive Reserve, Warrandyte South	35 K8
Local Drainage		Yarra Valley Water	Shirvington Place, Donvale	48 F2
Yarra River Tributary	West	Yarra Valley Water	Yarra Street, Warrandyte	23 H12

Table C2.9 – Sewer Emergency Relief Points in the Mullum Mullum Creek and Harris Gully / Andersons Creek Catchments in the City of Manningham

Command, Control and Coordination

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

Flood Impacts & Operational Considerations (Intelligence Cards)

The tables on the following pages provide a breakdown of the possible consequences of flooding along Mullum Mullum Creek, Harris Gully and Andersons Creek at various creek heights or rain totals within Manningham. These tables are to be used only as a guide as no two floods at a location will have identical impacts.

Intelligence Cards have been included for the following locations:

- Mullum Mullum Creek at Doncaster East
- Mullum Mullum Creek Tributaries in Doncaster East, Donvale, Park Orchards and Warrandyte
- Harris Gully and Andersons Creek in Warrandyte and Park Orchards

FLOOD INTELLIGENCE CARD – DONCASTER EAST GAUGE, MULLUM MULLUM CREEK

Version 4 – April 2020



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

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LOCATION	Heidelberg-Warrandyte Road, Doncaster East
MELWAY REFERENCE:	34 F3
STREAM:	Mullum Mullum Creek
GAUGE NUMBER:	229648A
GAUGE ZERO:	28.634m AHD
GAUGE TYPE	Stream Level

MINOR:	Not Established
MODERATE:	Not Established
MAJOR	Not Established
LEVEE HEIGHT:	N/A
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	3.75m (5 TH February 2011)

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
3.75m	5 th February 2011 Flood Level Peak		
4.6m	5% AEP (20-year ARI flow)	Community Infrastructure Likely Flooded - Mullum Mullum Creek Trail at various sections - Pedestrian walkway at Mullum Mullum Reserve may be flooded	
5.0m	2% AEP (50-year ARI flow)		
5.4m	1% AEP (100-year ARI flow)	Property Flooding 3 Properties in Total 630-658 Blackburn Road, Templestowe 157-179 & 182-190 Heidelberg-Warrandyte Road, Warrandyte Community Infrastructure Likely Flooded - Mullum Mullum Reserve, cnr Springvale Road & Reynolds Road, Donvale - Crystal Brook Tourist Caravan Park on Heidelberg-Warrandyte Road, Warrandyte Essential Infrastructure Likely Impacted - The SPAusNet Templestowe Terminal Station on The Parkway, Templestowe likely to have floodwaters within compound Water Over Road (above 400mm depth) - Park Road, Donvale	

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		- Reynolds Road, Warrandyte - Habitat Park Drive, Doncaster East - Heidelberg-Warrandyte Road, Doncaster East	

Table C2.10 – Breakdown of likely consequences at various Doncaster East gauge level heights along Mullum Mullum Creek with operational considerations

FLOOD INTELLIGENCE CARD – MULLUM MULLUM CREEK TRIBUTARIES (UNGAUGED)

Version 2 – April 2020



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

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CLOSEST RAIN GAUGE	Doncaster East
LOCATION	Zerbes Reserve, Nedlands Ct, Doncaster East
MELWAY REF:	34 B10

GAUGE NUMBER	586037
GAUGE TYPE	Rain
TELEMETRIC/MANUAL	Telemetric

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
11mm in 10 mins; 18mm in 30 mins; 23mm in 1 hour; 29mm in 2 hours; 33mm in 3 hours; or 41mm in 6 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	20% AEP (5-year ARI)	Property Flooding (exceeding hazard criteria or where flood depth is greater than 100mm) 19 Properties in Total 24 Arawata Drive, Doncaster East 28 Beckett Road, Donvale 14-16 Elgin Crescent, Park Orchards 7 & 8 Eva Court, Donvale 83 Glenvale Road, Donvale 3 Hillhouse Road, Templestowe 5 & 15 Lookover Road, Donvale 11 & 15 Niagara Road, Donvale 42-48 Park Road, Donvale 10 & 11 Princeton Place, Templestowe - Basement Carpark of 181 Reynolds Road, Doncaster East - ATM 5/181 Reynolds Road, Doncaster East 9 Robertswood Close, Doncaster East 12 Snow Gum Road, Doncaster East 51 Woodhouse Road, Doncaster East	
23mm in 10 mins; 37mm in 30 mins; 45mm in 1 hour;	1% AEP (100-year ARI)	Property Flooding (exceeding hazard criteria or where 20% AEP flood depth is greater than 100mm) 37 Properties in Total 24 Arawata Drive, Doncaster East	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
54mm in 2 hours; 60mm in 3 hours; or 76mm in 6 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.		• 28 Beckett Road, Donvale • 106 & 108 Bellevue Avenue, Doncaster East • 4 & 10 Burge Court, Doncaster East • 1/5 Callistemon Court, Doncaster • 5-7 & 17-19 Curry Road, Park Orchards • 4 Edmonton Place, Doncaster East • 14-16 Elgin Crescent, Park Orchards • 7, 8 & 9 Eva Court, Donvale • 83 Glenvale Road, Donvale • 3 Hillhouse Road, Templestowe • 8 Hollywood Close, Templestowe • 120 Landscape Drive, Doncaster East • 4/3 & 5/3 Leslie Street, Donvale • 5 & 15 Lookover Road, Donvale • 11, 13 & 15 Niagara Road, Donvale • 42-48 Park Road, Donvale • 10 & 11 Princeton Place, Templestowe • Basement Carpark of 181 Reynolds Road • ATM 5/181 Reynolds Road, Doncaster East • 9 Robertswood Close, Doncaster East • 3 Shelley Court, Templestowe • 12 Snow Gum Road, Doncaster East • 290-292 Springvale Road, Donvale • 9 Thomas Hardy Drive, Templestowe • 9A Thomas Hardy Drive, Templestowe • 51 Woodhouse Road, Doncaster East Community Infrastructure Likely Flooded • Stockland Donvale Retirement Village on Springvale Road, Donvale may have access cut along main driveway with flooding, although pedestrian overpass expected to remain dry Water Over Road (above 400mm depth) • Oban Road, Park Orchards at two low points between Glenvale Road & Lookover Road • Alder Court, Park Orchards • Ennismore Crescent, Park Orchards between Curry Road & Gosford Crescent • Rainbow Valley Road, Park Orchards at McIntyres Road Intersection • Raymond Elliot Court, Park Orchards • Tralee Court, Park Orchards • Villanova Court, Park Orchards • Aroonah Close, Donvale • Flora Road, Donvale • Larne Avenue, Donvale between Conway Avenue & Drummond Close	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Murndal Drive, Donvale • Serpells Terrace, Donvale • Sowter Court, Donvale • Valepark Drive, Donvale • Bellevue Avenue, Doncaster East near Hunt Street • Burge Court, Doncaster East • Edmonton Place, Doncaster East • Landscape Drive, Doncaster East • Larnoo Drive, Doncaster East • Laurie Road, Doncaster East • Long Valley Way, Doncaster East • Sanders Road, Doncaster East • Serpells Road, Doncaster East • Snow Gum Road, Doncaster East • Bronte Rise, Templestowe • Browning Drive, Templestowe at Serpells Road • Cliveden Court, Templestowe • Glendarragh Road, Templestowe at Wagon Road • Hadley Court, Templestowe • Orama Court, Templestowe • Serpells Road, Templestowe • Shakespeare Drive, Templestowe • Spring Valley Drive, Templestowe • Oakland Drive, Warrandyte • St Muir Drive, Warrandyte	

Table C2.11 – Breakdown of possible consequences at various rainfall intensities around the Mullum Mullum Creek tributaries with operational considerations

FLOOD INTELLIGENCE CARD –ANDERSONS CREEK & BRUSHY CREEK (UNGAUGED)

Version 2 – April 2020



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

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

CLOSEST RAIN GAUGE	Yarra River at Warrandyte
LOCATION	South bank of river at end of Police Street, Warrandyte
MELWAY REF:	23 D12

GAUGE NUMBER	229200B
GAUGE TYPE	Stream Level & Rain
TELEMETRIC/MANUAL	Telemetric

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
11mm in 10 mins; 18mm in 30 mins; 23mm in 1 hour; 29mm in 2 hours; 33mm in 3 hours; or 42mm in 6 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	20% AEP (5-year ARI)	Property Flooding (exceeding hazard criteria or where flood depth is greater than 100mm) 11 Properties in Total Andersons Creek 17 Everard Drive, Warrandyte 83 & 85 Melbourne Hill Road, Warrandyte 324 & 373-383 Ringwood-Warrandyte Road, Warrandyte 16 Wattleblossom Road, Warrandyte Brushy Creek 3 Barry Court, Wonga Park 77-79 Homestead Road, Wonga Park 7 Moser Road, Wonga Park 7 Sky View, Wonga Park 33 Toppings Road, Wonga Park	
23mm in 10 mins; 37mm in 30 mins; 45mm in 1 hour; 54mm in 2 hours; 60mm in 3 hours; or 76mm in 6 hours	1% AEP (100-year ARI)	Properties at Flood Risk (exceeding hazard criteria or where 20% AEP flood depth is greater than 100mm) 22 Properties in Total Andersons Creek 17 Everard Drive, Warrandyte 66 Knees Road, Park Orchards 79, 83 & 85 Melbourne Hill Road, Warrandyte 321, 323, 324 & 373-383 Ringwood-Warrandyte Road, Warrandyte	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
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.		• 583 Ringwood-Warrandyte Road, Warrandyte South • 1-21 Tills Drive, Warrandyte • 12-14 Wattleblossom Road, Warrandyte • 16 Wattleblossom Road, Warrandyte Brushy Creek • 3 Barry Court, Wonga Park • 22 Blackwood Drive, Wonga Park • 155 Brysons Road, Wonga Park • 41 Gatters Road, Wonga Park • 77-79 Homestead Road, Wonga Park • 7 Moser Road, Wonga Park • 7 Sky View, Wonga Park • 33 Toppings Road, Wonga Park • 383 Yarra Road, Wonga Park Community Infrastructure Likely Flooded • Warrandyte Reserve on Taroona Avenue, Warrandyte • Taroona Reservoir on Everard Drive, Warrandyte Water Over Road (above 400mm depth) • Everard Drive, Warrandyte • Gold Memorial Road, Warrandyte • Harris Gully Road, Warrandyte • Heidelberg-Warrandyte Road, Warrandyte at Andersons Creek • Ringwood-Warrandyte Road, Park Orchards between Falconer Road and Milne Road • Ringwood-Warrandyte Road, Warrandyte at Harding Road and Tills Drive • Taroona Avenue, Warrandyte	

Table C2.12 – Breakdown of possible consequences at various rainfall intensities around Harris Gully & Andersons Creek with operational considerations

APPENDIX C3 – KOONUNG, RUFFEY CREEKS & BULLEEN DRAIN FLOOD EMERGENCY PLAN

Overview of Flooding Consequences

This Summary table is generated from Victorian Government data. The State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons access this information should make appropriate enquiries to assess the currency of the data.

Summary of Consequences in a 1% AEP (100yr ARI) flood along Koonung Creek and its stormwater tributaries in Manningham

Property					
Properties	86				
Residential	82				
Commercial	4				
Industrial	0				
Public Land	0				
Rural	0				
Community Infrastructure					
Child Care / Kindergartens	1	Vista Valley Preschool			
Community Venues	1	Tende Beck Scout Hall			
Retirement Villages	1	Applewood Retirement Village			
Schools / Colleges	2	Carey Sports Complex; Marcellin College			
Essential Infrastructure					
Major Roads	1	Bulleen Road			
Drainage Facilities	3	Retarding Basins			
Tourism / Recreation					
Sports Facilities	1	Freeway Public Golf Course			
Recreation Facilities	1	Bulleen Park			
Government Boundaries					
Local Gov't Areas	1	Manningham	CMA	1	Port Phillip & Westernport
Adjacent LGAs	2	Whitehorse; and Boroondara	CFA District	0	
SES Unit Area	1	Manningham	MFB District	1	Eastern

Table C3.1 – Consequence Summary of 1% AEP flood along Koonung Creek and its stormwater tributaries in Manningham

Koonung Creek and the adjoining Manningham suburbs of Bulleen, Doncaster, Doncaster East & Donvale are located between 10-20km north east of Melbourne in a predominantly residential area. Koonung Creek flows from the east in Donvale and forms the southern boundary of Manningham with the northern boundary of the City of Whitehorse. The Creek follows the path of the Eastern Freeway, crossing the roadway at a number of locations. A section of the creek in Doncaster and Bulleen has been turned into an underground drain, alleviating overland flooding along that length. The Eastern Freeway in Balwyn North and Bulleen Road at Bulleen is the main area of impact from flooding in this catchment. For more insight into flooding in the area, refer to Mapping in Appendix F.

Summary of Consequences in a 1% AEP (100yr ARI) flood within the Ruffey Creek catchment

Property					
Properties	66				
Residential	64				
Commercial	0				
Industrial	0				
Public Land	1				
Rural	1				
Community Infrastructure					
Child Care / Kindergartens	1	Noni's Nursery Childcare & Kindergarten			
Care Facilities	1	Greenridge Retirement Home			
Essential Infrastructure					
Bus Routes	2	305; and 908			
Drainage Facilities	2	Retarding Basins			
Sewerage Facilities	96	Unsewered Properties			
Tourism / Recreation					
Sports Facilities	1	Tom Kelly Athletics Track			
Government Boundaries					
Local Gov't Areas	1	Manningham	CMA	1	Port Phillip & Westernport
Adjacent LGAs	0		CFA District	0	
SES Unit Area	1	Manningham	MFB District	1	Eastern

Table C3.2 – Consequence Summary of 1% AEP flood within the Ruffey Creek catchment

Ruffey Creek and the adjoining suburbs of Doncaster East, Doncaster, Templestowe & Templestowe Lower are located approximately 15km north east of Melbourne in a predominantly residential area. Ruffey Creek flows from Doncaster East in a north westerly direction to Ruffey Lake in Doncaster before continuing to flow north west through Templestowe & Templestowe Lower to the Yarra River. The only gauge in the catchment is the Rain Gauge at Zerbes Reserve in Doncaster East. The catchment size of Ruffey Creek is quite small, with flash flooding occurring during high intensity-short duration storms like those that occurred in December 1978, December 2003 & February 2011. Due to the hilly terrain, floodwaters rise and fall quickly during a flood event. See mapping in Appendix F for more insight into flooding in the area.

Gauges and Warnings

Whilst there are hydrographic/telemetry stations (river gauges) within the municipality, Melbourne Water does not provide any flood warning service at this point, due to the generally short warning times available.

Melbourne Water Gauges	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Doncaster East	586037	Zerbes Reserve, Nedlands Ct, Doncaster East		✓	34 B10
Doncaster	586010	Eastern Golf Club, Doncaster at end of Eastern Ave		✓	33 A12
Yarra River at Heidelberg	229135A	East bank of River on Northern side of Banksia Street Bridge, Bulleen	✓	✓	32 C5
Koonung Creek at Bulleen	229229A	North bank of the creek on East side of Bulleen Rd, Bulleen	✓		32 D10
Mitcham	586006	Melb Water Mitcham Reservoir, Madison Bvd, Mitcham		✓	48 J10

Table C3.3 – Hydrographic Monitoring Stations within or close to the Koonung Creek and Ruffey Creek catchments

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

Areas of Flood Risk

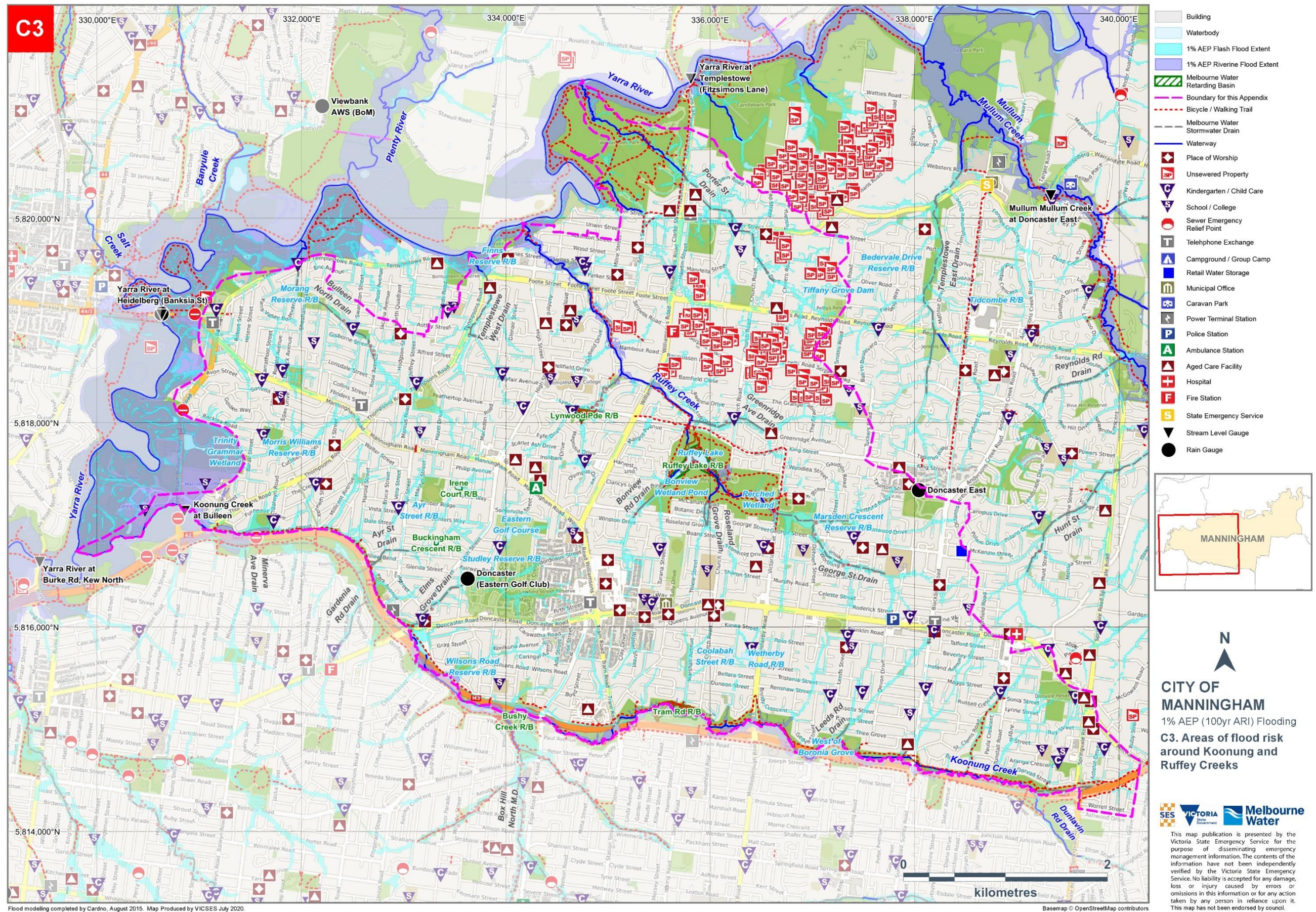


Figure C3 – Areas of flood risk around Koonung Creek and Ruffey Creek in the City of Manningham

Properties at Flood Risk

Properties listed in the table below are at risk from flooding over 300mm depth along Koonung Creek and its stormwater tributaries in Manningham. As more intelligence becomes available, this list may change. This table has been populated based on modelling work as part of the Koonung Creek (Cardno, August 2015) flood mapping and risk assessment program. Note that any multi-lot properties situated above ground floor likely impacted by isolation only with flooding on ground floor impacting access to common areas and/or carpark and storage facilities. Information on above ground-floor properties is not available in this list.

Hazard criteria is defined as being where flooding is equal to or greater than 180m² and the depth of flooding is greater than 100mm or the product of velocity and depth is equal to or greater than 0.008.

Note that 20% AEP data for properties within the Ruffey Creek catchment are absent from this list due to data availability.

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

Properties at risk from Flooding exceeding Hazard Criteria or where 20% AEP flood depth is greater than 100mm					
Residential		Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event		Address	Suburb	Within Catchment	Flood Risk Type
20% AEP	1% AEP				
	✓	8A Alison Avenue	Bulleen	Bulleen Main Drain	Flash
	✓	37A Anderson Street	Templestowe	Bulleen Main Drain	Flash
	✓	39 Anderson Street	Templestowe	Bulleen Main Drain	Flash
	✓	3 Bilby Street	Templestowe Lower	Bulleen Main Drain	Flash
	✓	5 Bilby Street	Templestowe Lower	Bulleen Main Drain	Flash
	✓	7 Bilby Street	Templestowe Lower	Bulleen Main Drain	Flash
✓	✓	Bulleen Plaza 101 Manningham Road	Bulleen	Bulleen Main Drain	Flash
✓	✓	Bulleen Plaza 103 Manningham Road	Bulleen	Bulleen Main Drain	Flash
✓	✓	Bulleen Plaza 105 Manningham Road	Bulleen	Bulleen Main Drain	Flash
	✓	30 Chivers Road	Templestowe	Bulleen Main Drain	Flash
	✓	5/413 Church Road	Templestowe	Bulleen Main Drain	Flash
✓	✓	328-330 Church Road	Templestowe	Bulleen Main Drain	Flash
✓	✓	7/420-424 Church Road	Templestowe	Bulleen Main Drain	Flash
	✓	5 Cottonwood Court	Templestowe	Bulleen Main Drain	Flash
✓	✓	7 Cottonwood Court	Templestowe	Bulleen Main Drain	Flash
	✓	13 Fitzsimons Lane	Templestowe	Bulleen Main Drain	Flash
✓	✓	6 Gisborne Street	Bulleen	Bulleen Main Drain	Flash
✓	✓	8 Gisborne Street	Bulleen	Bulleen Main Drain	Flash
	✓	12 Greenaway Street	Bulleen	Bulleen Main Drain	Flash
✓	✓	13 Greenaway Street	Bulleen	Bulleen Main Drain	Flash
✓	✓	15 Greenaway Street	Bulleen	Bulleen Main Drain	Flash
	✓	61 Hawtin Street	Templestowe	Bulleen Main Drain	Flash
	✓	1/63 Hawtin Street	Templestowe	Bulleen Main Drain	Flash
	✓	2/63 Hawtin Street	Templestowe	Bulleen Main Drain	Flash
	✓	43 Hazel Drive	Templestowe Lower	Bulleen Main Drain	Flash

Properties at risk from Flooding exceeding Hazard Criteria or where 20% AEP flood depth is greater than 100mm

Residential		Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event		Address	Suburb	Within Catchment	Flood Risk Type
20% AEP	1% AEP				
	✓	1/19 Heysham Way	Templestowe	Bulleen Main Drain	Flash
	✓	17 Heysham Way	Templestowe	Bulleen Main Drain	Flash
	✓	18 Heysham Way	Templestowe	Bulleen Main Drain	Flash
	✓	18A Heysham Way	Templestowe	Bulleen Main Drain	Flash
	✓	2/9 Heysham Way	Templestowe	Bulleen Main Drain	Flash
	✓	21 Heysham Way	Templestowe	Bulleen Main Drain	Flash
	✓	4 Hodgson Street	Templestowe Lower	Bulleen Main Drain	Flash
	✓	1-11 Innisfallen Avenue	Templestowe	Bulleen Main Drain	Flash
	✓	1/32 John Street	Templestowe Lower	Bulleen Main Drain	Flash
	✓	2/21 Kanooka Avenue	Templestowe Lower	Bulleen Main Drain	Flash
✓	✓	14 Kim Close	Bulleen	Bulleen Main Drain	Flash
✓	✓	15 Kim Close	Bulleen	Bulleen Main Drain	Flash
✓	✓	8 Lempriere Close	Templestowe	Bulleen Main Drain	Flash
	✓	11 Lempriere Close	Templestowe	Bulleen Main Drain	Flash
	✓	12 Lempriere Close	Templestowe	Bulleen Main Drain	Flash
	✓	16 Lempriere Close	Templestowe	Bulleen Main Drain	Flash
	✓	5 Little Valley Road	Templestowe	Bulleen Main Drain	Flash
	✓	115 Macedon Road	Templestowe Lower	Bulleen Main Drain	Flash
	✓	117 Macedon Road	Templestowe Lower	Bulleen Main Drain	Flash
✓	✓	12 Manningham Road	Bulleen	Bulleen Main Drain	Flash
✓	✓	14-16 Manningham Road	Bulleen	Bulleen Main Drain	Flash
	✓	78 Manningham Road	Bulleen	Bulleen Main Drain	Flash
✓	✓	38B/101 Manningham Road	Bulleen	Bulleen Main Drain	Flash
✓	✓	48 Marcus Road	Templestowe Lower	Bulleen Main Drain	Flash
✓	✓	50 Marcus Road	Templestowe Lower	Bulleen Main Drain	Flash
✓	✓	18 Merna Drive	Templestowe	Bulleen Main Drain	Flash
	✓	7 Milner Close	Templestowe	Bulleen Main Drain	Flash
✓	✓	8 Milner Close	Templestowe	Bulleen Main Drain	Flash
	✓	9 Milner Close	Templestowe	Bulleen Main Drain	Flash
	✓	42 Mincha Avenue	Templestowe Lower	Bulleen Main Drain	Flash
	✓	44 Mincha Avenue	Templestowe Lower	Bulleen Main Drain	Flash
	✓	46 Mincha Avenue	Templestowe Lower	Bulleen Main Drain	Flash
	✓	52 Mincha Avenue	Templestowe Lower	Bulleen Main Drain	Flash
✓	✓	8 Princely Terrace	Templestowe	Bulleen Main Drain	Flash
✓	✓	39-41 Rose Avenue	Bulleen	Bulleen Main Drain	Flash
✓	✓	43 Rose Avenue	Bulleen	Bulleen Main Drain	Flash
	✓	63-67 Serpells Road	Templestowe	Bulleen Main Drain	Flash
	✓	25 Serpells Road	Templestowe	Bulleen Main Drain	Flash
	✓	25A Serpells Road	Templestowe	Bulleen Main Drain	Flash
✓	✓	96-106 Swanston Street	Templestowe Lower	Bulleen Main Drain	Flash
	✓	372 Thompsons Road	Templestowe Lower	Bulleen Main Drain	Flash
	✓	374 Thompsons Road	Templestowe Lower	Bulleen Main Drain	Flash

Properties at risk from Flooding exceeding Hazard Criteria or where 20% AEP flood depth is greater than 100mm

Residential		Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event		Address	Suburb	Within Catchment	Flood Risk Type
20% AEP	1% AEP				
	✓	376 Thompsons Road	Templestowe Lower	Bulleen Main Drain	Flash
	✓	80/410-418 Thompsons Road	Templestowe Lower	Bulleen Main Drain	Flash
	✓	26 Verene Avenue	Templestowe Lower	Bulleen Main Drain	Flash
	✓	28 Verene Avenue	Templestowe Lower	Bulleen Main Drain	Flash
	✓	1/66 Waratah Drive	Templestowe Lower	Bulleen Main Drain	Flash
	✓	2/66 Waratah Drive	Templestowe Lower	Bulleen Main Drain	Flash
✓	✓	91-93 Websters Road	Templestowe	Bulleen Main Drain	Flash
✓	✓	103-111 Websters Road	Templestowe	Bulleen Main Drain	Flash
	✓	75 Yarra Valley Boulevard	Bulleen	Bulleen Main Drain	Flash
	✓	77 Yarra Valley Boulevard	Bulleen	Bulleen Main Drain	Flash
	✓	79 Yarra Valley Boulevard	Bulleen	Bulleen Main Drain	Flash
	✓	Applewood Retirement Village 1 Andrew Grove	Doncaster	Koonung Creek	Flash
	✓	Applewood Retirement Village 1/5 Grand Boulevard	Doncaster	Koonung Creek	Flash
✓	✓	Applewood Retirement Village 3 Grand Boulevard	Doncaster	Koonung Creek	Flash
✓	✓	Applewood Retirement Village 13-19A Tram Road	Doncaster	Koonung Creek	Flash
	✓	Applewood Retirement Village 13-19B Tram Road	Doncaster	Koonung Creek	Flash
	✓	Applewood Retirement Village 15 Greengully Retreat	Doncaster	Koonung Creek	Flash
	✓	Applewood Retirement Village 16 Greengully Retreat	Doncaster	Koonung Creek	Flash
	✓	Applewood Retirement Village 18 Greengully Retreat	Doncaster	Koonung Creek	Flash
	✓	Applewood Retirement Village 19 Greengully Retreat	Doncaster	Koonung Creek	Flash
	✓	Applewood Retirement Village 2 Andrew Grove	Doncaster	Koonung Creek	Flash
✓	✓	Applewood Retirement Village 3 Lauren Place	Doncaster	Koonung Creek	Flash
	✓	21 Argyle Street	Donvale	Koonung Creek	Flash
	✓	23 Argyle Street	Donvale	Koonung Creek	Flash
✓	✓	2/72 Ayr Street	Doncaster	Koonung Creek	Flash
✓	✓	3/72 Ayr Street	Doncaster	Koonung Creek	Flash
✓	✓	3/64 Beverley Street	Doncaster East	Koonung Creek	Flash
✓	✓	4/64 Beverley Street	Doncaster East	Koonung Creek	Flash
✓	✓	64-66 Bowen Road	Doncaster East	Koonung Creek	Flash
✓	✓	24 Buckingham Crescent	Doncaster	Koonung Creek	Flash
	✓	2B Canara Street	Doncaster East	Koonung Creek	Flash
	✓	35 Cassowary Street	Doncaster East	Koonung Creek	Flash
✓	✓	51 Caringal Avenue	Doncaster	Koonung Creek	Flash
✓	✓	6 Cerberus Street	Donvale	Koonung Creek	Flash
✓	✓	7 Cerberus Street	Donvale	Koonung Creek	Flash

Properties at risk from Flooding exceeding Hazard Criteria or where 20% AEP flood depth is greater than 100mm

Residential		Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event		Address	Suburb	Within Catchment	Flood Risk Type
20% AEP	1% AEP				
✓	✓	8 Cerberus Street	Donvale	Koonung Creek	Flash
✓	✓	9 Cerberus Street	Donvale	Koonung Creek	Flash
	✓	14 Dale Street	Bulleen	Koonung Creek	Flash
	✓	16 Dale Street	Bulleen	Koonung Creek	Flash
	✓	1037 Doncaster Road	Doncaster East	Koonung Creek	Flash
✓	✓	1/17 Dunoon Street	Doncaster	Koonung Creek	Flash
✓	✓	19 Dunoon Street	Doncaster	Koonung Creek	Flash
✓	✓	20 Dunoon Street	Doncaster	Koonung Creek	Flash
	✓	1 Eildon Street	Doncaster	Koonung Creek	Flash
	✓	3 Eildon Street	Doncaster	Koonung Creek	Flash
	✓	55A Estelle Street	Bulleen	Koonung Creek	Flash
	✓	65 Estelle Street	Bulleen	Koonung Creek	Flash
✓	✓	9 Estelle Street	Bulleen	Koonung Creek	Flash
	✓	34 Fairway Road	Doncaster	Koonung Creek	Flash
	✓	1 Glenview Road	Doncaster East	Koonung Creek	Flash
	✓	36 Harcourt Street	Doncaster	Koonung Creek	Flash
	✓	5 High Street	Doncaster	Koonung Creek	Flash
✓	✓	1 Kandanga Grove	Bulleen	Koonung Creek	Flash
✓	✓	3 Kandanga Grove	Bulleen	Koonung Creek	Flash
✓	✓	4/19 Lincoln Drive	Bulleen	Koonung Creek	Flash
✓	✓	5/19 Lincoln Drive	Bulleen	Koonung Creek	Flash
✓	✓	2/1 Mantell Street	Doncaster East	Koonung Creek	Flash
	✓	1A Marjorie Close	Bulleen	Koonung Creek	Flash
	✓	1/41 Massey Street	Doncaster	Koonung Creek	Flash
	✓	2/41 Massey Street	Doncaster	Koonung Creek	Flash
	✓	3/41 Massey Street	Doncaster	Koonung Creek	Flash
	✓	39 Massey Street	Doncaster	Koonung Creek	Flash
	✓	4/41 Massey Street	Doncaster	Koonung Creek	Flash
✓	✓	3/2 Milan Street	Doncaster East	Koonung Creek	Flash
	✓	2/10 Millicent Avenue	Bulleen	Koonung Creek	Flash
	✓	6A Millicent Avenue	Bulleen	Koonung Creek	Flash
✓	✓	9 Monaco Street	Doncaster	Koonung Creek	Flash
✓	✓	23 Morna Road	Doncaster East	Koonung Creek	Flash
✓	✓	25A Morna Road	Doncaster East	Koonung Creek	Flash
✓	✓	1/57 Rosella Street	Doncaster East	Koonung Creek	Flash
	✓	1/59 Rosella Street	Doncaster East	Koonung Creek	Flash
✓	✓	2/57 Rosella Street	Doncaster East	Koonung Creek	Flash
✓	✓	3/57 Rosella Street	Doncaster East	Koonung Creek	Flash
	✓	53 Roy Street	Donvale	Koonung Creek	Flash
	✓	69 Stanton Street	Doncaster	Koonung Creek	Flash
	✓	71 Stanton Street	Doncaster	Koonung Creek	Flash
	✓	1 Stutt Avenue	Doncaster	Koonung Creek	Flash

Properties at risk from Flooding exceeding Hazard Criteria or where 20% AEP flood depth is greater than 100mm

Residential		Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event		Address	Suburb	Within Catchment	Flood Risk Type
20% AEP	1% AEP				
	✓	10 Stutt Avenue	Doncaster	Koonung Creek	Flash
	✓	12 Stutt Avenue	Doncaster	Koonung Creek	Flash
	✓	6-8 Stutt Avenue	Doncaster	Koonung Creek	Flash
✓	✓	1/8 Thea Grove	Doncaster East	Koonung Creek	Flash
✓	✓	2/8 Thea Grove	Doncaster East	Koonung Creek	Flash
	✓	Apt 101/195 Thompsons Road	Bulleen	Koonung Creek	Flash
	✓	2/4 Tobruk Street	Bulleen	Koonung Creek	Flash
	✓	2A Tobruk Street	Bulleen	Koonung Creek	Flash
✓	✓	3/27 Tram Road	Doncaster	Koonung Creek	Flash
✓	✓	1A Tudor Road	Doncaster	Koonung Creek	Flash
	✓	3 Tullamore Avenue	Doncaster	Koonung Creek	Flash
	✓	2/136 Tunstall Road	Donvale	Koonung Creek	Flash
✓	✓	9 Village Avenue	Doncaster	Koonung Creek	Flash
	✓	12 Westwood Drive	Bulleen	Koonung Creek	Flash
	✓	3/6-8 Wetherby Road	Doncaster	Koonung Creek	Flash
	✓	102 Wilsons Road	Doncaster	Koonung Creek	Flash
	✓	104 Wilsons Road	Doncaster	Koonung Creek	Flash
	✓	16 Windella Quadrant	Doncaster	Koonung Creek	Flash
✓	✓	28 Winters Way	Doncaster	Koonung Creek	Flash
✓	✓	71-89 Williamsons Road	Doncaster	Koonung Creek	Flash
	✓	139-153 Williamsons Road	Templestowe Lower	Ruffey Creek	Flash
	✓	2 Belinda Crescent	Doncaster East	Ruffey Creek	Flash
	✓	28 Belinda Crescent	Doncaster East	Ruffey Creek	Flash
	✓	8 Belinda Crescent	Doncaster East	Ruffey Creek	Flash
	✓	1/213 Blackburn Road	Doncaster East	Ruffey Creek	Flash
	✓	10/213 Blackburn Road	Doncaster East	Ruffey Creek	Flash
	✓	13/213 Blackburn Road	Doncaster East	Ruffey Creek	Flash
	✓	14/213 Blackburn Road	Doncaster East	Ruffey Creek	Flash
	✓	9/213 Blackburn Road	Doncaster East	Ruffey Creek	Flash
	✓	5 Chelmsford Avenue	Templestowe	Ruffey Creek	Flash
	✓	7 Chelmsford Avenue	Templestowe	Ruffey Creek	Flash
	✓	10 Daws Road	Doncaster East	Ruffey Creek	Flash
	✓	1/50 Dryden Street	Doncaster East	Ruffey Creek	Flash
	✓	11 Dundas Court	Doncaster East	Ruffey Creek	Flash
	✓	7 Dundas Court	Doncaster East	Ruffey Creek	Flash
	✓	8 Dundas Court	Doncaster East	Ruffey Creek	Flash
	✓	1/304 George Street	Doncaster	Ruffey Creek	Flash
	✓	39 Greenridge Avenue	Templestowe	Ruffey Creek	Flash
	✓	1 Hillcroft Drive	Templestowe	Ruffey Creek	Flash
	✓	11 Hillcroft Drive	Templestowe	Ruffey Creek	Flash
	✓	3 Hillcroft Drive	Templestowe	Ruffey Creek	Flash
	✓	5 Hillcroft Drive	Templestowe	Ruffey Creek	Flash

Properties at risk from Flooding exceeding Hazard Criteria or where 20% AEP flood depth is greater than 100mm

Residential		Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event		Address	Suburb	Within Catchment	Flood Risk Type
20% AEP	1% AEP				
	✓	7 Hillcroft Drive	Templestowe	Ruffey Creek	Flash
	✓	6 Homebush Court	Doncaster East	Ruffey Creek	Flash
	✓	41 Lynnwood Parade	Templestowe Lower	Ruffey Creek	Flash
	✓	43 Lynnwood Parade	Templestowe Lower	Ruffey Creek	Flash
	✓	32 Margot Avenue	Doncaster	Ruffey Creek	Flash
	✓	34 Margot Avenue	Doncaster	Ruffey Creek	Flash
	✓	8 Marsden Crescent	Doncaster East	Ruffey Creek	Flash
	✓	3/4 May Street	Doncaster East	Ruffey Creek	Flash
	✓	4B May Street	Doncaster East	Ruffey Creek	Flash
	✓	40 Montpellier Crescent	Templestowe Lower	Ruffey Creek	Flash
	✓	44 Montpellier Crescent	Templestowe Lower	Ruffey Creek	Flash
	✓	46 Montpellier Crescent	Templestowe Lower	Ruffey Creek	Flash
	✓	46A Montpellier Crescent	Templestowe Lower	Ruffey Creek	Flash
	✓	11 Newlyn Close	Templestowe	Ruffey Creek	Flash
	✓	12 Newlyn Close	Templestowe	Ruffey Creek	Flash
	✓	2 Nottingwood Street	Doncaster East	Ruffey Creek	Flash
	✓	3 Romilly Avenue	Templestowe Lower	Ruffey Creek	Flash
	✓	5 Romilly Avenue	Templestowe Lower	Ruffey Creek	Flash
	✓	2 Saxon Street	Doncaster	Ruffey Creek	Flash
	✓	22-24 St Georges Avenue	Templestowe	Ruffey Creek	Flash
	✓	3 The Boulevard	Doncaster	Ruffey Creek	Flash
	✓	6 The Boulevard	Doncaster	Ruffey Creek	Flash
	✓	97 The Grange	Templestowe	Ruffey Creek	Flash
	✓	1 Totara Court	Templestowe Lower	Ruffey Creek	Flash
	✓	139A Williamsons Road	Templestowe Lower	Ruffey Creek	Flash
	✓	139B Williamsons Road	Templestowe Lower	Ruffey Creek	Flash
	✓	43 Winston Drive	Doncaster	Ruffey Creek	Flash
	✓	45 Winston Drive	Doncaster	Ruffey Creek	Flash
	✓	47 Winston Drive	Doncaster	Ruffey Creek	Flash
	✓	32 Wood Street	Templestowe	Ruffey Creek	Flash
	✓	16 Wood Street	Templestowe	Ruffey Creek	Flash
	✓	16 Worthing Avenue	Doncaster East	Ruffey Creek	Flash
	✓	2/48 Worthing Avenue	Doncaster East	Ruffey Creek	Flash
	✓	2/60 Worthing Avenue	Doncaster East	Ruffey Creek	Flash
	✓	27 Worthing Avenue	Doncaster East	Ruffey Creek	Flash
	✓	29 Worthing Avenue	Doncaster East	Ruffey Creek	Flash
	✓	32 Worthing Avenue	Doncaster East	Ruffey Creek	Flash
	✓	52 Worthing Avenue	Doncaster East	Ruffey Creek	Flash
	✓	54 Worthing Avenue	Doncaster East	Ruffey Creek	Flash
	✓	56 Worthing Avenue	Doncaster East	Ruffey Creek	Flash
	✓	58 Worthing Avenue	Doncaster East	Ruffey Creek	Flash
	✓	6 Worthing Avenue	Doncaster East	Ruffey Creek	Flash

Properties at risk from Flooding exceeding Hazard Criteria or where 20% AEP flood depth is greater than 100mm					
Residential		Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event		Address	Suburb	Within Catchment	Flood Risk Type
20% AEP	1% AEP				
	✓	2/14 Worthing Avenue	Doncaster East	Ruffey Creek	Flash
	✓	2 Yallaroo Court	Doncaster East	Ruffey Creek	Flash
Totals					
63	230				

Table C3.4 – Properties at risk of flooding within the Bulleen, Koonung and Ruffey catchments in the City of Manningham

Isolation

No major isolation risks exist for areas around Ruffey Creek and Koonung Creek in Bulleen, Doncaster, Templestowe & Templestowe Lower. Some localised short-duration isolation may occur due to flash flooding. The Eastern Freeway experienced flooding in the flash floods of Dec 2003 cutting access along the freeway.

Essential Infrastructure

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. <http://ptv.vic.gov.au/live-travel-updates/>. A map of Public Transport routes within the City of Manningham is available via the website at: https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/fc42bcf06d/27_Manningham_LAM.pdf

Apart from the roads outlined below, all other essential infrastructure and services areas around Ruffey Creek and Koonung Creek in Bulleen, Doncaster, Templestowe & Templestowe Lower are expected to remain predominantly dry during an intense rainfall event.

Road Closures

The following roads are subject to closure during flooding around Ruffey Creek in Doncaster, Templestowe & Templestowe Lower. Check the Department of Transport website for more details: <http://alerts.vicroads.vic.gov.au/>

DoT Roads affected in a 1% AEP event	
Bulleen Road, Bulleen north of Koonung Creek	

Table C3.7 – VicRoads Possible Road Closures during a flooding event

Manningham City Council Roads affected in a 1% AEP event			
BULLEEN	Park Avenue	Dundas Court	The Grange
Doyle Street	Saxon Street	George Street	TEMPLESTOWE LOWER
Estelle Street	The Boulevard	Hertford Road	Cassinia Road
Gisborne Street	Thiele Street	Kerry Close	Dellfield Drive
Kampman Street	Sentinel Way	Rowan Street	Esther Street
White Way	Stutt Avenue	Saxonwood Drive	Fyfe Drive
Rose Avenue	Tullamore Avenue	TEMPLESTOWE	Hazel Drive
DONCASTER	Winters Way	Beecroft Crescent	Janet Street
Gregory Court	DONCASTER EAST	Church Road	Lynnwood Parade
Lauer Street	Barrabool Street	Fernbrook Way	Montpellier Crescent
Massey Street	Dryden Street	Hillcroft Drive	

Table C3.8 – Manningham City Council Possible Road Closures during a flooding event

Flood Mitigation

Retarding Basins

Melbourne Water Retarding Basin	On Drain/ Waterway	Spillway Crest Level	Full Supply Level	1% AEP Flood Level	Embankment Crest Height	Storage Capacity	ANCOLD Hazard Rating	Houses In Flow Path (sunny day)	Melway Reference
Buckingham Crescent, Bulleen	Ayr Street Drain	44.9m AHD	45.6m AHD	Unavailable	1.5m	1.4 ML	Low	Unavailable	32 K11
Irene Court, Bulleen	Ayr Street Drain	65.4m AHD	65.7m AHD	Unavailable	1.6m (65.8m AHD)	1.6 ML	High C	Unavailable	33 A10
Lynnwood Parade, Templestowe Lower	Montpellier Crescent Drain	50.8m AHD	50.8m AHD	50.4m AHD	2.5m (51.0m AHD)	10-15 ML	High C	20	33 D8
Ruffey Lake, Templestowe	Ruffeys Creek	56.7m AHD	56.7m AHD	55.1m AHD	6.0m (56.7m AHD)	177 ML	High A	105	33 G9
Tram Rd, Doncaster	Koonung Creek	Unavailable	60.1m AHD	55.5m AHD	4.0m	Unavailable	High C	Unavailable	47 F3

Table C3.9 – Melbourne Water Retarding Basins within the Ruffey Creek and Koonung Creek catchments in the City of Manningham

Dams or Retarding Basins	Catchment	Location	Type	Melway Reference
Anthony Reserve R/B	Ayr Street Drain	Anthony Avenue, Doncaster	Below Ground Retarding Basin	33 A10
Ayr Street R/B	Ayr Street Drain	Ayr Street, Doncaster	Below Ground Retarding Basin	32 J10
Coolabah Street R/B	Koonung Creek	Coolabah Street, Doncaster	Above Ground Retarding Basin	47 G2
Eastern Golf Course 1	Elms Grove Drain	Former Eastern Golf Club, Doncaster	Below Ground Dam	35 B11
Eastern Golf Course 2	Elms Grove Drain	Former Eastern Golf Club, Doncaster	Below Ground Dam	35 B11
Eastern Golf Course 3	Elms Grove Drain	Former Eastern Golf Club, Doncaster	Below Ground Retarding Basin	33 B11
Marsden Crescent Reserve R/B	Ruffey Creek	Marsden Crescent, Doncaster East	Below Ground Retarding Basin	33 K11
Morang Reserve R/B	Bulleen North Drain	Morang Reserve on Morang Avenue, Bulleen	Below Ground Retarding Basin	32 G5
Morris Williams Reserve R/B	Koonung Creek	Yarraleen/Morris William Reserve on Doyle Street, Bulleen	Below Ground Retarding Basin	32 G9
Studley Reserve R/B	Elms Grove Drain	Studley Street, Doncaster	Below Ground Retarding Basin	33 B11
Tiffany Grove Dam	Porter Street Drain	Tiffany Grove, Templestowe	Below Ground Water Storage Dam	33 K5
Wetherby Road R/B	Koonung Creek	Wetherby Road Retarding Basin Reserve on Wetherby Road, Doncaster	Below Ground Retarding Basin	47 H2
Wilsons Road Reserve R/B	Koonung Creek	Wilsons Reserve on Wilsons Road, Doncaster	Below Ground Retarding Basin	47 A2

No formal Pumping Stations or Levees exist around Ruffey Creek, Koonung Creek or the Bulleen & Porter Street Drains.

Sewerage Infrastructure

Sewerage Infrastructure of note during a severe flood event located within the Ruffey Creek Catchment is contained within the following table.

Sewer Pumping Stations

Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Operator	Location	Melway Reference
7 Unsewered Properties	Local Drainage		Yarra Valley Water	Around Chivers Road, Templestowe	33 J4
6 Unsewered Properties	Local Drainage		Yarra Valley Water	Around McDonald Avenue, Templestowe	33 K4
76 Unsewered Properties	Local Drainage		Yarra Valley Water	Either Side of Serpells Road, Templestowe	33 H6
3 Unsewered Properties	Ruffey Creek		Yarra Valley Water	Around Duxson Drive, Templestowe	33 E6
4 Unsewered Properties	Ruffey Creek		Yarra Valley Water	On Bamfield Close, Templestowe	33 F7

Table C3.10 – Sewer Pumping Stations within the Ruffey Creek Catchment in the City of Manningham

Command, Control and Coordination

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

Flood Impacts & Operational Considerations (Intelligence Cards)

The tables on the following pages provide a breakdown of the possible consequences of flooding within the Ruffey Creek, Koonung Creek, Bulleen North and Porter Street Drain Catchments at various creek heights or rain totals within Manningham. These tables are to be used only as a guide as no two floods at a location will have identical impacts.

Intelligence Cards have been included for the following locations:

- Koonung Creek at Bulleen
- Ruffey Creek and its Stormwater Tributaries
- Bulleen North and Porter Street Drains

FLOOD INTELLIGENCE CARD – BULLEEN GAUGE, KOONUNG CREEK

Version 4 – April 2020



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

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LOCATION	North bank of the creek on East side of Bulleen Rd, Bulleen
MELWAY REFERENCE:	32 D10
STREAM:	Koonung Creek
GAUGE NUMBER:	229229A
GAUGE ZERO:	9.32m AHD
GAUGE TYPE	Stream Level

MINOR:	Not Established
MODERATE:	Not Established
MAJOR	Not Established
LEVEE HEIGHT:	N/A
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	5.30m (24 th December 1978)

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
4.25m		Water Over Road Bulleen Road, Bulleen	
4.51m	3 rd December 2003 Flood Level	Event Summary 10 motorists required rescuing by boat on the Eastern Freeway at Bulleen Road when floodwaters reached chest high under the bridge - Marcellin College on Bulleen Road, Bulleen flooded - Trinity College Sports Grounds on Bulleen Road, Bulleen flooded	
4.69m	1% AEP (100-year ARI) Flood Level	Property Flooding (exceeding hazard criteria or where 20% AEP flood depth is greater than 100mm) 86 Properties in Total 1 & 2 Andrew Grove, Doncaster 3 & 1/5 Grand Boulevard, Doncaster 13-19A & 13-19 Tram Road, Doncaster 15, 16, 18 & 19 Greengully Retreat, Doncaster 3 Lauren Place, Doncaster 21 & 23 Argyle Street, Donvale 2/72 & 3/72 Ayr Street, Doncaster 3/64 & 4/64 Beverley Street, Doncaster East 64-66 Bowen Road, Doncaster East	

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 24 Buckingham Crescent, Doncaster • 2B Canara Street, Doncaster East • 35 Cassowary Street, Doncaster East • 51 Caringal Avenue, Doncaster • 6, 7, 8 & 9 Cerberus Street, Donvale • 14 & 16 Dale Street, Bulleen • 1037 Doncaster Road, Doncaster East • 1/17, 19 & 20 Dunoon Street, Doncaster • 1 & 3 Eildon Street, Doncaster • 9, 55A & 65 Estelle Street, Bulleen • 34 Fairway Road, Doncaster • 1 Glenview Road, Doncaster East • 36 Harcourt Street, Doncaster • 5 High Street, Doncaster • 1 & 3 Kandanga Grove, Bulleen • 4/19 & 5/19 Lincoln Drive, Bulleen • 2/1 Mantell Street, Doncaster East • 1A Marjorie Close, Bulleen • 39 & Units 1-4/41 Massey Street, Doncaster • 3/2 Milan Street, Doncaster East • 6A & 2/10 Millicent Avenue, Bulleen • 9 Moncaco Street, Doncaster • 23 & 25A Morna Road, Doncaster East • 1/57, 1/59, 2/57 & 3/57 Rosella Street, Doncaster East • 53 Roy Street, Donvale • 69 & 71 Stanton Street, Doncaster • 1, 6-8, 10 & 12 Stutt Avenue, Doncaster • 1/8 & 2/8 Thea Grove, Doncaster East • Apt 101/195 Thompsons Road, Bulleen • 2A & 2/4 Tobruk Street, Bulleen • 3/27 Tram Road, Doncaster • 1A Tudor Road, Doncaster • 3 Tullamore Avenue, Doncaster • 2/136 Tunstall Road, Donvale • 9 Village Avenue, Doncaster • 12 Westwood Drive, Bulleen • 3/6-8 Wetherby Road, Doncaster • 102 & 104 Wilsons Road, Doncaster • 16 Windella Quadrant, Doncaster • 28 Winters Way, Doncaster • 71-89 Williamsons Road, Doncaster	

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Community Infrastructure Flooded - Carey Sports Complex at 169-173 Bulleen Road, Bulleen - Marcellin College at 160 Bulleen Road, Bulleen - Bulleen Park at 175-189 Bulleen Road, Bulleen - Applewood Retirement Village at 13-19 Tram Road, Doncaster - Tende Beck Scout Hall at 5 High Street, Doncaster - Freeway Public Golf Course on at 175A Bulleen Road, Bulleen - Vista Valley Preschool at 3 Vista Street, Bulleen Water Over Road (above 400mm depth) - Bulleen Road, Bulleen between Thompsons Road & Golden Way - Doyle Street, Bulleen - Eastern Freeway, Balwyn North at Bulleen Road - Eastern Freeway, Box Hill North between Station Street & Blackburn Road - Estelle Street, Bulleen - Gregory Court, Doncaster - Kampman Street, Bulleen - Sentinel Way, Doncaster - Stutt Avenue, Doncaster - Tullamore Avenue, Doncaster - White Way, Bulleen - Winters Way, Doncaster	
8.9m	1% AEP Flood Level from Yarra River flow		

Table C3.11 – Breakdown of likely consequences at various Bulleen gauge level heights along Koonung Creek with operational considerations

FLOOD INTELLIGENCE CARD – RUFFEY CREEK & ITS STORMWATER TRIBUTARIES (UNGAUGED)

Version 4 – April 2020



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

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CLOSEST RAIN GAUGE	Doncaster East
LOCATION	Zerbes Reserve, Nedlands Ct, Doncaster East
MELWAY REF:	34 B10

GAUGE NUMBER	586037
GAUGE TYPE	Rain
TELEMETRIC/MANUAL	Telemetric

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability	Consequence / Impact	Action
43mm in 3 hours	3 rd December 2003 Rainfall Total		
92mm in 12 hours	4 th February 2011 Rainfall Total		
20mm in 10 mins (47mm in total over 6 hours)	24 th December 1978 Rainfall Total	Event Summary Properties Flooded (over floor) 1 property on Olympus Drive, Templestowe Lower 5 properties on Montclair Court, Templestowe Lower 1 property on Golden Court, Doncaster Water Over Road - Foote Street, Templestowe Lower - Dellfield Drive, Templestowe Lower - Eumeralla Avenue, Templestowe Lower - St Georges Avenue, Templestowe - Williamsons Road, Templestowe	
24mm in 10 mins; 39mm in 30 mins; 48mm in 1 hour; 57mm in 2 hours; 63mm in 3 hours; or	1% AEP (100-year ARI)	Properties at Flood Risk (exceeding hazard criteria) 66 Properties in Total 139-153 Williamsons Road, Templestowe Lower 2, 28 & 8 Belinda Crescent, Doncaster East 1/213, 9/213, 10/213, 13/213, 14/213 Blackburn Road, Doncaster East 5 & 7 Chelmsford Avenue, Templestowe	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability	Consequence / Impact	Action
78mm in 6 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.		10 Daws Road, Doncaster 1/50 Dryden Street, Doncaster East 7, 8 & 11 Dundas Court, Doncaster East 1/304 George Street, Doncaster 39 Greenridge Avenue, Templestowe 1, 3, 5, 7 & 11 Hillcroft Drive, Templestowe 6 Homebush Court, Doncaster East 41 & 43 Lynnwood Parade, Templestowe Lower 32 & 34 Margot Avenue, Doncaster 8 Marsden Crescent, Doncaster East 3/4 & 4B May Street, Doncaster East 40, 44, 46 & 46A Montpellier Crescent, Templestowe Lower 11 & 12 Newlyn Close 2 Nottingwood Street, Doncaster East 3 & 5 Romily Avenue, Templestowe Lower 2 Saxon Street, Doncaster 22-24 St Georges Avenue, Templestowe 3 & 6 The Boulevard, Doncaster 97 The Grange, Templestowe 1 Totara Court, Templestowe Lower 139A & 139B Williamsons Road, Templestowe Lower 43, 45 & 47 Winston Drive, Doncaster 16 & 32 Wood Street, Templestowe 6, 2/14, 16, 27, 29, 32, 2/48, 52, 54, 56, 58 & 2/60 Worthing Avenue, Doncaster East 2 Yallaroo Court, Doncaster East Community Infrastructure Flooded - Tom Kelly Athletics Track at Rieschiecks Reserve, 125 George Street, Doncaster East - Greenridge Retirement Home, 39 Greenridge Avenue, Templestowe - Noni's Nursery Childcare & Kindergarten at 1 Hillcroft Drive, Templestowe Essential Infrastructure Likely Impacted - Bus Route 305 along George Street, Doncaster East - Bus Route 908 along Lynwood Parade, Templestowe Lower Water Over Road (above 400mm depth) - Saxon Street, Doncaster - The Boulevard, Doncaster - Kerry Close, Doncaster East - Dryden Street, Doncaster East - George Street, Doncaster East - Beecroft Crescent, Templestowe - Fernbrook Way, Templestowe	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability	Consequence / Impact	Action
		• Hillcroft Drive, Templestowe • The Grange, Templestowe • Cassinia Road, Templestowe Lower • Fyfe Drive, Templestowe Lower east of Elder Court • Montpellier Crescent, Templestowe Lower • Lynnwood Parade, Templestowe Lower • Thiele Street, Doncaster • Barrabool Street, Doncaster East • Dellfield Drive, Templestowe Lower • Dundas Court, Doncaster East • Hertford Road, Doncaster East • Rowan Street, Doncaster East • Saxonwood Drive, Doncaster East	

Table C3.12 – Breakdown of possible consequences at various rainfall intensities around Ruffey Creek with operational considerations

FLOOD INTELLIGENCE CARD – BULLEEN NORTH & PORTER ST DRAINS (UNGAUGED)

Version 2 – April 2020



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

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CLOSEST RAIN GAUGE	Viewbank
LOCATION	Southern side of Country Lane, Viewbank
MELWAY REF:	20 H12

GAUGE NUMBER	86068
GAUGE TYPE	Rain
TELEMETRIC/MANUAL	Telemetric

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability	Consequence / Impact	Action
24mm in 10 mins; 39mm in 30 mins; 48mm in 1 hour; 57mm in 2 hours; 63mm in 3 hours; or 78mm in 6 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	1% AEP (100-year ARI)	Properties at Flood Risk (exceeding hazard criteria or where 20% AEP flood depth is greater than 100mm) 78 Properties in Total 8A Alison Avenue, Bulleen 37A & 39 Anderson Street, Templestowe 3, 5 & 7 Bilby Street, Templestowe Lower - Bulleen Plaza 101, 103 & 105 Manningham Road, Bulleen 30 Chivers Road, Templestowe 5/413 Church Road, Templestowe 328-330 Church Road, Templestowe 7/420-424 Church Road, Templestowe 5 & 7 Cottonwood Court, Templestowe 13 Fitzsimons Lane, Templestowe 6 & 8 Gisborne Street, Bulleen 12, 13 & 15 Greenaway Street, Bulleen 61, 1/63 & 2/63 Hawtin Street, Templestowe 43 Hazel Drive, Templestowe Lower 2/9, 17, 18, 1/19 & 21 Heysham Way, Templestowe 4 Hodgson Street, Templestowe Lower 1-11 Innisfallen Avenue, Templestowe 1/32 John Street, Templestowe Lower 2/21 Kanooka Avenue, Templestowe Lower	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability	Consequence / Impact	Action
		14 & 15 Kim Close, Bulleen 8, 11, 12 & 16 Lempriere Close, Templestowe 5 Little Valley Road, Templestowe 115 & 117 Macedon Road, Templestowe Lower 12, 14-16, 78 & 28B/101 Manningham Road, Bulleen 48 & 50 Marcus Road, Templestowe Lower 17 Merna Drive, Templestowe 7, 8 & 9 Milner Close, Templestowe 42, 44, 46 & 52 Mincha Avenue, Templestowe Lower 8 Princely Terrace, Templestowe 39-41 & 43 Rose Avenue, Bulleen 25, 25A & 63-67 Serpells Road, Templestowe 96-106 Swanston Street, Templestowe Lower 372, 374, 376 & 80/410-418 Thompsons Road, Templestowe Lower 26 & 28 Verene Avenue, Templestowe Lower 1/66 & 2/66 Waratah Drive, Templestowe Lower 91-93 & 103-111 Websters Road, Templestowe 75, 77 & 79 Yarra Valley Boulevard, Bulleen Community Infrastructure Flooded Bulleen North Drain - Lower Templestowe Preschool at 96-106 Swanston Street, Templestowe Lower Porter Street Drain - Templestowe Retirement Village at 29 Fitzsimons Lane, Templestowe Water Over Road (above 400mm depth) Bulleen North Drain - Esther Street, Templestowe Lower - Gisborne Street, Bulleen - Hazel Drive, Templestowe Lower - Janet Street, Templestowe Lower - Rose Avenue, Bulleen Porter Street Drain - Church Road, Templestowe	

Table C3.13 – Breakdown of possible consequences at various rainfall intensities around Bulleen North & Porter Street with operational considerations

APPENDIX D - FLOOD EVACUATION ARRANGEMENTS

Phase 1 - Decision to Evacuate

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

- Properties are likely to become inundated;
- Properties are likely to become isolated and occupants are not suitable for isolated conditions;
- Public health is at threat as a consequence of flooding and evacuation is considered the most effective risk treatment. This is the role of the Health Commander of the incident to assess and manage. Refer to the State 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; and
 - Different stages of an evacuation process.

The decision to evacuate is to be made in consultation with the MERO, MERC, DHS, Health Commander and other key agencies and expert advice (CMA's and Flood Intelligence specialists). The table below details triggers for evacuation, if these heights are predicted or are likely to occur evacuation should be considered.

Sector	Gauge	Trigger

The table below details time required to evacuate established areas.

Sector	Likely time required for evacuation (including resource assumptions)

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.

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

VICPOL will control security of evacuated areas.

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

Possible Evacuation Routes to be used:

Sector	Evacuation Route	Evacuation route closure point and gauge height of closure

Landing zones for aircraft will be determined by the following:

- The IC will determine the requirements for airborne resources
- The State Aircraft Desk will deploy and coordinate air resources
- The pilot in command will determine the safest location to land.
- Landing zones for helicopters are located at Donvale Reserve and Domeney reserve.

Vulnerable People in Emergencies

Vulnerable people living in the community will be identified through funded agencies, community service organisations or other community networks. Such people will be assessed against the

definition of a vulnerable person and may qualify for registration on the Vulnerable Persons Register (VPR). A list of facilities where vulnerable people may be located is also kept by Council. These may be funded facilities including, education, health and childcare, commonwealth regulated aged care facilities and other locally identified facilities. Further information on Vulnerable People in Emergencies can be obtained from Councils Emergency Management Co-ordinator.

Phase 4 – Shelter

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

Sector	Relief Centre/Assembly Area (include address)	Comments
ERC's to be listed and inserted as a link to MEMPlan details.		

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

Animal Shelter

Animal shelter compounds will be established for domestic pets and companion animals of evacuees. These facilities may be located at locations detailed in the MEMPlan

Sector	Animal Shelter (include address)	Comments
Listed in Animal Welfare Plan (and developing Emergency Animal Welfare Plan) create a link and include		

Caravans

Caravans maybe evacuated to the following locations:

Sector	Caravan evacuation location (include address)	Comments
	Ted Ajani Reserve	
	Quanvy Reserve (within Maroondah)	
	Bulleen Reserve	

Phase 5 – Return

Return will be consistent with the Strategic Plan for the Return of Community. The IC in consultation with VICPOL will determine when it is safe for evacuees to return to their properties and will arrange for the notification of the community. VicPol will manage the return of evacuated people with the assistance of other agencies as required.

Considerations for deciding whether to 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; and
- Transportation particularly for people without access to transport

Disruption to Services

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

Service	Impact	Trigger Point for action	Strategy/Temporary Measures
School Bus Routes			
Local Road Network			

Essential Infrastructure and Property Protection

Essential Infrastructure and properties (e.g. residences, businesses, roads, power supply etc.) that require protection are:

Facility	Impact	Trigger Point for action	Strategy/Temporary Measures
Bridge	Traffic		

Manningham City Council will establish a sandbag collection point at the municipal depot located at 620 Blackburn Road Doncaster East. (at rear of the Depot and will not impact on SES egress)

Rescue

Resources are available within the Manningham SES unit to assist with rescue operations:

Full details of equipment and resources are held by the SES unit. (Consider listing the inventory on Volume 2 “Contacts & Resources Directory”)

Known high-risk areas/communities (i.e. low-lying islands) where rescues might be required are detailed in the **Appendix F** flood maps.

APPENDIX E – STORM AND FLOOD WARNING SYSTEMS

Storm and Flood Warning

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

Flood Bulletins

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

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

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

Flood Bulletins should follow the following structure

What is the current flood situation;

What is the predicted flood situation;

What are the likely flood consequences;

What should the community do in response to flood warnings;

Where to seek further information; and

Who to call if emergency assistance is required.

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

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

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

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

Local Flood Warning System Arrangements

Include details of any local flood warning systems or arrangements.

Moderate Flood Warning Example

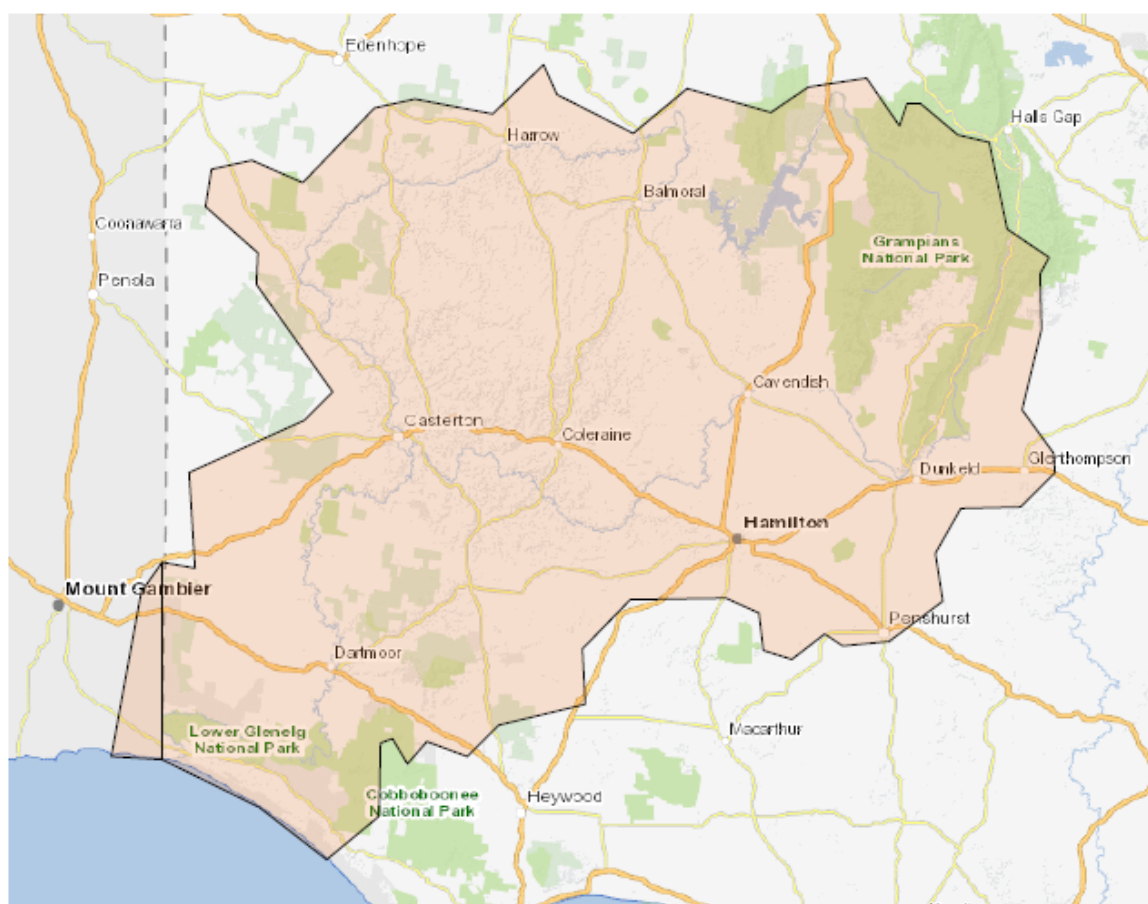
Community Notification Sign-off



WARNING - FLOOD

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

Map



Message

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

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

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

What you should do:

Decide if you will evacuate if it becomes necessary.

If you choose to leave:

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

If you are travelling:

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

If you stay or if it is unsafe to leave:

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

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

Impacts in your area:

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

This message was issued by State Emergency Service.

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

Flood information:

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

Emergency contacts:

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

Stay informed:

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

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

Facebook

WARNING - FLOOD

Incident Location: Glenelg River at Casterton

Incident Name: GlenelgRiverFloodSept2017

Issue Date:

Next Update:

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

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

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

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

Twitter

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

Sign-off

Authorised By:

Authorised Signature:

APPENDIX F – MAPS & SCHEMATICS

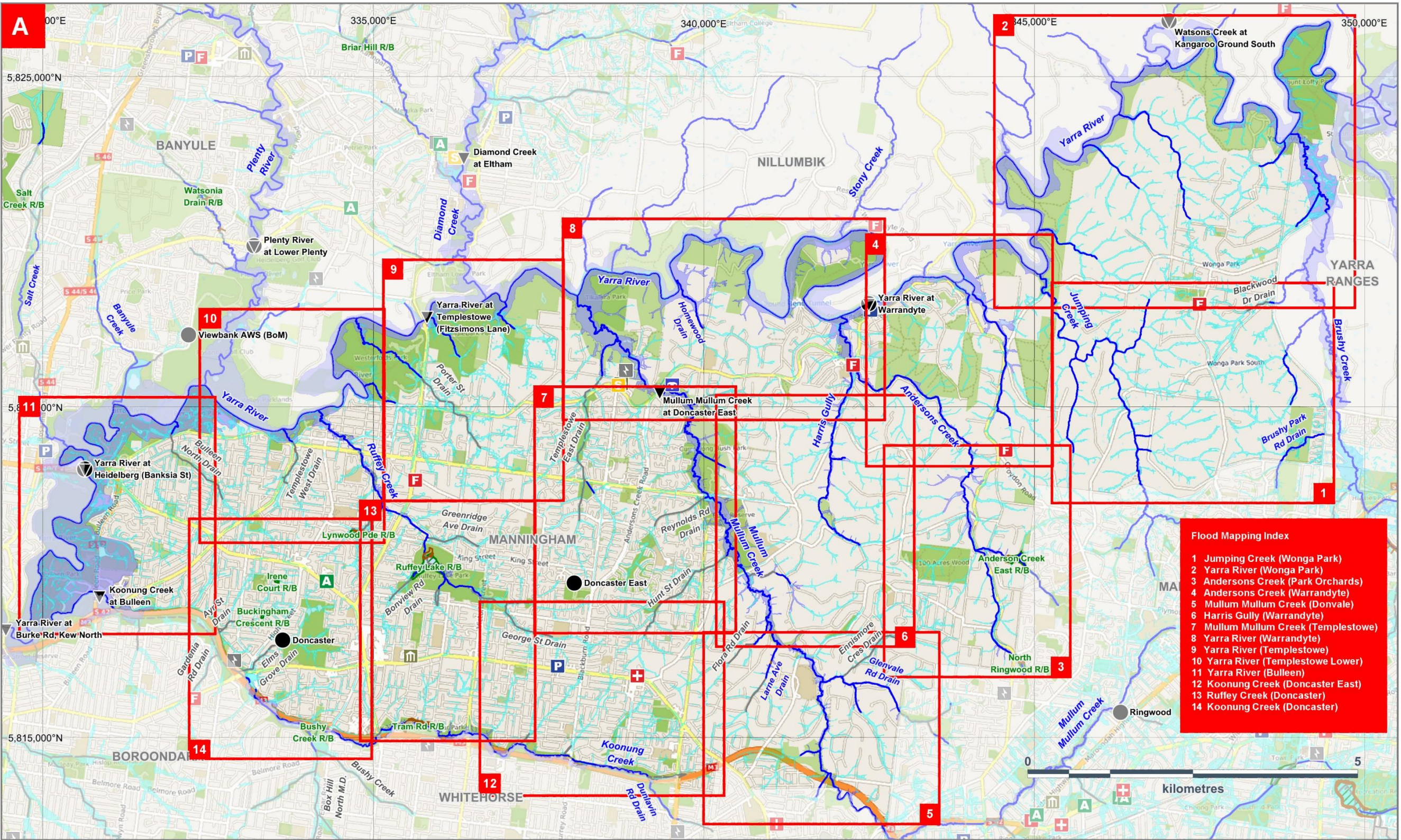
Overview

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

- A map outlining a series of flooding hot spot maps within the City of Manningham.
- A map showing the Municipal boundary together with the open waterways and underground stormwater drainage pipe network within the City of Manningham and the 1% AEP (100-year ARI) flood extents (sourced from Melbourne Water GIS).
- A set of 14 maps showing flooding hot spots within the City of Manningham together with the 1% AEP (100-year ARI) flood extents (sourced from the Melbourne Water GIS).
- Where the 1% AEP Flood Extent is included this has been filtered to include areas equal to or greater than 180m² in size and where the flood depth is greater than 100mm or the product of Velocity and Depth is equal to or greater than 0.008.
- Where a 1% AEP Flood Hazard overlay is included this is for flooded locations greater than 180m² in size and where the flood depth is greater than 400mm, the velocity is greater than 1.5m/s or the product of velocity and depth is greater than 0.35.
- 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 Manningham Planning Scheme can be used as a guide to areas that may flood during an event. The maps can be found in hard copy form at the Council's main office or online at the Department of Environment, Land, Water & Planning website <https://mapshare.vic.gov.au/vicplan/>.
- Maps showing 1 in 100-year ARI (1% AEP) flood extents and floodways (together with volume, height and water quality data) are shown at DELWP's mapshare website <http://mapshare.maps.vic.gov.au/MapShareVic/index.html?viewer=MapShareVic.PublicSite&locale=en-AU>
- Note that not all waterways or drains are included in the schematics, only those that are likely to contribute to flooding further on along the drainage system. Note also the flow direction; the schematics either flow from the top of the page to the bottom, or vice versa.



Map Produced by VICSES July 2020.

Basemap © OpenStreetMap contributors

N

CITY OF MANNINGHAM

Version 4: July 2020

A. Flood Mapping Index Map

Waterbody

1% AEP Flash Flood Extent

1% AEP Riverine Flood Extent

Melbourne Water Retarding Basin

Melbourne Water Stormwater Drain

Waterway

Flood Mapping Border

Stream Level Gauge

Rain Gauge

Power Terminal Station

Municipal Offices

Municipal Depot

Police Station

Ambulance Station

Hospital

Caravan Park

Fire Station

State Emergency Service

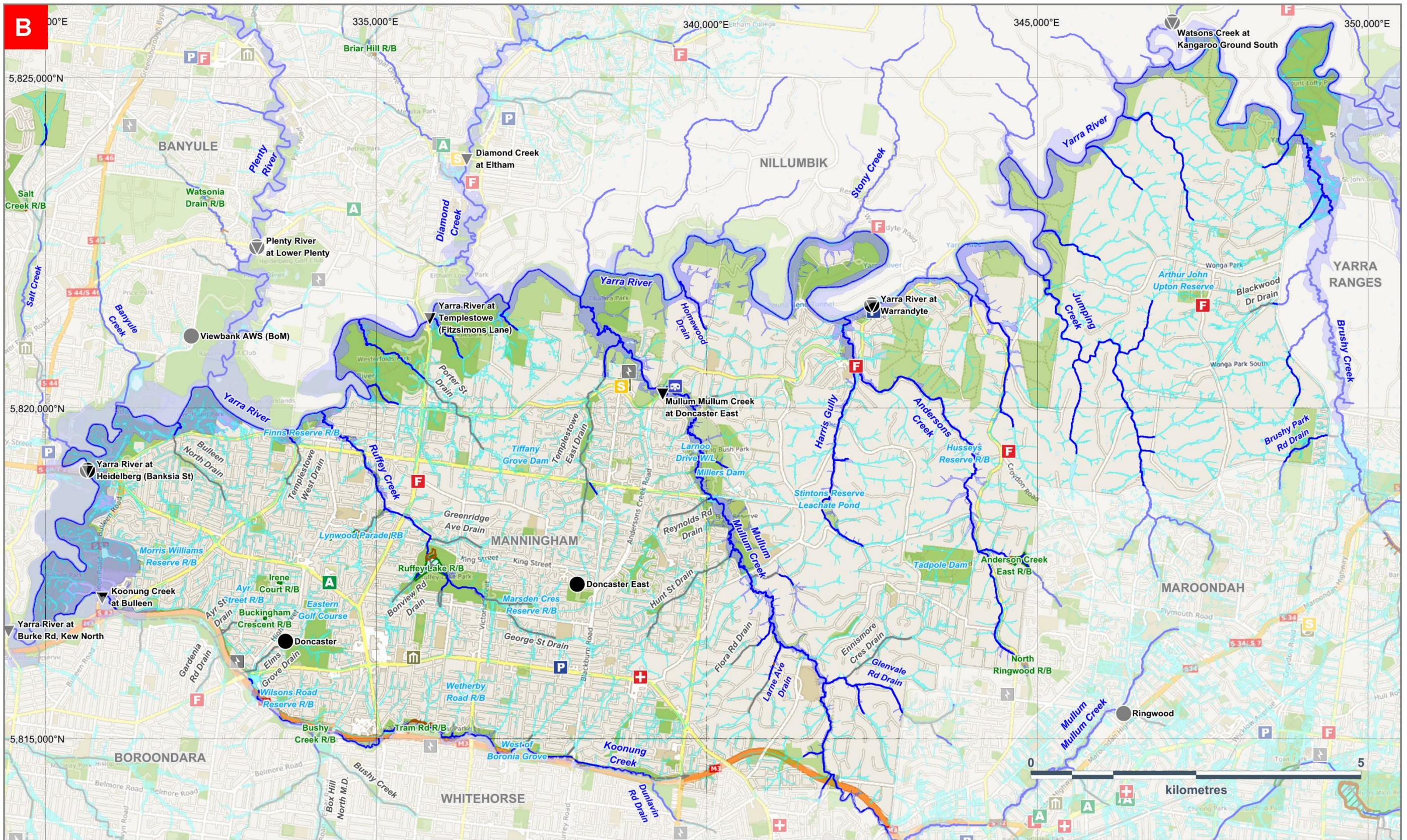
SES

VICTORIA

Melbourne Water

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Manningham Storm and Flood Emergency Plan – A Sub-Plan of the MEMP – Version 7.0 April 2020 - 92 -



Map Produced by VICSES July 2020.

CITY OF MANNINGHAM
Version 4: July 2020
B. 1% AEP (100yr ARI) Flood Mapping

- | | | | | | |
|--|----------------------------------|--|------------------------|--|-------------------------|
| | Waterbody | | Stream Level Gauge | | Ambulance Station |
| | 1% AEP Flash Flood Extent | | Rain Gauge | | Hospital |
| | 1% AEP Riverine Flood Extent | | Power Terminal Station | | Caravan Park |
| | Melbourne Water Retarding Basin | | Municipal Offices | | Fire Station |
| | Melbourne Water Stormwater Drain | | Municipal Depot | | State Emergency Service |
| | Waterway | | Police Station | | |

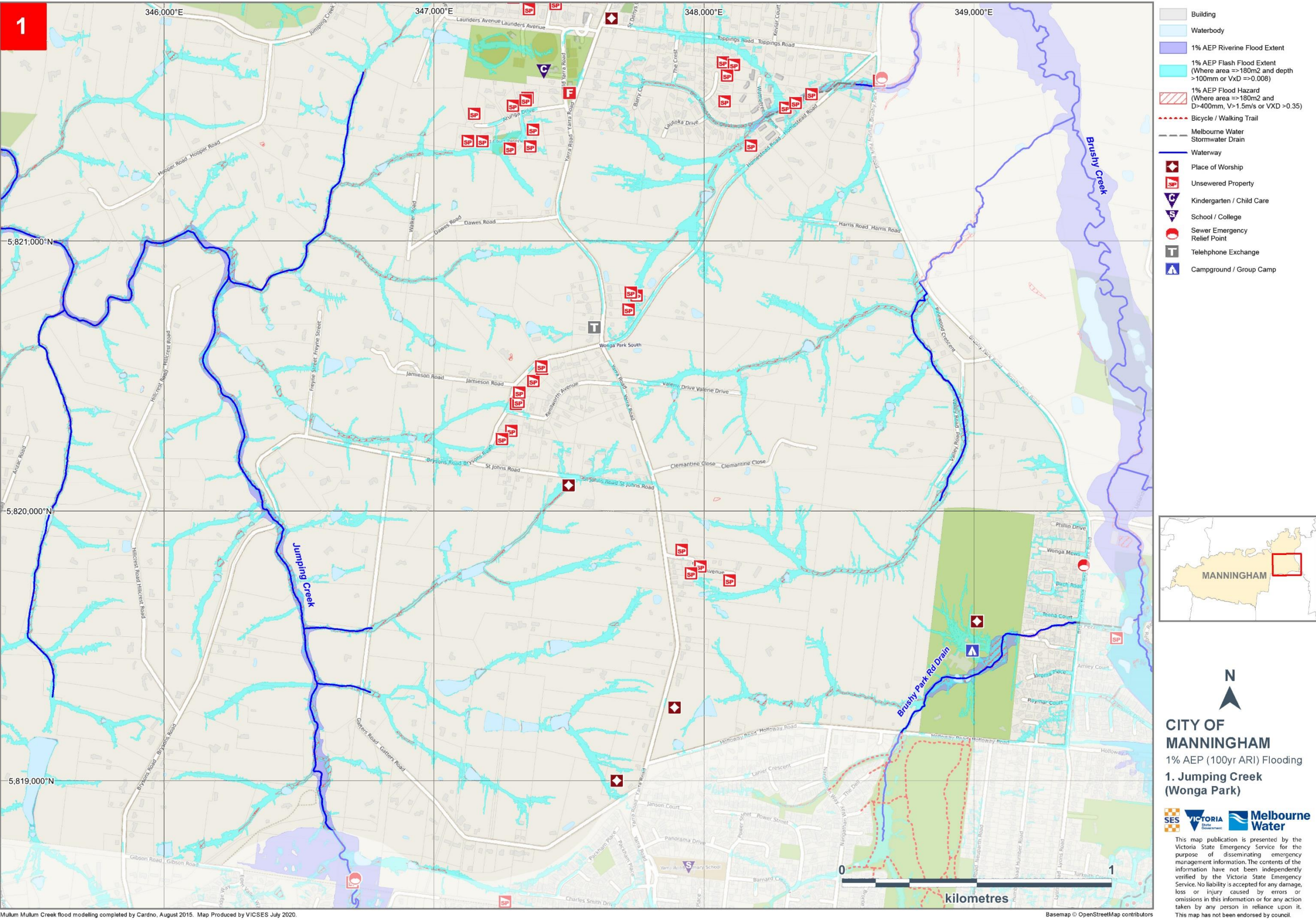
- Flood Study Details**
- (a). Andersons Creek (Andersons Creek Flood Mapping, Cardno, August 2015)
 - (b). Bulleen North Drain (Bulleen North Main Drain, Cardno, August 2015)
 - (c). Brushy Creek (Brushy Creek Lower, Melbourne Water, September 1996)
 - (d). Jumping Creek (Jumping Creek, Melbourne Water, June 1996)
 - (e). Koonung Catchment (Koonung Catchment Flood Mapping, Cardno, August 2015)
 - (f). Mullum Mullum Creek (Mullum Mullum Catchment Flood Mapping, Cardno, August 2015)
 - (g). Ruffey Creek (Ruffey Catchment Flood Mapping, Cardno, August 2015)
 - (h). Yarra River (Yarra River Flood Mapping, S.P. Goh & Associates, November 2010)

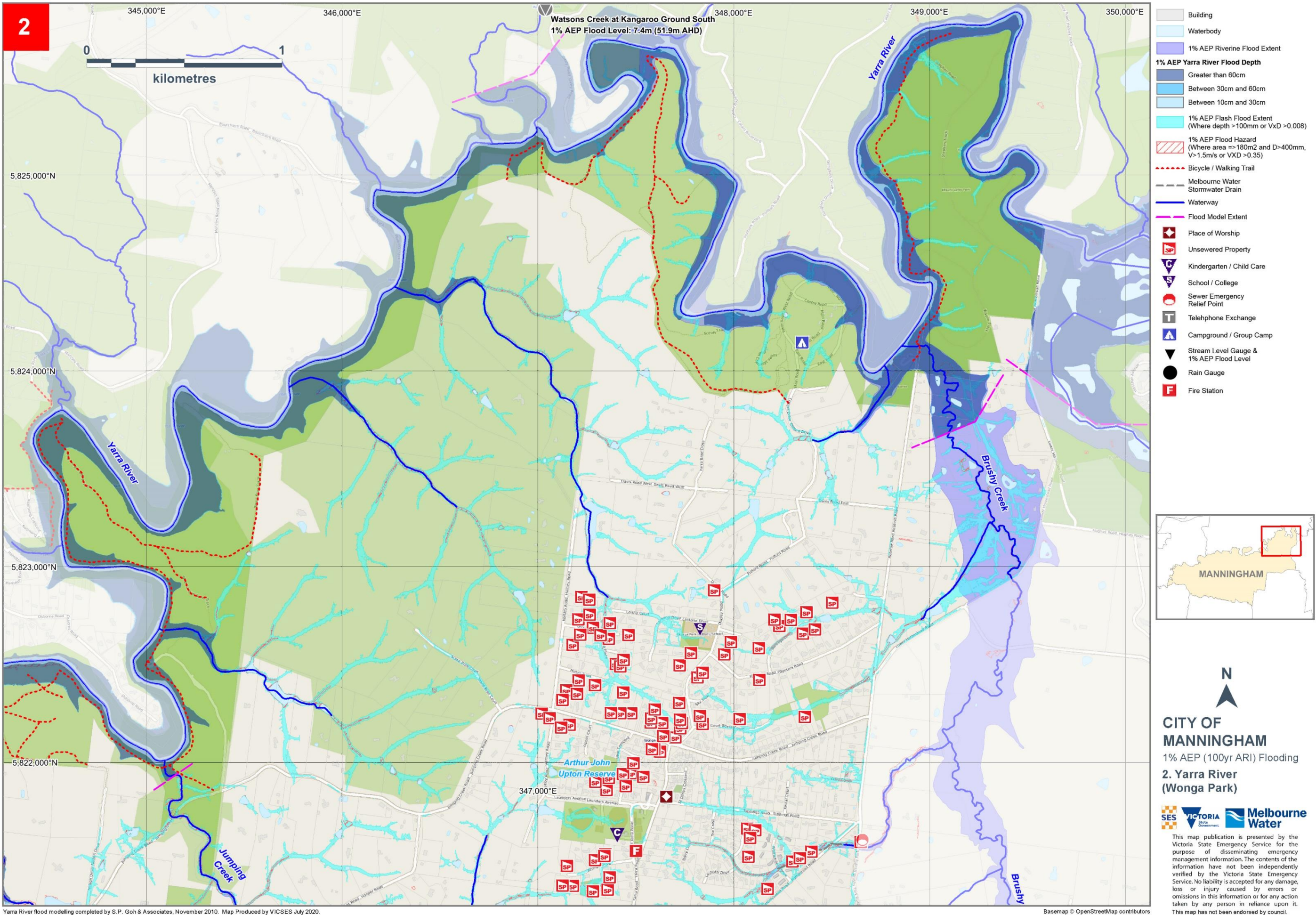


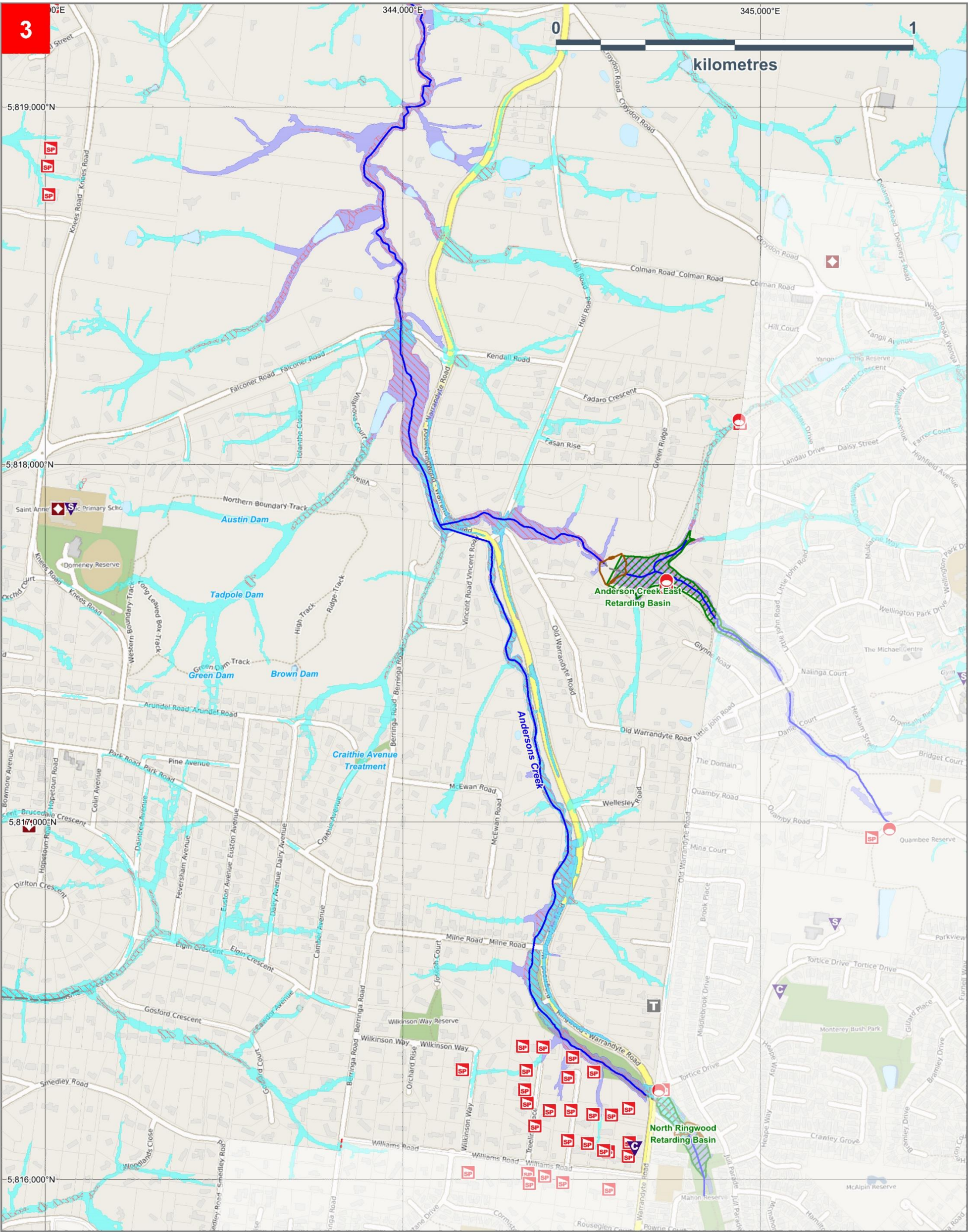
SSES VICTORIA State Emergency Service
Melbourne Water

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Flooding Hot Spot Maps (sourced Melbourne Water GIS and City of Manningham)







Andersons Creek flood modelling completed by Cardno, August 2015. Map Produced by VICSES July 2020.

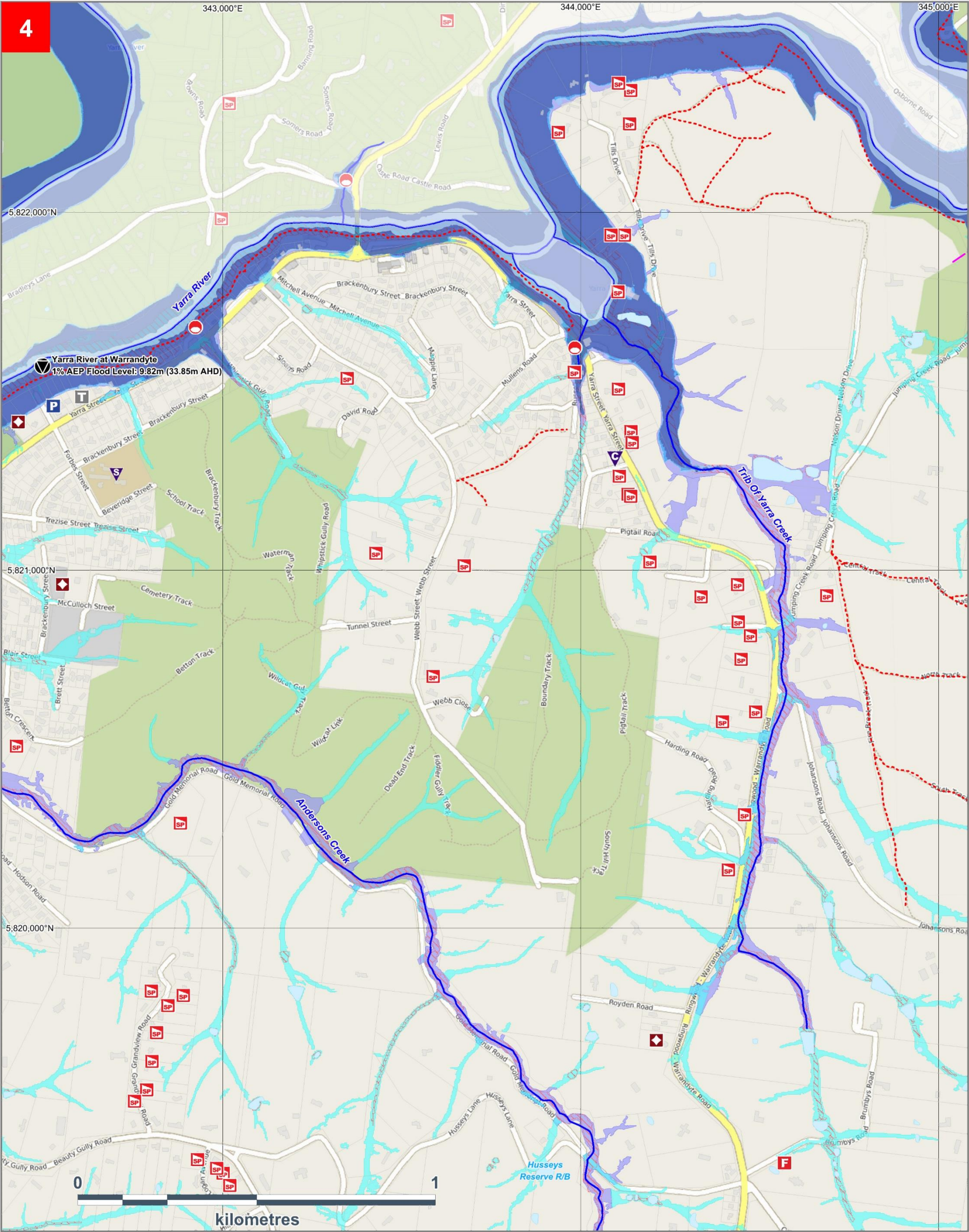
Basemap © OpenStreetMap contributors

CITY OF MANNINGHAM
1% AEP (100yr ARI) Flooding
3. Andersons Creek (Park Orchards)

- Building
- Waterbody
- 1% AEP Flash Flood Extent (Where area $\geq 180m^2$ and depth $>100mm$ or $VxD \geq 0.008$)
- 1% AEP Riverine Flood Extent (Where area $\geq 180m^2$ and depth $>100mm$ or $VxD \geq 0.008$)
- 1% AEP Flood Hazard (Where area $\geq 180m^2$ and $D > 400mm$, $V > 1.5m/s$ or $VXD > 0.35$)
- Melbourne Water Retarding Basin
- Waterway
- Embankment
- Place of Worship
- Unsewered Property
- Kindergarten / Child Care
- School / College
- Sewer Emergency Relief Point



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Yarra River flood modelling completed by S.P. Goh & Associates, June 2016. Andersons Creek flood modelling completed by Cardno, August 2015. Map Produced by VICSES July 2020.

Basemap © OpenStreetMap contributors

CITY OF MANNINGHAM
1% AEP (100yr ARI) Flooding
4. Yarra River and Andersons Creek (Warrandyte)

1% AEP Yarra River Flood Depth

- Greater than 60cm
- Between 30cm and 60cm
- Between 10cm and 30cm

1% AEP Flash Flood Extent
(Where area $\geq 180m^2$ and depth $>100mm$ or $Vx \geq 0.008$)

1% AEP Riverine Flood Extent
(Where area $\geq 180m^2$ and depth $>100mm$ or $Vx \geq 0.008$)

1% AEP Flood Hazard
(Where area $\geq 180m^2$ and $D > 400mm$, $V > 1.5m/s$ or $VxD > 0.35$)

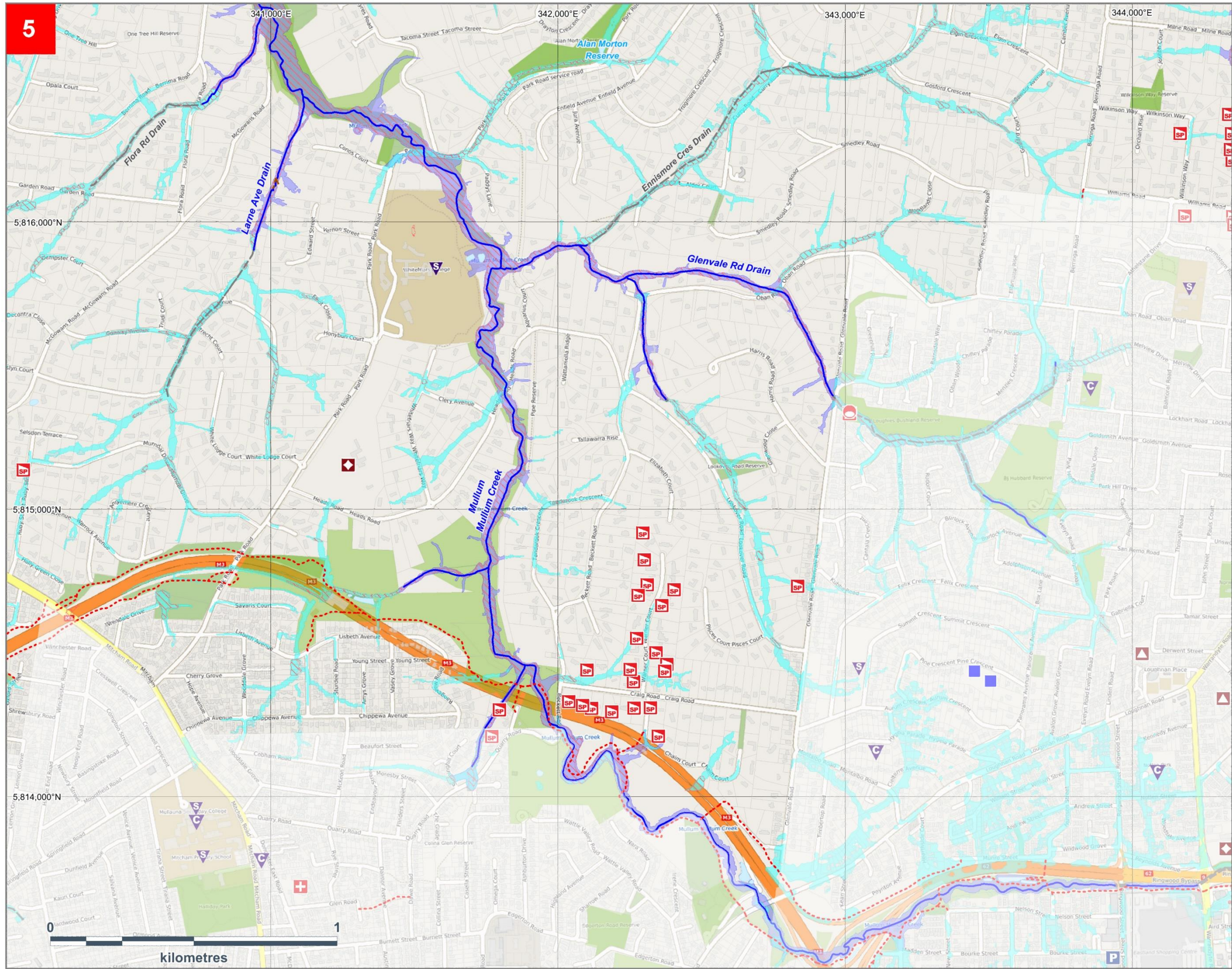
Legend

- Building
- Waterbody
- Waterway
- Melbourne Water Stormwater Drain
- Bicycle / Walking Trail
- Aged Care Facility
- Place of Worship
- Telephone Exchange
- Unsewered Property
- Kindergarten / Child Care
- School / College
- Police Station
- Sewer Emergency Relief Point
- Stream Level Gauge & 1% AEP Flood Level
- Rain Gauge



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- Building
- Waterbody
- 1% AEP Flood Hazard (Where area $\geq 180m^2$ and $D > 400mm$, $V > 1.5m/s$ or $VxD > 0.35$)
- 1% AEP Flash Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD \geq 0.008$)
- 1% AEP Riverine Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD \geq 0.008$)
- Bicycle / Walking Trail
- Melbourne Water Stormwater Drain
- Waterway
- Place of Worship
- Unsewered Property
- Kindergarten / Child Care
- School / College
- Sewer Emergency Relief Point
- Telephone Exchange
- Aged Care Facility
- Police Station
- Hospital
- Retail Water Storage



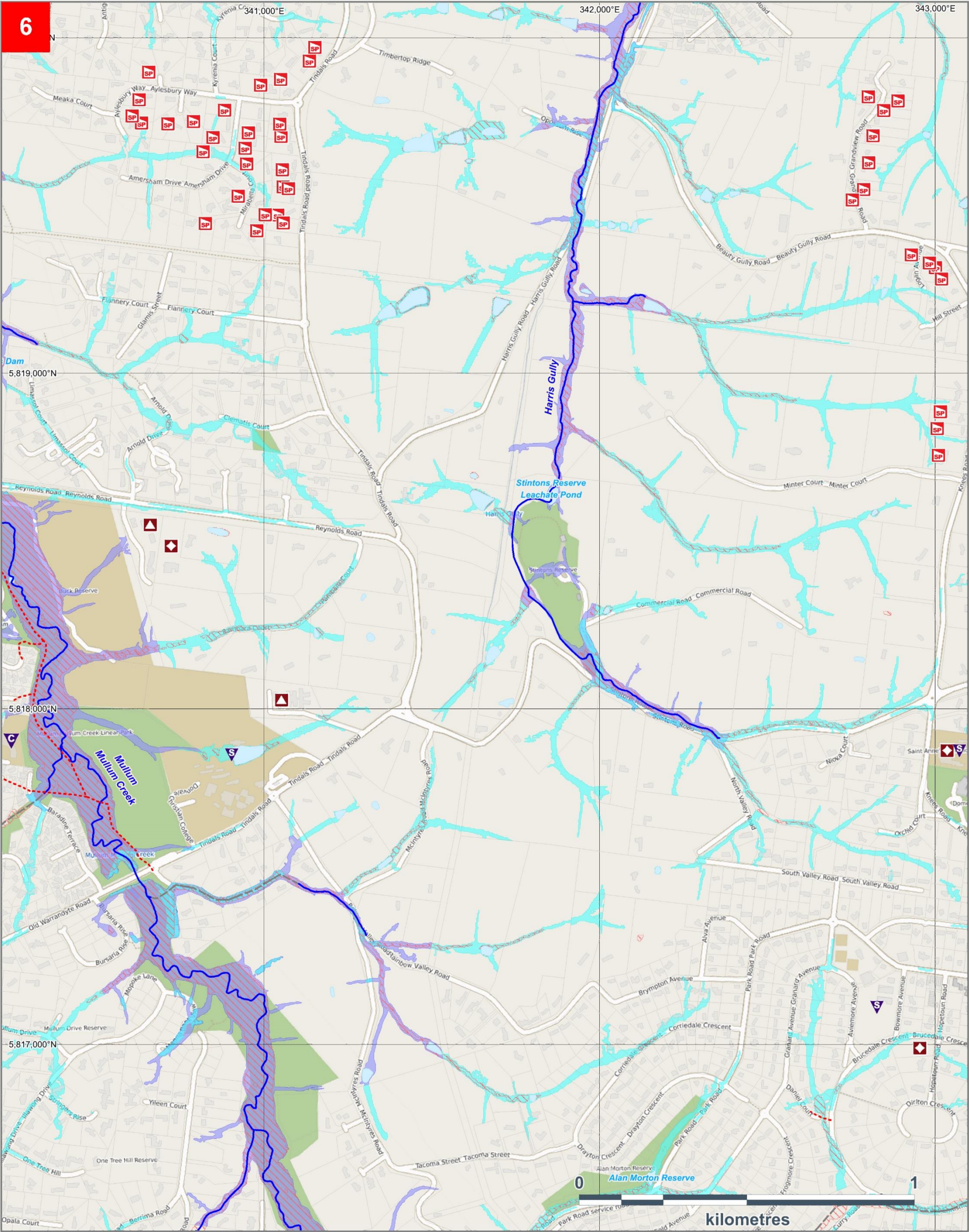
CITY OF MANNINGHAM
1% AEP (100yr ARI) Flooding
5. Mullum Mullum Creek (Donvale)

SES VICTORIA Melbourne Water

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Mullum Mullum Creek flood modelling completed by Cardno, August 2015. Map Produced by VICSES July 2020.

Basemap © OpenStreetMap contributors



Mullum Mullum Creek flood modelling completed by Cardno, August 2015. Map Produced by VICSES July 2020.

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CITY OF MANNINGHAM
1% AEP (100yr ARI) Flooding
6. Harris Gully (Warrandyte)

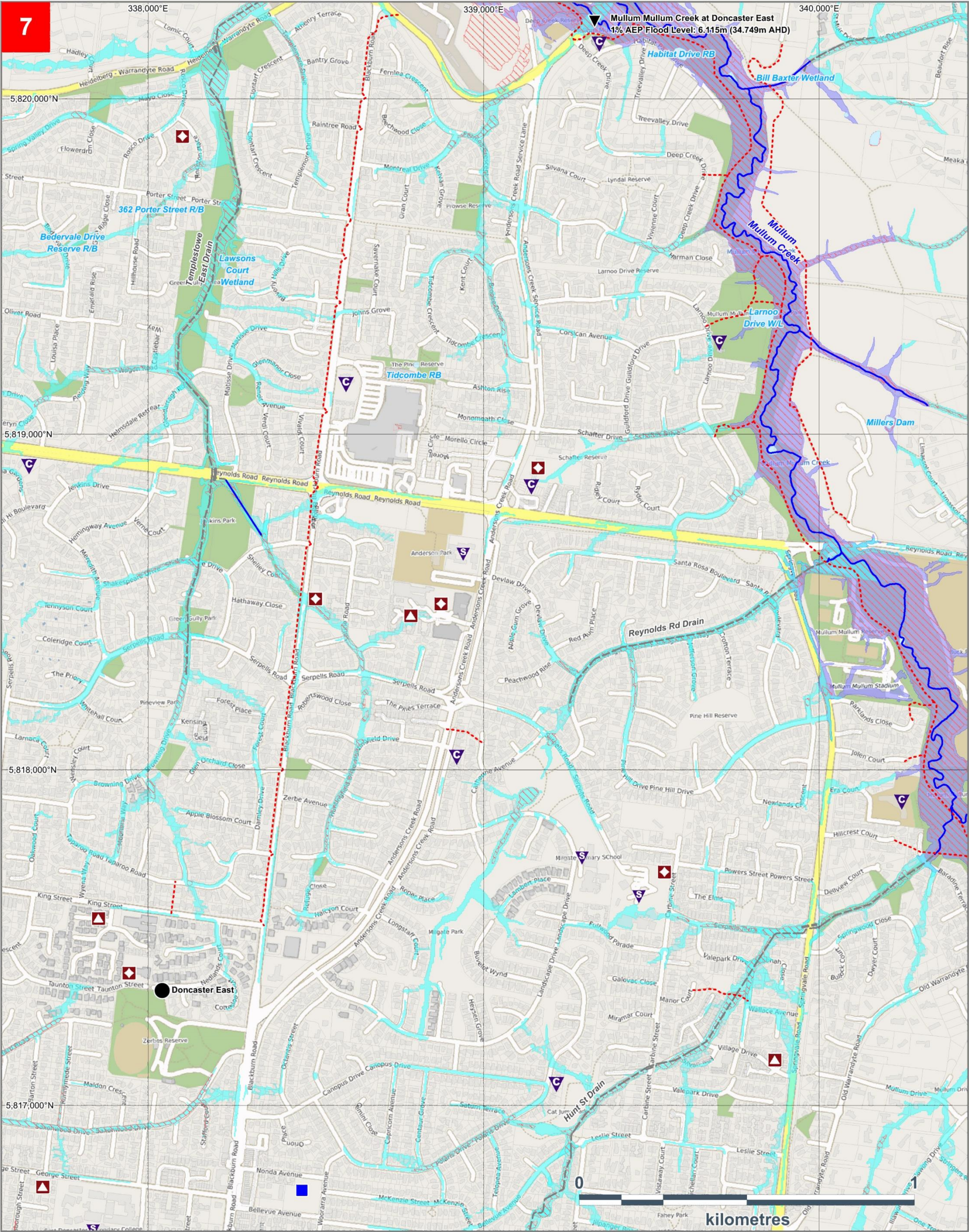
Legend

Building	Melbourne Water Stormwater Drain	Telephone Exchange
Waterbody	Waterway	Power Terminal Station
1% AEP Flood Hazard (Where area >= 180m2 and D > 400mm, V > 1.5m/s or VxD > 0.35)	Embankment	Municipal Office
1% AEP Flash Flood Extent (Where area >= 180m2 and depth > 100mm or VxD > 0.008)	Place of Worship	Aged Care Facility
1% AEP Riverine Flood Extent (Where area >= 180m2 and depth > 100mm or VxD > 0.008)	Unsewered Property	Rain Gauge
Melbourne Water Retarding Basin	Kindergarten / Child Care	Fire Station
Bicycle / Walking Trail	School / College	
	Sewer Emergency Relief Point	



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Mullum Mullum Creek flood modelling completed by Cardno, August 2015. Map Produced by VICSES July 2020.

Basemap © OpenStreetMap contributors

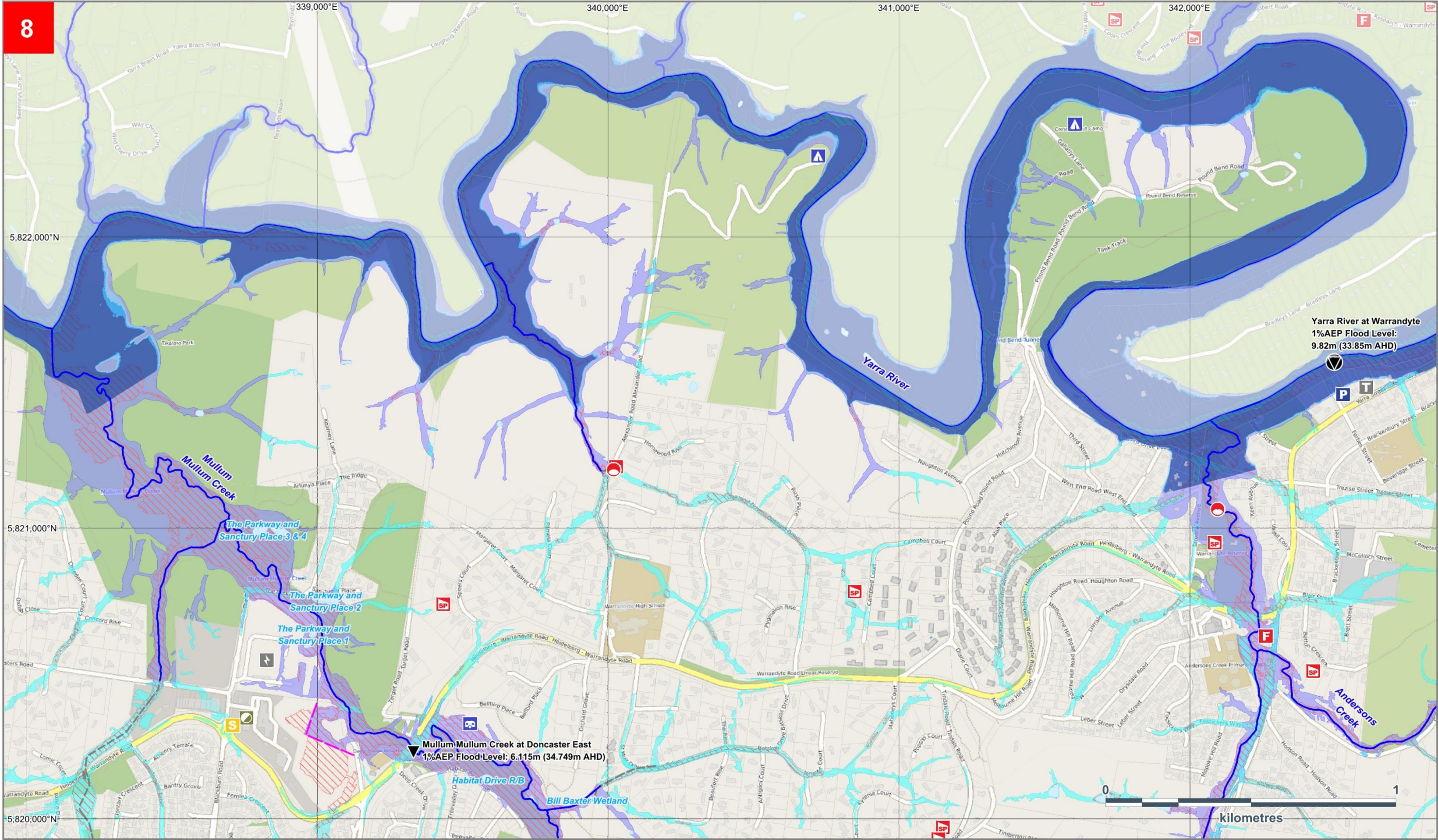
CITY OF MANNINGHAM
1% AEP (100yr ARI) Flooding
7. Mullum Mullum Creek (Templestowe)

- Building - Waterbody 1% AEP Flood Hazard (Where area $\geq 180m^2$ and $D > 400mm$, $V > 1.5m/s$ or $VxD > 0.35$) 1% AEP Flash Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD > 0.008$) 1% AEP Riverine Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD > 0.008$) - Melbourne Water Retarding Basin - Bicycle / Walking Trail	- Melbourne Water Stormwater Drain - Waterway Embankment - Place of Worship - Unsewered Property - Kindergarten / Child Care - School / College - Sewer Emergency Relief Point	- Telephone Exchange - Power Terminal Station - Municipal Office - Rain Gauge - Fire Station - Aged Care Facility - Stream Level Gauge & 1% AEP Flood Level
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SES VICTORIA **Melbourne Water**

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Flood modelling completed by S.P. Goh & Associates, June 2016. Map Produced by VICSES July 2020.

CITY OF MANNINGHAM
1% AEP (100yr ARI) Flooding
8. Yarra River (Warrandyte)

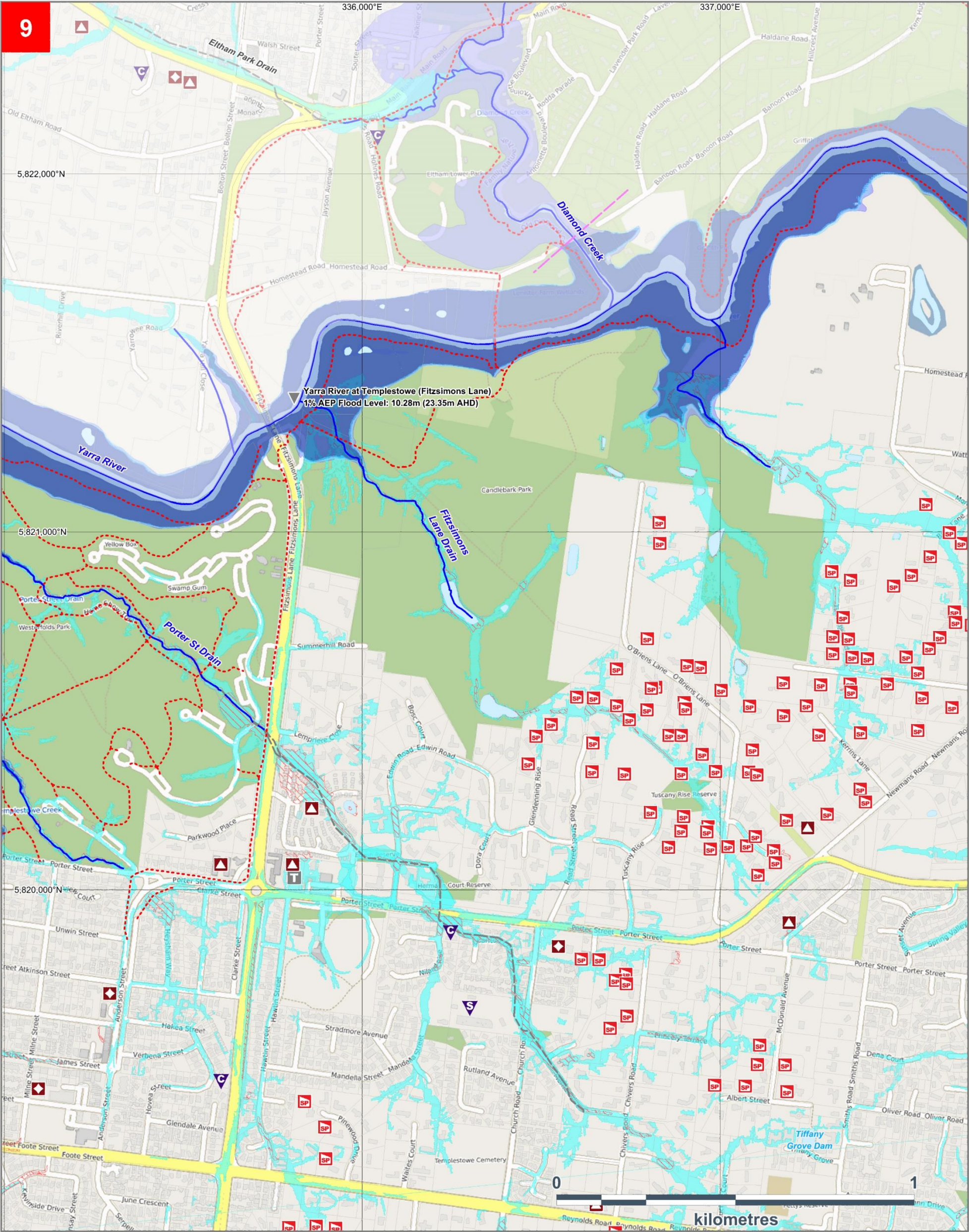
- | | | |
|--|---------------------------------|-------------------------|
| Building | Aged Care Facility | Ambulance Station |
| Waterbody | 1% AEP Over-Floor Flooding Risk | Hospital |
| 1% AEP Flood Hazard (Where area $\geq 180m^2$ and $D > 400mm$, $V > 1.5m/s$ or $VxD > 0.35$) | Telephone Exchange | Municipal Depot |
| 1% AEP Flash Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD \geq 0.008$) | Stream Level Gauge | Caravan Park |
| 1% AEP Riverine Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD \geq 0.008$) | Rain Gauge | Fire Station |
| Melbourne Water Stormwater Drain | Power Terminal Station | State Emergency Service |
| Waterway | Sewer Emergency Relief Point | |
| Flood Model Extent | | |

- 1% AEP Yarra River Flood Depth**
- Greater than 60cm
 - Between 30cm and 60cm
 - Between 10cm and 30cm



Melbourne Water

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Flood modelling completed by S.P. Goh & Associates, June 2016. Map Produced by VICSES July 2020.

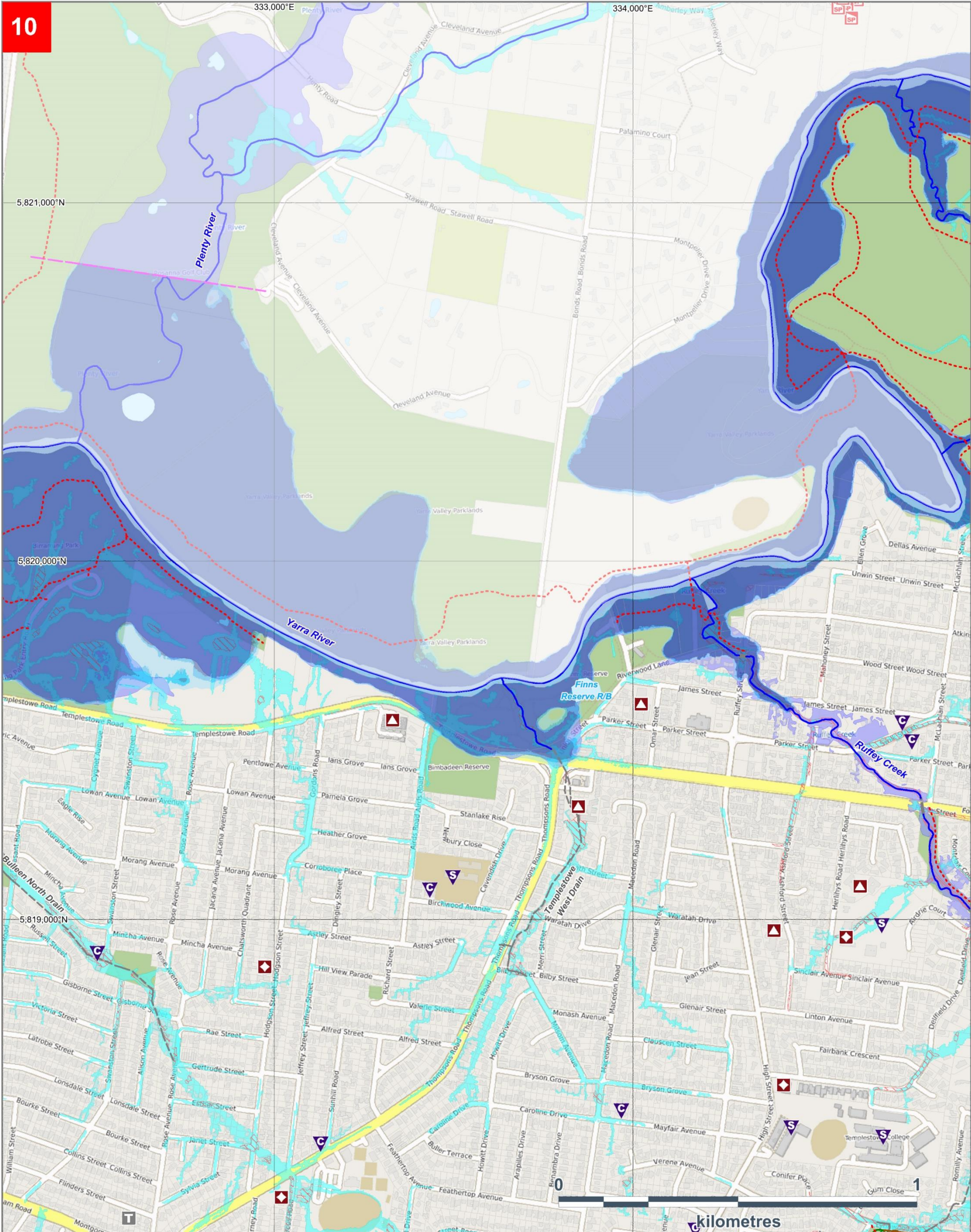
Basemap © OpenStreetMap contributors

CITY OF MANNINGHAM
1% AEP (100yr ARI) Flooding
9. Yarra River (Templestowe)

Building	Waterway	Telephone Exchange
Waterbody	Melbourne Water Stormwater Drain	Unsewered Property
1% AEP Flash Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD \geq 0.008$)	Bicycle / Walking Trail	Kindergarten / Child Care
1% AEP Riverine Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD \geq 0.008$)	Flood Model Extent	School / College
1% AEP Flood Hazard (Where area $\geq 180m^2$ and $D > 400mm$, $V > 1.5m/s$ or $VXD > 0.35$)	Aged Care Facility	1% AEP Riverine Flood Depth
Place of Worship	Stream Level Gauge & 1% AEP Flood Level	Greater than 60cm
		Between 30cm and 60cm
		Between 10cm and 30cm



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Flood modelling completed by S.P. Goh & Associates, June 2016. Map Produced by VICSES July 2020.

Basemap © OpenStreetMap contributors

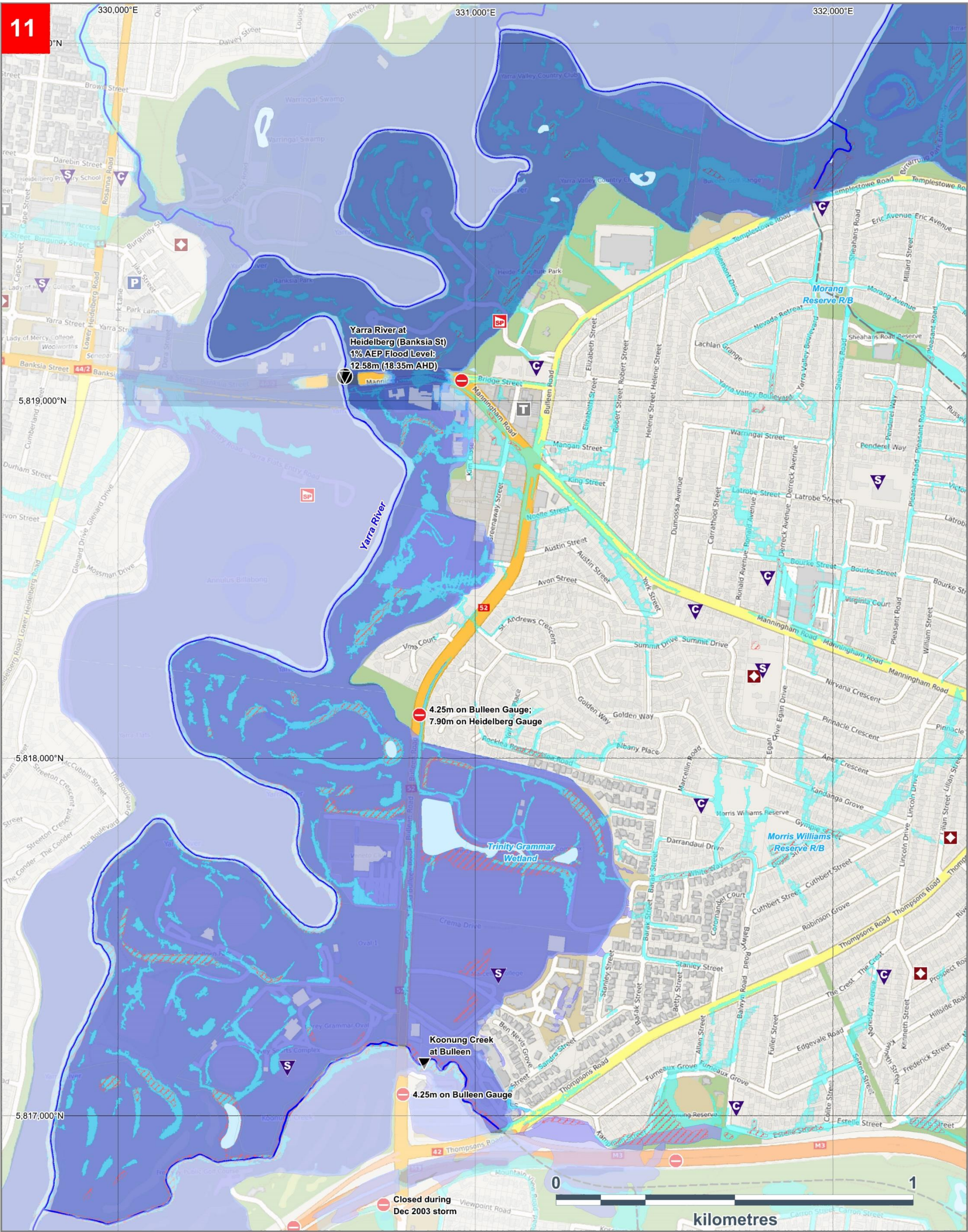
CITY OF MANNINGHAM
1% AEP (100yr ARI) Flooding
10. Yarra River (Templestowe Lower)

- | | | |
|--|----------------------------------|---------------------------------------|
| Building | Melbourne Water Retarding Basin | Embankment |
| Waterbody | Aged Care Facility | Bicycle / Walking Trail |
| 1% AEP Flood Hazard (Where area $\geq 180m^2$ and $D > 400mm$, $V > 1.5m/s$ or $VxD > 0.35$) | Telephone Exchange | Flood Model Extent |
| 1% AEP Flash Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD \geq 0.008$) | Place of Worship | 1% AEP Yarra River Flood Depth |
| 1% AEP Riverine Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD \geq 0.008$) | Kindergarten / Child Care | Greater than 60cm |
| | School / College | Between 30cm and 60cm |
| | Waterway | Between 10cm and 30cm |
| | Melbourne Water Stormwater Drain | |



SES VICTORIA **Melbourne Water**

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Flood modelling completed by S.P. Goh & Associates, June 2016. Map Produced by VICSES July 2020.

Basemap © OpenStreetMap contributors

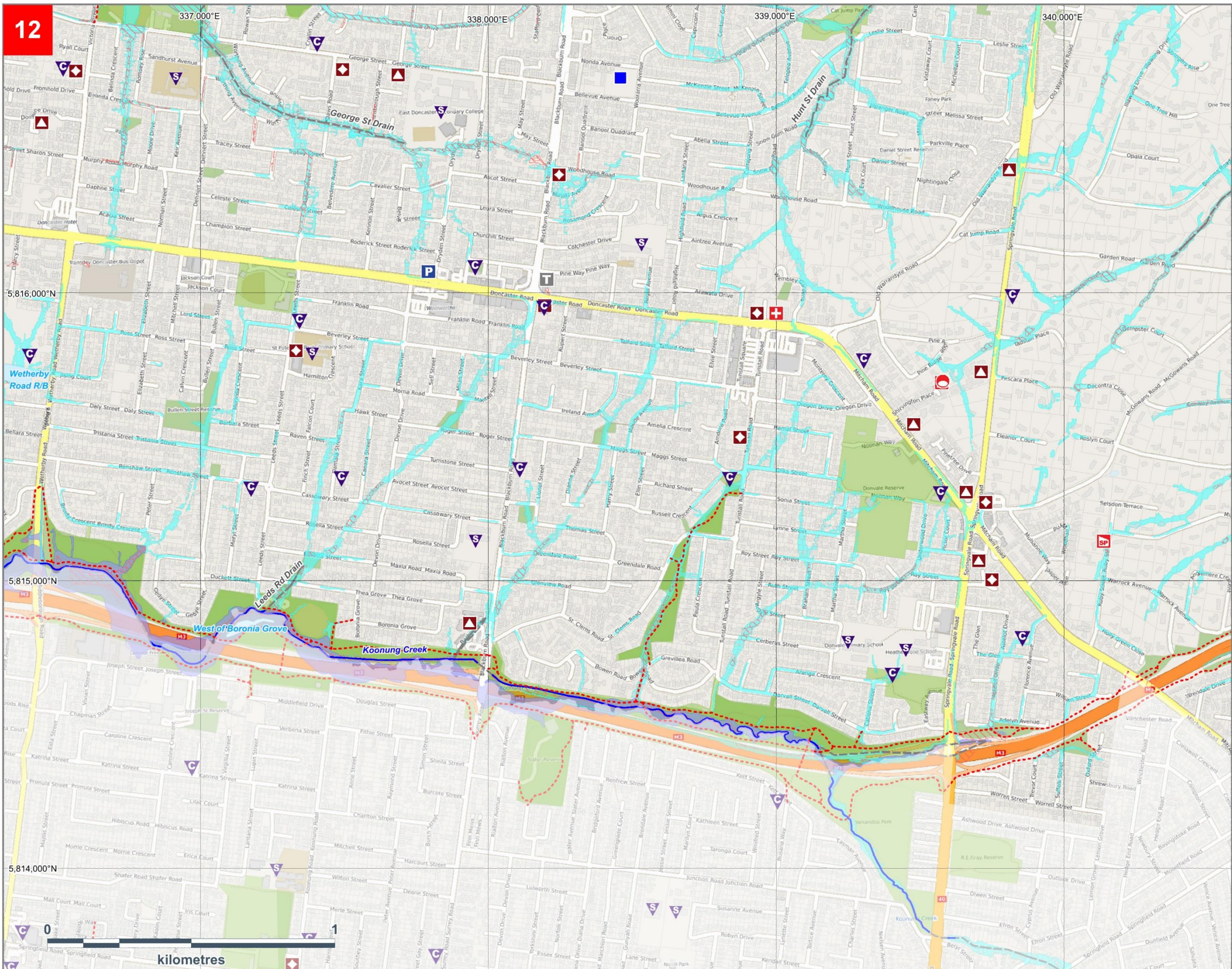
CITY OF MANNINGHAM
1% AEP (100yr ARI) Flooding
11. Yarra River (Bulleen)

- | | | |
|--|---|---------------------------------------|
| Building | Aged Care Facility | Police Station |
| Waterbody | Sewer Emergency Relief Point | Kindergarten / Child Care |
| 1% AEP Flood Hazard (Where area >=180m2 and D>400mm, V>1.5m/s or VxD >0.35) | Telephone Exchange | School / College |
| 1% AEP Flash Flood Extent (Where area >=180m2 and depth >100mm or VxD >0.008) | Place of Worship | Road Closure against Gauge |
| 1% AEP Riverine Flood Extent (Where area >=180m2 and depth >100mm or VxD >0.008) | Sewer Pumping Station | 1% AEP Yarra River Flood Depth |
| Waterway | Stream Level Gauge & 1% AEP Flood Level | Greater than 60cm |
| Melbourne Water Stormwater Drain | Rain Gauge | Between 30cm and 60cm |
| | | Between 10cm and 30cm |



SES VICTORIA **Melbourne Water**

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- Building
- Waterbody
- 1% AEP Flood Hazard
(Where area $\geq 180m^2$ and $D > 400mm$, $V > 1.5m/s$ or $VxD > 0.35$)
- 1% AEP Flash Flood Extent
(Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD \geq 0.008$)
- 1% AEP Riverine Flood Extent
(Where area $\geq 180m^2$ and depth $> 100mm$ or $VxD \geq 0.008$)
- Bicycle / Walking Trail
- Melbourne Water Stormwater Drain
- Waterway
- Place of Worship
- Unsewered Property
- Kindergarten / Child Care
- School / College
- Sewer Emergency Relief Point
- Telephone Exchange
- Aged Care Facility
- Police Station
- Hospital
- Retail Water Storage



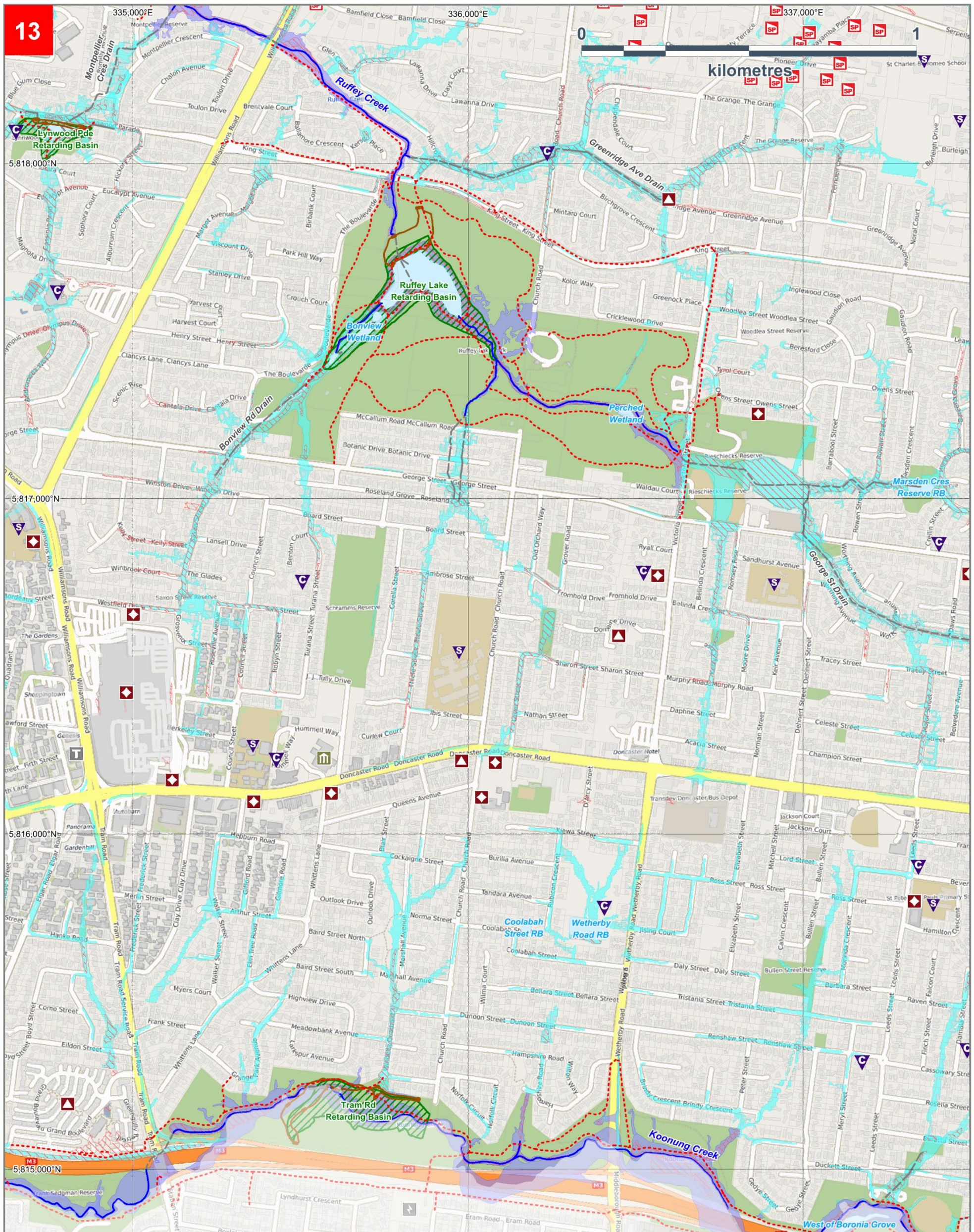
CITY OF MANNINGHAM
1% AEP (100yr ARI) Flooding
12. Koonung Creek (Doncaster East)



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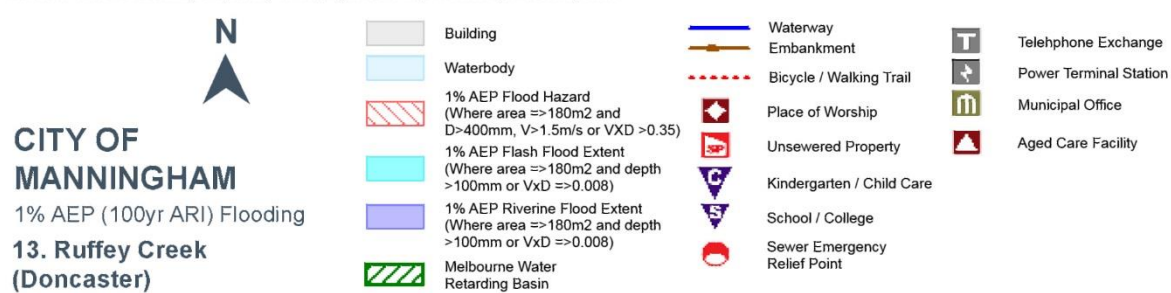
Koonung Creek flood modelling completed by Cardno, August 2015. Map Produced by VICSES July 2020.

Basemap © OpenStreetMap contributors



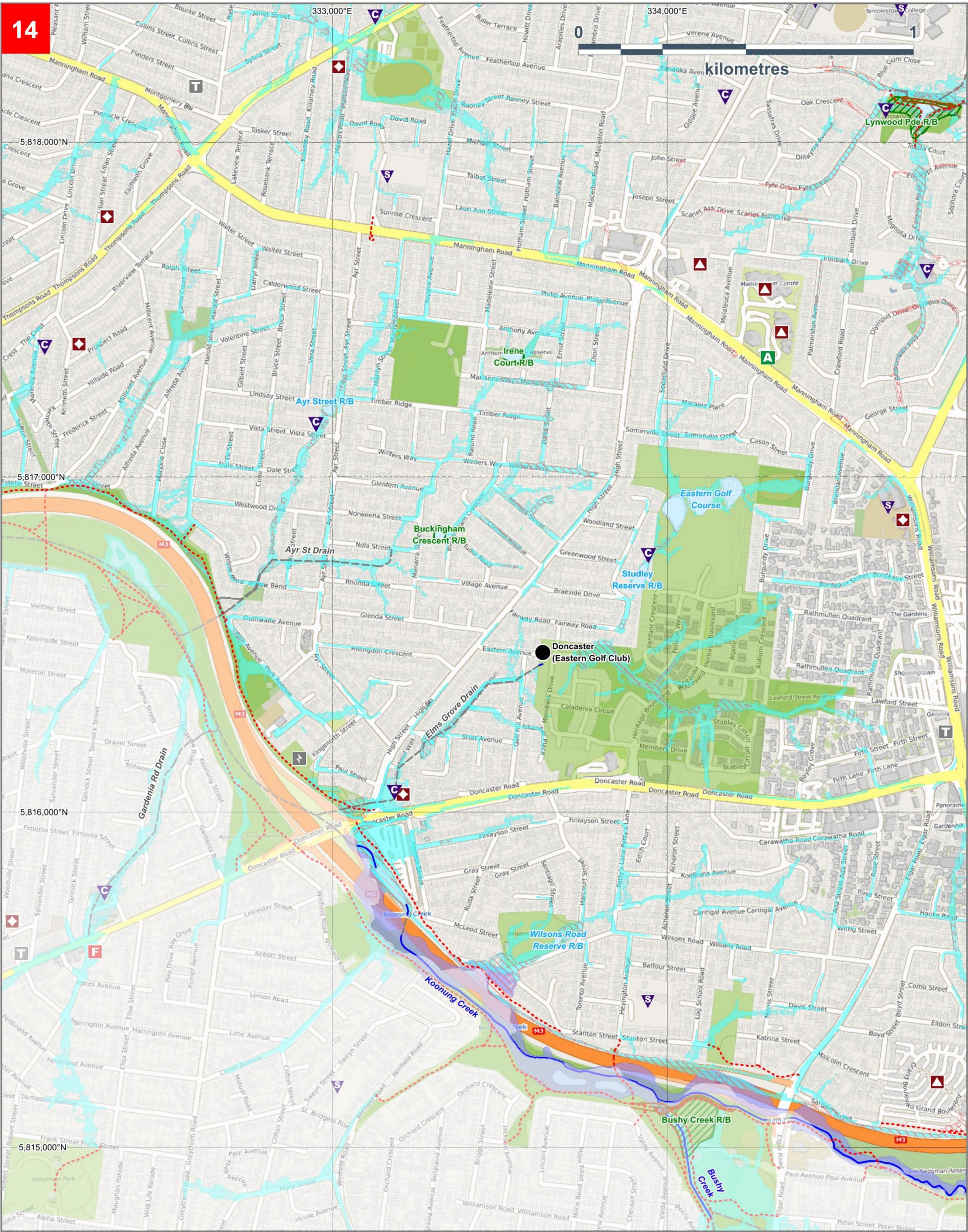
Andersone Creek flood modelling completed by Cardno, August 2015. Map Produced by VICSES July 2020.

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Koonung Creek flood modelling completed by Cardno, August 2015. Map Produced by VICSES July 2020.

Basemap © OpenStreetMap contributors

CITY OF MANNINGHAM
1% AEP (100yr ARI) Flooding
14. Koonung Creek (Doncaster)

Legend

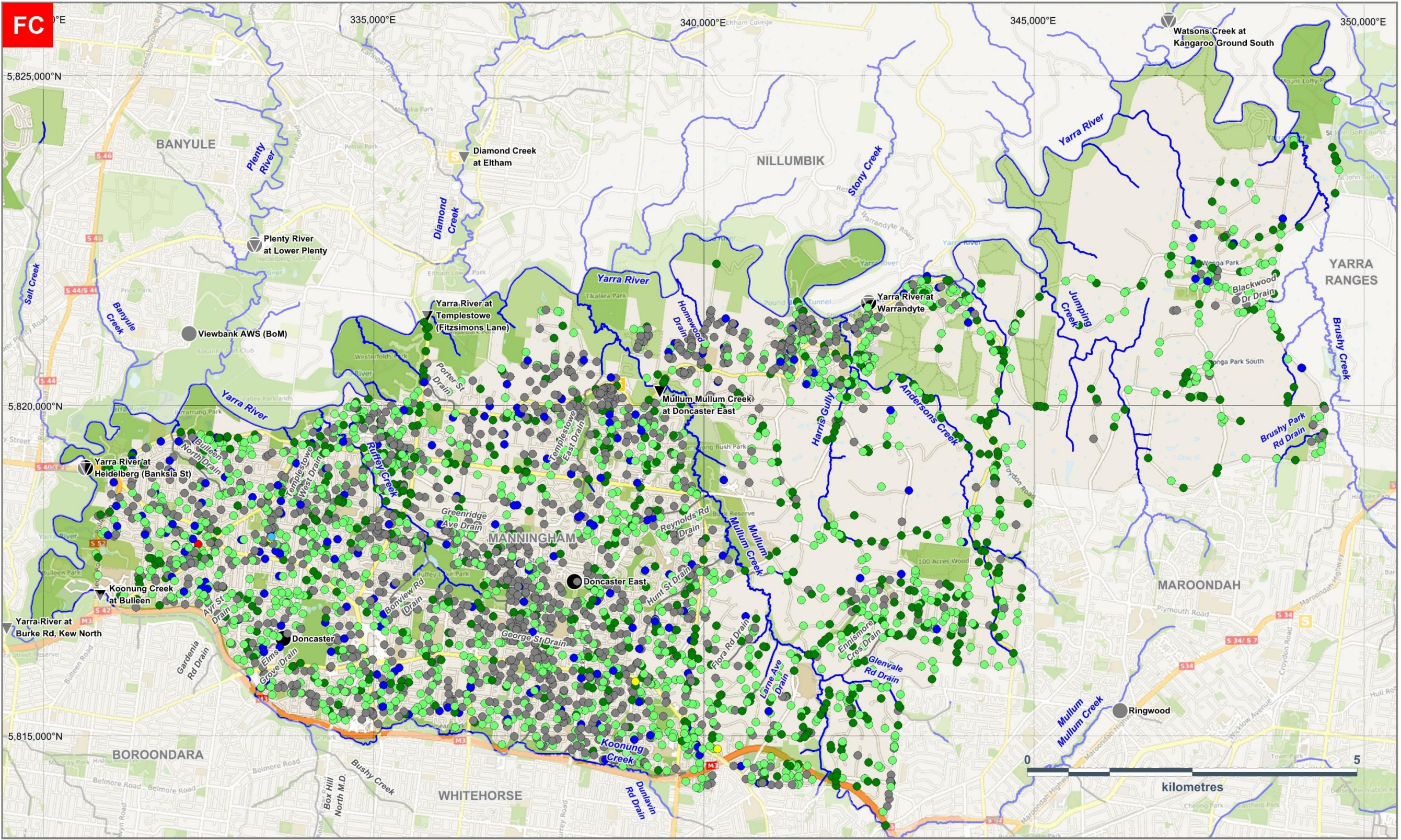
- Building
- Waterbody / Council RB
- 1% AEP Flood Hazard (Where area $\geq 180m^2$ and $D > 400mm$, $V > 1.5m/s$ or $V_{XD} > 0.35$)
- 1% AEP Flash Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $V_{XD} > 0.008$)
- 1% AEP Riverine Flood Extent (Where area $\geq 180m^2$ and depth $> 100mm$ or $V_{XD} > 0.008$)
- Melbourne Water Retarding Basin
- Waterway
- Melbourne Water Stormwater Drain
- Embankment
- Bicycle / Walking Trail
- Place of Worship
- Kindergarten / Child Care
- School / College
- Ambulance Station
- Telephone Exch
- Power Terminal Sta
- Fire Station
- Rain Gauge
- Aged Care Facility



SES VICTORIA **Melbourne Water**

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Severe Weather Maps (Sourced VICSES Requests for Assistance)



Map Produced by VICSES March 2020.

CITY OF MANNINGHAM
Version 4: March 2020

FC - Severe Weather Requests for Assistance
by Type (July 2009 - January 2020)

- Waterbody
- Melbourne Water Stormwater Drain
- Waterway
- Stream Level Gauge
- Rain Gauge
- State Emergency Service

- Severe Weather RFAs (Storm or Flood)**
- Building Damage (1,646)
 - Flooding (263)
 - Loose Debris / Objects / Fence (3)
 - Rescue Persons Trapped (5)
 - Sandbag Request (3)
 - Tree Down (1,646)
 - Tree Down Traffic Hazard (911)

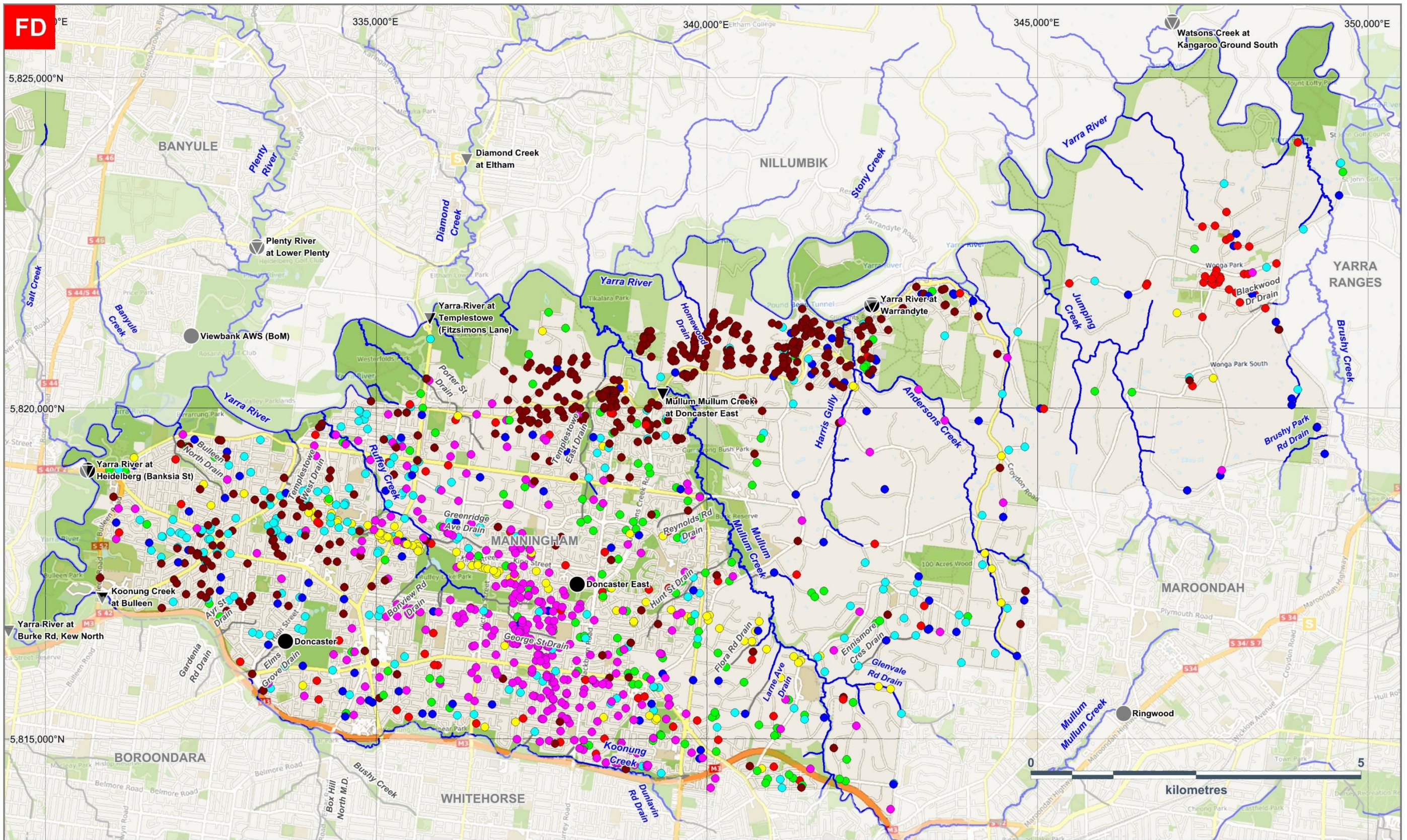


Base map © OpenStreetMap contributors

SES VICTORIA
State Government

Melbourne Water

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Map Produced by VICSES March 2020.

CITY OF MANNINGHAM
Version 4: March 2020
**FD - Severe Weather Requests for Assistance
by Date (July 2009 - January 2020)**

- Waterbody
- Melbourne Water Stormwater Drain
- Waterway
- ▼ Stream Level Gauge
- Rain Gauge
- S State Emergency Service

Severe Weather RFAs (Storm or Flood)
(By Month > 100 Requests Received)

● August 2009	(113)
● June 2010	(137)
● September 2012	(153)
● August 2013	(244)
● October 2016	(124)
● December 2017	(382)
● January 2020	(500)



Base map © OpenStreetMap contributors

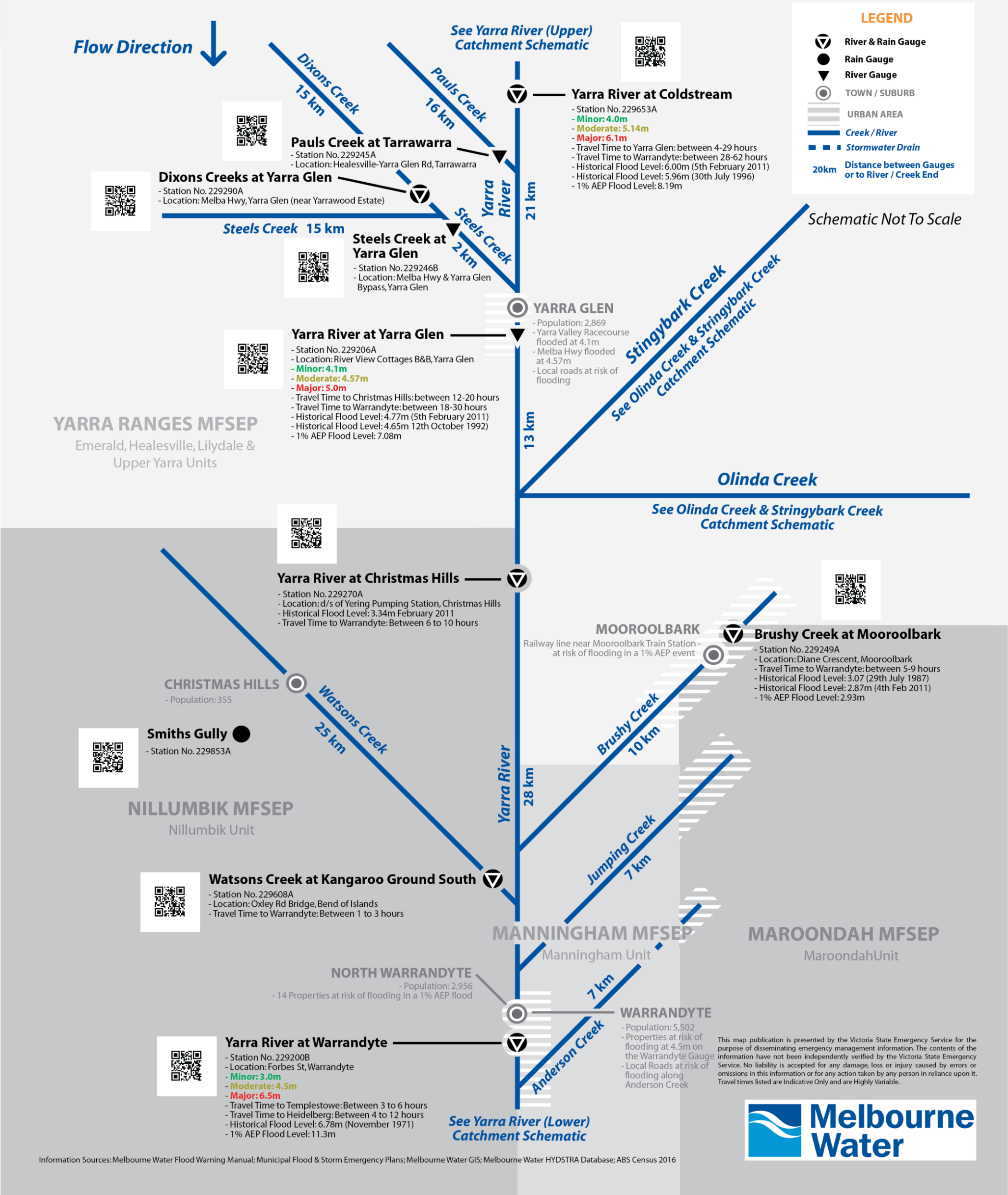
SSES VICTORIA Melbourne Water

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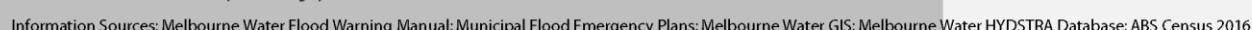
Yarra River (Middle) Catchment Schematic

Version 5 - April 2020





Flow Direction





Koonung, Ruffey & Mullum Mullum Creeks Catchment Schematic

Version 4 - April 2020



Yarra River at Heidelberg

See Yarra River (Lower)
Catchment Schematic

Yarra River

BULLEEN

- 5 properties at risk of flooding a 1% AEP event
- Trinity Grammar School Sporting Complex at risk of flooding at 5.6m on the Templestowe Gauge
- Bulleen Rd at risk of flooding at 7.9m on Heidelberg Gauge or 4.25 on the Bulleen Gauge
- Eastern Freeway flooded at Bulleen Rd underpass in 3rd Dec 2003 event

Koonung Creek at Bulleen

- Station No. 229229A
- Location: Bulleen Swim Centre, Bulleen Road, Bulleen
- Historical Flood Level: 4.63m December 1999
- Historical Flood Level: 4.53m April 2011
- Historical Flood Level: 4.51m December 2003
- Historical Flood Level: 4.49m February 2005



Doncaster

- Station No. 586010
- Location: Eastern Golf Club, Doncaster



Doncaster East

- Station No. 586037
- Location: Zerbes Reserve, Doncaster East



Yarra River at Templestowe

TEMPLESTOWE

- 28 properties at risk of flooding in a 1% AEP event
- Local Roads at risk of flooding in a 1% AEP event



Mullum Mullum Creek at Doncaster East

- Station No. 229648A
- Location: Heidelberg-Warrandyte Rd, Doncaster East
- Historical Flood Level: 3.75m February 2011
- Historical Flood Level: 3.66m September 1984
- Historical Flood Level: 3.51m December 2003

BOROONDARA MFEP

Whitehorse Unit

BOX HILL NORTH

- 118 properties at risk of flooding over-floor in a 1% AEP event
- Elgar Road, Station Street and local roads at risk of flooding in a 1% AEP event

BLACKBURN NORTH

WHITEHORSE MFEP

Whitehorse Unit

MANNINGHAM MFEP

Manningham Unit

Flow Direction



LEGEND

River & Rain Gauge

Rain Gauge

River Gauge

TOWN / SUBURB

URBAN AREA

Creek / River

Stormwater Drain

20km Distance between Gauges or to River / Creek End



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

Schematic Not To Scale



Ringwood

- Station No. 586065
- Location: Burnt Bridge - Tennis Club, Ringwood

MAROONDHA MFEP

Maroondah Unit

RINGWOOD

- Maroondah Hwy at risk of flooding at three separate locations

APPENDIX G - SEVERE WEATHER STORM EVENTS

Overview

Storm events in the Manningham Municipality may be subject to include wind storms, dust storms, hailstorms, and thunderstorms (including lightning activity). Flash flooding events are a relatively common occurrence with the greatest inconvenience being short term delays on roadways. Greater property damage may occur when flash flooding occurs in conjunction with damaging winds. In the Manningham municipality is susceptible to severe weather events because of a combination of its undulating terrain, high number of mature trees located within the municipality, substantial parkland areas.

Severe storm activity could result in injuries and an increase in road accidents. Damaging wind events will tend to lead to trees down, with damage to the built and natural environment. Obstructions across roads could disrupt services, affect community functioning and have great potential for road traffic delays. Financial loss and temporary displacement of Manningham residents may occur as a result of property damage.

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

VICSES Requests for Assistance

The Victoria State Emergency Service records requests for assistance made by the public during severe weather events. Table G1 below is a breakdown of requests by suburb and damage type during the period July 2009 and January 2020.

VICSES Request for Assistance (June 2010 – January 2020)					
Suburb	Building Damage	Flooding	Tree Down	Tree Down Traffic Hazard	Other *
Bulleen	93	31	105	38	4
Doncaster	228	34	211	57	0
Doncaster East	433	40	233	91	2
Donvale	143	27	247	142	1
Park Orchards	32	6	122	109	0
Ringwood North	3	1	8	21	0
Templestowe	325	50	211	141	0
Templestowe Lower	161	33	165	56	4
Warrandyte	191	28	214	137	0
Warrandyte South	5	0	17	28	0
Wonga Park	29	12	109	83	0

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

* Fence Down, Loose Debris / Objects, Rescue Persons Trapped, Sandbag Request

Table G2 is a breakdown of requests for assistance by date (month) and damage type.

VICSES Request for Assistance (July 2009 – January 2020)					
Date	Building Damage	Flooding	Tree Down	Tree Down Traffic Hazard	Other*
July 2009	1	0	5	1	0
August 2009	33	0	63	17	0
September 2009	1	2	7	10	0
October 2009	2	0	4	0	0
November 2009	30	5	30	7	0
December 2009	5	1	4	2	0
January 2010	4	1	5	1	0
February 2010	2	1	12	0	0
March 2010	23	4	5	3	0
April 2010	1	0	2	2	0
May 2010	1	0	2	0	0
June 2010	84	0	41	12	0
July 2010	7	0	5	2	0
August 2010	4	0	25	10	0
September 2010	6	0	17	13	0
October 2010	16	10	10	13	0
November 2010	10	0	12	0	0
December 2010	19	12	28	15	0
January 2011	14	11	11	2	0
February 2011	15	24	28	18	1
March 2011	1	1	1	3	0
April 2011	6	7	7	7	0
May 2011	2	0	2	6	0
June 2011	4	0	8	6	0
July 2011	1	0	2	3	0
August 2011	0	0	0	0	0
September 2011	5	0	7	4	0
October 2011	3	0	1	9	0
November 2011	6	9	16	11	0
December 2011	30	29	10	4	1
January 2012	8	0	16	6	0
February 2012	11	3	30	11	0
March 2012	5	1	7	3	0
April 2012	8	2	12	7	0
May 2012	5	0	0	3	0
June 2012	7	0	9	8	0
July 2012	2	0	1	4	0
August 2012	6	0	8	5	0
September 2012	49	0	81	23	0
October 2012	3	0	4	2	0
November 2012	1	0	2	2	0
December 2012	2	0	9	4	0
January 2013	2	0	6	0	0
February 2013	2	1	4	7	0
March 2013	4	0	14	3	0
April 2013	0	0	2	4	0
May 2013	1	1	1	4	0
June 2013	6	4	2	5	0
July 2013	4	0	12	8	0
August 2013	69	0	113	62	0
September 2013	18	0	31	17	0
October 2013	19	0	34	16	0
November 2013	1	0	6	3	0
December 2013	2	1	9	2	0
January 2014	5	0	13	11	0

VICSES Request for Assistance (July 2009 – January 2020)					
Date	Building Damage	Flooding	Tree Down	Tree Down Traffic Hazard	Other*
February 2014	2	0	8	2	0
March 2014	0	0	3	4	0
April 2014	0	0	5	3	0
May 2014	0	0	3	3	0
June 2014	16	0	36	11	0
July 2014	4	0	16	12	0
August 2014	5	0	3	4	0
September 2014	40	3	28	13	0
October 2014	2	0	7	0	0
November 2014	2	1	11	1	0
December 2014	4	1	14	10	0
January 2015	6	0	17	3	0
February 2015	3	1	2	5	0
March 2015	2	0	8	1	0
April 2015	2	1	4	2	0
May 2015	3	0	2	1	0
June 2015	1	0	3	2	0
July 2015	10	0	6	8	0
August 2015	1	0	3	1	0
September 2015	1	0	2	2	0
October 2015	5	0	4	5	0
November 2015	7	0	43	18	0
December 2015	8	0	12	11	2
January 2016	10	0	18	6	0
February 2016	2	0	2	7	0
March 2016	12	0	13	7	0
April 2016	1	0	2	3	0
May 2016	12	1	19	14	0
June 2016	4	0	6	7	0
July 2016	6	1	17	12	0
August 2016	2	0	4	4	0
September 2016	0	2	4	6	0
October 2016	28	1	66	29	0
November 2016	4	0	7	9	0
December 2016	27	11	16	4	0
January 2017	2	0	9	6	0
February 2017	2	1	6	9	0
March 2017	5	0	8	3	0
April 2017	5	0	7	6	0
May 2017	0	0	1	1	0
June 2017	0	0	1	1	0
July 2017	1	0	1	4	0
August 2017	2	0	1	6	0
September 2017	9	1	7	6	0
October 2017	2	0	2	0	0
November 2017	2	0	4	2	0
December 2017	333	23	14	12	0
January 2018	6	0	8	8	0
February 2018	8	0	14	10	0
March 2018	5	0	21	8	0
April 2018	11	0	13	11	0
May 2018	6	0	3	4	0
June 2018	9	3	7	3	0
July 2018	5	0	9	9	0
August 2018	2	0	6	6	0
September 2018	0	0	4	1	0
October 2018	2	0	1	3	0

VICSES Request for Assistance (July 2009 – January 2020)					
Date	Building Damage	Flooding	Tree Down	Tree Down Traffic Hazard	Other*
November 2018	9	5	18	13	1
December 2018	13	17	10	7	0
January 2019	8	2	10	11	0
February 2019	2	2	5	6	0
March 2019	5	2	6	4	0
April 2019	2	0	4	1	0
May 2019	5	0	4	2	0
June 2019	2	1	4	3	0
July 2019	14	25	25	1	0
August 2019	6	1	12	5	0
September 2019	4	0	4	8	0
October 2019	2	1	12	3	0
November 2019	21	2	48	27	1
December 2019	2	0	24	13	0
January 2020	324	50	94	28	4

Table G2 – Breakdown of severe weather RFAs received by VICSES Maroondah Unit by month

* Fence Down, Loose Debris / Objects, Rescue Persons Trapped, Sandbag Request